STRUCTURAL FRAMING SYSTEM

The new aircraft-support bridge at the Cincinnati/North Kentucky International Airport required a novel approach due to severe loading and structural-depth requirements. Designers considered the options and decided on a single 87’ long, post-tensioned, cast-in-place (cip) span without any joists.

The bridge was designed and detailed as a simple-span structure to carry aircraft loading. To allow the contractor to erect falsework and pour slabs of a manageable size, the 217’ wide bridge was divided into three segments: two 72’-4” wide outer segments and an inner segment that is 72’-2” wide. The segments are separated by a longitudinal expansion joint made of an expandable, watertight foam sealant and a strip-seal system at the roadway level.

The post-tensioned voided deck is supported by plain elastomeric bearing pads that in turn are supported by 6’ deep by 4’-6” wide end bents. The bents are supported by 13, 48” diameter concrete drilled shafts. The bridge provides the necessary 16’-11” of clearance over the roadway.

The approach slabs on each side consist of 24” thick reinforced cast-in-place concrete slabs supported on one side by a bracket protruding from the post-tensioned slabs and on the other side by a 6’ wide longitudinal sleeper pad. The approach slabs were designed as structural members on elastic foundations to carry the wheel load of the aircraft.

The concrete slab which is 4’-6” thick, was post-tensioned both longitudinally and transversely. The voids were made of 14 corrugated metal pipes, 30” in diameter, spaced at 4’-6” on-center per segment.

The longitudinal post-tensioning of each slab segment consists of 30 tendons. Each is composed of 27 0.6” diameter strands. Two additional empty ducts were provided and capped for future use. The transverse post-tensioning features four 0.6” diameter strands at 11¾” from the top of the slab. All post-tensioning strands are seven-wire strands conforming to ASTM 416 A416 270 ksi low-relaxation steel.

The result of this attention to detail and key concerns is a bridge that will support heavy aircraft loads for many decades of service to come. Using the new post-tensioning enhancement strategies will help reduce inspection and maintenance needs over its entire service life.

*New post-tensioning specifications were used to increase the durability and performance level of the bridge.*