TECH-LINE

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Leveling Devices and Haunch Forms

Leveling devices are used to set the bare grid or precast grid panel to the proper elevation established in the contract plans. Most often, the leveling devices on any single panel are set at different heights relative to each other to induce a transverse cross slope in the deck. When setting panels for cast-in-place operations, deflection in the weak direction of the panel is considered and three standard leveling bolts are required per supporting beam per panel for panels up to nine feet wide. Precast panels are more rigid and only require two standard leveling bolts per supporting beam per panel for panels up to nine feet wide. Prior to galvanization, the leveling devices are shop fabricated with the panel and located at or near the supporting beam centerlines and, therefore, are normally within the full depth blockout region. Their use is considered temporary until the full depth closure pour is placed, at which time the haunch supports the panel, and the leveling bolt is assimilated into the deck.

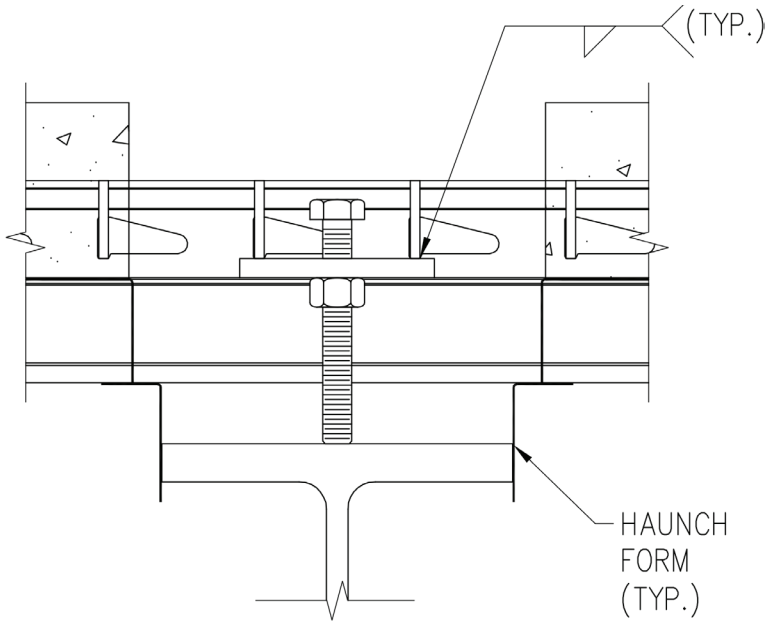

Figure 1

Standard haunch forms consist of thin gauge galvanized sheet steel, sheared into strips, and bent 90° to form an angle. The horizontal leg of the haunch form mates with the underside of the grid deck and the built-in bulkheads, while the vertical leg fits up against the edge of the supporting beam flange creating the haunch containment. These haunch forms are attached in the field by straps, screws or welding. Other haunch forming systems can be considered such as dimensional lumber or self-adhesive foam for very small haunch heights.

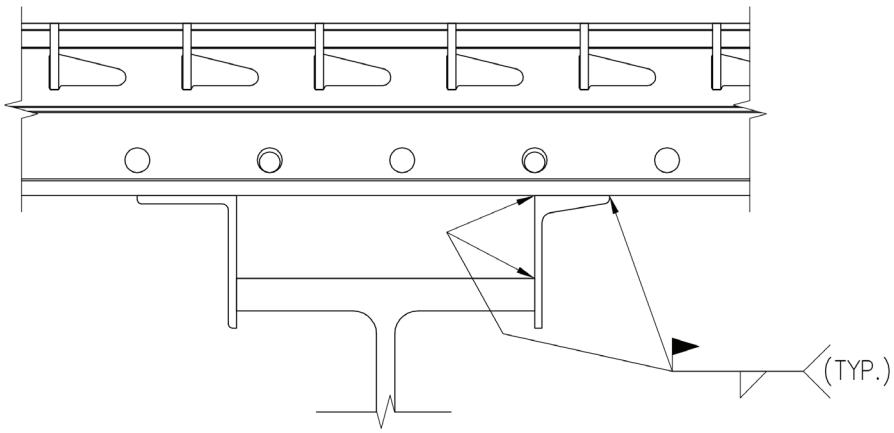

Figure 2

Figure 1 shows the standard leveling bolt and haunch form systems. Additional leveling systems and information can be found on the ***BGFMA Grid Reinforced Concrete and Exodermic® Bridge Decks*** brochure located on the BGFMA Website.

Sometimes it is desirable to place construction equipment onto the bare grid panels (partial depth or full depth grid decks only) for cast-in-place construction. The standard leveling bolt system is not designed to accommodate these live loads. Standard leveling bolts can be retracted, or temporarily removed, and panels can be supported by the structure with shims placed under each main bar as required to ensure bearing between the grid and the support. Alternately, heavier gauge fabricated angles, structural angles or cut structural channels (*Figure 2*) can be field welded to the grid and to the structure (Continued on back page)

to support the temporary live load and then serve as the permanent haunch forming system. Because the deck was designed as a grid reinforced concrete deck, a detailed analysis must be performed on the bare grid deck and supporting haunch forms for the imposed construction live load to ensure no damage to the deck system. The use of structural angles or channels is also appropriate for deeper haunches where standard thin gauge sheet metal haunch forms may buckle.

On one particular project, the chemistry of the existing steel girders made it preferable to avoid welding to the girders. A "saddle" was shop fabricated consisting of a plate welded to two angles, each approximately 3" in length, which was saddled over the girder (*Figure 3*). Full length angles were then field welded to the bare grid and the saddle. The full length angles served as haunch forms and minimal sealing between the girder flange and full length angle was required within the saddle intervals.

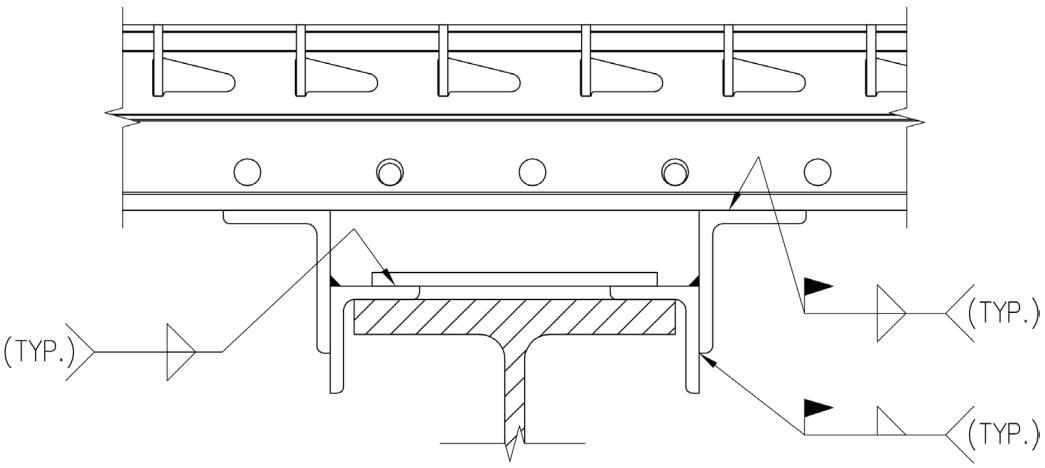

Figure 3

Normally, grid reinforced concrete decks are attached to the supporting structure via headed shear studs between the main bars and a full-depth pour as referenced in *Gridline #6*. Although rare, on a few projects this standard connection method was replaced by a unique "bolster" system comprised of two structural steel angles placed back-to-back (*Figure 4*). One angle is shop welded to the bottom of the grid panel and the other angle is bolted to the first. The second angle is then field welded to the supporting structure. Both angles are fabricated with slots or oversize holes to allow for vertical height adjustment. Alternately, if the exact haunch height is known, the bolted connection can be replaced by shop welding the two angles together. Although this method eliminates the closure pours in the "blockouts" over the supporting structure, it does require access underneath the deck to perform the field welding and bolting if specified.

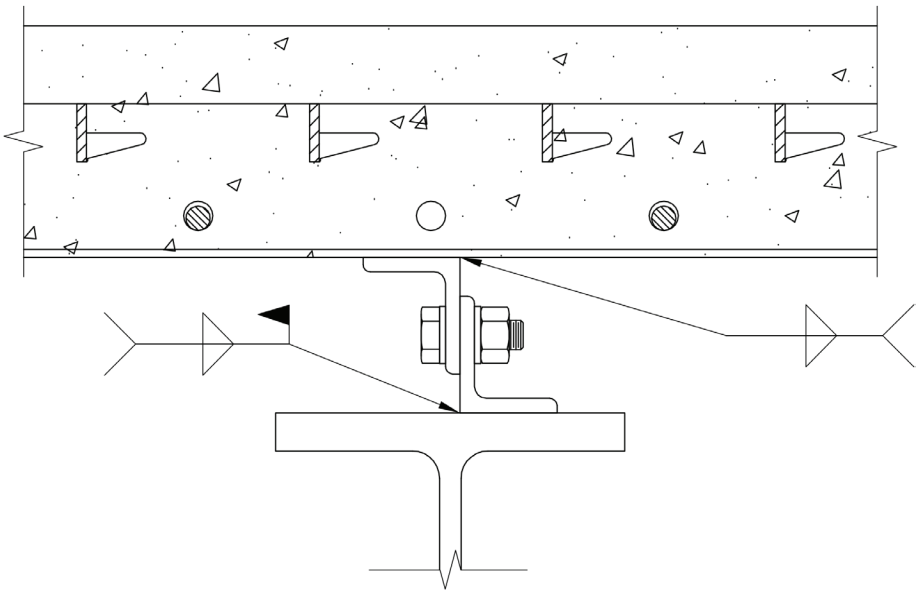

Figure 4

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