

Section 12

STEEL GRID FLOORING

12.1 GENERAL

12.1.1 Description

This work shall consist of furnishing and installing steel grid flooring of the open type, or of the concrete filled type as specified in the special provisions and as shown on the plans. When the Contractor is allowed to select any details of the design, said details shall meet the requirements for the design of steel grid floors in Division I, Article 3.27.

12.1.2 Working Drawings

The Contractor shall submit complete working drawings with assembly details to the Engineer for approval. Fabrication or construction of the flooring shall not be started until the drawings have been approved. Such approval shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work.

12.2 MATERIALS

12.2.1 Steel

All steel shapes, plates and bars shall conform to AASHTO M 270 (ASTM A 709) Grade 36, 50, or 50W. Unless the material is galvanized or epoxy coated it shall have a copper content of 0.2%.

Reinforcing steel shall conform to the requirements of Section 9, "Reinforcing Steel."

12.2.2 Protective Treatment

Open type floors, unless otherwise specified, shall be galvanized in accordance with the requirements of AASHTO M 111 (ASTM A 123).

Filled or partially filled types, as called for in the special provisions, shall be either galvanized, painted, epoxy coated, or supplied in unpainted weathering steel.

If painted, the paint shall be applied according to the specifications for Section 13, "Painting," except that dipping will be permitted. The paint shall be as specified for metal structures unless paint or coating of another type is required by the special provisions. When painting is specified, those areas of steel grid flooring completely encased in concrete may remain unpainted, unless otherwise specified.

12.2.3 Concrete

All concrete in filled steel grid floors shall conform to the requirements of Section 8, "Concrete Structures." The concrete and the size of aggregate shall be as specified for Class C (AE) concrete.

12.2.4 Skid Resistance

The upper edges of all members forming the wearing surface of open type grid flooring shall be serrated to give the maximum skid resistance.

Concrete filled or overlaid grid floors shall be given a skid-resistant texture as specified in Article 8.10.2.

12.3 ARRANGEMENT OF SECTIONS

Where the main elements are normal to center line of roadway, the units generally shall be of such length as to extend over the full width of the roadway for roadways up to 40 feet but in every case the units shall extend over at least three panels. Where joints are required, the ends of the main floor members shall be welded at the joints over their full cross-sectional area, or otherwise connected to provide full continuity.

Where the main elements are parallel to center line of roadway, the sections shall extend over not less than three panels, and the ends of abutting units shall be welded over their full cross-sectional area, or otherwise connected to provide full continuity in accordance with the design.

12.4 PROVISION FOR CAMBER

Unless otherwise provided on the plans, provision for camber shall be made as follows:

Steel units so rigid that they will not readily follow the camber required shall be cambered in the shop. For grid flooring types other than those employing a field placed full depth concrete filling attached to the deck with welded shear connectors, the stringers shall be canted or provided with shop-welded beveled bearing bars to provide a bearing surface parallel to the crown of the roadway. If beveled bars are used, they shall be continuous and fillet welded along the center line of the stringer flange; in which case, the design span length shall be governed by the width of the bearing bar instead of the width of the stringer flange.

Longitudinal stringers, except as provided in the following paragraph, shall be mill cambered or provided with bearing strips so that the completed floor after dead load deflection will conform to the longitudinal camber shown on the plans.

Vertical adjustment of full-depth-filled grid floors, which are to be connected to supporting members with shear connectors, may be accomplished by use of adjusting bolts operating through nuts welded to the grid and bearing on the top flange of framing members. Alternatively, shims may be used, and shims must be used if construction vehicles are to be allowed on the floor prior to final attachment.

12.5 FIELD ASSEMBLY

Areas of considerable size shall be placed and, if necessary, adjusted to proper fit before the floor is connected to its supports. Care shall be taken during lifting and placing to avoid overstressing the grid units. The main elements shall be made continuous as specified in Article 12.3, and sections shall be connected together along their edges by welding or bolting in accordance with the plans or the approved working drawings.

12.6 CONNECTION TO SUPPORTS

Except when other connection methods are specified or approved, the floor shall be connected to its steel supports by welding every fourth main element to the supporting member; however, welds shall be spaced no greater than 15 inches on centers. Before any welding is done, the floor shall either be temporarily loaded or it shall be clamped down to make a tight joint with full bearing. To minimize the stresses induced through clamping down, any differential elevation of $\frac{1}{4}$ inch or more over a 4-foot support-

ing member shall be shimmed before welding the shim, the grid, and the supporting member. The location, length, and size of the welds shall be subject to the approval of the Engineer.

Around the perimeter of continuous units of grid flooring, the ends of all the main steel members of the flooring shall be securely fastened together by means of steel plates or angles welded to the ends of the main members, or by thoroughly encasing the ends with concrete.

When specified or approved, methods other than welding may be used for attaching steel grid floors (both open and concrete filled types) to framing members. In such cases, welded headed shear connectors can be employed for concrete filled grids and open steel grids can be connected to framing members by bolting.

12.7 WELDING

All shop and field welding shall be done in accordance with *ANSI/AASHTO/AWS Bridge Welding Code D1.5*.

12.8 REPAIRING DAMAGED GALVANIZED COATINGS

Galvanized surfaces that are abraded or damaged at any time after the application of the zinc coating shall be repaired by thoroughly wire brushing the damaged areas and removing all loose and cracked coating, after which the cleaned areas shall be painted with two applications of unthinned commercial quality zinc-rich primer (organic vehicle type). Spray cans shall not be used.

12.9 PLACEMENT OF CONCRETE FILLER

12.9.1 Forms

Concrete filled types of flooring with bottom flanges not in contact with each other shall be provided with bottom forms of metal or wood to retain the concrete filler without excessive leakage. Forms shall be removed after the concrete has been cured except that metal forms conforming to the following paragraph may be left in place.

If metal form strips are used they shall fit tightly on the bottom flanges or protrusions of the grid members and be placed in noncontinuous lengths so as to extend not more than 1 inch onto the edge of each support, but in all cases the forms shall be such as will result in adequate bearing of slab on the support. If metal forms are to be left in place, they shall either be galvanized or protective treated by the same method that is required for the grid flooring.

12.9.2 Placement

When the plans indicate that the concrete filling does not extend to the bottom of the steel grid, the concrete, except concrete for cells in which shear connectors are to be installed, may be placed with the grid in an inverted position prior to installation, or the portion of the grid to remain unfilled may be blocked out by the use of a temporary inert filling material, such as sand or polystyrene board filler which is later removed, or by the use of metal lath form strips or other approved methods. The method used shall permit full embedment of the tertiary bars and the shear connector studs, if used.

When the plans or specifications indicate that filled or partially filled grids or reinforced concrete slabs incorporating steel grids are to act compositely with their supporting members, all shear connecting studs shall be fully encased in concrete and the entire area between the top flange of the supporting member and the bottom of the grid filling shall be filled with concrete.

The concrete for filled grid floors shall be mixed, placed, and cured in accordance with the requirements of Section 8. The concrete shall be thoroughly compacted by vibrating the steel grid floor. The vibrating device and the manner of operating it shall be subject to the approval of the Engineer.

12.10 MEASUREMENT AND PAYMENT

Steel grid flooring will be measured by the square foot. The number of square feet will be based on the dimensions of the flooring in place and approved by the Engineer in the completed work.

Steel grid flooring will be paid for at the contract price per square foot. Such payment for steel grid floor, open or concrete filled types, shall be considered to be full compensation for the cost of furnishing of all materials, equipment, tools, and labor necessary for the satisfactory completion of the work.