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An Account of the Geology of Oregon City, Oregon with notes on the adjacent West Linn and Willamette, Oregon region

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by

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Geologic History

Although the earth history of our globe encompasses some two billion years, the geologic records in the West Linn-Oregon City region are, at the most 30 or 40 million years old. The oldest known geologic units in the region are sediments that were deposited near the eastern shoreline of an ancient sea during Oligocene time. These deposits are concealed beneath layer upon layer of lava flows in this area but have been penetrated by wells drilled for water (as at Gladstone) and are exposed by erosion and great landslides in Washington and Columbia counties.

During a time lapse of some 10 million years the marine sediments were deformed and eroded. About 20 million years ago (during middle Miocene time) the earth's crust was ruptured and lavas welled up from the earth's interior, pouring out on the surface in a succession of vast floods that covered much of southeastern Washington and northern Oregon and extended from Idaho to the Pacific Ocean. These fissure eruptions represent one of the greatest volcanic catastrophes our world has known. The lava product of this episode is the Columbia River basalt, which buried the marine sediments in this area and compose the cliffs scaled by the municipal elevator.

After a period of general stability and deep soil formation, movement to relieve stresses within the earth began to warp and fold the lavas, slowly developing great upfolds and downfolds that are preserved, in part, today. During this time the barrier that is the modern Cascade Range began to be formed.

Some of the rivers that flowed across the ancient terrain increased their cutting action as the folding proceeded and maintained their courses through the great barriers that were being established. Into the basins formed by the downfolding, these rivers discharged great volumes of gravel, sand, and silt, which through the ages have been cemented into hard conglomerates and sandstones and then deeply weathered to clay. This basin filling continued intermittently over a great period of time, perhaps into the last million years of time, and many periods of alluviation, separated by periods of cutting and scouring, are represented in the deposits (the Troutdale formation). Exposures of these continental sediments may be seen in places along the valley walls of Abernathy Creek.

Erosion of the land surface was punctuated locally by small volcanoes being born, living their short life, and dying. This volcanic activity probably occurred during the last few million years. Many of these dead, but not buried, volcanoes dot the skyline. Perhaps the most familiar is Mount Sylvania, from which tentacles of lavas extend short distances in all directions. To the south and east, the ancestral Willamette River was planing back and forth across the land, as far west as South End Road and as far east as Cascade Highway. Then the volcano that is now Highland Butte came into being. Vast quantities of lavas (Boring lava) poured from the volcano and advanced across the floodplain of the ancestral Willamette, forcing the river to shift farther and farther to the west until finally it was pinched against the masses of older rock (Columbia River basalt) that forms Pete Mountain and the highland area of Rossmont. The river could no longer retreat and it held its new position, cutting a new channel marginal to the lava front from New Era to Oregon City.

Within the last million years, the great volcanoes that form the prominent peaks along the crest of the Cascade Mountains came into existence and were mantled again and again with ermine coats of snow as the climatic conditions changed. Meltwaters from wasting ice cut and enlarged valleys, and new rivers came into existence. Glaciers extended down these valleys, and great ice sheets formed in Canada and pushed their way down into the northern parts of Washington and Idaho. Floods of water from the wasting of these ice sheets and valley glaciers brought vast quantities of sand and gravel through the Columbia River gorge and discharged it into the valleys of the lower Columbia River and the Willamette River, which were ponded during the latter part of the episode. Great icebergs were also borne by the floods, and many of these bergs held within them huge blocks of granite, which they dropped wherever they might be at the time they melted.

At intervals the winds whipped fine material out of the flood-plains and deposited it on the highlands as a concealing mantle. The continuing process of soil building and the dense growth of vegetation further obscures the geologic record that has been described, but in the Oregon City and West Linn area the terrain reflects very simply the great forces that have been at work.

Many successive events -- rupturing and warping of the earth's crust, the vomiting of volcanoes, cutting and depositing by rivers, and the gouging, carving, chewing, and discharging of rocks by glaciers and their meltwaters-- have contributed to give us an extremely varied terrain upon which we live, build our homes and industries, from which we derive materials to build with, and which we puncture in attempts to obtain water.

Geologic Conditions

Oregon City.-- Oregon City presents a variety of subsurface conditions that will affect foundation excavations and drainage. The lower river-cut bench, upon which the business section of the city is established, is of Columbia River basalt mantled by 20 to 30 feet of alluvial deposits, predominantly sand. The cliffs to the east are of the same basalt, which is also exposed at the surface or is at shallow depths to as far east on 7th Street as about J. Q. Adams Street. Bedrock exposures of Columbia River basalt are scattered but may be observed on 10th Street between Jefferson and Madison Streets, at the corner of 3rd and Jefferson, and in the old quarry behind the city shops.

Overlying the Columbia River basalt and composing the bedrock over much of the eastern part of the city is the so-called Troutdale formation, which is composed of mudstones, sandstones, and conglomerates. These indurated sediments have been deeply weathered in places, and subsoils developed from them are poorly drained and may be unstable on steep slopes when saturated. They are, however, rather easily excavated.

The higher southeastern part of the city is underlain by the Boring lavas which overlie the sedimentary rocks. These lavas form the steep cliffs along the abandoned Park Road, and along South End Road and the southern end of Center Street. Because of the depth of weathering of their upper surface, shallow excavations are not difficult, the surface is farmed, and rock exposures are rare. In places, rounded boulders resulting from spheroidal weathering processes litter the surface. The basalt at Buena Vista Park, in the northern part of the city, is probably an erosional remnant of Boring lava but may be an erosional prominence of Columbia River basalt jutting-up through the sediments of the so-called Troutdale formation, which are exposed just north of the park and below it on the abandoned railroad grade.

West Linn and Willamette.-- The geology of the cities of West Linn and Willamette (about two miles upstream from West Linn, not included on map) is less complex. With the exception of the terrace deposits in northeastern West Linn, east of State Highway No. 43, the city is underlain by Columbia River basalt, which, in the higher parts of the city, is mantled by as much as 30 feet or more of silt of windblown origin. These silts commonly are present above an approximate altitude of 500 feet and completely mantle the surface in the Rosemont area.

The city of Willamette is situated on a thick terrace deposit that fills the lower Tualatin River valley to an altitude of about 225 feet and is composed predominantly of sand and silt. These materials are well exposed in new cuts along Market Road, east of the bridge across the Tualatin River. These fine sediments overlie, at least in part, a boulder deposit that rests on bedrock and is exposed just west of the north abutment of Weiss Bridge, in the southeastern part of the city. Bedrock probably will not be encountered in any excavation within the city. The coarse boulder deposit, beneath the finer deposits composing the bulk of the terrace, probably constitutes a good ground-water reservoir and wells penetrating this deposit should be productive.