



City of Bellevue Transportation Department
Neighborhood Services, Traffic Management Division

P.O. Box 90012
Bellevue, WA 98009-9012

July 1, 2010

To: City of Bellevue
Planning and Community Development Department

From: Kam Szabo/Vangie Garcia
City of Bellevue
Transportation Department

RE: **SE 7th PI Streetlights Design Memorandum**

Project Description

This design memorandum presents the design basis for the SE 7th Place Streetlights project. The SE 7th Place Streetlights project limits are from Lake Hills Connector to the 12600 block, where the residential area begins. This project proposes to install 10 light-emitting diode (LED) streetlights and poles in total – 9 along SE 7th Place and 1 on the trail/path leading to the bus stop on Lake Hills Connector. Construction of the project would consist of trenching from the intersection of SE 7th Place and Lake Hills Connector and the installation of streetlight poles, foundations, junction boxes, and conduit for wiring.

This project was funded through the Neighborhood Enhancement Program (NEP) and is the highest priority project for the Wilburton neighborhood.

Site Description

SE 7th Place is one of the main entrances into the Wilburton neighborhood. The project is located in the southern half of Section 33, Township 25 North, Range 5 East. This roadway consists of a two lane roadway with asphalt shoulders ranging from 2 feet to 8 feet on each side. There is a 5-ft wide asphalt pathway on the south side of the street starting from Lake Hills Connector and approximately 600 feet in length. This roadway serves the adjacent Wilburton neighborhood as well as public transit and school transportation.



The project is within the Kelsey Creek Drainage Basin. There is a Wilburton stream tributary that crosses under SE 7th Place in a culvert, approximately 460 feet east of Lake Hills Connector. According to City Drainage maps, this tributary is not fish-bearing. The roadway exists between the Hyak Jr. High School Wetland and the Kelsey Creek Park Wetland.

Land Use Criteria

This project utilizes the best available construction, and design to result in the least impact on the critical area and critical area buffer in accordance with Part 20.30P.140 LUC. This project will meet the performance standards in LUC 20.25H.100 by directing proposed lighting away from the wetland and installing further screening with vegetation.

Design Selection Process

Various designs have been considered for the street lights along SE 7th place before the current design was selected as the best alternative. The main factors influencing the design decision were: light trespass into the wetland, wetland disturbance (and mitigation), energy consumption, ability to dim or turn off the light remotely, and aesthetical look with respect to the neighborhood and wetland. Below is a table outlining the various design alternatives and how they ‘scored’ against our main factors.

Description	Light Trespass	Wetland Disturbance	Energy Consumption	Light Control	Aesthetical Look
A - 250W Shoebox lights on 40ft tall square concrete poles , placed 10ft clear of traveled way	Large trespass behind each light and ‘extra’ light being cast beyond the road in the direction of the light	Large disturbance due to the poles being placed 10ft back, and because of weight factor of using concrete poles.	Approximately 6400 kWh/year = \$ 261/year	Not easily controlled without retrofitting ballast in each light.	Arterial style street lighting, not in sync with the wetland or a ‘rural’ neighborhood setting.
B - 100W & 150W cobra heads lights on 30ft tall metal poles, placed 10ft clear of traveled way	Less trespass than shoebox lights, but still large trespass behind each light	Large disturbance due to the poles being placed 10ft back.	More energy efficient than shoebox lights. Approximately 3600 kWh/year = \$ 147/year	Not easily controlled without retrofitting ballast in each light.	Similar to existing lights on PSE poles, but higher and brighter.
C - Cyclone LED street lights on 22ft metal poles, placed 10ft clear where possible, and within the road prism along the east end of the project	Less bright spots on the road (more uniform light) with slightly less trespass than cobrahead lights	Minimum disturbance because poles are being placed in the roadway prism or improved surfaces with break-away bases.	Approximately 2748 kWh/year = \$ 112/year	Not currently dimmable without a new driver in each light (custom from the manufacturer)	Shorter poles with smaller/less intense lights for the rural setting.
D - Leotek LED Street lights on 23ft metal poles, placed 10ft clear where possible, and within the	Excellent light control (almost no trespass off the road)	Minimum disturbance because poles are being placed in the roadway prism or improved surfaces	Approximately 1956 kWh/year = \$ 80/ year	Not currently dimmable. First generation of dimming will be in pre-set	Shorter poles with smaller/less intense lights for the rural setting.

road prism along the east end of the project		with break-away bases.		steps, not a full range.	
E - Philips Lumec LED Street lights on 30ft metal poles, placed 10ft clear where possible, and within the road prism along the east end of the project	Excellent light control on street, small amount of light trespass behind the light which is being mitigated by plantings. Includes the option to use 'controls' on the lights to dim or turn them off during the night.	Minimum disturbance because poles are being placed in the roadway prism or improved surfaces with break-away bases.	Approximately 3000 kWh/year = \$ 122/ year	Dimmable driver included with pre-programmed night time dimming feature.	Medium poles with fixtures that are flat, but slightly less 'rural'

The Philips Lumec LED Street lights (Option E) was selected to be the best option for this project. Once the design was agreed upon, the geotechnical findings were reviewed and foundations were designed to minimize impacts. Because of the soil conditions, either a spread-footing foundation or a deep foundation was necessary. The deep foundations were chosen to minimize the impacts to existing wetland vegetation.

Minimum Impacts to Critical Area

The SE 7th Place Streetlights Project will be installed within the improved roadway prism or within already improved areas along the roadway. The lights will be on during hours of darkness. The LED fixtures being proposed for this project cause little light trespass on the wetland and will help illuminate pedestrians walking along the paved shoulder of SE 7th Place. Although situated within the vicinity of a wetland, there is no technically feasible alternative with less impact on the wetland.

The bases will be designed with the least square footage to minimize impacts to the adjacent land. The poles will be designed to be break away due to some lights being located within the clear zone of the travelled roadway.

Restoration/Mitigation Plan

The project shall mitigate the disturbance area within the wetland by restoring the square footage of impacted area with plants from Template C2 of the Critical Areas Handbook. The amount of disturbance is approximately 1,650 SF and the mitigation square footage is 4,063 SF. See attached plans for detail.

CITY OF BELLEVUE TRANSPORTATION DEPARTMENT



SE 7TH PLACE STREET LIGHTING

CITY MANAGER

STEVEN R. SARKOZY

MAYOR

DON DAVIDSON

DIRECTOR OF TRANSPORTATION

GORAN SPARRMAN

CITY COUNCIL

CLAUDIA BALDUCCI

JOHN CHELMINIAK

GRANT DEGGINGER

CONRAD LEE

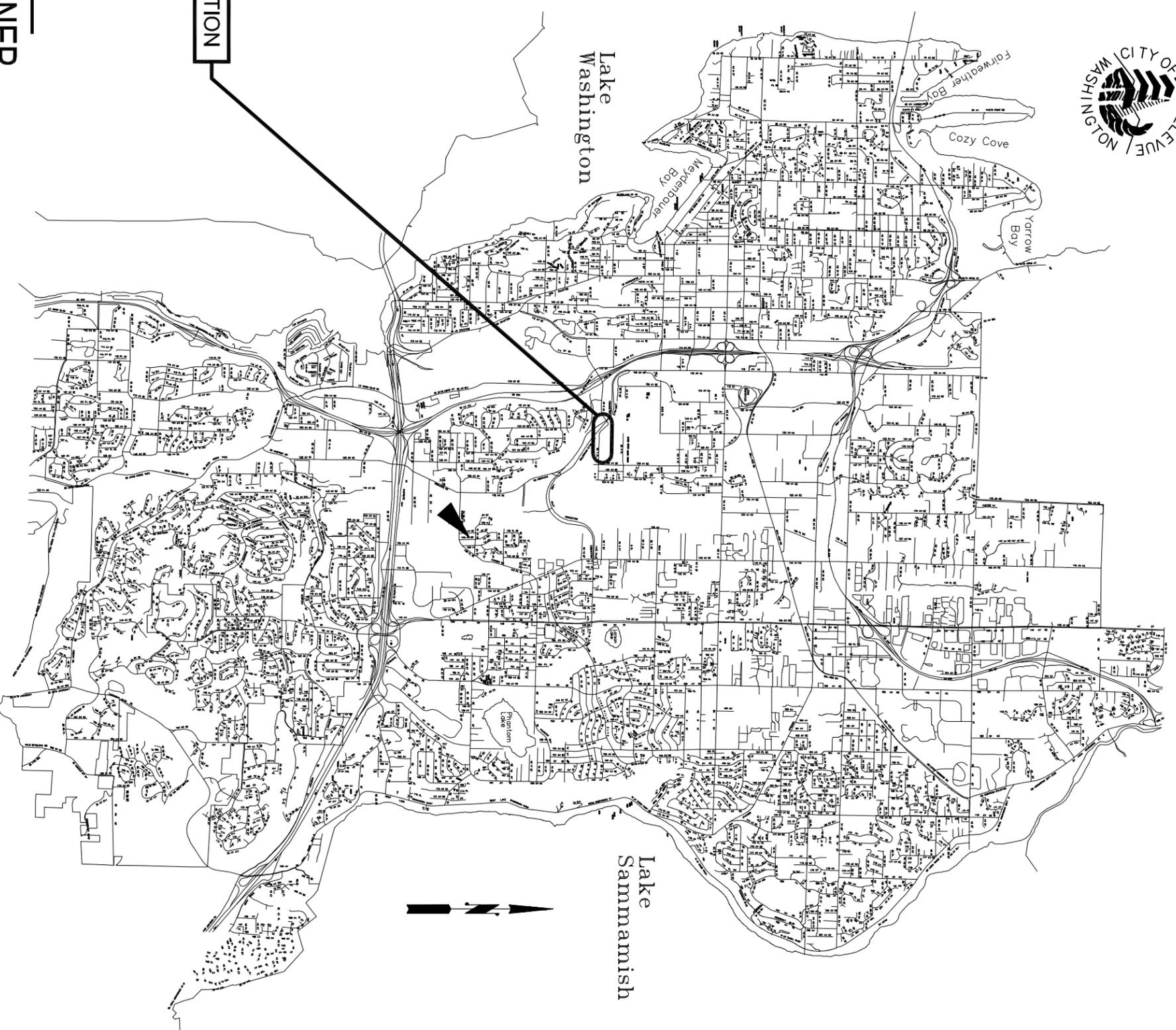
JENNIFER ROBERTSON

KEVIN WALLACE

SCHEDULE OF DRAWINGS

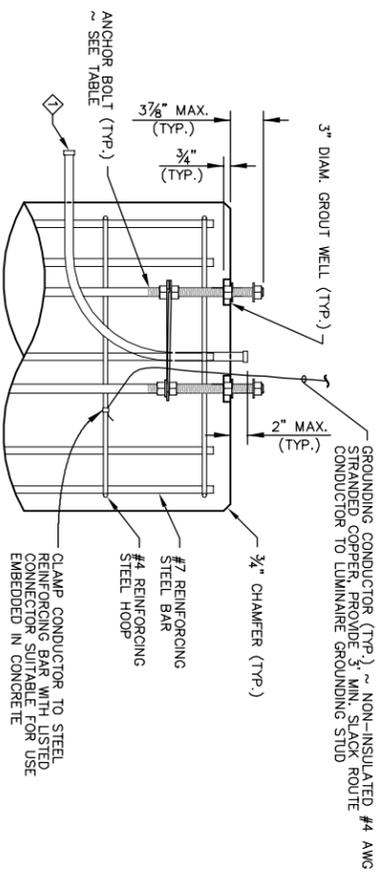
- | NO. | TITLE |
|-----|--------------------|
| 1 | COVER SHEET |
| 2 | ILLUMINATION PLAN |
| 3 | FOUNDATION DETAILS |

PROJECT LOCATION



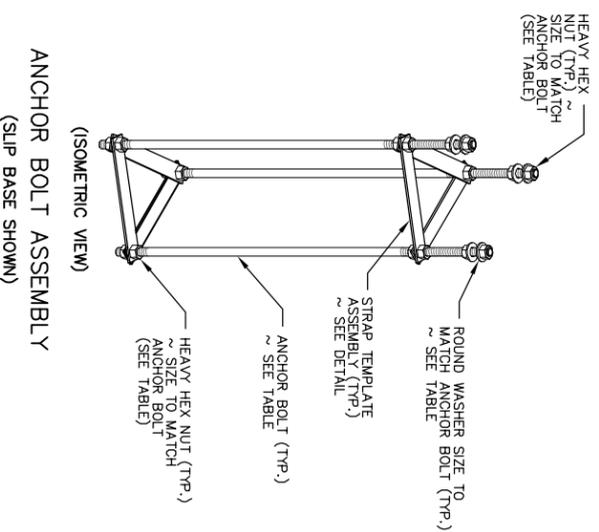
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C.I.P. NO. PW-NEP

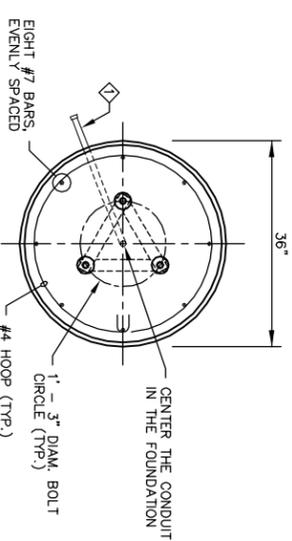
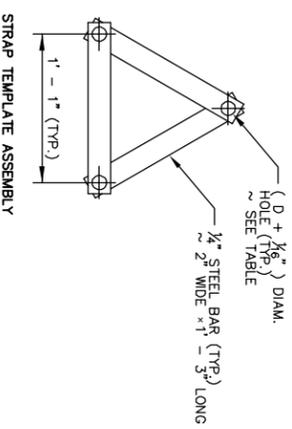


PARTIAL ELEVATION VIEW
SLIP BASE

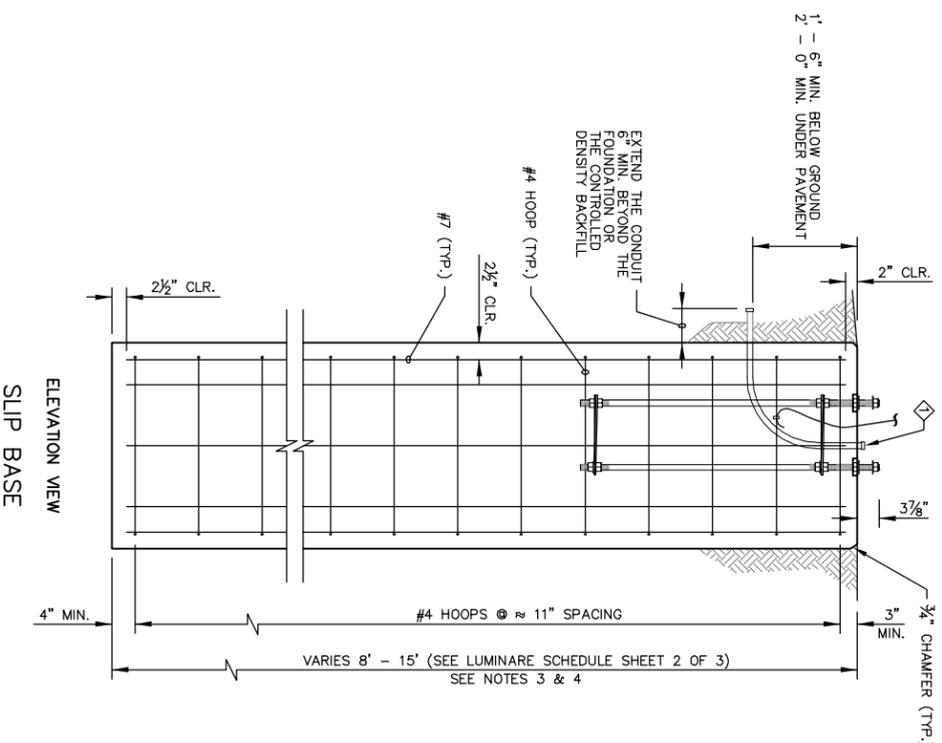
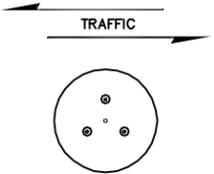
1" DIAM. CONDUIT ~ CAP EACH END FOR ADDITIONAL SIGNAL CABLE WHERE SHOWN IN THE CONTRACT.



ANCHOR BOLT ASSEMBLY
(SLIP BASE SHOWN)



TOP VIEW
SLIP BASE



ELEVATION VIEW
SLIP BASE

GENERAL NOTES

- SEE STANDARD PLAN J-28.40 FOR LUMINAIRE POLE BASE MOUNTING DETAILS.
- THE STRAP TEMPLATES SHALL BE HELD IN PLACE BY NUTS, 6" FROM THE TOP OF THE FOUNDATION AND 3" FROM THE BOTTOM OF THE ANCHOR BOLTS. 8 HEAVY DUTY NUTS AND 8 ROUND WASHERS ARE REQUIRED FOR A SLIP BASE ASSEMBLY. 18 HEAVY DUTY HEX NUTS AND 8 FLAT WASHERS ARE REQUIRED FOR A FIXED BASE ASSEMBLY.
- USE STEEL LIGHT STANDARD FOUNDATION TYPE A ON LEVEL GROUND OR SLOPES NOT EXCEEDING 4H:1V. USE TYPE B FOR SLOPES STEEPER THAN 4H:1V, BUT NOT EXCEEDING 2H:1V. SLOPES STEEPER THAN 2H:1V SHALL REQUIRE A SPECIAL DESIGN.
- THESE FOUNDATIONS ARE DESIGNED FOR A MINIMUM OF 2,000 PSF (TYPE A) OR 1,500 PSF (TYPE B) ALLOWABLE LATERAL BEARING PRESSURE FOR THE SOIL. A SPECIAL FOUNDATION SHALL BE REQUIRED FOR SOIL WITH LOWER ALLOWABLE LATERAL BEARING PRESSURE THAN 1,500 PSF.
- THE LUMINAIRE POLE HEIGHT SHALL NOT EXCEED 50' (H1).
- SLIP BASES SHALL NOT BE INSTALLED ON 50' (H1) POLES WITH DOUBLE MAST ARMS, NOR ON POLES WEIGHING MORE THAN 1000 LBS.
- SLIP BASES ARE NOT REQUIRED ON POLES PLACED OUTSIDE OF THE DESIGN CLEAR ZONE, NOR ON POLES INSTALLED BEHIND TRAFFIC BARRIER.
- FOUNDATIONS CONSTRUCTED WITHIN ECOLOGY EMBANKMENTS SHALL BE INCREASED IN DEPTH BY THE DEPTH OF THE ECOLOGY EMBANKMENT.
- EXPOSED PORTIONS OF THE FOUNDATION SHALL BE FORMED TO CREATE A CLASS 2 SURFACE FINISH. ALL FORMING SHALL BE REMOVED UPON COMPLETION OF FOUNDATION CONSTRUCTION.
- FOR EXCAVATION, CONCRETE PLACEMENT, AND BACKFILL OPTIONS, SEE METHOD 1 AND METHOD 2 ON SHEET 2 OF 2.
- THE ANCHOR BOLTS SHALL BE HIGH STRENGTH STEEL, MANUFACTURED FROM ASTM A449, WITH HEAVY HEX NUTS AND HARDENED WASHERS. GALVANIZE THE ANCHOR BOLTS ACCORDING TO AASHTO M292.
- THE FOUNDATION SHALL BE GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF STANDARD SPECIFICATION SECT. 8-20.3(4).
- SEE STANDARD PLAN C-8B AND C-14H FOR STEEL LIGHT STANDARDS ON TRAFFIC BARRIER.

ANCHOR BOLT TABLE

LUMINAIRE HEIGHT (H1)	MAST ARM TYPE	MAST ARM LENGTH	ANCHOR BOLT DIAMETER "D"
20' TO 50'	SINGLE	6' TO 16'	1"
20' TO 50'	DOUBLE	6' TO 8'	1"
20' TO 45'	DOUBLE	10' TO 16'	1"
46' TO 50'	DOUBLE	10' TO 16'	1 1/8"

NO.	DATE	BY	APPR.	REVISIONS

Approved By		ENGINEERING MANAGER	DATE
PROJECT MANAGER	DATE	DESIGNED BY	DATE
		DRAWN BY	DATE
		CHECKED BY	DATE

City of Bellevue

 TRANSPORTATION DEPARTMENT

PROFESSIONAL ENGINEER

SE 7th Place

WIRE SCHEDULE		
#	RACEWAY / CONDUIT SIZE	COMMENTS
1	EX 2"	2-#8 (ILL)
2	2"	2-#8 (ILL)

WIRE NOTES:
 1. ALL PVC CONDUITS CONTAINING CONDUCTORS SHALL INCLUDE GROUND WIRE. GROUND WIRE SIZE SHALL MATCH THE LARGEST CONDUCTOR (MIN #8 AWG OR AS NOTED OTHERWISE IN THE WIRE SCHEDULE).

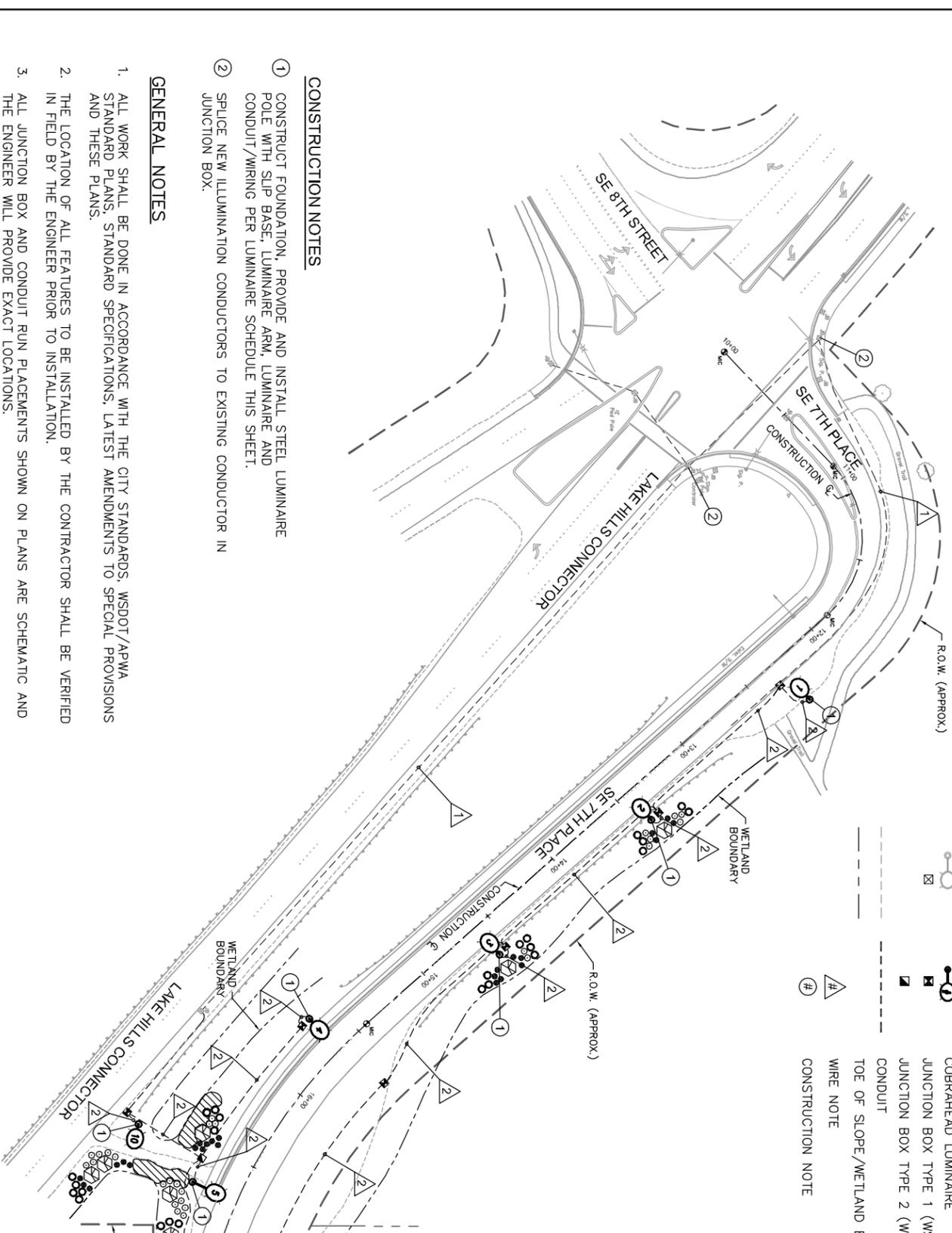


SCALE: 1" = 40'

SYMBOL	DESCRIPTION
	EXISTING COBRAHEAD LUMINAIRE
	NEW JUNCTION BOX TYPE 1 (WSDOT STD PLAN J-110)
	JUNCTION BOX TYPE 2 (WSDOT STD PLAN J-110)
	WETLAND BOUNDARY
	R.O.W. (APPROX.)
	CONSTRUCTION NOTE

LUMINAIRE #	STATION	OFFSET	LUMINAIRE TYPE	ARM	MOUNTING HEIGHT	BASE	CIRCUIT BREAKER	FOUNDATION TYPE	POLE LABEL
1	12+27.80	29.70' LT	Philips GPLS-40W-30LED4K	8'	30'	SLIP	N/A	15' DEEP SET @ LKHLBD02	
2	13+42.50	21.00' LT	Philips GPLS-40W-30LED4K	4'	30'	SLIP	N/A	8' DEEP SET @ LKHLBD04	
3	14+59.80	21.00' LT	Philips GPLS-40W-30LED4K	4'	30'	SLIP	N/A	8' DEEP SET @ LKHLBD06	
4	15+64.80	24.90' RT	Philips GPLS-40W-30LED4K	4'	30'	SLIP	N/A	15' DEEP SET @ LKHLBD01	
5	16+72.00	27.90' RT	Philips GPLS-40W-30LED4K	8'	30'	SLIP	N/A	15' DEEP SET @ LKHLBD05	
6	17+90.00	29.50' RT	Philips GPLS-40W-30LED4K	8'	30'	SLIP	N/A	12' DEEP SET @ LKHLBD08	
7	19+13.00	9.00' RT	Philips GPLS-40W-30LED4K	4'	30'	SLIP	N/A	15' DEEP SET @ LKHLBD07	
8	20+36.80	9.00' RT	Philips GPLS-40W-30LED4K	4'	30'	SLIP	N/A	15' DEEP SET @ LKHLBD09	
9	21+62.50	9.00' RT	Philips GPLS-40W-30LED4K	4'	30'	SLIP	N/A	15' DEEP SET @ LKHLBD11	
10	16+57.50	70.40' RT	Philips GPLS-40W-30LED4K	4'	30'	SLIP	N/A	15' DEEP SET @ LKHLBD03	

(EXISTING SERVICE CONNECTION)



CONSTRUCTION NOTES

- CONSTRUCT FOUNDATION, PROVIDE AND INSTALL STEEL LUMINAIRE POLE WITH SLIP BASE, LUMINAIRE ARM, LUMINAIRE AND CONDUIT/WIRING PER LUMINAIRE SCHEDULE THIS SHEET.
- SPlice NEW ILLUMINATION CONDUCTORS TO EXISTING CONDUCTOR IN JUNCTION BOX.

GENERAL NOTES

- ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE CITY STANDARDS, WSDOT/APWA STANDARD PLANS, STANDARD SPECIFICATIONS, LATEST AMENDMENTS TO SPECIAL PROVISIONS AND THESE PLANS.
- THE LOCATION OF ALL FEATURES TO BE INSTALLED BY THE CONTRACTOR SHALL BE VERIFIED IN FIELD BY THE ENGINEER PRIOR TO INSTALLATION.
- ALL JUNCTION BOX AND CONDUIT RUN PLACEMENTS SHOWN ON PLANS ARE SCHEMATIC AND THE ENGINEER WILL PROVIDE EXACT LOCATIONS.
- TWO WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES.
- CALL ONE CALL, 1-800-424-5555, PRIOR TO CONSTRUCTION.
- ALL VEGETATION REMOVAL OR TRIMMING SHALL BE APPROVED BY THE ENGINEER.
- A TRAFFIC/PEDESTRIAN CONTROL PLAN MUST BE PROVIDED TO THE TRANSPORTATION DEPARTMENT FOR APPROVAL AT LEAST 10 DAYS PRIOR TO START OF WORK.
- RIGHT OF WAY WORK HOURS: THE HOURS FOR CONSTRUCTION ACTIVITY, LANE CLOSURES OR ACTIVITIES THAT IMPEDE OR MAY POTENTIALLY IMPEDE TRAFFIC SHALL BE MONDAY THROUGH FRIDAY, 7:00 AM TO 6:00 PM. THE HOURS FOR CONSTRUCTION ACTIVITY IN THE RIGHT OF WAY THAT DOES NOT IMPEDE TRAFFIC SHALL BE MONDAY THROUGH FRIDAY, 7:00 AM TO 6:00 PM. THE INSPECTOR ASSIGNED TO THIS PROJECT MAY CHANGE THESE WORK HOURS TO A MORE SUITABLE TIME FOLLOWING APPROVAL BY THE R.O.W. USE OFFICE.

PLANTING LEGEND

- FRAXINUS LATIFOLIA / OREGON ASH (9' O.C.)
- PHYSOCARPUS / CAPITATUS / PACIFIC NINEBARK (4' O.C.)
- ROSA NUT KANA / NOOTKA ROSE (4.5' O.C.)
- CORNUS SERICEA / RED-OSIER DOGWOOD (4' O.C.)
- ATHYRIUM FILIX-FEMINA / LADY FERN

NO.	DATE	BY	APPR.	REVISIONS

Approved By	DATE
ENGINEERING MANAGER	4/10
PROJECT MANAGER	4/10

DESIGNED BY	DATE
K.S. DJR	4/10
DRAWN BY	DATE
CHECKED BY	DATE

City of Bellevue
TRANSPORTATION DEPARTMENT

STATE OF WASHINGTON
PROFESSIONAL ENGINEER
NO. 48714
K. S. DJR

SE 7th Place

ILLUMINATION PLAN	SHT <u>2</u> OF <u>3</u>
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