TRANSMOUNTAIN

BUILDING A PIPELINE

Step by Step

Surveying and Staking: After finalizing a route, crews survey and stake the right-of-way and any temporary workspace needed for construction.

Clearing: Trees and vegetation are removed from the right-of-way.

Grading: Area is cleared and graded. The topsoil is removed and stockpiled for replacement and future reclamation.

Stringing: Individual lengths of pipe ranging from 12 to 24 metres long are laid out end-to-end along the right-of-way.

Bending: Individual joints of pipe are bent using a hydraulic bending machine for directional changes and to fit the terrain.

Joining: Welders join the pipes together with either manual or automated welding processes. All welds are tested using high-tech methods such as X-ray or ultrasound.

Coating: The pipeline coating protects against corrosion. The pipeline is delivered to the right-of-way pre-coated. Field application coating is applied to welded joints.

Trenching: Excavators dig the trench to the required depth. Pipelines are buried in trenches that are generally a minimum of 0.9 metres deep, depending on sub-surface conditions.

Lowering In: The welded pipeline is lowered into the trench with heavy lifting machines called side booms.

Valves and Fittings: Valves and other fittings are installed at intermediate locations as required by the Canadian Standards Association pipeline code. The valves are used once the line is operational to isolate the pipeline for maintenance or in the event of an emergency.

Backfilling: Soils are replaced in the order in which they were removed.

Pressure Testing: Pipelines are hydrostatically tested to 125 per cent of the anticipated operating pressure.

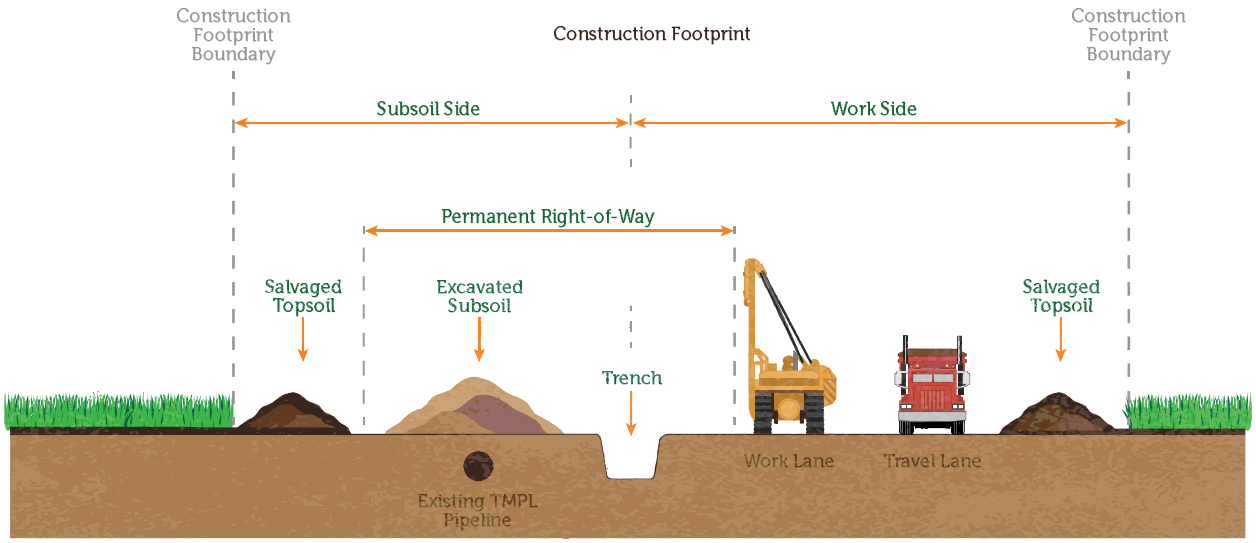
Cleanup: The pipeline right-of-way is reclaimed. Temporary facilities are removed. The land is re-contoured and re-seeded as part of restoration.

KINDER MORGAN CANADA

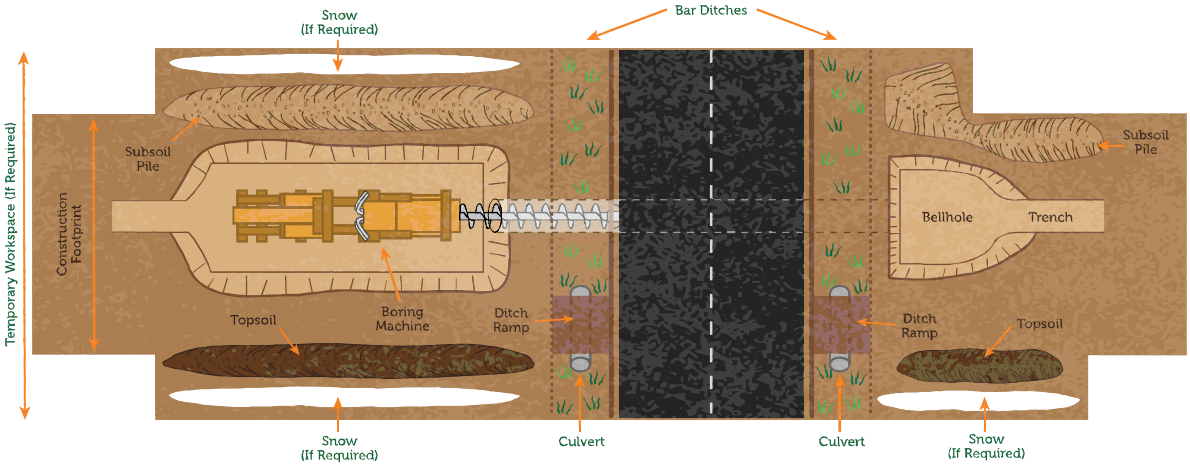
TRANSMOUNTAIN

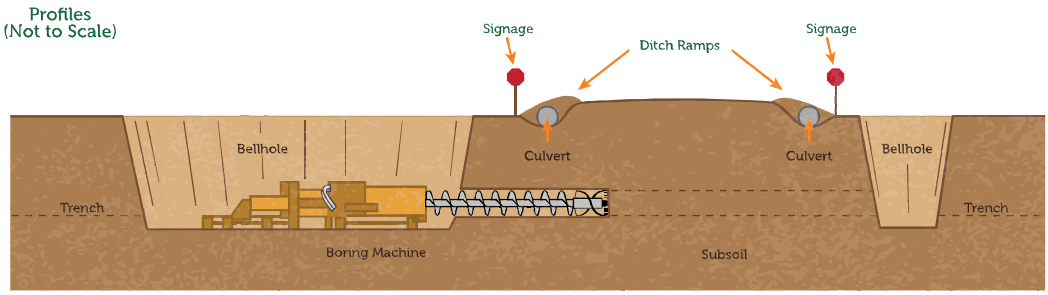
PIPELINE CONSTRUCTION METHODS

Conventional Pipeline Construction



Trenchless Technique for Crossing Roads and Railways





These are representations of standard pipeline construction techniques. Trans Mountain will use the most appropriate technique for each specific location.

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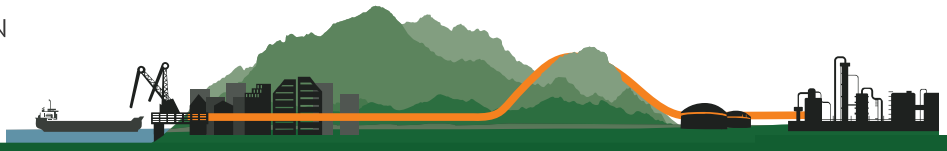

Community Construction Schedule

Key Pipeline Construction Activities

2017

- Infrastructure – laydowns
- Construction yards
- Camp site preparation
- Clearing
- Select river crossing HDDs
- Start of grading in select areas

2018

- Clearing continues
- HDDs continue
- Pipeline construction:
  - Grading
  - Stringing
  - Welding
  - Trenching
  - Lowering in
  - Backfill
  - Cleanup

2019

- Pipeline construction continues
- Hydrostatic testing
- Leave to open
- Commissioning
- Cleanup
- Restoration

MINIMIZING DISRUPTION DURING CONSTRUCTION

Trans Mountain and its Contractors will work to limit noise, dust and night lighting during construction in order to minimize disruption to communities.

Where practical, Trans Mountain will meet or exceed expectations outlined in applicable municipal and provincial permits and bylaws. Trans Mountain will continue to engage and communicate regarding construction activities before and during construction and will establish a community liaison in each affected community.

Light

Lights are used to enhance worker safety and job site security. Trans Mountain will seek to minimize light disturbance through measures such as directional lighting, diffusion, coating on bulbs and turning off lights when not in use. Some lights will be left on during night hours for security reasons.

Dust

Trans Mountain will use a number of techniques in urban, rural and agricultural settings to minimize dust created by construction vehicles and activities. These measures may include speed control, site watering, use of dust suppressants, as well as physical measures to limit the spread of dust.

Viewscapes

The Environmental Protection Plan (EPP) identifies measures to limit visual disturbance including screening, replacement of ornamental trees and vegetation, as well as reclamation techniques to ensure regrowth blends with nearby vegetation.

Noise

The Noise Control Plan identifies techniques to minimize noise effects including construction scheduling, equipment selection and maintenance, vehicle operation, position of noisy equipment and use of enclosures and baffles. The Noise Control Plan also outlines how Trans Mountain will monitor and report on the effectiveness of these measures.

Construction Scheduling

Construction will typically take place 5 – 6 days per week for 10 – 12 hours during the day. In special circumstances more night-time or weekend hours may be required to complete a critical construction activity.

These images are representative of urban pipeline construction in general. Trans Mountain construction activities may vary depending on the location.