

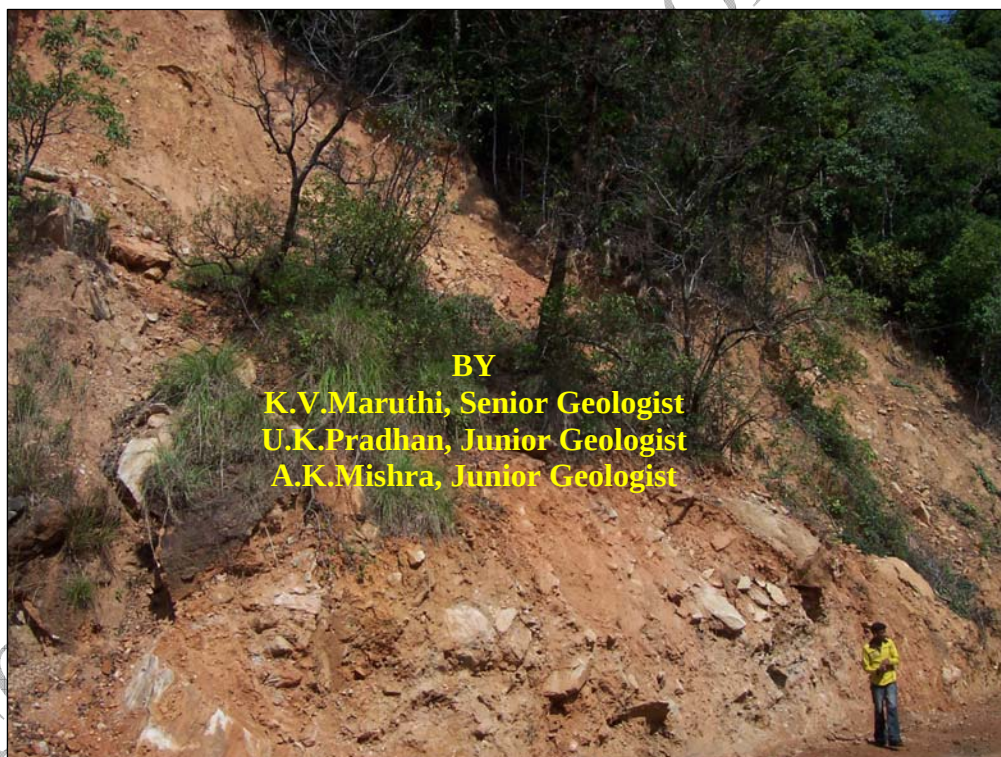
**GOVERNMENT OF INDIA
GEOLOGICAL SURVEY OF INDIA**



**REPORT ON LANDSLIDE INVENTORY ALONG NH & SH
OF GHAT ROADS IN CHIKMAGALUR, COORG AND
SHIMOGA DISTRICTS, KARNATAKA**

(Progress Report for the Field Season 2008-09)

Code No.: EG/SR/KG/2008/043



BY

K.V.Maruthi, Senior Geologist

U.K.Pradhan, Junior Geologist

A.K.Mishra, Junior Geologist

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The Director General, Geological Survey of India**

Project: ENGINEERING GEOLOGY

State Unit: Karnataka and Goa

BANGALORE

2010

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CONTENTS

		Page no
	ABSTRACT	
I	Introduction	1
	I. 1. Location	1
	I. 2. Present work	1
	I. 3. Methodology for landslide inventory	2
	I. 4. Constraints & limitations	2
	I. 5. Acknowledgements	3
II	Regional Geology	3
III	Description of individual slide	
	III. 1. Landslides recorded along SH-50 and NH-206 between Jog falls-Honnar road section.	4
	III. 2. Landslides recorded along SH-64 between Kotighera – Charmudi road section (Charmudi ghat).	41
	III. 3. Landslides recorded along SH-66 between Kotighera-Kalasa road section.	86
	III. 4. Landslides recorded along SH-64 between Chikmagalur-Mudigere road section	110
	III. 5. Landslides along SH-88 Madikere -Suliya road section.	114
	III. 6. Landslides along SH-88 Madikere -Siddapur road section.	138
	III. 7. Landslides along SH-27 Madikere -Virajpet road section.	153
	III. 8. Landslides along NH-48 Sakleshpur road section (Shiradi ghat).	164
IV	Characteristics of Landslides studied in 2008-09	218
	IV. 1. Type of slides.	218
	IV. 2. Dimensions of slides	220
	IV. 3. Bed rock Geology	224
	IV. 4. Depth/length(D/L) ratio	224
	IV. 5. History of landslides	224
	IV. 6. Cut slope heights	225
V	Summary and conclusions	226
VI	Recommendations	229
	References	230
	Appendix –I: Landslide Inventory Format	
	Photographs	

Annexure-I Landslide inventory table	
PLATES	
Plate-1: Location map of Karnataka state in India.	
Plate 2: Index map showing landslide incidences along NH and SH of ghat roads in Karnataka during 2008-09	
Plate 3: Landslide inventory map along NH and SH of ghat roads of Karnataka, toposheet no 48 J/15 and J/16.	
Plate 4: Landslide inventory map along NH and SH of ghat roads of Karnataka, toposheet no 48 J/11 and J/12.	
Plate 5: Landslide inventory map along NH and SH of ghat roads of Karnataka, toposheet no 48 J/7.	
Plate 6: Landslide inventory map along NH and SH of ghat roads of Karnataka, toposheet no 48 O/12.	
Plate 7: Landslide inventory map along NH and SH of ghat roads of Karnataka, toposheet no 48 O/8.	
Plate 8: Landslide inventory map along NH and SH of ghat roads of Karnataka toposheet no 48 O/12.	
Plate 9: Landslide inventory map along NH and SH of ghat roads of Karnataka, toposheet no 48 P/11.	
Plate 10: Landslide inventory map along NH and SH of ghat roads of Karnataka, toposheet no 48 P/6.	
Plate 11: Landslide inventory map along NH and SH of ghat roads of Karnataka, toposheet no 48 P/15.	
Plate 12: Landslide inventory map along NH and SH of ghat roads of Karnataka, toposheet no 48 P/9.	
Plate 13: Landslide inventory map along NH and SH of ghat roads of Karnataka, toposheet no 48 P/13.	

कर्नाटक राज्य के चिकमगलूर, कूर्ग एवं शिमोगा के राष्ट्रीय मार्ग एवं राज्य मार्ग के घाट मार्गों में भूस्खलन पर प्रतिवेदन

(क्षेत्र सत्र 2008-09 का प्रगति प्रतिवेदन)

कूट सं. : ई.जी./एस.आर./के.जी./2008/043

द्वारा

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सारांश

भूस्खलन आपद एवं जोखिम न्यूनीकरण पर एन.डी.एम.ए. के प्रस्तावित कार्य योजना के कार्यान्वयन के लिए कर्नाटक राज्य के भागों में पश्चिमी घाट में भविष्य के भूस्खलन अनुक्षेत्र वर्गीकरण, प्रतिरूप एवं भूस्खलन के लिए भूस्खलन डाटाबेस का कार्य आरंभ किया गया. डाटाबेस के नवीकरण के लिए घाट अनुभागों में एन.एच. एवं एस.एच. में मिशन अभियन्तकी भूविज्ञान एवं भूतकनीकी अन्वेषण कार्यक्रम: भूस्खलन आपद मूल्यांकन के तहत कार्य आरंभ किया गया. भूस्खलन का कार्यक्रम शिमोगा के पश्चिमी घाट में घाट सडकों, उत्तर कन्नडा, कूर्ग, हस्सन, दक्षिण कन्नडा एवं चिकमगलूर जिलों में भूआकृति सं.48 O/8.12; P/6.9.11.13.15; J/7.9.11.12.16 में किया गया.

क्षेत्र सत्र 2008-09 के दौरान निम्नलिखित घाट अनुभागों, राष्ट्रीय मार्गों एवं राज्य मार्गों में कार्य किया गया:

- अ) जोग जलप्रपात-होन्नवार सडक अनुभाग के बीच में एस.एच-50 एवं एन.एच.-206 में रिकार्ड किए गए भूस्खलन: 37 स्खलन.
- ब) कोटिगेरे-चारमुडी सडक अनुभाग (चारमुडी घाट) के बीच राज्य मार्ग-64 में रिकार्ड किए गए भूस्खलन: 45 स्खलन
- स) कोटिगेरे-कलसा सडक अनुभाग के बीच राज्य मार्ग-66 में रिकार्ड किए गए भूस्खलन:24 स्खलन
- ड) चिकमगलूर-मुडिगेरे सडक अनुभाग के बीच एस.एच-64 में रिकार्ड किए गए भूस्खलन:25 स्खलन
- ई) मडिकेरी-सुल्लिया सडक अनुभाग में एस.एच.-88 में रिकार्ड किए गए भूस्खलन: 24 स्खलन
- फ) मडिकेरी-सिद्धापुर सडक अनुभाग में राज्य मार्ग -88 में भूस्खलन:15 स्खलन
- ज) मडिकेरी -विराजपेट सडक अनुभाग में राज्य मार्ग-27 में भूस्खलन:11 स्खलन
- ह) सकलेशपुर-गुण्डिया सडक अनुभाग में एन.एच-48 में भूस्खलन: 54 स्खलन

प्रस्तुत अध्ययन यह दिखाता है ज्यादातर स्खलन छिछले(<2 मी गहराई) मलबे स्खलन/अवसर्पण है. कट ढाल ऊँचाई सभी स्खलनों में मुख्य भूमिका अदा करती हैं, चूंकि क्रोढ से टो तक की स्खलन प्रक्रिया कट ढालों के बीच में सीमित है. यह देखा गया कि ज्यादातर स्खलन कट ढालों में सीमित हैं जिसकी ऊँचाई 10 मी से ज्यादा है एवं ढाल कोण 70 से 90 तक है. कट ढाल से तुलनात्मक उच्चावच सभी अनुभागों में निम्न से सामान्य है एवं 5 मी से 20 मी एवं उपरिभार की गहराई 0.5 से 10 मी तक है. पश्चिमी घाट में भूस्खलन का मुख्य कारण सडक के निर्माण के लिए चट्टान ढाल के टो कटिंग, मानवीय बस्ती का परिवर्द्धन, अपक्षीण चट्टान पिण्ड एवं निरंतर वर्षा है. पानी की बहुव्यापी उपस्थिति ठोस अपक्षीण के लिए अनुकूल है जिससे अपरूपण प्रतिरोध में काफी कमी आई है.

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ABSTRACT

In order to implement the proposed action plan 2006 of the National Disaster Management Authority (NDMA) on landslide hazard and risk mitigation and to prepare a landslide database for future landslide studies, landslide inventory of the Ghat section of Western Ghat in parts of Karnataka state has been taken up. To update the database, an item pertaining to the landslide inventory along National highway (NH) and State highway (SH) roads in ghat sections was taken up as an annual programme: Landslide Hazard Evaluation. The landslide inventory was carried out along the Ghat roads of the Western Ghat in Shimoga, Uttara Kannada, Coorg, Hassan, Dakshin Kannada and Chikmagalur districts covering parts of the toposheet nos.48 O/8&12;P/6 ,9,11,13&15;J/7,9,11,12 &16.

The following Ghat sections (NH and SH roads) were covered during the FS 2008-09.

- a) Landslides recorded along SH-50 and NH-206 between Jog falls-Honnar road section: 37 landslides,
- b) Landslides recorded along SH-64 between Kotighera-Charmudi road section (Charmudi ghat): 45 landslides
- c) Landslides recorded along SH-66 between Kotighera-Kalasa road section: 24 landslides.
- d) Landslides recorded along SH-64 between Chikmagalur-Mudigere road section: 4 landslides.
- e) Landslides along SH-88 Madikere -Suliya road section: 24 landslides
- f) Landslides along SH-88 Madikere -Siddapur road section: 15 landslides
- g) Landslides along SH-27 Madikere -Virajpet road section: 11 landslides
- h) Landslides along NH-48 Sakleshpur - Gundlupeta road section: 54 landslides

The present study reveals that most of the Landslides are shallow (<2m depth) debris slides/slumps. The cut slope height and angle plays a major role in all the slides as the sliding events from crown to toe are restricted between the cut slopes. It was observed that majority of the slides are restricted to the cut slopes having height more than 10m and slope angle varying from 70°- 90°. The relative relief from the cut slope is low to moderate at all the section and varies from 5m to 20m with depth of overburden varying from 0.5-10m. The main causes of landsliding in the Western Ghat are: toe cutting of hill slopes for the construction of roads, modification for human settlements, highly weathered rock mass and frequent rain. The ubiquitous presence of water is favorable for intense weathering of rocks causing drop in their shearing resistance. The heavy rainfall during monsoon triggers almost all Landslides.

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I. INTRODUCTION

Geological Survey of India, after its new status as the Nodal agency for Landslides in India declared during 2004, vigorously and swiftly started multipoint approach towards landslide hazard studies which included site specific Landslide studies, landslide hazard zonation along corridor and township and preparation of landslide inventory. As far as the State unit: Karnataka and Goa of Geological Survey of India is concerned, Landslide inventory was first carried out during FS 2007-08 in the states of Karnataka and Goa separately.

In order to implement the proposed action plan 2006 of the National Disaster Management Authority (NDMA) on landslide hazard and risk mitigation and to prepare a landslide database for future landslide studies, landslide inventory of the Ghat section of Western Ghat in parts of Karnataka state has been taken up. Engineering Geology division, State unit: Karnataka and Goa has been preparing systematically landslide database in Karnataka from 2007-08. To update the landslide database an item for landslide inventory along NH and SH in ghat sections was taken up under the annual programme EG/SR/KG/2008/044(item no. 053), Mission Engineering geology and Geotechnical investigation programme of Landslide Hazard Evaluation. The landslide inventory was carried out in parts of Ghat roads of Western Ghat in Shimoga, Uttara Kannada, Coorg, Hassan, Dakshin Kannada and Chikmagalur districts covering parts of toposheet nos. 48 O/8&12 ;P/6 ,9,11,13&15;J/7,9,11,12&16.

I.1 LOCATION

The Karnataka state is bounded by the Arabian sea to the west, Goa and Maharashtra to the northwest and north, respectively and Tamilnadu and Kerala state to the South (Plate-1). During the FS 2008-09, landslide inventory was carried out along the ghat roads in the Western Ghat belt. The Western Ghat belt which is known for its thickly vegetated forests and mineralisation is an irregularly elongated north-west trending belt. In Karnataka, the western ghat extends from Coorg district in the south to Uttara Kannada district in the north.

I.2. PRESENT WORK

During the FS 2009-10, landslide inventory was carried out along ghat roads in the Western Ghat belt. A total of 235 line km was covered and 214 incidences of landslides were studied. The following ghat sections (NH and SH) were covered during the FS 2008-09.

- A. Landslides recorded along SH-50 and NH-206 between Jog falls-Honnavar road section: 37 landslides (Plate-3, 4 and 5).

- B. Landslides recorded along SH-64 between Kotighera-Charmudi road section (Charmudi ghat): 45 landslides (Plate-6 and 7).
- C. Landslides recorded along SH-64 between Kotighera-Kalasa road section: 24 landslides (Plate 6 and 7).
- D. Landslides recorded along SH-64 between Chikmagalur-Mudigere road section: 4 landslides (Plate-8).
- E. Landslides along SH-88 Madikere -Suliya road section: 24 landslides (Plate-9 and 10).
- F. Landslides along SH-88 Madikere -Siddapur road section: 15 landslides (Plate-11).
- G. Landslides along SH-27 Madikere -Virajpet road section: 11 landslides (Plate-9).
- H. Landslides along NH-48 Sakleshpur - Gundiya road section: 54 landslides (Plate-12 and 13).

I.3. METHODOLOGY FOR LANDSLIDE INVENTORY

1. The historical landslide data were collected from district commissioner offices, PWDs and other district authorities of different districts.
2. Prioritization of the landslides for inventory was carried out i.e., the road sections where there is more number of landslide incidences are reported were taken on priority basis.
3. No data could be obtained from aerial photo/imageries as the landslides are small in size.
4. The most important characters and the important data to be collected were discerned as the data sheet provided by the CHQ was inadequate in many respects.
5. The check list table was prepared i.e., which road section to be carried out first, whether any data of reported landslides are available, consultation of aerial photos
6. Each slide site was studied and the measurements of various dimensions taken by using measuring tape.
7. During the field season 2007-08 (Mishra & Pradhan, 2010) the slides were given an unique ID number to distinguish them from each other. As for Karnataka state the slides were named as KA -01, KA-02 etc. In continuation of that this time the first slide was assigned as KA-65 with a view that each slide will have unique ID and can be stored in the landslide inventory database.
8. As many of the landslides don't have the data/lacks data on date of occurrence, the date on which landslide data collected takes preference over date of occurrence, any other morphometric or independent criteria
9. Photo graphs taken are more than what is provided in the report and the numbering is done as Slide no: KA01 (1), Slide no: KA01 (2)... etc and is stored in the landslide inventory database file in .jpeg format for future reference.
10. Data are entered in excel format according to check list and stored as in soft copy. The soft copy is provided to the Dy.DG, SU: Karnataka and Goa and the Director EG for safe custody till viable software is developed to keep the database for future reference.

I.4. CONSTRAINTS, LIMITATIONS & ASSUMPTIONS

1. Data of many landslides were incomplete and many places these can be inferred because of inaccessibility and hence some measurements like scarp depth/width was visually estimated.
2. Scarp radius was visually estimated
3. Angle of repose and angle of failure were taken at the present slope even though slided surface might be different

4. Vertical interval and horizontal components were calculated from slide length and failure angle.
5. The size of slides in Western Ghat is small hence were difficult to pick up from the satellite imageries or Aerial photo of 1:50,000scale
6. Recent Aerial photos and multi-temporal images are not available
7. Weathering depth at the slide site or nearby *nala* sections were studied.

NATURE AND QUANTUM OF WORK

Nature of Work	Total work envisaged	Work proposed for FS: 2008-09	Work completed
Aerial photo/ High resolution image interpretation and checking of incidences given by state governments and other incidences enroute.	200 L km	200 L km	235 L km (214 incidences)

I.5. ACKNOWLEDGEMENTS

The authors are sincerely thankful to Dy. D. G, SU: Karnataka and Goa for support and guidance. They are thankful to Shri. R. Panduranga, Director, Engineering Geology Division for his technical guidance and scrutiny of the report. Without the data provided by the district authorities, locating slides would have been a difficult task. In this regard authors are grateful to the authorities of Govt. of Karnataka, namely, District Commissioner, officials from PWD and officials from Revenue Department Govt. of Karnataka.

II. REGIONAL GEOLOGY

The western ghat belt preserves an ideal succession of Bababudan Group, which is exposed in the mountainous region of Kudremukh, Agumbe and Kodchadri. The Sargur Group is represented by a number of enclaves within gneisses and granites and the enclaves are quartzite, amphibolite, iron formation, garnetiferous mica schist, kyanite-staurolite schist, silimanite-garnet schist, calc-silicate rock and ultramafics. The Peninsular Gneiss of this region is a complex of migmatitic gneiss and granitoids and includes biotite gneiss, hornblende-biotite gneisses and hornblende gneiss. The peninsular gneiss is unconformably overlain by the Dharwar Supergroup (Bababudan Group). Bababudan Group is represented by four formations, namely (a) Walkunje Formation, (b) Kudremukh Formation, (c) Kodchadri Formation, and d) Narasiparvata Formation. The Walkunje Formation represents the lower arenaceous and argillaceous member of the Bababudan Group. Other rock members associated with it are quartzites, quartz-sericite schist, greywacke, arkose and quartz-biotite-chlorite schist. Kudremukh formation comprises amygdular metavolcanics, amphibolite, actinolite-chlorite schist, meta gabbro and ultramafics with interbeds of quartzites, quartz-sericite schist and chlorite schist. Kodchadri Formation comprises of Banded magnetite quartzite and quartz-chlorite-sericite schist. The Narasiparvata formation comprises of acid porphyries, chlorite quartz schist and iron stones. Numerous dykes, varying in texture from coarse to fine grained, are reported from various localities. The laterite cover is extensive in the area between the coastal plains and the intermediate range of hills below the Western Ghats (Awasthi, 1980; Davay, 1968; Gopal Reddy et.al 1984; Jagannathan et.al 1983)

III. DESCRIPTION OF INDIVIDUAL SLIDES

III. 1. LANDSLIDES RECORDED ALONG SH-50 AND NH-206 BETWEEN JOG FALLS- HONNAVAR ROAD SECTION

SLIDE NO: KA-65

LOCATION: The slide is located at latitude 14° 13' 43" N and longitude 74° 48' 53" E in Survey of India toposheet No 48 J / 16 along SH-50 between Jog falls-Sagar road section, Sagar Taluk, Shimoga district (300 m from KPCL guest house Jog falls towards NH-206).

SLIDE DESCRIPTION: The slide is classified as a debris slide. The debris consists of boulders & rock fragments of weathered granite and colluvial deposits. The slid area has an overburden thickness of nearly 3 m. The slope forming material consists of unconsolidated weathered granite. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head condition is stable where as the toe and crown conditions are very much unstable. At the toe part on the left flank highly weathered granite has been altered to clay particles. (Photo 1)

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 19.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 22.2 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 189.0 m ³ |
| e. Slope angle post failure | : 40° |
| f. Slope angle pre failure | : 70° |
| g. General slope gradient | : 20° |
| h. Run-out distance / up to | : 15.0 m /SH-50 |
| i. Cut slope Height | : 12.0 m |
| j. Direction of slide | : N20°W |

CAUSES: The cutting of the slope for the construction of the road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: SH -50 road was affected.

RECCOMENDATION: The crown part was found to be unstable. The geometrical modification of the slope by graded or bench to be provided with height 2m and bench width

1m at a slope angle of $<30^\circ$. Biogeotechnical measures of slope protection such as plantation of vetiver grass along the slope will reinforce this shallow slide.

SLIDE NO: KA-66

LOCATION: The slide is located at latitude $14^\circ 13' 45.8''$ N and longitude $74^\circ 48' 59.5''$ E in Survey of India toposheet No 48 J / 16 along SH-50 between Jog falls-Sagar road section, Sagar Taluk, Shimoga district (200m from slide no KA-65 towards NH-206).

SLIDE DESCRIPTION: The slide is classified as a debris slide. The debris consists of boulders & rock fragments of weathered granite and colluvial deposits. The slid area has an overburden of nearly 2.5 m. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head of landslide is stable where as the toe and crown conditions are very much unstable. Trees are uprooted by the slide. (Photo 2)

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.6 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 421.8 m^3 |
| e. Slope angle post failure | : 50° |
| f. Slope angle pre failure | : 70° |
| g. General slope gradient | : 20° |
| h. Run out distance /up to | : 10.4 m/SH50 |
| i. Cut slope Height | : 10.0 m |
| j. Direction of slide | : $N5^\circ W$ |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: SH -50 road was affected.

RECCOMENDATION: The crown part was found to be unstable. Removal of debris and trees fallen on the slided material. The geometrical modification of the slope by graded or bench to be provided with height 2m and bench width 1m at a slope angle of $<30^\circ$. Boigeotechnical measures of slope protection such as plantation of vetiver grass along the slope will reinforce this shallow slide.

SLIDE NO: KA-67

LOCATION: The slide is located at latitude $14^\circ 16' 14.8''$ N and longitude $74^\circ 45' 17.2''$ E in Survey of India toposheet No 48 J / 15 along NH-206 between Sagar-Honnavar road section, Siddapur Taluk, Uttar Kannada district (500 m from 51 km stone to Honnavar, 10 km from Gersoppa).

SLIDE DESCRIPTION: The slide is classified as a debris slide. The debris consists of boulders & rock fragments of weathered granite and colluvial deposits. The slided area has an overburden depth of nearly 3.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head condition is stable where as the toe and crown conditions are very much unstable. Trees are uprooted by the slide and are still lying on the debris. (Photo 3)

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 19.15 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 21.3 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 203.9 m^3 |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 15.0 m/NH-206 |
| i. Cut slope Height | : 15.0 m |
| j. Direction of slide | : $S20^\circ W$ |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: The crown part was found to be unstable. Easening of slopes, construction of retaining wall and removal of tree trunks from the crown position is recommended.

SLIDE NO: KA-68

LOCATION: The slide is located at latitude 14° 16' 14.5" N and longitude 74° 45' 16" E in Survey of India toposheet No 48 J / 15 along NH-206 between Sagar-Honnavar road section, Siddapur Taluk, Uttar Kannada district (50 mts from Slide No KA-67 towards Honnavar).

SLIDE DESCRIPTION: The slide is classified as a debris slide. The debris consists of boulders & rock fragments of weathered granite/ gneiss and colluvial deposits. The slided area has an overburden thickness of nearly 4.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head condition of the slided area is stable where as the toe and crown conditions are very much unstable. (Photo 4)

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 12.5m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 11.5m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0m |
| d. Volume of failed mass above the failure surface | : 71.9m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. Original slope angle | : 20° |

- h. Run out distance /up to : 11.0 m /NH-206
- i. Cut slope Height : 8.0 m
- j. Direction of slide : S40°E

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: The crown part was found to be unstable. Easening of slopes is recommended.

SLIDE NO: KA-69

LOCATION: The slide is located at latitude 14° 16' 11.9" N and longitude 74° 45' 13.6" E in Survey of India toposheet No 48 J / 15 along NH-206 between Sagar-Honnavar road section, Siddapur Taluk, Uttar Kannada district (75 m from Slide No KA-68 towards Honnavar).

SLIDE DESCRIPTION: The slide is classified as reactivated a debris slide. The debris consists of boulders & rock fragments of weathered granite/ gneiss and colluvial deposits. The slided area has an overburden thickness of nearly 4.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head part is stable where as the toe and crown parts are very much unstable. Towards NE the slide may prograde laterally. (Photo 5)

MORPHOLOGICAL PARAMETER OF SLIDE:

- a. Length of failed mass from crown to foot : 15.5 m
- b. Maximum width of failed mass from the left flank to the right flank boundary : 35.0 m
- c. Maximum depth of the failed mass from the surface of the slide to

the failure surface	: 2.5 m
d. Volume of failed mass above the failure surface	: 678.1 m ³
e. Slope angle post failure	: 65°
f. Slope angle pre failure	: 80°
g. General slope gradient	: 20°
h. Run out distance / up to	: 13.9 m/NH-206
i. Cut slope height	: 15.0 m
j. Direction of slide	: S25°E

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: The crown part was found to be unstable. Easening of slopes is recommended.

SLIDE NO: KA-70

LOCATION: The slide is located at latitude 14° 16' 39.2" N and longitude 74° 43' 11.4" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (2 km from start of Honnavar taluk boundary towards Honnavar towards Honnavar).

SLIDE DESCRIPTION: The slide is classified as a debris slide and it is new slide. The debris consists of boulders & rock fragments of weathered granite/ gneiss and colluvial deposits. The slided area has an overburden thickness of nearly 5.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head part is stable where as the toe and crown parts are very much unstable. (Photo 6)

MORPHOLOGICAL PARAMETER OF SLIDE:

- a. Length of failed mass from crown to foot : 14.5m
- b. Maximum width of failed mass from the left flank to the right flank boundary : 16.0m
- c. Maximum depth of the failed mass from the surface of the slide to the failure surface : 3.0 m
- d. Volume of failed mass above the failure surface : 348.0 m³
- e. Slope angle post failure : 70°
- f. Slope angle pre failure : 85°
- g. General slope gradient : 30°
- h. Run out distance / up to : 14.5 m/NH-206
- i. Cut slope height : 12.0 m
- j. Direction of slide : S80°W

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: The crown part was found to be unstable; trees on the crown part and on slopes are under pressure and are likely to fall. Easening of slopes and removal of trees are recommended.

SLIDE NO: KA-71

LOCATION: The slide is located at latitude 14° 16' 47.7" N and longitude 74° 43' 1.0" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (1 km from slide no KA-70 towards Honnavar).

SLIDE DESCRIPTION: The slide is classified as a debris slide and it is new slide. The debris consists of boulders & rock fragments of weathered granite/ gneiss and colluvial deposits. The slided area has an overburden thickness of nearly 5.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The local geology of the

studied area comprises of weathered granite/gneisses. The head part of the slide is stable where as the toe and crown parts are very much unstable. (Photo 7)

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 16.5m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 17.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3.0 m |
| d. Volume of failed mass above the failure surface | : 420.8 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 13.5 m/NH-206 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S20°W |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: The crown part was found to be unstable. The Slide may retrograde and there are chances of blocking the NH as huge trees are resting on crown part. Easening of slopes and removal of trees are recommended.

SLIDE NO: KA-72

LOCATION: The slide is located at latitude 14° 16' 45.7" N and longitude 74° 42' 55.9" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (1 km from slide no KA-70 towards Honnavar).

SLIDE DESCRIPTION: The slide is classified as a debris slide and it is new slide. The debris consists of boulders & rock fragments of weathered granite/ gneiss and colluvial deposits. The slided area has an overburden thickness of nearly 5.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head part of the slide is stable where as the toe and crown parts are very much unstable. Trees are uprooted due to slide and are still lying on the debris material. (Photo 8)

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 16.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 17.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 204.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 16.0 m/NH-206 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S40°W |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: The crown part was found to be unstable; a chance of blockage of NH road is visible as huge trees are resting on crown part. Care should be taken to remove the slided material. Easening of slopes is recommended.

SLIDE NO: KA-73

LOCATION: The slide is located at latitude 14° 16' 20.5" N and longitude 74° 41' 56.3" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (2 km from slide no KA-72 towards Honnavar).

SLIDE DESCRIPTION: The slide is classified as a debris slide and it is new slide. The debris consists of boulders & rock fragments of weathered granite/ gneiss and colluvial deposits. The slided area has an overburden thickness of nearly 4.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head part is stable where as the toe and crown parts are very much unstable. Trees are uprooted by the slide and are still lying on the debris material. (Photo 9)

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 23.4 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 19.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 444.6 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 22.5 m/NH-206 |
| i. Cut slope height | : 18.0 m |
| j. Direction of slide | : S80°W |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: The crown part was found to be unstable; chances of blockage of NH road are visible as huge trees are resting on the crown part. Care should be taken to remove the slided material. Easening of slopes is recommended.

SLIDE NO: KA-74

LOCATION: The slide is located at latitude 14° 15' 23.0" N and longitude 74° 40' 16.2" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttara Kannada district (1 km from Gersoppa circle towards Jog, near dam gate).

SLIDE DESCRIPTION: The slide is classified as a debris slide and it is new slide. The debris consists of boulders & rock fragments of weathered granite/ gneiss and colluvial deposits. The slid area has an overburden thickness of nearly 2.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head part of the slide is stable where as the toe and crown parts are very much unstable. (Photo 10)

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 9.5m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 142.5 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 8.5 m/ NH-206 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S40°E |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECOMMENDATION: Grading of slope is recommended.

SLIDE NO: KA-75

LOCATION: The slide is located at latitude 14° 15' 31.1" N and longitude 74° 40' 17.3" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (600 m from slide no KA-74 towards Jog falls) .

SLIDE DESCRIPTION: The slide is classified as an old debris slide. The debris consists of boulders & rock fragments of weathered granite and colluvial deposits. The slided area has an overburden thickness of nearly 3.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the area comprises of weathered granite/gneisses. The head, toe and crown parts of the slide are stable and the slide is almost stabilised (Photo 11).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 16.5 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 198.0 m ³ |
| e. Slope angle post failure | : 50° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 11.0 m/NH-206 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S65°E |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: The slide is an old slide > 2 years. Slope modification or benching is recommended.

SLIDE NO: KA-76

LOCATION: The slide is located at latitude 14° 16' 37.6" N and longitude 74° 43' 48.3" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (Near Malmame on NH-206) .

SLIDE DESCRIPTION: The slide is classified as an earth slide. The debris consists of mainly clay minerals and highly weathered materials. The slided area has an overburden thickness of nearly 3.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head part of the slide is stable where as toe and crown parts are unstable (Photo 12).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 8.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 12.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 24.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance /up to | : 6.0 m/NH-206 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S20°W |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris/clay material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: The slide is a small earth slide. Slope modification or benching is recommended.

SLIDE NO: KA-77

LOCATION: The slide is located at latitude 14° 16' 29.5" N and longitude 74° 42' 3.4" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, in Honnavar Taluk, Uttara Kannada district (1 km from slide no KA-76 on NH-206 towards Honnavar) .

SLIDE DESCRIPTION: The slide is classified as an old debris slide. The slid area has an overburden thickness of nearly 5.0 m. The geology of the studied area comprises of weathered granite/gneisses. Toe, head and crown parts of the slide are stable (Photo 13). The slide has been stabilised by providing suitable remedial measures in the form of stone pitching, retaining wall at the mid slope and at the toe. Part of the road was washed out during earlier slide and by providing backfilling and proper remedial measures the slope has been stabilised.

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 40.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 50.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 5.0 m |
| d. Volume of failed mass above the failure surface | : 5000.0 m ³ |
| e. Slope angle post failure | : 45° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance /up to | : 10.0 m/NH-206 |
| i. Cut slope height | : |
| j. Direction of slide | : |

CAUSES: The valley side of the road has been slid which might be due to the increase in the pore pressure during monsoon in the loose back filled material used during road construction.

NATURE OF DAMAGE: NH-206 road was affected.

RECOMMENDATION: Existing remedial measures like retaining wall at the mid slope and at toe, stone pitching at the slope have stabilised the slope. However proper maintenance of the existing remedial measures is recommended.

SLIDE NO: KA-78

LOCATION: The slide is located at latitude 14° 16' 27.9" N and longitude 74° 41' 56.8" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttara Kannada district (200 m from slide no KA-77 on NH-206 towards Honnavar) .

SLIDE DESCRIPTION: The slide is classified as a new rock slide. The slope forming material consisting of weathered granite/gneisses was weak and loose because of joints. Two sets of joints are noticed on granite J1- N60E/75NW and J2- N30E/30SE both with a spacing of 1 m and tight opening. Rock slide has occurred on J-1 joint plane. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head part of the slide is stable where as toe and crown parts are unstable (Photo 14).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 12.7 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 19.5 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 123.8 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance /up to | : 10.0 m/NH-206 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : N30°W |

CAUSES: Rock slide along J-I plane, the big slide is composited by 3 small slides, nala cutting headwords triggering the slide.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: Removal of rock debris in the slided area, modification and grading of the slope with proper drainage recommended.

GEOLOGICAL SURVEY OF INDIA

SLIDE NO: KA-79

LOCATION: The slide is located at latitude 14° 16' 16.5" N and longitude 74° 41' 28.7" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (2 km from slide no KA-78 on NH-206 towards Honnavar) .

SLIDE DESCRIPTION: The slide is classified as an old debris slide. The debris consists of boulders & rock fragments of weathered granite and colluvial deposits. The slided area has an overburden thickness of nearly 2.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. Slide is old one and restoration structure in the form of retaining wall with a length of 57 m and height of 3 m with weep holes is noticed in the slided area. A huge tree has fallen on retaining wall. The geology of the studied area comprises of weathered granite/gneisses. The head part of the slide is stable whereas toe and crown parts are unstable (Photo 15, 16).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 58.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 870.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 30° |
| h. Run out distance /up to | : 12.0 m/NH-206 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : Towards W |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris/clay material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: Crown portion has to be easened to stabilise the slide and as the slide is retrograding retaining wall may be provided where it has been breached and increase the height of retaining wall by another 0.5to 1.0m.

GEOLOGICAL SURVEY OF INDIA

SLIDE NO: KA-80

LOCATION: The slide is located at latitude 14° 16' 10.4" N and longitude 74° 41' 1.8" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttara Kannada district (1 km from Gersoppa Dam gate on NH-206 towards Jog falls)

SLIDE DESCRIPTION: The slide is classified as old earth slide. The debris consists of mainly clay minerals and highly weathered materials. The slided area has an overburden thickness of nearly 4.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. Slide is old one and restoration structure in the form of retaining wall has been provided already with a length of 30 m and height of 4 m with weep holes has been breached. The geology of the studied area comprises of weathered granite/gneisses. The head part of the slide is stable where as toe and crown parts are unstable (Photo 17).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 32.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 30.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 5.0 m |
| d. Volume of failed mass above the failure surface | : 2400.0 m ³ |
| e. Slope angle post failure | : 50° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 30° |
| h. Run out distance /up to | : 25.0 m/NH-206 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S70°E |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris/clay material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected

RECOMMENDATION: Debris in the slided area has to be removed and easening of slope with reconstruction of retaining wall at toe part.

SLIDE NO: KA-81

LOCATION: The slide is located at latitude 14° 16' 8.9" N and longitude 74° 41' 2.5" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (10 m from slide no KA-80 on NH-206 towards Honnavar).

SLIDE DESCRIPTION: The slide is classified as a new earth slide. The debris consists of clay minerals, fragments of weathered rocks. The slid area has an overburden thickness of nearly 2.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head part of the slide is stable where as toe and crown parts are unstable (Photo 18).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.5 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 16.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 84.0 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance /up to | : 10.0 m/NH-206 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : N60°E |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris/clay material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected

RECCOMENDATION: Recommended for removal of slid material and easening of the slope. As the slide is adjoining slide no KA-80, the existing retaining wall may be extended.

SLIDE NO: KA-82

LOCATION: The slide is located at latitude 14° 14' 16.3" N and longitude 74° 35' 49.1" E in Survey of India toposheet No 48 J / 12 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (Near Uponi village on NH-206).

SLIDE DESCRIPTION: The slide is classified as a new earth slide. The debris consists mostly clay minerals and highly weathered materials. It is a multiple earth slide, small mound near Uponi village; clay minerals are seen on slided surface. The slided area has an overburden thickness of nearly 2.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head part of the slide is stable where as toe and crown parts are unstable (Photo 19).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 16.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 120.0 m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 75° |
| g. General slope gradient | : 25° |
| h. Run out distance /up to | : 15.0 m/NH-206 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S30°E |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris/clay material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected

RECCOMENDATION: Easening of slope and removal of debris are recommended.

SLIDE NO: KA-83

LOCATION: The slide is located at latitude 14° 14' 24.5" N and longitude 74° 35' 39.3" E in Survey of India toposheet No 48 J / 12 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (350 m from slide no KA-82 on NH-206 towards Honnavar).

SLIDE DESCRIPTION: The slide is classified as a new earth slide. The debris consists of clay minerals and highly weathered materials. The slid area has an overburden thickness of nearly 2.5 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered granite/gneisses. The head part of the slide is stable where as toe and crown parts are unstable (Photo 20).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 18.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 42.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 378.0 m ³ |
| e. Slope angle post failure | : 60° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 30° |
| h. Run out distance /up to | : 10.0 m/NH-206 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S30°W |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris/ clay material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected

RECCOMENDATION: Slope easening at the crown position and removal of debris are recommended.

GEOLOGICAL SURVEY OF INDIA

SLIDE NO: KA-84

LOCATION: The slide is located at latitude 14° 17' 16.7" N and longitude 74° 30' 36.4" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (Near Hadinbail on NH-206).

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of mostly clay minerals and highly weathered materials. Small debris slump caused due to the widening of road should be treated otherwise it may retrograde laterally. The slided area has an overburden thickness of 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of metabasalt. The head part of the slide is stable where as toe and crown parts are unstable (Photo 21).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 20.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 50.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance /up to | : 20.0 m/NH-206 |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : S30°W |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slump as the slope forming debris/clay material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected

RECCOMENDATION: Slope easening at crown position and removal of debris are recommended

SLIDE NO: KA-85

LOCATION: The slide is located at latitude 14° 17' 36.5" N and longitude 74° 30' 17.0" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttara Kannada district (2 km from slide no KA-84 towards Honnavar).

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of boulders & rock fragments of weathered laterite and colluvial deposits. The slid area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of metabasalt. The head part of the slide is stable where as toe and crown parts are unstable (Photo 22).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 20.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 125.0m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 18.0 m/NH-206 |
| i. Cut slope height | : 18.0 m |
| j. Direction of slide | : Towards S |

CAUSES: Small debris slump caused due to slope cutting should be treated otherwise it may retrograde laterally.

NATURE OF DAMAGE: NH-206 road was affected.

RECOMMENDATION: Slope modification or benching is recommended.

SLIDE NO: KA-86

LOCATION: The slide is located at latitude 14° 18' 5.1" N and longitude 74° 29' 14.3" E in Survey of India toposheet No 48 J / 7 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (Near Balegudde village).

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of boulders & rock fragments of weathered laterite and colluvial deposits. The slid area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 23).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 18.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 108.0m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 10.0 m/NH-206 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S 70° W |

CAUSES: Small debris slump caused due to slope cutting should be treated otherwise it may retrograde laterally

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: Slope modification or benching is recommended.

SLIDE NO: KA-87

LOCATION: The slide is located at latitude 14° 18' 12.6" N and longitude 74° 29' 1.9" E in Survey of India toposheet No 48 J / 9 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (Near Basekeri Bridge).

SLIDE DESCRIPTION: The slide is classified as a new earth slide. The debris consists of clayey materials and rock fragments of weathered laterite and colluvial deposits. The slided area has an overburden thickness of nearly 6.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 24).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 10.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 37.5m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 7.0 m/NH-206 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 40° E |

CAUSES: Small earth slide caused due to weathering.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: Slope modification or benching is recommended.

SLIDE NO: KA-88

LOCATION: The slide is located at latitude 14° 17' 48.2" N and longitude 74° 28' 14.4" E in Survey of India toposheet No 48 J / 7 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (Near Aroli village towards Jog falls).

SLIDE DESCRIPTION: The slide is classified as a new earth slump. The debris consists of clayey materials and rock fragments of weathered laterite and colluvial deposits. The slided area has an overburden thickness of nearly 1.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 25).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 7.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 35.0m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 5.0 m/NH-206 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : N 60° W |

CAUSES: Small debris slump caused due to slope cutting.

NATURE OF DAMAGE: NH-206 road was affected.

RECOMMENDATION: Slope modification or benching is recommended. The hanging laterite boulders in the crown part need to be removed.

SLIDE NO: KA-89

LOCATION: The slide is located at latitude 14° 17' 49.4" N and longitude 74° 28' 17.5" E in Survey of India toposheet No 48 J / 7 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (20 m from slide no KA-88 towards Jog falls).

SLIDE DESCRIPTION: The slide is classified as an old debris slide. The debris consists of clayey materials and rock fragments of weathered laterite and colluvial deposits. The slided area has an overburden thickness of nearly 2.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 26).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 18.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 17.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3.5 m |
| d. Volume of failed mass above the failure surface | : 533.5 m ³ |
| e. Slope angle post failure | : 50° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0 m/NH-206 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : N 5° W |

CAUSES: Big reactivated retrograding slide, the pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: Slope modification or benching with proper drainage are recommended.

SLIDE NO: KA-90

LOCATION: The slide is located at latitude 14° 17' 54.1" N and longitude 74° 28' 32.8" E in Survey of India toposheet No 48 J / 7 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (Near Aroli village towards Jog falls).

SLIDE DESCRIPTION: The slide is classified as an old debris slide. The debris consists of clayey materials and rock fragments of weathered laterite and colluvial deposits. The slided area has an overburden thickness of nearly 2.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 27).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 31.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 232.5 m ³ |
| e. Slope angle post failure | : 50° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : 10.0 m/NH-206 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : N 80° W |

CAUSES: Slide caused due to slope cutting and improper drainage.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: Slide stabilised by retaining wall of length 30 mts and height 2 mts with weep holes. Periodic maintenance of the existing remedial measures and provision of proper drainage is recommended.

SLIDE NO: KA-91

LOCATION: The slide is located at latitude 14° 17' 55.1" N and longitude 74° 28' 33.0" E in Survey of India toposheet No 48 J / 7 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (Near Aroli village towards Jog falls).

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The debris consists of clayey materials and rock fragments of weathered laterite and colluvial deposits. The slided area has an overburden thickness of nearly 1.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 28).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 33.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3.0 m |
| d. Volume of failed mass above the failure surface | : 742.5 m ³ |
| e. Slope angle post failure | : 50° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : 10.0 m/NH-206 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 75° W |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: Removal of debris from the accumulation zone and if possible provide the plantations on slope. Extension of existing retaining wall with proper drainage is recommended.

SLIDE NO: KA-92

LOCATION: The slide is located at latitude 14° 17' 56.4" N and longitude 74° 28' 33.2" E in Survey of India toposheet No 48 J / 7 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (10 m from slide no KA- 91 towards Jog falls).

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of clayey materials and rock fragments of weathered laterite and colluvial deposits. The slided area has an overburden thickness of nearly 1.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. Circular crown cracks with 4-5 m length and 1cm opening with radial angle are noticed. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 29).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 28.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 315.0 m ³ |
| e. Slope angle post failure | : 50° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : 10.0 m/NH-206 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 75° W |

CAUSES: The cutting of the slope for construction of road has increased the gradient. The pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: Removal old debris and provide plantation, the existing retaining wall may be extended.

SLIDE NO: KA-93

LOCATION: The slide is located at latitude 14° 18' 11.0" N and longitude 74° 28' 58.3" E in Survey of India toposheet No 48 J / 7 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (Near Baskeri village towards Jog falls).

SLIDE DESCRIPTION: The slide is classified as a new earth slide. The debris consists of clayey materials and rock fragments of weathered laterite and colluvial deposits. The slided area has an overburden thickness of nearly 1.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 30).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 8.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 30.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : 15.0 m/NH-206 |
| i. Cut slope height | : 13.0 m |
| j. Direction of slide | : S 10° E |

CAUSES: Small earth slide caused due to water action and load factor at crown. The crown part is very unstable.

NATURE OF DAMAGE: NH-206 road was affected.

RECOMMENDATION: Removal old debris and plantation are recommended.

SLIDE NO: KA-94

LOCATION: The slide is located at latitude 14° 14' 41.7" N and longitude 74° 34' 39.0" E in Survey of India toposheet No 48 J / 12 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district (2 km from slide no KA-93 towards Jog falls).

SLIDE DESCRIPTION: The slide is classified as a new earth slump. The debris consists of clayey materials and rock fragments of weathered granite and colluvial deposits. The slid area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 31).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 8.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 50.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 100.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : 5.0 m/NH-206 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S 30° W |

CAUSES: Three small debris slumps adjacent to each other, water action is the cause as the pore pressure development during monsoon triggered this slide since the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: Removal of old debris, plantation on the slope, slope easening with proper drainage are recommended.

SLIDE NO: KA-95

LOCATION: The slide is located at latitude 14° 15' 37.0" N and longitude 74° 40' 39.4" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district.

SLIDE DESCRIPTION: The slide is classified as a new Earth slide. The debris consists of clayey materials and rock fragments of weathered granite. The slided area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 32).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 8.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.5m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 21.0m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. Original slope angle | : 20° |
| h. Run out distance / up to | : 5.0 m/NH-206 |
| i. Cut slope height | : 7.0 m |
| j. Direction of slide | : N 55° W |

CAUSES: Small earth/debris slump water action is the cause as the pore pressure development during monsoon triggered this slide as the slope forming debris material was highly saturated with rain water.

NATURE OF DAMAGE: NH-206 road was affected.

RECOMMENDATION: Slope modification or benching is recommended.

SLIDE NO: KA-96

LOCATION: The slide is located at latitude 14° 16' 3.7" N and longitude 74° 40' 58.6" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttar Kannada district.

SLIDE DESCRIPTION: The slide is classified as a new earth slide. The debris consists of clayey materials and rock fragments of weathered laterite. The slid area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 33).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 8.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 20.0m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. Original slope angle | : 20° |
| h. Run out distance / up to | : 7.0 m/NH-206 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S 5° E |

CAUSES: Small earth/debris slump caused due to slope cutting and water action.

NATURE OF DAMAGE: NH-206 road was affected.

RECCOMENDATION: Slope modification or benching is recommended.

SLIDE NO: KA-97

LOCATION: The slide is located at latitude 14° 16' 3.7" N and longitude 74° 40' 59.5" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttara Kannada district. (10 m from slide no-96, towards Jog falls)

SLIDE DESCRIPTION: The slide is classified as a new earth slide. The debris consists of clayey material and rock fragments of weathered laterite. The slid area has an overburden thickness of nearly 1.0 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 34).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 8.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 17.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 68.0m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 80° |
| g. Original slope angle | : 20° |
| h. Run out distance / up to | : 7.0 m/NH-206 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S 10° E |

CAUSES: Small earth/debris slump caused due to slope cutting and water action

NATURE OF DAMAGE: NH-206 road was affected.

RECOMMENDATION: Slope easening is recommended.

SLIDE NO: KA-98

LOCATION: The slide is located at latitude 14° 16' 4.1" N and longitude 74° 41' 0.3" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttara Kannada district. (10 m from slide no-97 towards Jog falls)

SLIDE DESCRIPTION: The slide is classified as a new earth slide. The debris consists of clayey materials and rock fragments of weathered laterite. The slid area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 35).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 7.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 8.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 14.0m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. Original slope angle | : 20° |
| h. Run out distance / up to | : 6.0 m/NH-206 |
| i. Cut slope height | : 7.0 m |
| j. Direction of slide | : S 25° E |

CAUSES: Small earth/debris slump caused due to load on the crown (trees) and infiltration of water.

NATURE OF DAMAGE: NH-206 road was affected.

RECOMMENDATION: Slope easening is recommended.

SLIDE NO: KA-99

LOCATION: The slide is located at latitude 14° 16' 4.7" N and longitude 74° 41' 1.1" E in Survey of India toposheet No 48 J / 11 along NH-206 between Sagar-Honnavar road section, Honnavar Taluk, Uttara Kannada district. (11 m from slide no-98 towards Jog falls)

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The debris consists of clayey materials and rock fragments of weathered laterite. The slid area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of laterite. The head part of the slide is stable where as toe and crown parts are unstable (Photo 36).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 8.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 30.0m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. Original slope angle | : 20° |
| h. Run out distance / up to | : 8.0 m/NH-206 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S 35° E |

CAUSES: Small slide caused due to impervious clay horizon and water action.

NATURE OF DAMAGE: NH-206 road was affected.

RECOMMENDATION: Slope easening is recommended.

SLIDE NO: KA-100

LOCATION: The slide is located at latitude 14° 13' 57.9" N and longitude 74° 48' 47.2" E in Survey of India toposheet No 48 J / 11 near NH-206 between Sagar-Honnavar road section, Sagar Taluk, Shimoga district.(Near Jog falls rest house road and NH-206 junction)

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of clay minerals and rock fragments of weathered gneiss. The slid area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered gneiss. The head part of the slide is stable where as toe and crown parts are unstable (Photo 37).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 8.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 24.6m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 49.2m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. Original slope angle | : 20° |
| h. Run out distance / up to | : 7.0 m/NH-206 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S 40° E |

CAUSES: Two small slumps taken as one caused due to slope cutting and improper drainage.

NATURE OF DAMAGE: NH-206/ rest house road was affected.

RECCOMENDATION: Slope easening and clearing of dumped material are recommended.

SLIDE NO: KA-101

LOCATION: The slide is located at latitude 14° 13' 59.0" N and longitude 74° 48' 46.6" E in Survey of India toposheet No 48 J / 16 near NH-206 between Sagar-Honnavar road section, Sagar Taluk, Shimoga district.(Near Jog falls rest house road and NH-206 junction)

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of clay minerals and rock fragments of weathered gneiss. The slid area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area comprises of weathered gneiss. The head part of the slide is stable where as toe and crown parts are unstable (Photo 38).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 8.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 14.5m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 29.0m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. Original slope angle | : 20° |
| h. Run out distance / up to | : 7.0 m/NH-206 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S 60° E |

CAUSES: Small debris slump caused due to slope cutting and improper drainage.

NATURE OF DAMAGE: NH-206/ rest house road was affected.

RECCOMENDATION: Slope easening and clearing of dumped material are recommended.

III. 2. LANDSLIDES RECORDED ALONG SH-64 BETWEEN KOTIGHERA – CHARMUDI ROAD SECTION (CHARMUDI GHAT)

SLIDE NO: KA-102

LOCATION: The slide is located at latitude 13° 17' 4.1" N and longitude 75° 30' 47.8" E in Survey of India toposheet No 48 O / 12 along SH-64 between Kotighera-Charmudi road section (2 km from Kotighera towards Charmudi) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new earth Slump. The debris consists of mostly clay minerals and highly weathered materials. The slided area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1.5 m and vertical interval of 10 m (Photo 39).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 12.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 7.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 21.0m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 12.0 m/SH-64 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : N 80° E |

CAUSES: Small earth/debris slump caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Slope modification or benching is recommended as slide may prograde laterally.

SLIDE NO: KA-103

LOCATION: The slide is located at latitude 13° 7' 12.3" N and longitude 75° 30' 37.8" E in Survey of India toposheet No 48 O / 12 along SH-64 between Kotighera-Charmudi road section (3 km from Kotighera towards Charmudi) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new earth Slump. The debris consists of mostly clay minerals and highly weathered materials. The slided area has an overburden thickness of nearly 1.0 m. One set of joint is noticed which is parallel to foliation plane in granite trending N20°W/70°W. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head and crown parts of the slide are unstable whereas toe part is stable. The slide has a horizontal extent of 1.5 m and vertical interval of 10 m (Photo 40).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 12.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 7.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 21.0m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 12.0 m/SH-64 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 80° E |

CAUSES: Small earth/debris slump caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Slope modification or benching is recommended as slide may prograde laterally.

SLIDE NO: KA-104

LOCATION: The slide is located at latitude 13° 7' 17.0" N and longitude 75° 29' 56.6" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section (5 km from Kotighera towards Charmudi) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as and new debris Slump. The debris consists of mostly clay minerals and highly weathered materials. The slided area has an overburden thickness of nearly 1.0 m. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneisses. The head part, crown and toe parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 18 m (Photo 41).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 20.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 6.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 60.0m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0 m/SH-64 |
| i. Cut slope height | : 18.0 m |
| j. Direction of slide | : S 60° W |

CAUSES: The vertical debris slump is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of dumped material and slope easening are recommended as the slide may prograde laterally.

SLIDE NO: KA-105

LOCATION: The slide is located at latitude 13° 7' 10.3" N and longitude 75° 29' 43.8" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section (6 km from Kotighera towards Charmudi) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris Slump. The debris consists of mostly clay minerals and highly weathered materials several limonitic patches are observed on the debris material. The slided area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneisses. The head part, crown and toe parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 10 m. (Photo 42).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Maximum length of failed mass from crown to foot | : 13.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 7.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 22.8 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 13.0 m/SH-64 |
| i. Cut slope height | : 18.0 m |
| j. Direction of slide | : N 60° E |

CAUSES: Debris slump caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of dumped material and slope easening are recommended.

SLIDE NO: KA-106

LOCATION: The slide is located at latitude 13° 7' 9.3" N and longitude 75° 29' 43.8" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section (10 m from slide no KA-105) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris Slump. The debris consists of mostly clay minerals and highly weathered materials. The slided area has an overburden thickness of nearly 0.5 m. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneisses. The head part, crown and toe parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 8 m (Photo 43).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Maximum length of failed mass from crown to foot | : 10.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 5.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 12.5 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 10.0 m/SH-64 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : N 80° E |

CAUSES: Debris slump caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of dumped material and slope easening are recommended.

SLIDE NO: KA-107

LOCATION: The slide is located at latitude 13° 6' 59.1" N and longitude 75° 29' 47.0" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section, Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris Slump. The debris consists of mostly clay minerals and highly weathered materials. The slided area has an overburden thickness of nearly 1.0 m. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneisses. The head part, crown and toe parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 7m. The repose angle is 35° (Photo 44).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Maximum length of failed mass from crown to foot | : 10.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 37.5 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 8.0 m/SH-64 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 40° E |

CAUSES: The debris slump is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of dumped material and slope easening are recommended as the slide may prograde laterally.

SLIDE NO: KA-108

LOCATION: The slide is located at latitude 13° 6' 57.7" N and longitude 75° 29' 48.9" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(200 m from slide no KA-107) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris Slump. The debris consists of mostly clay minerals and highly weathered materials several limonitic patches are observed on the debris material. The slided area has an overburden thickness of nearly 0.5 m. One set of joint is noticed which is parallel to foliation plane in granite trending N45°W/63°W. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneisses. The head part, crown and toe parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 20 m (Photo 45).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Maximum length of failed mass from crown to foot | : 22.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 6.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 66.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0 m/SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : Towards E |

CAUSES: The debris slump is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of dumped material and slope easening are recommended.

SLIDE NO: KA-109

LOCATION: The slide is located at latitude 13° 6' 57.1" N and longitude 75° 29' 48.1" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(10 m from slide no KA-108) in Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old reactivated debris Slump. The debris consists of mostly clay minerals and highly weathered materials. The slid area has an overburden thickness of nearly 0.5 m. Three sets of joints are noticed viz., J1-N65°E/70°N with 1-2m spacing and is tight, J2- N30°W/75°SW with 10-15 cm spacing with 0.5cm opening filled with soil and J3-N40°E/22°SE with 2 m spacing and is tight. The foliation plane noticed in granite trends N30°W/70°E. The slope forming material was weak and loose. The geology of the studied area is mainly weathered granite/gneisses. The head part, crown and toe parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 20 m (Photo 46).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Maximum length of failed mass from crown to foot | : 20.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 38.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 380.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0 m/SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : N80°E |

CAUSES: The debris slump is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of dumped material and slope easening are recommended.

SLIDE NO: KA-110

LOCATION: The slide is located at latitude 13° 6' 51.3" N and longitude 75° 29' 49.5" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section in Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old reactivated Debris Slump. The debris consists of mostly clay minerals and highly weathered materials. The slid area has an overburden thickness of nearly 1 m. One set of joint is noticed viz., J1-N50°W/65°SW with 15 cm spacing and is tight. The slope forming material was weak and loose but as the slide is old the toe portion is almost stabilised. The geology of the studied area is mainly weathered granite/gneisses. The head and crown parts of the slide are unstable. The slide has a horizontal extent of 7 m and vertical interval of 14 m. (Photo 47).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Maximum length of failed mass from crown to foot | : 18.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 32.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 4.0 m |
| d. Volume of failed mass above the failure surface | : 1152.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0 m/SH-64 |
| i. Cut slope height | : 18.0 m |
| j. Direction of slide | : N80°E |

CAUSES: Big debris slump caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of dumped material and slope easening are recommended.

SLIDE NO: KA-111

LOCATION: The slide is located at latitude 13° 6' 50.3" N and longitude 75° 29' 49.1" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section in Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old reactivated debris Slump. The debris consists of mostly clay minerals and highly weathered materials. One basic Dyke is running across the Slide at the toe part. The slided area has an overburden thickness of nearly 1 m. The slope forming material was weak and loose but as the slide is old the toe portion is almost stabilised. The geology of the studied area is mainly weathered granite/gneisses. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 19 m (Photo 48).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Maximum length of failed mass from crown to foot | : 25.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 18.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 450.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 18.0 m/SH-64 |
| i. Cut slope height | : 18.0 m |
| j. Direction of slide | : S60°E |

CAUSES: The debris slump is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of dumped material, slope easening and stabilising of crown part are recommended.

SLIDE NO: KA-112

LOCATION: The slide is located at latitude 13° 6' 47.5" N and longitude 75° 29' 44.3" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section in Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a rock fall. The rock fall has occurred within the basic dyke. Three sets of joints are noticed viz., J1-N70°E/85°NW with 0.1-1.0m spacing and 1.0 cm opening filled by soil, J2- N60°W/37°SW with 0.3-1.0 m spacing and is tight and J3-N25°W/57°NE with 0.3-1.0 m spacing and is tight. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope and has caused the slide. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 8 m (Photo 49).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Maximum length of failed mass from crown to foot | : 11.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 38.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 313.5 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 11.0 m/SH-64 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 45° W |

CAUSES: The rock fall is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Basic dyke was cut to make way for the road; loose boulders precariously hanging towards road should be removed. Sign board should be installed. Crown part should be covered with polythene sheets or crown part may be graded.

SLIDE NO: KA-113

LOCATION: The slide is located at latitude 13° 6' 48.5" N and longitude 75° 29' 41.6" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section in Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris Slump. The debris consists of mostly clay minerals and highly weathered materials several limonitic patches are observed on the debris material. The slided area has an overburden thickness of nearly 1.0 m. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneisses. The head part, crown and toe parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 9 m (Photo 50).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Maximum length of failed mass from crown to foot | : 14.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 7.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 49.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 14.0 m/SH-64 |
| i. Cut slope height | : 14.0 m |
| j. Direction of slide | : S20°W |

CAUSES: Debris slump caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of dumped material and slope easening are recommended.

SLIDE NO: KA-114

LOCATION: The slide is located at latitude 13° 6' 34.1" N and longitude 75° 29' 10.8" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section in Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a rock fall. The rock fall has occurred within weathered gneisses. The debris material has covered the road. Three sets of joints are noticed viz., J1-N65°W/72°NE with 10-15 cm spacing and is tight, and is parallel to foliation plane in gneiss, J2- N25°E/70°NW with 0.2-1.0 m spacing and is tight and J3-EW/26°S with 0.5 m spacing and is tight is also a day lighted plane. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope and has caused the slide. The head part, toe and crown parts of the slide are unstable. The shape of the slide is irregular with a horizontal extent of 3 m and vertical interval of 17 m (Photo 51).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Maximum length of failed mass from crown to foot | : 20.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 16.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 320.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 22.0 m/SH-64 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S10°W |

CAUSES: The rock fall is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECOMMENDATION: Removal of slided material and slope easening are recommended.

SLIDE NO: KA-115

LOCATION: The slide is located at latitude 13° 06' 34.6" N and longitude 75° 29' 11.0" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris Slump. The debris consists of mostly rock fragments and highly weathered materials. The slided area has an overburden depth of nearly 1.0 m. Four sets of joints are noticed viz., J1-N65°W/72°NE with 10-15 cm spacing and is tight, J2- N25°E/70°NW with 0.2-1.0 m spacing and is tight, J3-EW/26°S with 0.5 m spacing and is tight is also a day lighted plane and J4- N10°W/85°SW with 0.15-.5 m spacing and having 0.5 cm opening filled with soil. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 28 m (Photo 52).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 30.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 38.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 570.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 32.0 m/SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : S 10° W |

CAUSES: The earth/debris slump is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Slope modification or benching is recommended.

SLIDE NO: KA-116

LOCATION: The slide is located at latitude 13° 06' 22.5" N and longitude 75° 28' 57.7" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a reactivated old debris Slump. The debris consists of mostly soil material and highly weathered materials. The slided area has an overburden depth of nearly 0.5 m. Three sets of joints are noticed viz., J1-NS/47°E with 30 cm spacing and is tight, J2- N70°W/80°N with 20 cm spacing and is tight and J3- N35°E/66°NW with 1.0 m spacing and is tight. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 17 m (Photo 53).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 20.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 32.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 160.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 22.0 m/SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : S 80° E |

CAUSES: the earth/debris slump is caused due to road cutting has been reactivated.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Slope modification or benching is recommended.

SLIDE NO: KA-117

LOCATION: The slide is located at latitude 13° 06' 15.6" N and longitude 75° 28' 59.3" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a reactivated old rock fall. Serectic clays are noticed on debris material. Three sets of joints are noticed viz., J1-N25°W/38°NE with 10 cm spacing and is tight is the day lighted plane along which material has moved, J2-N45°W/85°NE with 50 cm spacing and is tight and J3-N10°E/70°W with 1.0 m spacing with 1 cm opening filled with soil. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 9 m (Photo 54).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 12.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 12.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 36.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 20.0 m/SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : N 60° E |

CAUSES: Old rock fall has been reactivated.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of dump material and slope modification or benching is recommended.

SLIDE NO: KA-118

LOCATION: The slide is located at latitude 13° 06' 14.9" N and longitude 75° 29' 0.3" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a reactivated old debris slump. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 8 m (Photo 55).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 10.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 25.0m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0 m/SH-64 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 10° E |

CAUSES: Old debris slump caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Slope modification or benching is recommended.

SLIDE NO: KA-119

LOCATION: The slide is located at latitude 13° 06' 1.2" N and longitude 75° 28' 56.4" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section (near Jenukallu temple) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old rock fall which may reactivate at any time. Three sets of joints are noticed viz., J1-N25°W/83°NE with 50 cm spacing with 1 cm opening filled with soil, J2- N30°E/56°NW with 1.0 m spacing with 1 cm opening filled with soil and J3-N10°E/30°E with 1.0 m spacing with 1 cm opening filled with soil. The rock fall is planar in nature. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 38 m (Photo 56).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 40.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 38.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3.0 m |
| d. Volume of failed mass above the failure surface | : 2280.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 40.0 m/SH-64 |
| i. Cut slope height | : 45.0 m |
| j. Direction of slide | : N 80° E |

CAUSES: Old rock fall caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of precariously hanging boulders and slope modification or benching is recommended. The reactivated old rock fall may reactivate at any time.

SLIDE NO: KA-120

LOCATION: The slide is located at latitude 13° 05' 59.5" N and longitude 75° 28' 56.2" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section (near Jenukallu temple, 20 m from slide no KA-119 towards Charmudi) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old rock fall which may reactivate at any time already reactivated to certain extent on the left flank. Three sets of joints are noticed viz., J1-N45°W/85°NE with 50 cm spacing with 1 cm opening filled with soil, J2-N35°E/74°NW with 1.0 m spacing with 1 cm opening filled with soil and J3-N10°E/40°E with 2.0 m spacing and is tight. The rock fall is planar in nature. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 45 m (Photo 57).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 50.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 55.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 4.0 m |
| d. Volume of failed mass above the failure surface | : 5500.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 50.0 m/SH-64 |
| i. Cut slope height | : 50.0 m |
| j. Direction of slide | : N 75° E |

CAUSES: Old rock fall caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of precariously hanging boulders and slope modification or benching is recommended. The old rock fall may reactivate at any time

SLIDE NO: KA-121

LOCATION: The slide is located at latitude 13° 05' 53.8" N and longitude 75° 28' 53.5" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section (1 km from Jenukallu temple) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a debris slump. The debris consists of mostly clay material and highly weathered rock. The slided area has an overburden depth of nearly 0.5 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1m and vertical interval of 7 m (Photo 58).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 10.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 25.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 10.0 m/SH-64 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S 45° E |

CAUSES: The debris slump caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Slope modification or benching with proper drainage is recommended.

SLIDE NO: KA-122

LOCATION: The slide is located at latitude 13° 05' 50.7" N and longitude 75° 28' 50.8" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(50 m from slide No KA-121) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old rock fall which may reactivate at any time. Two sets of joints are noticed viz., J1-N30°W/76°SW with 30 cm spacing and is tight and J2- N50°E/80°SW with 1.0 m spacing and is tight. The rock fall is planar in nature. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 8 m (Photo 59).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 12.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 45.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 10.0 m/SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : S 5° W |

CAUSES: An old rock fall caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of boulders and slope modification or benching is recommended. The old rock fall may reactivate due to road cutting.

SLIDE NO: KA-123

LOCATION: The slide is located at latitude 13° 05' 50.4" N and longitude 75° 28' 48.4" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(80 m from slide No KA-122) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old rock fall which may reactivate at any time. Three sets of joints are noticed viz., J1-N65°W/34°SW with 1.0 m spacing with 1 cm opening and filled with soil which is also a day lighted plane, J2- EW/45° N with 30 cm spacing with 1 cm opening and filled with soil and J3- N25°W/78°NE with 1.5 m spacing with 1 cm opening and filled with soil. The rock fall is planar in nature. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 5 m (Photo 60).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 150.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 12.0 m/SH-64 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 15° W |

CAUSES: An old rock fall caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of boulders and slope modification or benching is recommended. The old rock fall may reactivate at any time due to road cutting.

SLIDE NO: KA-124

LOCATION: The slide is located at latitude 13° 05' 50.0" N and longitude 75° 28' 47.1" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(80 m from slide No KA-123) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old rock fall which may reactivate at any time (two slides are taken as one slide). One set of joint is noticed viz., J1-N25°W/30°SE with 2.0 m spacing with 1 cm opening and filled with soil. The rock fall is planar in nature. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered Granite/Gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1.5 m and vertical interval of 22 m (Photo 61).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 25.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 156.25m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 25.0 m/SH-64 |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : S 75° W |

CAUSES: An old rock fall caused due to road cutting.

NATURE OF DAMAGE: SH-64 was affected.

RECCOMENDATION: Removal of boulders and slope modification or benching is recommended. The old rock fall may reactivate at any time due to road cutting.

SLIDE NO: KA-125

LOCATION: The slide is located at latitude 13° 05' 32.8" N and longitude 75° 28' 43.8" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a reactivated debris Slump. Serectitic clay seen on debris. The debris consists of mostly rock fragments and highly weathered materials. The slided area has an overburden thickness of nearly 1.0 m. one set of joint is noticed in Granite/Gneiss viz., J1-N5°W/62°W with 10 cm spacing and is tight. The slope forming material was weak and loose. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 22 m (Photo 62).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Maximum length of failed mass from crown to foot | : 25.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 40.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 500.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 35.0 m/SH-64 |
| i. Cut slope height | : 30.0 m |
| j. Direction of slide | : N 50° E |

CAUSES: The earth/debris slump is reactivated one caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of debris, slope modification and retaining wall is recommended.

SLIDE NO: KA-126

LOCATION: The slide is located at latitude 13° 05' 28.1" N and longitude 75° 28' 43.6" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(150 m from slide no KA-125) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a reactivated rock fall which may reactivate at any time. The slide is planar in nature. The slided area has an overburden thickness of nearly 0.5 m. one set of joint is noticed in Granite/Gneiss viz., J1-N70°W/82°S with 50 cm spacing with 0.5 cm opening and filled with soil. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 22 m (Photo 63).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Maximum length of failed mass from crown to foot | : 25.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 20.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 250.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 25.0 m/SH-64 |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : S 60° E |

CAUSES: The rock fall is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of debris, slope easening is recommended. The old rock fall may reactivate at any time due to road cutting.

SLIDE NO: KA-127

LOCATION: The slide is located at latitude 13° 05' 27.4" N and longitude 75° 28' 31.8" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(1.5 km from slide no KA-126) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of mostly rock fragments and highly weathered materials. The slided area has an overburden thickness of nearly 0.5 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 10 m (Photo 64).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 13.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 65.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 20.0 m/SH-64 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S 15° E |

CAUSES: Debris slump is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of debris, slope easening and retaining wall is recommended as nearby another slide is seen.

SLIDE NO: KA-128

LOCATION: The slide is located at latitude 13° 05' 26.8" N and longitude 75° 28' 31.2" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(30 m from slide no KA-127) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of mostly rock fragments and highly weathered materials. The slid area has an overburden thickness of nearly 1.0 m. Three sets of joints are noticed in weathered Granite/Gneiss viz., J1-N30°E/36°SE with 50 cm spacing with 2 cm opening and filled with soil which is also a day lighted plane , J2-N80°W/76°N with 0.5 to 2.0 m spacing and is tight and J3-N15°E/80°E with 1.0 m spacing and is tight. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 12 m (Photo 65).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 15.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 8.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 60.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 20.0 m/SH-64 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S 55° E |

CAUSES: Debris slump is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Proper drainage, slope easening and retaining wall are recommended.

SLIDE NO: KA-129

LOCATION: The slide is located at latitude 13° 05' 16.1" N and longitude 75° 28' 27.1" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(800 m from slide no KA-128) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of mostly rock fragments and highly weathered materials. The slid area has an overburden thickness of nearly 0.5 m. Three sets of joints are noticed in weathered Granite/Gneiss viz., J1-N10°E/39°E with 15 cm spacing with 50 cm opening and filled with soil, J2-N10°W/72°W with 50 cm spacing and is tight and J3- N65°W/80°SW with 20 cm spacing and is tight. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 7 m (Photo 66).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Maximum length of failed mass from crown to foot | : 10.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 7.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 17.5m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 20.0 m/SH-64 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S 80° E |

CAUSES: The debris slump is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Proper drainage, slope easening and removal of debris are recommended.

SLIDE NO: KA-130

LOCATION: The slide is located at latitude 13° 05' 14.9" N and longitude 75° 28' 25.6" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(100 m from slide no KA-129) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of mostly rock fragments and highly weathered materials. The slided area has an overburden thickness of nearly 1.0 m. Two sets of joints are noticed in Granite viz., J1-N75°W/Vertical with 60 cm spacing and is tight and is also a foliation plane and J2-N10°W/55°W with 60 cm to 1 m spacing and is tight. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 27 m (Photo 67).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Maximum length of failed mass from crown to foot | : 30.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 33.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 495.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 45.0 m/SH-64 |
| i. Cut slope height | : 32.0 m |
| j. Direction of slide | : N 65° E |

CAUSES: the debris slump is caused due to road cutting.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Proper drainage, slope easening, removal of debris and removal of trees which are precariously hanging at crown are recommended. A retaining wall is also recommended.

SLIDE NO: KA-131

LOCATION: The slide is located at latitude 13° 05' 12.5" N and longitude 75° 28' 26.3" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(200 m from slide no KA-130) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old rock fall which is reactivated. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 7 m (Photo 68).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Maximum length of failed mass from crown to foot | : 8.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0m |
| c. Maximum thickness of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 20.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 12.0 m/SH-64 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : N 80° E |

CAUSES: The rock fall is slightly reactivated due to construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Easening of slope is recommended.

SLIDE NO: KA-132

LOCATION: The slide is located at latitude 13° 05' 11.6" N and longitude 75° 28' 26.7" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(50 m from slide no KA-131) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide. The earlier rockslide may reactivate further; side by side a new debris slide has occurred which may prograde laterally. The debris consists of mostly rock fragments and highly weathered materials. The slided area has an overburden thickness of nearly 2.0 m. One set of joint is noticed in Granite/Gneiss viz., J1-NS/66°W with 30 cm spacing with 1 cm opening which is filled by soil. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The shape of the slide is irregular with a horizontal extent of 1 m and vertical interval of 27 m (Photo 69).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Maximum length of failed mass from crown to foot | : 30.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 24.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 360.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 30.0 m/SH-64 |
| i. Cut slope height | : 30.0 m |
| j. Direction of slide | : N 50° E |

CAUSES: Debris slide caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Slope easening is recommended.

SLIDE NO: KA-133

LOCATION: The slide is located at latitude 13° 05' 11.6" N and longitude 75° 28' 26.7" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(50 m from slide no KA-132) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old reactivated debris slide. The debris consists of mostly rock fragments and highly weathered materials. The slid area has an overburden thickness of nearly 2.0 m. One set of joint is noticed on Granite/Gneiss viz., J1-N75°W/80°N with 15 cm to 2 m spacing with 2 cm opening which is filled by soil. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 23 m (Photo 70).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Maximum length of failed mass from crown to foot | : 26.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 20.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 260.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 30.0 m/SH-64 |
| i. Cut slope height | : 30.0 m |
| j. Direction of slide | : N 80° E |

CAUSES: Old slide reactivated as new debris slide caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of boulders and slope easening are recommended.

SLIDE NO: KA-134

LOCATION: The slide is located at latitude 13° 05' 9.5" N and longitude 75° 28' 26.7" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(50 m from slide no KA-133) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old rock fall which may reactivate at any time. Two sets of joints are noticed in Granite/Gneiss viz., J1-NS/65W with 10 cm spacing and are tight and is also parallel to foliation plane. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 9 m (Photo 71).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Maximum length of failed mass from crown to foot | : 12.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 12.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 72.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 20.0 m/SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : S 50° E |

CAUSES: Old rock fall may reactivate at any time. The slide is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of boulders and slope easening are recommended.

SLIDE NO: KA-135

LOCATION: The slide is located at latitude 13° 05' 8.2" N and longitude 75° 28' 25.6" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(36 km to Dharmsthala-98 KM stone) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old rock fall which is reactivated as rock fall. One set of joint is noticed in weathered granite/gneiss viz., J1-NS/85°E with 30 cm spacing and is tight. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 9 m (Photo 72).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.0m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 7.0m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 42.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 18.0 m/SH-64 |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : S 50° E |

CAUSES: Old rock fall is reactivated caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: The hanging tree on the crown part should be removed, debris materials are to be removed and easening of slope is recommended.

SLIDE NO: KA-136

LOCATION: The slide is located at latitude 13° 05' 7.3" N and longitude 75° 28' 23.6" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(150 m from slide no KA-135) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a old debris slide which may reactivate; small trees and plants are grown on debris material. The thickness of overburden is 1 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 9 m. (Photo 73).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 20.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 100.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : - /SH-64 |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : S 25° E |

CAUSES: The debris fall which may reactivate is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Easening of slope is recommended.

SLIDE NO: KA-137

LOCATION: The slide is located at latitude 13° 05' 7.1" N and longitude 75° 28' 22.7" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(10 m from slide no KA-136) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a old debris slide which may reactivate; small trees and plants are grown on debris material. The thickness of overburden is 1 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 18 m (Photo 74).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 20.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 250.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : - /SH-64 |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : S 35° E |

CAUSES: The debris fall which may reactivate is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Easening of slope is recommended.

SLIDE NO: KA-138

LOCATION: The slide is located at latitude 13° 05' 5.1" N and longitude 75° 28' 20.6" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(250 m from slide no KA-137) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a old reactivated debris slump. The debris consists of weathered material. The thickness of overburden is 1 m. One set of joint is noticed on weathered Granite/Gneiss viz., J1-N35°E/56°W which is parallel to foliation plane. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 7 m (Photo 75).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 26.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 130.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 25.0 m/SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : S 35° E |

CAUSES: The debris slide reactivated is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of dump material, slope easening and on the crown part trees must be removed.

SLIDE NO: KA-139

LOCATION: The slide is located at latitude 13° 05' 2.4" N and longitude 75° 28' 12.7" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(1 km from slide no KA-138) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump may prograde laterally. The debris consists of weathered material and rock fragments. The thickness of overburden is 0.5 m. One set of joint is noticed on weathered Granite/Gneiss viz., J1-N85° W/45° N with 1 m spacing and is tight. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 4 m (Photo 76).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 7.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 4.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 7.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 9.0 m/SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : Towards S |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: The hanging tree on the crown part should be removed and debris material should be removed.

SLIDE NO: KA-140

LOCATION: The slide is located at latitude 13° 05' 1.0" N and longitude 75° 28' 12.7" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(15 m from slide no KA-139) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 10 m (Photo 77).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 11.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 17.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 93.5 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0 m/SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : S 80° E |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of debris and slope easening is recommended.

SLIDE NO: KA-141

LOCATION: The slide is located at latitude 13° 04' 50.0" N and longitude 75° 28' 10.4" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(Near 97 km stone- 35 km to Dharmsthala)Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 7 m (Photo 78).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 12.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 30.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0 m/SH-64 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S 60° E |

CAUSES: The debris slump is caused due slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: The hanging tree on the crown part should be removed, debris material should be removed and easening of slope is recommended.

SLIDE NO: KA-142

LOCATION: The slide is located at latitude 13° 04' 47.8" N and longitude 75° 28' 12.3" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section(Near 97 km stone- 35 km to Dharmsthala) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide is has a horizontal extent of 1 m and vertical interval of 7 m (Photo 79).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 25.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0 m/SH-64 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S 70° E |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Debris material should be removed with easening of slope is recommended.

SLIDE NO: KA-143

LOCATION: The slide is located at latitude 13° 04' 44.2" N and longitude 75° 28' 14.8" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 9 m (Photo 80).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 150.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 18.0 m/SH-64 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : N 45° E |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Roots of tree seen on crown part are to be removed, removal of debris material and easening of slope is recommended.

SLIDE NO: KA-144

LOCATION: The slide is located at latitude 13° 04' 40.1" N and longitude 75° 28' 18.4" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of weathered material and rock fragments. One set of joint is noticed on weathered Granite/Gneiss i.e. J1-NS/85°W which is also parallel to foliation plane. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has horizontal extent of 2 m and vertical interval of 15 m (Photo 81).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 18.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 12.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 108.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 35.0 m / SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : N 10° W |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECOMMENDATION: Removal of debris material and easening of slope is recommended.

SLIDE NO: KA-145

LOCATION: The slide is located at latitude 13° 04' 42.2" N and longitude 75° 28' 22.0" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 5 m (Photo 82).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 8.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 6.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 12.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0 m / SH-64 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : N 50° E |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECOMMENDATION: Removal of debris material with easening of slope is recommended.

SLIDE NO: KA-146

LOCATION: The slide is located at latitude 13° 04' 42.3" N and longitude 75° 28' 21.0" E in Survey of India toposheet No 48 O / 8 along SH-64 between Kotighera-Charmudi road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 7 m (Photo 83).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 25.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0 m / SH-64 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : N 15° W |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECOMMENDATION: Removal of debris material with easening of slope is recommended.

III. 3. LANDSLIDES RECORDED ALONG SH-66 BETWEEN KOTIGHERA-KALASA ROAD SECTION

SLIDE NO: KA-147

LOCATION: The slide is located at latitude 13° 07' 42.8" N and longitude 75° 30' 52.8" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of weathered material and rock fragments. The thickness of overburden is 3.0 m. The repose angle of the slide is 30°. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 9 m (Photo 84).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 13.5 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 51.0 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.5 m/SH-66 |
| i. Cut slope height | : 13.0 m |
| j. Direction of slide | : N 50° W |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECOMMENDATION: Easening of slope and removal of loose material from the crown is recommended.

SLIDE NO: KA-148

LOCATION: The slide is located at latitude 13° 11' 56.6" N and longitude 75° 23' 21.6" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section(near Marsanagi school in Marsanagi village) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The debris consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The repose angle of the slide is 30°. Cracks are observed at the crown part which are 1 m in length with 0.5 cm opening and are at vertical angle. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 10 m (Photo 85).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 13.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 5.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 16.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : 11.0 m/SH-66 |
| i. Cut slope height | : 11.0 m |
| j. Direction of slide | : S 5° E |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Easening of slope and removal of loose material from the crown is recommended.

SLIDE NO: KA-149

LOCATION: The slide is located at latitude 13° 11' 56.6" N and longitude 75° 23' 21.6" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section (near Marsanagi School in Marsanagi village) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old debris slump and already remedial measures have been taken. The thickness of overburden is 1.5 m. The repose angle of the slide is 30°. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 8 m and vertical interval of 8 m (Photo 86).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 18.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 20.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 270.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : 14.0 m/SH-66 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 40° E |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: The existing remedial measures provided may be monitored properly.

SLIDE NO: KA-150

LOCATION: The slide is located at latitude 13° 12' 53.2" N and longitude 75° 22' 39.7" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as new debris slump (multiple slides side by side taken as one slide). The debris material consists of weathered material and rock fragments. The thickness of overburden is 0.5 m. The repose angle of the slide is 20°. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 6 m (Photo 87).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 8.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 38.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 76.0 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : - /SH-66 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S 40° W |

CAUSES: The multiple debris slumps are caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Easening of slope is recommended.

SLIDE NO: KA-151

LOCATION: The slide is located at latitude 13° 12' 53.2" N and longitude 75° 22' 39.7" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 1 m and vertical interval of 4 m (Photo 88).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 5.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 7.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 9.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : - /SH-66 |
| i. Cut slope height | : 7.0 m |
| j. Direction of slide | : S 15° E |

CAUSES: Debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Easening of slope is recommended.

SLIDE NO: KA-152

LOCATION: The slide is located at latitude 13° 13' 21.4" N and longitude 75° 21' 59.8" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as huge multiple slide four slides side by side taken as one slide. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.5 m. Cracks at crown part are observed which are 5 m in length with 15 cm opening and are vertical in nature. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 18 m (Photo 89, 90).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 21.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 190.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 2993.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0 m /SH-66 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 80° W |

CAUSES: The multiple debris slides, four slides taken as one slide caused by slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECOMMENDATION: Easening of slope with proper drainage and removal of debris is recommended.

SLIDE NO: KA-153

LOCATION: The slide is located at latitude 13° 13' 53.1" N and longitude 75° 21' 15.0" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section (near IBP petrol pump Kalasa) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump caused due to slope cutting. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The repose angle is 20°. The slope modification for construction petrol pump is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 13 m (Photo 91).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 13.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 98.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : - / - |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S 40° E |

CAUSES: The debris slump is caused due to slope cutting.

NATURE OF DAMAGE: The petrol pump adjoining area is affected.

RECCOMENDATION: Easening of slope and removal of debris is recommended.

SLIDE NO: KA-154

LOCATION: The slide is located at latitude 13° 13' 53.0" N and longitude 75° 21' 53.0" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section (near IBP petrol pump Kalasa) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as new debris slump. The debris material consists of weathered material and rock fragments. The slide is located just behind the petrol pump and the petrol pump is in grave danger. The repose angle is 20°. The thickness of overburden is 1.0 m. Cracks at crown part are observed which are 2 m in length with 1 cm opening and are vertical in nature. The slope modification for construction petrol pump is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 25 m (Photo 92, 93, 94 and 95).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 30.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 68.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 1530.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : - / - |
| i. Cut slope height | : 30.0 m |
| j. Direction of slide | : S 30° W |

CAUSES: The debris slump is caused due to slope cutting.

NATURE OF DAMAGE: The petrol pump and adjoining area is affected.

RECCOMENDATION: Crown part is unstable, the retaining wall should be extended or the slope easening has to be carried out.

SLIDE NO: KA-155

LOCATION: The slide is located at latitude 13° 13' 53.3" N and longitude 75° 21' 51.7" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as new debris slump which is retrograding upwards. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction petrol pump is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. (Photo 96).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 12.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 90.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 10.0 m /SH-66 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S 20° E |

CAUSES: The debris slump is caused due to slope cutting.

NATURE OF DAMAGE: The petrol pump and adjoining area is affected.

RECCOMENDATION: Easening of slope is recommended.

SLIDE NO: KA-156

LOCATION: The slide is located at latitude 13° 13' 14" N and longitude 75° 22' 13.2" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section (2 km from Kalasa) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as reactivated debris slide and is spreading laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction petrol pump is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 9 m and vertical interval of 11 m (Photo 97).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 48.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 90.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : - / - |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : N 35° E |

CAUSES: The debris slide is caused by slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road is affected

RECOMMENDATION: Crown part is unstable, debris removal and the slope easening has to be carried out.

SLIDE NO: KA-157

LOCATION: The slide is located at latitude 13° 11' 47.8" N and longitude 75° 24' 33.9" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section in Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris material consists of weathered material and rock fragments. The weathered material has slipped over the day lighted plane. One joint set is observed on weathered Granite/Gneiss viz., J1-N20°W/48°W which is day lighted plane. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 9 m and vertical interval of 11 m (Photo 98).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 48.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 360.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 13.0 m /SH-66 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : Towards S |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road was affected.

RECCOMENDATION: Easening of slope is recommended.

SLIDE NO: KA-158

LOCATION: The slide is located at latitude 13° 10' 6.9" N and longitude 75° 28' 55.9" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.5 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 10 m (Photo 99).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 28.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 252.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : - /- |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : Towards W |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road was affected.

RECCOMENDATION: Easening of slope is recommended.

SLIDE NO: KA-159

LOCATION: The slide is located at latitude 13° 8' 35.9" N and longitude 75° 28' 55.9" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide almost stabilised. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are stable. The slide has a horizontal extent of 2 m and vertical interval of 12 m (Photo 100).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 28.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 5.0 m |
| d. Volume of failed mass above the failure surface | : 1050.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : - / - |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 55° E |

CAUSES: The debris slide is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road was affected at the time when old slide took place.

RECCOMENDATION: Old slide almost stabilised.

SLIDE NO: KA-160

LOCATION: The slide is located at latitude 13° 10' 12.2" N and longitude 75° 28' 55.9" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as old debris slide almost stabilised. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are stable. The slide has a horizontal extent of 15 m and vertical interval of 18 m (Photo 101).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 21.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 16.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3.0 m |
| d. Volume of failed mass above the failure surface | : 504.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : - /SH-66 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : S 10° E |

CAUSES: The debris slide is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road was affected during old slide took place.

RECCOMENDATION: Old slide almost stabilised.

SLIDE NO: KA-161

LOCATION: The slide is located at latitude 13° 10' 11.8" N and longitude 75° 28' 25.9" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section(50m from slide no KA-160) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide almost stabilised. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are stable. The slide has a horizontal extent of 10 m and vertical interval of 17 m (Photo 102).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 20.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 150.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : - /- |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : Towards S |

CAUSES: The debris slide is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road was affected at the time of old slide took place.

RECCOMENDATION: Old slide almost stabilised.

SLIDE NO: KA-162

LOCATION: The slide is located at latitude 13° 9' 58.7" N and longitude 75° 27' 11.6" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section (Near Kalgere estate) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old and reactivated debris slide stabilised to some extent. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 19 m (Photo 103).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 22.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 9.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 58.7 m |
| d. Volume of failed mass above the failure surface | : 5811.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 25.0 m /SH -66 |
| i. Cut slope height | : 30.0 m |
| j. Direction of slide | : Towards N |

CAUSES: the debris slide is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road was affected.

RECOMMENDATION: Slope modification, proper drainage is recommended.

SLIDE NO: KA-163

LOCATION: The slide is located at latitude 13° 10' 3.7" N and longitude 75° 27' 6.4" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section(200 m from slide no KA-162) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as new debris slide extending from the cut slope to below the road. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head and crown part is unstable (Photo 104).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|---|
| a. Length of failed mass from crown to foot | : 18.0 m |
| | (above the road
in cut slope 8 m
below the road
10 m – road
located at mid
slope) |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 4.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 36.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0 m / below
SH -66 |
| i. Cut slope height | : 30.0 m |
| j. Direction of slide | : N 25° W |

CAUSES: The debris slide is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road was affected.

RECCOMENDATION: Slope modification or benching with proper drainage is recommended.

SLIDE NO: KA-164

LOCATION: The slide is located at latitude 13° 09' 52.7" N and longitude 75° 26' 56.8" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as new debris slump extending from the road towards valley. The materials used for construction of road are slided. The thickness of overburden is 1.0 m. Crown cracks are noticed which 10 m in length with 50 cm are opening, and are vertical in nature. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part is unstable (Photo 105, 106, and 107).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 125.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0 m / below SH -66 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : N 55° W |

CAUSES: The material removed from the cut slope has been dumped, executed the slide. Material below the road has been washed away. It is a fresh debris slump.

NATURE OF DAMAGE: SH-66 was affected.

RECCOMENDATION: SH-66 is in grave danger and crown part is unstable. The debris removal and the slope stabilisation by back filling are recommended.

SLIDE NO: KA-165

LOCATION: The slide is located at latitude 13° 9' 50.9" N and longitude 75° 26' 33.2" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as old debris slide almost stabilised. The thickness of overburden is 0.5 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are stable. The slide has a horizontal extent of 3 m and vertical interval of 8 m (Photo 108).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 63.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0 m / SH-66 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 20° E |

CAUSES: The debris slide is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road was affected.

RECCOMENDATION: Old slide almost stabilised.

SLIDE NO: KA-166

LOCATION: The slide is located at latitude 13° 10' 33.4" N and longitude 75° 25' 48.6" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as old debris slide may reactivate at any time. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 6 m and vertical interval of 12 m (Photo 109).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 9.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 68.0 m ³ |
| e. Slope angle post failure | : 60° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0 m / SH-66 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 35° E |

CAUSES: The debris slide is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road was affected.

RECOMMENDATION: Old slide may reactivate at any time slope easening is recommended.

SLIDE NO: KA-167

LOCATION: The slide is located at latitude 13° 10' 44.3" N and longitude 75° 25' 35.5" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are stable. The slide has a horizontal extent of 15 m and vertical interval of 25 m (Photo 110).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | | |
|----|---|--------------------------------------|
| a. | Length of failed mass from crown to foot | : 30.0 m |
| b. | Maximum width of failed mass from the left flank to the right flank boundary | : 17.0 m |
| c. | Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. | Volume of failed mass above the failure surface | : 255.0 m ³ |
| e. | Slope angle post failure | : 60° |
| f. | Slope angle pre failure | : 90° |
| g. | General slope gradient | : 20° |
| h. | Run out distance / up to | : 35.0 m / towards valley from SH-66 |
| i. | Cut slope height | : 5.0 m |
| j. | Direction of slide | : N 40° E |

CAUSES: The debris slide is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road was affected.

RECCOMENDATION: Old slide stabilised by providing retaining wall of 12 m length 3 m height and 0.5 m thickness. The remedial measures given should be monitored regularly.

SLIDE NO: KA-168

LOCATION: The slide is located at latitude 13° 11' 29.8" N and longitude 75° 25' 10.0" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as new debris slump extending from the road towards valley. The materials used for construction of road are slided. The thickness of overburden is 1.0 m. Crown cracks are noticed which 10 m in length with 50 cm are opening and is vertical in nature. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part is unstable. The slide has a horizontal extent of 20 m and vertical interval of 30 m (Photo 111, 112).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 40.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 300.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 50.0 m / below SH -66 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : N 50° E |

CAUSES: The material removed from the cut slope has been dumped which executed the slide. Material below the road has been washed away. It is a fresh debris slump.

NATURE OF DAMAGE: SH-66 road was affected.

RECCOMENDATION: SH-66 road is in grave danger remedial measures should be attended immediately. Slope grading, retaining wall, stone pitching on erosional part of road surface (below road, valley side) recommended.

SLIDE NO: KA-169

LOCATION: The slide is located at latitude 13° 14' 45.3" N and longitude 75° 21' 3.3" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump caused mainly due to water action at head and toe, lot of debris has washed away. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 6 m and vertical interval of 9 m (Photo 113).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|---|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 55.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 330.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0 m / SH-66 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : Varies from N to E as slide is on bend of the road. |

CAUSES: Earth slump is caused mainly due to water action at head and toe part, huge debris material has washed away.

NATURE OF DAMAGE: SH-66 road was affected.

RECCOMENDATION: Proper drainage, easening of slope and removal of debris are recommended.

SLIDE NO: KA-170

LOCATION: The slide is located at latitude 13° 14' 45.0" N and longitude 75° 21' 3.0" E in Survey of India toposheet No 48 O / 8 along SH-66 between Kotighera-Kalasa road section (20 m from slide no KA-169) Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable (Photo 114).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 50.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 10.0 m / SH-66 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : Towards E. |

CAUSES: Earth slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-66 road was affected.

RECCOMENDATION: Easening of slope is recommended.

III. 4. LANDSLIDES RECORDED ALONG SH-64 BETWEEN CHIKMAGALUR-MUDIGERE ROAD SECTION

SLIDE NO: KA-171

LOCATION: The slide is located at latitude 13° 10' 8.5" N and longitude 75° 39' 6.1" E in Survey of India toposheet No 48 O / 12 along SH-64 between Chikmagalur-Mudigere road section Mudigere Taluk, Chikmagalur district (5 km from Mudigere towards Chikmagalur).

SLIDE DESCRIPTION: The slide is classified as new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 10 m and vertical interval of 24 m (Photo 115).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 30.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 6.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2 m |
| d. Volume of failed mass above the failure surface | : 180.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : - / - |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : S20°W |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Easening of slope and proper drainage is recommended.

SLIDE NO: KA-172

LOCATION: The slide is located at latitude 13° 11' 48.4" N and longitude 75° 40' 7.4" E in Survey of India toposheet No 48 O / 12 along SH-64 between Chikmagalur-Mudigere road section Mudigere Taluk, Chikmagalur district (10 km from Mudigere towards Chikmagalur).

SLIDE DESCRIPTION: The slide is classified as new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 0.5 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 24 m (Photo 116).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 8.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 5 m |
| d. Volume of failed mass above the failure surface | : 200.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 10° |
| h. Run out distance / up to | : - /- |
| i. Cut slope height | : 7.0 m |
| j. Direction of slide | : N25°W |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of unstable material and proper drainage is recommended.

SLIDE NO: KA-173

LOCATION: The slide is located at latitude 13° 10' 11.1" N and longitude 75° 39' 4.6" E in Survey of India toposheet No 48 O / 12 along SH-64 between Chikmagalur-Mudigere road section Mudigere Taluk, Chikmagalur district (Near slide No KA-172).

SLIDE DESCRIPTION: The slide is classified as new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 10 m and vertical interval of 12 m (Photo 147).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 20.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 100.0 m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : - /- |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : N75°W |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECOMMENDATION: Removal of unstable material and proper drainage is recommended.

SLIDE NO: KA-174

LOCATION: The slide is located at latitude 13° 10' 11.0" N and longitude 75° 39' 4.4" E in Survey of India toposheet No 48 O / 12 along SH-64 between Chikmagalur-Mudigere road section Mudigere Taluk, Chikmagalur district.

SLIDE DESCRIPTION: The slide is classified as new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 7 m (Photo 118).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 6.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 15.0 m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : - / - |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S55°W |

CAUSES: The debris slump is caused due to slope cutting during construction of road.

NATURE OF DAMAGE: SH-64 road was affected.

RECCOMENDATION: Removal of unstable material and proper drainage is recommended.

III. 5. LANDSLIDES ALONG SH-88 MADIKERE -SULIYA ROAD SECTION

SLIDE NO: KA-175

LOCATION: The slide is located at latitude 12° 26' 37.0" N and longitude 75° 38' 54.7" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section (2-3 km from Jodpal towards Suliya)Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part and crown parts of the slide are unstable whereas toe part is stable. The slide has a 1 m horizontal extent and 9 m vertical interval (Photo 119).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | | |
|----|---|-----------------------|
| a. | Length of failed mass from crown to foot | : 10.0 m |
| b. | Maximum width of failed mass from the left flank to the right flank boundary | : 8.0 m |
| c. | Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. | Volume of failed mass above the failure surface | : 20.0 m ³ |
| e. | Slope angle post failure | : 85° |
| f. | Slope angle pre failure | : 90° |
| g. | General slope gradient | : 20° |
| h. | Run out distance / up to | : 10.0 m / SH-88 |
| i. | Cut slope height | : 12.0 m |
| j. | Direction of slide | : S 80° E. |

CAUSES: The earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECOMMENDATION: Grading of Slope is recommended.

SLIDE NO: KA-176

LOCATION: The slide is located at latitude 12° 26' 45.7" N and longitude 75° 38' 49.2" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris material consists of weathered material and rock fragments. The thickness of overburden is 0.5 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part and crown parts of the slide are unstable whereas toe part is stable. The slide has a 1 m horizontal extent and 7 m vertical interval (Photo 120).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 8.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 14.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 28.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 10.0 m / SH-88 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : N 25° E. |

CAUSES: The earth slump is caused due to road cutting.

NATURE OF DAMAGE: SH-88 earth was affected.

RECOMMENDATION: Slope easening is recommended.

SLIDE NO: KA-177

LOCATION: The slide is located at latitude 12° 26' 1.5" N and longitude 75° 38' 38.1" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section (Near Glen Coorg estate) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new complex slide; left side of the slide is debris slide right side is rock fall. The debris material consists of weathered material and rock fragments and rock fall is planar one. Two sets of joints are noticed on weathered granite viz., J1-N80°E/75°S which is having 50 cm spacing and is tight and J2-N15°E/23°SE which is having 30 cm spacing and is tight is also a day lighted plane. The thickness of overburden is 0.5 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part, toe and crown parts of the slide are unstable. The slide has a 7 m horizontal extent and 16 m vertical interval (Photo 121).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 18.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 26.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 351.0 m ³ |
| e. Slope angle post failure | : 50° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0 m / SH-88 |
| i. Cut slope height | : 14.0 m |
| j. Direction of slide | : Towards E. |

CAUSES: Complex slide is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECOMMENDATION: Removal of debris and slope easening is recommended.

SLIDE NO: KA-178

LOCATION: The slide is located at latitude 12° 27' 4.0" N and longitude 75° 38' 38.4" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section (Near Glen Coorg estate) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The debris material consists of weathered material and rock fragments. Two sets of joints are noticed on weathered granite viz., J1-N20°W/74°E which is having 1.5 m spacing and is tight and J2-N10°E/38°SE which is having 1.5 m spacing and debris have slipped along this plane. As the granite is highly fractured it is very difficult to distinguish between fracture plane and joint plane. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part, toe and crown parts of the slide are unstable. The slide has a 7 m horizontal extent and 16 m vertical interval (Photo 122).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 12.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 72.0 m ³ |
| e. Slope angle post failure | : 50° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 14.0 m / SH-88 |
| i. Cut slope height | : 14.0 m |
| j. Direction of slide | : N 75° E. |

CAUSES: The debris slide is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Removal of debris and slope easening is recommended.

SLIDE NO: KA-179

LOCATION: The slide is located at latitude 12° 27' 6.1" N and longitude 75° 38' 36.8" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section (Near big curve of Glen Coorg estate) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a debris slump. The debris material consists of weathered material and rock fragments. The thickness of overburden is 0.5 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. Weathered granite in the process of lateritisation (limonitic patches seen and rock is highly fractured and jointed). Three sets of joints are noticed in weathered granite viz., J1-N35°W/40°NE which is having 5 cm spacing and is tight which is also a day lighted plane, J2-N15°E/45°W which is having 20 cm spacing and is tight and J3-N40°W/58°SW having 6 cm spacing and is tight. The head part, toe and crown parts of the slide are unstable. The slide has a 7 m horizontal extent and 16 m vertical interval (Photo 123, 124).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|--|
| a. Length of failed mass from crown to foot | : 18.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 60.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 540.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 20.0 m / SH-88 |
| i. Cut slope height | : 13.0 m |
| j. Direction of slide | : N 40° E varies according to the curve. |

CAUSES: The debris slide is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECOMMENDATION: Removal of debris and slope easening is recommended.

SLIDE NO: KA-180

LOCATION: The slide is located at latitude 12° 27' 3.4" N and longitude 75° 38' 34.5" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section(50 m from slide no KA-179) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a old and reactivated debris slump. The debris material consists of weathered material and rock fragments. The thickness of overburden is 0.5 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part, toe and crown parts of the slide are unstable. The slide has a 3 m horizontal extent and 10 m vertical interval (Photo 125).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 150.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0 m / SH-88 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 20° W. |

CAUSES: The debris slide is reactivated one caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Removal of debris and slope grading is recommended.

SLIDE NO: KA-181

LOCATION: The slide is located at latitude 12° 27' 2.5" N and longitude 75° 38' 34.5" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section(200 m from slide no KA-180) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as an old debris slump which may reactivate. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part and crown parts of the slide are unstable where as toe part is stable (Photo 126).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 18.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 108.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 12.0 m / SH-88 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 80° W. |

CAUSES: The debris slide may reactivate is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Slope grading is recommended.

SLIDE NO: KA-182

LOCATION: The slide is located at latitude 12° 27' 7.7" N and longitude 75° 38' 33.3" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section(50 m from slide no KA-181) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide which may reactivate as longitudinal cracks are developed on the flanks which are 1 m in length with 4 cm opening and are vertical. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part and crown parts of the slide are unstable where as toe part is stable. The slide has a 3 m horizontal extent and 9 m vertical interval (Photo 127).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 11.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 83.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 12.0 m / SH-88 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 70° W. |

CAUSES: The debris slide may reactivate is caused due slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Slope grading is recommended.

SLIDE NO: KA-183

LOCATION: The slide is located at latitude 12° 26' 57.0" N and longitude 75° 38' 30.9" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section(180 m from slide no KA-182) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide which may reactivate as a stream is flowing on debris. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part and crown parts of the slide are unstable where as toe part is stable. The slide has a 3 m horizontal extent and 9 m vertical interval (Photo 128).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 11.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 11.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 61.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 12.0 m / SH-88 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : N 65° W. |

CAUSES: The debris slide may reactivate is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Slope grading with proper drainage and is recommended.

SLIDE NO: KA-184

LOCATION: The slide is located at latitude 12° 27' 35.1" N and longitude 75° 37' 46.1" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide which may reactivate. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part and crown parts of the slide are unstable where as toe part is stable. The slide has a 3 m horizontal extent and 9 m vertical interval (Photo 129).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 28.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 168.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 14.0 m / SH-88 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 10° E. |

CAUSES: The debris slide may reactivate is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Slope grading is recommended.

SLIDE NO: KA-185

LOCATION: The slide is located at latitude 12° 27' 53.1" N and longitude 75° 37' 0.8" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section (7 km from Sampaje towards Madikere) in Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide which may reactivate. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part and crown parts of the slide are unstable where as toe part is stable. The slide has a 3 m horizontal extent and 8 m vertical interval (Photo 130).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 18.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 90.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 12.0 m / SH-88 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 70° E. |

CAUSES: The debris slide may reactivate is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Slope grading is recommended.

SLIDE NO: KA-186

LOCATION: The slide is located at latitude 12° 28' 10.3" N and longitude 75° 36' 41.2" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section (6 km from Sampaje towards Madikere) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide which may reactivate. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part and crown parts of the slide are unstable where as toe part is stable. The slide has a 3 m horizontal extent and 7 m vertical interval (Photo 131).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 17.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 43.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 12.0 m / SH-88 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : N 30° E. |

CAUSES: The debris slide may reactivate is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Slope grading, removal of debris and trees are recommended.

SLIDE NO: KA-187

LOCATION: The slide is located at latitude 12° 28' 21.6" N and longitude 75° 36' 20.5" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section (5.5 km from Sampaje towards Madikere) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as an old debris slump which may reactivate cracks are seen on debris due to deep penetration of roots of trees. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part and crown parts of the slide are unstable whereas toe part is stable. The slide has a 3 m horizontal extent and 5 m vertical interval (Photo 132).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 7.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 53.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 10° |
| h. Run out distance / up to | : 10.0 m / SH-88 |
| i. Cut slope height | : 9.0 m |
| j. Direction of slide | : N 10° E. |

CAUSES: The debris slide may reactivate is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Slope grading, removal of debris and trees are recommended.

SLIDE NO: KA-188

LOCATION: The slide is located at latitude 12° 28' 23.5" N and longitude 75° 35' 56.6" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section (4.5 km from Sampaje towards Madikere) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as an old debris slump which may reactivate. The debris material consists of weathered material and rock fragments. Two sets of joints were noticed on weathered granite viz., J1-N60°W/81°NE which is having 60 cm spacing and is tight and J2- N55°W/53°SW and is tight is parallel to foliation plane of granite. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The granite highly deformed and foliated with a foliation plane of N55°W/53°SW. The head part, toe and crown parts of the slide are unstable. The slide has a 5 m horizontal extent and 10 m vertical interval (Photo 133).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 13.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 20.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 130.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 15.0 m / SH-88 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : N 25° E. |

CAUSES: The debris slide may reactivate is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Slope grading and removal of debris are recommended.

SLIDE NO: KA-189

LOCATION: The slide is located at latitude 12° 28' 23.0" N and longitude 75° 35' 44.4" E in Survey of India toposheet No 48 P / 11 along SH-88 between Madikere-Suliya road section (4.0 km from Sampaje towards Madikere) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump with large scarp development. The scarp is having 10 m radius, 5 m width and 3 m height. The debris material consists of weathered material and rock fragments. The thickness of overburden is 3.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part, toe and crown parts of the slide are unstable. The slide has a 5 m horizontal extent and 10 m vertical interval (Photo 134, 135).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 13.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 30.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 195.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 15.0 m / SH-88 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : N 25° E. |

CAUSES: The debris slide with huge scarp is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 was affected.

RECCOMENDATION: Slope grading is recommended with removal of debris and mainly removal of hanging trees on the crown portion.

SLIDE NO: KA-190

LOCATION: The slide is located at latitude 12° 31' 2.8" N and longitude 75° 29' 12.9" E in Survey of India toposheet No 48 P / 06 along SH-88 between Madikere-Suliya road section (2 km from Gonadka towards Suliya) Suliya Taluk, Dakshina Kannada district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump. The debris material consists of clay materials and weathered rock material. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly laterite. The head part, toe and crown parts of the slide are unstable. The slide has a 4 m horizontal extent and 6 m vertical interval (Photo 136).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 8.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 40.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 11.0 m / SH-88 |
| i. Cut slope height | : 7.0 m |
| j. Direction of slide | : S 70° W. |

CAUSES: The earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Slope grading is recommended.

SLIDE NO: KA-191

LOCATION: The slide is located at latitude 12° 31' 9.0" N and longitude 75° 27' 11.8" E in Survey of India toposheet No 48 P / 06 along SH-88 between Madikere-Suliya road section (300 m from Gonadka bridge towards Suliya) Suliya Taluk, Dakshina Kannada district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump. The debris material consists of clay minerals and weathered rock material. The thickness of overburden is 1.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly laterite. The head part, toe and crown parts of the slide are unstable. The slide has a 3 m horizontal extent and 6 m vertical interval (Photo 137).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 7.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 44.0 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 9.0 m / SH-88 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : N 25° E. |

CAUSES: The earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Removal of debris and slope easening is recommended.

SLIDE NO: KA-192

LOCATION: The slide is located at latitude 12° 31' 9.0" N and longitude 75° 27' 10.2" E in Survey of India toposheet No 48 P / 06 along SH-88 between Madikere-Suliya road section (40 m from Slide no KA-191) Suliya Taluk, Dakshina Kannada district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump. The debris material consists of clay minerals and weathered rock material. The thickness of overburden is 5.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly laterite. The head part, toe and crown parts of the slide are unstable. The slide has a 4 m horizontal extent and 8 m vertical interval (Photo 138).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 38.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0 m / SH-88 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : N 5° E. |

CAUSES: The earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Removal of debris and slope easening is recommended.

SLIDE NO: KA-193

LOCATION: The slide is located at latitude 12° 31' 9.1" N and longitude 75° 27' 10.0" E in Survey of India toposheet No 48 P / 06 along SH-88 between Madikere-Suliya road section (10 m from Slide no KA-192) Suliya Taluk, Dakshina Kannada district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump. The debris material consists of clay minerals and weathered rock material. The thickness of overburden is 5.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly laterite. The head part, toe and crown parts of the slide are unstable. The slide has a 3 m horizontal extent and 7 m vertical interval (Photo 139).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 38.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0 m / SH-88 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : N 5° E. |

CAUSES: The earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Removal of debris and slope easening is recommended.

SLIDE NO: KA-194

LOCATION: The slide is located at latitude 12° 31' 10.7" N and longitude 75° 26' 57.7" E in Survey of India toposheet No 48 P / 06 along SH-88 between Madikere-Suliya road section (300 m from Slide no KA-193) Suliya Taluk, Dakshina Kannada district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump which is laterally spreading. The debris material consists of clay minerals and weathered rock material. The thickness of overburden is 6.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly laterite. The head part, toe and crown parts of the slide are unstable. The slide has a 3 m horizontal extent and 9 m vertical interval (Photo 140).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 18.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 54.0 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 13.0 m / SH-88 |
| i. Cut slope height | : 13.0 m |
| j. Direction of slide | : S 5° E. |

CAUSES: The earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Slope easening with proper drainage and removal of debris are recommended.

SLIDE NO: KA-195

LOCATION: The slide is located at latitude 12° 31' 12.8" N and longitude 75° 26' 31.5" E in Survey of India toposheet No 48 P / 06 along SH-88 between Madikere-Suliya road section (800 m from Slide no KA-194) Suliya Taluk, Dakshina Kannada district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump. The debris material consists of clay minerals and weathered rock material. The thickness of overburden is 8.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly laterite. The head part, toe and crown parts of the slide are unstable. The slide has a 3 m horizontal extent and 8 m vertical interval (Photo 141).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 13.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 33.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0 m / SH-88 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 20° W. |

CAUSES: The earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Slope easening with proper drainage as *nala* is flowing and most of the slump is covered by bushes and removal of debris and are recommended.

SLIDE NO: KA-196

LOCATION: The slide is located at latitude 12° 32' 48.9" N and longitude 75° 24' 0.9" E in Survey of India toposheet No 48 P / 06 along SH-88 between Madikere-Suliya road section (6 km from Slide no KA-195 near Suliya) Suliya Taluk, Dakshina Kannada district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump which is spreading laterally due to water action. The debris material consists of clay minerals and weathered rock material. The thickness of overburden is 8.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly laterite. The head part, toe and crown parts of the slide are unstable. The slide has a 2 m horizontal extent and 5 m vertical interval (Photo 142).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 7.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 18.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 63.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 8.0 m / SH-88 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 60° W. |

CAUSES: The earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Easening of slope with proper drainage and removal of debris; removal of trees which are precariously hanging on the crown is recommended. Due to water action slump is spreading laterally.

SLIDE NO: KA-197

LOCATION: The slide is located at latitude 12° 32' 48.9" N and longitude 75° 24' 0.9" E in Survey of India toposheet No 48 P / 06 along SH-88 between Madikere-Suliya road section (6 km from Slide no KA-196, near Suliya) Suliya Taluk, Dakshina Kannada district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump. The debris material consists of clay minerals and weathered rock material. The thickness of overburden is 8.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly laterite. The head part, toe and crown parts of the slide are unstable. The slide has a 2 m horizontal extent and 6 m vertical interval (Photo 143).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 8.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 38.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 152.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 10.0 m / SH-88 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 70° W. |

CAUSES: The earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Easening of slope and removal of debris is recommended.

SLIDE NO: KA-198

LOCATION: The slide is located at latitude 12° 32' 56.8" N and longitude 75° 23' 54.1" E in Survey of India toposheet No 48 P / 06 along SH-88 between Madikere-Suliya road section (near Suliya) Suliya Taluk, Dakshina Kannada district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump. The debris material consists of clay minerals and weathered rock material. The thickness of overburden is 10.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly laterite. The head part, toe and crown parts of the slide are unstable. The slide has a 2 m horizontal extent and 6 m vertical interval (Photo 144).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 7.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 18.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 63.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 10.0 m / SH-88 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S 30° W. |

CAUSES: The earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-88 road was affected.

RECCOMENDATION: Grading of slope and removal of debris is recommended. Care should be taken for the crown part which is accommodated with plantations and a house.

III. 6. LANDSLIDES ALONG SH-88 MADIKERE -SIDDAPUR ROAD SECTION

SLIDE NO: KA-199

LOCATION: The slide is located at latitude 12° 24' 43.5" N and longitude 75° 45' 27.6" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. Three adjacent slides are taken as one. At various places Granite is exposed. Some trees are precariously hanging. The debris material consists of weathered rock material and rock fragments. The thickness of overburden is 2.0 m. Two sets of joints are noticed in Granite viz., J1-N65°E/77°SE which has 1 m spacing and is tight and J2-NS/25°W which is having 1 m spacing and is tight. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. The slide has a 5 m horizontal extent and 18 m vertical interval (Photo 145).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 20.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 70.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 1050.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 25.0 m / SH-89 |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : Towards E. |

CAUSES: Multiple debris slides are caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Slope easening with removal of debris and crown stabilisation are recommended.

SLIDE NO: KA-200

LOCATION: The slide is located at latitude 12° 24' 40.3" N and longitude 75° 45' 28.0" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section (100 m from slide no KA-199) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump. The debris material consists of weathered rock material and clay minerals. The thickness of overburden is 2.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. The slide has a 3 m horizontal extent and 12 m vertical interval (Photo 146).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | | |
|----|---|-----------------------|
| a. | Length of failed mass from crown to foot | : 15.0 m |
| b. | Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. | Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. | Volume of failed mass above the failure surface | : 38.0 m ³ |
| e. | Slope angle post failure | : 70° |
| f. | Slope angle pre failure | : 80° |
| g. | General slope gradient | : 25° |
| h. | Run out distance / up to | : 18.0 m / SH-89 |
| i. | Cut slope height | : 20.0 m |
| j. | Direction of slide | : N 80° E. |

CAUSES: Earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Removal of debris and slope easening is recommended.

SLIDE NO: KA-201

LOCATION: The slide is located at latitude 12° 24' 38.6" N and longitude 75° 45' 28.2" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section (50 m from slide no KA-200)Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new earth slump. The slide material consists of clay. The thickness of overburden is 3.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. The slide has a 3 m horizontal extent and 8 m vertical interval (Photo 147).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | | |
|----|---|-----------------------|
| a. | Length of failed mass from crown to foot | : 11.0 m |
| b. | Maximum width of failed mass from the left flank to the right flank boundary | : 13.0 m |
| c. | Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. | Volume of failed mass above the failure surface | : 36.0 m ³ |
| e. | Slope angle post failure | : 70° |
| f. | Slope angle pre failure | : 80° |
| g. | General slope gradient | : 25° |
| h. | Run out distance / up to | : 13.0 m / SH-89 |
| i. | Cut slope height | : 15.0 m |
| j. | Direction of slide | : N 80° E. |

CAUSES: Earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Removal of debris, slope grading with plantations and proper drainage is recommended.

SLIDE NO: KA-202

LOCATION: The slide is located at latitude 12° 24' 36.4" N and longitude 75° 45' 28.7" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section (50 m from slide no KA-201) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as new earth slump. Two slides side by side are taken as one slide. The debris consists of clay and weathered rock material. The thickness of overburden is 5.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. The slide has a 3 m horizontal extent and 8 m vertical interval (Photo 148).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | | |
|----|---|-----------------------|
| a. | Length of failed mass from crown to foot | : 8.0 m |
| b. | Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. | Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. | Volume of failed mass above the failure surface | : 50.0 m ³ |
| e. | Slope angle post failure | : 70° |
| f. | Slope angle pre failure | : 80° |
| g. | General slope gradient | : 20° |
| h. | Run out distance / up to | : 12.0 m / SH-89 |
| i. | Cut slope height | : 10.0 m |
| j. | Direction of slide | : S 80° E. |

CAUSES: Earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Removal of debris, slope grading with plantations and proper drainage is recommended.

SLIDE NO: KA-203

LOCATION: The slide is located at latitude 12° 23' 37.0" N and longitude 75° 47' 45.8" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section (500 m from Kattalkad) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as an old and reactivated earth slump. The debris consists of clay and weathered rock material. The thickness of overburden is 5.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. The slide has a 4 m horizontal extent and 22 m vertical interval (Photo 149).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | | |
|----|---|------------------------|
| a. | Length of failed mass from crown to foot | : 25.0 m |
| b. | Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. | Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. | Volume of failed mass above the failure surface | : 156.0 m ³ |
| e. | Slope angle post failure | : 70° |
| f. | Slope angle pre failure | : 80° |
| g. | General slope gradient | : 30° |
| h. | Run out distance / up to | : 28.0 m / SH-89 |
| i. | Cut slope height | : 25.0 m |
| j. | Direction of slide | : N 45° E. |

CAUSES: Earth slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Slope grading with plantations is recommended.

SLIDE NO: KA-204

LOCATION: The slide is located at latitude 12° 23' 36.5" N and longitude 75° 47' 46.4" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section (50 m from slide no KA-203) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a debris slump on the valley side of the road. The debris consists of clay, rock fragments and weathered rock material. The thickness of overburden is 3.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. The slide has a 10 m horizontal extent and 28 m vertical interval (Photo 150).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 30.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 375.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : - |
| g. General slope gradient | : 45° |
| h. Run out distance / up to | : 35.0 m / SH-89 |
| i. Cut slope height | : - |
| j. Direction of slide | : N 45° E. |

CAUSES: Debris slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Slide on the embankment and is danger to the road; Retaining wall/stone pitching is recommended.

SLIDE NO: KA-205

LOCATION: The slide is located at latitude 12° 23' 28.8" N and longitude 75° 47' 52.2" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as complex slide half side is rock fall half debris slide. The debris consists of clay, rock fragments and weathered rock material. The rock fall is planar in nature. Three sets of joints noticed on granite viz., J1-N50°E/70°SE which is having 1 m spacing and is tight, J2-N30°W/54°SW having 60 cm spacing and is tight and J3-N30°W/53°NE having 80cm spacing and is tight. The thickness of overburden is 0.5 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. The slide has a 12 m horizontal extent and 30 m vertical interval (Photo 151).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 35.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 20.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 4.0 m |
| d. Volume of failed mass above the failure surface | : 1400.0 m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 45° |
| h. Run out distance / up to | : - / SH-89 |
| i. Cut slope height | : 30.0 m |
| j. Direction of slide | : N 65° E. |

CAUSES: Complex slide is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Removal of debris, protection should be given at toe and head in the form of retaining wall and stone pitching, slope gradation with proper drainage is recommended.

SLIDE NO: KA-206

LOCATION: The slide is located at latitude 12° 23' 24.9" N and longitude 75° 47' 57.9" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as debris slump. The debris consists of clay, rock fragments and weathered rock material. The thickness of overburden is 2.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The toe and crown parts of the slide are unstable whereas head condition is stable. The slide has a 2 m horizontal extent and 10 m vertical interval (Photo 152).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | | |
|----|---|-----------------------|
| a. | Length of failed mass from crown to foot | : 11.0 m |
| b. | Maximum width of failed mass from the left flank to the right flank boundary | : 6.0 m |
| c. | Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. | Volume of failed mass above the failure surface | : 17.0 m ³ |
| e. | Slope angle post failure | : 70° |
| f. | Slope angle pre failure | : 80° |
| g. | General slope gradient | : 45° |
| h. | Run out distance / up to | : 12.0 m / SH-89 |
| i. | Cut slope height | : 10.0 m |
| j. | Direction of slide | : N 70° E. |

CAUSES: Debris slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Removal of material from the crown part and slope grading is recommended.

SLIDE NO: KA-207

LOCATION: The slide is located at latitude 12° 23' 23.0" N and longitude 75° 47' 58.2" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as an old and reactivated debris slump. The debris consists of clay, rock fragments and weathered material. The thickness of overburden is 3.0 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head toe and crown parts of the slide are unstable. The slide has a 8 m horizontal extent and 25 m vertical interval (Photo 153).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | | |
|----|---|------------------------|
| a. | Length of failed mass from crown to foot | : 30.0 m |
| b. | Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. | Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. | Volume of failed mass above the failure surface | : 225.0 m ³ |
| e. | Slope angle post failure | : 70° |
| f. | Slope angle pre failure | : 80° |
| g. | General slope gradient | : 45° |
| h. | Run out distance / up to | : 40.0 m / SH-89 |
| i. | Cut slope height | : 25.0 m |
| j. | Direction of slide | : N 75° E. |

CAUSES: Slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Removal of material and slope grading is recommended.

SLIDE NO: KA-208

LOCATION: The slide is located at latitude 12° 23' 22.3" N and longitude 75° 47' 57.7" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as complex slide with half is debris slide and half is rock fall. The debris consists of clay, rock fragments and weathered rock material. The rock fall is planar in nature. The thickness of overburden is 2.0 m. One set of joint noticed in granite viz., J1-N55°W/50°SW which is having 1.0 m spacing and is tight. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. The slide has a 10 m horizontal extent and 27 m vertical interval (Photo 154).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 32.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 35.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 1120.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 40° |
| h. Run out distance / up to | : 50.0 m / SH-89 |
| i. Cut slope height | : 30.0 m |
| j. Direction of slide | : N 85° E. |

CAUSES: Complex slide is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Slope grading is recommended.

SLIDE NO: KA-209

LOCATION: The slide is located at latitude 12° 23' 20.6" N and longitude 75° 47' 58" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as an old rock fall. The debris consists of rock fragments and weathered granitic material. The rock fall is planar in nature. The thickness of overburden is 0.5 m. The depth of weathering is 2m. Two sets of joints are noticed on granite viz., J1-N50°E/vertical and J2-N30°W/39°SW is a foliation joint plane. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. The slide has a 5 m horizontal extent and 10 m vertical interval (Photo 155).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 150.0 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 40° |
| h. Run out distance / up to | : - / SH-89 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : N 78° E. |

CAUSES: Rock fall is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Slope grading is recommended.

SLIDE NO: KA-210

LOCATION: The slide is located at latitude 12° 23' 17.1" N and longitude 75° 48' 2.6" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section (100 m from slide no KA-209) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of rock fragments, clay minerals and weathered granitic material. The thickness of overburden is 1.0 m. The depth of weathering is 10 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. Tree roots are penetrating and cracks are seen on crown part. The slide has a 4 m horizontal extent and 10 m vertical interval (Photo 156).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | | |
|----|---|-----------------------|
| a. | Length of failed mass from crown to foot | : 12.0 m |
| b. | Maximum width of failed mass from the left flank to the right flank boundary | : 11.0 m |
| c. | Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. | Volume of failed mass above the failure surface | : 66.0 m ³ |
| e. | Slope angle post failure | : 75° |
| f. | Slope angle pre failure | : 90° |
| g. | General slope gradient | : 35° |
| h. | Run out distance / up to | : 15.0 m/ SH-89 |
| i. | Cut slope height | : 10.0 m |
| j. | Direction of slide | : N 35° E. |

CAUSES: Slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Removal of debris material from the crown part and slope grading is recommended.

SLIDE NO: KA-211

LOCATION: The slide is located at latitude 12° 23' 15.9" N and longitude 75° 48' 4.6" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section (50 m from slide no KA-210) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 2.0 m. The depth of weathering is 10 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part, toe and crown parts of the slide are unstable. The slide has a 4 m horizontal extent and 12 m vertical interval (Photo 157).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | | |
|----|---|-----------------------|
| a. | Length of failed mass from crown to foot | : 16.0 m |
| b. | Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. | Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. | Volume of failed mass above the failure surface | : 80.0 m ³ |
| e. | Slope angle post failure | : 70° |
| f. | Slope angle pre failure | : 90° |
| g. | General slope gradient | : 35° |
| h. | Run out distance / up to | : 18.0 m/ SH-89 |
| i. | Cut slope height | : 12.0 m |
| j. | Direction of slide | : N 50° E. |

CAUSES: Slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Removal of debris material from the crown part and slope grading is recommended.

SLIDE NO: KA-212

LOCATION: The slide is located at latitude 12° 23' 16.9" N and longitude 75° 48' 9.7" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section (200 m from slide no KA-211) Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The debris consists of rock fragments, clay and weathered granitic material. Earlier mud road washed away by huge slide, the material has been saturated by heavy rains. The thickness of overburden is 2.0 m. The depth of weathering is 10 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head part is stable where as toe and crown parts of the slide are unstable. The slide has a 20 m horizontal extent and 25 m vertical interval (Photo 158, 159).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 40.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 70.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3.0 m |
| d. Volume of failed mass above the failure surface | : 4200.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 50.0 m/ SH-89 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : N 50° E. |

CAUSES: The debris slide is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Removal of trees at crown portion, removal of debris and slope modification or benching is recommended.

SLIDE NO: KA-213

LOCATION: The slide is located at latitude 12° 22' 49.6" N and longitude 75° 49' 21.9" E in Survey of India toposheet No 48 P / 15 along SH-89 between Madikere -Siddapur road section Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 0.5 m. The depth of weathering is 10 m. One set of joint is noticed on granite viz., J1-N30°W/39°SW which is also a foliation plane. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly granite. The head portion, toe and crown parts of the slide are unstable. The slide has a 5 m horizontal extent and 7 m vertical interval (Photo 160).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | | |
|----|---|-----------------------|
| a. | Length of failed mass from crown to foot | : 10.0 m |
| b. | Maximum width of failed mass from the left flank to the right flank boundary | : 12.0 m |
| c. | Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. | Volume of failed mass above the failure surface | : 30.0 m ³ |
| e. | Slope angle post failure | : 70° |
| f. | Slope angle pre failure | : 80° |
| g. | General slope gradient | : 25° |
| h. | Run out distance / up to | : 12.0 m/ SH-89 |
| i. | Cut slope height | : 10.0 m |
| j. | Direction of slide | : N 80° E. |

CAUSES: Slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-89 road was affected.

RECCOMENDATION: Removal of debris material at crown portion and slope modification is recommended.

III. 7. LANDSLIDES ALONG SH-27 MADIKERE -VIRAJPET ROAD SECTION

SLIDE NO: KA-214

LOCATION: The slide is located at latitude 12° 24' 50.9" N and longitude 75° 44' 34.2" E in Survey of India toposheet No 48 P / 11 along SH-27 (250 m from Madikere towards Virajpet) between Madikere -Virajpet road section, Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 1.0

m. The depth of weathering is > 10 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 1 m horizontal extent and 5 m vertical interval (Photo 161).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 5.7 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 36.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 3.0 m/ SH-27 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S 60° W. |

CAUSES: The slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-27 road was affected.

RECCOMENDATION: Slope modification or benching is recommended.

SLIDE NO: KA-215

LOCATION: The slide is located at latitude 12° 24' 47.1" N and longitude 75° 44' 34.6" E in Survey of India toposheet No 48 P / 11 along SH-27(100 m from Slide no KA-214 towards Virajpet) between Madikere -Virajpet road section, Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 1.0 m. The depth of weathering is > 10 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 1.5 m horizontal extent and 1 m vertical interval (Photo 162).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 20.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 225.0 m ³ |
| e. Slope angle post failure | : 50° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 10.0 m/ SH-27 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S 60° W. |

CAUSES: The slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-27 road was affected.

RECCOMENDATION: The corrective measure recommended to protect the slope is modification of slope or benching.

SLIDE NO: KA-216

LOCATION: The slide is located at latitude 12° 24' 44.0" N and longitude 75° 44' 38.1" E in Survey of India toposheet No 48 P / 11 along SH-27(550 m from Madikere towards Virajpet) between Madikere -Virajpet road section, Madikere Taluk, Coorg district

SLIDE DESCRIPTION: The slide is first of its kind in Karnataka as this is the slide where for the first time any casualties were reported. The slide occurred on 4th July 2006 killing 6 persons including 4 children and damaging one house completely. Detailed geotechnical investigation was carried out by GSI and report was submitted. (R.Dharuman and B.Anjanappa, 2007). The thickness of overburden is 2.0 m. The depth of weathering is > 10 m. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 1.0 m horizontal extent and 14 m vertical interval (Photo 163).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 142.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 2130 m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 150.0 m/ SH-27 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S 65° W. |

CAUSES: The prolonged heavy rain saturating the excavated loose and unconsolidated debris material has caused sudden slicing of the slope material dislodging about 2120 cu.m of material along the slope downwards for more than 150 m in a narrow channel.

NATURE OF DAMAGE: 6 persons were killed including 4 children and damaging one house completely.

RECCOMENDATION: Short term measures of slope grading and proper drainage were recommended and micro Zonation of the Madikere-Marnad road section was recommended at the time of post-disaster study.

SLIDE NO: KA-217

LOCATION: The slide is located at latitude 12° 24' 44.6" N and longitude 75° 44' 38.5" E in Survey of India toposheet No 48 P / 11 along SH-27(600 m from Madikere towards Virajpet) between Madikere -Virajpet road section, Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 1.0 m. The depth of weathering is > 10 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 1.0 m horizontal extent and 10 m vertical interval (Photo 164).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 7.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 42.0 m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 8.0 m/ SH-27 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S 70° W. |

CAUSES: The slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-27 road was affected.

RECCOMENDATION: The corrective measure recommended to protect the slope is modification of slope or benching.

GEOLOGICAL SURVEY OF INDIA

SLIDE NO: KA-218

LOCATION: The slide is located at latitude 12° 24' 44.2" N and longitude 75° 44' 38.5" E in Survey of India toposheet No 48 P / 11 along SH-27(600 m from Madikere towards Virajpet) between Madikere -Virajpet road section, Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 1.0 m. The depth of weathering is > 10 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 1.0 m horizontal extent and 14 m vertical interval (Photo 165).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 16.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 120.0 m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 10.0 m/ SH-27 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S 70° W. |

CAUSES: The slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-27 road was affected.

RECCOMENDATION: The corrective measure recommended to protect the slope is modification of slope or benching.

SLIDE NO: KA-219

LOCATION: The slide is located at latitude 12° 24' 43.4" N and longitude 75° 44' 38.5" E in Survey of India toposheet No 48 P / 11 along SH-27(600 m from Madikere towards Virajpet) between Madikere -Virajpet road section, Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 1.0 m. The depth of weathering is > 10 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 1.0 m horizontal extent and 16 m vertical interval (Photo 166).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 25.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3.0 m |
| d. Volume of failed mass above the failure surface | : 938.0 m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 12.0 m/ SH-27 |
| i. Cut slope height | : 11.0 m |
| j. Direction of slide | : S 70° W. |

CAUSES: The slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-27 road was affected.

RECCOMENDATION: The corrective measure recommended to protect the slope is modification of slope or benching.

SLIDE NO: KA-220

LOCATION: The slide is located at latitude 12° 24' 35.6" N and longitude 75° 44' 38.7" E in Survey of India toposheet No 48 P / 11 along SH-27(2 km from Madikere 24 km towards Virajpet) between Madikere -Virajpet road section, Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 4.0 m. The depth of weathering is > 10 m. one set of Joint is noticed on weathered granite/gneiss is J1-N65°W/72°NE which is also a foliation plane. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 1.0 m horizontal extent and 14 m vertical interval (Photo 167).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 17.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 26.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 442.0 m ³ |
| e. Slope angle post failure | : 40° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 15.0 m/ SH-27 |
| i. Cut slope height | : 5.0 m |
| j. Direction of slide | : S 45° W. |

CAUSES: The slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-27 road was affected.

RECCOMENDATION: The corrective measure recommended to protect the slope is modification of slope or benching.

SLIDE NO: KA-221

LOCATION: The slide is located at latitude 12° 24' 38.6" N and longitude 75° 44' 39.0" E in Survey of India toposheet No 48 P / 11 along SH-27(2.2 km from Madikere 23.8 km towards Virajpet) between Madikere -Virajpet road section, Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a reactivated debris slide. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 2.0 m. The depth of weathering is > 10 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 1.0 m horizontal extent and 12 m vertical interval (Photo 168).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 30.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 450.0 m ³ |
| e. Slope angle post failure | : 45° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 12.0 m/ SH-27 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S 65° W. |

CAUSES: The slide is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-27 road was affected.

RECCOMENDATION: The corrective measure recommended to protect the slope is modification of slope or benching.

GEOLOGICAL SURVEY OF INDIA

SLIDE NO: KA-222

LOCATION: The slide is located at latitude 12° 24' 23.5" N and longitude 75° 44' 31.3" E in Survey of India toposheet No 48 P / 11 along SH-27 between Madikere -Virajpet road section, Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new multiple debris slide. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 1.5 m. The depth of weathering is > 10 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 2.0 m horizontal extent and 8 m vertical interval (Photo 169).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 48.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 240.0 m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 10.0 m/ SH-27 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S 25° W. |

CAUSES: The slide is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-27 road was affected.

RECCOMENDATION: The corrective measure recommended to protect the slope is modification of slope or benching.

SLIDE NO: KA-223

LOCATION: The slide is located at latitude 12° 24' 22.0" N and longitude 75° 44' 31.3" E in Survey of India toposheet No 48 P / 11 along SH-27 between Madikere -Virajpet road section, Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 1.5 m. The depth of weathering is > 10 m. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 2.0 m horizontal extent and 6 m vertical interval (Photo 170).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 5.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 38.0 m ³ |
| e. Slope angle post failure | : 65° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 12.0 m/ SH-27 |
| i. Cut slope height | : 5.0 m |
| j. Direction of slide | : S 64° W. |

CAUSES: The slide is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-27 road was affected.

RECOMMENDATION: The corrective measure recommended to protect the slope is modification of slope or benching.

SLIDE NO: KA-224

LOCATION: The slide is located at latitude 12° 24' 19.6" N and longitude 75° 44' 32.2" E in Survey of India toposheet No 48 P / 11 along SH-27 between Madikere -Virajpet road section, Madikere Taluk, Coorg district.

SLIDE DESCRIPTION: The slide is classified as a old debris slide. The debris consists of rock fragments, clay and weathered granitic material. The thickness of overburden is 1.0m. The depth of weathering is > 10 m. one set of joint is noticed on weathered granite/gneiss i.e. J1-N70°E/62°S which is also a foliation plane. The slope modification for construction of the State Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite/gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 2.0 m horizontal extent and 6 m vertical interval (Photo 171).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 8.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 20.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 80.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 10.0 m/ SH-27 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S 70° W. |

CAUSES: The slide is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: SH-27 road was affected.

RECCOMENDATION: The corrective measure recommended to protect the slope is modification of slope or benching.

III. 8. LANDSLIDES ALONG NH-48 SAKLESHPUR ROAD SECTION

(SHIRADI GHAT)

SLIDE NO: KA-225

LOCATION: The slide is located at latitude 12° 49' 48.6" N and longitude 75° 35' 34.8" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 17 m (Photo 172).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 18.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 45.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0m / NH-48 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : Towards S |

CAUSES: The debris slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of trees from the crown, grading of slopes and proper drainage is recommended.

SLIDE NO: KA-226

LOCATION: The slide is located at latitude 12° 49' 49.3" N and longitude 75° 35' 35.6" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite and granulite. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 8 m (Photo 173).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 60.0 m ³ |
| e. Slope angle post failure | : 78° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0m / NH-48 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S20°E |

CAUSES: The debris slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of trees from the crown, grading of slopes and proper drainage is recommended.

GEOLOGICAL SURVEY OF INDIA

SLIDE NO: KA-227

LOCATION: The slide is located at latitude 12° 49' 49.4" N and longitude 75° 35' 36.8" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district(10m from slide no KA-226).

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The slide has occurred from mid of cut slope up to the road and will retrograde. The debris material consists of weathered material and rock fragments. The thickness of overburden is 4.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part, toe and crown parts of the slide are unstable. The slide is has a horizontal extent of 4 m and vertical interval of 8 m (Photo 174).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 8.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 20.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 10 .0m/NH-48 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : S20°E |

CAUSES: The debris slump is caused slope cutting during construction of the road.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-228

LOCATION: The slide is located at latitude 12° 49' 50.9" N and longitude 75° 35' 38.4" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 5.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 10 m and vertical interval of 10 m (Photo 175).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 32.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2 m |
| d. Volume of failed mass above the failure surface | : 480.0 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0m /NH-48 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : N40°E |

CAUSES: The debris slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-229

LOCATION: The slide is located at latitude 12° 49' 43.2" N and longitude 75° 36' 4.7" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 3.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite and granulite. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 6 m and vertical interval of 6 m (Photo 176).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 30.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 150.0 m ³ |
| e. Slope angle post failure | : 60° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 22° |
| h. Run out distance / up to | : 7.0m /NH-48 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S50°W |

CAUSES: The debris slump is caused due to slope cutting during construction of the road.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Large tree resting on the crown should be removed. Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-230

LOCATION: The slide is located at latitude 12° 49' 45.9" N and longitude 75° 36' 24.5" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new rock slide. The slide is a wedge failure due to intersection of 3 sets of joints. The joint are J1-N10°W/50°W, J2-NS/74°E and J3-N50°E/25°NW. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 15 m (Photo 177, 178).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 18.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 90.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 18.0m / NH-48 |
| i. Cut slope height | : 17.0 m |
| j. Direction of slide | : S55°E |

CAUSES: The rock slide is caused by planar failure due to slope cutting during construction of the road.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose boulders. Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-231

LOCATION: The slide is located at latitude 12° 49' 45.6" N and longitude 75° 37' 46.9" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The failure surface is slip. The overburden thickness is 2m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 7 m (Photo 179).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 8.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 40.0 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 6.0m /NH-48 |
| i. Cut slope height | : 7.0 m |
| j. Direction of slide | : S10°W |

CAUSES: The debris slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECOMMENDATION: Removal of loose materials. Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-232

LOCATION: The slide is located at latitude 12° 54' 22.5" N and longitude 75° 44' 7.5 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The failure surface is slip. The overburden thickness is 5m. The depth of weathering is 20m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss and granulite. The head part, toe and crown parts of the slide are unstable (Photo 180).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 56.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2 m |
| d. Volume of failed mass above the failure surface | : 1456.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 6.0m /NH-48 |
| i. Cut slope height | : 40.0 m |
| j. Direction of slide | : E |

CAUSES: The debris slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes, Plantation and proper drainage is recommended.

SLIDE NO: KA-233

LOCATION: The slide is located at latitude 12° 54' 1.7" N and longitude 75° 44' 7.6 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The failure surface is slip. The depth of weathering is 8m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 8 m (Photo 181).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 13.4 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 6.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 40.2 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 12.5m / NH-48 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S45E |

CAUSES: The debris slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes, Plantation on slopes and proper drainage is recommended.

SLIDE NO: KA-234

LOCATION: The slide is located at latitude 12° 54' 0.7" N and longitude 75° 44' 6.4 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The failure surface is slip. The overburden thickness is 2m. The depth of weathering is 8m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 10 m (Photo 182).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.5 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 6.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 37.5 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 11.5m /NH-48 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S50E |

CAUSES: The debris slide caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes, Plantation on slopes and proper drainage is recommended.

SLIDE NO: KA-235

LOCATION: The slide is located at latitude 12° 49' 47.8" N and longitude 75° 38' 50.9" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 6.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss and granulite. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 10 m and vertical interval of 15 m (Photo 183).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 22.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 25.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 5 m |
| d. Volume of failed mass above the failure surface | : 1375.0 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 15.0m /NH-48 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : N75°E |

CAUSES: The debris slide is caused due to slope cutting during construction of the Highway.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of trees from the crown, grading of slopes and proper drainage and retaining wall is recommended.

GEOLOGICAL SURVEY OF INDIA

SLIDE NO: KA-236

LOCATION: The slide is located at latitude 12° 49' 52.4" N and longitude 75° 38' 50" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly weathered granite and granulite. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 9 m (Photo 184).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 11.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 37.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 203.5 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 10.0m / NH-48 |
| i. Cut slope height | : 9.0 m |
| j. Direction of slide | : N75°E |

CAUSES: The debris slump is caused due to slope cutting during construction of the Highway.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of trees from the crown, grading of slopes and proper drainage is recommended.

GEOLOGICAL SURVEY OF INDIA

SLIDE NO: KA-237

LOCATION: The slide is located at latitude 12° 49' 59.9" N and longitude 75° 38' 59.9" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 9 m (Photo 185).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 45.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0m / NH-48 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S20°W |

CAUSES: The debris slump is caused due to slope cutting during construction of the Highway.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-238

LOCATION: The slide is located at latitude 12° 50' 0.6" N and longitude 75° 39' 9.9" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. (Photo 186).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 29.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3 m |
| d. Volume of failed mass above the failure surface | : 652.5 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 30.0m / NH-48 |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : S25°E |

CAUSES: Increase in the slope angle due to slope cutting. Weathered and debris material above the bed rock has moved due to heavy rain.

NATURE OF DAMAGE: NH-48 road was affected.

RECOMMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-239

LOCATION: The slide is located at latitude 12° 50' 31" N and longitude 75° 39' 15.3" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 4.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 8 m and vertical interval of 13 m (Photo 187).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 18.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 45.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2 m |
| d. Volume of failed mass above the failure surface | : 810.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0m /NH-48 |
| i. Cut slope height | : 18.0 m |
| j. Direction of slide | : S50°E |

CAUSES: Increase in slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-240

LOCATION: The slide is located at latitude 12° 50' 7.1" N and longitude 75° 39' 19.6" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The thickness of overburden is 4m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 10 m (Photo 188).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 75.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : 15.0m / NH-48 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S35°E |

CAUSES: Increase in slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECOMMENDATION: Removal of loose materials. Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-241

LOCATION: The slide is located at latitude 12° 50' 21.6" N and longitude 75° 39' 34.6 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide. The failure surface is slip. The earlier retaining wall is broken due to new slide. Retaining wall was constructed for length of 50 m height 5m. The overburden thickness is 3m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 4 m and vertical interval of 8 m (Photo 189).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 30.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 150.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 10.0m /NH-48 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S25°E |

CAUSES: The debris slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes with proper drainage and retaining wall is recommended.

SLIDE NO: KA-242

LOCATION: The slide is located at latitude 12° 50' 22" N and longitude 75° 39' 36.6 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide. The old slide has prograded laterally on both sides. The failure surface is slip. The retaining wall has been constructed for 50 mts and the slide is stabilised. The overburden thickness is 5m. The depth of weathering is 10m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a 10m horizontal interval and 50m vertical extent (Photo 190).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|--------------------------|
| a. Length of failed mass from crown to foot | : 60.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 440.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 5 m |
| d. Volume of failed mass above the failure surface | : 66000.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 75.0m / NH-48 |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : S20°W |

CAUSES: The debris slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials, Grading of slopes, Plantation and proper drainage is recommended.

SLIDE NO: KA-243

LOCATION: The slide is located at latitude 12° 50' 22.2" N and longitude 75° 39' 41.2 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide. The old slide is stabilised by retaining wall for 30 mts. The failure surface is slip. The thickness of overburden is 5m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable (Photo 191).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 30 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 61.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3 m |
| d. Volume of failed mass above the failure surface | : 2745 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 28.0m / NH-48 |
| i. Cut slope height | : 25.0 m |
| j. Direction of slide | : Towards south |

CAUSES: The debris slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECOMMENDATION: Removal of loose materials. Grading of slopes, Plantation on slopes and proper drainage is recommended.

SLIDE NO: KA-244

LOCATION: The slide is located at latitude 12° 50' 22" N and longitude 75° 39' 46.3 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The failure surface is slip. The overburden thickness is 2m. The depth of weathering is 6m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 4 m and vertical interval of 8 m (Photo 192).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|---------------------|
| a. Length of failed mass from crown to foot | : 10 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 75 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 10.0 m/ NH-48 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S10°E |

CAUSES: The debris slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes, Plantation on slopes and proper drainage is recommended.

SLIDE NO: KA-245

LOCATION: The slide is located at latitude 12° 50' 24.7" N and longitude 75° 40' 24.5" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 8 m (Photo 193).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 8.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 40.0 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 9.0m / NH-48 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S10°W |

CAUSES: Increase in the slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of debris, grading of slopes and proper drainage is recommended.

SLIDE NO: KA-246

LOCATION: The slide is located at latitude 12° 50' 27.4" N and longitude 75° 40' 26" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 15 m and vertical interval of 10 m (Photo 194).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 25.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 50.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 4 m |
| d. Volume of failed mass above the failure surface | : 2500 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 25.0m /NH-48 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S10°E |

CAUSES: Increase in the slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-247

LOCATION: The slide is located at latitude 12° 50' 27.1" N and longitude 75° 40' 28.7" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 10 m and vertical interval of 15 m (Photo 195).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 15.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 45.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0m /NH-48 |
| i. Cut slope height | : 18.0 m |
| j. Direction of slide | : S15°E |

CAUSES: Increase in the slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

GEOLOGICAL SURVEY OF INDIA

SLIDE NO: KA-248

LOCATION: The slide is located at latitude 12° 50' 35.8" N and longitude 75° 40' 38.1" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 5 m and vertical interval of 8 m (Photo 196).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 90.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 540 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0m / NH-48 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : E |

CAUSES: Increase in the slope angle due to slope cutting. Weathered and debris material above the bed rock has moved due to heavy rain.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes or benching and proper drainage is recommended.

SLIDE NO: KA-249

LOCATION: The slide is located at latitude 12° 50' 42.1" N and longitude 75° 40' 36.8" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 10 m and vertical interval of 28 m (Photo 197).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 35.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 6.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 105.0 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : 40.0m / NH-48 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : S30°W |

CAUSES: Increase in slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes or benching and proper drainage is recommended.

SLIDE NO: KA-250

LOCATION: The slide is located at latitude 12° 50' 39.1" N and longitude 75° 40' 42.1" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as an old and reactivated debris slide. The thickness of overburden is 7m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The head part, toe and crown parts of the slide are unstable. The slide has a horizontal extent of 20 m and vertical interval of 15 m (Photo 198).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 40.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 55.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 4 m |
| d. Volume of failed mass above the failure surface | : 4400.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 45.0m / NH-48 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S35°W |

CAUSES: Increase in slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-251

LOCATION: The slide is located at latitude 12° 50' 40.3" N and longitude 75° 40' 48.7 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The failure surface is slip. The overburden thickness is 2m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 10 m and vertical interval of 10 m (Photo 199).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 24.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 28.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 336.0 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : 25.0m / NH-48 |
| i. Cut slope height | : 18.0 m |
| j. Direction of slide | : S10°W |

CAUSES: The debris slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-252

LOCATION: The slide is located at latitude 12° 50' 40.7" N and longitude 75° 40' 59.3 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The overburden thickness is 1m. The depth of weathering is 8m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a 6m horizontal and 7m vertical extent (Photo 200).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 9.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 14.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 63.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 10.0m / NH-48 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S35°W |

CAUSES: The debris slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes, plantation and proper drainage is recommended.

SLIDE NO: KA-253

LOCATION: The slide is located at latitude 12° 50' 41.9" N and longitude 75° 41' 4.9 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The thickness of overburden is 1m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a 3m horizontal and 9m vertical extent (Photo 201).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------------------|
| a. Length of failed mass from crown to foot | : 10 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 40.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 200 m ³ |
| e. Slope angle post failure | : 90° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 10.0m / NH-48 |
| i. Cut slope height | : 9.0 m |
| j. Direction of slide | : S20W(varies as road takes turn) |

CAUSES: The debris slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes, plantation on slopes and proper drainage is recommended.

SLIDE NO: KA-254

LOCATION: The slide is located at latitude 12° 50' 43.9" N and longitude 75° 41' 6.5 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The failure surface is slip. The overburden thickness is 1m. The depth of weathering is 6m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 7 m and vertical interval of 7 m (Photo 202).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 15 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 27 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.5 m |
| d. Volume of failed mass above the failure surface | : 303.8 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 88° |
| g. General slope gradient | : 15° |
| h. Run out distance / up to | : 15.0 m/ NH-48 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : S60°E |

CAUSES: The debris slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECOMMENDATION: Removal of loose materials. Grading of slopes, plantation on slopes and proper drainage is recommended.

SLIDE NO: KA-255

LOCATION: The slide is located at latitude 12° 50' 44.9" N and longitude 75° 41' 8.3" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The depth of overburden is 1.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 2 m and vertical interval of 13 m (Photo 203).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 9.5.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 35.6 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 10° |
| h. Run out distance / up to | : 15.0 m/ NH-48 |
| i. Cut slope height | : 13.0 m |
| j. Direction of slide | : S40°E |

CAUSES: Increase in the slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of debris, grading of slopes and proper drainage is recommended.

SLIDE NO: KA-256

LOCATION: The slide is located at latitude 12° 50' 45" N and longitude 75° 41' 11.2" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide and prograding laterally. One big slide of 50 m and two small slides are taken as one. Weathered rock material has moved over the bed rock. The debris material consists of weathered material and rock fragments. The depth of overburden is 2.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 10 m and vertical interval of 15m (Photo 204).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 30.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 85.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 4 m |
| d. Volume of failed mass above the failure surface | : 5100 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 30.0m/ NH-48 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S |

CAUSES: Increase in the slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-257

LOCATION: The slide is located at latitude 12° 50' 49.8" N and longitude 75° 41' 19.7" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The depth of overburden is 1.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable (Photo 205).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 75.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 450.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0m / NH-48 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S50°W |

CAUSES: Increase in the slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

GEOLOGICAL SURVEY OF INDIA

SLIDE NO: KA-258

LOCATION: The slide is located at latitude 12° 50' 45.7" N and longitude 75° 41' 23.6" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as an old debris slide and prograding laterally. Old slide stabilised by masonry wall of 25 m length and 2 m height with weep holes. The debris material consists of weathered material and rock fragments. The depth of overburden is 1.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 10 m and vertical interval of 10 m (Photo 206).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 20.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 75.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2 m |
| d. Volume of failed mass above the failure surface | : 1500 m ³ |
| e. Slope angle post failure | : 70° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 25.0 m/ NH-48 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S75E |

CAUSES: Increase in the slope angle due to slope cutting. Weathered and debris material above the bed rock has moved due to heavy rain.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes, proper drainage and retaining wall is recommended.

SLIDE NO: KA-259

LOCATION: The slide is located at latitude 12° 50' 54.7" N and longitude 75° 41' 32.5" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The depth of overburden is 5.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 8 m and vertical interval of 10 m (Photo 207).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 60.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 225.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 25.0m/ NH-48 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S20°W |

CAUSES: Increase in slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-260

LOCATION: The slide is located at latitude 12° 50' 46.4" N and longitude 75° 41' 35" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The depth of overburden is 1m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has with a horizontal extent of 4 m and vertical interval of 10 m (Photo 208).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 82.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 615.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0m / NH-48 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S25°W |

CAUSES: Increase in slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes with proper drainage and retaining wall is recommended.

SLIDE NO: KA-261

LOCATION: The slide is located at latitude 12° 50' 49.2" N and longitude 75° 41' 43 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The overburden depth is 2m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 8 m and vertical interval of 8 m (Photo 209).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 16.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 120.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 960.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 18.0m /NH-48 |
| i. Cut slope height | : 18.0 m |
| j. Direction of slide | : S30°E |

CAUSES: The debris slump is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-262

LOCATION: The slide is located at latitude 12° 50' 58.1" N and longitude 75° 41' 47.6 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. Two slide adjacent to each other laterally prograded to one. The overburden depth is 1m. The depth of weathering is 8m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a 5m horizontal and 10m vertical extent (Photo 210).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 29.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 174.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0m / NH-48 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S70°E |

CAUSES: The debris slump is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes, Plantation and proper drainage is recommended.

SLIDE NO: KA-263

LOCATION: The slide is located at latitude 12° 51' 8.8" N and longitude 75° 41' 47.4 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new rock slide. Rock slide is rock toppling and rock fall. The depth of overburden is 1m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a 5m horizontal and 10m vertical extent (Photo 211).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 18m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 158.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1 m |
| d. Volume of failed mass above the failure surface | : 1422 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0m / NH-48 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : E |

CAUSES: The rock slide is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-264

LOCATION: The slide is located at latitude 12° 51' 17.9" N and longitude 75° 41' 43.6 " E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The overburden depth is 1m. The depth of weathering is 7m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The has a horizontal extent of 8 m and vertical interval of 8 m (Photo 212).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 15 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 56 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 420 m ³ |
| e. Slope angle post failure | : 75° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0m/ NH-48 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S25°E |

CAUSES: The debris slump is caused by increase of slope angle due to slope cutting. The heavy ingress of water during monsoon has increased the pore water pressure.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of loose materials. Grading of slopes, Plantation on slopes and proper drainage is recommended.

SLIDE NO: KA-265

LOCATION: The slide is located at latitude 12° 51' 20.7" N and longitude 75° 41' 41.3" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 3.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 15 m and vertical interval of 10 m (Photo 213).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 25.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 20.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3 m |
| d. Volume of failed mass above the failure surface | : 750 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 30.0m / NH-48 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S |

CAUSES: Increase in the slope angle due to slope cutting. Increase in pore water pressure due to heavy rain in monsoon.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Removal of debris, grading of slopes and proper drainage is recommended.

SLIDE NO: KA-266

LOCATION: The slide is located at latitude 12° 51' 28.7" N and longitude 75° 41' 47.6" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. The slide has a horizontal extent of 3 m and vertical interval of 12m (Photo 214).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|---------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 12.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 45 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 15.0m / NH-48 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S50°W |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

GEOLOGICAL SURVEY OF INDIA

SLIDE NO: KA-267

LOCATION: The slide is located at latitude 12° 51' 25.4" N and longitude 75° 41' 54.9" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable (Photo 215, 216 and 217).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|--------------------------|
| a. Length of failed mass from crown to foot | : 20.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 500.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2 m |
| d. Volume of failed mass above the failure surface | : 10000.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 80° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 20.0m / NH-48 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S70°E |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECOMMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-268

LOCATION: The slide is located at latitude 12° 51' 40.3" N and longitude 75° 41' 2.0" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable. (Photo 218).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 85.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2 m |
| d. Volume of failed mass above the failure surface | : 1020.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 10.0m / NH-48 |
| i. Cut slope height | : 10.0 m |
| j. Direction of slide | : S 25°E |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECOMMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-269

LOCATION: The slide is located at latitude 12° 51' 44.3" N and longitude 75° 42' 4.4" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide and prograding laterally. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The depth of weathering is 8 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable and head part of the slide is stable. The slide has a horizontal extent of 4.0 m and vertical interval of 10.0 m (Photo 219).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 20.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 40.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 400.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0m/ NH-48 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : Towards S |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-270

LOCATION: The slide is located at latitude 12° 51' 46.3" N and longitude 75° 42' 10.1" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The depth of weathering is 8 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable and head part of the slide is stable. The slide has a horizontal extent of 4.0 m and vertical interval of 15.0 m (Photo 220).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 20.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 115.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 2300.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 20.0m/ NH-48 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S 10° W |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-271

LOCATION: The slide is located at latitude 12° 51' 51.2" N and longitude 75° 42' 9.1" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. Two slides are taken as one slide. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The depth of weathering is 3.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable and head part of the slide is stable. The slide has a horizontal extent of 3.0 m and vertical interval of 6.0 m (Photo 221).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 8.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 42.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 84.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 8.0m/ NH-48 |
| i. Cut slope height | : 6.0 m |
| j. Direction of slide | : S 35° E |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-272

LOCATION: The slide is located at latitude 12° 52' 4.7" N and longitude 75° 42' 14.2" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The depth of weathering is 10.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable and head part of the slide is stable. The slide has a horizontal extent of 15.0 m and vertical interval of 8.0 m (Photo 222).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|------------------------|
| a. Length of failed mass from crown to foot | : 22.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 30.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 2.0 m |
| d. Volume of failed mass above the failure surface | : 660.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 30° |
| h. Run out distance / up to | : 22.0m/ NH48 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : Towards S |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-273

LOCATION: The slide is located at latitude 12° 52' 5.2" N and longitude 75° 42' 15.5" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. Four slides are taken as one slide which is continuous including one old slide; length of large slide is taken. The debris material consists of weathered material and rock fragments. The thickness of overburden is 2.0 m. The depth of weathering is 10.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable and head part of the slide is stable. The slide has a horizontal extent of 10.0 m and vertical interval of 10.0 m (Photo 223).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 25.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 90.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3.0 m |
| d. Volume of failed mass above the failure surface | : 3375.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 25.0m/ NH-48 |
| i. Cut slope height | : 15.0 m |
| j. Direction of slide | : S 15° E |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECOMMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-274

LOCATION: The slide is located at latitude 12° 52' 5.2" N and longitude 75° 42' 25.4" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The debris material consists of weathered material and rock fragments. The thickness of overburden is 1.0 m. The depth of weathering is 6.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable and head part of the slide is stable. The slide has a horizontal extent of 6.0 m and vertical interval of 6.0 m (Photo 224).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 12.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 6.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 36.0 m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 12.0m/ NH-48 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : N 80° W |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-275

LOCATION: The slide is located at latitude 12° 52' 10.7" N and longitude 75° 42' 34.9" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slide. The debris material consists of weathered material and rock fragments. The thickness of overburden is 0.5 m. The depth of weathering is 10.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable and head part of the slide is stable. The slide has a horizontal extent of 10.0 m and vertical interval of 15.0 m (Photo 225).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-------------------------|
| a. Length of failed mass from crown to foot | : 30.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 44.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 3.0 m |
| d. Volume of failed mass above the failure surface | : 1980.0 m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 90° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 30.0m/ NH-48 |
| i. Cut slope height | : 20.0 m |
| j. Direction of slide | : S 15° W |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-276

LOCATION: The slide is located at latitude 12° 53' 13.2" N and longitude 75° 43' 19.6" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The thickness of overburden is 1.0 m. The depth of weathering is 8.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable and head part of the slide is stable (Photo 226).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 85.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 637.5m ³ |
| e. Slope angle post failure | : 85° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0m/ NH-48 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 80° W |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECOMMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-277

LOCATION: The slide is located at latitude 12° 55' 10.8" N and longitude 75° 44' 51.0" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The thickness of overburden is 0.5 m. The depth of weathering is 8.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable and head part of the slide is stable. The slide has a horizontal extent of 3.0 m and vertical interval of 12.0 m (Photo 227).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|-----------------------|
| a. Length of failed mass from crown to foot | : 15.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 22.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 1.0 m |
| d. Volume of failed mass above the failure surface | : 165.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 20° |
| h. Run out distance / up to | : 15.0m/ NH-48 |
| i. Cut slope height | : 12.0 m |
| j. Direction of slide | : S 50° W |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

SLIDE NO: KA-278

LOCATION: The slide is located at latitude 12° 55' 9.6" N and longitude 75° 45' 26.1" E in Survey of India toposheet No 48 P / 9 along NH-48 between Sakleshpur-Gundiya road section, Sakleshpur Taluk, Hassan district.

SLIDE DESCRIPTION: The slide is classified as a new debris slump. The thickness of overburden is 3.0 m. The depth of weathering is 6.0 m. The slope modification for construction of the National Highway is the only land use on this moderately vegetated slope. The geology of the studied area is mainly gneiss. The toe and crown parts of the slide are unstable and head part of the slide is stable. The slide has a horizontal extent of 5.0 m and vertical interval of 2.0 m (Photo 228).

MORPHOLOGICAL PARAMETER OF SLIDE:

- | | |
|--|----------------------|
| a. Length of failed mass from crown to foot | : 10.0 m |
| b. Maximum width of failed mass from the left flank to the right flank boundary | : 10.0 m |
| c. Maximum depth of the failed mass from the surface of the slide to the failure surface | : 0.5 m |
| d. Volume of failed mass above the failure surface | : 25.0m ³ |
| e. Slope angle post failure | : 80° |
| f. Slope angle pre failure | : 85° |
| g. General slope gradient | : 25° |
| h. Run out distance / up to | : 10.0m/ NH-48 |
| i. Cut slope height | : 8.0 m |
| j. Direction of slide | : N 10° W |

CAUSES: Increase in the slope angle due to slope cutting and increase in pore water pressure due to heavy rain in monsoon are the main causes.

NATURE OF DAMAGE: NH-48 road was affected.

RECCOMENDATION: Grading of slopes and proper drainage is recommended.

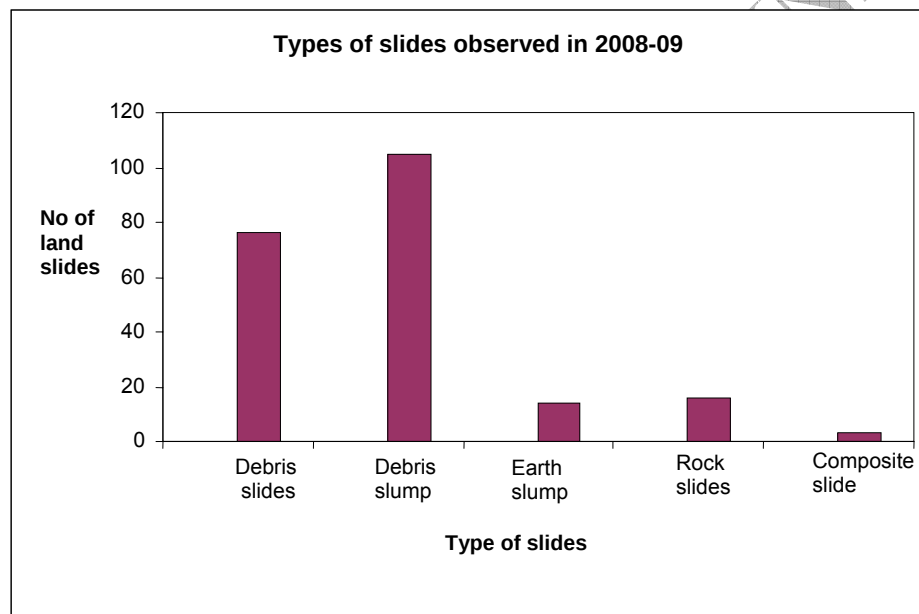
IV. CHARACTERISTICS OF LANDSLIDES STUDIED IN 2008-09

IV. 1. Type of landslides: out of the Total 214 landslides observed in 2008-09 majority are slumps, including both debris slump and earth slumps (119 landslides or 55.61% of the total)

followed by debris slides (76 landslides or 35.51% of the total) and rock slides (16 slides or 7.48% of the total). 3 complex or composite slides were also observed. (Table 1 & Fig 1)

Table 1: Type of landslides in each section.

Type of slides	No of slide	%
Debris slide	76	35.51
Slump	105	49.07
Earth slump	14	6.54
Rockslide	16	7.48
Composite slide	3	1.40
Total	214	100



Section wise analysis on the type of landslide revealed that Kotighera- Charmudi section is having maximum number of debris slump (28 no) and also rock slides (12 no) closely followed by Jog – Honnavar and Sakleshpur–Gundiya section having 18 and 20 debris slump, respectively. Debris slides were prominent in Sakleshpur – Gundiya section (32 no) followed by Jog – Honnavar section (18 no). Madikere – Suliya section recorded maximum number of earth slumps (9 no) followed by Madikere – Siddapur and Madikere - Virajpet sections (9 no in both), (Table 2, 3)

Table 2: Type of landslides in each section.

	Jog-Honnar	Kotighera-Charundi	Kotighera-Kalasa	Chikmagalur-Mudigere	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Sakleshpur-Gundiya
Debris slide	18	5	8	0	5	2	6	32
Debris slump	18	28	16	4	9	5	5	20
Earth slump	0	0	0	0	9	5	0	0
Rock slide	1	12	0	0	0	1	0	2
Complex slide	0	0	0	0	1	2	0	0
Total	37	45	24	4	24	15	11	54

Table 3: Percentage distribution of type of slides in each section.

	Jog-Honnar	Kotighera - Charundi	Kotighera - Kalasa	Chikmagalur-Mudigere	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Sakleshpur-Gundiya
Debris slide	48.65	11.11	33.33	0.00	20.83	13.33	54.55	59.26
Debris slump	48.65	62.22	66.67	100.00	37.50	33.33	45.45	37.04
Earth slump	0.00	0.00	0.00	0.00	37.50	33.33	0.00	0.00
Rock slide	2.70	26.67	0.00	0.00	0.00	6.67	0.00	3.70
Complex slide	0.00	0.00	0.00	0.00	4.17	13.33	0.00	0.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

IV. 2. Dimensions of landslides: The length, width and depth of the slides observed in 2008-09 with respective percentages are presented in (Table 4, 5 and Fig 2). It can be noted from the length and width that most of the landslides have length < 20.0 m and <30.0 m width with distribution having 68.5% and 74.77% respectively indicating small dimensions of the slides. With regard to depth also most of the slides are shallow with <10.0 m depth and in most cases less than 2.0 m. The dimensions of slides in each road sections are also represented in Table 6, 7, 8,9,10 and 11 with corresponding percentage distribution.

Table 4: Dimensions of landslides observed in 2008-09

	Length	Width	Depth
≤10m	61	54	212
>10 ≤20m	107	68	0
>20m≤30m	32	38	0
>30m≤40m	9	18	0
>40m≤50m	1	10	0
>50m	4	26	2
Total	214	214	214

Table 5: Percentage distribution of dimensions of all landslides observed in 2008-09.

	Length (in m)	Breadth (in m)	Depth(in m)
≤10 m	28.50	25.23	99.07
>10m≤20m	50.00	31.78	0.00
>20m≤30m	14.95	17.76	0.00
>30m≤40m	4.21	8.41	0.00
>40m≤50m	0.47	4.67	0.00
Total	100.00	100.00	100.00

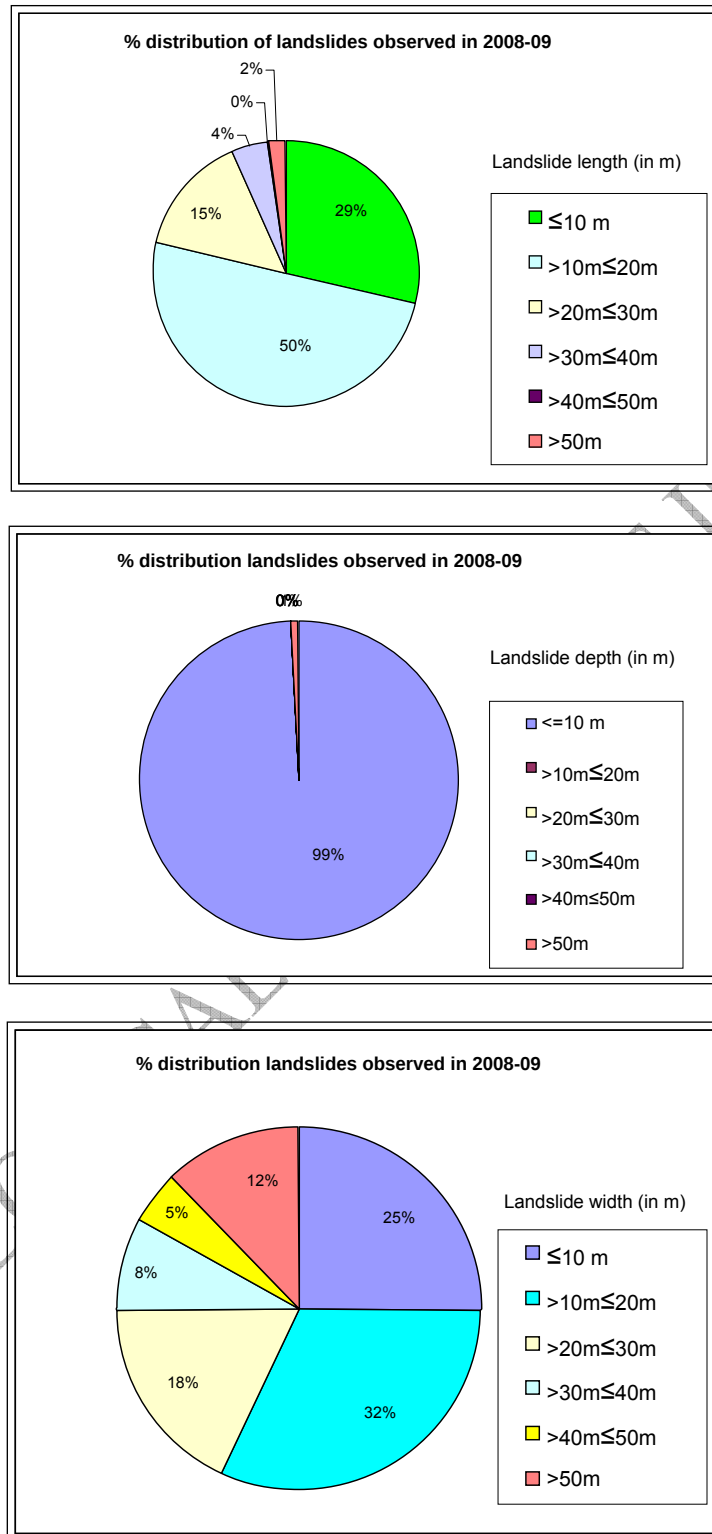


Fig 2: The percentage distribution of landslides with respect to their dimensions

Table 6: Number of landslides in each section with different slide length.

Length (in m)	Jog-Honnavar	Kotighera-Charmudi	Kotighera-Kalasa	Chikmagalur-Mudigere	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Sakleshpur-Gundiya
≤10m	13	13	5	2	13	2	3	10
>10m≤20m	20	21	12	1	11	7	6	29
>20m≤30m	1	9	6	1	0	3	1	11
>30m≤40m	2	1	1	0	0	3	0	2
>40m≤50m	0	1	0	0	0	0	0	0
>50m	1	0	0	0	0	0	0	2
Total	37	45	24	4	24	15	10	54

Table 7: Percentage distribution of landslides in each section with different slide length.

Length (in m)	Jog-Honnavar	Kotighera-Charmudi	Kotighera-Kalasa	Chikmagalur-Mudigere	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Sakleshpur-Gundiya
≤10m	35.14	28.89	20.83	50.00	54.17	13.33	30.00	18.52
>10m≤20m	54.05	46.67	50.00	25.00	45.83	46.67	60.00	53.70
>20m≤30m	2.70	20.00	25.00	25.00	0.00	20.00	10.00	20.37
>30m≤40m	5.41	2.22	4.17	0.00	0.00	20.00	0.00	3.70
>40m≤50m	0.00	2.22	0.00	0.00	0.00	0.00	0.00	0.00
>50m	2.70	0.00	0.00	0.00	0.00	0.00	0.00	3.70
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table 8: Number of landslides in each section with different slide width.

Width (in m)	Jog-Honnavar	Kotighera-Charmudi	Kotighera-Kalasa	Chikmagalur-Mudigere	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Sakleshpur-Gundiya
≤10m	6	18	6	4	2	3	2	13
>10m≤20m	18	12	9	0	15	5	3	6
>20m≤30m	6	6	3	0	5	4	4	10
>30m≤40m	3	8	1	0	1	1	0	4
>40m≤50m	3	0	2	0	0	0	1	4
>50m	1	1	3	0	1	2	0	17
Total	37	45	24	4	24	15	10	54

Table 9: Percentage distribution of landslides in each section with different slide width.

Width (in m)	Jog-Honnavar	Kotighera-Charvoudi	Kotighera-Kalasa	Chikmagalur-Mudigere	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Sakleshpur-Gundiya
≤10m	16.22	40.00	25.00	100.00	8.33	20.00	20.00	24.07
>10m≤20m	48.65	26.67	37.50	0.00	62.50	33.33	30.00	11.11
>20m≤30m	16.22	13.33	12.50	0.00	20.83	26.67	40.00	18.52
>30m≤40m	8.11	17.78	4.17	0.00	4.17	6.67	0.00	7.41
>40m≤50m	8.11	0.00	8.33	0.00	0.00	0.00	10.00	7.41
>50m	2.70	2.22	12.50	0.00	4.17	13.33	0.00	31.48
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table 10: Percentage distribution of landslides in each section with different slide depth.

Depth	Jog-Honnavar	Kotighera-Charvoudi	Kotighera-Kalasa	Chikmagalur-Mudigere	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Sakleshpur-Gundiya
≤10m	37	45	23	4	24	15	10	54
>10m≤20m	0	0	0	0	0	0	0	0
>20m≤30m	0	0	0	0	0	0	0	0
>30m≤40m	0	0	0	0	0	0	0	0
>40m≤50m	0	0	0	0	0	0	0	0
>50m	0	0	1	0	0	0	0	0
Total	37	45	24	4	24	15	10	54

Table 11: Percentage distribution of landslides in each section with different slide depth.

Depth (in m)	Jog-Honnavar	Kotighera-Charvoudi	Kotighera-Kalasa	Chikmagalur-Mudigere	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Sakleshpur-Gundiya
≤10m	100.00	100.00	95.83	100.00	100.00	100.00	100.00	100.00
>10m≤20m	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
>20m≤30m	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
>30m≤40m	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
>40m≤50m	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
>50m	0.00	0.00	4.17	0.00	0.00	0.00	0.00	0.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

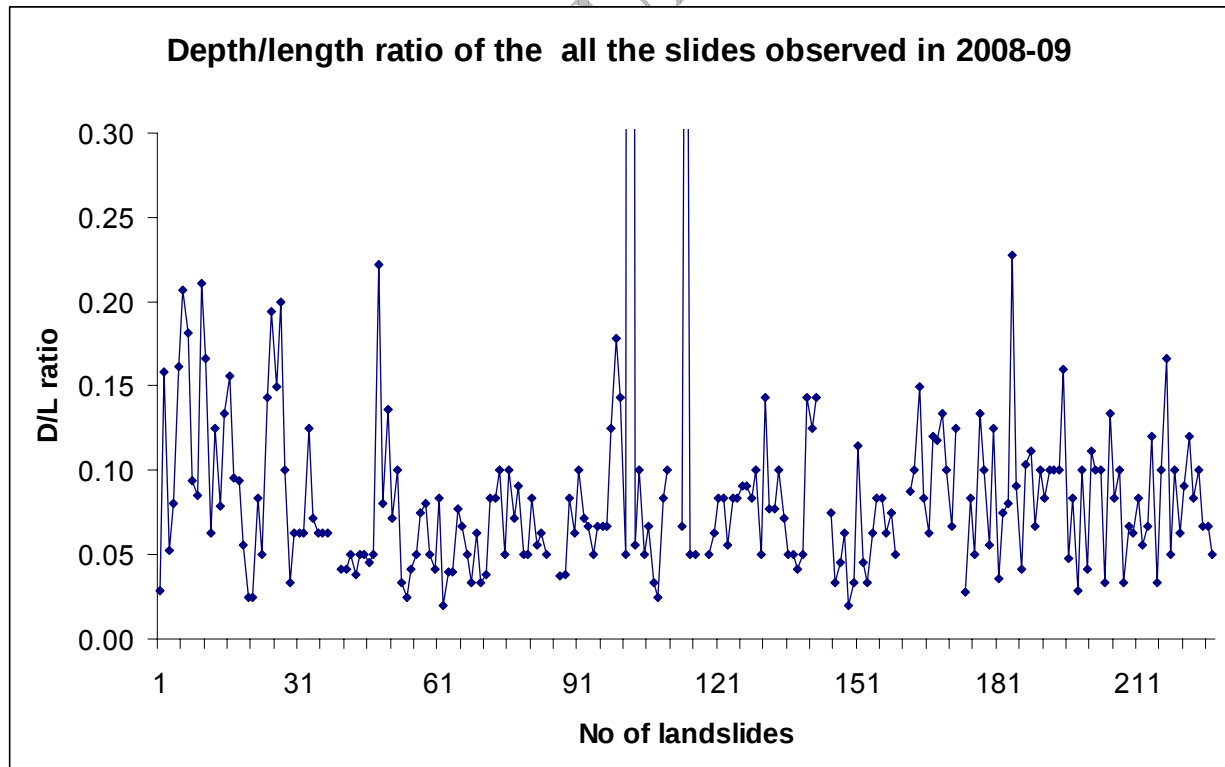
IV. 3. Bed rock Geology: The geology of the bed rock of the landslides observed in 2008-09 shows that majority of the landslides have occurred where bed rock is weathered gneiss or Gneiss.(151 slides or 70.56 %of the total). This is followed by laterite (23 slides or 10.75%) and granite and 22 slides or 10.28% of the total). Two slides are noticed on Meta basalt and a rock fall was noticed on basic dyke. (Table 12)

Bed rock geology	No of slides	%
Weathered Gneiss	102	47.66
Weathered Granite	15	7.01
Laterite	23	10.75
Granite	22	10.28
Gneiss	49	22.90
Metabasalt	2	0.93
Basic dyke	1	0.47
Total	214	100.00

Table 12: Bed rock Geology of slides observed in 2008-09.

IV. 4. Depth/length(D/L) ratio : The depth to Length ratio(D/L) for all the slides show that most of the slides fall in between 0.03 to 0.15 indicating shallow depth of the landslides. Some slides in Shiradi ghat between Sakleshpur-Gundiya section are quite deep landslides with D/L ratio going beyond 1.0. (Table 13)

Table 13: Depth/length ratio of all sides observed in 2008-09.



IV. 5. History of landslides: due to the lack of data on the date of occurrence of landslides the age of landslide is therefore taken on the morphological features observed on hill slopes. The landslides with fresh surface having less plant growth on debris categorized as new slides and rest are grouped as old slides. As regard to reactivated one the old slides wherein new slides are developed are considered

along with the slides wherein authorities have provided some remedial measures but still then failed are also grouped under reactivated one.

Most of the landslides are grouped as new slides (157 slides or 73.36% of the total) followed by old slides (37 slides or 17.29% of the total) and reactivated slides (20 slides or 9.35% of the total). (Table 14)

Table 14: Number of landslides observed in 2008-09 according to their ages.

History of slides	No of slide	%
New	157	73.36
Old	37	17.29
Reactivated	20	9.35
Total	214	100.00

Table 15: number of landslides in each section observed in 2008-09 according to their ages.

History of landslides	Jog-Honnar	Kotighera-Charumudi	Kotighera - Kalasa	Chikmagalur-Mudiger e	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Saklesh pur-Gundiya
New	31	24	14	4	15	11	9	49
Old	5	12	7	0	7	1	1	4
Reactivated	1	9	3	0	2	3	1	1
Total	37	45	24	4	24	15	11	54

Table 16: Percentage distribution of landslides in each section observed in 2008-09.

History of landslides	Jog-Honnar	Kotighera-Charumudi	Kotighera - Kalasa	Chikmagalur-Mudigere	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Saklesh pur-Gundiya
New	83.78	53.33	58.33	100.00	62.50	73.33	81.82	90.74
Old	13.51	26.67	29.17	0.00	29.17	6.67	9.09	7.41
Reactivated	2.70	20.00	12.50	0.00	8.33	20.00	9.09	1.85
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

History of slides in each road section reveals majority of new slides have occurred in Shakleshpur-Gundiya section (49 slides or 90.74% of total slides in this section) closely followed by Jog-Honnar section (31 slides or 83.78% of total slides in this section). Old slides are mostly seen in Kotighera-Kalasa and Madikere-Suliya sections (Table 15, 16).

IV. 6. Cut slope heights: Majority of the new slides observed in 2008-09 have cut slope heights ranging between >5m to ≤15 m (151 slides or 71.57% of total slides) followed by >15m m to ≤20m m with (30 slides or 14.22% of total slides). 11 slides have failed with cut slope heights more than >25m (5.21% of total slides), and three slides have failed on the filled slopes (Table 17, 18 and 19).

Table 17: number of landslides observed in 2008-09 in different cut slope height.

Cut slope Heights	No of slides	%
≤5m	3	1.42
>5m≤10m	73	34.60
>10m≤15m	78	36.97
>15m≤20m	30	14.22
>20m≤25m	16	7.58
>25m	11	5.21
Total	211	100.00

Table 18: number of landslides in each section observed in 2008-09 in different cut slope height.

Cut slope heights	Jog-Honnar	Kotighera-Charmudi	Kotighera-Kalasa	Chikmagalur-Mudigere	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Sakleshpur-Gundiya
≤5m	0	0	1	0	0	0	2	0
>5m≤10m	18	3	9	1	8	4	7	23
>10m≤15m	14	16	9	2	16	2	1	18
>15m≤20m	3	15	1	0	0	3	0	8
>20m≤25m	1	5	2	1	0	3	0	4
>25m	0	6	2	0	0	2	0	1
Total	36	45	24	4	24	14	10	54

Table 19: Percentage distribution of cut slope heights of slides in each section observed in 2008-09.

Cut slope heights	Jog-Honnar	Kotighera-Charmudi	Kotighera-Kalasa	Chikmagalur-Mudigere	Madikere-Suliya	Madikere-Siddapur	Madikere-Virajpet	Sakleshpur-Gundiya
≤5m	0.00	0.00	4.17	0.00	0.00	0.00	20.00	0.00
>5m≤10m	50.00	6.67	37.50	25.00	33.33	28.57	70.00	42.59
>10m≤15m	38.89	35.56	37.50	50.00	66.67	14.29	10.00	33.33
>15m≤20m	8.33	33.33	4.17	0.00	0.00	21.43	0.00	14.81
>20m≤25m	2.78	11.11	8.33	25.00	0.00	21.43	0.00	7.41
>25m	0.00	13.33	8.33	0.00	0.00	14.29	0.00	1.85
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

V. SUMMARY AND CONCLUSIONS:

A) Landslides recorded along NH-206 and SH-50 between Jog fall and Honnavar: 37 landslides are recorded in this 60 km stretch of ghat section. Majority of slides are debris slides caused due to toe cutting of the slope for construction of the road. The lithology is granite, gneisses and laterite. The vertical cut slopes have failed due to heavy rain in the ghat section during monsoon. It was observed that the slopes are moderately vegetated and general slope angle varies from 25° to 35°. The depth of overburden consisting of soil and weathered rock varies from 1-5m. The cut slope angle varies from 70° to 80°. The slides are shallow with < 2.0 m depth.

One rock slides with planner failure is also observed. The joint planes were day lighted by road cuttings, which slipped along during heavy rain.

B) Landslides recorded along Kotighera-Charmudi Ghat road section SH-64: 45 landslides are recorded in this 15 km stretch ghat section. Majority of the slides are debris slumps and earth slumps caused due to toe cutting of the slope for the construction of the road. Many of the old slides are seen to be reactivated due to lack of remedial measures taken in due time. The lithology is mainly granite and gneisses. The vertical cut slopes have failed due to heavy rain in the ghat section during monsoon. It was observed that the slopes are moderately to thickly vegetated and general slope angle varies from 20° to 35° . The depth of overburden consisting of soil and weathered rock varies from 0.5 to 2.0 m. The cut slope angle is 70° to 80° . The slides are shallow with <2m depth. Six rock slides with wedge failures are also observed.

C) Landslides recorded along Kotighera- Kalasa road section SH-66: 24 landslides are recorded in this 40 km stretch of the ghat section. Majority of slides are debris slumps and earth slumps and few are debris slides caused due to toe cutting of the slope for making road. Some of the old slides are seen to be reactivated due to lack of remedial measures taken in due time. Out of 24 slides, 20 slides are in cut slopes and 4 slides are below the road. Material removed from cut slope has been dumped on valley side of the road which got washed away during rain causing landslides. These 4 slides are identified as most dangerous and threat to the SH. The lithology is mainly granite and gneisses. Though the cut slope height is less in most part of the road section (less than 5m) still the vertical cut slopes have failed where the cut slope height is higher than 5 m. It was observed that the slopes are moderately to thickly vegetated and covered by tea, coffee and spice plantations. General slope angle varies from 25° to 35° . The depth of overburden consisting of soil and weathered rock varies from 0.5 to 2.0 m. The cut slope angle is 70° to 80° in most slides. The slides are shallow with <2m depth.

D) Landslides recorded along Mudigere- Chikmagalur road section SH-64: 4 landslides are recorded in this 25 km stretch road section. All slides are debris slumps. The lithology is mainly granite and gneisses. The cut slope angle varies from 70° to 80° in most of the slides. The slides are shallow with <2m depth.

E) Landslides recorded along Madikere (Jodpal)-Suliya Ghat road section SH-88: 24 landslides are recorded in this 30 km stretch ghat section. Majority of slides are debris slumps and earth slumps caused due to toe cutting of the slope for making road. The lithology is mainly granite and gneisses. The vertical cut slopes have failed due to heavy rain in the ghat section during monsoon. It was observed that the slopes are moderately to thickly vegetated and covered by tea, coffee and spices plantations. General slope angle varies from 20° to 35° . The depth of overburden consisting of soil and weathered rock varies from 0.5 to 2.0 m. The cut slope angle varies from 70° to 80° in most slides. The slides are shallow with <2m depth. Three complex slides which consist of both debris and rock slide and one rock slide with planner failures is also observed. The planes day lighted by road cuttings has slipped along weak planes due to heavy rain.

F) Landslides recorded along Madikere-Siddapur Ghat road section SH-89 and SH-88B: 15 landslides are recorded in this 25 km stretch ghat section. Majority of slides are debris slumps and earth slumps mainly due to toe cutting of the slope for making road. The lithology is mainly granite and gneisses. The vertical cut slopes have failed due to heavy rain in the ghat section during monsoon. It was observed that the slopes are moderately to thickly vegetated and covered by tea, coffee and spices plantations. General slope angle varies from 20° to 40° . The depth of overburden consisting of soil and weathered rock varies from 0.5 to 5.0 m. The cut slope angle varies from 70° to 80° in most of the slides. The slides are shallow with <2m depth. Two complex slides consisting of both debris and rock slide and one rock slide with planner failure is also observed. The planes day lighted by road cuttings has slipped along weak planes due to heavy rain.

G) Landslides recorded along Madikere-Virajpet road section SH-27: 11 landslides are recorded in this 15 km stretch ghat section. Majority of slides are debris slides caused due to cutting

of the natural slope for making road. The lithology is mainly granite and gneisses. The vertical cut slopes have failed due to increase in pore water pressure during heavy rain in the ghat section in monsoon. It was observed that the slopes are moderately to thickly vegetated and general slope angle varies from 20° to 35°. The depth of overburden consisting of soil and weathered rock varies from 0.5 to 2.0 m. The cut slope angle varies from 70° to 80° in most slides. The slides are shallow with <2m depth.

H) Landslides recorded along Shiradi Ghat, NH-48: 54 land slides are recorded in this 40 km stretch ghat section. Majority of the slides are debris slides caused due to toe cutting of the slope for making road. Few old and reactivated slides are also observed. The lithology is gneisses and granulate. The vertical cut slopes for making road have increased the instability of the hill slopes. The loose and non-cohesive material formed due to prolonged weathering failed due to the increase in pore water pressure during heavy rain, in monsoon. It was observed that the slopes are moderately vegetated and general slope angle varies from 25° to 35°. The depth of overburden consisting of soil and weathered rock varies from 1-5m. The cut slope angle varies from 70° to 80° in most slides. The slides are shallow with <2m depth.

One rock slides with planner failures is also observed. The planes day lighted by road cuttings has slipped along weak planes due to heavy rain.

CONCLUSIONS:

1. All slides studied were caused due to the human interference with the natural slopes. The main causes of landslides in Western Ghat are toe cutting of hill slopes for the construction of road, modification for human settlement, highly weathered rock mass and frequent rain.
2. All slides are triggered by heavy rainfall mainly in rainy seasons extending for 4 months from May to August. The ubiquitous presence of water is favorable for intense weathering of rocks causing appreciable drop in their shearing resistance. The heavy rainfall during monsoon is the major trigger for all the slides.
3. Majority of the slides observed in 2008-09 are slumps including debris slump and earth slumps (119 slides or 55.61% of the total). Small cut slope height and almost vertical to sub vertical slope angle may be attributed for more number of slumps. In Shaklespur -Gundiya section wherein the cut slope height is relatively higher than rest of the sections we can see the dominance of debris slides.
4. Majority of the slides are small in dimension viz., 93.45%, 74.47%, 99.07% of the slides observed were having less than 30 m in length, width and depth, respectively. Interesting to notice that almost all slides are shallow depth with less than 2m. The width of the slides vary between a long ranges because of the fact that multiple source, lateral grading of slides and slides are juxtaposed and difficult to delimit.
5. Most slides consisting of weathered gneiss or gneiss (151 slides or 70.56% of the total) followed by laterite and granite (23 slides or 10.75% and 22 slides or 10.28% of the total respectively). Two slides are noticed on meta basalt and a rock fall was noticed on basic dyke.
6. Majority of the slides have cut slope heights ranging between 6m to 15 m (151 slides, 71.57% of total slides) with nearly vertical slope angle.
7. Majority of the slides falls in new slide category (157 slides or 73.36% of the total) followed by old slides (37 slides or 17.29% of the total) and reactivated slides (20 slides or 9.35% of the total).
8. The depth to length ratio(D/L) for all the slides show that most of the slides fall in between 0.03 to 0.15 indicating shallow depth of the landslides. Some slides in Shiradi ghat between Shaklespur-Gundiya section are quite deep landslides with D/L ratio going beyond 1.0.
9. The convex slopes were found to be more prone /susceptible to sliding than the concave and irregular slopes. Therefore cut slopes should be made as a plane or with a little concavity with the top edge a plane at an angle less than the over angle of concavity.
10. Cut slope angle and height plays a major role in landsliding. Prograding of the slide is more towards both the flanks rather than towards back of the crown.

11. Overburden thickness is around 4-5m consisting of mostly soil and weathered rocks.

VI. RECCOMENDATIONS

1. Management of drainages is not properly carried out in the study area. Blockage of drainage is observed in 60% of the slided area. Water from up hill slope may be diverted in the following ways in order to minimize sliding.
 - i. Provision of contour drainage above the crown of landslides,
 - ii. Catch water drains in the sections,
 - iii. Insertion of horizontal perforated pipes into the slopes which will act as weep holes in the vertical slopes, thus reducing the pore pressure by draining out the excess water. This has to be given at suitable interval as per the site condition.
2. Vertical cut slopes should be avoided in future as it does not give stability in such terrain.
3. Retaining structures like retaining wall, stone pitching and gabions are recommended as per the site condition.
4. Efforts should be made to make it mandatory for the district authorities to provide each and every landslide details to GSI in the provided Performa.
5. The date of occurrence of slide and rainfall data to be provided by the dist. authority.

Sd/- K.V.MARUTHI Senior Geologist	Sd/- U.K.PRADHAN Geologist	Sd/- A.K.MISHRA Geologist
SCRUTINIZED BY Sd/- R.Panduranga Director		
APPROVED BY Sd/- Dr. K. AYYASAMY Dy. Director General		

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SYNOPSIS OF WORK DONE

1.	Title of the report	REPORT ON LANDSLIDE INVENTORY ALONG NH & SH OF GHAT ROADS IN CHIKMAGALUR, COORG AND SHIMOGA DISTRICTS, KARNATAKA		
2.	Item No.	EG/SR/KG/2008/043-054		
3	Field Season	2008-09		
4	Date of commencement	2008-09		
5	Date of completion	2008-09		
6	Officers Associated with investigation and No. of days spent in the field	K.V.MARUTHI, SENIOR GEOLOGIST U.K.PRADHAN, GEOLOGIST A.K.MISHRA, GEOLOGIST		
7	Quantum of work done			
	Nature of Work	Total work envisaged	Work proposed for FS: 2008-09	Work completed
	Aerial photo/ High resolution image interpretation and checking of incidences given by state governments and other incidences enroute.	200 L km	200 L km	235 L km (214 incidences)
8	Expenditure (1) POL (2) Wages (3) Misc.	Rs. 14,514/- Rs. 10,082/- Rs. 10,387/-		
9	Other information if any	----		
Sd/- K.V.MARUTHI SENIOR GEOLOGIST		Sd/- U.K.PRADHAN GEOLOGIST		Sd/- A.K.MISHRA SENIOR GEOLOGIST
		Sd/- R.PANDURANGA Director		