

Engineering Brief # 1

Date: August 27, 1974

ENGINEERING BRIEF NO. 1

PLASTIC GROOVING OF CONCRETE RUNWAY AT LAWTON, OKLAHOMA

In May of 1974, Jim Cloud (Oklahoma ADO) called me to say that the plastic grooving process was being applied to a runway overlay and extension project at Lawton, Oklahoma. On May 28, I went to Lawton Airport to inspect the project and was joined by Jim Cloud and Jim Dahlgren, a representative of the Guy James Construction Company (General Contractor).

The extension consists of a 150' wide Portland Cement Concrete runway constructed on a 6-inch stabilized asphalt base. The 25' wide lanes are being paved with a CMI slip form paving machine. It is followed by a tube float which have a burlap drag attached to its aft. The plastic grooving machine follows about 150' behind the burlap drag. The curing machine is in the caboose position.

The CMI plastic grooving machine consists of a thick walled 10" diameter aluminum pipe, 10 feet long, with ridges spaced 2 inches apart. It is mounted on a Lewis bridge and is moved across the paving transversely to form grooves in the surface while concrete is still in a plastic condition.

At the start of the paving operation, the CMI groover was power driven so that it actually wore grooves in the plastic surface. However, it was soon discovered that the ridged cylinder tended to tear aggregate from the plastic concrete when power driven for this purpose. (The Southwest Region indicated that the purpose of the power drive is not to cut grooves, but to prevent the grooving tube from being dragged across the concrete without rolling in the event it jams or sticks.)

In experimenting with this problem, the contractor disconnected the power drive and merely rolled the grooving cylinder across the plastic surface. This eliminated the displaced aggregate problem and at the same time provided the desired groove effect. This change in operation made the timing of grooving more critical, i.e., the ridged cylinder had to be rolled across the concrete while the concrete was still plastic enough to form a groove without grinding, but this timing has not been a real problem. What it amounts to is that the location of the grooving machine in the paving train must be adjusted each day depending on temperature, humidity, and other environmental factors. This adjustment has been accomplished satisfactorily and has resulted in a consistently good grooving pattern and runway surface.

The finished surface texture now consists of a burlap drag finish in the longitudinal direction with transverse grooves approximately 3/16" wide by 1/8" deep spaced 2 inches apart. The

surface is free of tears caused by displaced aggregate.

In the past this plastic grooving process has been applied at Will Rogers World Airport at Oklahoma City and at Baton Rouge, Louisiana.

The Southwest Region feels that this type of grooving has a beneficial effect on surface friction during rain conditions and that wear of runway surfaces is not detrimentally affected by the formation of grooves when concrete is in a plastic state. They indicate that elimination of the tearing of surface aggregate, as has been accomplished at Lawton, should enhance the application of plastic grooving process and feel that the technique has reached the point where sponsors should be encouraged to consider its use from an economic standpoint, in lieu of the standard sawed method. They also feel that plastic grooves are almost as effective as sawed grooves.

At Lawton, the cost of the plastic grooving was included in the concrete cost per square yard and is considered to be negligible. The Southwest Region indicates the cost of the plastic groove finish is about the same as a conventional belted finish. The price for sawed grooves 1/4" by 1/4" by 1 1/4" averages about 15 cents per square foot.

The Lawton project, including plastic grooving, is ADAP funded. The grooves are being constructed on the basis of a modified specification for plastic grooving which was issued to ADO's by the Southwest Region and permits the 3/16" by 1/8" by 2" configuration.

Any comments on your experience with plastic grooving will be appreciated.

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