Technical Memorandum

To:	Olenka Karetnik	**From:**	Ben Phillips Mariana Paloscia
Company:	GB (Vaughan 7) Limited Partnership re. Melrose Investments Inc.	**SLR Consulting (Canada) Ltd.**	
Cc:	Kirill Blotskii	**Date:**	March 21, 2024
		Project No.	241.V30094.00000
		Revision	0

RE: Construction Noise Assessment
2851 Highway 7, Vaughan, ON

Dear Olenka,

SLR personnel visited the construction site located at 2851 Highway 7, Vaughan on February 12, 2024. Measurements of construction noise activities as well as sound levels from the adjacent road, Highway 7, were performed. Measurements of construction activity were compared to those of roadway noise at nearby sensitive residential buildings.

It is understood that noise from construction activities is a concern that, due to operational necessities, occur in the evening. These activities are related to concrete polishing of slabs that need to happen once concrete is suitably cured.

Modelling of the construction noise sources, and traffic noise was also undertaken. Traffic noise is predicted to be higher than construction activities at the facades of nearby sensitive land uses, i.e. the residential Expo City Towers to the north of the site.

1.0 Introduction

The development at 2851 Highway 7 is currently under construction and is located adjacent to Highway 7 which is an 8-lane roadway. The construction is currently at Level 3 and 4 with construction activities including the pouring of concrete slabs and shear walls, and the forming and installation of these and associated elements. Concrete polishing of recently poured concrete slabs is the main construction activity considered in this document.

Concrete polishing using motorised power trowels is required to ensure the concrete cures with a smooth hardwearing finish and is suitably compacted for durability, strength, and reduced permeability. It is a time-sensitive process that must be performed at a specific stage of the concrete curing process. The curing process depends on meteorological conditions (temperature & humidity) and in general, the process duration is longer in the cooler months of the year. Longer curing times have the potential of delaying polishing operations into later hours of the evening (19:00 – 23:00) or night (after 23:00 – 00:00).

The primary noise sources in the concrete polishing process are the motorised trowels used for concrete polishing which have a small engine used to rotate the smoothing paddles/blades.

Located to the north of the site, across Highway 7, is the nearest residential development assigned the municipal address of 2900 – 2910 Highway 7, known as the Expo City Towers.

These two towers and associated podium are occupied residential high-rise condos. Suites with exterior facades facing the construction site (suites on the south side of the towers) are most affected by construction noise as well as noise from road traffic on Highway 7.

2.0 Criteria

The City of Vaughan does not set prescriptive limits for construction noise at nearby noise sensitive receptors. Noise By-law 121-2021 sets operating time constraints on construction activities primarily in Section 10 Paragraph (1):

> *No person shall, between 1900 hours of one day and 0700 hours of the next day operate or cause to be operated or permit, any Construction Vehicle or Construction Equipment in connection with the Construction of any building or structure, Highway, motor car, steam boiler or other engine or machine;*

The By-law contains a provision in Section 20, to obtain a construction noise exemption.

Although construction activity is not a stationary noise source, guideline limits for stationary noise sources would provide a framework to assess against.

The sound level limits for stationary sound sources are expressed as a 1-hr equivalent sound level (1-hr L_{eq} dBA) and is the higher of the NPC-300 exclusionary limits or the existing background sound level. The exclusionary limits in a Class 1 (urban) area are 50 dBA during the daytime and 45 dBA at night.

Background sound levels at Expo City Towers were predicted using Cadna/A and road traffic volumes associated with Highway 7. The lowest 1-hour predicted sound levels during the daytime, evening, and night-time were used to determine the sound level limits. The lowest sound levels on the south façade of East Expo Tower occur at the residential tower floor above the podium which is screened from Highway 7 road traffic by the podium. Minimum sound levels at this location are predicted to be 62 dBA during the day (07:00 – 19:00), 60 dBA during the evening (19:00 – 23:00), and 59 dBA at night (23:00 – 00:00).

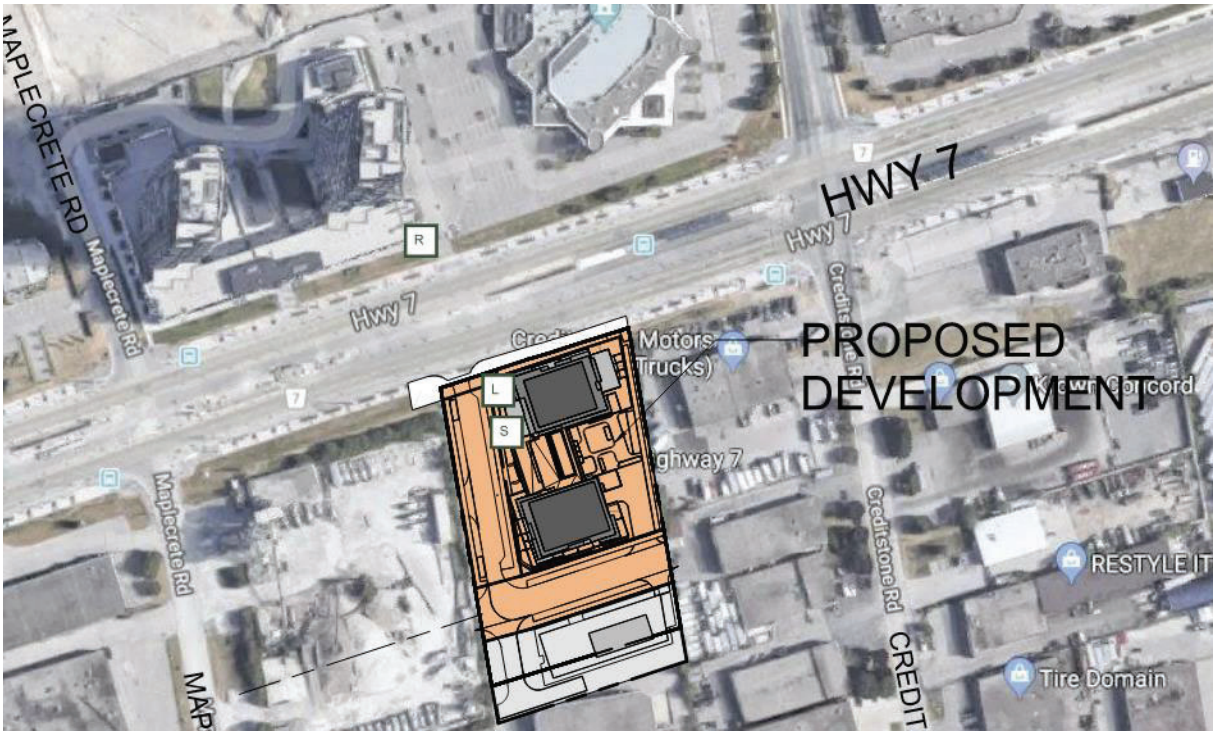
3.0 Sound Level Measurements

Sound level measurements were conducted at three locations:

- S – Source measurements were taken between 1 m and 10 m from the concrete polishers. These measurements are used to predict the sound emissions from the equipment.
- L – Logging measurements were taken near the site boundary; these were used to assess the duration of operation and how sound levels changed depending on the construction activity.
- R – Receiver measurements were taken near the façade of the residential tower. These were primarily used to assess roadway noise but also to quantify the sound due to construction activities.

A plan drawing showing the three measurement locations is provided in Figure 1.

Figure 1 Plan showing measurement locations (Source: 2851 Hwy 7 Tender Drawings)



Measurements at Locations S and L were performed on the third level of construction. Measurements at Location R were performed at grade, approximately in line with the façade of Expo City Towers. The sound level meters at measurement Locations R and L were on tripods with the microphone approximately 1.5m above the local ground level and the measurements at Location S were conducted using a handheld sound level meter at a height of approximately 1m. Photographs showing the measurement positions are provided in Figure 2, Figure 3 and Figure 4.

Figure 2 Measurement Location S

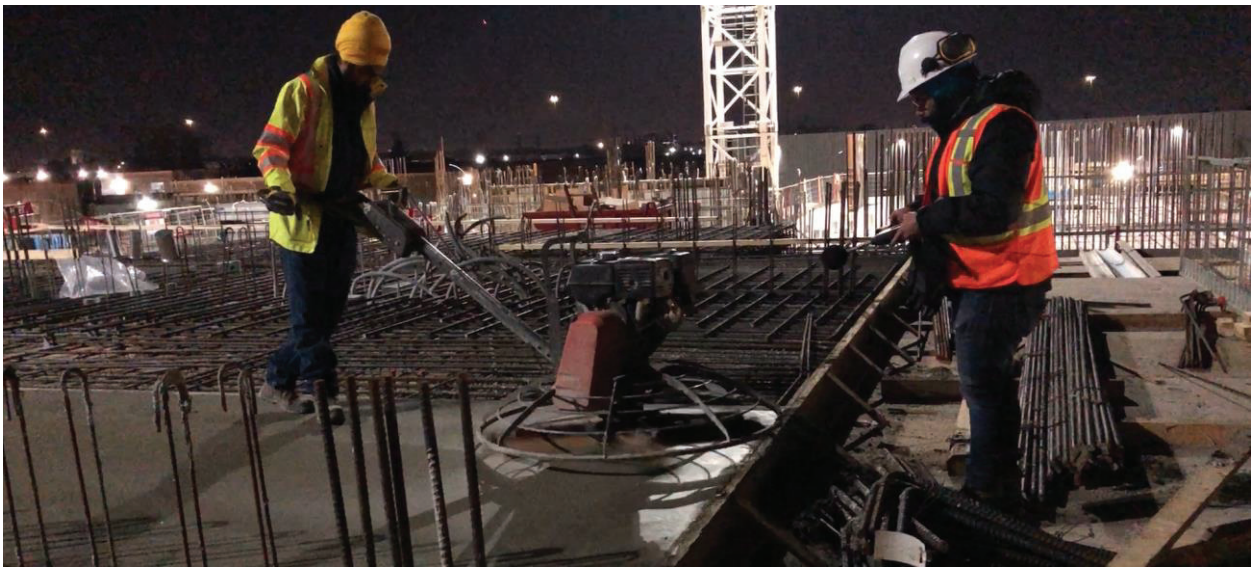


Figure 3 Measurement Location L

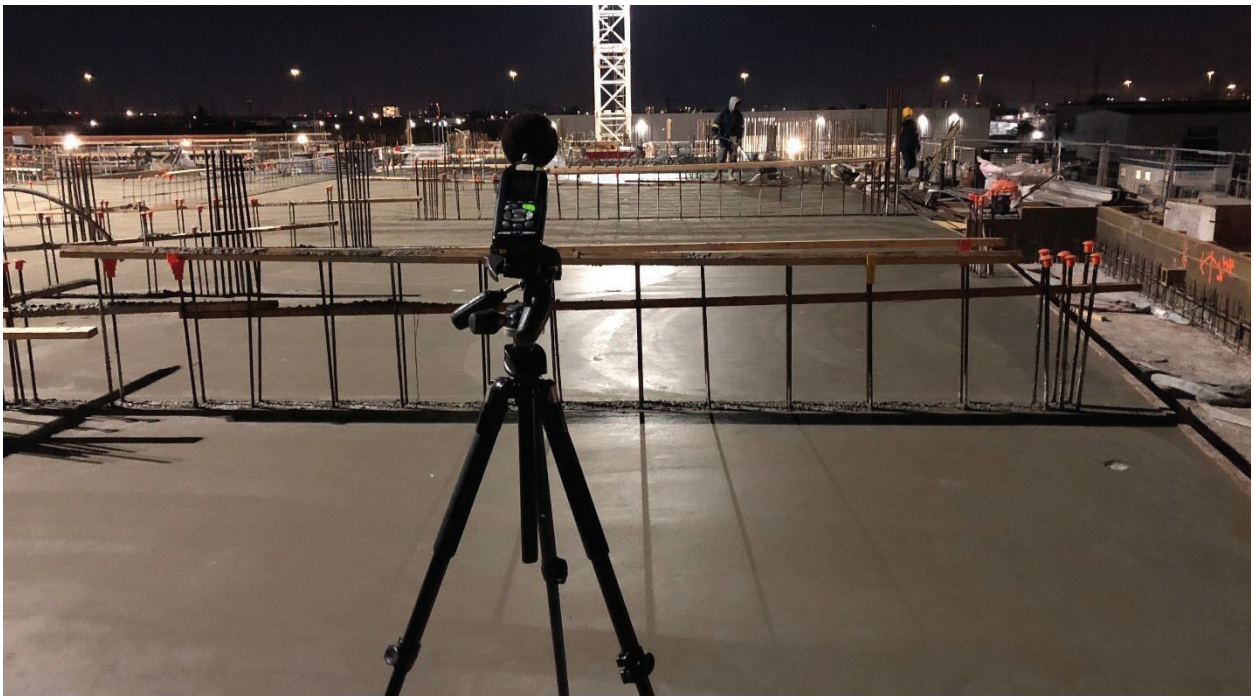


Figure 4 Measurement Location R

The three Class-1 sound level meters were:

- Larson Davis Model 824 at Location S,
- Larson Davis Model 831 at Location L,
- and a NTi Model XL2 at Location R.

Each sound level meter was calibrated before and after the measurements and no significant deviation in calibration was noted. The sound level meters at measurement Locations R and L were set up to record sound levels at 1-second intervals and the meter at measurement Location S was set up to record continuous energy averaged sound level. Additionally, all the sound level meters were time synchronized.

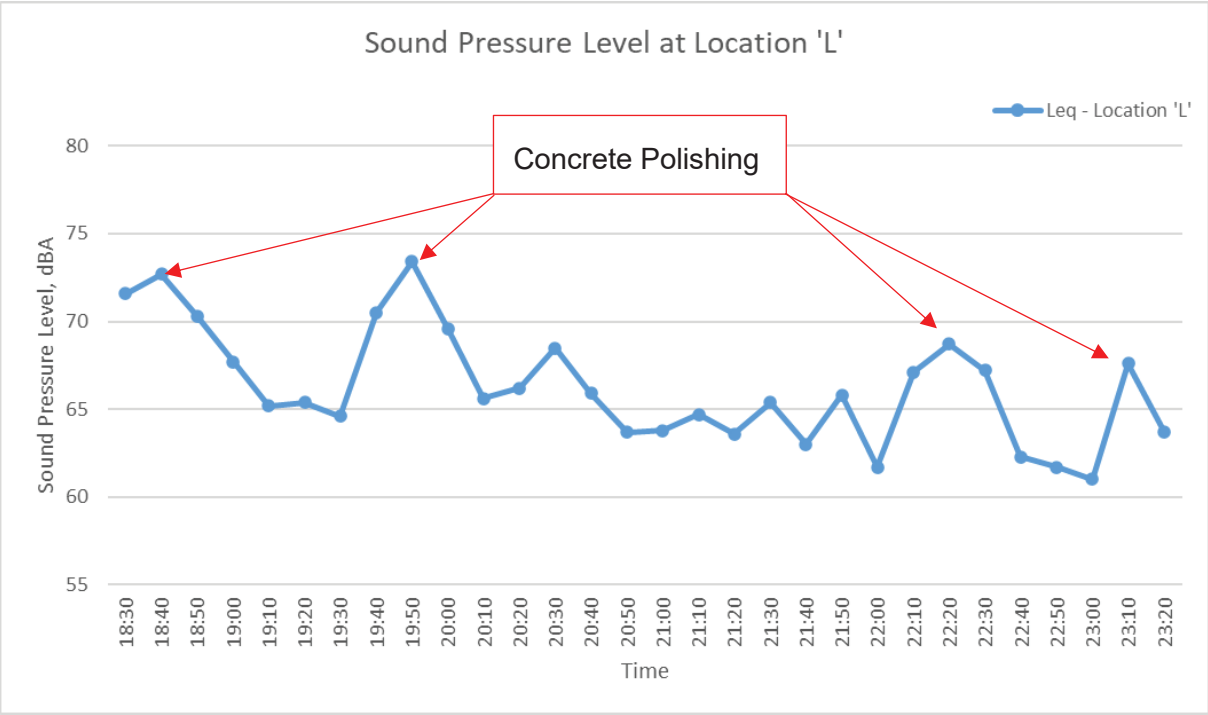
Measurements were taken between 6:26pm and 12:10am and the weather was fair for the duration of the measurements.

At Locations S and L, the concrete polishing work was the dominant source when they were operating. At Location R and Locations S and L, without concrete polishers operating, the dominant source of noise was road traffic on Highway 7. Intermittent noise from aircraft flying overhead and construction activity from other nearby development sites were also noted during the measurement period.

The sound data from 1-second time intervals was used to obtain the sound levels at measurement Locations R and L when the concrete polishers were operating. Measurements at Locations S, L, and R are provided in Table 2, Table 3, and Table 4 respectively at the end of this document.

A graph of 10-minute logging measurements taken at Location L is provided in Figure 5. High sound levels correspond to periods when concrete polishing activities occurred within that 10-minute measurement period.

Figure 5 Graph showing measurements at Location L



The sound levels recorded at Location L when the concrete polishers were not operating were slightly lower than the sound levels at Location R. This is because the sound level meter at Location L was further away from the road compared to Location R.

When the concrete polishers were operating, they were noted as the dominant source at Location L and higher sound levels were observed, however, at Location R, the traffic noise from Highway 7 was noted as the dominant source at all times. The sound from the concrete polishers was either inaudible or indistinguishable from the traffic noise at Location R. There was no significant difference in sound levels at Location R when the concrete polishers were operating and when they were not. This indicates that the contribution from the concrete polishing activities to the background sound levels at measurement Location R is negligible.

A comparison of the sound level at the residential measurement Location R, when concrete polishing operation and when they were not operating found no significant change in level.

4.0 Acoustic Modelling

Sound pressure levels at the Expo Tower facades facing the construction site were modelled in Canda/A. The sound pressure level due to traffic was calculated independently from the operational noise of the concrete polishers. Traffic noise modelling was based on traffic count information for Highway 7 and the daily distribution of traffic. The lowest predicted traffic counts for the period when concrete polishing could occur, 7pm to 12am, were used to assess traffic noise.

The range of predicted sound pressure levels calculated are in Table 1. The lowest predicted sound pressure level due to road traffic on the south facing façades of the expo tower were at Level 6. This is due to the lower levels of the towers being partially screened from traffic noise by the 5-storey podium connecting the two towers.

Construction noise was modelled with two concrete polishers on Level 3 of the development site which corresponds to a height of 13.5 metres. Concrete polisher sound power levels were calculated using the measured sound pressure levels at Location S described in Section 3.0. The concrete polishers were modelled as operating for 30 minutes during a 1-hour period which, from observations of activities is a suitable worse case assessment.

For all building façades facing the construction site, the modelled traffic noise was higher by at least 5.0 dBA when compared to the corresponding modelled construction noise at the same building façade. The Level 6 suites of the east Expo Tower showed the least difference between traffic and construction noise levels. The most affected suites will likely change as the construction progresses – as more stories are constructed the most affected suites will likely become upper storey suites. Upper storeys of the Expo Towers have higher predicted traffic noise than Level 6 suites; therefore, there will be a greater difference in predicted traffic noise to construction noise.

Table 1: Modelled Sound Pressure Level at South-East Facing Expo Tower Facades

Receiver	Traffic sound pressure level, L_{eq} (dBA)	Construction sound pressure level L_{eq} (dBA)	Predicted Below Limit?
Podium	59 – 73	49 – 57	Yes
East Tower	59 – 70	52 – 55	Yes
West Tower	53 – 70	47 – 51	Yes

An image showing the difference in level between predicted maximum concrete polishing noise and minimum road traffic noise is provided in Figure 6. The development site is shown with a red outline and the modelled location of concrete polishers are shown with an 'X'. The Expo City Towers are shown to the north of the image.

Figure 6 Difference in Level, dBA, Between Construction Noise and Road Traffic (Source Bing Satellite Imagery)

5.0 Discussion

Noise from concrete polishing operations was indistinguishable from background noise at measurement positions close to Expo City Towers. In addition, measurements show that there is no significant difference in noise during periods when concrete polishing activity is operating and when it is not.

Acoustic modelling has been performed, and at all sensitive locations on Expo City Towers, construction noise is at least 5 dBA lower than background noise.

Note that construction activity is not assessed in the same manner as stationary noise sources (e.g., parking garage exhaust fans or cooling towers). If sound levels from stationary sources were of a similar level as noise from the concrete polishing activities, it would be in compliance with MECP limits set in NPC-300. This is a good indication that the level of noise would be acceptable to occupants of Expo City Towers.

In addition, the construction activities under assessment are time-sensitive in that they are required to occur at a specific stage in the curing process of newly poured concrete slabs. It is understood that this activity only happens every few days, on the days when slabs have been poured. In addition, as the weather warms up, and concrete curing times decrease, the polishing activities will likely not happen as late into the evening as they have been over the winter of 2023 / 2024.

There may be operational controls to reduce noise levels from the concrete polishing activities. These could include:

- Only operating one polishing machine at a time, especially when carrying out the process to the north of the site.
- Providing temporary noise barriers along the north side of the slab being polished. This would reduce noise to the most affected areas of the Expo City Towers that are horizontal to the activity.
- Using equipment that is inherently quieter or has been modified to produce low noise emissions.

6.0 Statement of Limitations

This report has been prepared by SLR Consulting (Canada) Ltd. (SLR) for GB (Vaughan 7) Limited Partnership (Client) in accordance with the scope of work and all other terms and conditions of the agreement between such parties. SLR acknowledges and agrees that the Client may provide this report to government agencies, interest holders, and/or Indigenous communities as part of project planning or regulatory approval processes. Copying or distribution of this report, in whole or in part, for any other purpose other than as aforementioned is not permitted without the prior written consent of SLR.

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7.0 Closure

Should you have any questions about the memorandum described herein, please contact the undersigned.

Regards,

SLR Consulting (Canada) Ltd.

Ben Phillips, MIOA, B. Eng.
Principal Acoustics Consultant
bphillips@slrconsulting.com

Mariana Paloscia, P.Eng.
Sr Acoustic Engineer & Arch Acoustics Team Lead
mpaloscia@slrconsulting.com

Attachments: Appendix A - Measurement Result Tables

Appendix A

Measurements of motorised power trowels performing concrete polishing activities are provided in Table 2.

Table 2 Sound Level Measurements at Location S (Source)

Start time (hh:mm:ss)	Measurement Duration (mm:ss)	Sound Level, L_{eq} (dBA)	Notes
22:25:39	00:28	74	1 concrete polisher operating at 10 m.
22:33:00	00:13	93	1 concrete polisher operating at 1.4 m.
22:33:40	00:13	80	1 concrete polisher operating at 6 m.
22:35:45	00:04	93	1 concrete polisher operating at 1 m.
22:37:18	00:05	91	1 concrete polisher operating at 1 m.
23:15:58	00:04	96	1 concrete polisher operating at 1 m.
23:19:46	00:09	94	1 concrete polisher operating at 1 m.

Long term measurements at Location L are provided in Figure 5. Example measurements corresponding to those taken are locations S and R are provided in Table 3.

Table 3 Sound Level Measurements at Location L (Site Boundary)

Start time (hh:mm:ss)	Measurement Duration (mm:ss)	Sound Level, L_{eq} (dBA)	Notes
18:36:00	01:00	76	1 concrete polisher operating.
18:47:00	01:00	78	1 concrete polisher operating.
22:25:39	00:28	66	1 concrete polisher operating.
22:33:00	00:13	69	1 concrete polisher operating.
22:33:40	00:13	67	1 concrete polisher operating.
22:35:45	00:04	62	1 concrete polisher operating.
22:37:18	00:05	65	1 concrete polisher operating.
23:15:58	00:04	68	1 concrete polisher operating.
23:19:46	00:09	69	1 concrete polisher operating.

Measurements taken at Location R are provided in Table 4, as well as those corresponding to measurements at Location S.

Table 4 Sound Level Measurements at Location R (Receiver)

Start time (hh:mm:ss)	Measurement Duration (mm:ss)	Sound Level, L_{eq} (dBA)	Notes
18:26:02	16:42	70	Concrete polishers operating. Traffic noise dominating.
18:45:28	10:02	65	Concrete polishers operating. Traffic noise dominating.
18:56:00	11:33	67	Concrete polishers occasionally operating. Traffic noise dominating.
21:41:06	10:28	66	Concrete polishers not operating. Traffic noise dominating.
21:51:44	10:01	65	Concrete polishers not operating. Traffic noise dominating.
22:20:42	18:36	63	Concrete polishers operating. Traffic noise dominating.
22:49:04	5:32	63	Concrete polishers not operating. Traffic noise dominating.
00:00:02	10:33	64	Concrete polishers not operating. Traffic noise dominating.
18:36:00	01:00	70	2 Concrete polishers operating. Traffic noise dominating. Concrete polishers inaudible.
18:47:00	01:00	65	1 Concrete polishers operating. Traffic noise dominating. Concrete polishers inaudible.
22:25:39	00:28	63	1 concrete polisher operating. Intermittent traffic dominating. Concrete polishers inaudible.
22:33:00	00:13	64	1 concrete polisher operating. Intermittent traffic dominating. Concrete polishers inaudible.
22:33:40	00:13	64	1 concrete polisher operating. Intermittent traffic dominating. Concrete polishers inaudible.
22:35:45	00:04	63	1 concrete polisher operating. Intermittent traffic dominating. Concrete polishers inaudible.
22:37:18	00:05	63	1 concrete polisher operating. Intermittent traffic dominating. Concrete polishers inaudible.