TECH-LINE

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Expansion Joint Details and Deck Reinforcement

Design

There is a wide variety of bridge expansion joint types from which to choose and the final selection is most often determined by the total thermal movement range to be accommodated and/or owner preference.

Compression seals are often selected for maximum total thermal movement ranges up to 2" and minimal skew. The engineered honeycomb elastomeric seal is extruded and designed to remain in compression throughout the entire range of movement. Due to the web-like design, the seal can tolerate very little transverse movement, or "racking," and therefore only small skews should be considered.

Strip seal expansion joints are the most commonly specified system for total thermal movement ranges up to 4". An extruded neoprene gland with lugs is field-installed into the cavity of galvanized steel rails anchored in the concrete. Strip seal neoprene glands can accommodate an equal amount of transverse and longitudinal movement when set at an initial opening of 2" and the gland can be shop-vulcanized to conform to required miters on the deck surface.

For movement ranges beyond 4", finger joints or modular joints are required. Finger joints, also known as tooth plate joints, are open joints consisting of two plates with interlocking fingers with a trough underneath to collect and carry water to downspouts. Modular joints are multiple strip seals locked into center beams supported by individual support bars which span the opening and accommodate movement.

Details

Ideally, the expansion joint is installed independent of the grid deck as shown in *Figures 1 & 2*. A rebar cage must be designed to span supports and to engage the deck and the expansion joint. Rebar from the Exodermic® deck can extend from the end panel to tie into the cage as shown in *Figure 1*. Hooked rebar can be inserted through the cross bar punch in the main bar of filled systems to develop the deck and the cage as shown in *Figure 2*. To support the expansion joint assembly prior to pouring concrete, two possible suggestions are shown in the same figures. In *Figure 1*, a plate or shape is welded to the back side of the joint steel which in turn is supported by threaded rods nutted to the field-drilled top flange of the support. In *Figure 2*, a plate is welded to the backside of the steel which is then bolted to a tee shape supported by the diaphragm. *Figure 3* shows a suspended method when a blockout is created.

Finger joints are typically installed separate from the grid and carefully attached to the superstructure. Modular joints are generally set into a blockout and adjusted for elevation utilizing a support angle assembly as shown in *Figure 4*. However, the support angle assembly is not limited to modular joint assemblies and could also be used with other joint styles.

Alternately, a shop-welded plate to a strip seal frame rail, or a plate with headless studs can be field-welded to the grid components as shown in *Figures 5-7*. This method offers the most flexibility to make elevation adjustments when attachment of the joint components to the grid components is specified. Full depth concrete should extend from the joint rail back toward the span no less than 12" and drop down to and extend beyond the end diaphragm. Allowances should be made to omit cross bars or terminate supplemental bars as necessary to perform the required field weld.

Main bars spanning stringers on skewed structures may not span continuous over multiple supports and may end between supports. The expansion joint trim plate may serve to "collect" the ends of main bars and contribute to the capacity required in an overhang.

(Figures 1-7 Shown on Back Page)

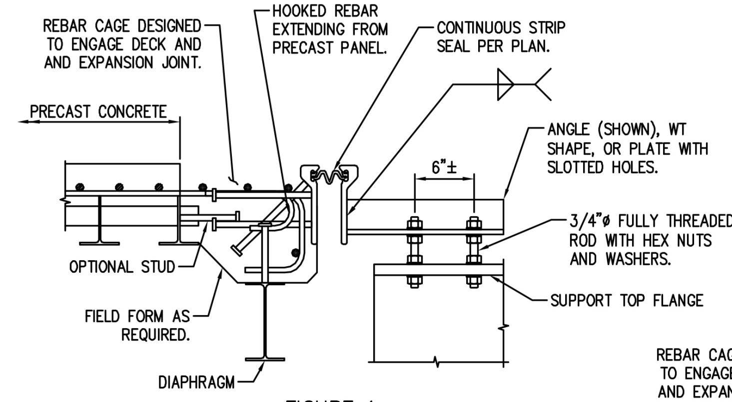
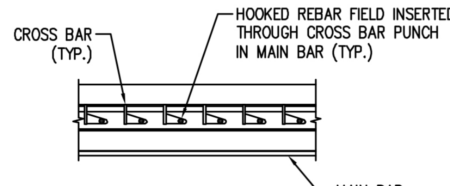


FIGURE 1
(GIRDER SUPPORT)



SECTION A-A

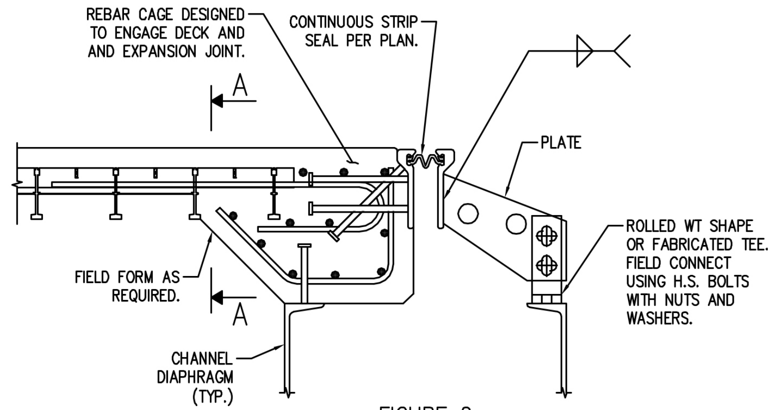


FIGURE 2
(DIAPHRAGM SUPPORT)

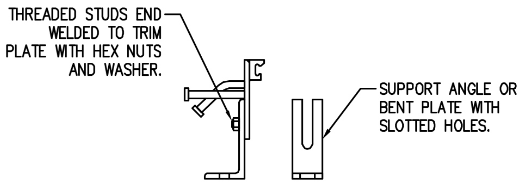


FIGURE 4
(SUPPORT ANGLE ASSEMBLY)

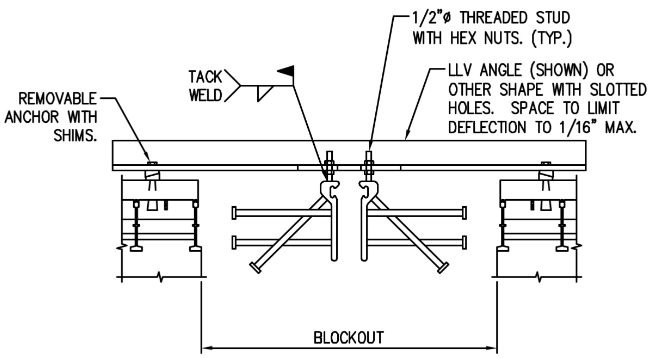


FIGURE 3
(SUSPENDED SUPPORT, REBAR NOT SHOWN FOR CLARITY)

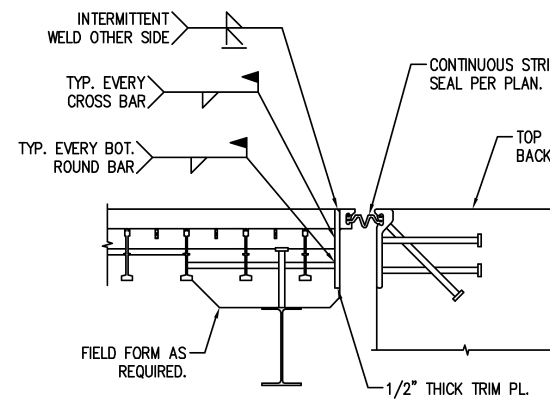


FIGURE 5
(STRIP SEAL AT ABUTMENT, MAIN BARS PERPENDICULAR)

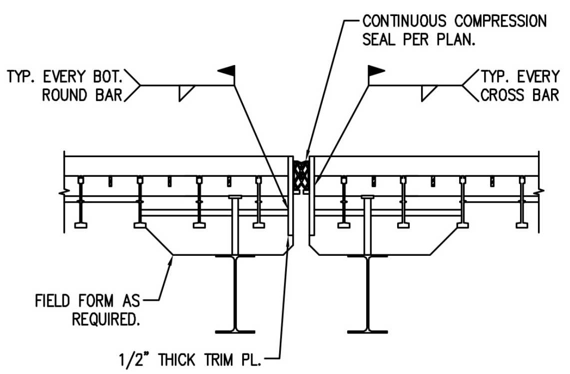


FIGURE 6
(COMPRESSION SEAL AT PIER, MAIN BARS PERPENDICULAR)

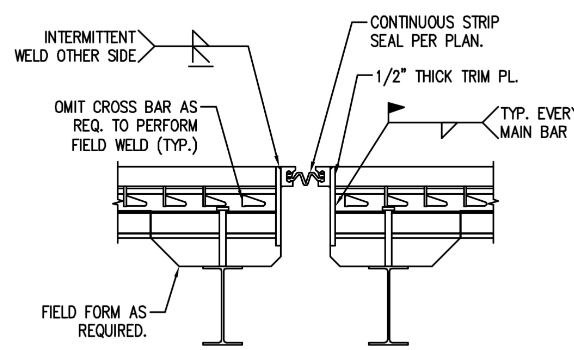


FIGURE 7
(STRIP SEAL AT PIER, MAIN BARS PARALLEL)

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