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## Engineering, Design and Installation

### Concrete Pad Information

More than 75% of shelter installation delays are due to delays in shelter infrastructure including preparing the concrete pad.

*When preparing a site for a shelter, what are the specifications of the concrete pad?*

The specifications for the concrete pad will be listed on the engineering drawing. The shelters are separated in Timber (T series) and Woodland (E Series). They are also separated in types 2, 3, 4 and 5 (For T Series Only). Every series will have its specific engineering drawing to be shared by BC Transit or The Contractor.

### Caisson Information

*What are Caissons?*

Caissons are a cylindrically shaped foundation that require a deeper excavation localized at the shelter pole baseplates. Installing caissons avoids having to install a thicker concrete pad spanning the entire length of the shelter.

*Why are they required?*

Caissons are required to support the cantilevered shelters specifically. Cantilevered shelters require a concrete pad engineered to withstand higher loads. The cantilevered shelters do not have sidewalls, which increases the loads (wind loads, snow loads and uplift) acting on the shelter.

*Who is responsible for installing the caissons?*

The Contractor is responsible for installing the caissons. The Contractor will be contacting the Local Government Partners to coordinate this work before installing the shelters. They will also apply for any business licenses and permits required to complete the work.

*How are caissons installed?*

To be able to install the caissons, existing asphalt or preferably a concrete sidewalk/extension will need to be installed. The caisson pits are cored through the asphalt/concrete. A hydro vacuum is used to remove the soil below the asphalt/concrete. Anchor cages are placed in the hydro vacuumed holes and then concrete is poured.

*Is there an alternative to a caisson foundation available?*

The caisson supply and install are included in the price of the shelter. There is an option for a thickened pad instead of caisson foundations, however if the thickened pad is installed by the Contractor, there will be additional costs. The thickened pad installation can be completed by the Local Government Partners. However, the Contractor will need to be notified and the Contractor will need to send an approval to pour to ensure compliance with the engineering drawing.

*If caissons are required, when should they be installed?*

The caisson foundations must be installed a minimum of 21 days prior to the shelter install. All caisson installs within the same region must be grouped in one trip.

### [Slope requirements for concrete install](#)

The shelters can accommodate slope within reason however concrete pads with slopes above 4% may require additional parts to be installed on the T Series. T Series shelters have Base Plate Covers that are installed to compensate for the slope. If an 8" Base Plate Cover or larger is required, additional charges will be incurred. If possible, the concrete pad should be installed with 4% slope or less.

### [Lighting requirements for concrete install](#)

The electrical is generally run through the rear exit pole (left hand side with the street behind you). If the Local Government Partners are installing the concrete pad, please include a conduit sized appropriately to the requirements of the electrical contractor. If the electrical needs to be run to any other pole, please let the Contractor know so they can accommodate this change.

### [BC Transit roof overhang requirements for concrete install](#)

BC Transit recommends .75m (29-1/2") distance from the front of the roof to the curb. When installing a new concrete pad, consider the .75m minimum roof overhang. Additional concrete materials should be installed in front of the shelter to meet the minimum requirement.

More information can be found in the [BC Transit Infrastructure design guidelines](#)

### [Are the concrete pads designed to the BC Building Code Standards](#)

All concrete pads are designed to meet the latest BC Building Code requirements.

### [Is it important to install the concrete as per the engineering drawings?](#)

The concrete pad must be installed as per the respective concrete pad drawings. The concrete pad can be installed larger than the concrete pads, however they need to be installed as per the concrete pad drawings as a minimum. If the concrete pads are not installed as per the drawings, the Local Government Partners will be liable for any failures. Additionally, if the concrete pads are not installed per the drawings, The Contractor will be unable to install, and any additional costs associated with the delay will be billed 100% to the Local Government Partners.

## Shelter Lighting Options

### [Grid Lighting Questions](#)

#### *How do we run electricity to the shelter?*

The electrical must be installed according to local/provincial/federal codes by a licensed electrician. The Contractor can submit electrical schematics if required.

#### *Where does the electricity run into the shelter?*

The electrical is installed through the rear exit pole. (The back left pole, when looking at the shelter from the street)



*What are the Preferred sources for electrical?*

The preferred source for electrical is a light standard or an electrical kiosk with available capacity. The benefit of using an adjacent light standard is that the lights on the shelter will turn on/off with the lights on a standard. Otherwise, a photocell needs to be installed to be installed for the lights to turn on/off at dusk/dawn.

*When is the grid illuminated shelter to be energized?*

The electrical circuit can be energized after the shelter has been installed, however it is preferred to have an electrician on site during the install for ease of electrical hookup and energization.

### Solar Lighting Questions

*Do the solar panels generate enough electricity to power the shelter year-round?*

Yes, the solar panels can generate enough electricity to power the lights all year round. In certain scenarios, there may be a time through the night where the lights will shut off. This will usually happen after the hours of operation of the transit system. In climates with snow fall, maintenance will need to be completed to remove any build-up of snow blocking the solar panels.

*What are the characteristics of an ideal location for solar lighting?*

For a solar shelter to be able to properly charge the batteries, there needs to be unobstructed access to sunlight for 6-8 hours. Any old growth trees in close vicinity may block the sunlight and may reduce the effectiveness of the solar lighting. Solar shelters

should not be installed next to a light standard as it could affect the photocell system installed on the solar shelters.

*If we attach the shelter to the grid, does the solar system feed back into the grid when there is a surplus of energy?*

The solar panels produce enough energy to charge the batteries that power the lights. There would not be an option to feed back into the grid.

*What maintenance is required to up-keep the solar system?*

The maintenance required depends on the local weather. In the more temperate climates, the solar panels would only require a regular cleaning. In climates that experience medium to heavy snowfall, the solar panels will require cleaning to avoid any buildup of snow.

*How often do the batteries last?*

Generally, batteries will have a usage life of 3-4 years.

*How much does it cost to replace the batteries in the shelter?*

The Contractor can quote the battery removal and replacement. The installation process on the solar kits needs to be followed step by step and it is preferred that The Contractor completes this.

*How and where is the ground for the solar system installed in the pad?*

The solar grounding plate can either be installed by The Contractor or by the Local Government Partners, if the LGP are installing their own infrastructure. The solar grounding plate must be installed as per the supplied drawings (at 1m below grade).

## Shelter Installation Process

*Who is responsible for installing bus stop infrastructure? (Concrete pad, electrical, etc.)*

The Local Government Partners are responsible for installing the bus stop infrastructure. If preferred The Contractor can install concrete pads at an additional cost. The Contractor cannot complete any electrical works.

*Site Survey and Release for construction (RFC) information*

Prior to installation, a site survey will be performed by The Contractor. Prior to the shelter installation Release for Construction documents will be submitted for approval and signature by the Local Government Partners.

*Are there any recommendation for area with a high risk of Vandalism*

If the shelters are being installed in areas with a high likelihood of vandalism, please make this aware to the Contractor and recommendations can be made at that time.