



Slope Stability Map of Massachusetts: Sheet 1 - Western Massachusetts

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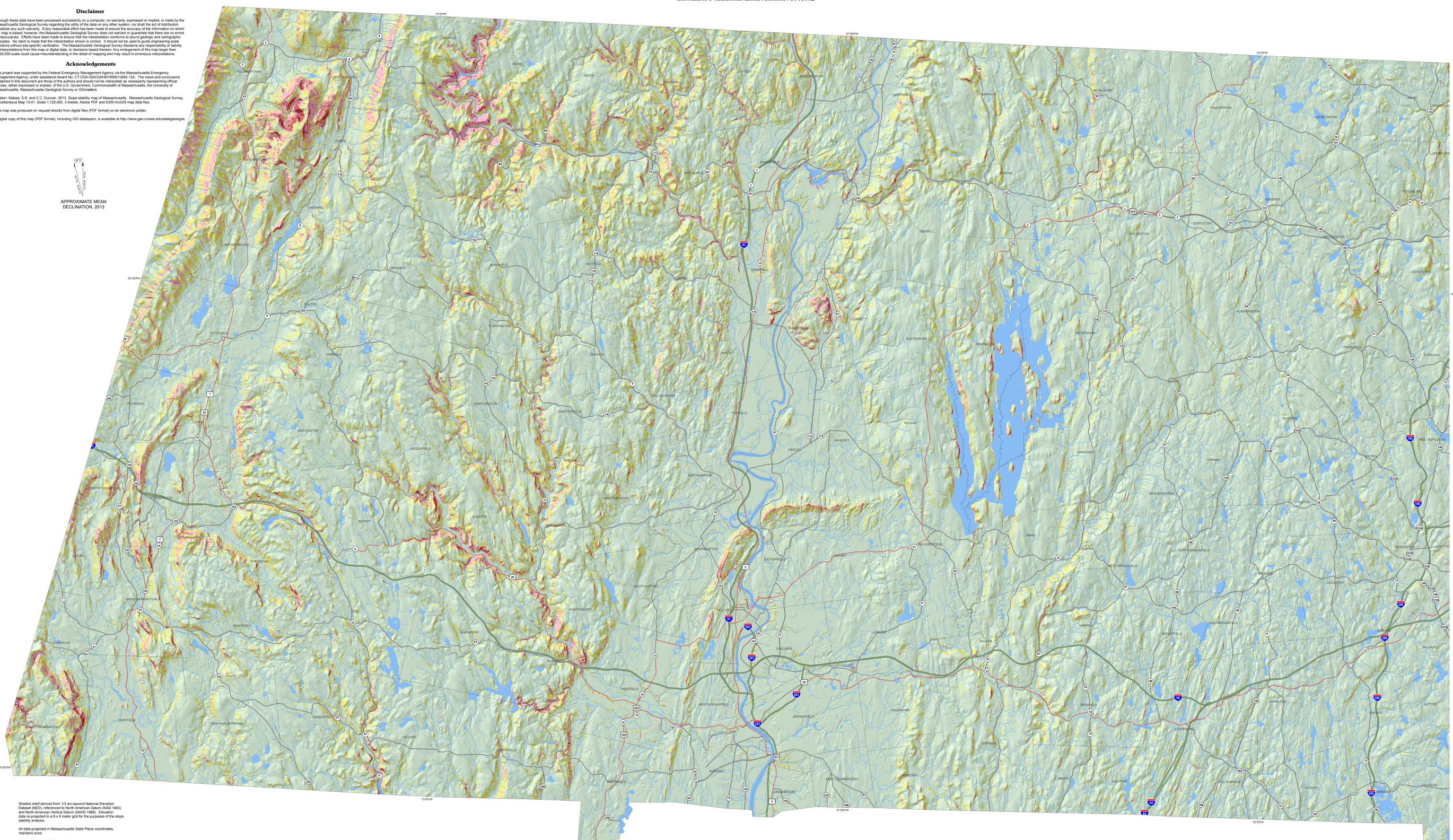
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Acknowledgements

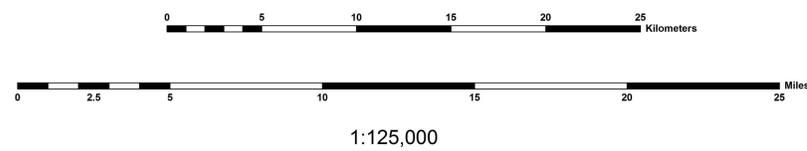
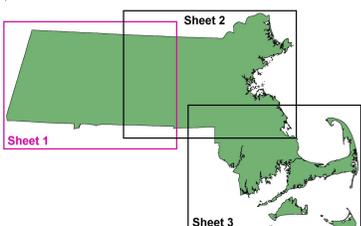
This project was supported by the Federal Emergency Management Agency via the Massachusetts Emergency Management Agency under assistance award No. CT-CO-A-03-0004-1896 (MSL-2A). The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing official policies, either expressed or implied, of the U.S. Government, Commonwealth of Massachusetts, the University of Massachusetts, Massachusetts Geological Survey or GISmatters.

Citation: Mabee, S.B. and C.C. Duncan. 2013. Slope stability map of Massachusetts. Massachusetts Geological Survey, Miscellaneous Map 13-01. Scale 1:125,000. 3 sheets. Adobe PDF and ESRI ArcGIS map data files.
 This map was produced on request directly from digital files (PDF format) on an electronic plotter.
 A digital copy of this map (PDF format), including GIS datafiles, is available at <http://www.geo.umass.edu/stategeologist>.

APPROXIMATE MEAN DECLINATION, 2013



Shaded relief derived from 1/3 arc-second National Elevation Dataset (NED), referenced to North American Datum (NAD 1983) and North American Vertical Datum (NAVD 1988). Elevation data is projected to a 9 x 9 meter grid for the purposes of the slope stability analysis.
 All data projected in Massachusetts State Plane coordinates, mainland zone.
 Roads from MassDOT (April 2012), Networked Hydrography Centlines (July 1998), MassDOT Hydrography (1:25,000) (March 2010), and Community Boundaries (Towns) (September 2006) downloaded from the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division.
 Slope Stability Index modeling conducted using SINMAP (Stability Index Mapping) software, version 1.0g for ArcView 3.x, developed by Rick, R.T., Tarboton, D.G., and Goodwin, C.N. 2007. SINMAP - A stability index approach to stability hazard mapping user's manual.
 Modeling conducted by C.C. Duncan (2013).



Map Color Code	Predicted Stability Zone	Relative Slide Ranking	Stability Index Range ¹	Factor of Safety (FS) ²	Probability of Instability ³	Predicted Stability With Parameter Ranges Used in Analysis	Possible Influence of Stabilizing or Destabilizing Factors ⁴
Red	Unstable	High	0	Maximum FS<1	100%	Range cannot model stability	Stabilizing factors required for stability
Orange	Upper Threshold of Instability		0 - 0.5	>50% of FS1	>50%	Optimistic half of range required for stability	Stabilizing factors may be required for stability
Yellow	Lower Threshold of Instability	Moderate	0.5 - 1	≥50% of FS1	<50%	Pessimistic half of range required for stability	Destabilizing factors are not required for stability
Light Green	Nominally Stable	Low	1 - 1.25	Minimum FS=1	-	Cannot model instability with most conservative parameters specified	Minor destabilizing factors could lead to instability
Green	Moderately Stable		1.25 - 1.5	Minimum FS=1.25	-	Cannot model instability with most conservative parameters specified	Moderate destabilizing factors are required for instability
Dark Green	Stable	Very Low	>1.5	Minimum FS=1.5	-	Cannot model instability with most conservative parameters specified	Significant destabilizing factors are required for instability

Relative Slide Ranking - This column designates the relative hazard ranking for the initiation of shallow slides on unmodified slopes.
Stability Index Range - The stability index is a numerical representation of the relative hazard for shallow translational slope movement initiation based on the factors of safety computed at each point on a 9 meter (~30 foot) digital elevation model grid derived from the National Elevation Dataset. The stability index is a dimensionless number based on factors of safety generated by SINMAP that indicates the probability that a location is stable considering the most and least favorable parameters for stability input into the model. The breaks in the ranges for the stability index categories are the default values recommended by the program developers.
Factor of Safety - The factor of safety is a dimensionless number computed by SINMAP using a modified version of the infinite slope equation that represents the ratio of the stabilizing forces that resist slope movement to destabilizing forces that drive slope movement (Pack et al., 2001). A FS=1 indicates a stable slope, a FS<1 indicates an unstable slope, and a FS>1 indicates the marginally stable situation where the resisting forces and driving forces are in balance.
Probability of Instability - This column shows the likelihood that the factor of safety computed within this map unit is less than one (FS<1, i.e., unstable) given the range of parameters used in the analysis. For example, a <50% probability of instability means that a location is more likely to be stable than unstable given the range of parameters used in the analysis.
Possible Influence of Stabilizing and Destabilizing Factors - Stabilizing factors include increased soil strength, root strength, or improved drainage. Destabilizing factors include increased wetness, or loss of root strength.
 Pack, R. T., Tarboton, D. G. and Goodwin, C. N., 2001. Assessing terrain stability in a GIS using SINMAP; in 15th annual GIS conference, GIS 2001, Vancouver, British Columbia, February 19-22.

