9.0 REGIONAL STREET CASE STUDIES

The recommended design alternative (Alternative 2.1) was applied to segments of five case study corridors, representing the five categories, in order to test the applicability.

9.1 CASE STUDY CORRIDORS

In consultation with Regional staff, five segments of roadways have been identified and used as case study corridors to represent the five generalized land use categories.

9.1.1 Case A – McCowan Road, Near Denison Road (Residential Category)

McCowan Road in the Denison Road area represents the residential category. **Figure 9-1** on page 91, illustrates the location of the Case A study corridor. With the exception of a few older houses near Denison Road which have direct access onto McCowan Road, all others in the area are representative of the classical reverse frontage development. A neighourhood retail plaza is found at the south-west corner of the McCowan Road/Denison Road intersection. This segment of roadway also has an asymmetrical cross-section (road vis-à-vis right-of-way).

9.1.2 Case B – McCowan Road, Near Highway 7 (Commercial Category)

McCowan Road, near Highway 7 represents the commercial category. **Figure 9-2** on page 92, illustrates the location of the Case B study corridor. Markville Shopping Centre is located on the west side of McCowan Road, with a major access onto McCowan Road opposite Heritage Road. Other smaller scale retail uses are found on the east side of McCowan Road, with individual direct driveways onto McCowan Road.

9.1.3 Case C – Leslie Street, Near Highway 7 (Urban Mixed Use Category)

Leslie Street, near Highway 7 represents the urban mixed use category. **Figure 9-3** on page 93, illustrates the location of the Case C study corridor. Various retail, office and hotel uses are found along both the east and west side of Leslie Street both north and south of Highway 7.

9.1.4 Case D – 16th Avenue, Near Highway 404 (Employment Campus Category)

16th Avenue, to the west of Highway 404 represents the employment campus category. **Figure 9-4** on page 94**,** illustrates the location of the Case D study corridor. Business park campuses are located on both the north and south sides of 16th Avenue, from Highway 404 through to Leslie Street.

9.1.5 Case E – Weston Road, Near Steeles Avenue (Industrial Category)

Weston Road, north of Steeles Avenue represents the industrial category. **Figure 9-5** on page 95, illustrates the location of the Case E study corridor. Industrial uses are located mainly on the west side of Weston Road, with direct driveways onto Weston Road.

9.2 STORAGE AND TAPER LENGTHS

For each of these case study corridors, the most recent turning movement traffic volumes were obtained from the Region. This data was supplemented with additional inbound/outbound turning movement counts at the existing driveways abutting the study corridors. Opportunities to consolidate some of these existing driveways or to transform some full-moves driveways into right-in/right-out driveways where other access/egress points are available onto side streets, were also examined. Synchro analyses were undertaken to estimate the storage lengths related to left turn lanes at intersections, or at median openings.

Given the spacing constraints between intersections, the length of taper for left turn lanes would generally need to be reduced as compared to that which is typically provided for a design speed of 60 km/h. This is required in order to achieve a reasonable length and width of median which can be landscaped, rather than simply being used to provide a buffer between opposing traffic lanes. Accordingly, a taper length of 35 metres is used in the design. This is within the range (lower end) of the taper length for roadways assuming a design speed of 60 km/h. Therefore for this purpose the design speed and the posted speed can be considered to be the same.

9.3 BASIC CROSS-SECTIONS AND VARIATIONS

As discussed in the previous sections, a basic 36 metre right-of-way requires compromises in order to accommodate all of the competing cross-sectional requirements, as well as a landscaped median. Essentially in order to accommodate a 6.0 metre wide landscaped median in a mid-block location, plus three travel lanes in each direction, 3.4 metre wide boulevards are all that can be achieved within this ROW. These can only accommodate utilities and a sidewalk. In the case of commercial, employment campus, industrial and urban mixed use categories, landscaping typically is required of adjacent uses (e.g. in conjunction with applications for site plan approval) and opportunities exist to place trees along the property line, such that the trees effectively straddle the lot line.

However, in the case of residential uses where reverse frontage development abuts the street, typically a fence or noise wall precludes any opportunity to locate trees along the lot line. It is also particularly important to have landscaping in the boulevard. Also, it is desirable to introduce a landscaped median. In order to achieve this all within the 36 metre ROW, the median width needs to be reduced and the space added to the boulevards for this one category. Although it would be desirable to retain a 6.0 metre median width through the residential areas as well, this represents the best compromise within the 36 metre right-of-way.

It should also be noted that in four out of the five sections the on-street bike lanes along both sides of the street have been included and illustrated. As previously discussed, the design provides flexibility to designate these from the onset, or alternatively to simply provide a wider curb lane (e.g. to more easily accommodate trucks in the industrial category, or as a convertible lane which would allow for HOV and bike lanes at some point in the future). As noted, inclusion of on-street bike lanes will depend on network continuity with respect to bike lanes.

9.4 LANDSCAPED STREETSCAPE TREATMENT

The treatment of landscaping including trees in the boulevards and medians is proposed to vary in accordance with the land use category through which the street passes. For example, in an Urban Mixed Use area the expectation is that the landscaping and streetscape features may be 'harder' than they would in a single family residential area.

Potential streetscape treatments in the medians are for illustrative purposes only, and they should be treated as such. The approach to the various categories is described in the following sections:

9.4.1 Residential Category Example

The design intent is to provide a pedestrian-friendly streetscape character, with streetscape initiatives which will assist in creating a comfortable sense of human scale in residential neighbourhoods.

The boulevards accommodate a continuous rhythm of high branching deciduous trees in a sodded apron. These trees create canopy and shade for pedestrians, as well as cyclists adjacent to the curb. It is recognized, however, that hydro and other utilities need to be considered both in terms of tree location and pruning in the case of overhead wires.

The new median will be instrumental in visually "breaking up" the expanse of the cross-section. At the mid-block locations deciduous trees are proposed, with an underplanting of low hardy evergreen shrubs to add year round interest, colour and texture. A salt apron and raised edges are introduced to minimize damage from salt spray. Irrigation and drainage also need to be considered, depending on the type of vegetation being planted. Occasional breaks are introduced into the median to allow pedestrians to cross the median; however pedestrian crossings at mid-blocks are not specifically designed nor encouraged, as previously discussed under the safety considerations.

The proposed streetscape plan for the residential case study corridor (Case A – McCowan Road near Denison Street) is illustrated in **Figure 9-6** on page 98. The perspectives for the existing condition and the future condition with widening and the recommended features, are illustrated in **Figure 9-7** on page 99.

9.4.2 Commercial Category Example

This category relates to existing commercial uses fronting onto or flanking Regional streets. The context assumes that these areas will continue to urbanize in the future, with a greater emphasis on development defining a new "street wall" of mixed retail uses and greater pedestrian activity.

Boulevards which are currently proposed to be 3.4 metres in width will become a component of a broader public environment, with an enriched streetscape and pedestrian environment. Street trees are proposed near the street line, with a variety of possible ground plane treatments including planting beds, seating, markers, bicycle racks, pedestrian lighting, waste receptacles, pedestrian lighting and public art initiatives.

The introduction of medians with a mid-block width up to 6.0 metres will significantly "break down" the expanse of the street cross-section and provide unique opportunities to explore design expressions of the personality of the street, complementing the adjacent land use. Opportunities include public art installations, combined with lighting and hardy urban trees, or clusters.

The cross-sections and perspectives employ precedent examples of street furnishings and public art installations from successful urban streetscapes to illustrate unique opportunities to animate and achieve streets with a new urban look and feel. From a pedestrian perspective this would be of significant benefit where the streets would achieve a new "sense of place" and social context.

The proposed streetscape plan for the commercial case study corridor (Case B – McCowan Road near Highway 7) is illustrated in **Figure 9-8** on page 101. The perspectives for the existing condition and the future condition with widening and the recommended features, are illustrated in **Figure 9-9** on page 102.

9.4.3 Urban Mixed Use Category Example

The mixed use application shares many of the characteristics of the commercial application, that is an urban context with a need to define the streets with highly animated boulevards and with appropriate paved pedestrian widths suitable to accommodate anticipated future pedestrian uses as new urban forms evolve, (i.e. shops, offices, institutional uses, urban spaces, parks and squares).

An opportunity exists to introduce a rich mixture of soft and hard urban furnishings, including tree canopy, seating, lighting, public art and wayfinding icons in the boulevards to fulfil a desired healthy urban environment and provide a functional and safe Regional street. Special design factors need to be considered to ensure adequate soil volumes are provided to maximize the tree health and survival.

The medians as defined by their length, width and outline are real places to add a new layer of streetscape initiatives to link the boulevards, define scale and animation to the broader street. The urban context will dictate the appropriate material palate relative to durability, cost, safety and maintenance.

The proposed streetscape plan for the urban mixed use case study corridor (Case C – Leslie Street near Highway 7) is illustrated in **Figure 9-10** on page 103. The perspectives for the existing condition and the future condition with widening and the recommended features are illustrated in **Figure 9-11** on page 104.

9.4.4 Employment Campus Category Example

The design opportunity is to successfully integrate the expanded street into an employment campus landscape. The concept of creating a "landscape parkway" is achievable through strategic application and positioning of tree plantings in the boulevards and mid-block medians. A double row of deciduous trees in the medians, coupled with corresponding trees positioned along the streetline in the boulevard, will provide a continuous canopy along the street. This initial planting framework will

encourage the planting of a second tree on the adjacent corporate block to further strengthen the concept and visually knit the street with the adjacent building sites.

The medians at intersection locations provide the unique opportunity to introduce "corporate" identification markers as public art initiatives and encourage the corporate neighbours along the street to engage with the language of the streetscape.

Emphasis on a highly developed pedestrian and cyclist agenda is designed into the street cross-section.

The proposed streetscape plan for the employment campus case study corridor (Case D – 16th Avenue near Highway 404) is illustrated in **Figure 9-12** on page 106. The perspectives for the existing condition and the future condition with widening and the recommended features are illustrated in **Figure 9-13** on page 107.

9.4.5 Industrial Category Example

A Regional street in an industrial context possesses its own design rationale. The broader landscape is generally more open, with buildings of significant scale.

The intent is to provide a streetscape which visually provides uniformity and a calming sense of scale to the driver and pedestrian.

The boulevard and median work together to accommodate a placement for hardy tree planting as a continuous canopy along the street. In this way the street will evolve over time, with the maturity, canopy and scale of the trees a desired character. Tree planting opportunities on adjacent sites through partnerships can further enhance the streetscape.

Additional streetscape elements, such as wayfinding markers and banners, would be positive elements to further characterize and animate the streetscape.

Bicycle lanes have been excluded to allow for the additional width in the curb lane to accommodate a higher proportion of truck traffic in this setting. This extra wide lane (5.0 wide) would be used for HOV/transit vehicles, as well as trucks, which are turning to and from this lane. Alternatively, if no HOV lane is planned for this roadway, then the curb lane can be used for mixed traffic, including trucks.

The proposed streetscape plan for the industrial case study corridor (Case E – Weston Road near Steeles Avenue) is illustrated in **Figure 9-14** on page 108. The perspectives for the existing condition and the future condition with widening and the recommended features, are illustrated in **Figure 9-15** on page 109.

9.5 SAFETY CONSIDERATIONS

It is recognized that the placement of landscape features, any street art, street furniture and light standards should be such that these elements do not pose safety concerns.

Based on the proposed cross-sections, these elements will be set a minimum of 1.4 metres (residential) and 1.0 metre (other cross-sections) offset from the edge of

pavement. This is acceptable according to the MTO Roadside Safety Manual, provided that the roadway design speed is 60 km/h or less, and a barrier curb is located a minimum of 0.5 metre in front of the potential hazard. Currently, the Region of York has a 90 km/h design speed on Regional streets, with a posted speed of 70 km/h. This proposed cross-section design requires a lowering of both the design speed (to 60 km/h) and the posted speed (to 60 km/h) at the time that these more urban cross-sectional elements are introduced in the roadside or boulevard. Essentially the design and posted speed would be the same. The posted speed is typically 10 km/h lower than the design speed for higher speed roads. For lower speed roads, the design and posted speeds are usually the same. According to TAC, setting the posted speed limit the same as the design speed is acceptable. In the case of higher speed roadways, the higher design speed as compared to the posted speed can provide an enhanced measure of safety. However, the counter-argument is that with a higher design speed than the posted speed, the driver perceives the higher design speed and tends to travel at a higher speed than the posted speed.

Ideally it would be desirable to set back any such elements further from the roadway. However, it must be noted that the proposal includes a 1.5 metre wide bikeway adjacent to the curb, in addition to the 1.0 to 1.4 metre setback behind the curb. This results in a total clear zone offset of 2.5 to 2.9 metres. Therefore, the wider boulevard option proposed in residential areas almost meets the required clear zone offset for a 60 km/h design, without the barrier curb.

Median widths of 5.2 metres (residential) and 6.0 metres (other cross-sections) are proposed in the mid-block sections. At many median locations a low planter is proposed with lighting, trees or plantings placed within this raised planter. This is quite similar to the landscape treatment along Hurontario Street in Mississauga, between Eglinton Avenue and Highway 401. The 0.85 metre setback from face of planter to edge of curb provides the required minimum 0.5 metre clear zone if the roadway design speed is 60 km/h or less. However, compared to the curbs by the boulevards, the raised median does not have the additional safety buffer offered by the 1.5 metre wide bike lane. Thus, the raised median treatment is more exposed to traffic running off the road due to the reduced offset from the edge of pavement.

The narrower median widths at the left turn bays can pose additional safety concerns. In these locations, where the median is 2.2 to 3.0 metres wide, any items such as light standards are more exposed to traffic due to a reduced offset and to traffic from both directions. As such, placement of design elements in this area could offer a breakaway base.

Reduced lane widths as discussed in Section 5.1, would also enhance safety.

9.6 POTENTIAL LANDSCAPING FEATURES

Varying types of plants with different planter arrangements can be put within the raised median. **Figures 9-16** and **9-17** on pages 111 and 112, illustrate the potential landscaping features that can be implemented within the 5.2 metre wide median (residential) and the 6.0 metre wide median (other cross-sections), respectively, that can be found at mid-block locations. The median width will be reduced to 2.2 metres (residential) and 3.0 metres (other cross-sections) at the left turn lanes. The potential

landscaping features that can be implemented within the 2.2 metre wide and 3.0 metre wide medians are illustrated in **Figures 9-18** and **9-19** on pages 114 and 115, respectively. **Figure 9-20** on page 116 illustrates the plan view that shows the step back of the landscaping at the intersection to ensure that sight lines are not obscured.

The potential landscaping features that can be implemented along the residential boulevards are illustrated in **Figure 9-21** on page 117 for the mid-block locations. For other cross-sections, the potential landscaping features are illustrated in **Figures 9-22** and **9-23** on pages 118 and 119**,** for the mid-block locations and locations near intersections, respectively. Depending on the planting materials, irrigation may be required.

9.7 HYDRO POLE LOCATIONS

Within York Region, the arterial road network is often used as the main distribution network for major hydro lines. Due to the exorbitant costs associated with hydro line burial, the high voltage lines are installed aerially. Hence, the majority of the hydro poles are often found within Regional road allowances.

Collisions with hydro poles account for about 10 percent of all fatalities on urban arterial roads. Pole density and pole offset from the travelled edge are key determinants of collision frequency. It is important to place the hydro poles as far from the road as possible. However, hydro poles are often used to mount luminaires for street lighting. This reduces the number of poles that can be potentially struck by an errant vehicle, but there are practical limits to the length of the luminaire arms. Guidance on the relationship between traffic volumes, pole density, and pole offset is provided in the TAC Geometric Design Guide (Section 2.2.11).

Hydro poles can be placed as close as 0.5m behind a barrier curb in urban areas, if the design speed of the roadway is 60 km/h or less, according to the MTO Roadside Safety Manual (RSM). For higher design speeds, the clear zone (distance between the through edge of pavement and an obstacle) varies in accordance with Table 2.2.1 of the RSM. However, it should be noted that the clear zone offsets in Table 2.2.1 may not be practical, and engineering judgment must be used to determine if shielding existing poles within the clear zone is feasible. Clear zones are measured from the through edge of pavement; bike lanes and/or auxiliary turn lanes can provide additional separation between the through traffic and an obstacle such as a hydro pole.

Poles should be located so that the proposed storm sewers or other underground utilities can be constructed without intruding within the clear zone required by the Occupational Health and Safety Act. This zone is a minimum of 3.0 metre radius from the lowest conductor (voltage higher than 750 V), measured from the cross-arm of the hydro pole. Designers should contact the local hydro company to confirm their clearance requirements.

Aerial hydro cables are under tension to reduce the amount of sag between poles. Whenever there is a significant change in the hydro pole alignment or the termination of an aerial line, an anchor guy(s) is installed. The anchor guy is located about 3 metres from the pole. Consideration should be given to the installation of sidewalk struts to span sidewalks. Permanent easements may be required to accommodate the anchor guys, if the pole line is close to the property line.

Landscaping within the hydro corridor can lessen the visual impact of the pole line. Small form trees that grow to a maximum height of 3 – 4 metres may be planted between the poles. Tree placement should consider salt damage if placed too close to the road and visual impacts near driveways and intersections. **Figure 9-24** on page 121 illustrates an example of the landscaping along the sidewalk in the hydro corridor.

9.8 COSTS

A general comparison of the typical costs between the standard Regional cross-section and the recommended alternative on a per kilometre basis are provided in **Table 9-1**. It should be noted that these are order-of-magnitude estimates for comparative purposes only. Individual project site/conditions, inflation, and costs of materials and labour are all factors that may affect the project costs.

Table 9-1
General Cost Comparison

Cost	Widening to Standard 6 Lane Cross-Section	Widening to Recommended Alternative Cross-Section
Construction Cost ($/km)		
Road Work	$3.21M	$3.15M
Bike Lanes	$0.00M	$0.07M
Boulevards	$0.11M	$0.10M
Medians	$0.00M	$1.25M
Total	$3.32M	$4.57M
Maintenance Cost ($/km/year)		
Road Operations	$48.0k	$48.0k
Aesthetics	$ 2.0k	$12.0k
Total	$50.0k	$60.0k

The costs related to the recommended cross-sections are clearly higher because of the additional median, associated landscaping, and the exclusive bike lanes.

9.9 PHASING OF LANDSCAPING FEATURES

In theory, the landscaping features can potentially be implemented in phases. For example, the new medians can be constructed without landscaping, or the boulevard can be built without any landscaping features, or with trees planted at a less frequent spacing. This would reduce the initial construction costs during widening.

Figure 9-25 on page 122 illustrates the potential phasing of the landscaping features at the McCowan Road (commercial) case study corridor, as an example. The figure illustrates in sequence (from top to bottom):

- The standard six general purpose lanes with a two-way-left-turn lane
- The six general purpose lanes, with exclusive bike lanes and grass median
- The four general purpose lanes plus HOV lanes, with exclusive bike lanes and grass medians
- The four general purpose lanes plus HOV lanes, with exclusive bike lanes and enhanced median aesthetics.

However, phasing the landscaping features would not help reduce the total costs. Indeed, as the labour costs and other material costs tend to increase year after year, the costs of implementing some landscaping features later would actually be higher than those if they are constructed at the outset with the road widening.

There are also other compelling reasons not to phase the implementation of the landscaping. Having a median and/or boulevard without putting in the landscaping features would negatively impact the aesthetics of the roadway and not accurately reflect the longer term intended look and feel to the corridor (the partially finished median and/or boulevard would not only look unfinished, but also potentially can be a magnate for garbage). Implementing the landscaping features at a later time would also contaminate the work already done. Completing a partially finished boulevard also presents other challenges. For example, if only half the trees are planted initially, the other half will be smaller than those originally planted, unless larger trees are purchased later, at an increased cost. Planting all the trees in the boulevard, however without the surface treatment, also makes no sense from a practical perspective.

It should also be noted that the landscaping costs are only a relatively small percentage of the total costs of the road widening. The potential issues and drawbacks far outweigh the potential benefits of phasing the landscaping features, particularly portraying an incomplete picture of the ultimate intent. This may dissuade the public from supporting similar future endeavours. Also, the overall costs would be greater than if the segment of street was completed as intended from the outset. It is recognized however, that this will necessitate a re-evaluation of the Region's Roads Capital Program.

9.10 TRANSITIONAL ZONES BETWEEN 4 LANES AND 6 LANES

Transitional zones between 4 lanes and 6 lanes typically occur at intersections. At the location where the 6 lane cross-section is being reduced to a 4 lane cross-section, the curb through lane (approach lane) can become an exclusive right turn lane. Alternatively, a new discharge lane can be introduced beyond the intersection and then tapered to allow vehicles to merge with the other two lanes of through traffic. When a 4 lane cross-section is being transitioned into a 6 lane cross-section, an exclusive right turn lane can be changed to a shared through-right lane, which matches the curb lane of the 6 lane cross-section on the far side of the intersection.