Greased Deformed Bars versus Smooth Dowels

Q. *We'll be constructing a 6 in. (152 mm) thick jointed plain concrete pavement (JPCP) with transverse joints spaced 16 ft (5 m) on center. The transverse joint detail features 18 in. (457 mm) long and 3/4 in. (19 mm) diameter smooth dowels placed perpendicular to the saw cuts at 12 in. (305 mm) on center at middepth of the slab (shown in Fig. 1). Due to supply chain issues, the specified smooth bars are not immediately available. To avoid a schedule delay, the general contractor has directed us to use No. 6 deformed steel reinforcing bars coated with grease and placed at 6 in. on center. We are not sure if the engineer has seen or approved this change. Will greased deformed bars work as an equivalent to smooth dowel bars?*

A. The directed substitution constitutes a significant deviation from the contract documents and so must be reviewed by the engineer. Transverse saw cuts in JPCP initiate full-depth cracking, creating contraction joints that minimize shrinkage strains in the resulting panels (Fig. 2). Dowels are provided to transfer load between the panels (Fig. 2(b)). Per ACI 325.12R-02(19), Section 4.1.1.2,[1] ASTM A615 plain, round bars should be used in dowelled joints and only lubricated, smooth dowel bars at transverse contraction joints (Fig. 2). While greasing of deformed bars will limit chemical bond, it will not prevent mechanical bond at the bar deformations. Thus, the proposed use of deformed greased bars will not provide a contraction joint.

In most pavements (and in your case), deformed reinforcing bars are used as tie bars at longitudinal joints. Tie bars are provided to transfer loads through enhanced aggregate interlock or keyway as well as restrain separation of adjacent panels. This is helpful at crowned longitudinal pavement joints where restraint stress is minimal due to the relatively short distance to the pavement edge.

References

1. ACI Committee 325, "Guide for Design of Jointed Concrete Pavements for Streets and Local Roads (ACI 325.12R-02) (Reapproved 2019)," American Concrete Institute, Farmington Hills, MI, 2002, 32 pp.

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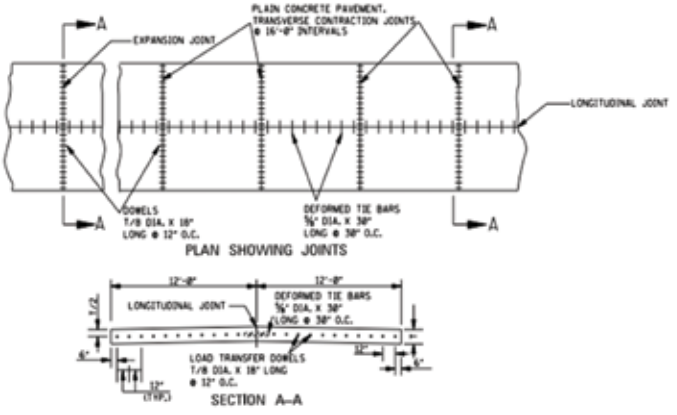

Fig. 1: A plan view of a pavement with transverse contraction joints and a cross section of a transverse joint detail

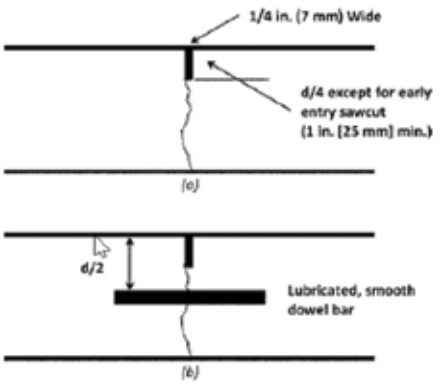

Fig. 2: Types of transverse contraction joints (Fig. 4.2 in ACI 325.12R-02(13)[1])