


# Innovative Precast Concrete Cantilever Retaining Wall System

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Challenges are incentives for the Michigan Department of Transportation to pursue innovation. Benesch responded with an innovative precast concrete retaining wall system to reduce the construction schedule and improve work-zone safety along the I-196, Baldwin Street off ramp, in the City of Grandville, Mich. The project is a major reconstruction, spanning two years with peak work in the second year. During the first construction season, westbound I-196 was constructed along with the bridges that carry westbound I-196 traffic over the CSX railroad and Buck Creek, and about 3995 ft of retaining walls. The rest of the project was constructed during the second construction season.

A new emulative design approach of precast concrete retaining walls not only reduced the construction time of the wall but helped expedite simultaneous construction of the adjacent roads and ramp in a safer manner. The project included 6762 linear ft or 160,240 ft<sup>2</sup> of retaining walls.

The precast concrete retaining walls are designed and detailed similar to cast-in-place concrete retaining walls. This particular design and system avoided the use of post-tensioning, which is typically used with precast concrete retaining wall systems. The precast concrete footings are erected 3 in. above a 3-in.-thick, cast-in-place concrete sub-footing. The 3-in. gap between the bottom of the footing and the sub-footing is filled with high-strength flowable grout. Precast concrete footings are cast in the plant with protruding dowels and precast concrete retaining walls are cast with grout filled mechanical splicers. This moment connection eliminates the use of welded plates and post tensioning.

The erection rate for the 12-ft-long precast concrete footing segments was 20 segments per day. Twenty precast concrete stem segments were erected in the same timeframe. The system worked well even though some of the heavier walls have many alignment changes. This innovative system reduced the construction schedule by four months. 

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*Completed precast concrete retaining walls.*



*Erection of precast concrete stem segments.*



*Protruding dowels from the precast concrete footings.*