#4
CB 117397

Michael L. Clark, PMP
SCL NODO Substation ORD
December 13, 2011
Version #1

**ORDINANCE _____**

AN ORDINANCE relating to the North Downtown electrical substation, distribution network, and associated transmission improvements in the South Lake Union Urban Center; removing two budget provisos that limit spending of appropriations in the 2009 Adopted Budget; adding a new project and revising project allocations for certain projects in the 2012-2017 Adopted CIP; and ratifying and confirming certain prior acts.

WHEREAS, South Lake Union is identified in the City of Seattle's Comprehensive Plan as a designated Urban Center for increased employment and residential growth; and

WHEREAS, the City Council adopted Resolution 30610, affirming the City of Seattle's commitment to the South Lake Union area as the region's most competitive location for biotech and high-tech research and industry; and

WHEREAS, the biotech and high-tech companies and institutions located in the South Lake Union area are extremely sensitive to outages and disruption of electrical service; and

WHEREAS, the increased growth and development density in the South Lake Union area has reduced the amount of physical space available in the right-of-way for electrical infrastructure; and

WHEREAS, the City Light Department recommends development of a network distribution system for the South Lake Union area as the most viable and safe alternative for meeting the high reliability needs of biotech and high-tech customers, and for providing electrical service in a dense, urban environment; and

WHEREAS, the existing substations in the downtown Seattle area do not have sufficient 13 kV capacity to serve a new network distribution system for the South Lake Union area; and

WHEREAS, a new North Downtown area substation will provide the necessary 13 kV capacity for a new network distribution system for the South Lake Union area, and provide additional capacity to manage loads in adjacent areas of downtown Seattle, including the Denny Triangle, Uptown, and First Hill Urban Centers; and

WHEREAS, a new North Downtown substation will require new transmission service to power the substation; and

WHEREAS, the 2009 Adopted Budget included provisos restricting the expenditure of appropriations for the North Downtown substation and North Downtown network until authorized by future ordinance; and



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WHEREAS, the City Light Department has provided policy guidelines for future network rate determinations in response to Council interest; and

WHEREAS, lifting the budget provisos limiting spending of 2009 appropriations for the North Downtown substation and North Downtown network, and creating a new CIP project for the North Downtown substation transmission lines, will allow the City Light Department to proceed with design and environmental review of these CIP projects; NOW, THEREFORE,

**BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:**

Section 1. The restriction imposed by the following budget proviso, as adopted by Ordinance 122863 and amended by Ordinance 123078, is removed in its entirety and expenditure of all allocated amounts is no longer subject to restriction.

| **Department** | **Green Sheet #** | **BCL Name / Code** |
|---|---|---|
| Seattle City Light | 3-1-A-1 | Customer Service and Energy Delivery – CIP / SCL350 |

"None of the money appropriated for 2009 for the City Light Department may be spent for pre-design or design work related to the North Downtown Substation Development Project, CIP Project ID 7757, until authorized by future ordinance. The Council anticipates that such authority will not be granted until City Light presents a convincing case for the substation. This proviso does not restrict expenditures for the purchase of property for a substation, or for work in support of that purchase, or environmental remediation of the site, or work in support of environmental remediation of the site."

Section 2. The restriction imposed by the following budget proviso, as adopted by Ordinance 122863, is removed in its entirety and is no longer a restriction for any purpose.

| **Department** | **Green Sheet #** | **BCL Name / Code** |
|---|---|---|
| Seattle City Light | 4-1-A-1 | Customer Service and Energy Delivery – CIP / SCL350 |

"None of the money appropriated in 2009 for the City Light Department may be spent for work related to the North Downtown Network Services CIP project, Project ID 8405, or North Downtown System Network CIP project, Project ID 8404, until authorized by future ordinance.



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The Council anticipates that such authority will not be granted until City Light proposes rates for the existing University District and First Hill networks and for the proposed new network."

Section 3. The North Downtown Substation Transmission Lines project, Project ID 7125, as described in Attachment 1 to this ordinance, is established in the 2012-2017 Adopted Capital Improvement Program.

Section 4. Appropriations in the 2012 Adopted Budget and project allocations in the 2012-2017 Adopted Capital Improvement Program are modified as follows:

| Fund | Budget Control Level | Appropriation Change | Project Name | 2012 Allocation (in $000's) |
|---|---|---|---|---|
| City Light Fund (41000) | Transmission and Distribution – CIP (SCL360) | $0 | North Downtown Substation Transmission Lines (7125) | New Project <u>$1,000</u> |
| | | | Substation Breaker Replacements and Reliability Additions (7779) | ((~~$4,661~~)) <u>$ 3,661</u> |
| | Net Change | $0 | | $0 |

Section 5. Any act pursuant to the authority of this ordinance taken after the passage of this ordinance is hereby ratified and confirmed.



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Section 6. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the ____ day of _____, 2012, and signed by me in open session in authentication of its passage this _____ day of _____, 2012.

_____

President _____of the City Council

Approved by me this ____ day of _____, 2012.

_____

Michael McGinn, Mayor

Filed by me this ____ day of _____, 2012.

_____

Monica Martinez Simmons, City Clerk

(Seal)

Attachment:

Exhibit A to SCL NODO Substation ORD



SEATTLE CITY CLERK

Michael L. Clark, PMP
SCL NODO Substation EXH A
December 13, 2011
Version #1

# Seattle City Light – CIP Project Pages

December 13, 2011

## New Project (1)

### North Downtown Substation Transmission Lines

**BCL/Program Name:** B1 Transmission - Transmission- CIP
**Project Type:** New Facility
**Project ID:** 7125
**BCL/Program Code:** SCL360-B1
**Start Date:** 1st Quarter 2012
**End Date:** 4th Quarter 2012

**Location:** System Wide
**Neighborhood Plan:** Not in a Neighborhood Plan
**Neighborhood District:** Not in a Neighborhood District
**Neighborhood Plan Matrix:** N/A
**Urban Village:** Not in an Urban Village

This project designs and constructs transmission lines to support the new North Downtown Substation. These transmission lines are created by dividing the existing East Pine to Broad Street Transmission line into two transmission lines, connecting at the new North Downtown Substation.

| | LTD Actuals | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Revenue Sources** | | | | | | | | | |
| City Light Fund Revenues | 0 | 0 | 0 | 1,000 | 0 | 0 | 0 | 0 | 1,000 |
| **Project Total:** | 0 | 0 | 0 | 1,000 | 0 | 0 | 0 | 0 | 1,000 |
| **Fund Appropriations/Allocations** | | | | | | | | | |
| City Light Fund | 0 | 0 | 0 | 1,000 | 0 | 0 | 0 | 0 | 1,000 |
| **Appropriations Total*** | 0 | 0 | 0 | 1,000 | 0 | 0 | 0 | 0 | 1,000 |
| **O & M Costs (Savings)** | | | 0 | 0 | 0 | 0 | 0 | | |
| **Spending Plan** | | 0 | 0 | 1,000 | 0 | 0 | 0 | 0 | 1,000 |





CITY CLERK

Michael L. Clark, PMP
SCL NODO Substation FISC
December 13, 2011
Version #1

Form revised: December 6, 2011

# FISCAL NOTE FOR CAPITAL PROJECTS ONLY

| Department: | Contact Person/Phone: | CBO Analyst/Phone: |
|---|---|---|
| City Light | Jon Lutton/4-3482 | Calvin Chow/4-4652 |

**Legislation Title:**
AN ORDINANCE relating to the North Downtown electrical substation, distribution network, and associated transmission improvements in the South Lake Union Urban Center; removing two budget provisos that limit spending of appropriations in the 2009 Adopted Budget; adding a new project and revising project allocations for certain projects in the 2012-2017 Adopted CIP; and ratifying and confirming certain prior acts.

**Summary and background of the Legislation:**
This legislation allows City Light to begin design and environmental review of the North Downtown substation (and associated transmission improvements) with existing budget resources. A new substation will provide additional capacity and flexibility to manage load growth in downtown Seattle, and would be City Light's first new substation investment in nearly 30 years. The new substation will also allow for future network distribution service in South Lake Union.

Design and development of the substation requires significant lead time. Beginning preliminary design in 2012 will keep the Utility on schedule to provide network distribution service to South Lake Union by late 2016. City Light will seek full approval for construction of the North Downtown substation and network distribution system as part of the Utility's Six-Year Strategic Plan. If approved in the Strategic Plan, City Light will include full design and construction funding for these projects in the 2013-2018 Proposed CIP and future rate proposals.

During the 2009 Budget deliberations, Council approved purchase of the future substation site, but restricted any additional spending until City Light provided a justification for the substation and a proposal for addressing network rates that included the First Hill and University District networks. To respond to these concerns, City Light prepared the following documents for Council's consideration (attached to this fiscal note):

- Summary of City Light's Proposal for South Lake Union Network Distribution Service
- Summary of City Light's Approach to Network Rate Policy
- Quanta Load Serving Report – Executive Summary

This legislation removes a 2009 proviso on approximately $16.7 million of appropriations that have carried forward to 2012 for the substation project (Project ID 7757). Of the appropriations carried forward, approximately $8.6 million is available to support design and environmental review, while $8.1 million will be used to complete environmental remediation of the purchased site. This legislation also creates a new project (Project ID 7125) and shifts $1 million of 2012 allocations within the 2012-2017 Adopted CIP, to begin design on associated transmission improvements.



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This legislation also removes a 2009 proviso on the South Lake Union network projects (Project ID 8404 and 8405), however City Light previously abandoned that appropriation authority and does not intend to work on these network projects in 2012. This proviso lift was included in this legislation because of the interdependence of the substation and the distribution network, and to clarify the legislative record through formal action. City Light will seek approval for future work on the distribution network in the context of the Six-Year Strategic Plan and subsequent 2013-2018 Proposed CIP. The continued development of the substation is the critical path for providing future network distribution service to South Lake Union.

| **Project Name:** | **Project I.D.:** | **Project Location:** | **Start Date:** | **End Date:** |
|---|---|---|---|---|
| North Downtown Substation Development | 7757 | South Lake Union Urban Center | 2007 | 2017 |
| North Downtown Substation Transmission Lines | 7125 | South Lake Union Urban Center | 2012 | 2020 |

Please check any of the following that apply:

_X_ **This legislation creates, funds, or anticipates a new CIP Project.**

____ **This legislation does not have any financial implications.**

_X_ **This legislation has financial implications.**

**Appropriations:**

| **Fund Name and Number** | **Department** | **Budget Control Level*** | **Existing 2012 Appropriation** | **New 2012 Appropriation (if any)** | **2013 Anticipated Appropriation** |
|---|---|---|---|---|---|
| City Light Fund (41000) | City Light | SCL360 | 16,714,000 (Project 7757) | 0 | TBD |
| | | | 1,000,000 (Project 7125) | 0 | TBD |
| **TOTAL** | | | **17,714,000** | **0** | **TBD** |

Appropriations Notes:
This legislation will remove the spending provisos enacted by Ordinance 122863 (and amended by Ordinance 123078) on 2009 appropriations that have carried forward to 2012. There is $16,714,000 of existing appropriations available for the North Downtown Substation project (Project ID 7757). No new appropriations are needed for 2012. If approved in the Strategic Plan, future year appropriations for this project will be included in the 2013-2018 Proposed CIP reflecting revised cost estimates based on the preliminary design work.



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The legislation also shifts $1 million of project allocations between CIP projects within the Transmission and Distribution – CIP BCL, in order to fund the North Downtown Substation Transmission Lines (Project ID 7125). These resources are available due to reduced project spending on the Substation Breaker Replacements and Reliability Additions (Project ID 7779).

**Spending Plan and Future Appropriations for Capital Projects (in $1,000's):**

| Spending Plan and Budget | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|
| ***Project 7757*** | | | | | | | |
| Spending Plan | 10,928 | 392 | 1,157 | 4,237 | | | **16,714** |
| Current Year Appropriations | 10,928 | 392 | 1,157 | 4,237 | | | **16,714** |
| Future Appropriations | | TBD | TBD | TBD | TBD | TBD | **TBD** |
| ***Project 7125*** | | | | | | | |
| Spending Plan | 1,000 | | | | | | **1,000** |
| Current Year Appropriations | 1,000 | | | | | | **1,000** |
| Future Appropriations | | TBD | TBD | TBD | TBD | TBD | **TBD** |

Spending Plan and Budget Notes:
Of the planned spending in 2012, $8,093,000 is estimated to be spent to complete environmental site remediation of the property that was purchased in 2009.

There are no new appropriations proposed in this legislation and the spending plan portrays existing appropriations only. This legislation will enable City Light to proceed with preliminary engineering and project cost evaluation that will allow SCL to develop the detailed spending plan for the future years. If approved in the Strategic Plan, this information will be used to develop the 2013-2018 Proposed CIP with updated spending plans.

**Funding Source:**

| Funding Source (Fund Name and Number, if applicable) | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| **TOTAL** | | | | | | | |

Funding Source Notes:
N/A



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**Bond Financing Required:**

| Type | Amount | Assumed Interest Rate | Term | Timing | Expected Annual Debt Service/Payment |
|---|---|---|---|---|---|
| | | | | | |
| TOTAL | | | | | |

Bond Notes:
N/A

**Uses and Sources for Operation and Maintenance Costs for the Project:**

| O&M | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|
| **Uses** | | | | | | | |
| Start Up | | | | | | | |
| On-going | | | | | | | |
| **Sources (itemize)** | | | | | | | |

Operation and Maintenance Notes:
N/A

**Periodic Major Maintenance Costs for the Project:**

| Major Maintenance Item | Frequency | Cost | Likely Funding Source |
|---|---|---|---|
| | | | |
| TOTAL | | | |

**Funding sources for replacement of project:**
N/A

**Total Regular Positions Created, Modified, or Abrogated through this Legislation, Including FTE Impact:**

| Position Title and Department* | Position # for Existing Positions | Fund Name & # | PT/FT | 2012 Positions | 2012 FTE | 2013 Positions ** | 2013 FTE ** |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| TOTAL | | | | | | | |

Position Notes:
There are no new positions created by this legislation.

**Do positions sunset in the future?**
No positions created.



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**Other Implications:**

a) **Does the legislation have indirect financial implications, or long-term implications?**
Yes, this legislation will allow City Light to proceed with the SEPA/EIS review process and develop Design/Build contract specifications for the substation project. These preliminary design activities are necessary to develop full cost estimates and prepare supportive documentation for the substation and distribution network projects to be included in the 2013-2018 Proposed CIP.

b) **What is the financial cost of not implementing the legislation?**
There is no immediate cost however not implementing the legislation will cause delays to the preliminary design schedule and will not allow the department to provide the necessary preliminary design and technical analysis necessary to justify the project in the 2013-2018 Proposed CIP.

c) **Does this legislation affect any departments besides the originating department?**
No

d) **What are the possible alternatives to the legislation that could achieve the same or similar objectives?**
None

e) **Is a public hearing required for this legislation?**
No

f) **Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation?**
No

g) **Does this legislation affect a piece of property?**
Yes, City Light purchased property for the North Downtown Substation in 2009 (under the authority of Ordinance 122537) and is currently completing environmental remediation of the site. The proposed legislation allows City Light to proceed with preliminary engineering and EIS/SEPA review of a new substation on this property.

h) **Other Issues:**
None

**List attachments to the fiscal note below:**
SCL NODO Substation, Attachment 1 Short Justification
SCL NODO Substation, Attachment 2 Network Rate Policy
SCL NODO Substation, Attachment 3 Quanta Executive Summary
SCL NODO Substation, Attachment 4 Site Map



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Uzma Siddiqi
SCL NODO Substation ATT 1
December 13, 2011
Version #1

# Seattle City Light's 2011 Plan to Serve Customers in the City Center
## *(South Lake Union, Denny Triangle, Uptown, and First Hill Urban Centers)*
**December 13, 2011**

Through its development and economic policies over the past decade, the City of Seattle has succeeded in making the City's center into the region's most competitive location for high-tech and bio-tech research and manufacturing, other high-tech research and manufacturing, and other innovative entrepreneurial high-tech industries (Resolutions 30542, 30610, 30635, Ordinance 121359). The urban centers that make up the North Downtown area (the South Lake Union Urban Center, the Denny Triangle area of the Downtown Urban Center, the Uptown Urban Center, and the First Hill Urban Center, collectively the "North Downtown area" or the "NODO area") have accepted most of this development activity to date. The *Seattle Times* recently published a block-by-block review of the growth and transformation that has occurred in the SLU Urban Center as an example. Including built and anticipated development from 2000 to 2010, the report identified 4.2 million square feet of new commercial space, 377,000 square feet of new retail space, and 2,369 new residential units (see Figure 1 below).

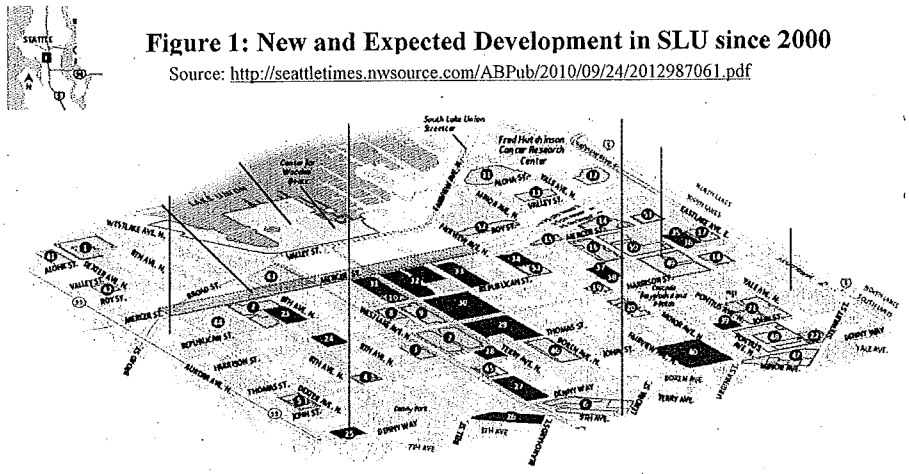


**Figure 1: New and Expected Development in SLU since 2000**
Source: http://seattletimes.nwsource.com/ABPub/2010/09/24/2012987061.pdf

As part of its long term strategy and in light of this growth, City Light proposes a network distribution system for SLU to meet the changing electric service needs in the neighborhood. This network proposal would meet the increased reliability demands of the high-tech and bio-tech industries, while also addressing the physical constraints of providing service in a dense urban environment. This solution also provides more system-wide flexibility for integrating radial distribution to accommodate planned and unplanned outages. A summary of these issues and City Light's recommended course of action is provided below.

### Customer Reliability Needs

In designating SLU as an Urban Center and articulating the neighborhood's role as a part of the regional center for the high-tech and bio-tech, the City explicitly acknowledged the emerging energy needs of these industries. Policy SLU-P43 of the Comprehensive Plan seeks to "provide for a stable and reliable supply of electrical power to South Lake Union, which has facilities with unique load and service requirements, such as high-technology and biotechnology research laboratories."

Because of their reliance on electronics and electronic communications, these high-tech and bio-tech facilities are extremely sensitive to outages and any disruptions in electric service. A network would provide multiple, redundant paths to serve these customers and provide for maximum reliability in the SLU distribution system. Many of City Light's customers in SLU have signaled a willingness to pay for network service to meet their business requirements.



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**Challenges to Serve Urban Density**

The rapid growth and build-out of SLU has also limited available space for electric infrastructure in the adjoining right-of-way. Like most other parts of City Light's service area, SLU is currently served by a high voltage 26kV looped-radial distribution system, with overhead wires installed on poles in the sidewalks. The overhead lines are required to maintain a 10 foot clearance from any adjoining structure. This air space (the shaded area in Figure 2) is an integral part of the radial distribution system design and provides physical separation to avoid accidental contact with live wires.

The increased urban density in SLU has resulted in larger buildings with zero setbacks from the property line. With zero setbacks, these overhead lines must either be moved to maintain the required clearance (if the sidewalk is wide enough) or must be relocated underground. In contrast to the overhead radial system, an underground radial system requires bulkier and more expensive equipment, including large high-voltage switches used to connect customers and transfer customer loads in case of feeder outages.

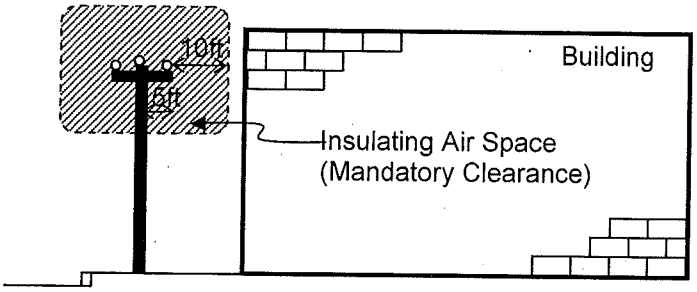


**Figure 2: Required Clearance for Overhead System**

These underground switches are 9 feet long and require a 10 ft x 10 ft x 10 ft concrete vault in the sidewalk. In high density areas like SLU, one large switch vault would be required every one or two city blocks, making the standard SCL radial distribution system untenable. A network system avoids the need for these large high-voltage switches and requires less physical space in the right-of-way.

**Recommendation and Need for a North Downtown Substation**

To meet customer needs and provide electrical service within the limited right-of-way, City Light's engineering staff recommends an underground network distribution system to serve the SLU Urban Center. City Light practice is to serve areas with high electrical load densities with a network distribution system. Developing a network in SLU will require a new substation. Although City Light's existing substations have some 26 kV looped-radial capacity to handle future load, there is no available capacity at the 13 kV network substations to serve a SLU network.

In addition to serving SLU, a new substation provides additional 13 kV and future 26 kV capacity and will also dramatically improve system operational flexibility for the downtown and First Hill networks. With the substations feeding the downtown network areas nearing their rating limit, SCL will be able to move load, as needed, to the new substation from the Denny Triangle neighborhood and other downtown areas. The new substation will also be able to provide future dedicated underground network feeders to First Hill, improving service and reliability to network standards. First Hill currently relies on a hybrid radial/network system with both overhead and underground feeders from the East Pine substation, which results in some challenging operational constraints.

In summary, City Light recommends a new underground network distribution system in the SLU neighborhood supported by a new North Downtown substation to:



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- Provide safe and more reliable power to high-tech and bio-tech customers in SLU.
- Continue to support the City's vision and development goals for the SLU Urban Center.
- Construct a viable electrical system to meet the expected customer load growth in SLU.
- Increase system-wide flexibility, allowing SCL more load serving options and increasing system operational choices throughout downtown and the adjoining service area.



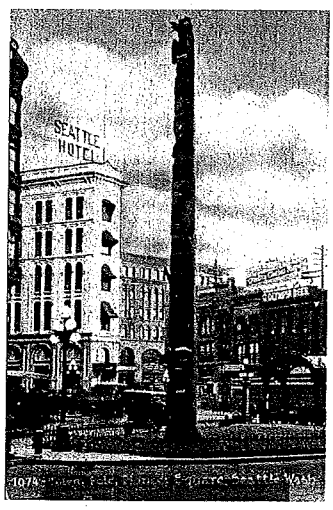
CITY CLERK

Michael L. Clark, PMP
SCL NODO Substation ATT 2
December 13, 2011
Version #1

# City Light Network Rate Policy
**December 2011**

## History of Network Infrastructure

City Light first began developing network service in the 1920s to meet the needs of Seattle's densely developed Downtown. The large electricity loads required by Downtown customers were overstressing that period's overhead radial distribution system and causing power outages. To solve this problem, City Light began serving Downtown buildings from multiple feeders and developed City Light's first network distribution system.

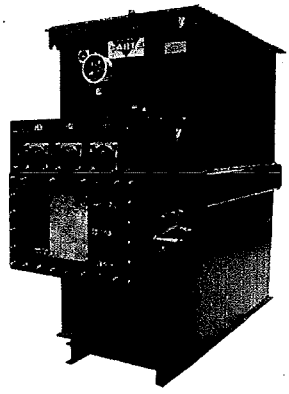



At the time, this investment in a network simply provided a level of reliability for Downtown (where the largest consumers of electricity were located) that was comparable to service for the rest of City Light's customers served by the radial system. The higher cost of network improvements were viewed as part of the overall system cost of providing service and were included in the general rate base. The network was viewed as being necessary to provide a comparable level of service to all customers, not as premium service to Downtown.

In the 1950s and 1960s, additional development density was anticipated in the University District and First Hill neighborhood. City Light believed that network service would be the most cost-effective way to provide reliable service for the large customers that were expected to locate to these areas and built network infrastructure in anticipation. While First Hill experienced the expected build-out of larger customers such as medical facilities, the University District did not see the same level of development.

## Evolution of Network Distribution Systems and Network Rates

It was not until later improvements in technology that network service became viewed as providing enhanced service and reliability over the more common looped-radial service. In 1999, the Council created a separate network rate (Ordinance 119747) to recognize the benefits of higher redundancy and reliability to medium and large general service customers fed by the network distribution system in Downtown. Higher installation and maintenance costs for this area were a direct result of the operation and design of the network system. The new network rates were not applied to First Hill or the University District.



Given the age of the Downtown network, the original construction costs had already been recovered over time through the general rate base. The new network rates were phased in over time, so that by 2007, the full on-going costs of operating and maintaining the Downtown network were recovered through the network rates. The



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original construction costs of the University District and First Hill networks have also already been fully recovered; however, their on-going operation and maintenance costs are still part of the general rate base and they pay non-network rates.

**Proposal for a New Area with Network Distribution System**
Recent development in the South Lake Union Urban Center has prompted City Light to propose building a new network to serve the area. High-tech and bio-tech customers in South Lake Union have signaled a willingness to pay network rates for network service. As part of budget deliberations on this issue in 2009, Council asked for clarification of policy on network rates and how such rates would apply to all network systems in City Light's service area.

**Recommendations on Network Rate Policy**
City Light recognizes that modern network service provides a higher level of reliability over looped-radial service and recommends moving all medium and large network customers to a single set of network rates (i.e., one rate schedule for medium network customers and one rate schedule for large network customers). However, no customers would pay network rates until they actually begin receiving network service (which means until they are energized as network service).

A single set of network rates is preferred over geographically individualized network rates for the following reasons:

- It allows network costs to be spread over the entire base of customers that receive a similar level of network service. This is analogous to City Light's radial system where the costs of investments in any specific neighborhood are shared across the entire rate base of radial customers.
- It spreads new costs among early recipients of network service and new network customers.
- It simplifies administration of rates and avoids creating multiple new rate classes.

Because of the proposal for a new network in South Lake Union and the history of investment in the First Hill and University Districts, City Light recommends moving to a single set of network rates over time to reflect the current state of each geographic network and anticipated improvements to standardize network service. City Light recommends that the network rates continue to apply to medium and large customers only. Actual rate proposals would come forward in the year when standardized network service is provided.

**Downtown** – Medium and Large customers are currently on the network rate.

**South Lake Union** – If Council approves development of a network in South Lake Union and the CIP budget is approved, City Light recommends connecting to that network all customers who submit network service applications and satisfy network connection requirements. Many high-tech and bio-tech companies have already developed their facilities in anticipation of network service. When sites with anticipated peak demand exceeding 500 kW are redeveloped within the network boundary,



2015 CITY CLERK

customers will be required to connect to the network. As customers are energized with network service, they will begin paying a network rate.

**First Hill** – First Hill customers are currently served by a hybrid radial/network system with both overhead and underground wires. The current system provides more reliability than looped radial, but has operational constraints and does not meet the same standard of network construction as the Downtown network. If a new North Downtown substation is built, City Light proposes to connect new future dedicated feeders from the new substation to First Hill, improving reliability to network standards. At that time, City Light would propose charging First Hill network customers a network rate.

**University District** – Within the University network area, the level of development activity and subsequent electrical load density has not reached the level that would require network service. However, the University of Washington is developing new campus plans for redeveloping the area which may require network service. The existing network infrastructure is relatively small (approximately 5x5 blocks). City Light proposes deferring decisions on the University District network until more is known of the University of Washington's plans for the area. In the interim, City Light will maintain the existing network infrastructure and customers in that area will continue to pay non-network rates.

**Future Network Areas** – The need for network service is driven by customer demand for a higher level of reliability and by competition for limited right-of-way in high density areas which constrain City Light's ability to maintain overhead and underground radial systems. City Light will consider future network areas as development warrants.



CITY CLERK

Quanta Technology, LLC
SCL NODO Substation ATT 3
October 26, 2011
Version #1

# Seattle City Light

# Load Serving Report

# Final (Executive Summary Excerpt)

**Prepared for**
**The City of Seattle**
**Seattle City Light Department (SCL)**

**Prepared by**
**Quanta Technology, LLC**
**4020 Westchase Boulevard, Suite 300**
**Raleigh, NC 27607**
**October 26, 2011**



CITY CLERK

# EXECUTIVE SUMMARY

Seattle City Light (SCL) is the municipal electric utility that serves the city of Seattle and surrounding communities. SCL is obligated to serve new and existing customers within its service territory. As a part of its Comprehensive Plan, the City of Seattle has designated certain areas to accommodate future population and job growth. As shown in Figure 1 below, the City of Seattle has designated areas in the North-Central parts of the city as Urban Centers, including South Lake Union (SLU), Denny Triangle, First Hill and University neighborhoods. These areas are undergoing rebuilding and redevelopment, especially the SLU neighborhood. To support the ongoing redevelopment activity, SCL needed to create an electric load serving plan for the North-Central Seattle area. Quanta Technology was engaged to develop the plan.

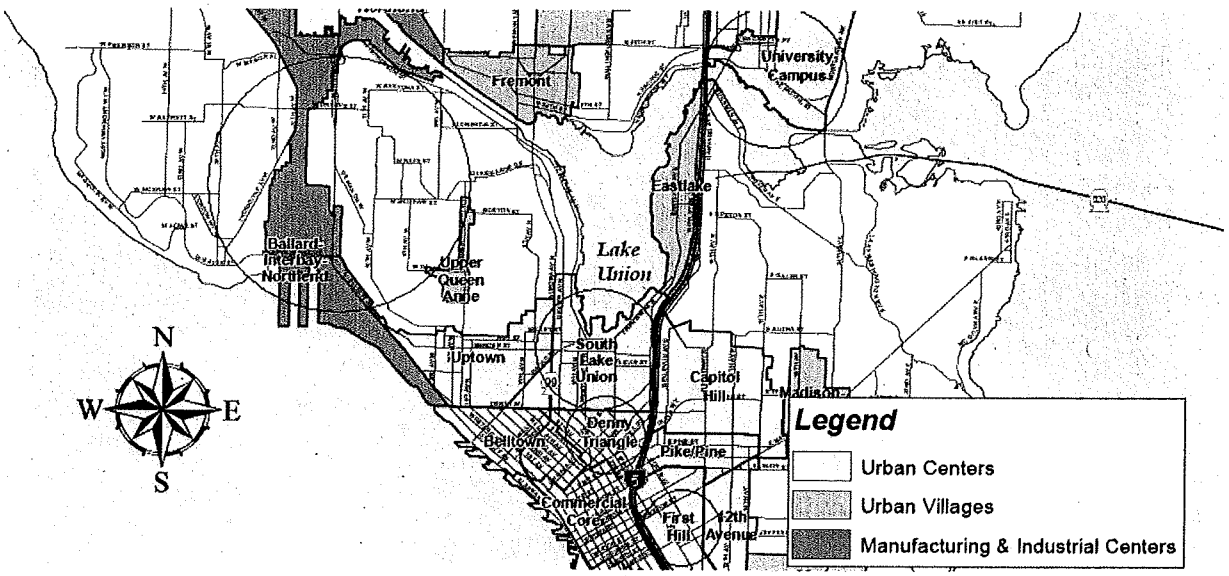


**Figure 1. Urban Centers and Urban Villages in North-Central Seattle**

Based upon the analysis described in the body and appendices of the report, Quanta Technology recommends that SCL construct a new substation in the area north of downtown Seattle ("NODO") and establish a 13 kV network distribution system from the new NODO Substation to serve the nearby high density areas, including SLU. This recommendation is based upon the following reasons:

- The NODO Substation with a 13 kV network is the best option available that will reliably and practically serve the forecast load in this area. This is because SCL's looped radial distribution voltage is 26 kV and requires very large vaults in the street and sidewalk areas for switches, resulting in difficult and expensive construction. The network design eliminates the need for these switch enclosures and will provide a much more reliable electric system for the area. This option is also consistent with SCL's method for serving high load density areas, such as downtown Seattle. The SLU forecasted load density will be approaching that of downtown Seattle and eight times the overall average load density of the SCL system.



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- The NODO Substation is the best option identified to provide added capacity for the network customers in the Denny Triangle neighborhood. The NODO Substation will also be able to provide back-up capacity for other sections of the downtown network system.
- The NODO Substation is the best option identified that allows SCL to provide long-term system flexibility for supporting operations and maintenance activities at critical, but aging, substations in the North-Central Seattle area.
- The NODO Substation is the best option identified that allows SCL to provide the network service requested by some of the customers in the SLU area.
- The NODO Substation will also:
    - Provide an excellent option for SCL to improve future electric service to the First Hill Network that provides electricity to many critical hospital loads, including Harborview Medical Center, Swedish Medical Center, and Virginia Mason Medical Center.
    - Align with the City of Seattle vision for high density residential, biotech, and high tech development in the SLU Urban Center.
    - Dramatically improve reliability for customers who convert to network service.
    - Provide the ability to increase revenues for SCL from customers who elect to convert to network service.
    - Improve the system operational efficiency.

This study shows that significant changes can be made to existing substations and feeders to provide adequate capacity within the 26 kV looped radial system to serve the SLU area loads. However, because this area is forecast to have a load that will result in a load density in SLU of 120 to 200 MW/sq. mile, underground construction for SCL's 26 kV distribution looped radial system is costly and difficult, reliability of electric system in this area does not meet utility goals and the biotech and other high tech customers are demanding a higher level of service reliability, it is recommended that a 13 kV spot network be installed to serve the new load in SLU. Also, it should be noted that some utilities consider areas with load densities of 40-90 MW/sq. mile[1] as candidates for a 13 kV network system.

Developing the NODO Substation and the associated distribution and transmission improvements in the 2017 timeframe will allow SCL to perform its construction as the neighborhood redevelops. SCL will be able to obtain space in the underground utility corridors for facilities. Delaying construction of NODO until after the area is fully developed will increase costs and construction complexity. Later construction will also be more disruptive to the neighborhood.

The analysis which Quanta Technology used to develop this recommendation included several steps. The first step was to develop an SCL system-wide load forecast. The analysis resulted in a forecasted average load increase of 0.6% per year. This annual forecast was in turn allocated to substations and in turn to the individual feeders. Neighborhood forecasts were then developed using these feeder loads. Special attention was given to five neighborhoods:

- First Hill
- South Lake Union

[1]Lee Willis, Senior Vice-President, Quanta Technology, personal email communication to Luther Dow, August 31, 2011.



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- Denny Triangle
- Interbay
- University

These areas in North-Central Seattle were studied to assess the future electric load because of the current growth being experienced there and future expected development. See Figure 1.

Quanta Technology also performed a system-wide review of SCL's reliability performance, as well as a review of the reliability of five neighborhoods identified by SCL staff. Of particular interest was the evaluation of the First Hill Network (FHNW). The FHNW has a history of excellent reliability; however, the reliability in this area is due to SCL engineering and operating personnel continuously monitoring the system and minimizing any unnecessary exposure. The FHNW has increased exposure to outages, as compared to all underground networks, because the network feeders are supplied from taps off of overhead looped radial feeders. In addition, the assets are approaching their expected end of life. These overhead feeders from East Pine Substation serve both looped radial and network customers. This is not a standard design at SCL or other utilities. It is used by other utilities on an exception basis. FHNW was identified for analysis by SCL based on the desire to maintain a high level of reliability.

Based on the technical analysis, the solution for the North-Central Seattle area needed to be centered in the area north of downtown Seattle. Quanta Technology developed four alternatives as recommended by the February 2010 E-3 report and as required by the Seattle City Council. The options to serve the loads in this area included:

- "Do nothing" option. Make no improvements to the SCL system.
- "Transfer Load" option. Shift loads to neighboring substations, but not providing network service to customers or system flexibility.
- "Strengthen Broad Street Substation" option. A fourth 115/26 kV transformer was studied, providing substation capacity, but with limited ability to transfer the power from the substation to customers. Also it does not provide network service to customers or greater system flexibility as would building a new substation.
- "New substation" option.

Based on the benefits and risks of the studied options, Quanta Technology recommends that SCL build a NODO Substation with network distribution to serve these high density load areas. See Figure 2. The solution includes the following:

- Substation with two 90 MVA 115/13 kV transformers.
- Transmission supply consisting of three 115 kV lines. Two supplies would be the result of looping the existing East Pine-Broad Street Substation line in and out of NODO. The third supply would be a new line from the Massachusetts Street Substation.
- Distribution system initially supplied by six feeders serving customers from spot-networks.

An economic evaluation was performed for each of the options considered. The estimated total construction cash outflow to construct the substation, transmission and six network feeders in the 2017 timeframe is $173.2M, with a present value of those costs equal to $128.5M. The substation property was



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purchased in 2009 for approximately $44M and environmental soil remediation is currently underway. Neither of these costs is reflected in the Quanta Technology estimates.

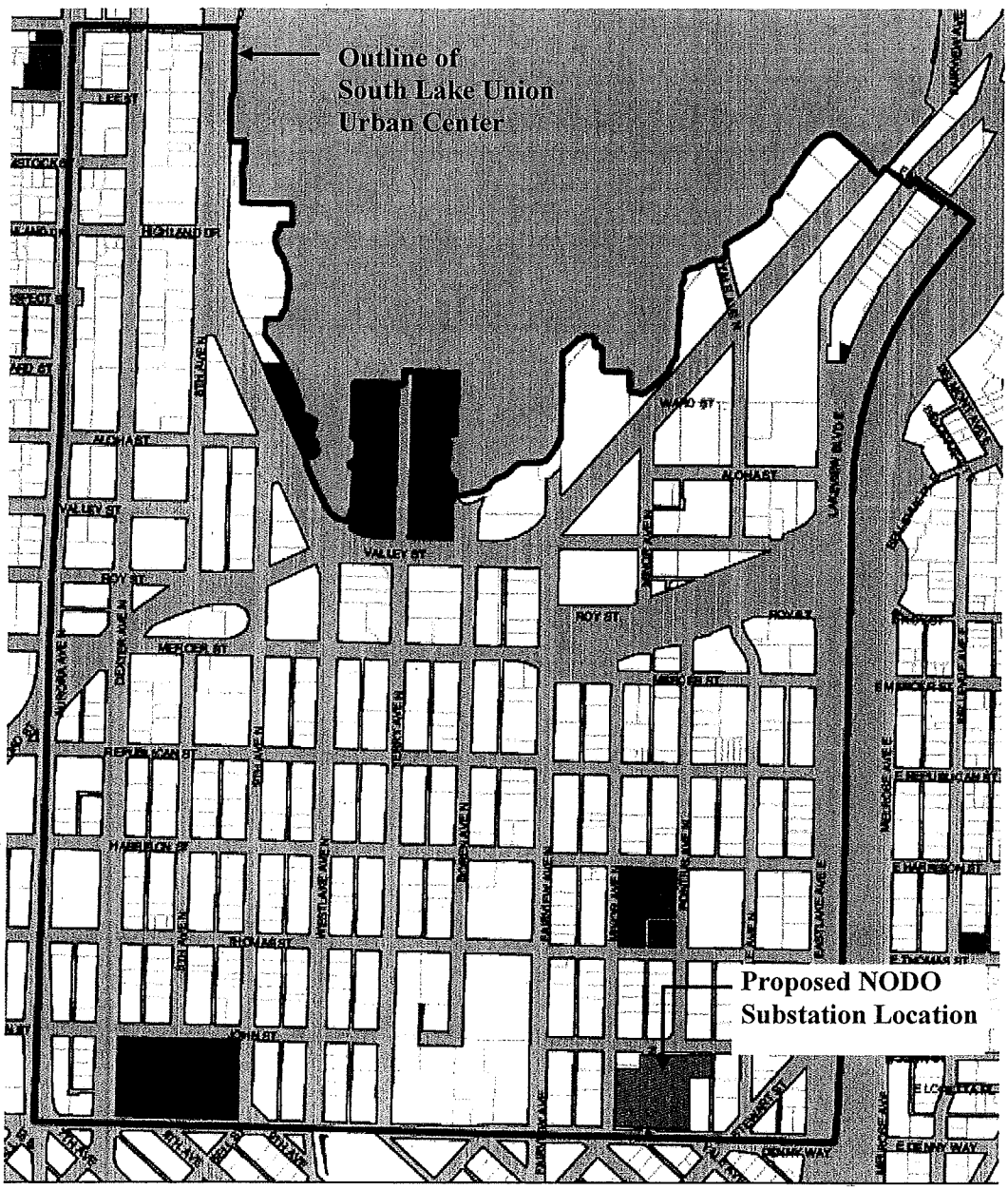


**Figure 2. Outline of South Lake Union Urban Center and Location of Proposed Substation**



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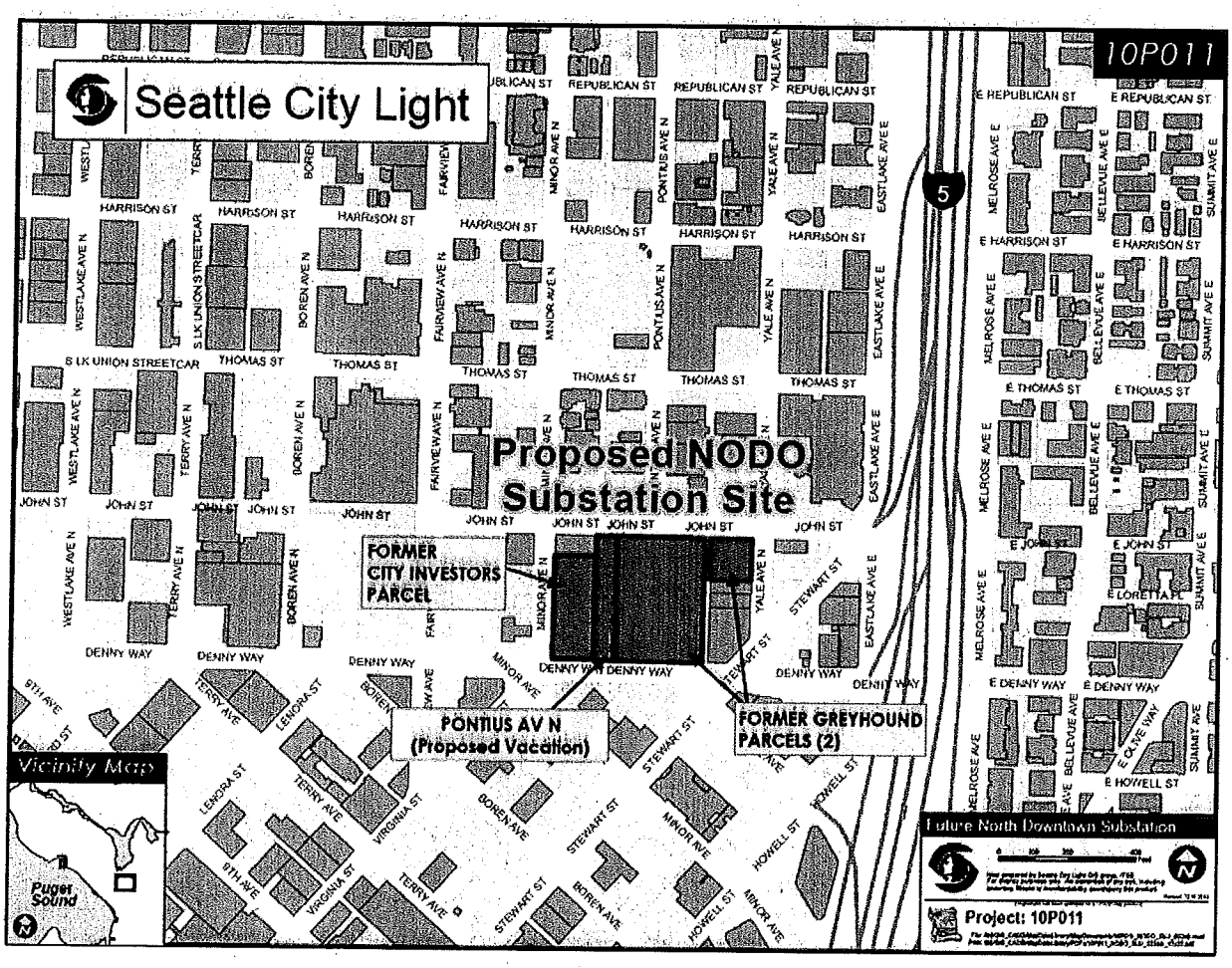
Michael L. Clark, PMP
SCL NODO Substation ATT 4
December 13, 2011
Version #1








2011 CITY CLERK

**City of Seattle**
Office of the Mayor

January 17, 2012

Honorable Sally J. Clark
President
Seattle City Council
City Hall, 2nd Floor

Dear Council President Clark:

I am pleased to transmit the attached proposed Council Ordinance to remove spending restrictions on the North Downtown Substation and associated projects. These spending limits were imposed by provisos SCL GS 3-1-A-1 and SCL GS 4-1-A-1 in the 2009 Budget. The provisos requested additional information to document the need for the substation and explain City Light's network rate structure, which are provided as attachments to the Fiscal Note.

In early 2011, City Light engaged Quanta Technology to supplement City Light's own engineering studies and assist with analysis of the load service needs for the urban centers in the North-Central area of Seattle. This work concluded that a network distribution system, supported by a new North Downtown substation, would provide the most viable, safe, reliable, and cost effective means to meet emerging load in the North Downtown area. A new substation would also provide needed capacity and flexibility to manage load growth in other nearby urban centers and would be City Light's first new substation investment in nearly 30 years.

Developing a substation requires significant lead time. This legislation will allow City Light to continue with design activities, with existing resources, on a schedule to provide network service to the North Downtown area by late 2016. City Light will seek approval for construction of the North Downtown substation and network distribution system as part of the Utility's Six-Year Strategic Plan. If approved in the Strategic Plan, City Light will include full design and construction funding in the 2013-2018 Proposed CIP.

Thank you for your consideration of this legislation. Should you have questions, please contact Michael Clark at 206-233-3776.

Sincerely,

Michael McGinn
Mayor of Seattle

cc: Honorable Members of the Seattle City Council

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