

Noise Fundamentals

AMBIENT NOISE MEASUREMENTS TAKEN AT 7 NOISE-SENSITIVE LOCATIONS

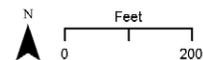


Sound Measurement Locations

1. Second-story courtyard of David Colwell building
2. Roof of David Colwell building
3. Second-story roof deck of the Alley 24 South Tower
4. Roof deck of Seattle Cancer Care Alliance House
5. Third-story hallway window of The Brewster apartments
6. Balcony of Mirabella Seattle Unit #819
7. Balcony of Mirabella Seattle Unit #523

Legend

- Long-Term Monitoring Locations
- Substation Site
- ▨ Potential Street Vacation
- ▭ Study Area



Noise Exposure

- Noise defined as unwanted sound, commonly characterized by rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level (amplitude)
- Sound pressure is the most common descriptor, measured in decibels (dB), a logarithmic loudness scale
 - » 0 dB = threshold of human hearing
 - » 120 to 140 dB = threshold of pain
- Typical human ear not equally sensitive to all frequencies of audible spectrum
- Measurements weighted to deemphasize frequencies below 1,000 hertz (Hz) and above 5,000 Hz to simulate the human ear — known as A-weighted decibels (dBA)

Effects of Noise on People

Noise levels compared to the existing environment — the “ambient” noise level

- 1-dBA change is not perceived, except in a controlled lab
- 3-dBA change is just-perceivable
- 5-dBA change is typically noticeable
- 10-dBA change generally heard as doubling in loudness



Noise & Vibration Key Findings

Construction Equipment	Noise Level (dBA, Leq at 50 feet)	Will Equipment be used for Project Component Construction?			
		Substation	Transmission Line	Broad Street Substation Inductor	Distribution System
Hoe ram (concrete breaker)	90	Yes	Yes	Yes	Yes
Auger Drill	84 ¹	Yes	No	No	No
Excavator	81	Yes	Yes	Yes	Yes
Roller	80	Yes	Yes	Yes	Yes
Concrete mixer	79	Yes	Yes	Yes	Yes
Crane, mobile	81	Yes	Yes	Yes	Yes
Bulldozer	82	Yes	No	No	No
Paver	77	Yes	No	No	No
Backhoe	78	Yes	Yes	Yes	Yes

Source: Federal Highway Administration (FHWA), 2006.

¹Noise level from auger drill is reported for engine noise only. Auguring can also generate noise from shaking the bit to remove sticky soils.

Noise

- Construction planned to avoid significant noise impacts during nighttime hours
- Noisy construction activity (such as concrete removal) near sensitive receptors restricted to daytime
- Construction outside of normal daytime hours would require a variance
- Operational noise levels for Substation Alternatives 1 (SA1) and 2 (SA2) would require mitigation
- Operation of Substation Alternative 3 (SA3) would not due to layout and shielding from perimeter wall
- Broad Street Substation inductor, transmission line, and distribution system would not generate significant noise impacts

Vibration

- Construction activity is temporary and typically restricted to daytime when most are not sleeping
- Construction vibration levels may cause minor to moderate annoyance during daytime hours



Noise Mitigation

ALL ALTERNATIVES WOULD EMPLOY AVOIDANCE AND MINIMIZATION MEASURES

CONSTRUCTION EQUIPMENT NOISE ALLOWED BY SEATTLE NOISE ORDINANCE*

NON-IMPACT CONSTRUCTION EQUIPMENT



IMPACT CONSTRUCTION EQUIPMENT



*As measured from the property line or at a distance of 50 feet from the equipment, whichever is greater.

Construction Noise

- Equipment and trucks will employ the best available noise control
- Impact tools powered hydraulically or electrically — if not possible, exhaust mufflers will be used
- Stationary sources located as far as possible from adjacent receptors — also muffled and shielded
- 1 week notification to those within 500 feet of impact equipment
- If a noise variance is needed, develop measures to minimize with DPD

Mitigation

- Impact equipment avoided — where feasible — within 500 feet of residence or lodging
- Ambient-sensitive broadband backup alarms or spotters
- For operation noise on SA 1 or SA 2:
 - » Construct with a higher screen wall (SA 1 only), **or**
 - » Relocate backup generator, **or**
 - » Install quieter equipment, **or**
 - » Install sound insulation around equipment

