

## Geopier Rammed Aggregate Pier® Elements Used to Support 22-Story Residence

### CLIENT'S CHALLENGE

The challenge on this project was addressing the differential settlement between a 22-story tower-supported mat foundation and a 3-story podium supported on spread footings. Based on the geotechnical information, as much as 4 – 6 inches (15 to 10 cm) of unreinforced settlement was predicted for the tower's mat, while 0.5 to 1 inches (1.3 to 2.5 cm) of settlements were expected for the lightly loaded podium.

### SUBSURFACE CONDITIONS

Soil conditions consisted of a layer of loose to medium dense silty sand followed by dense to very dense sand and gravel.

### GEOPIER® SOLUTION

In addition to decreasing the expected total settlements from 4 – 6 inches (15 to 10 cm) down to less than 2 inches (5.1 cm) and controlling differential settlement between the two structures, we were able to decrease the planned mat thickness from about 10ft (3 meters) thick to about 5 feet (1.5 meters). This was accomplished through an iterative design process that involved adjusting the pier stiffness values (springs) to match the applied contact stresses, thereby reducing the shear and bending moments in the mat.



### Caroline Street Residences

Waterloo, Ontario

#### Mady Developments Corp.

Owner

#### Van Mar Contractors

General Contractor

#### SOLA Engineering

Geotechnical Engineer

#### Stephenson Engineering

Structural Engineer

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"We have worked with Geosolv and Geopier on a number of projects, the most recent project being Caroline Street Private Residences. Geosolv worked very closely with the geotechnical and structural engineer to optimize both the ground improvement and the foundation design to minimize both total and differential settlements for this 22 storey building. In addition, they were able to reduce the raft slab thickness by 50%. We certainly would welcome working with this innovative firm on future projects."

- Art Van Maren, President, VanMar Constructors ON Inc.