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STEEL GRID FLOORS

Tabliers en grilles d'acier

Stahlgitterdecken

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Steel grid floors have been used extensively in the United States for more than 40 years. The primary use for this material is on long span and movable bridges where weight is such a critical factor. Other applications have been found in the reconstruction or rehabilitation of older bridges for the purpose of maintaining or sometimes increasing the live load capacity of the structure. A special use has been found for long span suspension bridges where grid floor sections provide "wind slots" which contribute to the aerodynamic stability of the structure. The relative high cost of this floor system limits the application to these or other similar special conditions.

Originally the grid floors consisted of two basic designs, rectangular and hexagonal. The rectangular pattern resulted from the fabrication of a combination of flat rolled bars placed at right angles, in slots and welded to specially rolled I beams. The hexagonal pattern is the result of riveting flat rolled main longitudinal bars to specially bent spacer bars. Due to its lighter construction, the hexagonal design is used for short stringer spans and the heavier rectangular design is used for longer stringer spans. More recently a design was developed which added a diagonal member to the rectangular pattern.

The three basic designs are illustrated in the attached photographs. The grid floor sections are produced in a variety of weights and dimensions to fit almost any beam or stringer spacing. Metal grid flooring will support standard truck loading when placed on properly designed beams or stringer system.

If the bridge owner considers the increased tire noise or reduced traction objectionable the metal grid floor may be filled or overfilled with concrete. The effect of the increased weight can be partially reduced by using light weight aggregate in the concrete mixture. An additional advantage that can be considered in the concrete filled grid is the composite

action that is developed between the floor and the supporting stringer. A flush filled grid floor can also be overlaid with bituminous concrete to produce a different texture for the wearing course.

Other methods for increasing the traction or skid resistance of the metal grid floor is to use serrated bars on the surface or to weld metal studs on the surface of existing grating. The 1/4-inch round welded studs are shown on a portion of the deck in photograph No. 5.

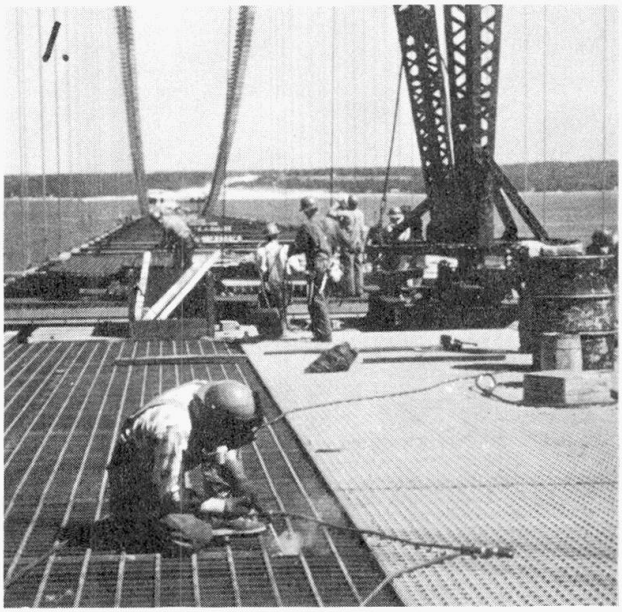
The fabrication of aluminum shapes into a grid floor system is of recent origin and is still in the development stage.

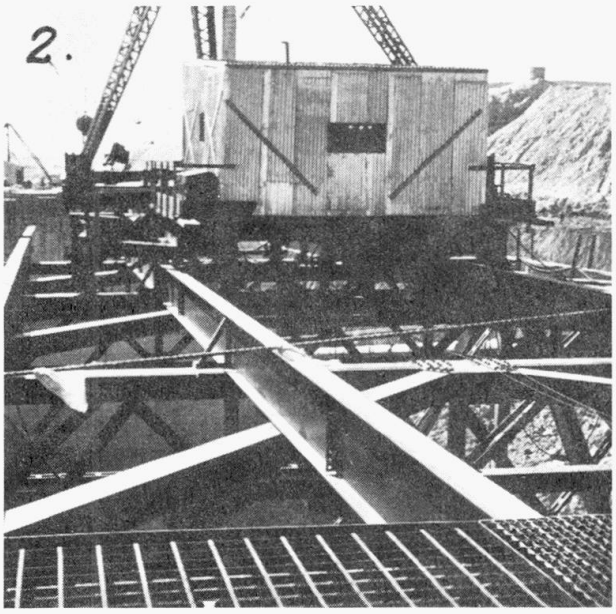
The preferred method of attachment of the grid flooring to the supporting members is by welding. However, metal clips, bolts and clamps have been devised to make these connections.

The relative weights of the various floor systems are as follows:

Type of Deck	Weight in Pounds per square foot
Aluminum type	10-12
Steel type	19-21
Concrete filled	38-54
Reinforced Concrete	75-100
Reinforced Lightweight Concrete	55-75

Due to the special nature and application of metal grid floors there is little meaningful cost data available except that the cost of the steel grid floor is approximately four times as costly as the conventional reinforced concrete bridge floor.

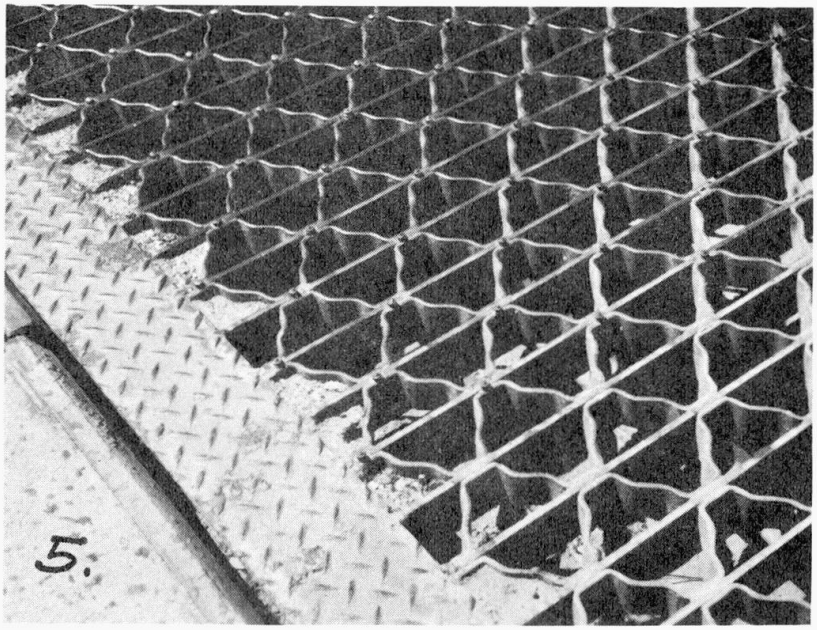




Photographs 1 and 2. Installation of steel grid floor for the Tagus River Bridge in Lisbon, Portugal. Two types of rectangular grid floor are shown. The close-spaced pattern on the right of each photograph is an open grid design and the panels on the left are to be concrete filled.

Photograph 3 shows some additional details of the grid floor which will be filled with concrete.

Photograph 4 shows the completed bridge deck of the Tagus River Bridge. The left lane has an open grid floor and the right lane has a concrete filled grid floor.



Photograph 5 shows an open grid on a bascule bridge in Connecticut which has a hexagonal pattern. This photograph also shows the modification which has been made to improve traction. One quarter inch round studs have been welded on the top of the longitudinal bars to give a rough texture. A portion of the floor on the lower right does not have the additional studs.

SUMMARY

Steel grid floors have been used in the United States for more than 40 years. The primary use is for long span or movable bridges where weight is critical. There are two basic designs; rectangular and hexagonal. In some applications the steel grid floors have been filled with concrete.

RESUME

Des tabliers de ponts en grilles métalliques ont été employés aux USA depuis plus de quarante ans. Leur poids léger les prédestine pour les ponts à grande portée ou les ponts mobiles. On distingue deux types de base: grilles rectangulaires et grilles hexagonales. Parfois, on remplit la grille avec du béton.

ZUSAMMENFASSUNG

In den Vereinigten Staaten werden Stahlgitterdecken seit mehr als 40 Jahren benutzt. Der hauptsächlichste Gebrauch liegt bei weitgespannten oder beweglichen Brücken, wo das Gewicht kritisch ist. Zwei Formen sind üblich: recht- und sechseckig. In einigen Fällen ist das Gitter mit Beton gefüllt worden.