



**Legislative Department  
Seattle City Council  
Memorandum**

**Date:** February 21, 2012  
**To:** Energy & Environment Committee  
**From:** Tony Kilduff (4-3580)  
**Subject:** **C.B. 117397 – lifting budget provisos related to NODO substation and network.**

Background

In 2009, the Council limited spending on two projects in City Light's 2009-2015 CIP. One project was to develop a new network distribution system in portions of the North Downtown area (NODO) to replace the existing radial distribution system. The other was to build a new substation on Denny at Pontius.

The Council's concerns with a new network was that City Light did not have a comprehensive policy on network rates for the existing networks in its service territory. In particular, customers on the Central Business District (CBD) network pay higher network rates, but those on the First Hill and University District networks do not. Adding a new network without establishing a general policy on network rates did not seem prudent to the Council.

In the case of the proposed substation, the Council had allowed City Light to acquire a suitable site for it in NODO as a hedge in the event it proved necessary. However, the Council was not convinced of the need to build one immediately.

Over the following two years, City Light realized dramatically lower wholesale revenues than budgeted and was forced to make deep cuts. Discussion of the network and substation was put on hold.

The Context for C.B. 117397

***Network***

For some time now, the City has acted to encourage economic growth and development in NODO. Up-zoning and zero-setback development have resulted in significant increases in both the physical density and the electrical load density in the area. As hoped, much of the growth has been in biotech and high-tech businesses where high electrical service reliability is at a premium. Of the two types of distribution service supported by City Light—network and radial—network service is considerably more reliable than radial service. It is also usually more expensive to build and maintain than over head

radial; in the case of NODO the cost to build the two systems are much closer for reasons discussed below.

Zero-setback development means that City Light cannot serve large portions of the area with the typical overhead radial distribution system because there is insufficient clearance from the overhead wires. Putting the radial system underground presents a number of challenges. Key among them is the switch gear needed to operate the system. While relatively simple and cheap in the overhead applications, the gear is large, expensive and complicated in underground applications. The vaults needed to house them are 10ft x 10ft x 10ft, and must be placed in the sidewalk because the lids will not support road traffic. The vaults not only prevent other utilities from using the right-of-way under the sidewalk, they often require curb bulbs that disrupt the street right-of-way and do not align with SDOT's street design guidelines. (Photos of the two types of switches and installations are at the end of this memo.)

Load density in NODO has increased from around 25 megawatts/square mile in the early part of the decade to 75 megawatts/square mile in 2010. On current projections, the area is on track to reach 180 megawatts/square mile within 20 years. That is considerably higher than densities in residential neighborhoods where the radial system is common. It is on a par with load densities in the CBD where City Light serves its customers with network service.

The businesses that the City has been hoping to attract to NODO benefit from high electric service reliability. Unfortunately, reliability in NODO is below the target for the entire service territory and significantly below that in the CBD. It is impossible to achieve the same level of reliability with a loop-radial system, whether overhead or underground, as with a network system.

In view of the cost and challenges of serving NODO with a radial system, City Light's design engineers recommend serving portions of it with a (spot) network.

At this time, City Light is prepared to present a comprehensive network rate policy. It proposes to charge network rates for CBD, NODO, and First Hill. However, the reliability of the First Hill network is not yet up to the standard of the CBD and City Light recommends not extending network rates to it until that standard can be met. Meeting that standard will be much easier if there is additional support at the substation level for that network.

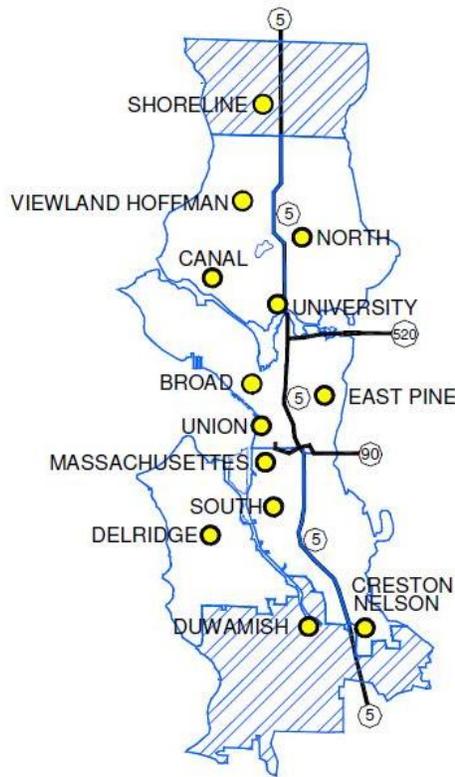
Currently there is no need for network service in the University District. If that remains the case City Light would convert it to a radial system over time. However, the University of Washington has recently indicated an interest in developing its private property holdings off campus, and that could change the plans for the area.

### ***Substation***

Although there has been little-to-no system-wide load growth in Seattle, there have been pockets of growth. When load grows unevenly, which is common, City Light must reallocate existing substation capacity. This task is expensive when the available capacity is a long way from the actual load center, as is the case with NODO (see the figure below).

Broad Substation is the closest to NODO and currently supports the area’s radial system, Queen Anne/Magnolia, and over 40% of the CBD network. From an engineering design standpoint, Broad support for both the radial and network systems is excessive<sup>1</sup>. And while it is possible to shift some of the load for the radial system to Canal Substation, there are no good candidates to accept network load. Prudent system design argues for additional substation support for both the CBD and First Hill networks. Additional support for radial load west of the I-5 and south of the Ship Canal is also desirable. As noted earlier, the First Hill network is not on a par with the CBD network; it will not be possible to achieve that level of redundancy with the current configuration.

Assuming the case for network service in NODO is compelling, then it will need support from Broad given the current configuration of City Light’s substations. That may be possible in the very short run. In the long run, however, sound engineering design argues for additional substation support for all the nearby distribution systems. These considerations lead staff to support passage of this Bill to allow design work to proceed for both a network and a substation in NODO.



**Substations in City Light’s Service Territory**

<sup>1</sup> Again, this is a design standards issue rather than a physical capacity issue. Design standards are purposefully conservative.



**Overhead Switch Gear: ~\$10,000 installed.**



**Underground Equivalent: ~ \$250,000 installed.**



**Vault to House Switch Gear: 10ft x 10ft x 10ft**

(To be clear, this type of switchgear and this scale of installation are not required for a network.)