Appendix B

Access and Servicing Review

1.0 Terwillegar Park Access

The following is a review of the existing conditions of the access road to Terwillegar Park and recommendations on proposed modifications to the road which should be completed to help ensure that it meets TAC (Transportation Association of Canada) Geometric Design Guidelines. The proposed improvements are designed to ensure that the access road can be improved to meet the long term needs of the City and Park users. ISL Engineering and Land Services completed a review of the horizontal and vertical alignments, cross section, turning movements of vehicles and drainage. A separate geotechnical report by Thurber Engineering completed in October 2005 was also reviewed as part of this access review.

1.1 Horizontal and Vertical Alignment

The existing road is approximately 550m long and has a posted speed of 30 km/hr. It drops in elevation from approximately 665m to 633m from the top of the North Saskatchewan River Valley to the bottom and follows a curvilinear path. There are four horizontal curves along the road which were assessed from an air photo of the area. The first curve is at the top of the bank, located at the end of Rabbit Hill Rd and has a radius of approximately 79m. Continuing down the access road there is a double s curve turn with radii of 37m and 61m respectively. The lowermost curve is a larger radius curve of 160m.

Table 2.1.4.4: Minimum Radii for Urban Designs from TAC, provides the minimum radii for roadways in urban areas and 40 km/hr design speed (30km/hr posted speed) as 40m (with a 0.06 (m/m) superelevation). All but one of the radii meet this criteria. For a 30 km/hr design speed the minimum radius is 20m. The curve with the 37m radius may be considered to be acceptable because a retaining wall is located to the north of this curve which is most likely limiting the radius allowed. During detailed design this curve should again be reviewed and the radius verified. The calculated 37m radius meets the minimum radius for a 30km/hr design speed. A review of the retaining wall should also be complete to determine the condition of the wall and how any adjustments to the curve may affect its location.

In assessing the vertical alignment of the road, there appears to be a consistent grade of approximately 9% for the entire length of the access road. According to Table 2.1.3.1 Maximum Gradients from TAC for a ULU road (Urban Local Undivided) the maximum grade for rolling topography is 6% and for mountainous topography it is 12%. 9% is still between these two extremes and would be an acceptable grade for an access road of this nature.

The minimum K value is also an important characteristic of the vertical alignment and is the measure of the flatness of the curve and it will affect the sight distance on a crest of a curve. According to Table 2.1.3.2 from TAC, for a 40 km/hr design speed a K of 4 is required which provides a stopping sight distance of 44.4m. Table 2.1.3.4 from TAC indicates that a sag vertical curve with a design speed of 40 km/hr also has a stopping sight distance of 44.4m. The K value when streetlights illuminate the roadway is 4 however if no streetlights are present then a K of 7 is used because of the reduced lighting. A profile of the existing road was created from contours and the approximate K value for the vertical curve at the top of the road is 25 and for the sag at the bottom is 6.2. During detailed design these values should be verified. The calculated K values are greater than the minimum K values from TAC however, lighting near the end of the roadway should be considered to meet this minimum criteria. All sightline requirements for stopping sight distance along the road appear to meet the adequate.

1.2 Cross Section and Drainage

The cross section of the road currently is not consistent for the length of the road. The width of the gravel portion of the roadway ranges from 6.6m to 8.5m. Where Rabbit Hill Road curves to the north the width of the road is 11.5m. According to the City of Edmonton Standards (Drawing 4024) a two lane rural road consists of two 3.5m lanes with 1.0m shoulders on each side for a total width of 9.0m and then 3:1 sideslopes down to a ditch. If this typical section does not meet the functional needs of the Park then a new typical section that may include pedestrian access and street lighting should be developed. To construct a different standard cross section along this access road will require the widening of the road and the need to remove vegetation within this area. A geotechnical review of the slope stability where the road widening occurs will be required.

During the site visit it was observed that W barriers had been located at three locations along the road. These W barriers have been placed due to steep side slopes down to the valley bottom. Depending on the side slopes of the natural ground from the access road, New Jersey or F shaped barriers may be considered as a better alternative as they will more likely prevent erroneous vehicles from leaving the road, rather than deflect like W barriers.

The road and parking lot may eventually be used for bus tours and maintenance vehicles, therefore a bus (B12) and a single unit vehicle (SU9) were used to test the turning radii and overhang characteristics, using AutoTURN software. Both of these vehicles were able to maneuver the road without any difficulties. Two passenger vehicles have no difficulty passing one another on this road and AutoTURN also shows that two buses or singles unit vehicles may also pass along the road.

Currently, poorly defined drainage ditches and channels exist along portions of the roadway. These ditches carry water down into the valley. There are three locations (at “W” barrier locations), where the natural ground slopes away from the road, and surface water runs off the road and down the slope into the trees. Proposed drainage should include proper ditch definition along the road with the recommendation for subdrains to be incorporated so that drainage is carried away in an engineered fashion and the erosion presently seen does not occur. The ditch slopes should also consist of some erosion control like rock rip rap to ensure the protection of not only the ditch but the road base. A drainage plan would also be require to be completed to determine how to handle the excess runoff from the paved surfaces of the road and parking lot.

A geotechnical investigation was completed by Thurber Engineering in October 2005 for the Terwillegar park access and parking lot. The report indicates that seepage at the subgrade level is occurring at the upper section of the road. To mitigate this problem the report suggests that lateral and transverse subdrains be installed. The report also recommends that portions of the road subgrade should be excavated and reconstructed. A non-woven geotextile may also be required in weaker areas. For the parking lot and other sections of the road, no subexcavation is require and the road structure may be constructed on top of the existing surface.

As Terwillegar Park is within the river valley, any work completed to this road and park will likely trigger an Environmental Impact Assessment according to the North Saskatchewan River Valley Bylaw (Bylaw #7188). The drainage and road works would have to be a part of that assessment.

1.3 Parking Lot

The existing parking lot for Terwillegar Park is approximately 60m by 40m and has a gravel surface. A review of the bus and truck turning movements was completed with the existing lot. The SU9 vehicle can maneuver through the lot with vehicles park perpendicular to the concrete barriers around the lot and vehicles parked north-south in the centre. A bus can maneuver through the lot if the concrete barriers on the north side of the entrance are moved. If interim measures are needed prior to the proposed expansion of the parking lot it is recommended that signs be placed in the lot indicating where vehicles may park to maintain the drive lanes for these larger turning vehicles. As part of the detailed design for the expanded parking lot, access and turning movements for buses and trucks should be accommodated.

1.4 Access Recommendations

The following recommendations should be incorporated into the upgrading of the Terwillegar Park Access Road:

- Posted speed should remain at 30 km/hr (design speed should be 40 km/hr).
- Review radius of second curve and the remaining wall.
- Add superelevation to horizontal curves along the road to ensure that the roadway is drivable in all weather conditions.
- Conduct a detailed analysis of the K values on the vertical curves and review the need for lighting at the end of the road.
- Develop a typical cross section for the road that will function for the needs of the Park.
- Widen the road to accommodate a minimum standard two lane City of Edmonton rural cross section (or a recommend cross section) to provide for consistent lane widths and shoulders on each side.
- Review side slopes along road for safety and erosion. Provide barriers along the roadway where side slopes provide a safety hazard. Ensure that entire slope is controlled for erosion to mitigate localized slumping and slipping of the roadway.
- Develop a parking lot plan that will accommodate bus and truck turning movements.
- Follow recommendations made with in the Terwillegar Park Access Roadway and Parking Lot Upgrading Geotechnical Investigation completed by Thurber Engineering.
- Account and accommodate for larger amounts of storm runoff from paved surfaces.
- Further investigate any Bylaw restrictions associated with the proximity to the North Saskatchewan River.

2.0 Site Servicing

2.1 Water Services

A water service into the Park will be required to provide water for sinks and water fountains. Depending on the type of building construction (ie. concrete block) and whether the proposed lake could be uses as a water source, there may not be a need for water service for fire protection. This would need to be determined at detailed design. To meet basic water service needs for the maintenance building and the program/washroom building, a 100-150mm diameter water line would need to be extended into the Park. A larger line may be required if fire protection is required. Due to the elevation difference, a pressure reducing valve would likely be required. The creation of a public utility lot (PUL) to connect to water lines along Rooney Crescent down into the Park is the shortest distance but would require some forest clearing. Rainwater harvesting off of the buildings should be proposed as part of the LEED objectives to provide water for high-efficiency toilets and for cleaning of equipment in the maintenance building. Water fountains are proposed in the Amenity Area and on the outside of the program/washroom building. A looped water line from the building to the drinking fountain in the Amenity Area should be installed to ensure that acceptable water quality can be maintained.

2.2 Sanitary Services

Due to the significant elevation difference (33m) between existing sanitary services at Rabbit Hill Road and/or Rooney Crescent and the proposed locations of the Park buildings, providing a sanitary service connection into the Park is not recommended. To provide this service would require a sanitary lift station at significant cost to the project. As in many of the City's parks, the proposed buildings and remote toilets can be adequately serviced using septic tanks that are pumped out on a regular basis. Based on estimated annual visits in the 350,000 to 400,000 range, it would be anticipated that the washroom in the program/washroom building would need to be pumped out about 2-3 times per week throughout the year assuming tanks of 5-8000 gallons. The other remote toilets at the west end of the park and in the Amenity Area (1-3000 gallons) would be pumped on a call out basis. From an operational perspective, all of the washrooms will need to be checked daily by Parks staff to ensure that they are in clean, working order, and to check on the service requirements.

During detailed design, consideration should be given to the use of waterless urinals and composting toilets as part of the LEED objectives for the building and remote washroom designs. Currently none of the City's parks buildings are using this technology, but there are prefabricated, concrete washroom buildings that are designed and equipped to meet objectives for resource efficiency and sustainable construction (www.romtec.com). Composting toilets do require power to operate, but this can be provided through the use of photovoltaics.

2.3 Shallow Utilities

All shallow utilities (natural gas, power, telephone) are available to be extended into the Park by the individual franchise holders as required based on the proposed programming for the Park. As with the water service, shallow utilities could be provided in a public utility lot (PUL) connecting to Rooney Crescent.

Natural gas may be required to provide heating for the program/washroom and the maintenance garage. There are some City parks buildings that are heated with propane but over the long term this is not the most cost effective or sustainable approach. Both buildings should be designed for maximum solar gain to minimize heating requirements and with natural ventilation to minimize cooling requirements. At detailed design, the City may elect to provide the basic heating service for both of these buildings through the use of photovoltaic and electric or radiant floor space heating as part of the LEED objectives for the buildings. If natural gas is identified as the best option, then Atco Gas will be the service provider and will determine the best and most cost effective alignment for providing this service into the Park.

Epcor would be responsible for extending power services into Terwillegar Park. With upgrading of the access road, it is recommended that street lights extended from the end of Rabbit Hill road down the access road and into the main parking lot. The proposed secondary Park road (Activity Area Access) and the satellite parking lots should also have some street lighting since all-season programmed activities may occur in the program/washroom building and in the group picnic sites. At detailed design, the level and location of this lighting can be determined based on the type and extent of proposed programming as well as a discussion of requirements related to safety and security.

In addition to street lighting, power service into the Park may be required to service the program/washroom building and the maintenance garage. At detailed design, the City may elect to provide the basic power service for both of these buildings through the use of solar voltaics as part of the LEED objectives for the buildings. It is assumed that the basic power requirements for both of these buildings will be relatively low, consistent with other City parks buildings. However, since there may be additional power service required to facilitate staging of events and programs that can not be accommodated by greener energy options, it has been assumed that a power service and transformer will be required. There are two options in terms of alignment for providing this service: one is to utilize a common power service corridor with the street lighting and the second option is to a public utility lot (PUL) from Rooney Crescent down into the Park as proposed with the water and natural gas services.