



Interoffice Memorandum

To: Public Works Committee
Through: Carl S. Goldsmith, Director of Public Works *CG by DWT*
From: David A. Dratnol, P.E., Village Engineer *DAD*
Date: April 22, 2010
Subject: Village Street Lighting: LED Lights

At the April 15, 2010 Village Board meeting, the Village Board requested that the Public Works Committee investigate the use of Light Emitting Diode (LED) technology for street lighting.

Background

As technologies continue to evolve, the Village is presented with opportunities to make changes that provide equivalent or superior services at a reduced cost. Street lighting is one such area experiencing technological change.

Over the years, the Village has changed the type of light utilized for street lighting. The last significant change was a switch from Mercury Vapor (MV) lights to High Pressure Sodium (HPS). This change was made as a cost saving measure because the HPS bulbs are more efficient than the mercury vapor lights. This switch from mercury vapor to HPS also involved changing from a "white" light to the orange glow of the HPS. When this change was made, there was resistance to making the change because residents were familiar with and comfortable with the existing lighting.

On Main Street, between Ethel Avenue and Taylor Road, the Village has replaced the HPS light bulbs in the "Main Street Lighting Standard" luminaires with LED fixtures. The lens for the acorn style fixture at the top of the pole has a 2" wide +/- band painted on the inside of the lens. This is to address comments made regarding glare from the LEDs. A similar modification has been made on three of the four coachlights, in which the top 2"+/- of the panels have been painted to once again shield a direct view of the LEDs inside the fixture. The light at the southeast corner of Taylor and Main has not been modified. Engineering Staff suggests that Committee members view the LED fixtures and the noted modifications, prior to the April 26th PWC meeting.

Attached to this memo are copies of a letter dated April 20, 2010 sent to residents along north Main Street and a survey form posted on the Village website.

LED Technology

Engineering Staff has arranged for representatives from Sternberg Lighting and Civiltech Engineering to attend the meeting. Sternberg Lighting will make a presentation to inform the Committee on LED lighting, what it is, how it works, the



InterOffice Memo

To: Public Works Committee
Through: Carl S. Goldsmith, Director of Public Works
From: David A. Dratnol, P.E., Village Engineer *DD*
Date: April 26, 2010
Subject: Main Street Lighting Project - Phase II
Public Comment on LED option

As part of Main Street Lighting - Phase II the Village is considering use of LED Luminaires instead of HPS Luminaires. Four light poles in the Phase I area on South Main Street between Taylor Road and Ethel Avenue were changed to LED Luminaires. To simulate the pattern that will be installed on North Main Street the opposite lights were turned off. This created a staggered pattern.

On April 20, 2010, a notice of the special PWC meeting was sent out to residents of North Main Street, which also asked for comments regarding the test lights. The residents were directed to fill out an online comment form on the Village website or call Public Works with comments.

There were 114 letters sent out. Public Works has received four responses by email and one by telephone. One response was concerned that N. Main Street would look like a runway (not specifically addressing LEDs but lights in general). One did not like the light pole structures with the two fixtures on them nor the LEDs. The other two did not like the LEDs because they thought they were bright and glaring. The one phone message was positive about the LEDs and wanted to know who the contractor was going to be.

File: H:\PWPW-Eng\PROJECTS\FY2008\M-08-05 Main Street Street Lighting\Main St Lighting Phase II\Bid\BOT Bid Memo M-08-05 B

technology of LEDs, and there will be samples for the Committee to look at. Civiltech Engineering will discuss the design of the Main Street Lighting project and specifics about the application of LED lighting.

Economics and Impacts

The use of LEDs instead of High Pressure Sodium Lights will save \$185 in electricity and bulb/ballast replacement, and 954 lbs of CO₂e (greenhouse gas emissions) annually per pole. There will be 42 poles in the Main Street Lighting project; the total annual savings by using LED would be \$7,770 and 20 Tons of CO₂e. Attached are copies of the “LED Payback Sheet” for the lights provided by Sternberg Lighting.

The 150 Watt HPS lightbulbs use 188 Watts of electricity per hour of use compared to 109 Watts for the proposed LED (used in the acorn style fixture). The 70 Watt HPS lightbulbs use 90 Watts of electricity per hour of use compared to 66 Watts for the proposed LEDs (used in the coachlights). The reduced electric consumption reduces the greenhouse gas emissions that result from the production of electricity.

The HPS bulbs and required ballasts have a significantly shorter life than the LEDs. Operationally, this impacts the required maintenance of each light with LEDs requiring significantly less maintenance (less frequent replacement of LEDs compared to HPS). Each HPS bulb is replaced every 5 years whereas the LED is replaced every 15 years.

When considering the cost savings of switching from HPS to LED, the payback period for switching to LED for the Main Street Lighting project is 5 years for the acorn style light and 6 years for the coachlight, and 5.4 years for the combination of the two lights.

Requested Action

As the Village moves forward, costs of providing services and opportunities for savings need to be periodically reviewed. Electricity and maintenance for street lighting are significant costs to the Village.

The Village Board has asked the Committee to compare the use of LED lighting to the current HPS lighting and is looking for a recommendation. Staff recommends that the Committee support the use of LED lights in lieu of HPS as the Village moves forward on various lighting projects.

DAD/
attachments

LED Payback Sheet

Job Name: Lombard, IL

Inputs	70 HPS
HID Lamp Watts	12
"ON" Hours per Day	0.070
Power Costs (\$ per KWHr)	\$ 250.00 ** see note
Relamp Costs	\$ 350.00 --- see note
Re-ballast Costs	Coal
Power Generation Fuel	
LED Fixture Watts	66 (from Sternberg)
Additional LED Fixture Cost	\$ 500.00 each

Ballast	50,000
Years to Re-Ballast	11.4
Annualized Re-ballast cost	\$ 30.66

Lamp Life	24,000
Years to Relamp	5.5
Annualized Relamp cost	\$ 45.63

Energy	91
Yearly Energy Savings - KWHr	109.5
Yearly Energy Savings - Cost	\$ 7.67

Emissions	2.095
Pounds CO2 generated per KWHr	
Annual CO2 reduction	229 pounds
Annual CO2 reduction	0.104 metric tons

Total Savings per Year \$ 83.95 Energy, Relamping and replacing ballasts

Payback 6.0 years

** Replacement cost assumes 2 men with benefits, a bucket truck, insurance and a few hours to travel to and set up for work
 --- Assumptions similar to lamp replacement plus added labor hours for additional work and added parts costs

Reference

HID Lamp Watts	Fixture Power	Typ. Lamp Life	Typ. Ballast Life**
50 MH	67	15,000	50,000
70 MH	90	12,500	50,000
100 MH	129	12,500	50,000
150 MH	185	12,500	50,000
175 MH	210	10,000	50,000
250 MH	295	15,000	50,000
50 HPS	66	24,000	50,000
70 HPS	91	24,000	50,000
100 HPS	130	24,000	50,000
150 HPS	188	24,000	50,000
200 HPS	250	24,000	50,000
250 HPS	295	24,000	50,000
50MV	74	24,000	50,000
100MV	120	24,000	50,000

** Average life, includes typical CAPS & Ignitors rated at 50,000 hrs

CO2 Generation

Fuel	Pounds per KWHr
Coal	2.095
Petroleum	1.969
Gas	1.321
Other	1.378
Average	1.341

LED Payback Sheet

Job Name: **Lombard, IL**

Inputs	
HID Lamp Watts	150 HPS
"ON" Hours per Day	12
Power Costs (\$ per KWHr)	\$ 0.070
Relamp Costs	\$ 250.00 ** see note
Re-ballast Costs	\$ 350.00 --- see note
Power Generation Fuel	Coal
LED Fixture Watts	109 (from Sternberg)
Additional LED Fixture Cost	\$ 500.00 each

Ballast Life	50,000
Years to Re-Ballast	11.4
Annualized Re-ballast cost	\$ 30.66

Lamp Life	24,000
Years to Relamp	5.5
Annualized Relamp cost	\$ 45.63

HID Fixture Watts	188
Yearly Energy Savings - KWHr	346.0
Yearly Energy Savings - Cost	\$ 24.22

Pounds CO2 generated per KWHr	2.095
Annual CO2 reduction	725 pounds
Annual CO2 reduction	0.329 metric tons

Total Savings per Year \$ **100.51** Energy, Relamping and replacing ballasts

Payback **5.0** years

** Replacement cost assumes 2 men with benefits, a bucket truck, insurance and a few hours to travel to and set up for work
 --- Assumptions similar to lamp replacement plus added labor hours for additional work and added parts costs

Reference

HID Lamp Watts	Fixture Power	Typ. Lamp Life	Typ. Ballast Life**
50 MH	67	15,000	50,000
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150 HPS	188	24,000	50,000
200 HPS	250	24,000	50,000
250 HPS	295	24,000	50,000
50MV	74	24,000	50,000
100MV	120	24,000	50,000

** Average life, includes typical CAPS & ignitors rated at 50,000 hrs

CO2 Generation

Fuel	Pounds per KWHr
Coal	2.095
Petroleum	1.969
Gas	1.321
Other	1.378
Average	1.341

LED Terminology in Plain English



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Junction Temperature (Tj)

The critical thermal measurement of a diode's operating temperature. This largely determines the life of the LED, the amount of light the LED produces, and the color stability of the output over time.

Lumen Maintenance (L70)

The amount of time it takes for a fixture's lumen output to decrease by 30% from its initial lumen output. 70,000 hrs represents 16 years if the lights are run 12 hours/night, 7 days/week. If they're run at the national average of 10.5 hours/night and 7 days/week, then 70,000 hours extends just over 18 years.

Go to: www1.eere.energy.gov/buildings/ssl/reliability_device.html

Downward Delivered Lumens

The amount of usable light emitted from a fixture that actually reaches the ground. This is separate from the rest of the light being emitted from the fixture that goes outward and/or upward.

SSL - Solid State Lighting

This refers to a type of lighting that uses semiconductor light-emitting diodes (LEDs), organic light-emitting diodes (OLED), or polymer light-emitting diodes (PLED) as sources of illumination.

CCT - Color Corrected Temperature

A measurement of the visual color produced by a light source. LEDs in the 6000K CCT range produce a more bluish-white color. LEDs in the 4500K CCT range produce a white light virtually identical to that of Metal Halide. LEDs in the 3500K CCT range have a color more similar to incandescent lamps. What's important to note is that higher color temps produce higher efficacy (lumens per watt).

CRI - Color Rendering Index

A measurement of how accurately the color of objects appears to us under different lighting conditions. Natural sunlight has a value of 100, in which all colors appear as they should. HPS lighting generally produces CRI of around 21 which is why everything is color shifted and somewhat "washed out". White light, such as LED, Metal Halide and Induction lighting, generally produces a CRI in the range of 75-80.

Lumens per Watt (Efficacy)

The number of lumens produced by the light source or fixture, versus the amount of wattage required to operate that light source or fixture.

IESNA LM-79-08:

Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

The guidelines by which we have shifted from relative photometry to absolute photometry.

IESNA LM-80-08:

Approved Method for Measuring Lumen Maintenance of LED Light Sources

The guidelines by which LED manufacturers perform the testing that yields their life rating data.

DOE CALiPer:

Commercially Available LED Product Evaluation and Reporting

"Consumer Watchdog" program by the Department of Energy to independently test various LED light fixtures and/or LED systems available to the market, with an initial focus on this that may not live up to their marketing material. For more information: <http://www1.eere.energy.gov/buildings/ssl/caliper.html>

➔ **See other side**



STERNBERG
LIGHTING

S I N C E 1 9 2 3

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LED Terminology in Plain English

Concerns with Aftermarket Retrofits

- Because of the wide variety and sheer volume of existing luminaires in place, many manufacturers may not know the specifics of the fixtures these units are going into, including how much air space is in the fixture, how much of the fixture is plastic or glass, and how much is metal.
- In many cases the retrofit unit has no way of removing heat from the LED's and out of the fixture.
- Because these are not designed to any specific fixture or style, they tend to have a significant impact the visual appearance of the light fixture, both when lit and not-lit.
- Often there is no LM-79 or LM-80 data available for these units, some of which have already been negatively reviewed by the CALiPER program.
- Because of the above, there are generally questions as to the warranties provided on these products, in terms of both longevity and performance.

Informative Reading

“How to Spend Your Stimulus Funds on LED Street Lighting” authored by Jim Brodrick, who runs the Solid State Lighting Program for the US Department of Energy. Read this article at: <http://worldofleds.blogspot.com/2009/06/how-to-spend-your-stimulus-funds-on-led.html>

LEDs Magazine online. A good source to keep current on the technology and various testing as LEDs continue to evolve. Go to: <http://www.ledsmagazine.com>

ASSIST: Alliance for Solid-State Illumination Systems and Technologies.

Another good source from the Lighting Research Center.

Go to: <http://www.lrc.rpi.edu/programs/solidState/ASSIST/index.asp>

Remember that LEDs are not just another white light source, but a technology that is completely different from HID light sources. The thermal dependence of LEDs is of the utmost importance, and if properly addressed and controlled, these lights can provide very efficient light output for decades with little to no maintenance while reducing current energy consumption by upwards of 50%.



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STERNBERG LIGHTING

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VILLAGE OF LOMBARD

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(630) 620-5700 Fax (630) 620-8222
www.villageoflombard.org

April 20, 2010

Village President
William J. Mueller

Village Clerk
Brigitte O'Brien

Trustees
Greg Alan Gron, Dist. 1
Richard J. Tross, Dist. 2
Zachary Wilson, Dist. 3
Dana L. Moreau, Dist. 4
Laura A. Fitzpatrick, Dist. 5
William Ware, Dist. 6

Village Manager
David A. Hulseberg

"Our shared Vision for Lombard is a community of excellence exemplified by its government working together with residents and businesses to create a distinctive sense of spirit and an outstanding quality of life."

"The Mission of the Village of Lombard is to provide superior and responsive governmental services to the people of Lombard."

Dear Resident:

This spring, the Main Street Lighting Phase II project will begin. This project consists of the installation of decorative light poles and fixtures on Main Street from Grove Street to LeMoyné Avenue. As you may be aware, the Village is considering using LED luminaires for these lights.

A special meeting of the Public Works Committee is scheduled for Monday, April 26, 2010 at 7:00 p.m. to discuss the proposed use of the LED luminaires. The meeting will be held at the Village Hall in the Community Room. Public participation is welcome.

If you wish to view an example of the LED luminaires, several test lights have been installed on the 800 block of S. Main Street, between Taylor Road and Ethel Avenue. A comment form is available for residents to submit comments about the lighting on the Village's website at <http://www.villageoflombard.org/index.aspx?NID=126>, or you can call the Public Works Department at (630) 620-5740.

Best Regards,

David A. Dratnol
David A. Dratnol, P.E.
Village Engineer

DD:sc



You are here: [Home](#) > [Forms](#)

N Main Street LED Lighting Comment Form

This form allows residents to submit comments they may have regarding the proposed installation of LED lighting on N. Main Street. Should you need to talk to a department representative, please call Public Works at (630) 620-5740.

The use of LEDs instead of High Pressure Sodium Lights will save \$185 and 954 lbs of CO₂e (greenhouse gas emissions) annually per pole. There will be 42 poles in this project so the total annual savings by using LED would be \$7,770 and 20 Tons of CO₂e.

Contact Information

Your Name:

Your Address:

Phone Number:

Email Address:

Please check your preference:*

I like the LED lighting

Other (see comments)

I dislike the LED lighting

Comments:

* indicates required fields.

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Wolf-Lindstrom, Patty

From: john kaforski [jjk699@comcast.net]
Sent: Wednesday, April 28, 2010 8:07 AM
To: Wolf-Lindstrom, Patty
Subject: Re: PWC Motion

Patty

I vote yes on the motion. The 2" band on the lower light is sufficient . The addition of the 5" band or different lenses on the lower lights could be utilized on an individual bases if needed.

Have great day.

John Kaforski

On Apr 27, 2010, at 10:24 AM, Wolf-Lindstrom, Patty wrote:

The motion that was made at last nights meeting that you will be voting on in the phone poll is as follows:

To move forward with the LED lights on Main St. with changes in the lens as directed by Public Works Committee with modifications made as follow: 5 inch banding on house side or frosted lens on house side. (Per Dave Dratnol - 2 inch banding on lens is already part of the project.)

Patricia Wolf-Lindstrom
Public Works Department
Village of Lombard
(630)620-5740
(630)620-5982 - fax
wolfp@villageoflombard.org

Wolf-Lindstrom, Patty

From: Steve Preins [preins2@sbcglobal.net]
Sent: Tuesday, April 27, 2010 11:23 PM
To: Wolf-Lindstrom, Patty; avanti63@sbcglobal.net; john@kafoski.com; press81@aol.com; daniel.mahal@expeditors.com; agrental@hevsys.net; stevep@qegi.com; Gron, Greg
Cc: Surges, Keith; Dratnol, Dave; Gorman, Dave
Subject: PWC LED Light Motion

Folks

I'm voting yes (or "aye", or OK, or cool, or "go ahead"). The 5 inch banding is not attractive, but it's hard to see the impact of the frosted lenses on the residence nearby because of a large, fully leafed out tree. However, it seems visually clear that the LED's cast less light on the sidewalks and parkways than do the HPS fixtures to the north and south, and in fact the frosted lenses appear to allow a higher LED lighting level on the sidewalks than do the beaded lenses (which might be good if we want better lighting on the sidewalks).

In any case, the 2 inch banding has adequately resolved the undesirable horizontal glare issues, and it now seems that even with the standard beaded lenses there should be less light cast on adjoining residences than with HPS, so in my view we can proceed without either the 5 inch banding or the frosted lenses and simply handle any individual residents' complaints as they arise during the project (and I'm guessing there won't be many).

Steve Preins

----- Original Message -----

From: Wolf-Lindstrom, Patty
To: avanti63@sbcglobal.net ; john@kafoski.com ; press81@aol.com ; daniel.mahal@expeditors.com ; agrental@hevsys.net ; stevep@qegi.com ; Gron, Greg
Cc: Surges, Keith ; Dratnol, Dave ; Gorman, Dave
Sent: Tuesday, April 27, 2010 10:05 AM
Subject: PWC Motion

The motion that was made at last night's meeting that you will be voting on in the phone poll is as follows:

To move forward with the LED lights on Main St. with changes in the lens as directed by Public Works Committee with modifications made as follow: 5 inch banding on house side or frosted lens on house side. (Per Dave Dratnol - 2 inch banding on lens is already part of the project.)

Patricia Wolf-Lindstrom
Public Works Department
Village of Lombard
(630)620-5740
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wolfp@villageoflombard.org

4/28/2010

