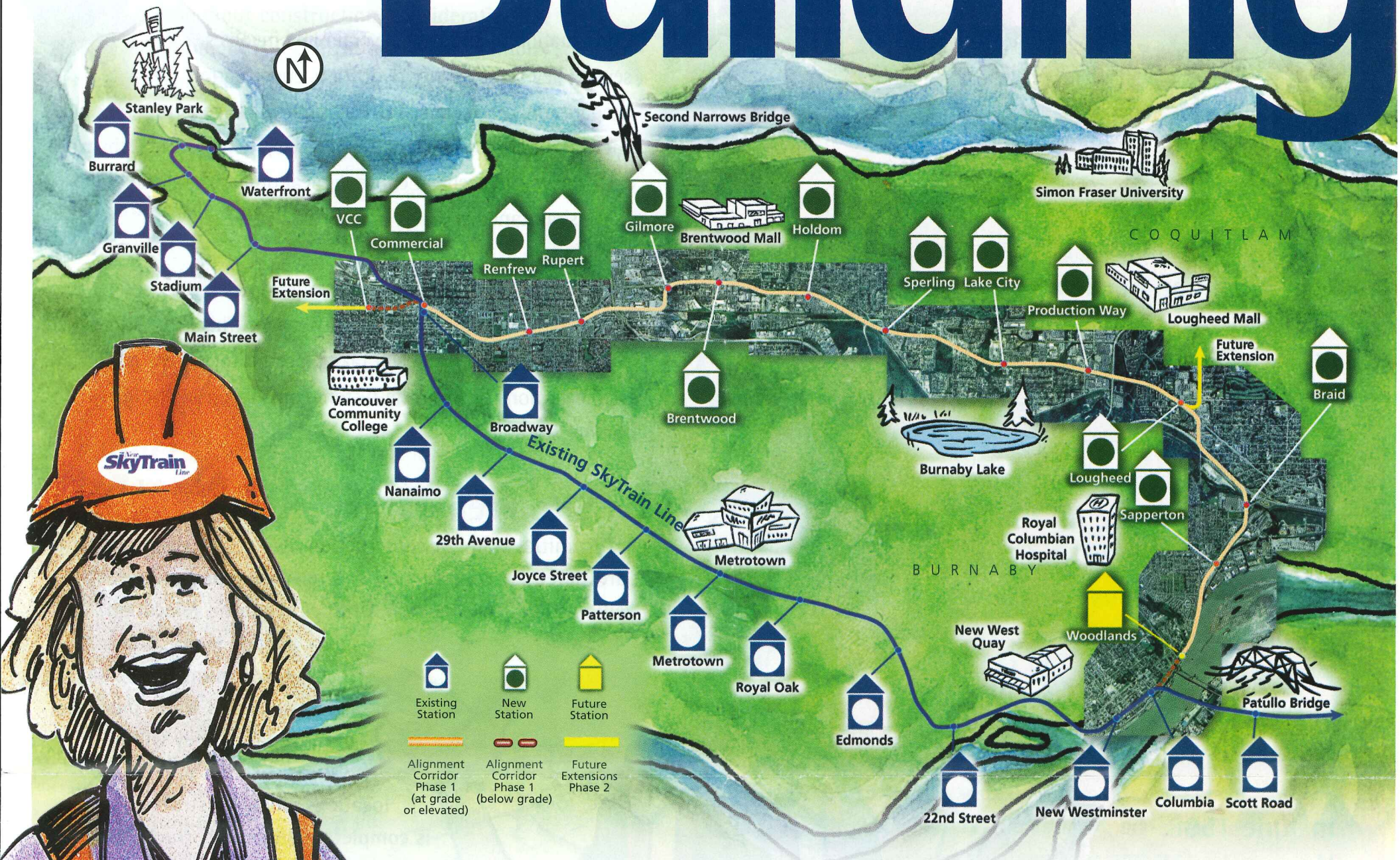


A primer  
on the  
construction of the  
new SkyTrain line.

# Building



“The new SkyTrain line includes 13 new stations over 21 kilometres linking people and neighbourhoods in Vancouver, Burnaby, New Westminster and Coquitlam.”

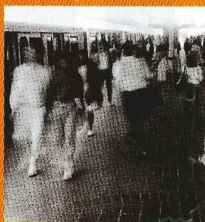


It will stop at Vancouver Community College, Brentwood and Lougheed Malls, and Royal Columbian Hospital. Future extensions of the system are proposed west of Commercial Drive in Vancouver and north from Lougheed Mall to Coquitlam Town Centre. The SkyTrain line will start up in two separate phases. The first phase is New Westminster to Lougheed Mall and the second, Lougheed Mall to Vancouver Community College. [Read more on how we build the new SkyTrain and some safety tips to keep in mind during construction.](#)

THE *New*  
**SkyTrain**  
*Line*

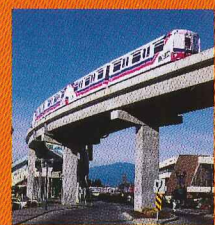


# A SkyTrain Primer



SkyTrain, Greater Vancouver's advanced rapid transit system, began operations in March 1986, just in time to serve the transportation needs of Expo 86.

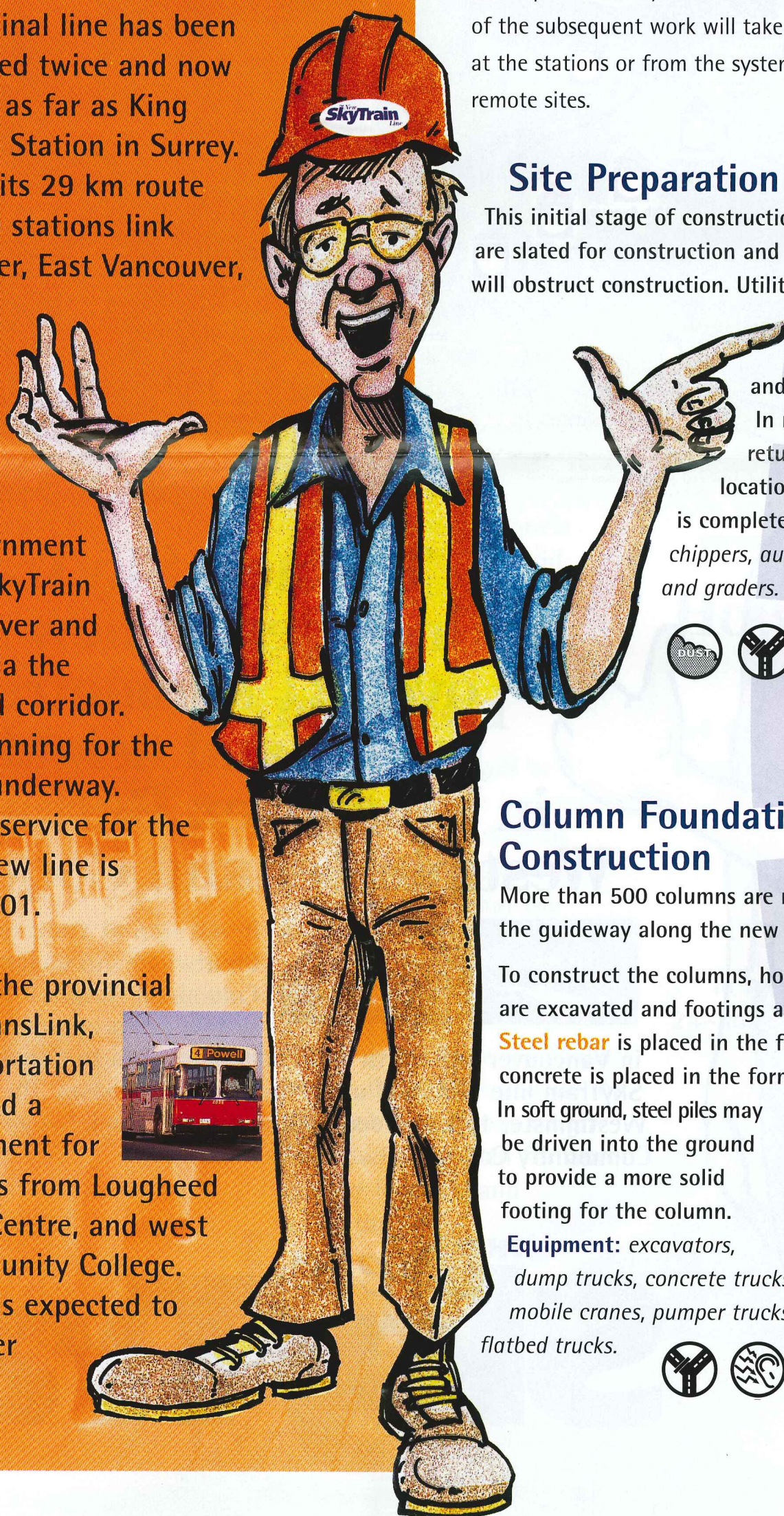
Since then, the original line has been extended twice and now travels as far as King George Station in Surrey. Today, its 29 km route and 20 stations link



downtown Vancouver, East Vancouver, Burnaby, New Westminister and Surrey with fast, efficient service.

In June 1998, the provincial government announced a new SkyTrain line, linking Vancouver and New Westminister via the Broadway-Lougheed corridor. Since that date, planning for the new line has been underway. Revenue passenger service for the first phase of the new line is expected in mid-2001.

On June 25, 1999, the provincial government and TransLink, the regional transportation authority, announced a cost-sharing agreement for future SkyTrain lines from Lougheed Mall to Coquitlam Centre, and west of Vancouver Community College. The Coquitlam line is expected to begin service no later than 2005.



## How we build it...

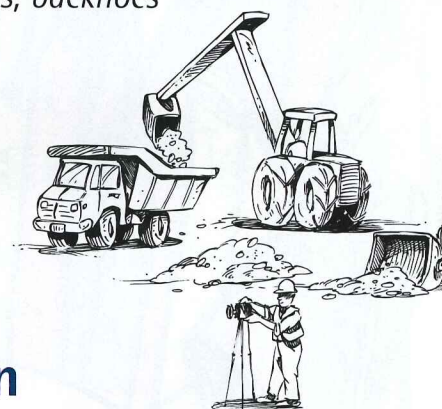


Construction of the new SkyTrain line involves several key areas: utility relocation, construction preparation, **guideway** construction, station construction and the installation of rails and guideway systems. These steps will not necessarily occur in chronological order; some may take place simultaneously.

Following the completion of construction elements, residents will experience only minimal disturbances. This is because much of the subsequent work will take place on top of the guideways, at the stations or from the system control centre and other remote sites.

### Site Preparation

This initial stage of construction involves clearing areas that are slated for construction and relocating any utilities that will obstruct construction. Utilities requiring relocation include hydro, gas and telecommunications lines, and sewage and water pipelines. In most cases, they will be returned to their original locations when construction is complete. **Equipment:** trucks, loaders, chippers, augers, backhoes and graders.



### Column Foundation Construction

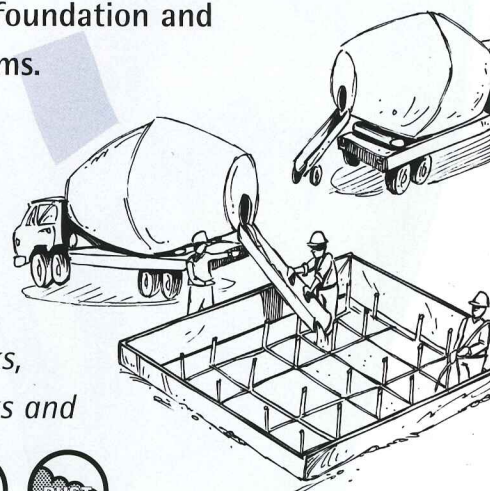
More than 500 columns are required to support the guideway along the new SkyTrain line.

To construct the columns, holes for the columns are excavated and footings are put in place.

**Steel rebar** is placed in the foundation and concrete is placed in the forms.

In soft ground, steel piles may be driven into the ground to provide a more solid footing for the column.

**Equipment:** excavators, dump trucks, concrete trucks, mobile cranes, pumper trucks and flatbed trucks.



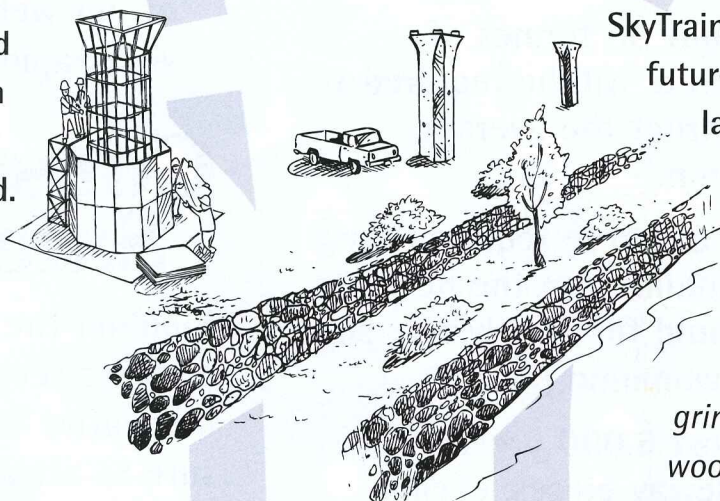


## Column Construction

Once the foundations are complete, column rebar cages are attached to the footing rebar and prefabricated forms are placed around the rebar. Concrete is then poured into the column form.

Throughout construction, consideration for the environment is a central focus. For example, special measures are taken to avoid affecting fish and fish habitat. Vegetation removed during construction is replaced.

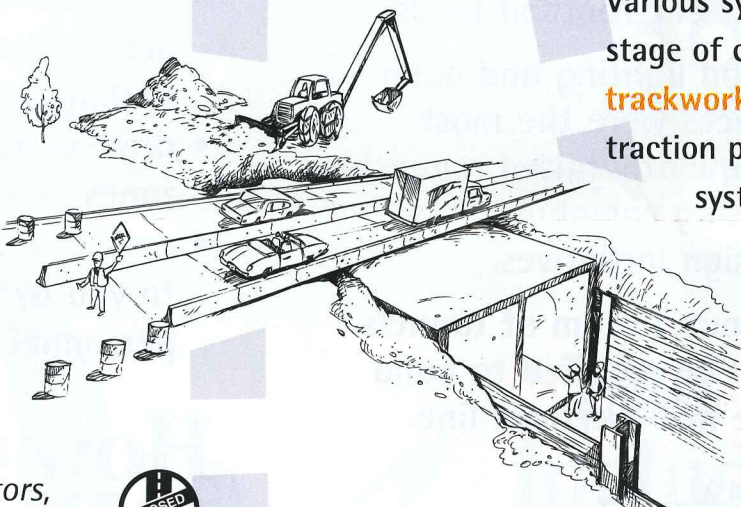
**Equipment:** concrete and pumper trucks.



## Tunnel Construction

About 1.6 km of twin tunnels will be required for the new SkyTrain line. The average height and width of the tunnels will be five metres.

Tunnel construction generally uses the "cut and cover" technique. In this most common technique, large trenches are excavated, allowing installation of the dual concrete tunnel box. Any earth initially removed is replaced and the area is landscaped.



**Equipment:** excavators, bulldozers, backhoes and compressors.

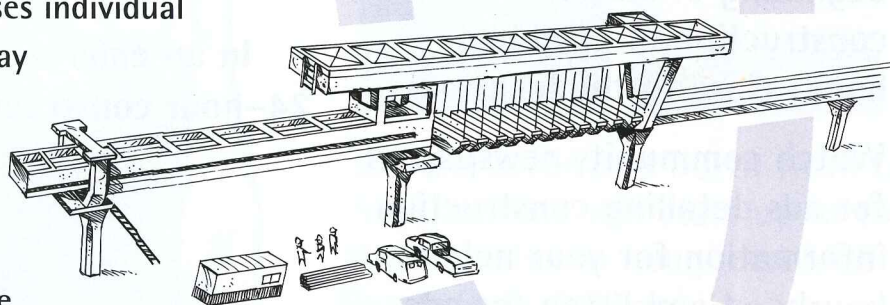


## Guideway Construction

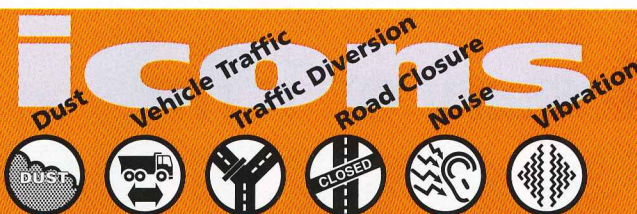
Constructing the new SkyTrain line will use a technique never before used in B.C. An **overhead cantilever truss system** raises individual pre-cast guideway segments about three metres long into place. Once in position, they are

tied together with

**post-tensioning cables** to form 37 metre long beams. **Equipment:** flatbed trucks, mobile cranes, cable hoists and post-tensioning equipment.



Building the new SkyTrain Line will have some probable construction impacts.



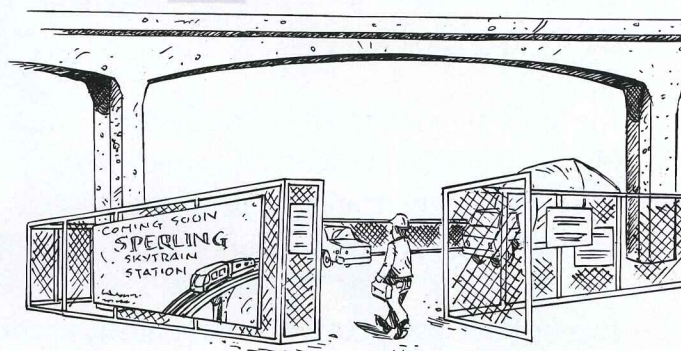
Words in orange are found in the Glossary

## Station Construction

A total of 13 new stations will be built on the new SkyTrain line. One additional station is proposed for future construction. Once the station foundation is laid, construction proceeds around the guideway.

The station facilities and equipment are installed at the final step of station construction.

**Equipment:** mobile cranes, concrete trucks, grinders, steel and wood saws.



## Systems Installation

Various systems and technology are installed during this stage of construction including **automatic train control**, **trackworks**, **linear induction motor (LIM) rail** and **power rail**, traction power and an integrated alarm notification system. This step also involves the installation of communications systems such as the passenger and public information system, platform safety systems and telephone and radio communications. **Equipment:** drills and pneumatic hammers.



## Final Stages

During the final phase of construction, testing and commissioning of the new SkyTrain line takes place. Bombardier, developer and manufacturer of SkyTrain technology, is responsible for the final testing and verification. The company will ensure that the existing line and the new line function together as an integrated SkyTrain system. The main feature of this phase will be 24-hour system vehicle testing.

# All Aboard!





## Glossary of Terms

**Automatic train control:** The computerized train control system that allows a SkyTrain car's movements to be directed from a centralized control centre. Each SkyTrain car is equipped with an antenna system that receives signals from a wire between the tracks and the LIM rail. The antenna passes the signals to a vehicle on-board computer (VOBC) that controls the SkyTrain car's movements. The guideway wires are linked to one of several vehicle control computers (VCC). There are three VCCs on the existing line; two will be added for the new SkyTrain line.

The VCCs are monitored by the System Management Computer (SMC) which looks after non-safety related items such as routes, schedules and station announcements. Each of the computers, VOBC, VCC and SMC, are actually two or three computers that continually check each other to ensure safety and reliability.

**Guideway:** The reinforced concrete structure upon which the SkyTrain tracks are fastened.

**LIM rail:** An aluminum-clad flat steel plate, or laminated plates, placed between the SkyTrain running rails. Each SkyTrain car's linear induction motors interact magnetically with the LIM rail to provide propulsion and braking.

**Linear induction motor (LIM):** A propulsion and braking system for SkyTrain cars that converts electrical energy into a magnetic field that reacts with the LIM rail. When braking, almost all braking energy is returned to the power rails to be used by other trains making SkyTrain one of the most energy efficient public transportation systems.

**Overhead cantilever truss system:** A machine that stands on guideway columns and is used to move segments of reinforced concrete into place to assemble the guideway beams.

**Post-tensioning cables:** Cables that are strung between and through guideway segments and tightened to form a continuous, strong guideway beam.

**Power rails:** "Third" and "fourth rails" attached to the inside of the guideway that supply 600 volts of direct electrical current to power the SkyTrain cars. The power rails can be on either side of the guideway to make room for junctions and switches.

**Steel rebar:** Steel bars used to internally reinforce concrete structures.

**Trackwork:** The standard-gauge steel running rails upon which the SkyTrain cars' wheels rest. These are identical to the rails used on mainline railways.



# THE *New* SkyTrain *Line*

## Interesting Facts

- About 50 tonnes of concrete will be required to construct the average column.
- The concrete required for all columns on the new line could fill six Olympic size swimming pools.
- Almost 6,000 pre-cast guideway pieces, each about three metres long, will be used during the guideway construction.
- If placed end to end, these guideway pieces would stretch the length of 190 CFL football fields.
- Good lighting and open spaces were the most frequently raised requests among community station design initiatives.
- About 1.6 km of tunnels will be required to build the new SkyTrain line.

## Stay Informed

- Advisory notices will be distributed before the start of major construction in affected neighbourhoods. Postcards will signal the beginning of station construction in neighbourhoods close to the location.
- Watch community newspapers for ads detailing construction information for your neighbourhood and listen for ads on your local TV and radio stations.

- For more information and details please visit the construction section of our website at [www.rapidtransit.bc.ca](http://www.rapidtransit.bc.ca)

## Construction Safety Tips

Building the new SkyTrain line employs several interesting and innovative techniques that are sure to attract your attention. However, it is important that you follow these rules when close to SkyTrain construction sites:

- remain well away from any construction activity
- never enter any construction area without proper authorization
- drive carefully in construction zones
- respect any instructions given to you by construction personnel such as flagpersons

## How to Reach Us

Call with questions or concerns about construction:

**Construction Relations Office**

**292-7912**

(8 a.m. - 5 p.m., M-F).

In an emergency, call our 24-hour construction hotline at **298-1725**

