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HIGHWAY 7 CORRIDOR AND VAUGHAN N-S LINK ENVIRONMENTAL ASSESSMENT RECOMMENDED ALIGNMENT

The Rapid Transit Public/Private Partnership Steering Committee recommends the adoption of the recommendations contained in the following report, September 8, 2003, from the Executive Co-ordinator, York Rapid Transit Plan:

1. RECOMMENDATIONS

It is recommended that:

1. Council endorse, for the purpose of developing the Draft Environmental Assessment (EA) Report.
 - The recommended alignment for surface rapid transit service and the use of both BRT and LRT technologies on portions of that alignment to accommodate the potential for transition from BRT to LRT at some point during the YRTP network evolution.
 - The recommended alignment, within York Region, of an extension of the Spadina Subway from the Downsview Station through York University to the Vaughan Corporate Centre.
2. Copies of this report be forwarded by the Regional Clerk to the Clerks of the Towns of Markham and Richmond Hill and the City of Vaughan.

2. PURPOSE

The purpose of this report is to inform Committee and Council that the Preliminary Preferred Alignment Alternative as described in the report to Steering Committee on August 26, 2003 has been presented to the public and based on the analysis of alternatives and public comments, a preferred alignment has been determined and is recommended for endorsement by Council.

3. BACKGROUND

The Ministry of the Environment (MOE) on June 13, 2003, approved the Terms of Reference for the Highway 7 Corridor and Vaughan N-S Link Environmental Assessment Study.

At the request of the City of Vaughan, the scope of the EA Study for the Vaughan N-S Link included assessment of alignment alternatives for two phases of the YRTP network evolution to facilitate property protection by the City. These comprised, initial implementation of surface rapid transit and, at some point in the future, fully grade-separated rapid transit in the form of an extension of the TTC Spadina Subway into York Region to link with the Highway 7 corridor at Vaughan Corporate Centre.

The Need and Justification Study and the Terms of Reference completed previously, recommended the study area for evaluation of the route alternatives. As illustrated in (*Attachment 1*), the area extends from the Peel boundary in the west to the Durham boundary in the east and between Steeles Avenue and the 16th Avenue-Carrville Road-Rutherford Road in the north-south direction.

The City of Toronto and the TTC are conducting a parallel Municipal Class EA for improved bus-based rapid transit between York University and the Downsview Subway Station as a precursor to extension of the Spadina Subway Line to the University. The study area for their EA extends to Steeles Avenue opposite the University. In addition the City is seeking Council approval to request proposals for an update of the EA for an extension of the Spadina Subway to York University.

Recently, the City of Vaughan completed two land-use policy and planning studies for the Highway 7 corridor. The first covered the lands between Highway 50 and Bathurst Street and included a major redevelopment study of the lands in the southeast quadrant of the Jane St./Highway 7 intersection. The second studied the lands north of Steeles Avenue between Jane and Keele Streets. The recommendations of these studies have been considered in evaluating rapid transit routes. Markham is planning to initiate a similar study of its portion of the Highway 7 corridor.

The results of the evaluation of alignment alternatives will be presented at Public Information Centres (PIC's) scheduled for Sept 18, 19 and 20th.

4. ANALYSIS AND OPTIONS

Given that the Highway 7 Corridor study area extends over 44 km east-west across three municipalities, the analysis of alignment options was done on a segmental basis using the four segments identified for the preliminary screening described in the Terms of Reference. The first phase of the EA developed alignment alternatives along the route options in each of the four Highway 7 linear segments and the Vaughan N-S Link shown in (*Attachment 1*).

These alignment alternatives were first presented to the Public at the second series of Public Information Centres held at three locations in April. The results of the evaluation of the route alternatives will be presented for public review at the subsequent final series of centres in mid-September.

It should be noted that the alignment analysis was neutral regarding the type of technology and the findings would apply to either a BRT or LRT technology option given that the alignments were developed to accommodate design standards of both technologies. For the Vaughan N-S Link, separate alignments were analysed for the surface technologies and the potential subway extension.

4.1 Description of Route Alternatives

4.1.1 Segment A: Highway 50 (Peel Boundary) to Highway 400

In this segment, the only feasible route alternative is to locate the transitway in the median of the existing Highway 7 cross-section. It will comprise two new lanes reserved exclusively for transit vehicles with all intersections crossed at-grade and traffic signals

modified, where beneficial, to give priority to transit vehicles. The existing and planned general traffic lanes will be retained.

For most of its length, the Highway 7 right-of-way is wide enough to accommodate the addition of the transit lanes by a reduction in the width of the existing boulevard between the curbs and property lines. The one exception is the approximately 0.75 km section between Kipling Avenue and the Humber River. As this section is too narrow to permit the insertion of transitway lanes without significant property acquisition and reconstruction of CP Rail's MacTier subdivision overpass, the only alternative is to operate the rapid transit in mixed traffic lanes. Options for mixed traffic operation include either Highway 7 itself or, as planned for the Quick Start phase, a diversion along Kipling Ave., Woodbridge Ave. and Islington Avenue before returning to Highway 7.

From the Islington Ave. intersection, the route continues eastward in the Highway 7 median to Highway 400. In this 9 km segment, stations are proposed at Highways 50 and 427, Highway 27, Martin Grove Road, Kipling Ave., Islington Ave., Helen Street, Pine Valley Drive, Aberdeen Ave., Ansley Grove Road and Weston Road. With the exception of Highway 427, Kipling and Islington Ave., where station platforms will be parallel, platforms will be positioned diagonally opposite each other on the far-side of the intersections.

4.1.2 Segment B: Highway 400 to Yonge Street including the Link to York University/Spadina Subway

This segment required analysis of three primary route alternatives in each of two sections. In the first western section, between Hwy 400 and Centre Street, the alternatives are:

- to place the transitway entirely in the Highway 7 right-of-way for the full 4 km length of the segment to Centre Street, (B1). This alternative was assessed in combination with an option for the Vaughan North-South Link, a transitway in the median of Jane Street from Highway 7 to the Hydro ROW and the planned regional transit terminal north of Steeles Avenue opposite York University.
- to locate the transitway on Highway 7 through the Vaughan Corporate Centre and then turn south at Jane Street to follow one of the Vaughan N-S Link alignments to the proposed regional terminal on Steeles Avenue opposite York University. From the University, the route continues east in the Hydro One right-of-way or on Steeles Avenue as far as Keele Street, which it then follows northward to return to Highway 7. For the remainder of the segment, the route continues eastward in the Highway 7 median to Centre Street, (B3).
- to follow the same route as the second option above to the University and eastward to Keele Street but then use the Hydro One right-of-way in a north-easterly direction returning to the Highway 7 corridor in the vicinity of Centre Street, (B2).

On the above routes, the transitway is assumed to be in the median of roadways or on a separate running way, in or adjacent to the Hydro right-of-way.

For the second section, to the east, between Centre Street and Yonge Street, three alternatives were again compared:

- continuing north and east along the Highway 7 right-of-way in the median to the planned Langstaff intermodal terminal at Yonge Street, (B4).
- leaving highway 7 at Centre Street and continuing eastward in the median of Centre Street as far as Bathurst Street. At the Bathurst Street intersection turning north into the median of Bathurst Street to return to the Highway 7 corridor. The route then turns east using the existing ramp to reach the median of Highway 7, in which it continues 2 km east to Yonge Street, (B6).
- continuing northeast in the Hydro One right-of-way up to and across Bathurst Street and then crossing Highway 407 to rejoin Highway 7 to reach the terminal at Yonge Street, (B5).

The above Segment B route alternatives and potential station locations are shown in (*Attachment 2.*)

4.1.3 Segment C: Yonge Street to Kennedy Road

Local Alignment Alternatives

In the western half of this segment, two local alternative alignments are available between Yonge Street and Bayview Avenue and a further two options to cross Highway 404 between Leslie Street and Woodbine Avenue. These alternatives are:

- From the Langstaff intermodal terminal, south to the median along Highway 7 with a loop up Silver Linden Drive and returning to Highway 7 for the section from Bayview Avenue to Leslie Street.
- From the Langstaff intermodal terminal northeast across CN Rail's Bala Subdivision into the High Tech Road median and then south on Silver Linden Drive, rejoining Highway 7 to continue east from Bayview Avenue to Leslie Street.
- Crossing Highway 404 in the Highway 7 median through the existing interchange structure with signal priority for the section between the interchange ramp intersections.
- Crossing Highway 404 by leaving Highway 7 at East Beaver Creek Road to reach a new transit-only overpass of the highway, approximately 0.5 km north of the interchange. East of the highway, a new right-of-way across a vacant lot would allow the transitway to reach Allstate Parkway, which would be used to return to the Highway 7 right-of-way.

Segment Route Alternatives

In the eastern half of Segment C, between Woodbine Avenue and Kennedy Road, three primary route alternatives were compared. These included:

- Placing the transitway in the median of Highway 7 for the entire length of the eastern half of the segment, (C1)
- From the median of Highway 7 at Cochrane Dr., south on Cochrane to Lanark Rd turning east across Woodbine Avenue into Yorktech Dr. and continuing east along Yorktech Dr. to Enterprise Drive at Warden Avenue, then through the Markham Centre Civic Mall to the Unionville GO Station. From the station the alignment follows Helen Ave. to Unionville main Street where it turns north to rejoin Highway 7 immediately west of the Rouge River crossing, (C2)
- Locating the transitway in the median of Highway 7 from Woodbine Avenue to Town Centre Blvd. and then turning south to Enterprise Drive. The alternative then continues east through the Markham Centre Civic Mall, passes under the Stouffville GO Line north of Unionville GO Station and joins Kennedy Road north of Helen Avenue, (C3)

Both alternatives passing through the Markham Centre provide convenient interconnection with GO Rail service and the proposed inter-regional BRT service on Highway 407. This is not possible with a route entirely on Highway 7.

Routing and station locations for the above alternatives are shown on (*Attachment 2.*)

4.1.4 Segment D: Kennedy Road to the York-Durham boundary

For this remaining 12 km segment, the Terms of Reference recommended Highway 7 as the most logical continuous route to serve major trip generators such as Markville Mall and the Markham-Stouffville Hospital. A transitway in the median has been assumed for the 4 km section from Kennedy Road to Markham Road. Between Markham Road and Wooten Way, cemeteries on both sides of Highway 7 make widening impossible hence a 1 km section of mixed traffic operation has been assumed for this section. In the remaining 5 km section east of Wooten Way widening of Highway 7 for a median transitway is feasible and is assumed.

The study considered two options for access to the Hospital, either a route on Ninth Line and Church Street or via a branch from Highway 7 to a transit terminal on Burr Oak Dr. east of the hospital property. Discussions with hospital planning staff indicated that the latter option could be made compatible with their expansion plans.

4.2 Evaluation Methodology for Selection of Preferred Alignment

The detailed evaluation within each segment, summarized in this report, considered the ability of the alignment alternatives to respond to the five main objectives of YRTP. These included:

- Improving mobility.
- Protecting and enhancing the social environment.
- Protecting the natural environment.
- Promoting smart growth, economic development and Regional/Municipal planning objectives.
- Maximizing cost-effectiveness of the rapid transit system.

For each of the above objectives, a range of goals and indicators was established to provide a measure of the effectiveness of each alternative in meeting the objectives.

4.3 Alignment Evaluation Findings

A synopsis of the detailed evaluation in each segment is presented in Table 1 (see *Attachment 3*). The effectiveness of each alternative in meeting the goals and objectives is reflected in the qualitative assessments summarizing the quantitative analysis carried out under each objective.

4.4 Preferred Alignment Alternative

Attachment 4 illustrates the preferred alignment alternatives for the entire corridor and the rationale for the recommendation in each segment is outlined below.

4.4.1 Segment A:

In this 8.5 km segment, the EA should seek approval for a transitway alignment mostly in the median of Highway 7 between Highways 50 and 400. Building on the Quick Start works and service, it is recommended that measures to achieve transit priority through the Woodbridge Village at Islington Avenue be included in the scope of the undertaking in this segment.

The EA will also assess effects of potential facilities at the Regional boundary to interface with future rapid transit service developed by Peel Region and City of Brampton.

4.4.2 Segment B:

The alignment evaluations in the west and east sections of this segment lead to the following recommendations:

Segment B West:

Alignment alternative B1, in combination with a partially segregated rapid transit service on Keele Street between Highway 7 and Steeles Avenue, is preferred because:

- Projections show that the combination will attract the highest ridership on east-west Highway 7 service by providing a direct link from Richmond Hill and Markham to both the Vaughan Corporate Centre and York University, which could include access to an extension of the Spadina Subway to Steeles Ave.
- The alignment conforms to the Official Plan's "nodes and corridors" policy by linking Vaughan Corporate Centre to the eastern YRTP network and the TTC system as well as serving the Jane/Highway 7 and Keele/Steeles redevelopment nodes on the corridors.
- The continuation of Quick Start service as partially segregated rapid transit on Keele Street between Hwy 7 and Steeles Avenue would offer an attractive routing for trips from the east, especially if Spadina Subway is extended initially to York University.
- The alignment combination supports Vaughan's vision for the ultimate development of land use along Avenue 7 and serves the planned major redevelopment to the south and east of the Jane Street intersection.
- A connection to a future Hwy 407 BRT service is possible at either Jane or Keele Street interchanges.

- A connection to a future station on GO Transit's Bradford Line is feasible.
- Adverse effects on the social and natural environment are either minimal or able to be mitigated.

The EA will protect opportunities for transit-oriented development by incorporating optional local alignment variations at the Highway 7/Jane and Steeles/Keele intersections.

Segment B East:

Alignment alternative B6 is preferred in this segment because:

- It has the potential to attract ridership from existing commercial and residential land uses on both sides of the alignment, as well as future transit-oriented intensification and redevelopment at the Dufferin and Bathurst nodes on Centre Street.
- The alignment serves existing community facilities and a major shopping area while also providing the opportunity for urban design improvements in the rights-of-way.
- A connection to a future 407 BRT service can be achieved at the Bathurst and Highway 7 intersection.
- Connections to local transit serving large residential areas north of Highway 7, such as the Carrville Community, can be made at the Bathurst and Dufferin nodes on the alignment. The local services will need to be configured as feeders to the rapid transit stations, using parts of Highway 7 where beneficial.
- Effects on the natural environment are negligible or minor and traffic management measures and improved transit vehicle technology can mitigate social environmental impacts.

Protection for measures to implement parallel express segregated rapid transit service entirely on Highway 7 is also recommended for this section between Bathurst and Centre Streets.

4.4.3 Segment C:

In this segment, the evaluation of options for crossing Highway 404 indicates that a short section of mixed-traffic operation between the inner ramps of the interchange could be feasible with transit signal priority. However, given that traffic volumes on Highway 7 may make this impractical, it is recommended that the EA also seek approval of an alignment bypassing the interchange to the north. From the east, this alignment uses Allstate Parkway to reach a new 404 overpass and returns to Highway 7 on East Beaver Creek Road on the west of the 404.

Evaluation of alignment alternatives between Woodbine Avenue and Kennedy Road has led to the selection of Alternative C3 as the preferred alternative because:

- It provides direct service to, and through, the planned Markham Centre from both east and west.
- It provides the best linkage of the existing Markham Civic Centre facilities to the major mixed-use Markham Centre development.

- A good connection to GO Transit's Stouffville Rail service and a future 407 BRT service can be achieved at Unionville GO Station.
- Proposed station locations will offer convenient access to both existing and future mixed-use development along most of the route.
- It offers the greatest potential for urban design improvements in the Highway 7 corridor through a combination of arterial road and civic mall rights-of-way.
- Although, not as minimal as a Highway 7 only route, effects on the natural environment are confined to a single new crossing of a Rouge River tributary.
- Capital costs are estimated to be similar to the other alternatives and land acquisition costs are limited to approx. 0.6 km of the route.
- Traffic interface concerns on the Highway 7 and Kennedy sections can be mitigated and attenuation of noise and vibration on the civic mall is feasible if required.

Protection for measures to implement parallel express rapid transit service entirely on Highway 7 is also recommended for this section between Town Centre Blvd. and Kennedy Road. These measures would build on Quick Start facilities to minimize congestion delays in this segment.

4.4.4 Segment D

Developing the transitway, mostly in the median of Highway 7 offers good access to stations and local transit, and can support a major improvement in the urban design of the corridor.

Assuming the urban structure of the east-west corridor through this segment is to be concentrated around Highway 7, rapid transit service entirely on the highway will best support this planning objective. Local diversions to access Markham-Stouffville Hospital and the planned, Markham East business and commercial are recommended.

4.4.5 Vaughan North-South Link Subway Alignment

Subway alignment alternatives developed during prior studies for the City of Vaughan were reviewed to confirm that the preferred alignment recommended in these studies responded well to the primary objectives adopted for the YRTP. As well, the compatibility of the alignment with current land use planning for the lands north of Steeles and the York University was verified. Alignments evaluated and the preferred alignment are illustrated in *Attachment 5*.

The preferred alignment, Alternative 'A', is recommended because:

- It conforms to the "nodes and corridors" policy of both the York Region and City of Vaughan Official plans
- It is consistent with the findings of subway expansion studies to date by the TTC
- It will achieve convenient access to the subway from the planned regional inter-modal centre north of Steeles Avenue and east of Jane Street.
- The alignment permits a connection with a future Hwy 407 transitway service at the Jane Street interchange
- It is the shortest lowest cost link between the planned regional terminal and the Vaughan Corporate Centre
- A station at the crossing of Highway 7 will provide service to both the Corporate Centre and the proposed Jane/Hwy 7 redevelopment area.

4.5 Characteristics of Preferred Transitway Alignment

4.5.1 System Capacity

By the year 2021, ridership forecasts indicate that the transitway service will require a capacity of 800-1500 passengers per hour per direction (pphpd) through and west of the Vaughan Corporate Centre in Segment A, 1600 pphpd approaching the York University from the east in Segment B, 1900-2600 pphpd in Segment C between Yonge Street and Kennedy Road and 2,400 pphpd in Segment D approaching Markham Centre from the east. The proposed two lane exclusive transitway, with at-grade intersections and either BRT or LRT technology, is able to accommodate the above volumes as well as some additional growth beyond 2021.

4.5.2 System Technology

In order to carry the projected ridership volumes in 2021, the following service levels would be required on the Highway 7 transitway for each technology under consideration:

Segment	Bus Rapid Transit (BRT)	Light Rail Transit (LRT)
A:	20 articulated buses (18m length) per hour Buses at approx. 1 km spacing	Projected demand does not justify LRT in this segment through a 2021 timeframe.
B:	20 articulated buses (18m length) per hour	Projected demand does not justify LRT in this segment through a 2021 timeframe unless intensification efforts are greater than anticipated.
C:	30 articulated buses (18m length) per hour	While projected demand alone does not justify LRT in this segment through a 2021 timeframe as part of the overall network analysis, to be evaluated in depth after 2008, LRT on this segment in conjunction with a Yonge Street LRT will warrant consideration.
D:	30 articulated buses (18m length) per hour	Projected demand does not justify LRT in this segment through a 2021 timeframe.
Vaughan N-S Link	20 articulated buses (18m length) per hour	Projected demand does not justify LRT in this segment through a 2021 timeframe. Also, an extension of the Spadina subway may become viable during this period.

As noted previously, terminal access improvements at Downsview Subway Station or a subway extension would be required to accommodate the vehicle frequencies listed above for the Vaughan Link service to the TTC subway network when they are combined with future TTC BRT volumes.

4.5.3 System Infrastructure

The preferred transitway alternative for Rapid Transit comprises:

- A 44 km two-lane, median transitway on the preferred alignments in the Highway 7 corridor between Highway 50 and Locust Hill designed to both BRT and LRT standards.
- Short sections of transit operation in mixed traffic through existing underpasses of major north-south arterial roads (e.g. Bathurst and Bayview).
- Stations at approximately one kilometre spacing, located generally at major intersections.
- Access to an intermodal terminal facility in the Langstaff area and at Markham Centre to provide connection to GO Transit and the proposed Yonge Street Transitway.
- Access to a maintenance facility for transit vehicles, potentially located south of Hwy 407 on the east side of Yonge Street.
- Park and Ride and passenger pick up/drop off facilities at selected stations.

Typical Highway 7 cross-sections and photo-simulations in *Attachment 6* illustrate the integration of these facilities.

5. FINANCIAL IMPLICATIONS

The budget for the consulting services to complete the EA for the Highway 7 Corridor and Vaughan N-S Link are included as part of the first stage agreement between York Consortium and York Region. No additional costs will be incurred as a result of completion of this work.

6. LOCAL MUNICIPAL IMPACT

Representatives from the Towns of Markham and Richmond Hill and the Cities of Toronto and Vaughan have participated on the Technical Advisory Committee and will be requested to continue their involvement during the assembly of the Draft EA Report. This report is to be circulated to Markham, Richmond Hill and Vaughan for review and comment.

7. CONCLUSION

The Highway 7 & Vaughan N-S Link EA study has completed a detailed evaluation of alignment alternatives for a rapid transit facility within the study area. The evaluation has identified a Recommended Alignment for a rapid transit service.

The Recommended Alignment and its effects on the environment have been thoroughly reviewed by the public and it has been selected with consideration of their comments.

The Recommended Alignment can accommodate either bus rapid transit (BRT) or light rail technology (LRT).

The details of the recommended alignment alternative for rapid transit and the effects of its implementation will be tabled in the Draft EA report, expected to be completed in July. This EA will seek approval for the use of both technologies on the Recommended Alignment to accommodate the potential for transition from BRT to LRT at some point during the YRTP network evolution.

The Highway 7 Corridor and Vaughan N-S Link are important transit initiatives to stimulate transit use, accommodate the growing travel demand and foster a number of urban form initiatives in the study area, specifically in three of the four Regional Centres and the lands north of Steeles Avenue at York University.

The Senior Management Group has reviewed this report.

(A copy of the attachments referred to in the foregoing has been forwarded to each Member of Council with the September 10, 2003 Rapid Transit Public/Private Partnership Steering Committee agenda and a copy thereof is on file in the Office of the Regional Clerk.)