City of Portland Green Purchasing Case Study

Warm-Mix Asphalt

PBOT now uses warm-mix asphalt for all capital improvement projects..

Purchasing Green

The Portland Bureau of Transportation's (PBOT) Street Maintenance Division began testing warm-mix asphalt (WMA) as a substitute for traditional hot-mix asphalt (HMA) for paving in 2009. HMA uses additives that produce asphalt at much lower temperatures than HMA, both at the asphalt plant and during application. The lower temperatures reduce fuel use as well as greenhouse gas (GHG) and volatile organic compound (VOC) emissions. PBOT replaced HMA with WMA for all capital improvement projects as of 2011. The two other City bureaus that use asphalt – Environmental Services and Water – have also started using WMA.

Benefits

Because it does not need to be heated to such a high temperature during the production process, WMA has significant environmental advantages over HMA. The City's contracted asphalt plants use 30-45 percent less fuel and emit less GHGs, SO2, NOx, and VOCs by making WMA rather than HMA.

PBOT's use of WMA improves the health of maintenance workers as well as the surrounding community through reduced exposure to fumes. If the City used 67,328 tons of WMA rather than HMA in 2008, they would have reduced GHG emissions by about 800 metric tons, or the equivalent of taking 176 cars off the road.

Cost

The additives used in WMA increase its cost up to $4 more per ton over HMA. However, PBOT recoups some of this extra cost from reduced placement costs and extended pavement life. Since WMA does not need to be heated to such high temperatures during application, it uses less fuel than HMA.

Performance

To date, PBOT has observed that the quality of pavement using WMA is comparable to HMA. Maintenance workers report that WMA comes out of trucks easier and doesn't stick to equipment as much as HMA. Additionally, WMA requires the same as or fewer roller passes as HMA to achieve a highly compacted pavement. WMA also cools more slowly and allows compaction at lower temperatures, allowing PBOT to extend the traditional paving season beyond the summer months.

WMA may also have long-term benefits. Because WMA is heated at a lower temperature, the cement does not prematurely age as sometimes happens with

At a glance –

Who –

- **Portland Bureau of Transportation**

Product –

- **Warm-mix asphalt**

Cost –

- **$0-$4 more per ton depending on how it's made**
- **Reduces heating fuel costs**

Benefits –

- **Reduces dependence on fossil fuels**
- **Reduces GHG and VOC emissions**
- **Extends paving season**
- **Extends pavement life**

"There appears to be no difference in either the placement or performance of WMA over traditional HMA. Both the short and long term benefits of WMA make the product very promising."

Brian Oberding,
City of Portland, PBOT

HMA. Therefore, WMA may have a longer service life before sunlight and other factors degrade the pavement surface.

Lessons Learned

Although WMA has many advantages over HMA, it is not appropriate for all applications. For instance, PBOT still uses HMA for small projects in late fall/early spring when weather conditions are not optimal for using WMA. Maintenance crews noticed that the WMA mixture cools excessively next to existing pavement edges, making compaction more difficult. This is most likely because HMA tends to heat the surrounding pavement more than WMA. Therefore, WMA should be used cautiously in cooler and moister conditions during the year. High humidity can cause problems too, as WMA uses water as a lubricant to facilitate compaction instead of higher heat.

WMA is also not ideal for patching. Instead, PBOT is testing cold-mix asphalt (CMA) for applications such as potholes. CMA costs slightly more than WMA, but provides even further reductions in fuel use and emissions because it doesn't need to be heated at all. While PBOT's use of CMA is still in a testing phase, so far the CMA is performing well.

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About Portland Bureau of Transportation (PBOT)

The Bureau of Transportation maintains the $8.4 billion investments in infrastructure facilities from streets and structures to traffic signals and street lights. PBOT is a community partner in shaping a livable city. We plan, build, manage and maintain an effective and safe transportation system that provides people and businesses access and mobility. We keep Portland moving.

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