

Recent Growth of Consulting Engineering Firms in North Dakota

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Since the dramatic rise in oil and gas activity in North Dakota began in earnest in the spring of 2009, so has the growth of its consulting engineering community. In 2009 there were just under 40 environmental and geotechnical-related consulting firms in the state, which was adequate for the amount of activity in the civil works, transportation and energy development sectors. Then, with the onset of unprecedented growth and development of the Bakken\Three Forks Formations, came an increased demand for environmental and geotechnical services across the state in all sectors, and more firms began to locate or expand operations in North Dakota. As of this writing there are over 140 individual engineering consulting firms, with offices located in the state, that are providing consulting geoengineering services to keep pace with the continued development of infrastructure and energy development activities in North Dakota's oil producing areas, although likely at a somewhat more moderate pace today than that of a year ago (fig 1).

The Bismarck area continues to lead the field in the number of consulting engineering firms with offices in North Dakota. Between 2009 and 2016 the number of firms more than doubled from 14 to 35. Significant growth has also occurred in the western North Dakota cities of Williston, Dickinson, Minot, and Mandan with more modest growth in Grand Forks, Devils Lake, and Jamestown (fig. 2). Supporting this growth, the NDGS "sets the geologic investigatory table" for industry by continuing to provide the basic geologic information, in the form of maps and reports, vital to the implementation of site specific engineering projects and comprehensive land use planning efforts.

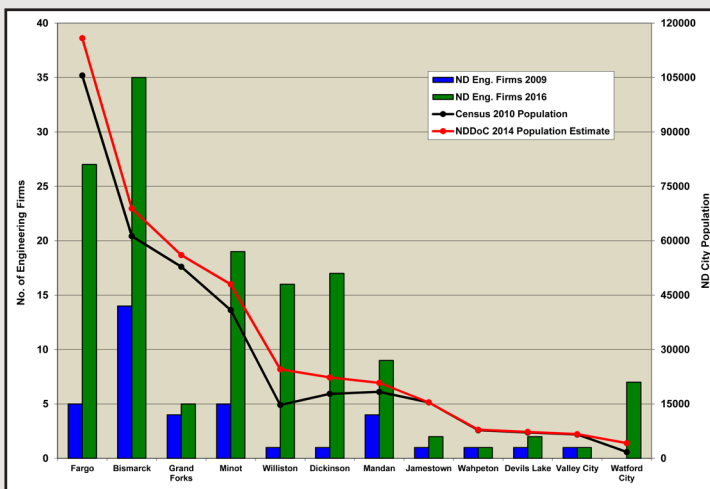


Figure 1. The number of engineering firms expanded considerably in the state to keep pace with the recent past surge in development in North Dakota's oil producing areas. This expansion is complemented by population increases in all of North Dakota's major cities.

The Fargo area has seen the largest surge in new engineering firms in the state. In 2009 there were just five individual firms providing engineering services. In 2016, some 27 firms provide consulting engineering services to the natural resource, civil infrastructure, and energy development sectors.

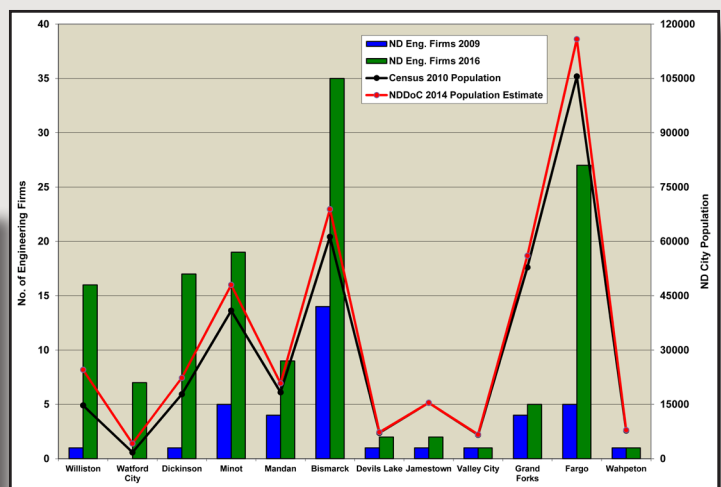


Figure 2. The regional impact of the recent rise in oil and gas development in western North Dakota is readily apparent when the increases in the number of engineering firms throughout the state and the corresponding population growth is presented in a geographical "west to east" manner.

For decades, NDGS geologists have been conducting geologic reviews of construction and civil works projects across the state (fig. 3), and have seen a steady increase in the number of requests for information and comments. The number of reviews evaluated by Survey geologists has increased nearly four times from just under 40 in 2004 to 145 in 2015. On average, Survey geologists complete two to three project reviews per week in addition to all of their other duties. Some of the findings that are typically communicated focus on highlighting geologic hazards or other unfavorable geologic conditions in or near a proposed project area. Comments and concerns related to: areas of landslides (fig. 4) or unstable soils,



Figure 3. Installation of new oil gathering pipeline near Stanley. Photo courtesy of Vern Whitten Photography (2016).

for example, as well as useful information such as depths to geologic units of interest (e.g. depth to bedrock or soft glacial lake clays) are commonly provided, along with descriptions of recently completed geologic investigations and geologic mapping that may be relevant.

As expected, the NDGS has conducted numerous geological investigations across North Dakota, many with a focus on the geology in and around our cities. Historically, the Survey has investigated and described the shallow, near-surface geotechnical conditions of the Fargo and Grand Forks areas as well as throughout the Red River Valley, in addition to the Minot, Bismarck, and Dickinson areas.

The NDGS is currently conducting detailed geologic stud-

ies in the Williston area consisting of geologic mapping at the 1:24,000 (detailed) scale along with regional geotechnical and glaciostratigraphic drilling work similar in scope to investigations completed in other North Dakota urban areas like Fargo (Arndt, 1977) and Minot (Kehew, 1983). These types of investigations reveal the engineering properties and lithologic characteristics of the materials found in the shallow subsurface. This information can then be used to characterize and describe the types of geologic units present, their likely behavior under engineering conditions and the stratigraphic relationships that exist between units (fig. 5). For example, throughout the Red River Valley glacio-lacustrine silts and clays of the Sherack, Brenna, and Argusville Formations envelope the sandy glaciofluvial



Figure 4. Landslide near Highway 21 south of Valley City in the Sheyenne River Valley. This slide damaged the fiber-optic line running in the ditch alongside the roadway.

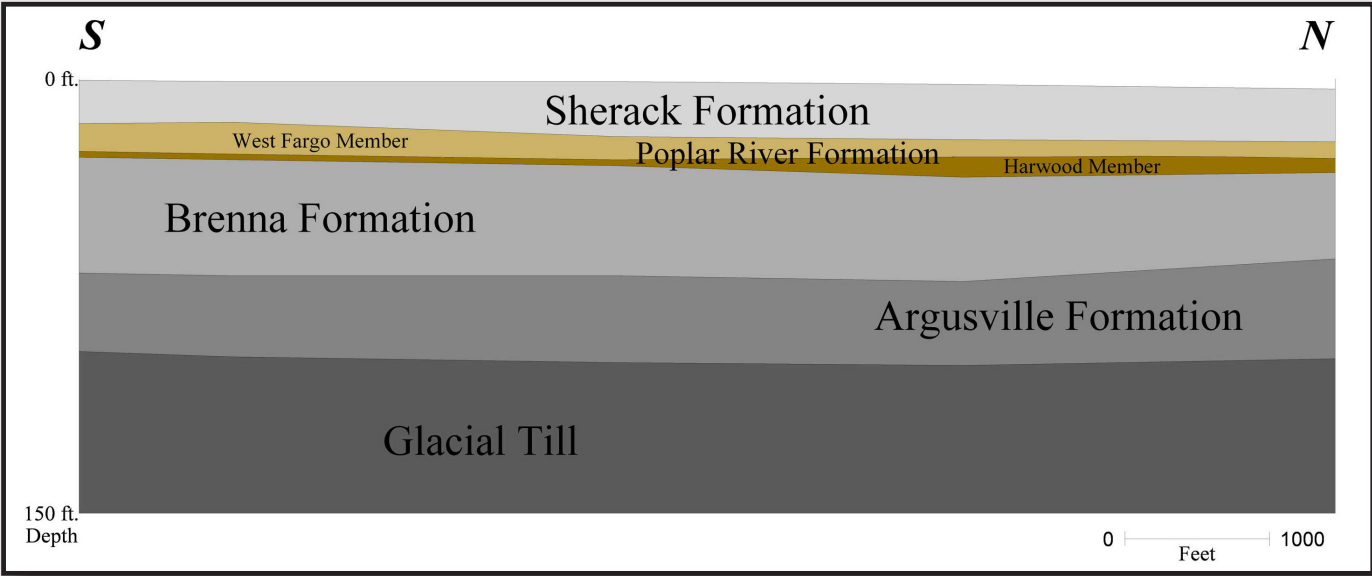


Figure 5. Generalized south to north shallow geologic cross-section of glacial stratigraphy found in the Fargo area revealed by shallow drilling investigations (Anderson, 2005).

West Fargo and Harwood members of the Poplar River Formation, which commonly form compaction ridges like the Sheyenne Ridge southwest of Fargo which extends to Horace (fig. 6). Both the lake clays of the Brenna Formation and the water-bearing sands of the Poplar River Formation are susceptible to deformation and instability when placed under load. Subglacial “till” sediments of the Red Lake Falls Formation underlie the former glacial Lake Agassiz lacustrine sediments and commonly provide the first load-bearing horizon for surface engineered civil construction works in the region.

Author’s Note:

Supporting data for this article was obtained from the various North Dakota City Chamber of Commerce web sites and the Census Office at the North Dakota Department of Commerce <http://www.commerce.nd.gov/census/>

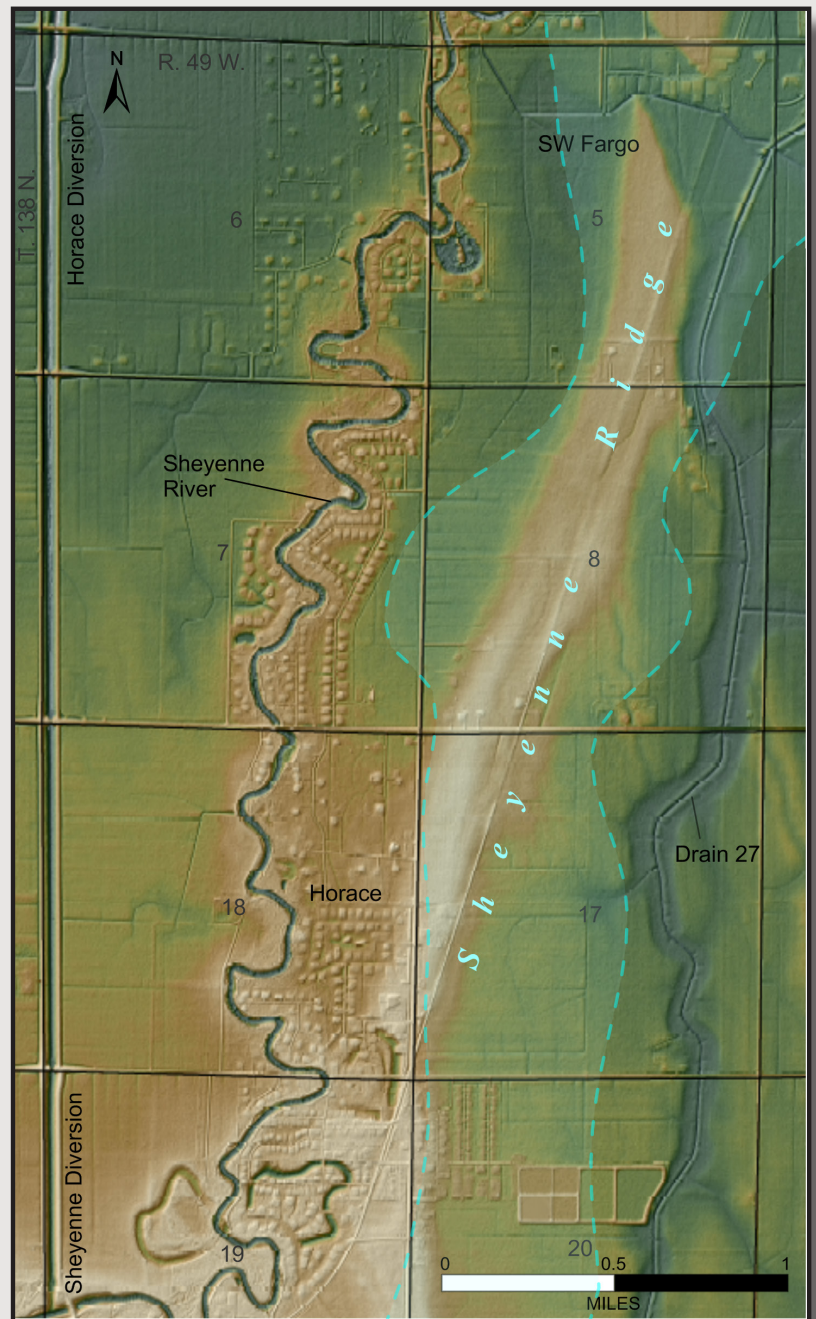


Figure 6. Portion of the LiDAR elevation map for the West Fargo South Quadrangle (Maike, 2016) that shows the Sheyenne Ridge traversing northeast from Horace to southwest Fargo. The shallow subsurface extent of the glaciofluvial compaction ridge is shown as the dashed pale blue area as taken from Anderson (2008). These ridges can be problematic for new construction projects.

Selected References

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