I think we would have no reservations in agreeing that LED traffic signal modules are here to stay. Incandescent bulbs are no longer the standard. For public transportation agencies that have retrofitted their traffic signals with LED modules, gone now are the days of replacing incandescent bulbs on a near daily basis. We have embraced the LED module for many reasons, as they have provided many more advantages than disadvantages, including:

1. LED modules dim out rather than burn out
2. Improved energy efficiency, with an expected savings of nearly 90%
3. Increased lifespan, lasting many years, not months
4. Enhanced motorist safety, because signal displays are brighter
5. Better contrast, even in direct sunlight
6. Reduced maintenance costs
7. Can handle conditions such as sun phantom, light uniformity, and color washout

In 2008, the City completed a traffic signal LED retrofit project, which involved replacing all city-owned incandescent traffic signal bulbs with LED modules at 107 signalized intersections. Additionally we replaced about 40 - 8” signal heads with 12” LED signal heads. Overall, we installed 1100 Green and Yellow Balls each, 250 Green and Yellow Arrows each, 250 – 9” WALK indications, 50 countdown only displays, and 230 countdown pedestrian signals.

As LED traffic signals have become common place, more and more agencies in climates that experience harsh winter conditions are discovering that there is one inherent issue with them: snow and ice buildup on the LED signal face. This occurs due to the low operating temperatures of the LED modules compared to their power-hungry predecessors who produced much more heat which ultimately melted snow and ice. I would not go so far as to say that this is a regularly-occurring problem with LEDs, as snow and ice buildup conditions, in my experiences at the City, have only occurred during “perfect storm” conditions. So, what is a perfect storm? First off, I am not a meteorologist and will not provide you with an education in weather. But I have experienced at least one snow event that resulted in many LED traffic signal displays becoming snow packed, resulting in the blockage and obstruction of those displays. I will explain that experience...

Throughout the day on Tuesday, December 8, 2009, temperatures increased from the upper teens to the lower to mid 30s. Barometric pressure steadily dropped while wind speeds increased from 0-5 mph to 25 mph with gusts of around 30 mph out of the north northeast, producing a rain-sleet type precipitation mixture that began coating many of our southbound traffic signal displays. Green Bay’s street pattern is predominantly grid style, with an orientation parallel and perpendicular to the Fox River. This street pattern is roughly 26 degrees off of true north, which when combined with the NNE wind, produced a relative northerly wind, a direct hit to our southbound traffic signals. By the end of Tuesday, the City received 0.34” of precipitation and 3.5” of snow. Once the snow began falling, it began to stick to the LED lenses that were now coated with ice.

Traffic signals with snow and ice buildup after the December 2009 snow storm

The blizzard had the rare strength of a Category 2 hurricane. Early Wednesday, the winter storm reached its height recording a central barometric pressure of 28.998 inches of Mercury. By way

Continued on page 42
IMSA Journal
of comparison, Hurricane Ida had a central barometric pressure of 29 inHg. Green Bay experienced its lowest barometric pressure reading in almost 20 years (A barometer measures air pressure; the lower the number, the stronger the storm).

The storm continued to hit the City through the morning rush hour, creating hazardous road conditions, and continued packing snow into the southbound LED traffic signal lenses. Ultimately, a deep freeze occurred, as temperatures plummeted into the low teens. Wind speeds and gust continued to increase to nearly 40 mph, with gusts up to 50 mph. By around 10 AM on Wednesday, the wind direction began to shift to the west, and snowfall rate started decreasing. In total, the storm produced 1.12” of precipitation and dumped just under 15” of snow on our city. The 14.7 inches of snow in Green Bay places this storm in the top 6 biggest snowstorms in Green Bay weather history (observations since 1886), and is the biggest December snowstorm ever. And as a bit of trivia, during the height of the storm, lightning and thunder were reported in the Green Bay area and in central Wisconsin.

Even as this epic storm wound down, the weather continued to produce unfavorable conditions for our traffic signals. As the barometric pressure began to rise, the temperatures began to plummet. After noon on Wednesday, the steady decline in temperature from the freezing mark to around -5 degrees Fahrenheit prevented any assistance by the sun to melt away the snow and ice from our signal faces.

An interesting observation we made during the snow event was that many motorists did not know how to react to a “white” signal. Some treated white signals as a 4-WAY STOP condition. Some treated white signals as a green light. Although many weather-related crashes occurred that day, the City is not aware of any crashes related to motorists’ inability to see a traffic signal display.

We quickly purchased 4 swivel scrub brushes on telescoping poles for use in wiping away and clearing the snow and ice buildup. We divided the City into 4 areas of roughly the same number of signalized intersections (25-30) for each to be cleaned by one DPW laborer. Staff worked as fast as they safely could to have all obstructed signals cleared. If time and signal access became constraining factors at any of the intersections, staff was instructed to clear at least one display per movement.

There are now products on the market that are designed to reduce and minimize the effects of snow and ice build up on traffic signal displays. During late winter 2009/2010, city
Combatng the Effects of Snow and Ice on LED Traffic Signals: The City of Green Bay Response

Continued from page 42

electricians installed both vented visors and clear angled covers over all LED traffic signal displays at one intersection in our downtown area. This intersection had experienced snow obstruction from the past storm so we were confident we would have a susceptible test bed during the next perfect storm. Additionally, we would be able to observe any variations in product performance as the intersection contains both vertically post-mounted heads and horizontally mast-arm mounted heads. The materials cost $1280.

The Fortran “Snow Sentry” cover (left) and the McCain “Snow Scoop” visor (right).

Although the City has not conducted a formal study of these products, we were able to make some general conclusions between the products based on one late season perfect storm:

1. Neither product eliminated snow nor ice buildup on affected signal displays.
2. The vented visors on vertical heads seemed to have difficulty keeping snow out of all heads on each display.
3. The vented visors on horizontal heads seemed to be more effective at keeping snow out than snow covers on horizontal heads. Note that our discussions with the snow cover manufacturer after installing the products advised us that their product was not intended to be used in conjunction with an open-bottom tunnel visor, but rather with a cutoff type visor.

A chemical de-icer was applied to these traffic signals.

Just one intersection west of the visor and cover intersection evaluation intersection, we tested an environmentally friendly anti-icing and deicing fluid on all signal displays. We were able to apply the chemical just days before a late fall storm hit the City. Again, like the other test bed, we have not conducted a formal evaluation of the product but were able to make some generic observations based on one storm. We found that the solution did have a noticeable snow and ice deterring effect, better than the visor and cover products. It is inconclusive however to know if the deterring effects are lasting based on how recent the solution was applied to the storm event, and whether other conditions such as sun bake or dust would impact its effectiveness.

Let us not forget the many benefits we have received after retrofitting our former incandescent traffic signals to LED modules. But like any technology, it is never perfect. Snow and ice buildup on LED traffic signals in winter climates is very real. All agencies responsible for maintaining traffic signals have, in the past, had the “luxury” of the heat produced by incandescent bulbs for decades to melt snow and ice as it fell and after the storm. Agencies can expect during a “perfect storm” that some LED modules may become partially or completely obstructed by snow and ice. Knowing how to identify what weather conditions define a perfect storm can assist traffic signal maintenance staff in their response to snow and ice-obstructed traffic signals; and being able to identify and respond to a perfect storm

Continued on page 45

WILCOX SALES COMPANY
PS/A-10 Series
Audible Pedestrian Signal

Since 1974 Wilcox Sales Company has been providing audible pedestrian signals to public agencies throughout the North American Continent. With the PS/A-10 Series, ease of installation, simplicity of use, and long lasting durability are just a few of the comments people constantly use to describe our products. Features:

- Two distinct tones: Koo-Koo-North South; Peep-Peep-East West
- Ambient noise volume override- 3 distinct dB noise thresholds
- Customizable messages
- NEMA TS-2 environmental requirements
- We stock all three standard colors; Traffic Signal Green, Safety Yellow, & Black

Family owned and made in the U.S.A.
since 1974

Products for the Visually Impaired

Wilcox Sales Company
1738 Fincroft Drive
Claremont, CA 91711
Phone: 909.624.6874
Fax: 909.624.8207
E-mail: wilcoxaps@verizon.net

July / August 2011
Continuing from page 43

before it hits should reduce the negative effect it has on your signals. The City of Green Bay has had success in removing snow and ice from LEDs using a swivel brush on a long pole. This mitigative technique may not be the most state-of-the-art, but it is effective, efficient, and low cost. We also have seen some positive results from aftermarket products designed with the intention of reducing and minimizing snow and ice buildup on LED signals, although no product stood out from the others, research and development in this area should continue.

To demonstrate the power of the system, the new applications, and the special offers available, Georgia 511 is planning a major summer promotion to coincide with the summer travel and construction season.

The Georgia Department of Transportation is committed to providing a safe, seamless, and sustainable transportation system that supports Georgia’s economy and is sensitive to both its citizens and its environment. For general information on the Georgia DOT, please visit www.dot.ga.gov.

About the 511 Sponsorship Team
Meridian Environmental Technology, Inc. (MET)

Iteris, Inc.

Econolite Introduces Autoscope ENCORE™
Introduction of Autoscope ENCORE™ highlights 20th anniversary of development partnership

Econolite and Image Sensing Systems, Inc. (ISS) today announced the introduction of Autoscope ENCORE™, the next generation of Autoscope multitasking video solutions, providing the reliable, immediate and comprehensive traffic information necessary for the most

Continued on page 46