Bridge Grid Flooring Manufacturers Association
Installation Tolerances & Guidelines for Grid Reinforced Concrete Bridge Decks

This document is applicable to cast-in-place or precast grid reinforced concrete bridge decks, which include: partially filled grids, fully filled grids, and Exodermic® grid decks.

A. INSTALLATION TOLERANCES

Alignment: Main bearing bar misalignment between adjacent grid deck panels shall be no more than 1/2".

Gap: Distance between main bearing bars between adjacent grid deck panels shall be as specified, ± 1/2".

B. INSTALLATION GUIDELINES

HANDLING AND STORAGE

1. Bare Grid Panels for Cast-in-Place Decks
Steel grid units are usually shipped on open trucks. The units should always be lifted from the trucks and subsequently handled by means of mechanical equipment. Four-point chain or cable hooks or slings should be attached near each edge of the unit at a point about one-fourth of the unit length from each end usually at the centerline of the block out for the stringer or floor beam. Careless handling and lifting of the units with improper devices may cause excessive out-of-squareness of ends, damage to the concrete containment system, etc.

The units should not be placed on the ground, but should always be laid with ample blocking under the lower units of the pile or stack of units. The blocking will prevent stones, lumps or any projections on the surface of the ground from forcing the form pans up out of position or damage to the sheet metal bulkheads. When units have been shop cambered, blocking should be arranged to retain the camber in the units by duplicating the contour of the blocking during shipment and storage.

2. Precast Panels
A rigid lifting frame should be used whenever the precast panels are moved. Lifting locations must be positioned to limit stresses in the panel and analysis should consider stresses caused by deflection of the lifting frame. Proposed handling methods must limit the actual concrete tensile stresses to the concrete modulus of rupture based upon the proposed support locations and expected dynamic loading during handling, storage, and transportation of the panels. Particular care shall be taken to avoid twisting of the panels or bending of the panels in the weak (perpendicular to the main bar) direction.

Lifting devices (fabricated tee, or other device) shall be used enabling the panel to be lifted from the bottom of the panel. Lifting panels from the leveling devices, rebar, cross bars, distribution bars or supplemental bars is prohibited.

Panels must be properly blocked with wood during transportation and storage in order to avoid distortion or other damage. Panels shall be stored and shipped right-side-up, and even thickness wood lagging shall be used with due regard for built-in panel camber to prevent steel, concrete, sheet metal, or galvanized coating damage. At a minimum, lagging shall be placed immediately adjacent to the proposed lifting locations and at the ends of the panel. Preferably, blocking should be placed at all stringer (floor beam) block-outs and at the ends of the panel. Blocking between stacked panels must be in vertical alignment across the panel width. Stack no more than four precast panels high.

LOCATION OF PANEL UNITS ON BRIDGE

Before placing the units on the bridge stringers (floor beams), the location of each unit should be carefully marked on the support to correspond with the location shown on the shop drawing erection plan. Measuring from a fixed point to avoid cumulative error, the best method is to mark on the support at the centerlines of the splices between units for the full length of the bridge. In this way, any gain or loss in length or width is readily discovered as soon as

the units show any tendency to overrun or underrun.

ALIGNMENT AND POSITIONING

The bare grid units, when not stored at the bridge site, are usually delivered to the bridge by truck, lifted off, and swung into position with a light crane. Precast panels arrive and may be stored likewise but may require a crane with greater capacity. Typically, the grid bottom is not in contact with the supporting structure. The grid panels are supplied with leveling devices positioned over the supporting elements and adjusted to the required grade leaving a haunch between the top of the girder and the bottom of the grid deck.

Once the panels are set to the required grade, haunch forms are installed. Commonly, sheet metal angles are utilized because of their ease of installation and capacity to accommodate varying haunch heights. Angles can be fabricated with a strap attached to the horizontal leg, so that once the panel is set to grade, the strap is pulled up and tied off to the grid. The angles are then tack welded or screwed to the bottom of the grid and the supporting steel. Adhesive backed foam has also been used and is best suited for constant haunch heights less then 1 1/2" and flange widths at least 8". Timber has also been used successfully.

It may be necessary to connect adjacent grid panels together when continuity is required in a negative moment region over an interior substructure or over a supporting element. Generally, these connections are accomplished by bolting the members directly or via trim plates welded to the members in the shop. Alignment for bolting can be achieved by inserting the tapered end of a spud wrench through the holes.

Shear studs are shot on between the main bearing bars of the grid, which is the means of positively attaching the grid deck to the structure. The top surface of the flanges should then be cleaned including breaking any ferrules around the base of the studs.

If required, any field placed rebar is installed. Ensure rebar placed parallel to the main bearing bar is located at least 1" away from the stem of the main bearing bar.

If joints are to be cast in with the deck, they are set to grade and anchored.

For precast decks, closure pours are made in the block outs and between panels. Because the concrete is specified as "rapid-setting," a mobile mixer is recommended for quality control, maximum working time and economy. Cast-in-place decks are poured like any traditional deck.

Use of a pencil vibrator is recommended to consolidate concrete into the haunch and panel splice areas to ensure good consolidation. Since form pans are only tack welded to the beams, there will be some grout seepage. After the concrete has set, seepage can be removed by hand scraping or by cleaning with a high-pressure water hose. Wet curing the concrete as soon as possible and for an extended period is recommended.

Precast decks should receive an overlay (latex modified concrete, polymer concrete, asphalt concrete, etc.) to help seal the cold joints.

SUPPORT OF CONSTRUCTION LOADS

Bare steel grids designed as partially filled or fully filled with concrete may be driven on and used as working platforms before concrete is poured. Design spans including concrete for HS20 and HS25 are provided in fabricators literature. For these spans, HS10 may be permitted on the deck before filling with concrete or during concreting. Since spans on which the grid deck is used may vary, users of grid decks are advised to contact BGFMA or any of the members to confirm maximum erection loads that may be permitted during installation. Leveling bolts must be removed or retracted. For all grid types, position the vehicle so that the tire loads are as directly distributed to the stringers as possible. Without special precautions, it is suggested to not drive on bare Exodermic® grid panels prior to casting concrete.

CAMBER

In order to provide drainage or to match a fixed crown on the approaches, it is often necessary that the grid units conform to a specified camber. Unless this camber is unusually severe, the units have enough flexibility to naturally conform to the desired camber.

Precast panels however, are rigid, and any required grade breaks need to be built into the panel.