

Combined Sewage Storage Tunnel (CSST) Site 5 Projected Construction Sequencing Summary

May 17, 2019

This table should be considered a living document and presents a best estimate based on the Contractor's submitted construction schedule and the project team's general experience with similar activities. Contractually, the Contractor is NOT required to adhere to this detailed schedule. The Contractor will be submitting detailed schedules and management plans prior to undertaking each main component of this work.						
Task	Work Location	Start Date	End Date	Duration	Details of Work	Truck and Noise (2)
Site 5a (Stanley Park)						
IOS Locating & Phase 2 Archaeological Investigation	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Mid November 2016	Early December 2016	2-3 weeks (COMPLETE)	Drill rig will be setup in Stanley Park to core down and find exact location of existing 15m- deep trunk sewer (IOS). Drill rigs used to core down are not excessively noisy. Daytime drilling expected. Little to no material trucking - just drilling crew. Access along pathway. During roughly same period, a Stage 2 archaeological investigation will take place.	Modest noise. Negligible trucking.
Tree Clearing	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Early March 2017	Late March 2017	2-3 weeks (COMPLETE)	Activities would be limited to clearing of larger trees outside of the bird nesting season. Stumps and smaller brushes would be left on site for later removal. Tree grabbers, chainsaws, tub grinders and grinders for branches will be used at the site. There will be some noise due to grinding and from the engine of the tub grinder. Daytime work only. Trucking will include hauling felled trees and mulch off site.	Some noise from tree cutting. Modest trucking.
Traffic Control, Hoarding/Fencing, Site Setup, Tree Protection	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Early March 2017	Mid May 2017	7-8 weeks (COMPLETE)	Site setup activities, including installation of the hoarding/fencing and tree protection measures. Modest trucking (fence delivery, etc) and noise.	Modest noise. Negligible trucking.
Build and Grade Temporary Access Roads & Pathways	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Early April 2017	Late April 2017	3-4 weeks (COMPLETE)	Converting the pathway to truck access route (making it more robust), and constructing pathway detours for park users. Will include hauling granular material (3-4 trucks per hour for about a week) and spreading the granular material (bulldozer/grader). Additionally, there would be 3-4 empty trucks per hour leaving the site. Some multi-use temporary pathways also require paving (small pathway paving equipment - one day).	Modest noise. Heavier trucking.
Construction of Secant Wall	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Early May 2017	Mid June 2017	4-6 weeks (COMPLETE)	Secant wall is a circular watertight enclosure around a deep excavation area (e.g. for a chamber). It is installed before removing the earth in order to mitigate affecting the groundwater table around the excavation. Activities consists of drilling vertically into soil, installing secant piles in a large circle and grouting the circumference to make the chamber area watertight. Handling of the secant piles could generate some noise. Noise Bylaw limits apply to any nighttime work. Marginal trucking for materials and some soils. A small amount of potentially contaminated soil may require disposal off-site during this phase.	Some loud noise associated with driving sheet piles. Modest trucking.
Construction of Odour Building	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Mid May 2017	Mid July 2018	50-55 weeks (13 months) (COMPLETE)	Typical building construction with material and equipment being delivered to site as required.	Modest noise. Modest trucking.
Earth Excavation	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Early July 2017	Late July 2017	4 weeks (COMPLETE)	Once secant walls are built, the earth inside will be removed in order to build the chambers and will be trucked off-site. Some potentially contaminated material could be encountered during the earth excavation for trucking and disposal off site. Applies to 2 chamber locations at Site 5a (main area). Expect to generate 3-4 trucks per hour hauling excavated earth off-site. Trucks must pass through wash bay prior to exiting the site. There will also be another 3-4 empty trucks returning to the site each hour during this period.	Modest noise. Heavier trucking.
Installation of Collar Beam	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Late July 2017	Mid August 2017	2-3 weeks (COMPLETE)	Shoring for deep excavations. No trucking other than bringing some material in.	Modest Noise. Negligible trucking.
Rock Excavation	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Late July 2017	Mid January 2018	20 weeks (COMPLETE)	Includes preparations (small amount of hoe ramming) for future rock excavation using drilling and blasting methods. Will also involve shotcrete and rockbolt installation. Trucking frequency will be low as rock removal is a slow operation compared to earth removal.	Some loud noise from breaking rock. Modest trucking.
Setup Tunnel Launch Shaft	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Early January 2018	Early July 2018	22 weeks (COMPLETE)	Includes pouring mud slab, hand-mining tail and starter tunnels. Will include trucking, but low frequency due to slow progress of hand-mining 40m long tail tunnel and 35m starter tunnel to prepare for the Tunnel Boring Machine (TBM) insertion. Modest noise would include handling of excavated rock (loading trucks).	Modest noise. Modest trucking.
Inserting and Setting up TBM	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Late August 2018	Late October 2018	8 weeks (COMPLETE)	Delivery of TBM to site (in pieces), inserting into the launch shaft, reassembly, prepare for launch. Other than trucking in the TBM pieces and associated support equipment/materials, limited trucking and limited noise.	Modest noise. Modest trucking.
Rock Excavation	Site 5a (Stanley Park - IOS Shaft)	Early October 2017	Early February 2018	16 months (COMPLETE)	Includes preparations (small amount of hoe ramming) for future rock excavation using drilling and blasting methods. Will also involve shotcrete and rockbolt installation. Trucking frequency will be low as rock removal is a slow operation compared to earth removal	Some loud noise from breaking rock. Modest trucking.
East-West Tunnel (EWT) Tunneling	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Mid November 2018	Mid November 2019	50 weeks (12 months)	TBM progressing along EWT. Spoils (crushed stones - gravel) being extracted from launch shaft and being trucked away. Tunneling 24 hours per day, but trucking limited to daytime hours only (between 7:00AM and 10:00PM). Noise Bylaw limits apply to afterhours activities. Estimate that tunnel spoils will be hauled away at 3 trucks per hour as the tunnel progresses. Another 3 empty trucks will be arriving to the site each hour to be loaded. Tunneling will also require, on average, 3 trucks per day delivering parts for the tunnel lining.	Modest noise. Heavier trucking.
Construction of Large Chambers	Site 5a (Stanley Park - IOS Shaft)	Mid February 2019	Mid February 2020	50 weeks (12 months)	Construction of chambers includes the following components: micro piles installation, structure floor, walls and roof construction, ventilation duct, installation of gates, ladders and steps, and backfill. Materials and concrete being delivered to site as required.	Modest noise. Modest trucking.
Construction of Large Chamber (once tunneling complete)	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Late November 2019	Late May 2020	28 - 30 weeks (5-6 months)	Construction of chambers includes the following components: micro piles installation, structure floor, walls and roof construction, ventilation duct, installation of gates, ladders and steps, and backfill. Materials and concrete being delivered to site as required.	Modest noise. Modest trucking.

Grading and Landscaping	Site 5a (Stanley Park – Main Chamber and Odour Control Building Area)	Late May 2020	Mid September 2020	12-16 weeks (3-4 months)	Will include hauling away granular material installed as a base for driving vehicles within the staging area and hauling in new topsoil for landscaping. This will be followed by bringing in and installing numerous trees throughout the park. It's estimated that hauling away the granular material would take approximately 2-3 weeks and result in approximately 2-3 trucks per hour during this two to three week period. It is likely that hauling in new topsoil could generate similar trucking at its peak, but would happen later in this period.	Modest noise. Heavier trucking.
Site 5b (Stanley Park - Closer to Queen Victoria Access)						
Earth Excavation	Site 5b (Stanley Park – Closer to Queen Victoria Access)	Mid July 2017	Late July 2017	1 week (COMPLETE)	Once shoring is installed, the earth material will be excavated and trucked away (maybe 3 trucks per hour for 3-4 days – small volume). The same frequency of empty trucks would also return to the site. Note that some potentially contaminated material could be encountered during the earth excavation for trucking and disposal off-site.	Modest Noise. Heavier trucking (very short duration) when moving soil.
Noise Barrier Construction	Site 5b (Stanley Park – Closer to Queen Victoria Access)	Mid August 2017	Early October 2017	6-7 Weeks (COMPLETE)	Erection of noise barrier system on both sides of the 5b construction access gate. Work activities will include installation of fence posts, and construction of wood sound barrier materials.	Modest noise. Modest trucking.
Rock Excavation	Site 5b (Stanley Park - Closer to Queen Victoria Access)	Early September 2017	Early October 2017	3-4 weeks (COMPLETE)	Rock excavation will involve hoe ramming, drilling, blasting, shotcrete and bolt installation, as well as trucking away excavated rock. Trucking frequency will be low as rock removal is a slow operation compared to earth removal.	Some loud noise associated with drilling
MicroTunnel Launch Shaft Setup	Site 5b (Stanley Park - Closer to Queen Victoria Access)	Early November 2017	Early December 2017	5-6 weeks (COMPLETE)	Activities for this phase include the setup of the shaft for the purposes of microtunneling. This will involve the pouring of concrete and setting rails for the equipment, as well as drilling the pilot hole.	Some modest noise within the shaft. Modest trucking
Micro-Tunneling of Diversion Sewer (5b to EWT Outlet Chamber - main shaft)	Site 5b & 5a (Stanley Park - Closer to Queen Victoria Access)	Early April 2018	Early July 2018	15 weeks (COMPLETE)	Includes installation of tunneling equipment, tunneling of a pilot hole, and back reaming along that pilot hole. The reaming operation (which consists of enlarging the smaller pilot hole to the size required for the sewer) is expected to produce the most trucking as it generates spoils (crushed rock) to be hauled away. Could fill one or two trucks per hour at its peak for that 5- 6 week period.	Modest noise. Modest trucking.
Microtunnel grade and alignment correction (5b to EWT Outlet Chamber - main shaft)	Site 5b & 5a (Stanley Park - Closer to Queen Victoria Access)	Mid January 2019	Early July 2019	20-24 weeks (5-6 months)	Includes grade and alignment correction, installation of a concrete pipe within the excavated microtunnel and grouting to seal the microtunnel. This operation will involve delivery of precast concrete piping to the main site and use of a crane to lower the piping to the elevation of the microtunnel.	Modest noise. Modest trucking.
Installation of 3 m Pre-Cast Shaft	Site 5b (Stanley Park - Closer to Queen Victoria Access)	Mid September 2019	Mid November 2019	8-10 weeks (2-3 months)	Activities include installing the precast chamber sections, benching and grouting, backfilling, removal of shoring, etc. Small chamber - modest trucking. Similar to installing a big sewer manhole with more parging/grouting and a large gate and related equipment on the inside.	Modest noise. Modest trucking.
Grading around shaft 5b	Site 5b (Stanley Park - Closer to Queen Victoria Access)	Mid November 2019	Late November 2019	2 weeks	Rough grading. Final landscaping is included as part of the landscaping activity described for Site 5a.	Modest noise. Heavier trucking.
Site 5c (Queen Victoria and River Lane)						
Traffic Control, Hoarding/Fencing, Site Setup, Utility Relocation and Temporary Sewer Bypass	Site 5c (Rideau River Collector - Overflow Diversion Chamber - At intersection of River Lane & Queen Victoria)	Early April 2017	Mid June 2017	12 weeks (COMPLETE)	Site setup activities, including installation of the fencing and relocation of utilities and sewers as required. Some noise during hoarding installation and modest trucking (delivery of fences/piping, hauling away of some material excavated for these relocations, etc).	Modest noise. Modest trucking.
Utility Relocation	Site 5c (Rideau River Collector - Overflow Diversion Chamber - At intersection of River Lane & Queen Victoria)	Mid May 2017	Early October 2017	12-13 weeks (COMPLETE)	Relocation of communication lines by the utility companies from above- ground to underground.	Some noise due to rock excavation. Modest trucking. Short Periods of loud noises to install poles.
Noise Barrier Construction	Site 5c (Rideau River Collection – Overflow Diversion Chamber – At Intersection of River Lane & Queen Victoria)	Mid November 2017	Mid December 2017	5-6 weeks (COMPLETE)	Erection of noise barrier system around the perimeter of Site 5c. Work activities will include installation of concrete blocks for foundations, construction of metal framing, and hanging of sound barrier material.	Some loud noise associated with excavation for gates. Modest Trucking.
Shoring, Earth Excavation, and Rock Excavation	Site 5c (Rideau River Collector - Overflow Diversion Chamber - At intersection of River Lane & Queen Victoria)	Mid December 2017	Early July 2018	24-26 weeks (COMPLETE)	Installation of shoring will generate some noise - limited to daytime. Modest trucking - limited to hauling shoring material and perhaps some volumes of rock and earth may be hauled away. Earth excavation will require an excavator; soil will be hauled away in trucks (2-3 per hour). Rock excavation will involve drilling, hoe- ramming, shotcrete and bolt installation, as well as trucking away excavated rock. Trucking frequency will be low as rock removal is a slow operation compared to earth removal.	Loud noise resulting from hoe-ramming and rock handling. Modest trucking.
Micro-Tunneling of Diversion Sewer (River Lane to 5B)	Site 5b (Rideau River Collector - Overflow Diversion Chamber - At intersection of River Lane & Queen Victoria)	Early July 2018	Early January 2019	24 weeks (COMPLETE)	Includes installation of tunneling equipment, tunneling of a pilot hole, and back reaming along that pilot hole. The reaming operation (which consists of enlarging the smaller pilot hole to the size required for the sewer) is expected to produce the most trucking as it generates spoils (crushed rock) to be hauled away. Could fill one or two trucks per hour at its peak for that 5- 6 week period.	Some modest noise associated with motor for auger. Modest trucking.
Microtunnel grade and alignment correction (River Lane to 5B)	Site 5c (Rideau River Collector - Overflow Diversion Chamber - At intersection of River Lane & Queen Victoria)	Late February 2019	Early September 2019	24-28 weeks (6-7 months)	Includes grade and alignment correction, installation of a concrete pipe within the excavated microtunnel and grouting to seal the microtunnel. This operation will involve delivery of precast concrete piping to the main site and use of a crane to lower the piping to the elevation of the microtunnel.	Modest noise. Modest trucking
Construction of Chambers (once micro-tunneling complete)	Site 5c (Rideau River Collector - Overflow Diversion Chamber - At intersection of River Lane & Queen Victoria)	Late April 2019	Early October 2019	20-24 weeks (4-5 months)	Construction of chambers includes the following components: structure floor, walls and roof construction, installation of weir, ladders and steps, demolition of section of existing overflow sewer, new connections, backfill and removal of shoring and noise barrier. Materials and concrete being delivered to site as required. This phase includes backfill around the chamber, estimated to generate 3-4 trucks per hour hauling backfill material to the site and the same frequency of empty trucks leaving the site. Other trucking would include concrete trucks during the pours	Modest noise. Heavier trucking during backfill (1- 2 weeks), modest otherwise.
Grading and Final Reinstatement	Site 5c (Rideau River Collector - Overflow Diversion Chamber - At intersection of River Lane & Queen Victoria)	Early October 2019	Mid November 2019	6-8 weeks	Grading of the surface, paving, curbs, sidewalks and placement of sod and plantings. Opening of the intersection. Heavier trucking will be during delivery of granular material for road construction (3-4 trucks per hour for a week or so)	Modest noise. Heavier trucking for 2 days of paving.

Important Notes:

1. The activities list is not intended to be an exhaustive list. Normal (a.k.a. daytime) working hours as defined in the city's Zoning Bylaw is 7:00AM-10:00PM. Outside of these hours (i.e. 10:00PM-7:00AM) is referred to as 'afterhours'. The Contract Documents stipulate that the following activities will not be permitted afterhours:

- Backing up construction equipment and vehicles (due to backup alarm)
- Deliveries, including loading/unloading material or excavated muck into trucks
- Operation of equipment, motors and power tools without noise dampening
- Handling sheet piling
- Tree removal, cutting or grinding
- Significant grading operations requiring earth-moving equipment

The Contract Documents further state that a noise monitoring program will be implemented by the Contractor to assess conformance to the stipulated limits. The noise monitoring program will be approved by the Contract Administrator prior to implementation. Exceedances will be reported to the Contract Administrator within 24 hours with a solution to prevent future exceedances. The City reserves the right to order the Contractor to cease the use of non-conforming equipment or to correct non-conforming procedures or to cease the nighttime construction activities at no cost to the City in the event that noise thresholds are exceeded.

2. The column for noise trucking is intended to be a high-level relative comparison. A noisy activity is the label used for activities that include breaking rock, banging steel, etc; other activities are considered to generate modest noise (relative to breaking rock and banging steel). Similarly, heavy trucking is the label used for activities generating 3 to 4 trucks per hour on average; other activities are considered to generate modest (considerably less than 3 to 4 trucks per hour).

3. All work at Site 5c (River Lane/Queen Victoria) is limited to daytime activities. No work is currently permitted at this site afterhours (10:00pm to 7:00am). The Contractor may submit a special request for a specific activity that is impractical to be completed during daytime, but it would need to be submitted for review and approval by the project team and the Councillor as it is not currently permitted.