

## PROJECT DESCRIPTION

<b>PROJECT:</b>	Grain Storage and Rail Loading/Unloading Facility	
<b>LOCATION:</b>	Northgate, North Dakota	
<b>DESIGN TEAM:</b>	<i>Structural Engineer:</i>	SCAFCP
	<i>Geotechnical Engineer:</i>	Zeltinger Geotechnical Budinger Geotechnical
<b>CONTRACTOR:</b>	The Haskins Company	



### DESCRIPTION:

- 488,000 bushels of grain storage
- 6 Behlen metal bins (49'-3" diameter by 58'-9" peak height)
- Maximum mat loading = 2925 psf
- Ringwall loading = 12 kips/foot

The geotechnical investigation revealed a soil profile consisting of medium stiff, sandy lean clay to a depth of about 18'. Below that depth the soils are typically stiff to very stiff. The maximum allowable bearing pressure for the upper soils was 2000 psf, which was not sufficient for the planned loading and would have required significantly increasing the mat size for each bin. Settlement of 2½-3½" was predicted. Alternatives included excavating beneath each bin to a depth of 9' and installing select structural replacement fill. The option of reinforcing the subgrade soils with Ramped Aggregate Pier® (RAP) elements was selected in order to avoid the need for overexcavating, to increase allowable bearing pressure to at least 3000 psf, and to control settlements.

Beneath each ring wall, 30" diameter RAP elements were installed on about 8' centers and extended to 13' below the bin floor (8' below the ring wall footing). Beneath the bin floor, RAP elements were also spaced about 8' on-centers and extended 12' below the slab.

A total of 242 RAP elements were installed to support the 6-bin facility.

The Geopier® System was installed in only 7 working days on-site.

### REFERENCES:

Sterling Haskins, Principal  
The Haskins Company  
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