In shallow planar landslides, the length of the moving mass is much greater than the depth of regolith affected by the movement, so that upslope- and downslope-acting internal forces effectively cancel each other, and may be disregarded (Skempton, Hutchinson, & Neville, 1969, p.318).

Therefore the forces acting may be analysed on the basis of the situation shown below-

Let the inclination of the slope be B, the depth to the slip surface z, and the depth of ground water above this level mz.

Then the weight of soil material above the slip
surface AB is
\[ \gamma z \cos B \]
and this weight divided by the area over which it acts gives

overburden pressure = \( \gamma z \cos B \)

Hence the component of overburden pressure downslope (that is, the shearing component), is

\[ \tau = \gamma z \sin B \cos B \]

To allow for the fact that the soil may at times become saturated to various depths, and that this water may seep downslope through the soil, we may proceed as follows-

Assuming that the flow lines run parallel to the slope surface (that is, that the soil is isotropic or that maximum permeability is in a direction parallel to the slope), it follows that the equipotential lines are normal to the slope. In the figure above, BC is an equipotential of length \( mz \cos B \) and the pressure head at B is the distance BD, equal to \( mz \cos^2 B \).

Now the neutral (or porewater) pressure is equal to the product of the piezometric head and the unit weight of water, so that

\[ u = \gamma_w mz \cos^2 B \]

According to the principle of effective stress, the effective stress is equal to the overburden pressure minus the neutral pressure. Hence

\[ \sigma' = (\gamma - m\gamma_w)z \cos^2 B \]
If the shear strength parameters of the soil, in terms of effective stress, are \( c' \) and \( \phi' \), then the shear resistance that can be mobilised on a slip surface is

\[
s' = c' + (\gamma - m\gamma_w) z \cos^2 B \tan \phi'
\]

Then the factor of safety is

\[
F = \frac{c' + (\gamma - m\gamma_w) z \cos^2 B \tan \phi'}{\gamma_z \sin B \cos B}
\]

The steepest slope which can exist has \( F \) equal to unity, so that

\[
\gamma \sin B = c' + (\gamma - m\gamma_w) \cos B \tan \phi'
\]

If \( c = 0 \) (as when using residual strength parameters), then

\[
tan B_{\text{max}} = \frac{(\gamma - m\gamma_w) \tan \phi'}{\gamma}
\]

and if the full depth of the soil is saturated, then

\[
tan B_{\text{max}} = \frac{(\gamma - \gamma_w) \tan \phi'}{\gamma}
\]
APPENDIX B

SLOPE PROFILE PLOTTING PROGRAM

This program allows slope profiles to be plotted at any scale using any vertical exaggeration and any unit length.

Profiles are normally plotted from the base upwards; to plot in the reverse direction, the sign of each reading must be reversed.

Visual display during plotting is as follows-
- z  angle counter
- y  average of all entered angles
- z  value of last angle entered

The totals for x- and y-coordinates may be recalled from registers f and e.
Instructions for use of the program:

1. Enter the program.
2. Follow the key sequence below-

```
END
CONT.

Enter-
1. Vertical exaggeration
2. Unit length

CONT.
FMT↓

Enter-
Angle

Enter-
1. New V.E.
2. New unit

CONT.

SET FLAG (to alter scale or unit length)

(if last angle)

END
CONT.
STOP
```
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APPENDIX C

COMPUTER PROGRAM 'CREST'

Data are entered on punched cards, using five columns for each reading, column 1 being for sign. Successive profiles are separated by a 79 column heading card. Each profile must be terminated by a dummy angle of 100.0 degrees.

Percentage of profile length represented by the unit length is calculated from the formula

\[
\frac{100}{N}
\]

Curvature is calculated from the relation

\[
\frac{100(\theta_a - \theta_b)}{1.5}
\]

in degrees per 100 metres. Curvature is expressed as a positive value when slope angle is increasing upslope.
PROGRAM CREST
COMMON THETA(200)
DIMENSION ANG(16), IFRE(100)
INTEGER EOFCKF
REAL KURT
REAL MEANC
ILE=1
IRANMAX=100
1 READ 99
IF(EQCKF(60),EQ,1)GO TO 1000
99 FORMAT (10H1)
1 PRINT 98
98 FORMAT (1H1)
PRINT 99
DO 2 I=ILE,IRANMAX
2 IFRE(1)=0
ILE=50
ANG(1)=0.0
IRANMAX=0
PRINT 200
200 FORMAT (52X,IHA.14X,11B/49X,8X,HORIZONTAL.8X,FALL.9X,GRADIENT
1*X,*TOTAL,*INCREMENT,*HORIZON,11X,VERT/4X,
2*ANGLE(0).8X,*COS 0*,16X,*SIN 0*,38X,*1.5COS 0*,7X.*1.5SIN 0*,6X.
3*SIGN W/COS 0*,8X,*CUM, A*,7X,*CUM, B',6X*CURVATURE*/)
3 READ 10C,(ANG(I),I=1,16)
100 FORMAT (16F5.1)_ -
1 DC 4 1*1.16
IF(ANG(1).EQ.100.0)BQ TO 5
IS=ITSET+1
THETA(IS)=ANG(I)
4 ANGaN=ANGMV+THETA(ISET)
GO TO 3
5 THETA(I)=THETA(2)
ITOT=ITSET+1
ANG(7)=ANG(8)=ANG(10)=ANG(11)=0.0
ANG(12)=ANG(13)=ANG(14)=ANG(15)=0.0
ANGMV=ANGMV/ITOT
DO 6 K=2,1SET
ANG(I)=THETA(K)
THAN=THETA(I)*0.017453
ANG(2)=CCSF(THEA)
ANG(3)=SINF(THEA)
ANG(4)=1.5*ANG(2)
ANG(5)=1.5*ANG(3)
ANG(6)=ANG(3)/ANG(2)
ANG(7)=ANG(7)+ANG(4)
ANG(8)=ANG(8)+ANG(5)
ANG(9)=(THETA(K-1)-THETA(K))*100.0/1.5
INDEX=ANG(1)/2.0+22
IFRE(Index)=IFPE(Index)+1
IF(ILE.GT.IND)ILE=INDEX
IF(IRANMAX.LT.IND)IRANMAX=INDEX
ANG(11)=ANG(11)+ANG(9)
THET=(THETA(K)
THAN=THAN-ANGMV
THANSQ=THAN*THAN
ANG(12)=ANG(12)+THANSQ
ANG(13)=ANG(13)+THAN*THANSQ
ANG(14)=ANG(14)+THANSQ*THANSQ
AN(12)=4.315*THCA+THEA
PRINT 201,AN(12),F15.2
201 FORMAT (1X,F10.1,F15.4,F15.2)
6 CONTINUE
IUNTOT=1
START=42.3*(ILE-1)*2.0
PRINT 202
202 FORMAT (1X,F10.1,F15.4,F15.2) /I
UC=7.*ILE,IRAMAX
ENDSTART=3.0
IUNTOT=1*UHOT+IFRE(K)
PRI.T 203,START,END,IFRE(K),UHOTOT
203 FORMAT (5X,F5.1,2X,15.1,15.1,15.1,15.1)
START=END
7 CONTINUE
RENL=100.0/IUHOT
MEAN=AMG1111/IUHOT
PRI.T 2.4,PERLEN,MEAN
204 FORMAT (9X,10.2,5X,MEAN CURVATURE,F10.2)
SKEN=AMG(12)/IHO1T*(AMG(12)/IHO1T)**(3.0/2.0)
CUM=AMG(14)/IHO1T*(AMG(12)/IHO1T)**(3.0/2.0)
STD=AMG(15)/IHO1T*(AMG(12)/IHO1T)**(3.0/2.0)
PRI.T 3.5,ANCR,STD,SKHOT,KURT
205 FORMAT (5X,MEAN,F10.1,F5X,STANDARD DEVIATION,F10.2,SKHENF)
100 CONTINUE
1000 CONTINUE
END
LOCAL ASSIGNMENTS
IRAN=0.05*40 I
AMG 0.0230 R
END 0.020 R
IFRE 0.0270 I
ILE 0.0440 I
INDEX 0.0474 I
THAN 0.0474 R
THANQ 0.0000 R
THEA 0.0046 R
THANQ 0.0000 R
COMMON ASSIGNMENTS
THETA 0.0000 R
EXTERNAL REFERENCES
CCSF +TYPE' R
ECOFW +TYPE' 1
SINF +TYPE' R
SORT +TYPE' R
STATEMENT LABELS
1 00572 2 00622 3 00651 4 00726 5 00745
LENGTH OF PROGRAM 01406 R
LENGTH OF CODE 00826 R
3200 FORTRAN DIAGNOSTIC RESULTS - FOR CREST
NO ERRORS
| ANGLE (O) | COS O | SIN O | HORIZONTAL | 1.5COS O | 1.5SIN O | INCREMENT | FALL | 1.5GRADIENT | GRADIENT | TOTAL | HORIZ | TOTAL | VERT  | CURVATURE |
|-----------|-------|-------|------------|----------|----------|-----------|------|-------------|----------|-------|-------|-------|-------|
| 1.5       | 3.013 | 0.967 | 1.4999     | 1.4943   | 1.0127   | 1.5071    | 1.5027| 1.5073      | 1.5073   | 1.4979| 0.3608| 0.3608| 0.0021|
APPENDIX D

RELAY SWITCHING CIRCUIT

Only the basic relay circuit is described here; details of connection to the motor would depend on individual circumstances.

It was noted that when using this circuit, sparking occurs between those relay terminals carrying full line voltage. If this circuit is to be used for a long period, therefore, these terminals must be safeguarded with capacitors, since relay failure will leave the motor unprotected.
APPENDIX E

SUMMARISED SLOPE PROFILE DATA
### Profile 1

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**Location:** South of Evelyn's Range, Picton, N.S.W.

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### Profile 9

**Facing:** 255
**Location:** South of Evelyn's Range, Picton, N.S.W.

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**Column Explanation:**

- **Depth (m):** Measurement of depth in meters.
- **Slope (%):** Percentage of slope at each depth.

**Note:** This data is for programming purposes only and is to be disregarded.
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</tr>
<tr>
<td>29</td>
<td>172</td>
<td>SOUTH OF EVELYN'S RANGE, PICTON, N.S.W.</td>
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<tr>
<td>39</td>
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**Profile 29**

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**Profile 29**

- **FACING:** 172
- **LOCATION:** SOUTH OF EVELYN'S RANGE, PICTON, N.S.W.

**Profile 39**

- **FACING:** 014
- **LOCATION:** SOUTH OF EVELYN'S RANGE, PICTON, N.S.W.

**Profile 31**

- **FACING:** 336
- **LOCATION:** SOUTH OF EVELYN'S RANGE, PICTON, N.S.W.

**Profile 33**

- **FACING:** 070
- **LOCATION:** SOUTH OF EVELYN'S RANGE, PICTON, N.S.W.

**Profile 34**

- **FACING:** 291
- **LOCATION:** SOUTH OF EVELYN'S RANGE, PICTON, N.S.W.

**Profile 34**

- **FACING:** 063
- **LOCATION:** SOUTH OF EVELYN'S RANGE, PICTON, N.S.W.

**Profile 36**

- **FACING:** 015
- **LOCATION:** SOUTH OF EVELYN'S RANGE, PICTON, N.S.W.

**Profile 37**

- **FACING:** 335
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<td>23.5</td>
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Aandahl, A.R. (1948). "The Characterisation of Slope Positions and their Influence on the total Nitrogen content of a few virgin soils of Western Iowa"  


Ahnert, F. (1966). "The role of the equilibrium concept in the interpretation of landforms of fluvial erosion and deposition"  

Zeit. f. Geomorph., Supp.9, 71-84.


American Society of Civil Engineers (1960). Research Conference on Shear Strength of Cohesive Soils (Boulder, Colorado), 1164pp.


Baulig, H. (1940). "Le profil d'équilibre des versants"
Ann. de Geograph., 49, 81-97.

Beaty, C.B. (1956). "Landslides and slope exposure"
Jnl. Geol., 64(1), 70-74.

Canadian Geotechnical Jnl., 9(2), 219-224.


Beirne, K.G. (1952). "Soil erosion in the Camden district"
Jnl. Soil Cons. Serv. N.S.W., 8, 122-131.

Beirne, K.G. (1953). "Soil conservation in the Camden district"
Jnl. Soil Cons. Serv. N.S.W., 9, 135-141.
Beirne, K.G. (1958). "Graded banks in the Camden sub-district"
Jnl. Soil Cons. Serv. N.S.W., 14(3), 177-183.

Benson, W.N. (1940). "Landslides and allied features in the Dunedin district in relation to geological structure, topography, and engineering"

Berry, L., & Ruxton, B.P. (1959). "Notes on weathering and soils on granitic rocks in two tropical regions"

Berry, L., & Ruxton, B.P. (1961). "Mass movement and landform in New Zealand and Hong Kong"


Geotechnique, 5, 7-17.

Geotechnique, 16(2), 91-128. (Sixth Rankine Lect.).
Bishop, A.W. (1967). "Progressive failure- with special reference to the mechanism causing it"

Geotechnique, 21(2), 168-172.

Geotechnique, 21(4), 273-328.


Bjerrum, L. (1951). "Fundamental considerations on the shear strength of soil"

Norwegian Geotechnical Institute; Pub. No. 77, 29pp.


Blackwelder, E. (1912). "The Gros Ventre slide, an active earth-flow"

Blong, R.J. (1971). "The underthrust slide- an unusual type of mass movement"

Newcastle University, 1969, 74pp.


Geography, 48, 175-181.


Bunting, B.T. (1961). "The role of seepage moisture in soil formation, slope development, and stream initiation"

Bunting, B.T. (1964). "Slope development and soil formation on some British sandstones"
Burchfiel, B.C. (1966). "Tin Mountain landslide, Southeastern California, and the origin of Megabreccia"


Cambage, R.H. (1923). "Plant invasion of a denuded area"

Cambage, R.H. (1924). "Landslides near Picton and notes on the local vegetation"


Carson, M.A. (1967). "The magnitude of variability in samples of certain geomorphic characteristics drawn from valley-side slopes"
Jnl. Geol., 75(1), 93-100.
Geographical Analysis, 1(1), 76-100.


Carson, M.A., & Kirkby, M.J. (1972). Hillslope Form and Process  


Geological Mag., 98(2), 117-130.

Chandler, R.J. (1966). "The measurement of residual strength in triaxial compression"  
Geotechnique, 16(3), 181-186.


*Geotechnique*, 20(3), 253-260.

Chandler, R.J. (1971). "Landsliding on the Jurassic escarpment near Rockingham, Northamptonshire" 

Chandler, R.J., & Pook, M.J. (1971). "Creep movements in low gradient clay slopes since the Late Glacial" 
*Nature*, 229(5284), 399-400.


Charlier, R.H. (1968). "Quantitative analysis, geometrics, and morphometrics" 
Child, J. (1968). *Trees of the Sydney Region*  


Chorley, R.J. (1962). "Geomorphology and general systems theory"  

Chorley, R.J. (1964). "Geomorphological evaluation of factors controlling shearing resistance of surface soils in sandstone"  

Chorley, R.J. (1967). "The nodal position and anomalous character of slope studies in geomorphological research"  

Chorley, R.J. (1967). "Models in Geomorphology"  

Chorley, R.J., & Haggett, P. (Eds., 1967). *Models in Geography*  

Clarke, W.B. (1878). "Remarks on the sedimentary formations of New South Wales"


Abst. from 3rd Newcastle Symp. on "Advances in the study of the Sydney Basin" (1968).
University of Newcastle: 1969.


Corbett, E.S., & Rice, R.M. (1966). "Soil slippage increased by brush conversion"

Corbett, J.R. (1972). "Physical geography of the Sydney area"
*Geograph. Jnl.*, 118, 197-204.

*N.Z. Jnl. Geol. & Geophys.*, 6(5), 769-774.

Crandell, D.R. (1952). "Landslides and rapid-flowage phenomena near Pierre, South Dakota"


Crozier, M.J. (1968). "Earthflows and related environmental factors of Eastern Otago"
*Jnl. of Hydrology (N.Z.)*, 7(1), 4-12.

*Engineering Geol.*, 3(4), 325-334.

*Proc. 1st Aust.-N.Z. Conf. on Geomechanics*, 1, 1-10.
(Melbourne: Australian Geomechanics Society).
Jnl. Geol., 71(2), 127-161.

Jnl. Geol., 73(2), 230-254.

Cumberland, K.B. (1944). "Contrasting regional morphology of soil erosion in New Zealand"


Davis, W.M. (1910). Geographical Essays

de Beer, E. (1967). "Shear strength characteristics of the 'Boom Clay'"

De Bethune, P. (1967). "On the field survey of hillslopes"


Denness, B. (1972). "End of the landslide menace?"
New Scientist, 53(784), 417-419.

Department of Main Roads, N.S.W. (1952). "Landslides on the Razorback Range and near Wollongong, 1949 and 1950"
Main Roads, 17(3), 77-83.


Earth Science Reviews, 8(1), 45-72.


Fair, T.J.D. (1947). "Slope form and development in the interior of Natal, South Africa"

Fair, T.J.D. (1948). "Slope form and development in the coastal hinterland of Natal"

Fenneman, N.M. (1908). "Some features of erosion by unconfined wash"
   Jnl. Geol., 16, 746-754.


   Ann. Soc. geol. de Belg., 84, 123-152.
   (cited by Pitty, 1966).


Gilbert, G.K. (1909). "The convexity of hilltops"
Jnl. Geol., 17, 344-350.


Glendenning, R.M. (1937). "The slope and slope-direction map"

Quart. Jnl. Engineer. Geol., 2(1), 1-5.

Goldstein, M., & Ter-Stepanian, G. (1957). "The long-term strength of clays and depth creep of slopes"


Hadley, J.B. (1964). "Landslides and related phenomena accompanying the Hebgen Lake earthquake of August 17, 1959"

Haefeli, R. (1950). "Investigation and measurements of the shear strengths of saturated cohesive soils"
Geotechnique, 2(3), 186-208.

Haefeli, R. (1966). "Creep and progressive failure in snow, soil, rock, and ice"

Hamel, J.V., & Flint, N.K. (1972). "Failure of colluvial slope"


Rec. Geol. Surv. N.S.W., 12(1), 29-44.

Her Majesty's Stationery Office (1952). Soil Mechanics for Road Engineers


Hewlett, J.D., & Hibbert, A.R. (1963). "Moisture and energy conditions within a sloping soil mass during drainage"

Jnl. of Materials, 3(4), 847-915.

Horn, H.M., & Deere, D.U. (1962). "Frictional characteristics of minerals"
Geotechnique, 12(4), 319-335.

Howard, A.D. (1965). "Geomorphological systems-equilibrium and dynamics"
Howe, E. (1909). "Landslides in the San Juan Mountains, Colorado"

Huston, J.J. (1953). "Earth flows cause widespread damage in the Camden district"
Soil Cons. Jnl., 1-6.


Geotechnique, 19(1), 6-38.

Geotechnique, 21(4), 353-358.

Hvorslev, M.J. (1939). "Torsion shear tests and their place in the determination of the shearing resistance of soils"

Hvorslev, M.J. (1960). "Physical components of the shear strength of saturated clays"
Jackson, R.J. (1966). "Slips in relation to rainfall and soil characteristics"


James, P.M. (1971). "The role of progressive failure in clay slopes"


Kardos, L.T., Vlasoff, P.I., & Twiss, S.N. (1943). "Factors contributing to landslides in the Palouse Region"

Karol, R.H. (1955). *Engineering Properties of Soils*
Karol, R.H. (1960). *Soils and Soil Engineering*  

Karrow, P.F. (1972). "Earthflows in the Grondines and Trois Rivieres areas, Quebec"  

Kenney, T.C. (1966). "Residual strength of fine-grained minerals and mineral mixtures"  


Kesseli, J.E. (1943). "Disintegrating soil slips of the Coast Ranges of Central California"  
Jnl. Geol., 51(5), 342-352.

Geography, 38, 1-9.

King, C.A.M. (1966). *Techniques in Geomorphology*  
King, L.C. (1953). "Canons of landscape evolution"

King, L.C. (1957). "The uniformitarian nature of hillslopes"


Kirkby, M.J., & Chorley, R.J. (1967). "Throughflow, overland flow and erosion"

(seen in abst. only)


Kraus, E.B. (1954). "Secular changes in the rainfall regime of S.E. Australia"

in Jongerius, A. (Ed., 1964) Soil Micromorphology
(Amsterdam: Elsevier), 351-360.

Engineering Geology, 1(4), 261-290.

Harvard Soil Mechanics Series No. 86
(Cambridge, Massachusetts).

Lake, P. (1928). "On hill slopes"

Lawrence, Elizabeth F. (1937). "A climatic analysis of New South Wales"

Lawson, A.C. (1932). "Rain-wash erosion in humid regions"


Fluvial Processes in Geomorphology
San Francisco, Freeman, 522pp.


(Vol. 1 of Proc. Symp. Internat. de Geomorph.,
Union Geographique Internationale).

Macgregor, D.R. (1957). "Some observations on the geographical significance of slopes"
Geography, 42, 167-173.

Marsland, A., & Butler, M.E. (1967). "Strength measurements on stiff fissured Barton Clay from Fawley (Hampshire)"

Matson, C.R. (1970). "Preliminary geological investigations of land stability and suitability for urban development of the area south and west of Campbelltown"


Melton, M.A. (1957). "An analysis of the relations among elements of climate, surface properties, and geomorphology"

Melton, M.A. (1960). "Intravalley variation in slope angles related to microclimate and erosional environment"


Northcote, K.H. (1971). *A Factual Key for the recognition of Australian soils*  

Ollier, C.D. (1968). "Open systems and dynamic equilibrium in geomorphology"  


Ongley, E.D. (1970). "Determination of rectilinear profile segments by automatic data processing"  


Ovington, J.D. (1965). *Woodlands*  

Page, K.J. (1966). "An examination of the related concepts of the 'steady state' and 'dynamic equilibrium' in the context of erosional valley side slopes on Razorback Range and in the Yorkey's Creek drainage basin"


Pain, C.F. (1971). "Rapid mass movement under forest and grass in the Hunua Ranges, New Zealand"


Jnl. Geol., 65, 653-656.

Parry, R.H.G. (1958). "Discussion on the yielding of soils"
Geotechnique, 8(4), 183-186.
Parry, R.H.G. (1971). "Undrained shear strengths in clays"


The Advancement of Science, 24(120), 205-216.


(Trans. H. Czech & K.C. Boswell)

Petley, D.J. (1966). "The shear strength of soils at large strains"
(quoted by La Gatta, 1970).


Poole, M.A., & O'Farrell, P.N. (1971). "The assumptions of the linear regression model"

Irish Geography, 6(3), 294-301.


San Francisco: Freeman, 768pp.


Roscoe, K.H. (1953). "An apparatus for the application of simple shear to soil samples"

*Geotechnique*, 8(1), 22-53.


*Geotechnique*, 22(2), 195-300.

*Zeit. f. Geomorph.*, Supp. 9, 44-56.
Trans. 9th Int. Cong. Soil Sci., 4, 551-560.


Ruxton, B.P. (1958). "Weathering and subsurface erosion in granite at the Piedmont angle, Balos, Sudan"  
Geol. Mag., 95(5), 353-377.

Saito, M. (1965). "Forecasting the time of occurrence of a slope failure"  


Savigear, R.A.G. (1952). "Some observations on slope development in South Wales"  


Schumm, S.A. (1956b). "The role of creep and rainwash on the retreat of badland slopes"


Skempton, A.W. (1953a). "The colloidal 'activity' of clays"


Geotechnique, 20(3), 320-324.


Skempton, A.W., & Petley, D.J. (1967). "The strength along structural discontinuities in stiff clays"

Small, R.J. (1970). The Study of Landforms


So, C.L. (1971). "Mass movements associated with the rainstorm of June 1966 in Hong Kong"


Souchez, R. (1965). "Slow mass-movement and slope evolution in coherent and homogeneous rocks"

Sparks, B.W. (1960). Geomorphology


Stace, H.C.T., Hubble, G.D., Brewer, R., Northcote, K.H., 
Sleeman, J.R., Mulcahy, M.J., & Hallsworth, E.G. 
(1968). A Handbook of Australian Soils 

Jnl. Geol., 43, 323-327.

Steele, J. (1904). "Early days of Picton" 

Stewart, J. (1960). "Rainfall intensities in New South Wales" 
Jnl. Soil Cons. Serv. N.S.W., 16, 231-244.


Strahler, A.N. (1950c). "Davis' concepts of slope development viewed in the light of recent quantitative investigations" 
Strahler, A.N. (1952a). "Hypsometric (area-altitude) analysis of erosional topography"

Strahler, A.N. (1952b). "Dynamic basis of geomorphology"

Strahler, A.N. (1954). "Statistical analysis in geomorphic research"
Jnl. Geol., 62(1), 1-25.

Strahler, A.N. (1956). "Quantitative slope analysis"

Strahler, A.N. (1957). "Quantitative analysis of watershed geomorphology"

Strahler, A.N. (1958). "Dimensional analysis applied to fluvially eroded landforms"

Abst. from 4th Newcastle Symp. on "Advances in the study of the Sydney Basin"
University of Newcastle, 1969.

Suklje, L. (1967). "Common factors controlling the consolidation and the failure of soils"


Ter-Stepanian, G. (1965). "In-situ determination of the rheological characteristics of soils on slopes"


Terzaghi, K. (1943). Theoretical Soil Mechanics

Terzaghi, K. (1950). "Mechanism of landslides"


Tiedmann, B. (1937). "Uber die Schubfestigkeit Bindiger Boden"
Bautchnik, 15, 433-435.
(quoted by La Gatta, 1970).


Troeh, F.R. (1964). "Landform parameters correlated to soil drainage"

Troeh, F.R. (1965). "Landform equations fitted to contour maps"


Proc. 1st Aust.-N.Z. Conf. on Soil Mechanics, Melbourne, 48-81.

Turner, H.W. (1896). "Further contributions to the geology of the Sierra Nevada"


Tylor, A. (1875). "Action of denuding agencies"
Geol. Mag., 22, 433-473.


Vargas, M., & Pichler, E. (1957). "Residual soil and rock slides in Santos (Brazil)"

Varnes, D.J. (1950). "Relation of landslides to sedimentary features"


Walker, P.H. (1963). "Soil history and debris-avalanche deposits along the Illawarra scarpland"


Walker, P.H., & Ruhe, K.V. (1968). "Hillslope models and soil formation. 2. Closed systems"
Trans. 9th Int. Cong. Soil Sci., 4, 561-568.


Waters, R.S. (1958). "Morphological mapping"
Geography, 43, 10-17.


Wilson, L. (1968). "Slopes".

Wiltshire, G.R. (1960). "Rainfall intensities in N.S.W."
Jnl. Soil Cons. Serv. N.S.W., 16, 54-70.


Woudt, B.D. vant (1955). "On a hillside moisture gradient in volcanic ash soil, New Zealand"

N.Z. Geographer, 22(1), 90-93.

Yatsu, E. (1966). *Rock Control in Geomorphology*  

Yatsu, E. (1967). "Some problems on mass movements"  


Young, A. (1960). "Soil movement by denudational processes on slopes"  
*Nature*, 188(4745), 120-122.

Young, A. (1961). "Characteristic and limiting slope angles"  

Young, A. (1963). "Deductive models of slope evolution"  

Young, A. (1963). "Soil movement on slopes"  
*Nature*, 200(4902), 129-130.

Young, A. (1963). "Some field observations of slope form and regolith, and their relation to slope development"  
Young, A. (1964). "Slope profile analysis"

Young, A. (1969). "The accumulation zone on slopes"

Young, A. (1970a). "Slope form in the xavantina-Cachimbo area"

Young, A. (1970b). "Concepts of equilibrium, grade, and uniformity as applied to slopes"

Young, A. (1971). "Slope profile analysis: the system of best units"

Young, A. (1972). SLOPES
