README_NEHRP_Site_Class

NEHRP Site Class Maps for the Idaho Falls-Rexburg Area, Idaho

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WHAT ARE NEHRP SITE CLASSES?

The intensity of ground shaking during an earthquake varies according to the nature of near-surface materials. For example, shaking intensity is generally greater in areas underlain by unconsolidated materials (called “soils” by engineers) than in those underlain by firm bedrock. Engineers and architects incorporate these local site conditions into their designs to reduce damage from earthquakes. In 1997, the National Earthquake Hazards Reduction Program (NEHRP) established procedures for placing building sites into classes based upon the geotechnical properties of near-surface materials. For each NEHRP site class, coefficients adjust expected earthquake motions for local ground conditions. Earthquake ground motion parameters are generated by the U.S. Geological Survey for all parts of the United States and are available as national seismic hazard maps (http://earthquake.usgs.gov/hazards/products/). NEHRP site classes are not shown on national seismic hazard maps because local conditions are frequently too variable to accurately depict at the hazard map scale, or because the required geotechnical information is unavailable. Both NEHRP site classes and USGS national seismic hazard maps are incorporated into the International Building Code and International Residential Code.

HOW THESE MAPS WERE PRODUCED

NEHRP site class maps were produced for the following 7.5-minute U.S. Geological Survey quadrangles:

Ammon
Firth
Goshen
Idaho Falls North
Idaho Falls South
Lewisville
Menan Butte
Rexburg
Rigby
Ririe
Ucon
Woodville

Methods for classifying site classes are given in Building Seismic Safety Council (1997, pp. 32-35). In general, site classes are determined with geotechnical properties of earth materials within 100 feet (30 m) of the ground surface. These include average shear wave velocity and average standard penetration resistance. However, these data are not available for many parts of the study area and making field measurements was beyond the scope of this project. Geotechnical properties were estimated for geologic units using procedures similar to those employed in other states (Wills and others, 2000; Palmer and others, 2004):

Measurements of shear wave velocity and standard penetration resistance were compiled for geologic units within the map area and surrounding portions of the eastern Snake River Plain. The geologic units were taken from 1:24,000-scale mapping (Phillips and Welhan, in preparation). Classification was based upon this compilation. No regional data were found for some units. Classification of these units was based upon published measurements of similar units in the western United States.

Areas of bedrock overlain by >10 feet of loess were identified with water well records (IDWR, 2010) and classified on the basis of loess.

County soil maps (Jorgensen, 1979; Noe, 1981; Miles, 1981; Salzmann and Harwood, 1973) were examined for areas underlain by thick soft clay, as identified with plasticity indexes > 20, water content of >40%, and total thicknesses of >4 feet. No such soils have been mapped in the study area. Assignment of class F requires a detailed geotechnical evaluation and class A is used only in the Eastern United States. Therefore, these classes are not used on the map.

SPREADSHEETS AND ARCGIS PERSONAL GEODATABASE

NEHRP site classes for each geologic unit in study area are given in the spreadsheet listed at the end of this file. The average shear wave velocities and standard penetration resistances used in preparing these maps are also given. NEHRP site class definitions are given in another spreadsheet. An ArcGIS personal geodatabase is also provided.

LIMITATIONS ON THE USE OF THIS MAP

This map is a general guide designed to outline areas with the potential for enhanced ground shaking. Site-specific investigation is required to determine actual ground conditions for specific building sites. This is because the data used in producing the map are based on regional geologic mapping and correlation of the geotechnical properties of map units.

This map is intended to be used at a scale of 1:24,000. As with all maps, users should not apply this map, either digitally or on paper, at more detailed scales.

OBTAINING DIGITAL AND PAPER COPIES OF THESE MAPS

The maps and the data used to make them are available in digital format for free download at the website of the Idaho Geological Survey (www.idahogeology.org).

REFERENCES CITED

Building Seismic Safety Council, 1997, NEHRP recommended provisions for seismic regulations for new buildings and other structures: Part 1, Provisions (FEMA 302): Building Seismic Safety Council, 334 p.

IDWR, 2010, Water well logs: Idaho Department of Water Resources, Boise. [Available at http://www.idwr.idaho.gov/GeographicInfo/GISdata/wells.htm.]

ITD, 2010, Test hole lithology and geotechnical data from bridge drawings: Idaho Transportation Department, Boise.

Jorgensen, W., 1979, Soil survey of Jefferson County, Idaho: U.S. Department of Agriculture, Soil Conservation Service, 219 p. 66 map plates, scale, 1:20,000.
Noe, H.R., 1981, Soil survey of Madison County area, Idaho: U.S. Department of Agriculture, Soil Conservation Service, 128 p., 29 map plates, scale 1:24,000. [Available at http://soildatamart.nrcs.usda.gov/]

Miles, R.L., 1981, Soil survey of Bonneville County area, Idaho: U.S. Department of Agriculture, Soil Conversation Service, 108 p., 58 plates, scale 1:24,000.

Palmer, S.P. and others, 2004, Liquefaction susceptibility and site class maps of Washington State by county: Washington Department of Natural Resources, Division of Geology and Earth Resources Open File Report 2004-20.

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Wills, C.J., M. Petersen, W.A. Bryant, M. Reichle, G.J. Saucedo, S. Tan, G. Taylor, and J. Treiman, 2000, A site-conditions map for California based on geology and shear-wave velocity: Bulletin of the Seismological Society of America, v. 90, no. 6B, pp. S187-S208.

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SPREADSHEETS

NEHRP_Site_Class_Definitions.xls
Definition of each NEHRP Site Class based on shear wave velocity, standard penetration resistance, and soil properties.

IF_REX_Units_Class_Geotech.xls
List of geologic units, assigned site class, and available geotechnical data used in classification.

ARCGIS PERSONAL GEODATABASE

ARCGIS PERSONAL GEODATABASE (version 1.2020.7)

\GIS_DATA\IDFall_NEHRP_LQ_GIS.mdb (start with IdahoFalls_NEHRP_and_Liquefaction.mxd)

Feature classes:
-->IDFalls_H2Otable_IDTM27-----Depth to water table
-->IDFalls_LQ_classIDTM27------Liquifation susceptibility data
-->IDFalls_sat_soil_IDTM27-----Saturated soils data
-->IDFalls_SiteClass_IDTM27----NEHRP site class data
-->Proj_area_quad_indexIDTM27--Quadrangle index overlay