SURFICIAL MATERIAL GEOLOGIC MAP OF THE O'FALLON 7.5' QUADRANGLE ST. CHARLES COUNTY, MISSOURI

Geology and Digital Compilation by
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PHYSIOGRAPHY

The O'Fallon quadrangle includes part of the large floodplain of the Mississippi River and loess covered uplands. The floodplain is greater than four miles wide in this area with only a small portion residing on this quadrangle. The quadrangle lies within the Dissected Till Plains Section of the Central Lowland Province of the Interior Plains Physiographic Division. The lowest recorded elevation of slightly less than 430 feet mean sea level (msl) occurs along the edge of the Mississippi River. The highest elevation on the quadrangle occurs on the loess covered uplands and is greater than 667 feet msl in the southwest corner of the quadrangle. Total relief on the O'Fallon quadrangle is approximately 237 feet.

GEOLOGICAL OVERVIEW

The O'Fallon quadrangle is underlain by Mississippian-age limestone and shale. The majority of the quadrangle is underlain by the Burlington/Keokuk Formation and the Warsaw Formation. In the southeastern corner of the quadrangle lies the Cottleville Fault which has a southeast to northwest orientation and appears to terminate in the southeast corner of the quadrangle. On the downthrown southwest side of the fault, the younger Salem Formation is the upper most bedrock unit.

DESCRIPTION OF MAP UNITS

AF **ARTIFICIAL FILL –** This unit comprises artificially emplaced fill material and is composed of a mixture of heterogeneous clay, silt, sand and gravel in various quantities. This unit may reach 40 feet in total thickness and comprises the material for highway and railroad beds, and waste water treatment facility fill. This artificial fill has typically been placed on undisturbed materials.

Qcly **QUATERNARY CLAY-CAPPED ALLUVIUM –** This unit has been deposited by the Mississippi river. The approximate upper 15 feet of these deposits are composed predominantly of clay with variable amounts of silt and organic material. The material residing below the clay is predominantly sand and gravel to the top of bedrock. In the northeastern portion of the map, the thickness of this unit reaches 120 feet near the large river. The water table is approximately five to 15 feet below ground surface, resulting in an interval of saturated sand and gravel greater than 100 feet thick. This unit is included in the cross sections as Quaternary clay-capped alluvium.

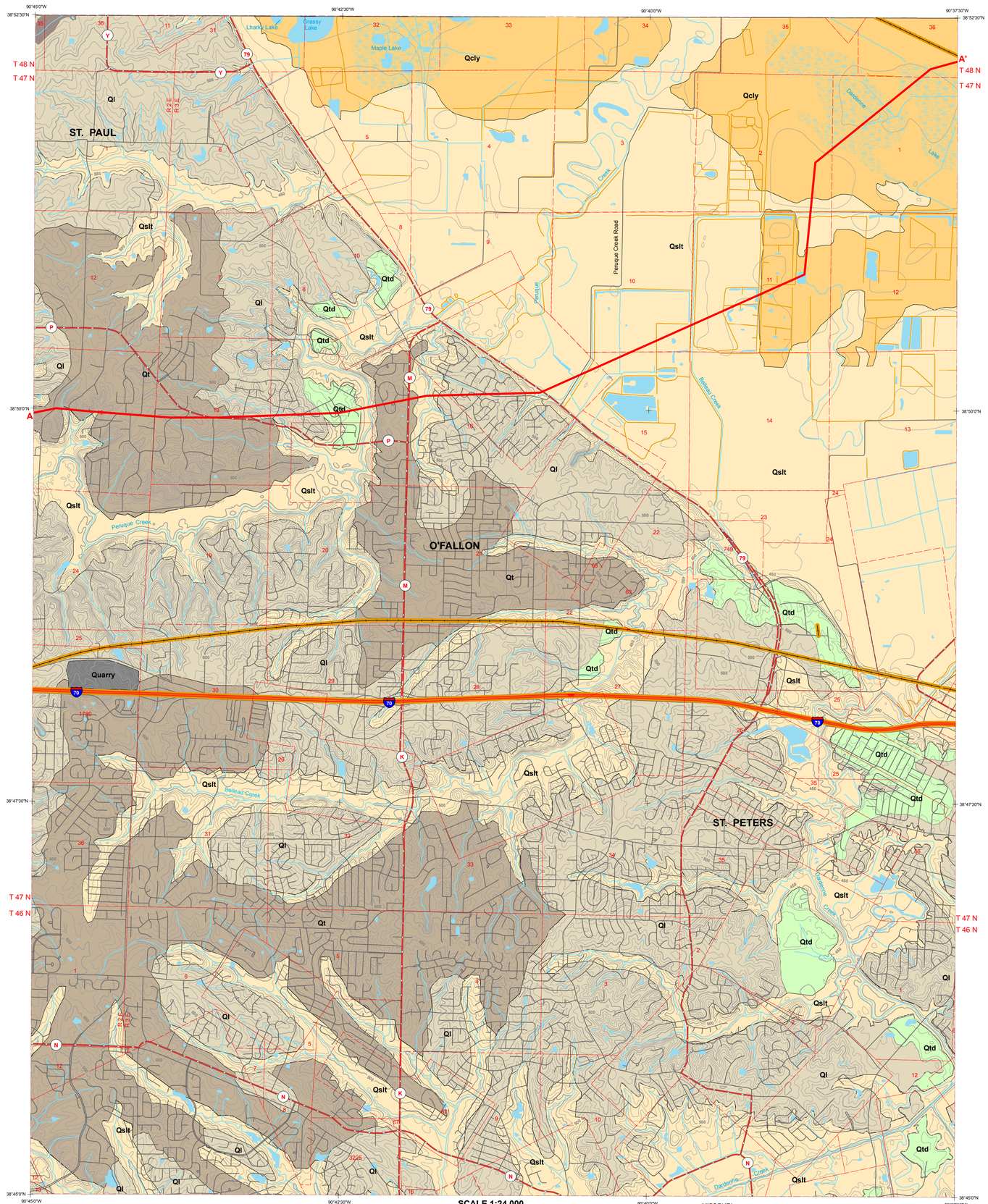
Qslt **QUATERNARY SILT-CAPPED ALLUVIUM –** This unit has been deposited by the Mississippi River. The approximate upper 15 feet of these deposits are composed predominantly of clay with variable amounts of silt and organic material. The material residing below the clay is predominantly sand and gravel to the top of bedrock. In the northeastern portion of the map, the thickness of this unit reaches between 120 feet near the large river to 130 feet near Dardenne Creek in the flood plain. The water table is approximately five to 15 feet below ground surface, resulting in an interval of saturated sand and gravel greater than 100 feet thick. This unit is included in the cross sections as Quaternary silt-capped alluvium.

Ql **QUATERNARY LOESS –** This unit is a wind-blown deposit of silt and clayey silt with occasional pockets of clay, sand and gravel. The unit is composed of two separate loess layers, the Roxana below and the Peoria above (Goodfield, 1965). The total thickness of the two units may reach 70 feet. The Roxana is higher in clay content and may have a paleosol developed in the upper few feet. The contact between the two units forms a potential slide plane in areas of high topographic relief. The loess overlies Mississippian-age bedrock comprised of limestone and shale creating two unique environments. Where the loess is thin, the limestone may be karstic. Where the underlying unit is predominantly shale, water will perch, destabilizing the contact zone. Where the loess rests upon shale, the slide potential is increased.

Qt **QUATERNARY TILL –** Deposits of clayey till are located in the western portion of the quadrangle. The quaternary till was deposited as a drift blanket during glaciation north of the Missouri River. The till is a mixture of clay, silt, sand, gravel and cobbles that covers the bedrock surface. The till varies in thickness from 10 to 25 feet with the thickest deposits inland from the river and in depressions of the bedrock surface.

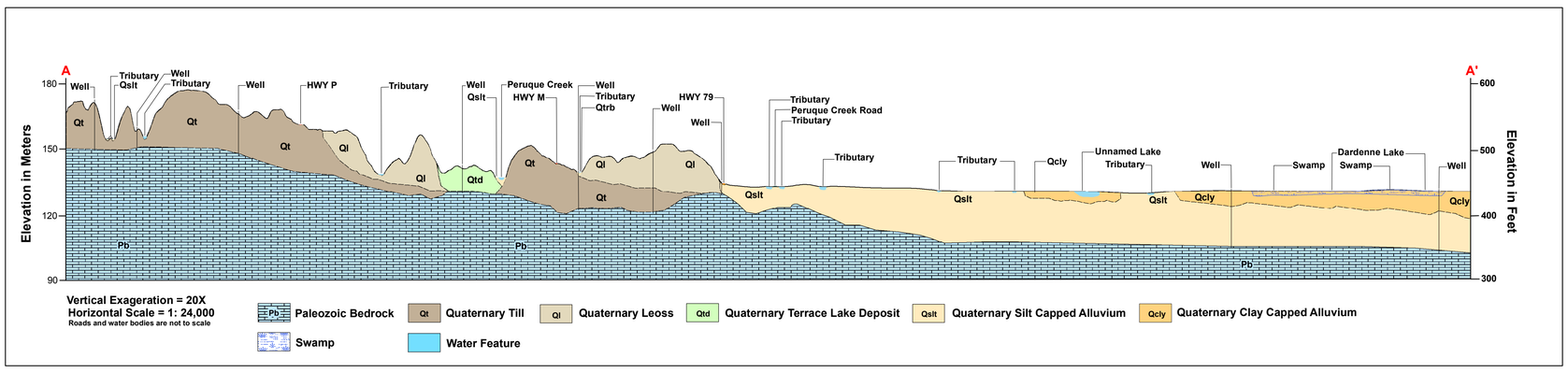
Qtd **QUATERNARY TERRACE DEPOSIT –** The terrace deposits in the quadrangle are slightly different than previously mapped terrace deposits. All were deposited during fluvial events leaving the terrace above low flow stage of the river. However, the terrace deposits in this quadrangle have a lacustrian signature of sensitive organic clays approximately 20 feet below the surface. After high stage flow dropped to normal, low lying areas within the terrace were filled with organic clay material. This zone has a very low shear wave velocity and underlies many types of infrastructure.

A——A' Line locates the placement of the cross section with end line symbols.



Produced by the Missouri Department of Natural Resources, Division of Geology and Land Survey, Geological Survey Program. Funded by the United States Geological Survey, National Earthquake Hazards Reduction Program, Award # G09AP00113. 2009 Topography was derived from a USGS 10 meter Digital Elevation Model using contouring software. Features were edited to the USGS, 38090-G6-024, 1994, O'Fallon 7.5' quadrangle and digital aerial photography from 2007 and 2009. Field checked in 2010. Universal Transverse Mercator (UTM), Zone 15 North American Datum 1983 (NAD 83)

UTM and 1994 Magnetic North Declination at Center of Sheet 2010 Magnetic North Declination ~ 0° 33' East, Field Strength: 53225.4 nT



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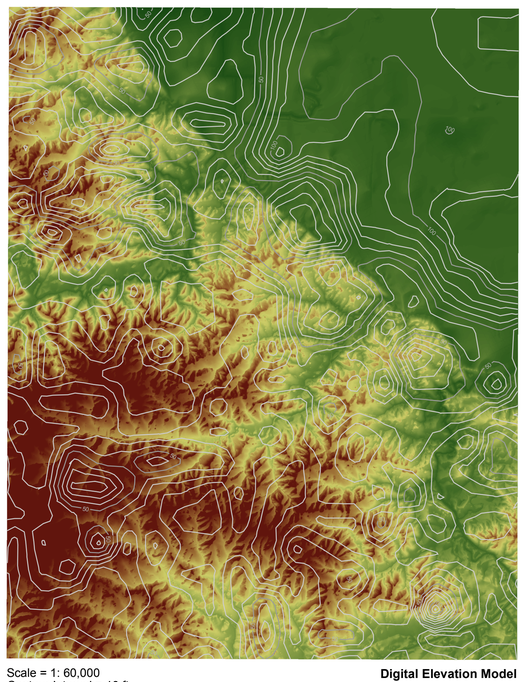
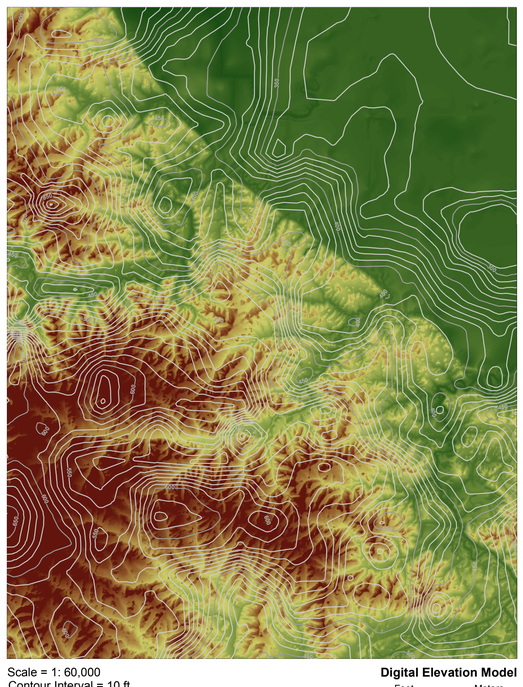
SURFICIAL MATERIAL THICKNESS



Scale = 1: 60,000
Contour Interval = 10 ft.
Index Contours = 50 ft.

Digital Elevation Model
Feet: High: 667 / Low: 412
Meters: High: 204 / Low: 126

TOP OF BEDROCK



Scale = 1: 60,000
Contour Interval = 10 ft.
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Digital Elevation Model
Feet: High: 667 / Low: 412
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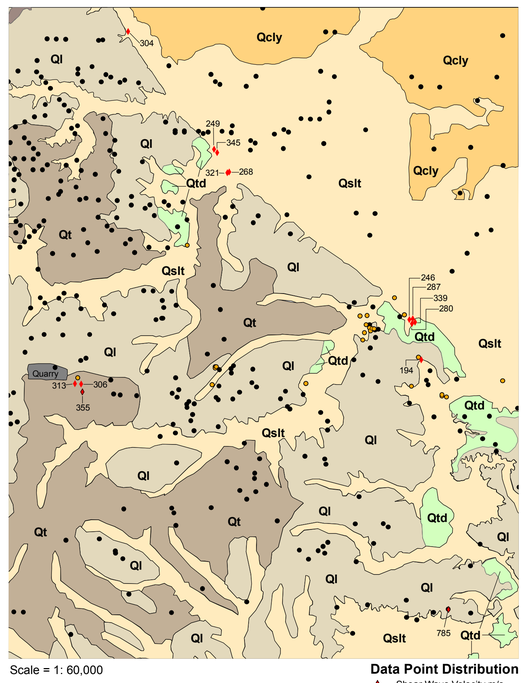
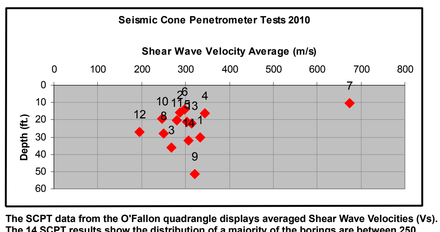
DATA POINT LOCATION



Scale = 1: 60,000

Data Point Distribution
- Shear Wave Velocity m/s
- Missouri Geotechnical DGLS
- Bedrock Borings DGLS
- Vs DGLS 2010 m/s



The SCPT data from the O'Fallon quadrangle displays averaged Shear Wave Velocities (Vs). The 14 SCPT results show the distribution of a majority of the borings are between 250 and 350 meters per second (m/s).

Shear Wave Velocity Averaged

Site	Vs (m/s)	Depth (ft.)	Depth (m)
OF-1	333.832927	30.02	9.152439024
OF-2	286.647378	15.91	4.850609756
OF-3	268.139507	36.25	11.05182927
OF-4	344.63628	16.08	4.902439024
OF-5	303.53938	21	6.402439024
OF-6	297.678735	13.78	4.201219512
OF-7	674.352668	10.33	3.149390244
OF-8	249.413855	28.05	8.551829268
OF-9	320.652744	51.35	15.6554878
OF-10	245.709604	19.52	5.951219512
OF-11	279.788807	20.51	6.25304878
OF-12	194.335332	26.9	8.201219512
OF-13	313.141569	22.31	6.801829268
OF-14	306.226152	32.18	9.81097561

Shear wave velocity testing was conducted in the O'Fallon quadrangle during June of 2010. Seismic Cone Penetrometer Testing are displayed above.

Acknowledgements

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