

recycling...  
continued from p. 1

- **Blending Unit** - serves as a continuous flow pugmixer to blend the processed material with asphalt emulsion and transfer the new homogeneous mixture to the milled road surface in a measured windrow for pickup by the fourth unit.
- **Paving Unit** - this unit includes a windrow elevator attachment. It picks up the new material and places it uniformly on the original milled surface.
- **35 Ton Rubber Tire Roller & Dual Drum Vibratory Roller** - these pieces of equipment provide the compaction necessary to complete the pavement recycling process.

Once a lane is constructed, and after as little as two hours, traffic is allowed to proceed over the compacted recycled material. As with any cold mix, a seal coat or hot-mix wearing surface needs to be placed. This final wearing surface cannot be placed on the recycled material until curing has reduced the moisture content to 1% or less by total weight of the mixture or after a curing period of 14 days has elapsed, whichever comes first.

## Materials

The requirements specified for the liquid binder was a high float medium set emulsion type of asphalt (HFMS-2T).

The actual amount of additive used was slightly above 1 percent. In addition, the contractor added small amounts of water to the pulverized material to facilitate uniformly mixing the emulsion with the pulverized material. The

Table 1: Description of Existing and Proposed Pavements

Description	Shoulders (10')	Driving Lanes (24')
New Hot Asphalt	1"	1"
Existing Depth Asp.	1"	5-6"
Recycle Method	Full Depth/Bomag	Partial Depth/Train
Recycle Depth	3"	4"
Crushed Stone	8"	8"
Crushed Gravel	8"	8"
Sand (Minimum)	8"	8"

water was added to the pulverized material during the mixing phase of the operation.

The gradation requirements for the new recycled product was 100% passing the 1-1/2" sieve and 90-100% passing the 1" sieve.

## Project Description

The project involved 5.94 Miles of one-inch hot bituminous pavement on recycled asphalt pavement and shoulders in the towns of Alton and New Durham. Table 1 presents a detailed description of the project at a glance. The total project cost was \$686,398.00. The cold in-place recycling/train method alone cost \$256,500.00. This cost reflects a unit bid of \$3.00 per sq. yd. which includes all work and materials barring traffic control.

## Summary of Advantages

The advantages of cold in-place recycling/train method can be summarized as follows:

1. **Cost Effective** - this is true mainly because the on-site reuse of existing materials reduces or eliminates the cost of buying new material and cost of disposing of old materials. Also, engineering and testing costs are less.
2. **Convenient to the Driving Public** - this becomes an advantage because traffic can be maintained at all times and construction requires the minimum number of days (8

## Tool Tip

### Joining corrugated metal pipes with collars

A frequent problem when working with corrugated metal pipes and using collars to join the pipes is the bolts are so long you cannot use an air impact wrench to tighten up the nuts. Even the deep sockets that you can buy are not deep enough to accommodate the length of bolt.

A tip to handle this is to buy a deep socket that will hold the nut that you have to drive and then cut the deep socket in half. Select a steel piece of pipe to match the socket and the length that you want -- perhaps 8 or 10 inches. Then weld the two halves of the socket on either end of the pipe. You now have an 8" or 10" deep socket that can be used with an electric or air powered wrench. This makes it possible to tighten up the coupling bands on corrugated metal pipes without having to use an open faced wrench. It makes the job much quicker.

The above article was reprinted with minor editing from *Technology Transfer Quarterly*, Vol. 7, No. 3, a publication of the Ohio T<sup>2</sup> Center. The original article was written by Glenn Sprowls, CEO. ■

working days for the recycle phase on this project).

3. **Environmentally Preferred** - this is true because it minimizes dust, pollution and smoke; reuses all old bituminous materials and avoids consuming energy resources needed to dispose of old pavement and to produce new pavement.

See the photos on pages 4 & 5!

The above article was researched and written by A.R. Van de Meulebroecke, Technology Transfer Engineer. Our special thanks to Bruce Knox, NHDOT Project Engineer for his cooperation and assistance in obtaining information for this report. ■