



OCTOBER 2018

MAGNOLIA NEIGHBORHOOD OUTAGE SUMMARY

SUMMARY:

Approximately 100 customers in the Magnolia neighborhood experienced a total of nine unplanned power outages in the span of one year (2017-2018). The table below shows the timestamp for each event, along with the known causes and outage durations.

Outage Start	Outage End	Cause	Duration (Minutes)
10/18/2017 3:00 p.m.	10/18/2017 6:36 p.m.	Tree in Wires	216
11/13/2017 3:55 p.m.	11/13/2017 5:05 p.m.	Tree in Wires	70
12/20/2017 12:20 p.m.	12/20/2017 10:16 p.m.	Bird - Crow	596
12/31/2017 2:47 a.m.	12/31/2017 9:50 a.m.	No Cause Found	423
1/11/2018 11:04 p.m.	1/12/2018 11:00 a.m.	Transformer	716
5/14/2018 3:32 p.m.	5/14/2018 4:28 p.m.	Switch	56
7/22/2018 9:21 a.m.	7/23/2018 12:31 a.m.	Cable	910
8/7/2018 7:15 p.m.	8/8/2018 3:05 a.m.	Transformer	470
8/27/2018 1:56 p.m.	8/27/2018 8:29 p.m.	Cable	415

As shown above, two outages were caused by windstorm events, where trees were brought down onto City Light’s overhead feeder powerlines. Other outage causes were attributed to birds, underground equipment failures with transformers, system switches and cables.

CITY LIGHT BACKGROUND:

There are over 1,000 circuit miles of underground primary cables in Seattle City Light’s service territory. Most of these aging cables were installed in the 1970s. Approximately 340 miles of cable were installed without electrical conduit (tubes used to protect and route underground electrical cables).

In 2008, City Light hired a contractor to improve the electrical reliability of the underground cables by injecting them with silicone. This work extends the life of the aging underground cables by filling the cracks in the cable insulation. 130 miles of cable were injected with silicone. The remaining 210 miles of direct buried cables were not suitable for silicone injection.

MAGNOLIA CABLE INJECTION PROGRAM

In 2011, 59.9% of the direct buried cables in Magnolia were injected to extend the lifespan of the aging cables. The other 40.1% of the cables were not suitable for injection due to the aging condition of the cables, which have decayed and experienced several cable splice points.

CABLE REPLACEMENT PROGRAM

Seattle City Light's Cable Replacement Program replaces the non-injectable cables by placing them in conduit. An underground cable replacement priority list was established based on a consultant study in 2013. This list was developed by City Light's System Planning group using the following criteria:

- Age of underground cables
- Cable splices per segment (failure)
- Condition of the cable's neutral wiring
- Reliability indexes used to determine:
 - Average number of outage interruptions that a customer would experience
 - Average outage duration for affected customers
 - Average outage restoration time
- Pavement restoration
- Silicone cable injection rate
- Race & Social Justice Initiative
- Budget/labor resources

ANALYSIS AND SOLUTIONS:

Seattle experiences several storm events throughout the year. These storms are unpredictable and can cause outages throughout the utility's service territory. In Magnolia, 23% of the 2017-2018 outages were storm-related. In an ongoing effort to provide reliable service to customers, City Light will assess the trees on West Emerson Street as part of the utility's tree trimming program. The tree trimming program runs on a four-year schedule cycle. The next tree trim is expected to occur in mid-to-late 2019.

23% of the outages in Magnolia were caused by cable failures within the past year. These failures occurred on a 1,000-foot segment of damaged cable where the silicone was non-injectable. Seattle City Light plans to replace this cable segment in late 2019 to maintain electrical reliability and reduce power outages for the affected Magnolia area.

Lastly, the report shows that a bird caused an outage through contact at a nearby utility pole. Seattle City Light plans to install a bird guard on the pole to prevent birds from landing on it and reduce the number of outages.

SHORT-TERM PLANS FOR IMPROVEMENT:

- During the outage on August 27, City Light crews discovered a segment of failed cable and rerouted the circuit to provide power for the affected Magnolia customers. This reroute should reduce the outage frequency by avoiding the failed cable segment.
- City Light will design a short-term solution for replacing the failed cable segment in Magnolia. This project will be designed in 2018-2019. Civil construction will follow in 2019-2020.

- Seattle City Light will assess the trees on West Emerson Street as part of the utility's tree trimming program. The tree trimming program runs on a four-year schedule cycle. The next tree trim is expected to occur in mid-to-late 2019.

LONG-TERM PLANNING:

After the underground cable injection program was completed in 2011, Magnolia was ranked 11th out of 38 neighborhoods within Seattle City Light's service territory for cable replacement. The utility assesses and prioritizes capital improvement projects based on budget, resource availability and other criteria.

Project Area	City	Type of Work	Scheduled for Design
Magnolia	Seattle	Cable Replacement	2021
Shorewood	Burien	Cable Replacement	2020
Queen Anne	Seattle	Cable Replacement	2020
5 th Avenue Northeast	Shoreline	Feeder Replacement	2019
Meridian Avenue North	Shoreline	Feeder Replacement	2019

Design work for the Magnolia Cable Replacement Project is scheduled to begin in 2021, with civil construction to follow in 2022. This project includes a larger section of the Magnolia neighborhood that was not covered in the short-term cable repairs.

Projects ahead of Magnolia include (but are not limited to) Shorewood, Queen Anne, 5th Avenue Northeast (Shoreline) and Meridian Avenue North (Shoreline).

The areas in Shoreline are part of two feeder replacement projects. Feeders are essential cables that provide electricity for multiple neighborhoods. These projects are scheduled for design in 2019.

The cable replacement projects in Shorewood, Queen Anne and Magnolia are localized based on their electrical configuration. Queen Anne has experienced several more cable failures in recent years than Magnolia (at a rate of 3 to 1). The Shorewood neighborhood (Burien) experienced failed neutral wiring within the underground cables that caused an outage. These projects will be designed in 2020.

City Light understands that the Magnolia neighborhood has experienced an increase in outages this past year. However, it's important to know that two of the nine outages (7/22/2018 & 8/27/2018) were caused by failures on the same cable segment. The utility's short and long-term plans for improving the electrical infrastructure will aid in maintaining electrical reliability for the affected Magnolia area.