

CASE STUDY

# Flour Sack Flats Condos

Mixed-Use Residential/Parking – Minneapolis, Minnesota

## History

The industry-altering steel sheet pile foundation system first made its mark on the Minneapolis, Minnesota community in 2006 with the Flour Sack Flats condominium complex. Designed for five floors of residential space atop two levels of below-grade heated parking, the 60-unit structure is located on the eastern shore of the Mississippi River in the historic St. Anthony Falls District. The Flour Sack Flats building, in an attempt to appeal to young professionals and college students in the nearby University of Minnesota campus, was designed as an environmentally-sensitive building that included a green roof covering a portion of the parking area with shallow vegetation designed to filter storm water runoff, high-quality plumbing fixtures and energy efficient appliances.



## Problem

The project footprint, in the city's old milling district, was tight to property lines on two sides and construction of typical concrete walls would reduce the parking areas. Due to climate constraints, traditional construction methods in the northern part of the United States have a limited window of opportunity.

Standard Penetration Test (SPT) borings showed sandy clay over limestone bedrock. Groundwater was significantly deeper than the lowest floor slab.

## Solution

Skyline Steel recommended a steel sheet pile wall that combines a temporary earth retention system with a permanent building foundation, a process with substantial time and cost savings that accentuated the sustainability-first

approach of the structure on a couple of levels. Of the sheet piles manufactured and supplied by Skyline, 80% are made from recycled steel and are 100% recyclable. And the usage of AZ steel sheet piles on two sides of the footprint in a hybrid top-down construction system allowed for excavation of the below-grade parking levels to continue while building of the superstructure began.

The hybrid up-down construction was made possible by the unique construction staging and the ability of the AZ sheet piles to carry the vertical loads of the structure.

The sheet pile walls had to be cantilevered because temporary anchors were not allowed and internal bracing would hamper the construction of the parking garage. Cantilevering a wall over 20 feet high would have required an expansive section, so a

berm was left in place during excavation to help support the walls. A line of columns and spread footings were then built down the center of the excavation. The ground floor slab was poured across the tops of the columns and between the rows of sheet piles.

Once the cured slab could assume the bracing loads from the sheet piling, the construction above and below grade could continue. The parking garage from this point forward was removed from the critical path of the project. The two-story clear height under the ground floor slab allowed for easy excavation of the berm.

The location of the berm made perimeter columns and footings unrealistic, so the vertical loads of the building were put on the sheet pile wall. The AZ 13s made up most of the walls and were designed as friction piles.

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There were also AZ 26s and AZ 38-700s placed under columns and the ends of girders, which were driven to rock. Vertical-load carrying capacity for all sections was verified by dynamic testing.

The project, completed in the winter of 2007, started later than a project using traditional methods across the street and the Flour Sack Flats project finished significantly sooner. After Flour Sack Flats was built, the partners re-thought future work, searching for where the application of sheet piles and top-down construction would have a positive effect on the economics of development.

### Project Partners

#### Developers

Wall Companies  
Minneapolis, Minnesota

Lupe Development Partners  
Minneapolis, Minnesota

#### Contractors

Doran Companies  
Minneapolis, Minnesota

Carl Bolander & Sons  
Minneapolis, Minnesota

#### Architect

BKV Group  
Minneapolis, Minnesota

#### Engineer

Engineering Partners Intl.  
Eagan, Minnesota

### Products

191 tons; AZ 13 for majority of walls;  
AZ 26 & AZ 38-700 at column and  
beam locations

