

Transit City Etobicoke - Finch West LRT

APPENDIX K – Structural Review

March 2010

Toronto Transit Commission

EXISTING CONDITIONS STRUCTURAL EVALUATION FOR

ETOBICOKE – FINCH WEST LRT TRANSIT CITY

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FINCH LRT – Task 1: Assess Existing Structures

The following is an assessment of the existing structures along the proposed Finch Avenue LRT route in segments two to four inclusive. Each structure has been provided with a reference ID which consists of a segment number suffix followed by the number of the structure within the segment when travelling east to west.

2.1 - West Don River Bridge

This bridge currently carries two lanes of traffic in each direction with a median lane down the centre of the structure. The overall width of the bridge is 19.8m with the travelled width between sidewalks being 15.24m.

Currently the bridge does not have sufficient width to carry the proposed cross-section, even if the cycle lanes were omitted and the sidewalks were removed from the structure. To accommodate the cycle lanes and sidewalks as currently required, the structure would need to be widened by 4.5m on each side. The structure is a concrete rigid frame structure which is feasible to widen to the specific width required. Replacement of this structure is not considered to be warranted as it is in good condition. The structure will require an evaluation to determine the effects of the LRT live loading as well as any additional dead load of the raised track structure.

2.2 - West Don River Culvert

This twin cell concrete box culvert is located at the bottom of a deep fill with the roadway above currently carrying two lanes of traffic in each direction plus a single left turn lane. The overall width of the roadway between curbs is approximately 15.2m with steel beam guide rails (SBGR) placed between the curbs and the sidewalks.

Currently the roadway embankment does not have sufficient width to carry the proposed cross-section. The preferred approach is to construct the proposed cross section by means of a perched embankment supported by a mechanical stabilized earth (MSE) retaining wall mitigating the need to lengthen the existing culvert. Alternatively, the culvert could be lengthened provided it is acceptable to place additional fill in the valley.

2.3 - CNR Overhead

This bridge is a two span post-tensioned structure which spans over Finch Avenue with a centre pier located in the median of Finch Avenue. Raised sidewalks provide hard boundaries to the traveled width of the roadway which is approximately 11.2m in each direction and accommodates two through lanes and an unused median lane.

As a result of the unused lane, it is anticipated that there will be sufficient width to accommodate the proposed cross-section, including sidewalk and cycle lanes.

2.4 - Black Creek Culvert

This corrugated steel arch culvert was constructed recently when the previous culvert was washed out, and is currently carrying two lanes of traffic in each direction. Adjacent to the roadway is a SBGR, a sidewalk and grassy boulevard.

As a result of the structure relying on the surrounding soil for stability and subject to LRT loading, the structure will need to be either strengthened or replaced with a reinforced concrete culvert or bridge structure in accordance with current TTC standards.

As a result of the boulevard and the length of the culvert, it is feasible that the proposed cross-section can be accommodated with either natural 2:1 slopes down from the edge of sidewalk to the culvert head wall, or a perched embankment could be utilized, similar to what is proposed for the West Don River culvert, provided replacement is not required.

If replacement is required, the structure can be tailored to the specific geometric requirements.

3.1 - Hwy 400 Overpass

This bridge consists of a two span concrete I-girder structure spanning over Finch Avenue with a centre pier located in the median of Finch Avenue. The overall width of half of the roadway between curbs is 15.5m which is fully utilized by three through lanes and a ramp lane. There is also a sidewalk under the structure in each direction.

The current configuration of the structure cannot accommodate the existing lane configuration and the proposed LRT without significant modification or replacement. However, based on the conversion of the outside ramp lanes to through lanes, there is, would be sufficient width for the raised LRT median, three travel lanes and bicycle lane in each direction.

Other considerations for sustaining the existing traffic lanes could be evaluated for this structure, including but not limited to the following; placing the LRT on a distinct alignment, placing the LRT in a subway trench through the structure or replacing the structure with a longer span structure.

3.2 - CPR Overhead

This two span railway bridge is comprised of steel beam spans over Finch Avenue with a centre pier located in the median. Raised sidewalks provide hard boundaries to the traveled width of the roadway. The overall width of half of the roadway between curbs is approximately 11.9m which accommodates three lanes of through traffic.

There is not sufficient span length to allow for the full width of the proposed cross-section, however there are two possible options to keep the bridge intact and maintain the LRT along the median of the roadway. The preferred option is to reduce the number of through lanes from three to two, allowing for the LRT, existing sidewalk and cycle lanes. An alternative option would keep the three through lanes by eliminating the cycle lanes and reducing the existing sidewalk width resulting in a sidewalk width of approximately 1.5m on

each side, however, this would not meet current requirement of the program to include cycle lanes along the full length of the corridor. Other considerations for sustaining the existing traffic lanes could be evaluated for this structure, including but not limited to the following; placing the LRT on a separate alignment or replacing the structure with a longer span structure.

4.1 - Islington over the Humber River

This bridge is a two span CPCI girder structure with a concrete deck and currently carries the intersection of Islington Avenue and Finch Avenue over the Humber River. Finch Avenue currently consists of two lanes of through traffic in each direction, a left turn lane, raised concrete median, right turn lane / bus refuge and variable width sidewalks.

It is understood that only local widening up to 1m would be required at the eastern acute corner of the structure to accommodate the proposed LRT and stops. This local widening of the structure is considered to be feasible by widening the deck and retaining wall at this location.

This structure presents some complications with regards to integrating the LRT track structure into the bridge deck in order to provide an at-grade crossing of the LRT and Islington Avenue. There are a couple of ways to approach this issue. The preferred approach is to raise the riding surface of the bridge to match the height of the LRT track structure. The structure was evaluated for the additional dead load and it was determined that this is feasible.

The alternative option that was considered was recessing the LRT track structure into the deck of the bridge to match the current roadway surface. However, the alternative. The second option presents technical difficulties as the main supporting girders are skewed to the centerline of the LRT making it difficult to recess the track into the deck without interfering with the girders.

4.2 - Farr Ave (Walkers) Pedestrian Bridge

This structure is a cambered warren truss which spans over Finch Avenue. The approaches and abutments have been constructed outside of the roadway right-of-way behind the existing noise barriers. The overall width between the noise barriers is approximately 29.5m which will allow for all the elements of the proposed cross-section with reduced furnishing and planting widths.



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