Rebates cut LED signal costs

Next time you want to "stop traffic," consider installing LED traffic lights. LED traffic signals last five times as long and use 85%-90% less energy than an incandescent lamp. Because they're on so frequently, that can translate into huge savings for a municipality. Now Wisconsin's Focus on Energy program, an innovative public/private partnership that strives to increase energy efficiency while saving businesses money, is offering rebates to municipalities as incentives to install the new lamps.

"Typically the first cost of LED traffic signals has been fairly high, with the energy savings resulting in paybacks of 3½ to 4 years. The incentives offered by Focus on Energy help buy that down to about half the price you see on the state bid contract," says Fred Dreher, manager of government buildings and operations for Focus on Energy. Installing the lamps is fairly straightforward, he adds.

The LED traffic signal incentive is one component of an overall incentive program aimed at local governments. The current program offers grants to help reduce the cost of installing energy efficiency measures and is in place until June 30, 2002. While the incentive program will continue after then, grant levels and program levels may change. The current program encourages energy efficiency improvements in a systematic way, rather than offering rebates for discrete measures. Lighting, heating and cooling systems should be considered for retrofit.

Focus on Energy also offers local governments such services as free technical assistance, identification surveys for ways to save energy, detailed analyses of specific energy saving measures, and financial grants. Typical ways to save energy around streets and highway operations include lighting, cooling equipment retrofits, air handler modifications, and heating retrofits.

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Concrete cylinders are roadway "insurance"

"Fortunately, concrete cylinder tests don't fail all that often," says Charles Gresser, P.E., of Giles Engineering Associates in Waukesha. "But if they're not as specified, you have to investigate." Gresser, a construction materials testing expert, taught in the recent T.I.C. workshops on *Basics of Good Concrete.*

Concrete cylinders are cast from the concrete as it's being placed, then cured and tested. Some are laboratory-cured under controlled temperature and moisture conditions, then tested in compression after 28 days to determine their strength. Others may be field-cured alongside the paving job. They help contractors decide when to remove forms and when to open the road to traffic.

Several things can result in cylinder failure. Sometimes, it is a wrong mix or bad batch from the concrete supplier. Another common reason for failure is adding too much water at the job site. Also, if the cylinder is not cast, stored or handled properly, the sample will be weaker than specified. Occasionally, a cylinder just fails because concrete doesn't always break as it should. Up to one set per hundred may fail under American Concrete Institute standards.

"Most specs say to make five sets of at least two cylinders for each class or type of concrete on the job," says Gresser. The lab then averages the two 28-day results from each set. The running average of any three sets must equal or exceed the design strength, with no individual set being more than 500psi below the design strength.

To be sure you're getting accurate results from your sample cylinders, use certified testing personnel and follow the ASTM (or AASHTO for DOT projects) standards (summarized here). Supervisors should be aware of the types of casting mistakes and field condition changes that produce bad cylinders.

The biggest casting problem is insufficient consolidation. The cylinder can lose up to 61% of its strength if not properly consolidated. A rough end before capping can steal up to a quarter of the cylinder's strength. Using a cardboard mold can reduce strength by 21% and a cylinder not cast on a level surface can cost up to 12% of the specified strength.

Freezing during the first 24 hours after casting can reduce strength by as much as 56%. Other environmental conditions that damage cylinders are: Seven days in the field at warm temperatures, up to 26%; or seven days in the field at 73 degrees with no added moisture, up to 18%.

Handle cylinders with care. Letting them rattle around in a box in the back of a car or pickup truck can damage them considerably.

When a cylinder fails, then lab engineers will have to do some

How to cast a concrete cylinder

Cylinders can be cast both for **laboratory curing** to test strength and quality, and for **field or job curing** to determine when to remove forms or when to put the structure into service. Make at least two cylinders for each purpose. Begin by gathering tools and cylinders. Samples should be taken at least every day for each class of concrete, or for every 150 cubic yards delivered. You must also test slump, air content, density, and temperature at the same time. The tests should be done carefully and precisely by a certified testing technician.

Cylinder types: metal, plastic and paper.

sleuthing. They will start by looking at whether the cylinder was made, cured and tested properly. The slump test, air content, unit weight, and temperature measurements taken at the same time provide crucial data for the detectives. If all those conditions were okay, then they will obtain a sample of the concrete in the field, usually taking core samples back to the lab for testing. On occasion, the engineer will accept the results of non-destructive field tests such as the rebound hammer or Windsor probe.

"If they got a bad load then everything delivered that day may have a problem," says Gresser. In that case, your concrete cylinder is your insurance, helping identify who will be responsible for remedying the problem. You'll be very glad if it is an unimpeachable witness: well made, properly cured and handled, and accurately identified.

To ensure accurate test samples, fill, rod, and surface cylinders properly.

*You may find it helpful to review the video, **Quality Control of Concrete on Site,** available from the T.I.C. lending library. You can certify your staff through technician training programs. See Resources on page 6 for details.*

1) After all on-site adjustments (water, admixtures) have been made, collect two or more samples at regularly spaced intervals from the middle portion of the batch. Combine and mix in a wheelbarrow. Complete this process in 15 minutes or less.
2) If the concrete includes coarse aggregate larger than 2 inches in diameter, use a wet sieve to remove the bigger stones or use a larger cylinder.
3) Molds should be 6 inches in diameter by 12 inches high. Use approved, non-absorbent, watertight molds which will not react with concrete and are firmly fixed to base plates. Coat reusable molds lightly with mineral oil or other non-reactive form-release material.
4) Place the molds on a level, rigid surface in the location where they will be stored for the first 24 hours, or as nearby as possible.

Cover and tag cylinder.

5) Fill molds in 3 equal layers and rod each layer uniformly, 25 times. When rodding middle and top layers, penetrate about 1 inch into the layer below. (For vibrator consolidation, follow ASTM specifications.)
6) Slightly heap the top layer above the mold, attempting to exactly fill the mold after compaction. If it subsides below the edge, add more from the sample batch. Do not add non-representative concrete.
7) Strike off the surface of the concrete and float or trowel it to produce a flat, even surface that is level with the edge of the mold.
8) Carefully mark the specimens to identify them and the concrete they represent. Do not damage the top surface of the concrete or mark on removable caps.
9) Immediately move specimens to the storage area. Cover with plastic or non-reactive plate. Immediately refinish any top surface that is marred during movement.
10) During the first 24 hours, cylinders must be protected from moisture loss, movement, and temperature extremes. Maintain the temperature between 60°F and 80°F.
11) After 24 hours transport **acceptance test** cylinders *in their molds* to laboratory for controlled storage. Handle carefully and protect from rattling or bumping in the back of a vehicle.
12) After 24 hours, unmold **field-cure** cylinders and cure next to the concrete they represent and under the same conditions. (If these cylinders are being used to determine when to put the structure into service, unmold at the same time that form work is removed.)

Curing box for protecting cylinders in the field.