LANE COBURN & ASSOCIATES, LLC

Electrical Engineering Solutions for the Construction Industry

NEWSLETTER - MAY 2009

Lane Coburn & Associates, LLC would like to take this opportunity to thank all of our Great Clients! We continue to improve to provide you a better product.

Our seven staff members include Professional Engineers, Sr. Electrical Designers, CAD designers, Lighting Designers & support staff. With an average of over 25 years of experience each, our team has the expertise to support your project. Two of our team members are LEED Accredited Professionals with a significant amount of experience on LEED projects.

The LCa Team

Keith Lane, P.E., LEED

Scott Coburn

Bill Waldrop

Don Pontsler, P.E.

Nick Alexander, LEED

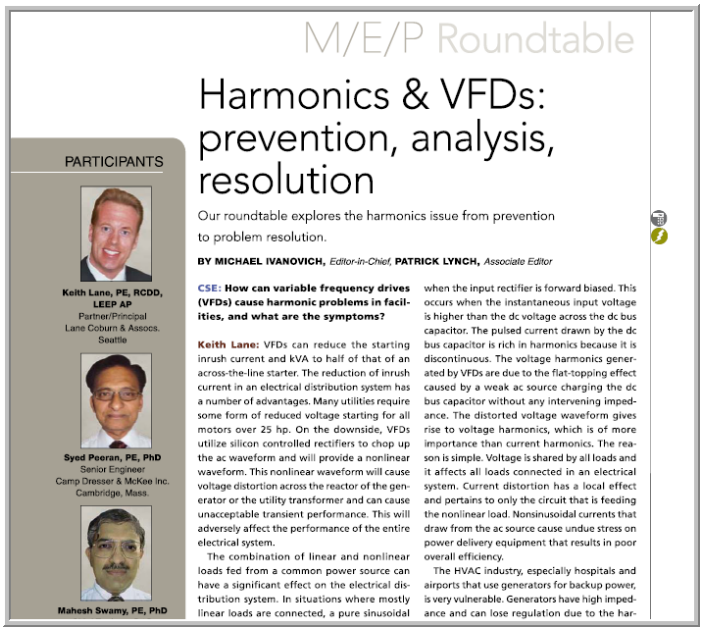
Michael Cailao, LC

Theresa Lane

In addition to engineering services, LCA contributes to the engineering community with Articles, Roundtables and Webcasts. Below is a summary of our recent contributions:

Keith Lane participated as an expert panelist for a **Consulting Specifying Engineering Roundtable** in March on the topic of **Data Center Trends.**

Keith Lane participated as an expert panelist for **Consulting Specifying Engineering Roundtable** in February on the topic of **VFD's & Harmonics: Symptoms, Solutions & Preventive Measures.**



M/E/P Roundtable

Harmonics & VFDs: prevention, analysis, resolution

Our roundtable explores the harmonics issue from prevention to problem resolution.

BY MICHAEL IVANOVICH, *Editor-in-Chief*, PATRICK LYNCH, *Associate Editor*

PARTICIPANTS

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Cambridge, Mass.

Mahesh Swamy, PE, PhD

CSE: How can variable frequency drives (VFDs) cause harmonic problems in facilities, and what are the symptoms?

Keith Lane: VFDs can reduce the starting inrush current and kVA to half of that of an across-the-line starter. The reduction of inrush current in an electrical distribution system has a number of advantages. Many utilities require some form of reduced voltage starting for all motors over 25 hp. On the downside, VFDs utilize silicon controlled rectifiers to chop up the ac waveform and will provide a nonlinear waveform. This nonlinear waveform will cause voltage distortion across the reactor of the generator or the utility transformer and can cause unacceptable transient performance. This will adversely affect the performance of the entire electrical system.

The combination of linear and nonlinear loads fed from a common power source can have a significant effect on the electrical distribution system. In situations where mostly linear loads are connected, a pure sinusoidal

when the input rectifier is forward biased. This occurs when the instantaneous input voltage is higher than the dc voltage across the dc bus capacitor. The pulsed current drawn by the dc bus capacitor is rich in harmonics because it is discontinuous. The voltage harmonics generated by VFDs are due to the flat-topping effect caused by a weak ac source charging the dc bus capacitor without any intervening impedance. The distorted voltage waveform gives rise to voltage harmonics, which is of more importance than current harmonics. The reason is simple. Voltage is shared by all loads and it affects all loads connected in an electrical system. Current distortion has a local effect and pertains to only the circuit that is feeding the nonlinear load. Nonsinusoidal currents that draw from the ac source cause undue stress on power delivery equipment that results in poor overall efficiency.

The HVAC industry, especially hospitals and airports that use generators for backup power, is very vulnerable. Generators have high impedance and can lose regulation due to the har-

Data center discussion

Our roundtable discusses energy efficiency, technological advancements, and best practices in data centers.

BY MICHAEL IVANOVICH, *Editor-in-Chief*, and PATRICK LYNCH, *Associate Editor*

PARTICIPANTS

Peter Babigian, LEEP AP, RCDD
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Steve Berry
Associate Director
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Group 3
London

Keith Lane, PE, RCDD, LEED AP
Partner/Principal
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Seattle

CSE: What problems arise due to a lack of a standard for data center energy efficiency or Power Utilization Equivalence (PUE)?

Keith Lane: There have been many unsubstantiated claims of very low PUE levels from data center operators and salespeople. PUE is a good matrix to identify energy efficiency, but there must be a standard to make sure that you are comparing the same thing. Also, the PUE levels are going to be dependent on the climate. There has been some discussion in the industry about providing a coefficient based on climate and location to provide more meaning to PUE. In some way it would be a method of comparing efficiency of data centers around the world.

Very low PUE numbers are suspect. By the time you take the UPS losses, transformer losses, I square R losses of the cables, and a few lights, you will be over 1.1 PUE before any mechanical or plumbing systems are brought into the equations. Additionally, engineers and owners should ask whether PUE claims are based on theoretical evaluation, actual best case scenario, average, or peak information.

Steve Berry: I agree. The main problem is an inability to make like-for-like comparisons.

level, PUE is computed by dividing total facility power by IT equipment power. The areas in which further refinements to PUE are required and underway include the following:

- Geographic location: Better PUE numbers are more easily achieved in temperate areas than in areas with an extreme hot or cold climate.
- Distinctions between facility and IT equipment: From internal server fans to cooling elements (such as pumps, refrigeration, blowers, and heat exchangers within the IT equipment itself), it is not yet clear how we can distinguish between IT equipment and cooling equipment. In addition, the categorization of certain components, such as facility equipment versus IT equipment, skews the PUE calculation.
- Dynamic nature: Simply dividing the total power by the IT power would produce a result, but there is no formal definition for measurement frequency or for averaging requirements. If measurements are taken on a day of extreme hot weather and low IT equipment usage, the results would be far different than if the measurements were taken on a day of temperate weather and high equipment use. In reality, PUE is not constant. Rather, it is always changing and computations should

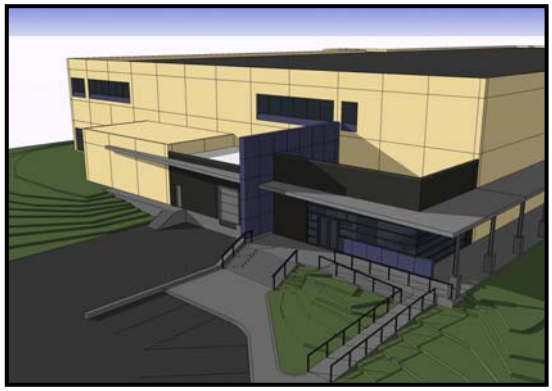
ELECTRICAL ENGINEERING D/B TEAM MEMBER LIGHTING DESIGN CONSULTING LEED A.P

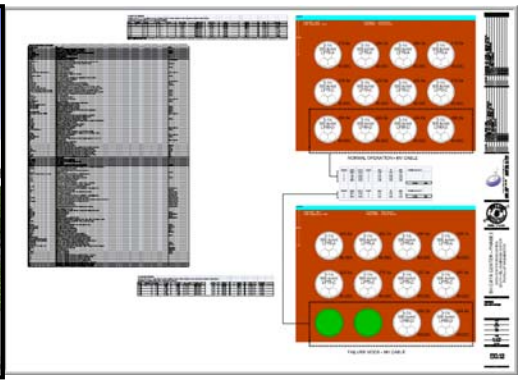
NEW PROJECT

Below is a review of New Projects that LCA has started since our last Newsletter in February '09

Undisclosed Owner – Next Generation Data Center - Manassas, VA - Lane Coburn & Associates is working directly with the Owner on developing the next generation data center. We are looking at various electrical distribution systems to provide the lowest PUE (Power Usage Efficiency) as well as minimizing sustainable costs.

Lane Coburn & Associates, LLC is working for Benaroya on the South Hill Business & Technology Center Building "D" Data Center. LCA is providing a complete electrical design of a 20,000 SF - Tier 3 data center. We are also providing master planning for a total of 55,000 SF of data center space as well as the medium voltage service to the 92 acre campus. LCA is working with Sequoyah Electric, Turner Construction McKinstry and PKJB Architects on this project.



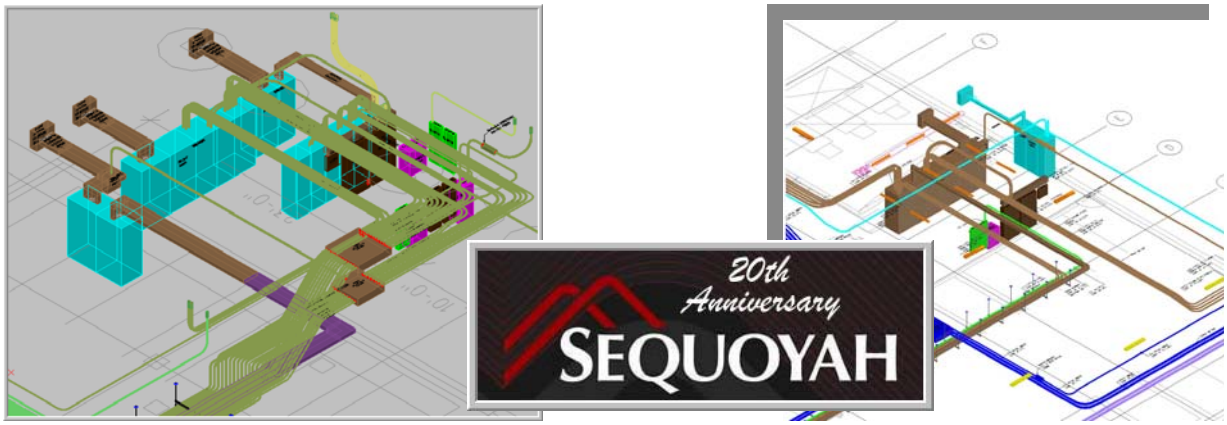


Lane Coburn & Associates, LLC teamed with The Harris Group and was awarded the Port of Seattle 3 year/$3,000,000 IDIQ – Indefinite Duration, Indefinite Quantity - Low Voltage Electrical Engineering contract.

Port of Seattle

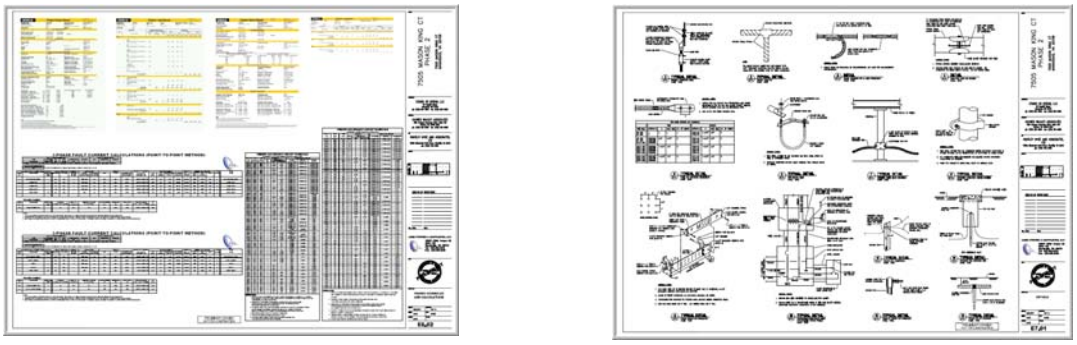
Harris Group Inc.
Engineering for Optimum Performance®

LCA is currently providing 3D Modeling Services for the Electrical Construction for the AMAZON TI Project for Sequoya Electric. LCA was also the Engineer of Record for this project.



LCA is currently providing electrical consulting services for SASCO for the next generation office building for a very large software provider. This scope of work includes defining the electrical distribution and load densities for future office build outs. Turner Construction is the General Contractor.

Undisclosed Owner – Large Data Center - Manassas, VA - Lane Coburn & Associates is working directly with the Owner for the Second phase of a large data center in Virginia.



Undisclosed Owner – Modular Data Center - Lane Coburn & Associates is working for Silent-Air Manufacturing on this modular data center design.

To Better Serve Our Clients

Lane Coburn & Associates has registered with the Small Business Administration and with the Central Contractor Registration for the Federal Government. The following is our registration information:

Certifications: SBE	DUNS # 926179537
CCR Registration	ORCA Registration
NAICS: 541330 & 541340	CAGE CODE: 555F1

Additionally, we have expanded our professional engineering state licenses to 12 and have recently added **Pennsylvania** and **Virginia** in order to serve our clients. Our other state licenses include; Washington, California, Oregon, Idaho, Arizona, Montana, Nevada, Utah, Hawaii & Alaska

THANKS TO OUR GREAT CLIENTS

AHCS	**IDC Architects**
AMAZON	**CH2MHILL**
AVDATA Inc	**Lighthouse Electric Group**
BERGER/ABAM	**Prime Electric**
Bovis Lend Lease	**Red Sea Group**
Benaroya Properties	**Rock Electric, Inc.**
Callison Architects	**SASCO**
City of Bellevue	**Sequoyah Electric**
Dynalectric/Emcore	**Silent-Air**
EHS Electric	**Turner Construction**
Greenfield LLC.	**TMOBILE**
The Harris Group	**williams + tam DesignWorks**

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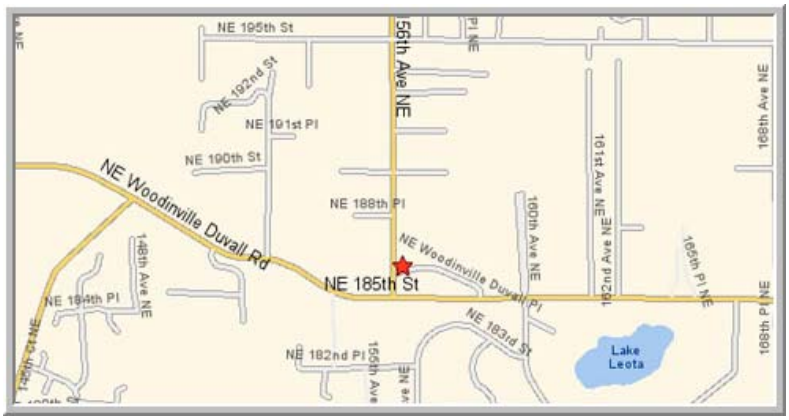
Lane Coburn & Associates, LLC – Office



Map Locating our Office