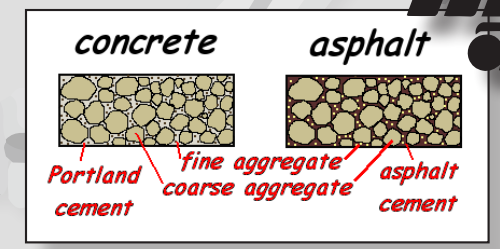
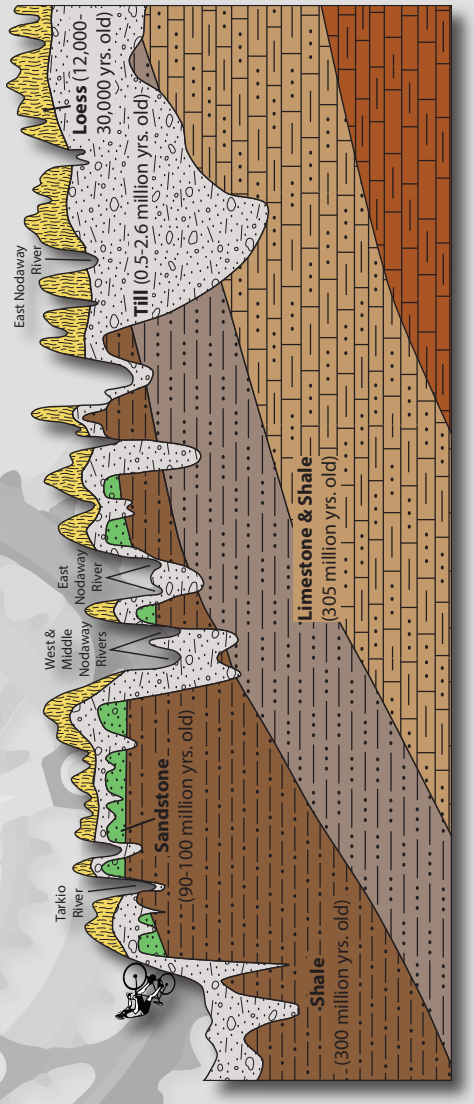
The Science of Roads

As you bike across the state of Iowa you will primarily be riding on paved roads, but what are they paved with? Some are paved with concrete and some with asphalt. What is the difference? Well both are composed mostly of aggregate, fragments of crushed limestone or dolomite and sand. It is the material that glues these fragments together that is the primary difference. Concrete (the white or light gray road surface) uses Portland cement to glue the aggregate together. Portland cement is made by firing a finely crushed mixture of limestone, sand, clay, and other materials to 2,600° F in a kiln to produce a clinker that is mixed with gypsum and crushed to a fine powder to make the cement. The cement is mixed with water and the aggregate and applied to the road base to create a concrete roadway. Asphalt is a viscous petroleum product that is heated, mixed with aggregate and applied to the road base to create an asphalt roadway. 94% of asphalt and 80% of concrete is made up from aggregate.





Daily Geology: The depth to the bedrock surface along today's ride ranges between 100 and 200 feet. Not until the Thompson River valley west of Decatur City will any bedrock exposures be encountered. The thick glacial cover makes finding sources of rock for aggregate very difficult. The only limestone quarries on the route so far were at Glenwood on Day 1 and Corning on Day 2, compared to areas like eastern Iowa where limestone quarries are scattered no more than 20 miles apart.

RAGBRAI

Day 3 2016

Tuesday, July 26

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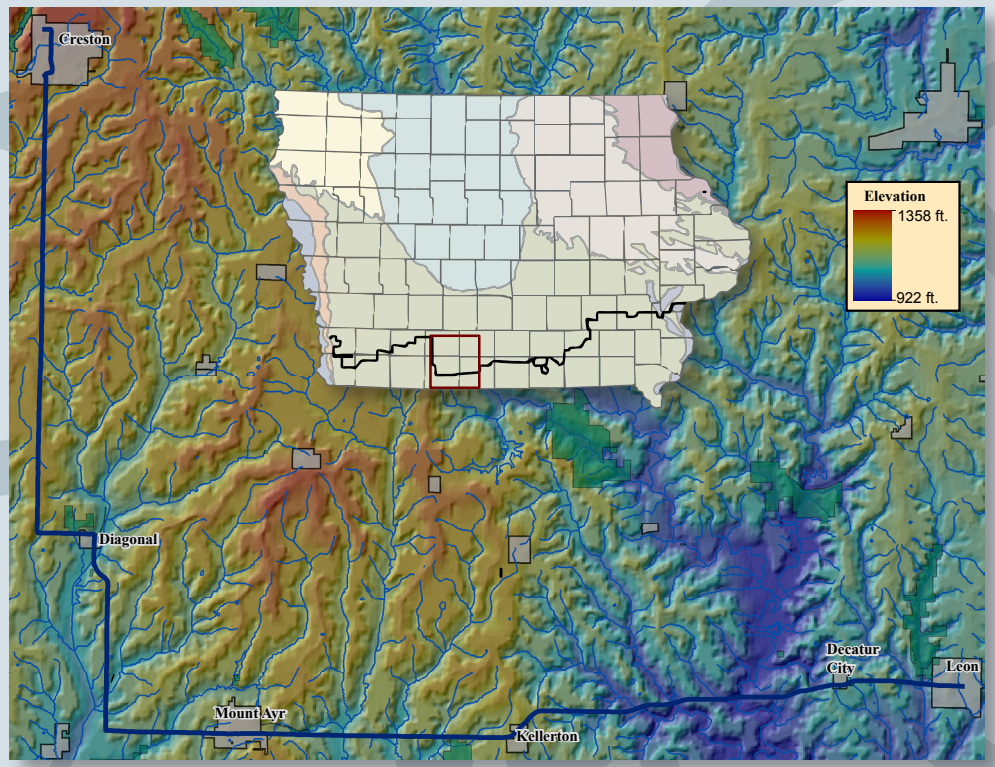
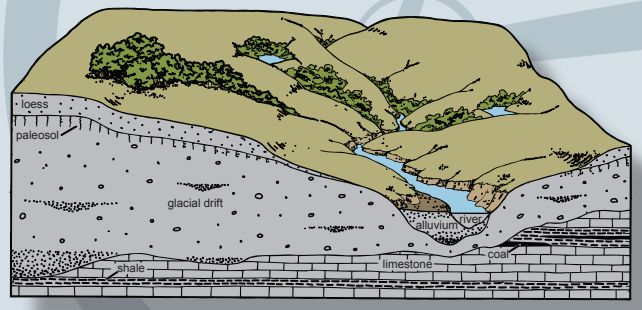
Southern Iowa Drift Plain

Unlike many previous rides, this year's route will be almost entirely within one landform region, the Southern Iowa Drift Plain, the largest landform region in the state, comprising most of Iowa's southern half. In general, this landform region is characterized by loess over deeply weathered Pre-Illinoian glacial deposits. Between 2.6 and 0.5 million years ago, Iowa was glaciated at least seven times. These glacial advances left behind a thick package of glacial till that has subsequently eroded. The long period of erosion and landscape development created the well-defined river valleys and topography that we see today. More recently, this area was mantled by several episodes of loess deposition. The loess deposits on the Southern Iowa Drift Plain are thickest near river sources that carried glacial outwash material from the Des Moines Lobe.

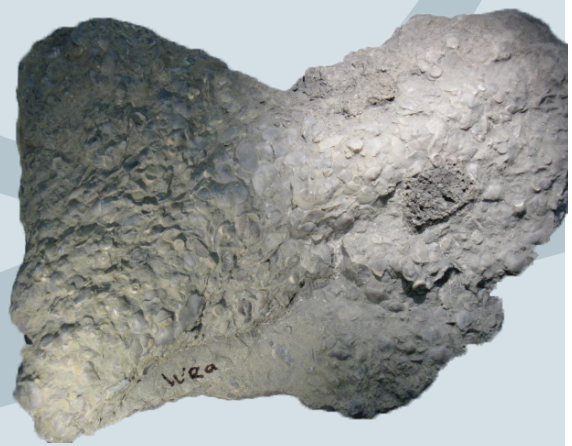




* Cover photo: A geologist looks on at Pennsylvanian stratigraphy in the Thayer quarry.

Aftonian Gravels

Union County, especially the area between Afton and Thayer, was the site of many of the initial investigations of Pleistocene geology in Iowa during the early 20th century. Several key localities near Afton and Thayer were used to establish the framework and type sections for this time period, including the 'Aftonian' interglacial period found between the 'Kansan' and 'Nebraskan' glacial advances. Early workers thought that a sand and gravel deposit layer named the 'Aftonian gravels' and a buried soil called the Aftonian paleosol could be used to divide the two glacial till packages. However, later workers found evidence of at least seven glacial advances instead of the two. The gravel has not been positively identified in its age and stratigraphy in this more complicated framework, but they have given geologists and palentologists a window into the mammals that were in Iowa between 0.5-2.6 million years ago. Fossils, mostly teeth, of mammoth, mastodon, horse, and camels have been identified in this unit.

Decatur City Quarry

Crushed limestone supplies Iowans with the materials necessary for roads, bridges, buildings, and more. The Iowa Geological Survey recently partnered with Schildberg Construction Company to host a geologic field trip inside a quarry near Decatur City. Participants experienced a rare opportunity to enter the quarry and learned about Pennsylvanian and Pleistocene stratigraphy, associated fossils, and which geologic units can be desirable for limestone producers. Brachiopod fossils found in the Wea Shale are shown to the right. A detailed trip guide can be found at:
http://s-iihr34.iihr.uiowa.edu/publications/uploads/GSI-086.pdf