Bloor/Yonge Station

Bloor/Yonge Station is the transfer station between the Yonge Subway and the Bloor-Danforth subway, and experiences a large movement of passengers between the two subway lines. This results in station dwell times, on the Yonge subway level, in excess of the 30 seconds for which the present signal system was designed. In order to reduce headways, it is necessary to reduce the dwell time at this station. Four options have been developed which will reduce the station dwell time by separating the loading and unloading functions.

Dwell time is dependent on the number of doors available passenger movement and on the width of the doors. At present, the doors on one side of the train only are used at station stops. It is not considered practical to widen the doors on the existing vehicles nor to increase the number of doors. At Yonge and Bloor, station delays are experienced because of the large volumes of passengers entering and exiting through the one set of doors. The options considered, therefore, permit the use of both sets of doors by the addition of station platforms.

The options developed are:

1. A Centre Platform Option - In this option, a centre platform is added to create a three-platform arrangement.
2. A Series Station Option - In this option, new platforms are added north of the existing platforms.
3. A Bi-Level Option - In this option, a second level is added below the existing station.
4. A Divided Station Option - In this option, the northbound track is moved east to Park Road or alternatively the southbound track is moved west to Yonge Street.

Analysis of these options indicates the Centre Platform Option to be the preferred option.

<u>Centre Platform Option Description</u>

This scheme would widen the existing station structure and track centres to accommodate both a centre unloading platform and two side loading platforms. This proposal is shown in Exhibit 4.1.1.

The new centre platform would be used exclusively for unloading passengers in both directions. The existing northbound platform would be dedicated to northbound loading passengers only, and the existing southbound platform for southbound loading passengers only.

Thus, each train would stop with an unloading platform on one side and a loading platform on the other. The loading and unloading of passengers would take place

simultaneously. A train would open doors to both platforms to allow unloading through doors on one side of the train and boarding through doors on the opposite side.

Modifications would be required to the subway cars to allow both doors to open at once by rewiring the electrical system. Further study will be required in this area. A new centre unloading platform measuring up to 18 feet wide, would be added to the Bloor Station, but there may be an opportunity to improve on this width in the detailed design stage. To allow for the new track transition, both the existing station structure and the running structure housing the alignment, would be widened. This would be achieved by spreading out the existing track centres over a length of about 1800 feet, stretching from north to south, between Church Street and Isabella Street.

The existing side platforms will be widened as part of future station modernization contracts. Each widened side platform would then be cut back approximately 5.5 feet in order to accommodate the new centre platform and widened track centres.

A set of stairs and escalators will service the south mezzanine to the new 33 Bloor East development on the north side of Hayden Street.

A pedestrian passage would be constructed under the widened portion of the southbound platform. These would be exclusively for the use of Bloor Station unloading passengers requiring access to the Bloor-Danforth Subway, Yonge Station platform. Stairs and escalators would be provided down from the new centre platform to access 2 pedestrian passages which cross under the southbound track and connect into the main passage under the southbound platform. The passage crosses under the Bloor-Danforth subway structure and access up to the Yonge Station platform is provided by two sets of stairs and escalators. The schematic underview in Exhibit 4.1.2 shows these passages.

The addition of the new set of stairs and escalators at the north end of the centre platform will require modifications to the north mezzanine.

The effect of opening doors on both sides of the train for simultaneous loading and unloading will be to double the number of doors and decrease the dwell time. The separation of loading and unloading platforms will eliminate the congestion resulting from two-way traffic on the existing platforms. Thus, the increased capacity and efficiency obtained from the 3 platform station would achieve the required 30 second dwell time.

Order of Magnitude estimates determined that the Centre Platform Option was the lowest cost option at $70,000,000 (1988 dollars). This cost was used in the evaluation which established the Centre Platform Option as the preferred proposal. Further study of this option resulted in the estimate being increased to $120,000,000. The other alternatives, having been rejected, were not developed further. Further study of these options would presumably result in similar increases in cost.

The updated Centre Platform Option estimate includes the north and south running structure widening, the station modifications, traction power and trackwork. The costs that are not included in this estimate are:

1. signal modifications,
2. property or easements,
3. injurious affection to neighbouring developments,
4. operations costs,
5. TTC marketing and relations costs
6. vehicle retrofit, and
7. yard modifications.

Feasibility

The feasibility of constructing this proposal is constrained by the close proximity of support caissons underlying the Bay and Bell buildings. These are located immediately north of the Bloor Station platforms, approximately 6 feet to either side of the existing structure.

The Bell building floor slab will be affected by the widening north of the station. The Hudson's Bay Centre columns and floor slab will also be affected by this widening.

At the south end of the station, the caissons required for the proposed 33 Bloor East development will be located far enough outside the existing structure to allow the widening of the side platforms in this area.

South of the station, the widening can be accomplished under the City Park parking lot to a point 65 ft. south of the centre line of Charles Street. The length of running structure to be widened south of the station will be approximately 320 feet. It is planned that the widening will be studied further in conjunction with a new development, by the Parking Authority of Toronto, to be located south of Hayden Street. In this way, each project can be constructed with minimal impact on the other.

As stated above, the new 18 foot wide, centre unloading platform would require spreading of the existing track centres north and south of the station to 28' 9 1/2". The caissons north of the station prohibit spreading out to this required width north of the station; thus the tracks would continue spreading out within the station.

The 18 foot wide centre platform would contain a TTC standard escalator and three staircases in tandem for access to a lower level passage. The resulting reduced platform width on either side of the stairs or escalators will be approximately 5.75 feet.

A future station modernization contract S3-5 will lay the groundwork for this centre platform proposal at the south end of the station in conjunction with the development overhead. The side platforms will be widened, a portion of the pedestrian passage will be

constructed under the southbound platform, and the subway roof will be replaced under this contract.

A study is presently being carried out on the subway and 33 Bloor East structural designs to allow removal and reconstruction of the subway roof (at the south end of the station) and to minimize the number of columns on the side platforms.

Construction Staging

An important element of the Improved Headway Study is the necessary reconstruction of the Bloor Station on the Yonge Subway line.

The majority of this reconstruction will be carried out during normal working hours, some specific items of work will be carried out during evening closure, and some systems oriented work during full closure of the Yonge Subway at this location. The reconstruction will be broken down into the following major segments of construction as shown in Exhibit 4.1.3.

Segment A

The construction at the south end of the station involving replacement of some of the roof, platform widening, and a portion of access passage beneath the existing station invert, will be carried out under an existing agreement with the developer. Since this project was not contemplated, in its present form, when the scope of Contract S3-5 was established, revisions to drawings and changes to the developer's contract must be implemented immediately. The construction of this segment of the work will be readily accessible by the open cut method. Existing buildings on the site will be demolished by the developer, to provide an unencumbered open area. New caissons will be installed behind the existing exterior walls to support new steel columns. Steel beams will be installed to span between these columns. The existing roof structure (now exposed) and centre columns will be sawcut into manageable sections, removed and replaced by steel girders and a concrete slab which will span the full width of the new station structure. Relocation of the exterior station walls will be accomplished by installing lagging, sawcutting and demolishing the existing walls in segments and then constructing the new platform, wall and roof sections outside the existing walls.

A portion of the new access passage, beneath the new platform extension will be constructed at the same time as the platform widening. Bulkheads will be included to be later demolished when the access passages are completed under the Segment C contract.

Segment B

The south taper, roughly from the south street line of Hayden Street to 97 metres further to the south can be constructed in open cut using the pre-bored piles and lagging method with street decking as required.

Access will basically be unlimited since the area occupied is currently a municipal parking lot.

Construction may run concurrently with the work described in Segment A above since an existing agreement with the developer and the Toronto Parking Authority requires that a parking garage be available prior to the completion of the developer's building.
The new tapered structure will be constructed wide enough to allow for the sawcutting of existing walls prior to demolition. The existing subway roof structure will be supported (hung) from the new roof structure which will span between the new tapered structure walls, and the existing centre wall of the subway which will remain in place.

Backfill and restoration work can be carried out in the same manner as open cut structures are normally done.

The sub-structure of the parking garage must of necessity be designed to span our new tapered structure and allow for normal clearances.

Segment C

This major segment of work, and ultimately most difficult will encompass the work to be carried out under Hayden Street, Bloor Street, the "Bay" department store, the Bell building behind the "Bay", and the access passages beneath the existing Bloor Street Station invert.

The work within the confines of Hayden and Bloor Streets can be open cut, using the pre-bored piles and lagging method of construction, and street decking to- facilitate continuing traffic flow. A preliminary sequence of construction will be to excavate, build new exterior walls, and invert slabs, outside the existing structure. Girders would be installed to span over the width of the roof and the roof would be anchored to the structural steel girders. The centre columns and old walls will then be saw cut and removed section by section.

The most difficult portions of work will be carried out underneath the existing Hudson Bay shopping mall, and beneath the existing basement of the "Bell" building. These two areas must be closed during construction, alternative arrangements for those currently occupying these areas must be made since access to the roof of our existing structure can only be gained through these existing floors.

To construct the north taper section vertical access shafts must be sunk on property presently occupied by a car wash on the north side of Asquith Avenue. Access tunnels will then be dug southward on each side of the existing structure and between existing foundations to the "Bay" and "Bell" buildings. Complicated underpinning in this area will be required.

New subway walls will be constructed, allowing sufficient working space to sawcut and remove existing subway walls later.

The existing subway roof will be hung from a system of steel carrying beams, resting on the new subway walls, and situated beneath the existing basement floors of the "Bay" and "Bell" buildings and the top of the existing subway roof. New sections of invert slab and roof slab can be constructed outside the existing walls and the floors to the Hudson's Bay Centre Concourse Level and "Bell" basement can be restored.

Once the basic outer structure is almost complete, work within the existing station can commence. What has to be accomplished here is the sequential construction of a new centre platform at the Yonge Street level and access passages connecting this to the existing Yonge Station on the Bloor/Danforth Subway.

To achieve this, the existing side platforms in the Bloor Station will be narrowed by saw cutting, demolishing and removing section by section.

This work will necessitate closure of the Bloor Station platform area for a period of four to six months, with service interruption for a similar period. During this closure, and subsequent to narrowing of the side platforms, relocation of the trackwork, traction power signal system can be accomplished. Also during this closure, construction of the new centre platform can commence, together with cutting access openings to the passages beneath the station.

Access passages will require tunneling by hand with minimal use of excavating equipment. Very difficult access and egress are involved. A two or three shift operation can be considered for this stage of the work.

Once this stage of the work is nearing completion architectural finishes can be restored and replaced.

A five year programme of construction is contemplated costing between $120 and $150 million (1988 $).

A more detailed breakdown of costs associated with Bloor Station construction is shown in Exhibit 4.1.4.