



Pattullo Bridge Replacement Project

Bridge Deck and Stay Cable Construction

With the foundations and bridge tower complete, construction can start on the platform that supports the roadway and multi-use paths, called the bridge deck.

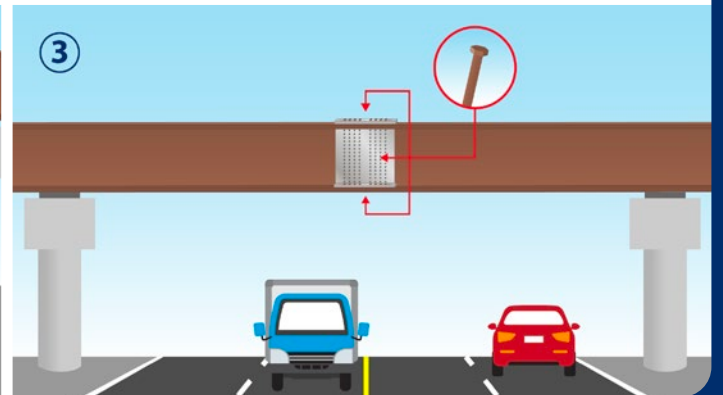
On-land bridge deck

To build the on-land bridge deck, large steel beams called girders are installed to connect the bridge foundations. Once the girders are in place, precast concrete

deck panels are installed on top. Girders and deck panels are installed by mobile cranes sitting on land or on a barge.

Girder Installation Steps

- 1 Girders are transported to site by large transport trailers.
- 2 Large cranes are used to pick up the steel girders and place them between the foundations to form spans.
- 3 Once the girders are in position, they are bolted and welded into place to ensure they are secure.



Watch a timelapse of the girders being installed over Columbia Street in New Westminster!



Cable-stayed bridge deck

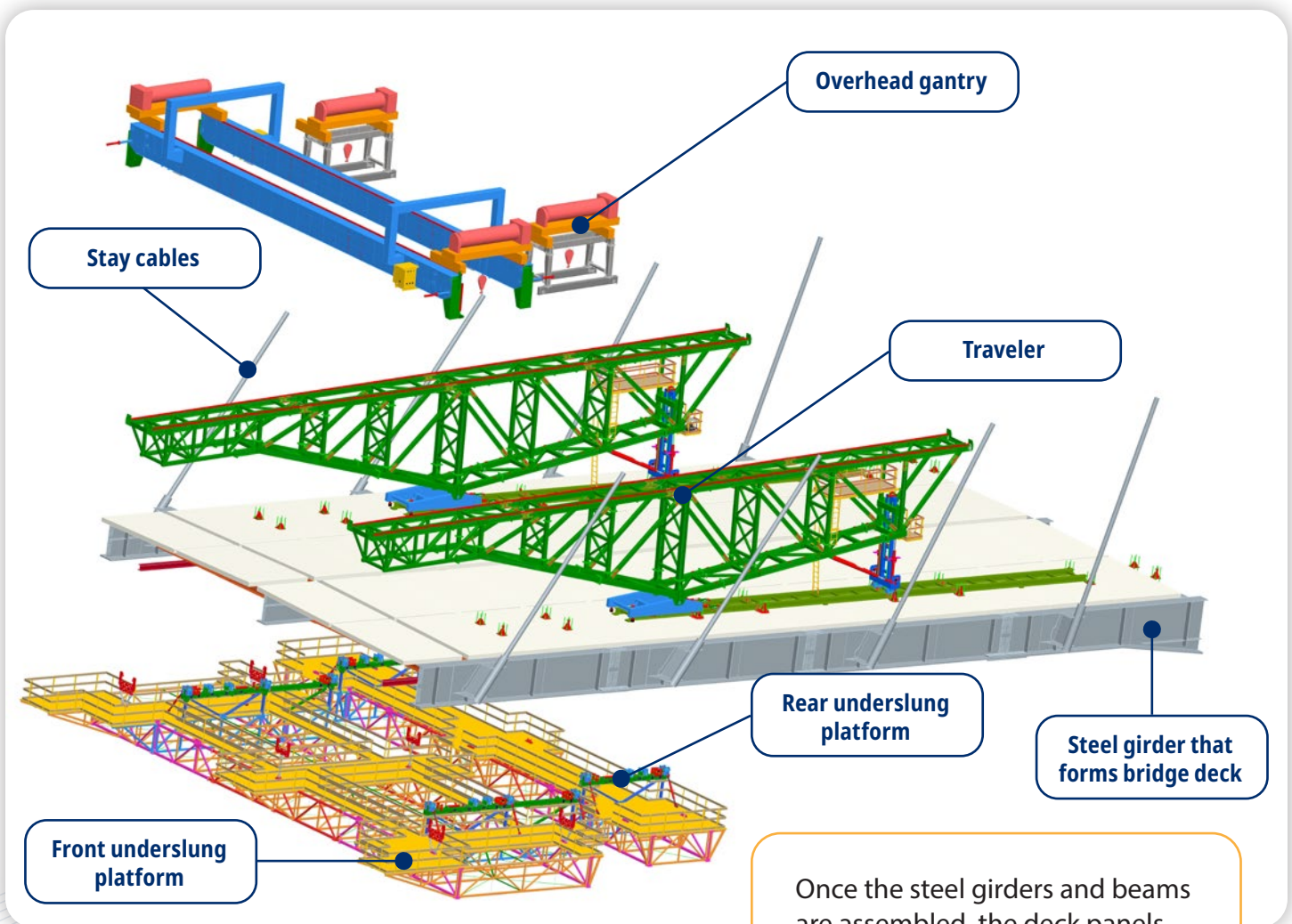
The bridge spans 530 metres across the river. In this section, the bridge deck is supported by cables connected to the bridge tower. This feature is what makes this bridge a 'cable-stayed' bridge.

The bridge deck in this section is installed using a method called "balanced cantilever". This means the structure is put up segment by segment on alternating sides of the bridge tower to keep the weight balanced on both sides of the bridge tower.

Each segment includes steel girders which are tied together with steel floor beams. The process of

assembling one segment – putting all the girder and beam pieces together in the air – is called a "Stick Build Operation". A special lifter crane is required to complete this operation, which consists of three parts:

1. **Overhead Gantry:** lifts girders, beams and precast panels
2. **Traveler:** levels the equipment and provides a guided rail to move it
3. **Front and Rear underslung platforms:** provides access for bolting and stay cable stressing



What are stay cables?

Stay cables are strong cables that connect to the bridge tower and bridge deck. They support the bridge deck, roadway and multi-use pathways for pedestrians and cyclists without the need of piers or other type of support. The stay cables are made of metal strands in a protective tubing.

How are the stay cables installed?

First, weather-resistant tubing is lifted into place. The lower end is connected to the edge of the bridge deck and the upper end to the bridge tower.

Metal strands are then pulled through the tube and secured at the upper end in the bridge tower. Next, a computerized machine tightens each strand, removing any slack and pulling the cable to the correct tension.

There will be 80 stay cables supporting the bridge deck, and each cable can contain between 23 and 80 metal strands. The number of strands in every cable depends on the load required.



Crews on the bridge deck install cable strands in the stay cable tube.



A view of the upper cable anchorages on the bridge tower.



A stay cable tube at base of the bridge tower is ready for installation.



Cables and cable tube at the base of the stay cable.





Concrete deck panels ready to be stitched together.

Stitching it all together

After the steel girders are installed to form the bridge deck, a lifter installs the precast concrete deck panels to create a solid surface. When the deck panels are in position, reinforcement will be placed between the panels and 'stitched' together with concrete to connect them. A second lifter on the opposite side of the bridge tower then installs the next segment to "balance" the segment that was just built.

At every step of the process, the girders, steel beams, lifter, deck panels, and bridge tower are carefully measured to make sure the deck structure is lined up.

Once bridge deck construction is completed, the new roadway is paved on top. The bridge is now ready for final touches including line painting, signage and safety features such as a traffic median and pedestrian railings!



A concrete panel is lifted onto the deck.

There will be approximately **2,500** precast deck panels. A typical panel is **4m wide** by **6.5m long** and weighs approximately **17 tonnes**. That's about the same weight as **three elephants!**

