Reduce, Reuse and Recycle within the State Materials Lab building

The WSDOT State Materials Lab has taken action close to home to reduce, reuse and recycle. We now recycle nearly every type of material we encounter: testing waste (aggregates, concrete, asphalt and steel), paper, cardboard, plastics and plastic sheeting, wooden pallets and even kitchen waste (wet or soiled paper towels, food waste, coffee grounds – all are taken for compost). The local waste hauler has certified the State Materials Lab as a Certified Green Program. Additionally, WSDOT’s State Materials Lab reviewed chemicals stored in the Chemistry Lab, evaluating the real need for having them on hand. By reducing those chemicals on hand (eliminating over 600 chemicals) we reduced consumption, the risk of storing potentially hazardous chemicals and the associated costs. Now, if we need a specialty chemical for a specific test, small quantities are ordered and after completion of the expected testing the remainder is recycled, greatly reducing hazardous chemical storage onsite.

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Sustainability: Highway Materials

WSDOT recognizes the need for sustainable transportation systems. Although sustainability may mean different things to different people, common definitions do exist.

Future Activities

More Warm Mix Asphalt Trials

Asphalt pavement makes up 63.3% of our state highways. Making asphalt pavement requires heating up the rock and asphalt binder (the “glue”), to drive off moisture and make it pliable when it is placed. New technologies can reduce the mixing temperature by 50° F or more, in a process called “warm mix asphalt” or WMA (as opposed to the current “hot mix asphalt”). Less heat means less fuel and lower emissions, conserving fossil fuels while reducing greenhouse gases. Our first warm mix asphalt test project was built in the summer of 2008 and more test projects are planned for 2009.

Solar Powered Traffic Systems

Solar power holds promise for a variety of traffic systems, especially in remote locations. We are examining solar powered systems for both new installations and for retrofitting old locations. In the right location solar power can reduce greenhouse gas emissions, reduce consumption and decrease costs.

Advancing Groundwater Infiltration

Highway runoff can overwhelm natural water courses, so ponds are built to help moderate the rate of infiltration. New research in groundwater infiltration may find better methods using the highway side slopes to infiltrate groundwater, saving money and resources by eliminating or greatly reducing the size of infiltration ponds.

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

“Sustainability, in a broad sense, is the capacity of maintaining a certain process or state. It is now most frequently used in connection with biological and human systems. In an ecological context, sustainability can be defined as the ability of an ecosystem to maintain ecological processes, functions, biodiversity and productivity into the future.”
Source: Wicipedia 22 January 2009 at 19:42

From the WSDOT State Materials Lab
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Three Key Words

Reduce, Reuse, Recycle: three key words in the world of sustainability. You reduce by building to last and by not using as much material in the first place. You reuse by taking a material and returning it back to the same use. Recycling takes one material manufactured for a specific use and remanufactures that material for a different use.

Reduce

Reducing involves working to eliminate the need to replace what you have built. Building higher quality, longer lasting facilities reduces the need to regularly replace those facilities. Better roads and better bridges last longer, reduce the need for maintenance and repair, and reduce the consumption of resources. WSDOT designs highways to be functional and durable. The basic infrastructure for any highway, the embankment and the roadway, do not need replacement once built. The basic alignment and the roadbed beneath the pavement remain in place indefinitely.

Pavement Design

Asphalt pavement designs preserve the pavement structure by driving the distress to the surface. The surface course is easily replaced, leaving the pavement’s base course and subbase course untouched. Today’s asphalt pavement structures will not need replacement once built. The Pavement Management System (WSPMS) increases pavement life while reducing the need to regularly replace those facilities. Extending pavement life reduces consumption, improving sustainability, while also saving money. WSDOT is a nationwide leader in the design and implementation of dowel bar retrofits.

Pavement Management

WSDOT’s Pavement Management System (WSPMS) increases pavement life while providing pavements at the lowest life cycle cost. The lowest life cycle cost occurs when you replace the pavement course just before it fails and causes damage to the pavement beneath. Replace the surface course too soon and the pavement is wasted since the surface course is late and costly pavement repair becomes necessary. Each year we measure all WSDOT pavements for smoothness, structural condition and rutting to find that specific point of lowest life cycle cost. Knowing when to replace the surface course preserves the pavement, decreases resource use and increases sustainability.

Alternative Hydraulic Cements

Portland cement is a wonderful material: it creates the concrete that meets many needs in construction. Production of portland cement, though, produces significant quantities of greenhouse gases, both from the fuels used in the manufacturing and the CO2 driven off the minerals used to make portland cement. Alternative hydraulic cements allow WSDOT to reduce the amount of portland cement used while still producing a high quality, durable concrete. Many of the alternative cements used in WSDOT pavements are made from flyash, microsilica and ground, granulated blast furnace slag find use in a wide variety of WSDOT concretes, reducing the need for greater quantities of portland cement.

LED Traffic Signal Heads

WSDOT aggressively updated signal heads from incandescent lamps to light emitting diode (LED) lamps, dramatically reducing energy consumption. LEDs are more durable and last much longer than incandescent lamps, saving even more money and reducing consumption, improving sustainability.

Warm Mix Asphalt: New Technology

Heating the aggregate and the asphalt binder to make asphalt pavement is expensive and consumes considerable fuel (diesel of lower grades of bunker fuel). Warm Mix Asphalt (WMA) uses special modifiers that lower the mixing temperature for asphalt. Decreases of 50°F or more are possible. We placed our first test section on I-90 in 2008 and more will follow.

Recycle

The final option for increasing sustainability is recycling: taking a material in one form and converting it to another material in another form.

Cold-In-Place Recycling

Cold-In-Place recycling reconditions low volume roadways, turning worn out pavement into sound new base. The pavement is milled in place, treated with a binding agent and compacted. This new, strong base is overlaid with either new asphalt pavement or a chip seal (sprayed liquid asphalt with rock chips embedded into it). The process is inexpensive and has been very successful.

Asphalt Shingle Recycling

Asphalt shingles present a possible opportunity for recycling, using the asphalt binder in the shingle to make new asphalt pavement. WSDOT’s State Materials Lab is working closely with King County as they build a test project using recycled shingles. We will help with testing and analysis of the pavement and will help track its performance over time.

Plants and Compost

WSDOT salvages plants before the start of construction and uses them to restore other areas. Trees and logs are saved and converted to habitat features within streams, wetlands and other natural areas. We convert what was once waste material into mulch, placing it back on site to reduce runoff and encourage plant growth. WSDOT is a national leader in using compost created from yard waste and other sources to control erosion and sediment on our projects.

Other

Other recycled materials used on WSDOT projects include benches and picnic tables manufactured from recycled pop bottles, converting brush onsite into compost for use within the project and crushing old concrete into new aggregate for base or subbase courses.