



# NEHRP Soil Classification Map of Arkansas

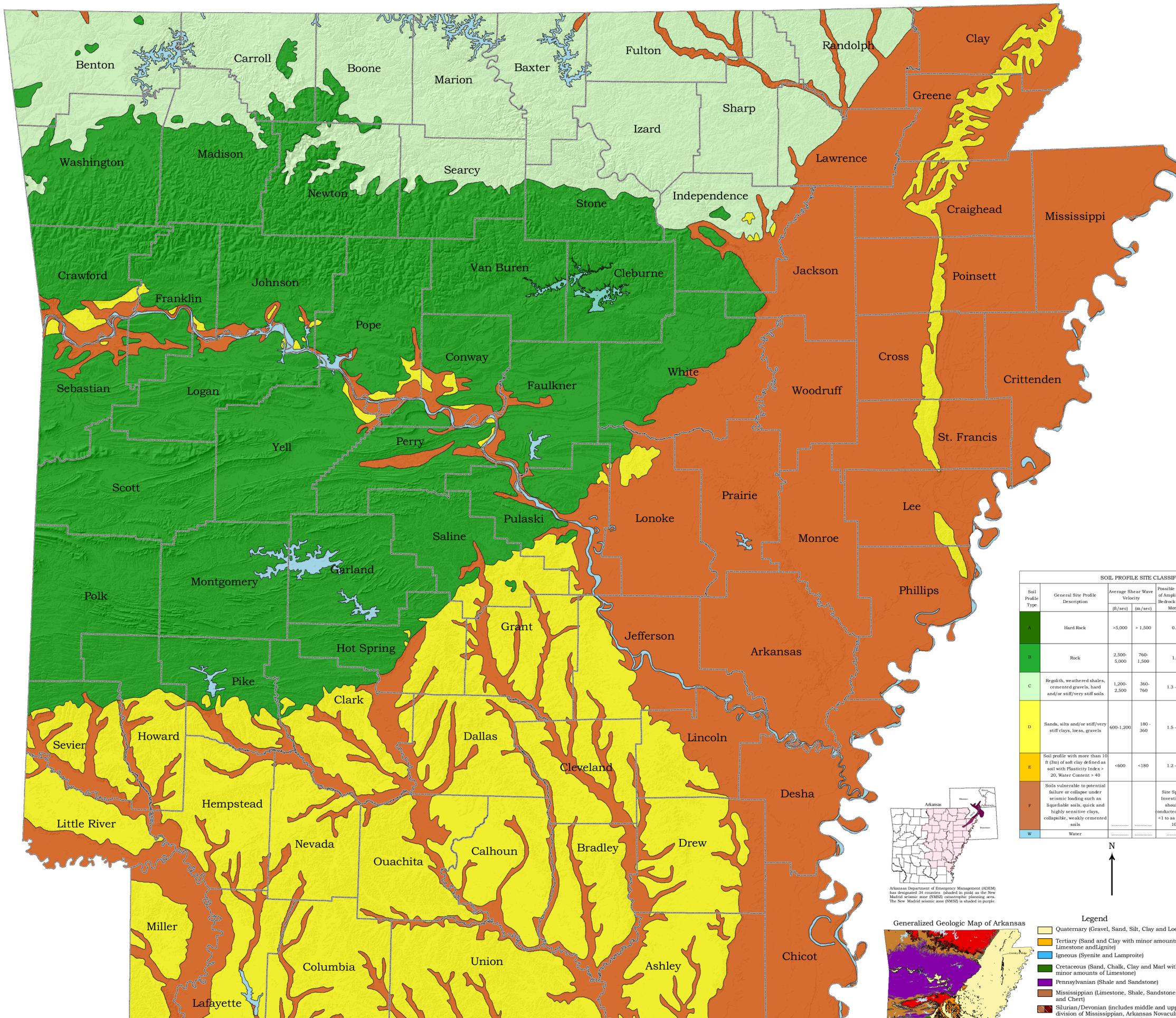
## About the Map

Scientific experiments have shown that seismic waves can amplify when passing through certain soil types. The amount of amplification of earthquake induced ground motions can be correlated to a soil's shear wave velocity. Based on this relationship, a classification system has been developed through the National Earthquake Hazard Reduction Program (NEHRP). This system assigns a letter (A, B, C, D, E and F) to the upper 30 meters of a soil based on its average shear wave velocity, thickness and potential to liquefy. The Arkansas Geological Survey (AGS) has coordinated with other member Geological Surveys of the Central U.S. Earthquake Consortium (CUSEC) to produce NEHRP soil classification maps for each of the respective eight states surrounding the New Madrid seismic zone (NMSZ). These individual state maps were subsequently compiled into an improved regional NEHRP soil classification map for the Arkansas Department Emergency Management's (ADEM) New Madrid seismic zone catastrophic planning initiative.

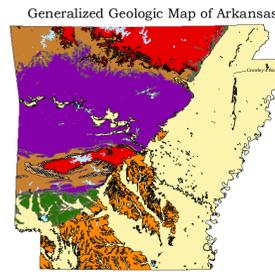
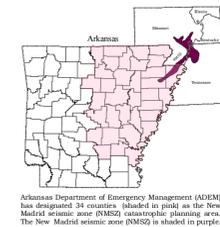
This map was developed from existing geologic and surficial materials maps including the USGS I-2789: *Map of Surficial Deposits in the Eastern and Central United States* (Fullerton, D.S., et al, 2003), as well as available shear wave velocity and standard penetration (SPT) data. Soils were classified based on the NEHRP procedures as described in the International Building Code (IBC) with the exception of including high velocity bedrock (where present) when determining the average shear wave velocity of the soil column. Soil classifications obtained from this map may be incorporated into the Federal Emergency Management Agency's (FEMA) HAZUS software for estimating potential losses from earthquakes. This map is for screening purposes only and is not intended to be a substitute for a site specific evaluation. Copies of this map are available from the Arkansas Geological Survey, Little Rock, Arkansas.

## References

- Borchardt, R.D., 1994, New developments in estimating sites effects on ground motion, in Proceedings of Seminar on New Developments in Earthquake Ground Motion Estimation and Implications for Engineering Design Practice, Applied Technology Council 35-1, pp. 10-1 through 10-44.
- Building Seismic Safety Council, 2004, NEHRP recommended provisions for seismic regulations for new buildings and other structures, 2003 edition, Part 1 Provisions: Federal Emergency Management Agency, FEMA 450, 355 pp.
- Fullerton, D.S., Bush, C.A. and Pennell, J.N., 2003, Map of surficial deposits and materials in the Eastern and Central United States (east of 102° west longitude): U.S. Geological Survey, Geologic Investigations Series Map I-2789, 1 sheet, scale 1:2,500,000; pamphlet, 48 pp, <http://pubs.usgs.gov/imap/i-2789/>.
- International Code Council, 2002, 2003 International Building Code, 686 pp.



Soil Profile Type	General Site Profile Description	Average Shear Wave Velocity (ft/sec)	(m/sec)	Possible Amount of Amplification Bedrock Ground Motion	Standard Penetration Tests (SPT) Average Blow Counts	Average Shear Strength (lbs/sq ft)	Remarks	Unit on Map
A	Hard Rock	>5,000	> 1,500	0.8	.....	.....	Outcrops of unweathered to slightly weathered bedrock of the Ozark Plateau, Ouachita Mountains and Arkansas River Valley	No
B	Rock	2,500-5,000	760-1,500	1.0	.....	.....	Outcrops of weathered bedrock and unweathered shales of the Ozarks, Ouachita Mountains and Arkansas River Valley	Yes
C	Highly, weathered shales, cemented gravels, hard and/or stiff/very stiff soils	1,200-2,500	360-760	1.3- 1.7	>50	2,000	Deeply weathered bedrock and residuum of predominantly limestones and dolomites of the Ozark Plateau	Yes
D	Sands, silts and/or stiff/very stiff clays, loess, gravels	600-1,200	180-360	1.5- 2.4	15- 50	1,000-2,000	Most of the Cretaceous and Tertiary deposits of the Gulf Coastal Plain; Quaternary loess and cemented gravels of the Mississippi Embayment; Quaternary terrace deposits of the Arkansas River Valley	Yes
E	Soil profile with more than 10 ft (3m) of soft clay defined as soil with Plasticity Index > 20, Water Content > 40	<600	<180	1.2- 3.5	<15	<1,000	Localized Quaternary terraces and alluvium of the Mississippi Embayment	No
F	Soils vulnerable to potential failure or collapse under seismic loading such as liquefiable soils, quick and highly sensitive clays, collapsible, weakly cemented soils	.....	.....	Site Specific Investigation should be conducted - can be <1 to as high as 10X	<15	<1,000	Most of the Quaternary terrace, alluvium deposits and sensitive materials that may fail during seismic induced events. Predominately found in large river valleys and the Mississippi Embayment	Yes
W	Water	.....	.....	.....	.....	.....	.....	Yes



- ### Legend
- Quaternary (Gravel, Sand, Silt, Clay and Loess)
  - Tertiary (Sand and Clay with minor amounts of Limestone and lignite)
  - Igneous (Syenite and Lamproite)
  - Cretaceous (Sand, Chalk, Clay and Marl with minor amounts of Limestone)
  - Pennsylvanian (Shale and Sandstone)
  - Mississippian (Limestone, Shale, Sandstone and Chert)
  - Silurian/Devonian (includes middle and upper division of Mississippian, Arkansas Novaculite)
  - Silurian/Devonian (Limestone, Shale and Sandstone)
  - Ordovician (Limestone, Dolomite, Sandstone and Chert)
  - Cambrian (includes portion of Lower Ordovician Collier Shale)
  - Water

## Disclaimer

Although this map was compiled from digital data that was successfully processed on a computer system using ESRI ArcGIS 9.x software at the Arkansas Geological Survey (AGS), no warranty, expressed or implied, is made by the AGS regarding the unity of the data on any other system, nor shall the act of distribution constitute any such warranty. The AGS does not guarantee this map or digital data to be free of errors nor assume liability for interpretations made from this map or digital data, or decisions based thereon.

The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the Arkansas Geological Survey.

The SM Hillshade base used in the making of this map was acquired at the Spatial Analysis Laboratory, University of Arkansas, Monticello and some of the other Feature Class Data was acquired online at [www.geoserver.arkansas.gov](http://www.geoserver.arkansas.gov).

