

TOWN OF ORANGEVILLE

REPLACEMENT OF SIDEWALKS AND BOULEVARDS CENTRAL BROADWAY (JOHN STREET TO THIRD STREET)



April, 2021

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REPLACEMENT OF SIDEWALKS AND BOULEVARDS CENTRAL BROADWAY, JOHN STREET TO THIRD STREET TOWN OF ORANGEVILLE

1.0 BACKGROUND

Central Broadway from John Street to Third Street was fully reconstructed in 1991, including the replacement of all underground services and reconstruction of the roadway and sidewalks. As part of that work, a Streetscaping design prepared by Stefan Bolliger and Associates was incorporated in the project. That design included paving stone intersection treatments, concrete sidewalks with paving stone boulevards, street trees, planters, decorative light standards, seating areas, and other amenities.

The Broadway plan also included mountable medians with paving stones. Following the completion of the South Arterial Road (Riddell Road) the Town undertook a project to replace the mountable medians with raised landscaped islands in 2005. Broadway was also resurfaced as part of that project. The paving stone intersections which were subject to wear from traffic were replaced in 2013.

The sidewalks and boulevards have not been replaced since 1991. These surfaces are exhibiting wear and increased maintenance costs, and now require replacement. The Town of Orangeville is proposing to replace the surface with durable materials that will be aesthetically pleasing and fit the character of the downtown.

Triton Engineering Services Limited was retained by the Town of Orangeville to undertake the design of the sidewalk and boulevard replacement. This report will present options for the boulevard replacement. Triton has also prepared a list of issues which should be considered in the project. These are based on our background investigations as well as input from the Town and the Business Improvement Area (BIA). While it is prudent to consider a number of these issues as part of replacing the sidewalks and boulevard bricks, it should be recognized that many of the issues are beyond the original scope of work. Further integration of ancillary issues would require approval and direction from the Town.

2.0 DESIGN CONSIDERATIONS

2.1 Sidewalk and Boulevard Materials

The existing surface consists predominantly of precast concrete paving stone, with a cast-in-place concrete sidewalk adjacent to the buildings. The concrete sidewalk has a 200mm wide paving stone strip every three panels, that was provided for aesthetic reasons. The width of the sidewalk varies from approximately 1.2m to 1.5m due to the inconsistent building setback from the property line. The 3.25 metre width from the sidewalk to the back of curb consists of paving stone, the majority of which are 100x200mm in size, with some 200x200mm pavers for contrast. Refer to photo 1 in Appendix A.

The width from back of curb to buildings varies from 4.5m to 4.7m. The existing landscaping lay-out is referenced to the back of curbs. The trees and decorative light standards are set at an offset of 1.6m from back of curb. The trees have a 1.2mx1.2m precast concrete grate, set on a concrete collar (some grates have been removed, but many are still in place). The edge of sidewalk is offset 3.2m from back of curb. The paving stone boulevard is symmetrical around the poles and trees. Refer to Figure 1 for the existing sidewalk cross-section.

Intersection treatments were a key feature of the 1991 design. Bulbs were created at the intersections to frame the parking lanes, shorten the crosswalk distances, and create feature areas. The bulbs also house the traffic signal poles and pedestrian pushbuttons. The surface of the bulbs is predominantly paving stone.

While existing sidewalk and boulevard materials have worn and require replacement. The following are among the concerns that have been identified (refer to photo gallery in Appendix A):

- Differential movement between concrete and pavers, in particular the narrow paving stone course between the concrete slabs, creating trip hazards (photo 2);
- Movement and shifting of the paving stones (photo 6);
- Heaving of tree grates and paving stones around the boulevard trees (photo 3);
- Vertical movement of curb stops and water valves where they are located in the paving stone (photo 2);
- Sidewalk ramps at curbs do not meet current AODA standards;
- Electrical junction boxes have shifted or broken and create trip hazards (photo 5);
- Fountains and watering hose bibs are no longer functional;
- Parking meter posts that are no longer functional due to meters no longer being used (photo 7);
- Additional issues regarding streetscape furniture and other amenities identified by the BIA.

The following goals and objectives have been identified for the renewed surface materials:

- Materials should be durable and designed to resist differential movement;
- Surfaces should be easy and cost effective to maintain;
- Accessibility and compliance with the AODA is a key objective;
- Items that can move vertically (curb stops, valve and junction boxes) should be designed to limit movement;
- Surfaces to be both functional and aesthetically pleasing.

The materials that are predominantly used for sidewalks and boulevards in urban areas are cast in place concrete, and precast concrete paving stone (also referred to as concrete pavers). Variations in colour, pattern, and size are available. Table 1 in Appendix A provides a general comparison of available surface materials and their benefits or drawbacks.

Another surface treatment that is available is coloured impressed asphalt. This product is sometimes used in roadways for crosswalks and other features. It can also be used to colour asphalt boulevards. However, due to the potential for differential movement between asphalt and concrete materials we do not recommend its use for the boulevards on this project.

2.2 Accessibility

The Accessibility for Ontarians Act (AODA) provides requirements for the design of public sidewalks (described as “pathways”). These include maximum grades and requirements for ramps at pedestrian crosswalks. Where the curb has been depressed to provide access at a roadway, tactile plates must be installed to warn the visually impaired that they are entering a traffic area. As part of this project, tactile plates must be installed at all such locations to meet current requirements.

Tactile plates come in a variety of different materials; however, cast iron plates have been found to be most durable in high volume areas with machine winter maintenance, as is the situation on this project. The plates are usually unfinished, but they can be coloured yellow. The Town has been in the practice of painting the curb depressions yellow in the downtown area. It is recommended that yellow coloured

tactile plates be used on this project for greater conspicuity. The practice of painting the curbs can then be discontinued.

Businesses are also required to make their facilities accessible. Due to the age of the buildings on Broadway, many still have steps from the sidewalk to the interior. The BIA has raised the question of whether these accessibility issues can be addressed in the design. It should be noted that as part of the 1991 reconstruction project, accessibility was looked at in detail, and adjustments were made where feasible to eliminate steps while adhering to the requirements for maximum sidewalk slopes and cross-slopes. Small steps and trip hazards were addressed, but it is not possible to eliminate the larger steps by variation in the slope of the sidewalks.

As part of this project, we have further reviewed the existing doorways and did not identify any locations where a minor adjustment to the sidewalk grades (keeping with AODA requirements) could be employed to eliminate interior steps to businesses. The construction of ramps (which would run parallel to the buildings) on municipal right-of-way could be considered, but will interfere with the sidewalk area. Approvals and liability issues would also need to be considered. The construction of ramps to adjacent businesses is outside the scope of the project. We have, however, identified two locations where accessibility ramps should be considered.

The Town of Orangeville Community Services has proposed construction of a ramp at the front of Town Hall / Orangeville Theatre. This project will be incorporated into the proposed works.

There are existing steps in front of No. 85 Broadway (which includes four businesses) that are in the municipal right-of-way. These steps are not AODA compliant, and it is recommended that they be replaced with a common ramp with the required railings.

There is an existing sidewalk ramp out from the doorway at No. 81 that is too steep and does not meet AODA standards. Options should be considered to address this.

2.3 Boulevard Trees

In consultation with Town staff, we have identified that a significant issue that will affect the project and its design is the maintenance and potential replacement of the boulevard trees. Trees were a significant component of the streetscape design in 1991. A total of 88 street trees were planted in the sidewalk areas, and six trees in concrete planters. The majority of the boulevard trees are Honeylocust. These were chosen for durability and for a “thinner” leaf structure (compared to maple, for instance) for less visual impact on business signage. When the project was constructed in 1991, the raised medians were not in place. The medians now provide tree planting opportunities that were not available then.

The boulevard trees were 125mm caliper when planted. In general, they have performed well as a durable street tree, but have grown in size, now ranging from 150 to 300 mm. The roots have expanded, and the Town has had to make modifications to the tree grates to accommodate the growth. In some cases, the grates have been reset, in other instances the grates have been removed and replaced with paving stones. This is due to the roots expanding and causing heaving of the grates and surrounding paving stones. In some cases, minimal heaving is observed, while others are showing significant heaving.

The trees were assessed by the Town’s arborist, Ott Tree Service, and are considered to be in generally good health. Ott has identified some of the trees as “under stress” and/or “overgrown” and their recommendations are for pruning, with very few recommended for removal. Ott’s assessment was of tree condition only, without consideration of the impact on the adjacent sidewalk. It should also be noted that the assessment was made in “leaf off” condition.

Triton has made an assessment of the extent of heaving at each tree. The results are summarized below.

South Side

33 “street trees” remain on the south side of Broadway. Comparison to 1991 plans indicates that 12 have been removed and not replaced. Of the trees assessed, Ott has recommended removal of two (the remaining Ginko’s on the bulb across from Second Street). Ott has identified two other trees to be reassessed in the spring for possible removal. We have identified 10 trees showing heaving of the precast grates and/or paving stone, with four of these characterized as “major.”

North Side

28 “street trees” remain on the north side of Broadway. Comparison to 1991 plans indicates that four have been removed and not replaced. Of the trees assessed, Ott is recommending removal and replacement of one (a small tree in front of No. 163 that is a recent replacement). Ott has identified two others to be reassessed in the spring for possible removal. We have identified 17 trees showing heaving of the precast grates and/or paving stone. Six of these are characterized as “major.”

There is a likelihood that many of the trees that are not causing heaving now will cause problems over the next 25 years. However, this is difficult to predict with any accuracy. Areas of concern will be identified and dealt with taking into account the condition of the tree, maintenance, and longevity of the new sidewalk and boulevard surfaces and other local factors as identified below.

The status and treatment of the boulevard trees represents a major constraint for the project design. If some or all of the trees are to remain, their location will affect the options for the sidewalk replacement. Also, steps will need to be taken to address the risk of the tree roots heaving in future and impacting the sidewalk materials. If full removal of the trees takes place, replantings can be considered including revising the locations. The design of the boulevard surface replacement depends in large part on the decisions taken in regard to the trees.

The following options have been identified:

Option A – Removal of all existing street trees

The existing trees are causing issues with heaving of surface materials, and even those trees that are not causing a problem now are expected to be an issue within the design life of the project (minimum 30 years). This can be accompanied by a program to replace some or all of the trees, as identified further below.

Option B – Remove trees that are causing issues now

This would involve the removal of a minimum of ten existing trees characterized as showing “major” heaving. In addition, there are another 17 that are showing some heaving now, and 32 not currently exhibiting heaving. The mature trees have reached a stage where they have essentially outgrown the grates installed in 1991. If these trees are to be retained, it is recommended that the grates be removed. Some work can be carried out such as vacuuming around the top of the root mass and placing mulch or soil to grade. An option could be to construct a raised curb around the tree pits of trees being retained. This increases the footprint for the trees and may be a maintenance concern.

It should be stressed that it is not possible to accurately predict how long individual trees will survive, or which trees could exhibit heaving issues in the future. Also, it should be expected that there will be some tree mortality in coming years.

Options for Tree Replacement

Various products are available for street trees, generally consisting of a structural soil cell system that surrounds and contains the root ball while providing support for the adjacent hard surfaces. The intent is to provide a sufficiently large interconnected cell system to feed the roots. These systems are expensive, and cannot readily be constructed around existing trees, meaning that they would only be used for replacement trees. While design details can vary, systems with soil cells and structural grating systems would cost in excess of \$10,000 per tree.

It is suggested that the function and placement of the street trees requires input from the various stakeholders including maintenance staff, the BIA, and business owners. Street trees can be beneficial to the overall streetscape, but they also represent obstructions both for maintenance and other uses. For instance, in an urban commercial setting if there is a greater priority on public uses such as patios, sidewalk sales, street vendors and other activities, there may be a limited number of locations where street trees will provide their intended function without impacting other activities.

2.4 Water Services

All water services were updated in 1991, and we understand that no replacements are required.

At the time, there were fountains installed in three locations (Town Hall, Library, Post Office). None of the fountains are operational now. As part of the work, the three fountains are to be removed and the services capped in a manner acceptable to the Town's Water Works Department.

Hose bibs were provided for watering, and we understand that they are not usable. These will be removed and capped.

Curb stops and valve boxes are set in the surface where required. Public Works advises that where these are set in concrete, they do not move and have not been an issue. Those located in paving stone can shift vertically with the frost, which creates maintenance issues and potential trip hazards. As part of the project design, these items should be set in concrete surfaces to the extent practical.

2.5 Street Furniture

Various items of Street furniture are in place on the street. Replacement was not included in the project scope, but this may be an opportune time. Details will be required for standards and who is supplying. The following is a list of items for consideration (others may identify more)

Waste Receptacles There are a variety of different styles on the street now. As part of this project, staff will seek input on location and type of receptacle so that proper bases can be established in the appropriate locations.

Parking Meter Posts Are no longer required and will be removed

Bicycle Racks A number of the parking meter posts have been converted to bike racks, but are unsightly and located too close to the curb for practicality. Consideration should be given to new bike rack design and placement. Staff will collaborate with others to ensure a single efficient design is established and placed in those areas where

they are most beneficial to end users. It should be noted that the purchase and supply of the bicycle racks is not part of the scope of this project.

| | |
|--------------------------|--|
| Benches | There are different styles, some on concrete footings. These can be retained and/or upgraded. It is suggested that Staff collaborate with others to establish a consistent design for the benches and include a base in those places that are best suited for this type of amenity. It should be clearly noted that the purchase and replacement of the benches is not part of the scope of this work. |
| Sculptures | There are carvings and other sculptures at various locations. Sculptures will be inventoried, removed and stored safely so that they can be re-established as part of the surface works in the latter phases of the project. Staff will collaborate with Communications to determine the best locations and if there are any new sculptures planned for the area. |
| Bus Stops | Bus stops will be retained at their existing locations. |
| Light Standards | It is assumed that the existing decorative lights standards will be retained in their existing location. They are set on concrete bases, and it would be very costly to relocate them. The light standards will be repainted as part of the project. |
| Concrete Planters | There are poured in place concrete planters in the bulbs at John Street and Mill Street. These provide a protected location for tree, shrub and flower plantings. |
| Planting Pots | There are a number of large planting pots with shrubs and flowers, that are set on the sidewalk. These have the advantage of being able to be relocated with sufficiently sized equipment. These pots will be removed during construction and replaced following completion. |

2.6 Ducts for Electrical Servicing

The BIA has requested additional electrical servicing for events. This work would be in addition to the original scope. While replacing the surface provides the opportunity to install ducts, a clear understanding of what is required needs to be provided. Staff will consult with the BIA to determine the best course of action. It should be noted that the addition of the ducts and electrical services were not part of the initial scope of work.

3.0 DESIGN CONCEPTS AND OPTIONS

The use of a single surface type would minimize differential movement between different types of materials. However, there are other benefits both aesthetic and functional in using different surface types in the streetscape. The key is to minimize the transition locations and to set them in logical locations with less foot traffic.

A brushed concrete surface is recommended for the main sidewalk path adjacent to the buildings. Concrete provides the smoothest non-slip surface and is ideal for mobility devices. Expansion joints are necessary on a 6 metre spacing. This will ensure that the concrete does not heave. The intermediate contraction joints will be sawcut joints to provide a smoother surface than a trowelled joint. The Town has employed this standard on new sidewalks for the past few years with good results.

It is recommended that the brushed concrete surface be placed against the existing buildings and be of sufficient width to provide a clear main walking path. This location allows for the placement of the curb stops in the concrete to address maintenance concerns. It is recommended that the concrete sidewalks be extended to the intersection radius curbs to provide continuity and provide for the installation of tactile plates at the curb depressions. Some of the bulb areas are relatively large, and some variation in surface treatment is recommended for aesthetic reasons.

Options exist for the treatment of the area between the concrete sidewalk and the curb, which will be referred to as the boulevard area. The use of alternative materials, patterns and/or colour in this area will create interest. However, this area remains usable by pedestrians and for various uses, including providing access to the parallel parking spots.

We recommend replacing the concrete sidewalk adjacent to the buildings with a continuous wider sidewalk. The width of the main sidewalk may be limited by the tree pits, depending on the treatment selected. If a number of the trees are retained in their current location, the concrete sidewalk would be a minimum of 2.2 m wide, or approximately half the width between the buildings and the curb.

The remaining 2.2 m boulevard between the concrete sidewalk and the back of curb is recommended to receive an alternative treatment, with the following options.

Coloured Concrete Coloured concrete with alternative brushing patterns can provide contrast with a durable surface. Colour matching for future replacements is a potential issue. If this option is selected, we would recommend a subtle colour such as grey or charcoal to avoid unnatural looking colours and make it easier to colour match in future.

Coloured Impressed Concrete We do not consider that impressed concrete adds much aesthetically to the concrete options and has the downside of increased cost, maintenance issues and slipperiness.

Concrete Pavers Concrete pavers provide an economical and visually appealing surface. Possible downsides regarding movement can be minimized by using the paving stones in secondary traffic areas. A wide variety of colour options is available. There is a trend towards the use of greys or charcoals, as have been used in the crosswalk portions of the intersection treatments. The existing paving stones are predominantly “terra cotta”, and this colour is used in the centre of the intersections and in the medians.

Numerous options are available on the market for concrete pavers, including larger blocks. The larger pavers have a wider and deeper gap between the pavers which may not be as appropriate for accessibility. However, the paving stone is recommended in the lower traffic areas. Samples of concrete paver options are enclosed in Appendix C.

Permeable Pavers

Opportunities to promote infiltration such as permeable pavers could be explored. Permeable pavers contain larger gaps between the stones filled with small pea-stone granular material to promote infiltration. This style of paver is being used more frequently in parking applications, but the larger gaps could be a concern in high traffic pedestrian applications. These installations also require the replacement of subbase with clear stone material and the installation of subdrains to ensure the trenches do not remain saturated. The silty-clay subsoils exhibit low permeability to the effectiveness of permeable pavers could be limited in this application. There is also a risk of heaving of sidewalk and road materials due to freeze/thaw cycles. The adjacent rubble stone foundation walls are also prone to leaking. For these reasons, the use of permeable pavers is not recommended for this project.

Preliminary Design Concept

A preliminary design concept has been prepared and is enclosed in Appendix B. It consists of a continuous concrete sidewalk adjacent to the buildings with a minimum width of 2.2 metres. The sidewalk extends to the bulbs and incorporates tactile plates at the intersection crosswalks. The sidewalk is intended to provide a clear and defined pedestrian walkway unencumbered by street furniture.

The 2.2 m wide strip between the sidewalk and back of curb is proposed to be concrete pavers. The colour and style can be determined through consultation with the stakeholders. This strip would be multi-purpose in that it would house the street trees and light standards, along with street furniture such as waste receptacles, benches, bicycle racks, and other amenities.

The “bulbed” areas at the intersections would be concrete surfaced. There is room to include some street furniture and planters within these bulbs, outside of the main pedestrian routes to the crosswalks. There is the option to provide some coloured concrete portions to set-off the areas containing these features.

4.0 CLOSING

This report presents a recommended treatment for the replacement of sidewalks and boulevards on Central Broadway. The following approach is recommended:

- Construction of a 2.2 m wide concrete sidewalk adjacent to the buildings, extended to the curbs at the intersection bulbs and including tactile plates for AODA compliance;
- Paving stone boulevards housing the streetlights and street furniture.

Consideration can be given to the inclusion of additional work should the scope be revised accordingly. This report has identified a number of issues for review with the BIA and other stakeholders. The removal, retention, and/or replacement of boulevard trees is identified as a significant issue to be addressed.

Respectfully Submitted

TRITON ENGINEERING SERVICES LIMITED



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Howard Wray, P. Eng.

APPENDIX A



Photo 1 – Existing sidewalk configuration with 1.5m concrete sidewalk, banding, and paving stone blvd



Photo 2 – Settlement in paving stone band and curb stop



Photo 3 – Paving Stone heaving around tree



Photo 4 - Tree with original tree grate and no heaving



Photo 5 – Settlement around junction boxes



Photo 6 – Uneven and broken paving stones



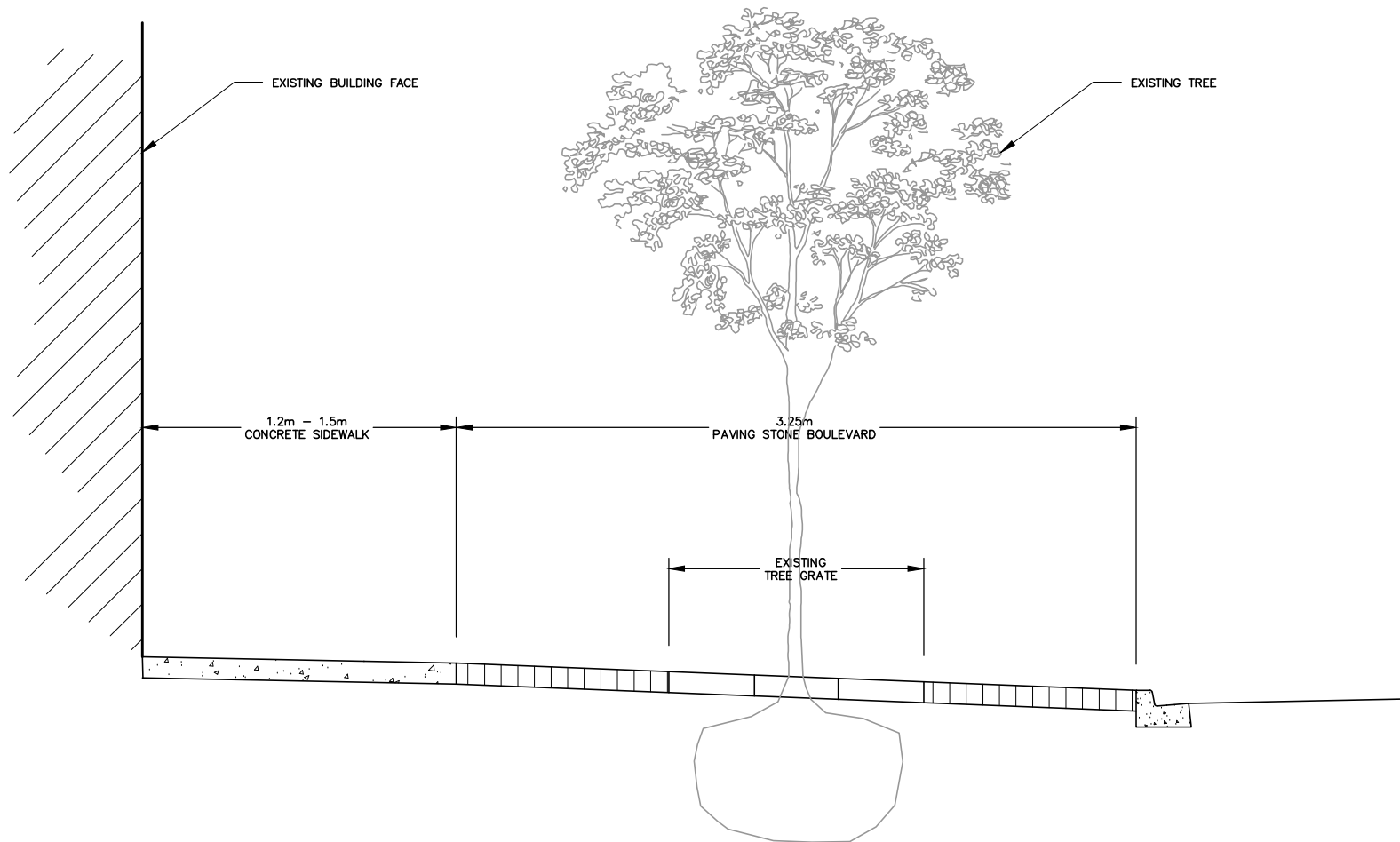
Photo 7 – Parking Metre Posts converted to Bike Racks



Photo 8 – Existing steps at 85 Broadway

Table 1 – Comparison of Sidewalk/Boulevard Materials

| Feature | Concrete with Brushed Finish | Coloured and/or Impressed Concrete | Concrete Pavers |
|---|---|---|---|
| Functionality | Provides a smooth functional surface. Expansion and contraction joints are required. Contraction joints can be sawcut for a smoother surface. | Similar to brushed concrete. Impressed Concrete is not smooth due to the impressed grooves. | Designed for both walking area and boulevards. Provides a generally smooth surface when properly installed, but there are seams between individual pavers. |
| Durability | Very durable. | Very durable. | Moderate durability. Over time some movement or heaving can occur. Surface of pavers can wear. |
| Maintenance | Easy to maintain with standard equipment. | Maintenance similar to brushed concrete but chipping is a potential problem. Surface of impressed concrete can be slippery, and water can collect in the indentations. | Similar to brushed concrete. More difficult to maintain once any differential movement occurs. |
| Replacement (when required for spot repairs) | Replaced panels will generally match adjacent, with some variation due to age of materials. | Requires removal with jackhammer and re-placing. Very difficult to match adjacent colour meaning replaced panels will not blend in. | Pavers can be removed and re-set, although difficult to get as smooth as original. Colour match is difficult as pavers change colour as they age. |
| Aesthetics | Considered least aesthetic due to monochrome grey colour and overall uniformity. Some options available in finish and brushing. | Adds colour to the streetscape, although individual colours are monochromatic. Colour selection is important. Red colouring can appear pinkish in appearance, especially after aging. | Wide variety of colours, sizes and patterns, and blended colouring is available providing more visual variation and avoids monochromatic look. |
| Accessibility | Meets all accessibility standards. Tactile plates can be set at curb drops. | Coloured concrete same as brushed. Impressed concrete can be slippery and surface is not as smooth. | Generally meets AODA standards when properly installed. Numerous joints between stones make a less smooth surface. Styles with more relief or “cobbled” appearance are not suitable. Not conducive to placement of tactile plates. |
| Cost | Lowest cost | Higher cost | Cost varies significantly based on style chosen. “Standard” pavers (100x200) on granular base are similar to or only slightly more expensive than brushed concrete. Pavers can be set on a concrete base for more durability, but is the highest cost option. |



EXISTING SIDEWALK SECTION

BROADWAY SIDEWALKS
TOWN OF ORANGEVILLE

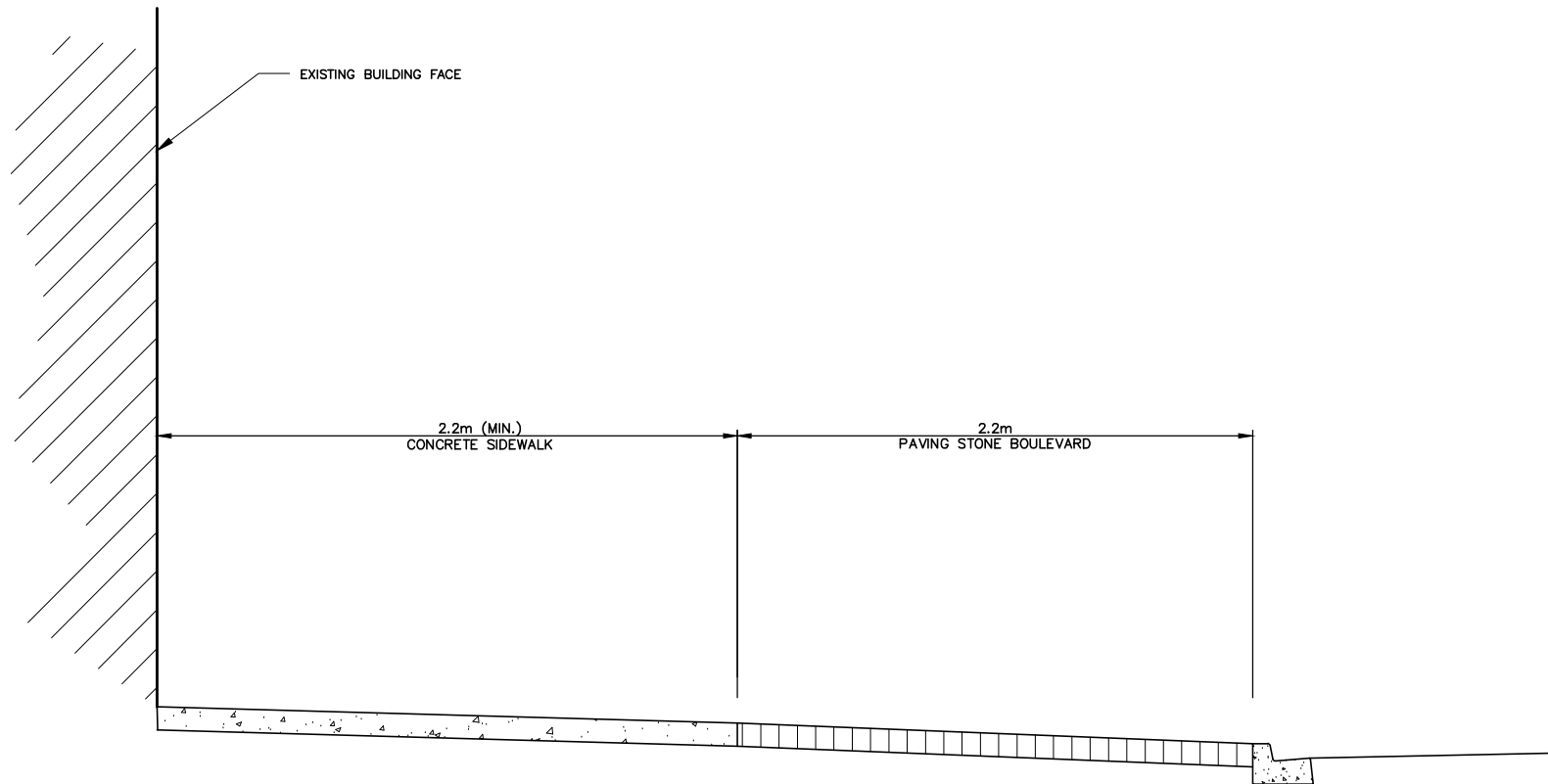
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| DATE: | MARCH 2021 |
| SCALE: | N.T.S. |




FIGURE No.

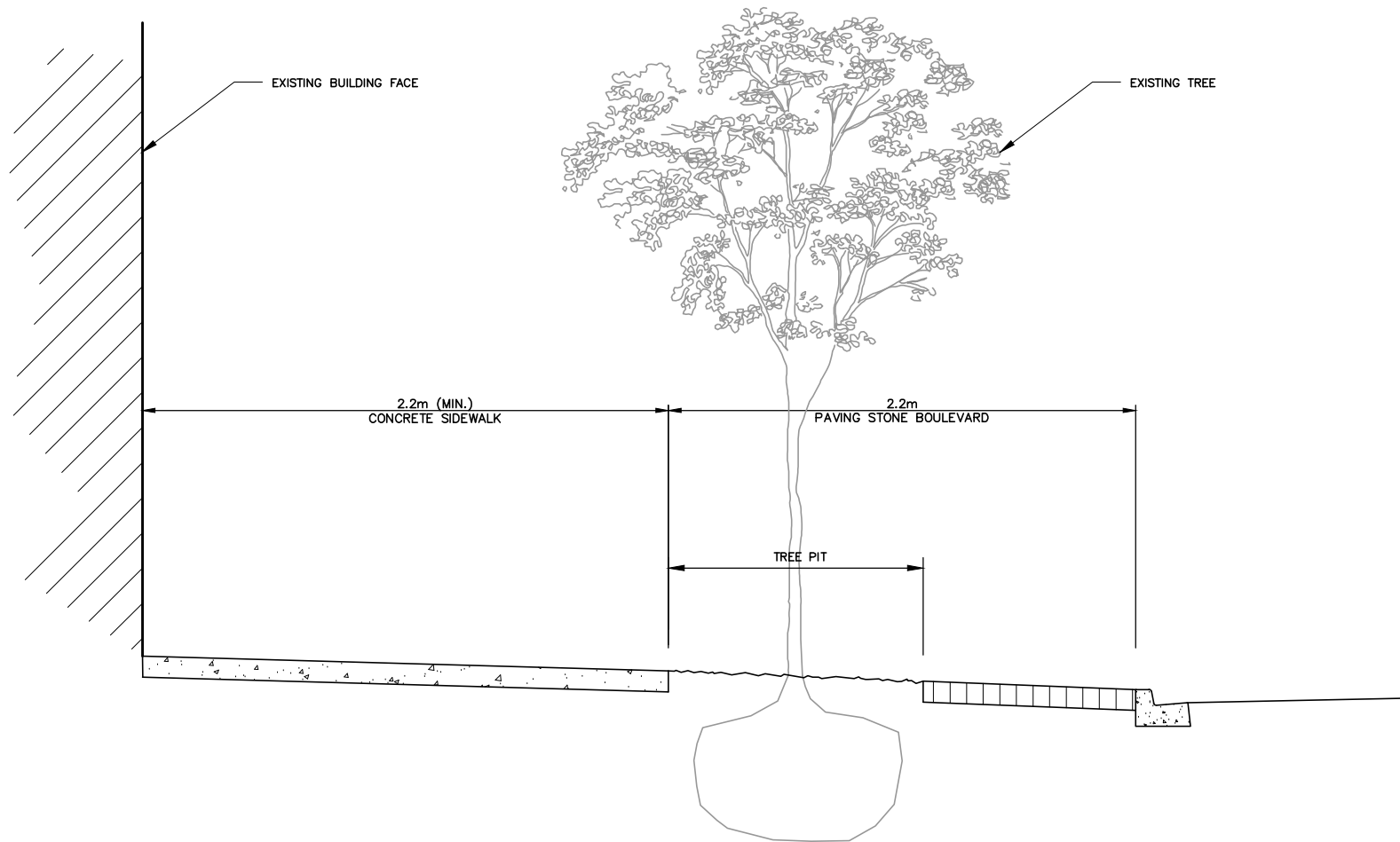
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APPENDIX B



PROPOSED SIDEWALK SECTION

| BROADWAY SIDEWALKS TOWN OF ORANGEVILLE | | | FIGURE No. |
|---|------------|--|------------|
| DRAWN BY: | S.A.W. |  TRITON ENGINEERING SERVICES LIMITED <small>Consulting Engineers</small> | 2 |
| DATE: | MARCH 2021 | | |
| SCALE: | N.T.S. | | |



**BROADWAY SIDEWALKS
TOWN OF ORANGEVILLE**

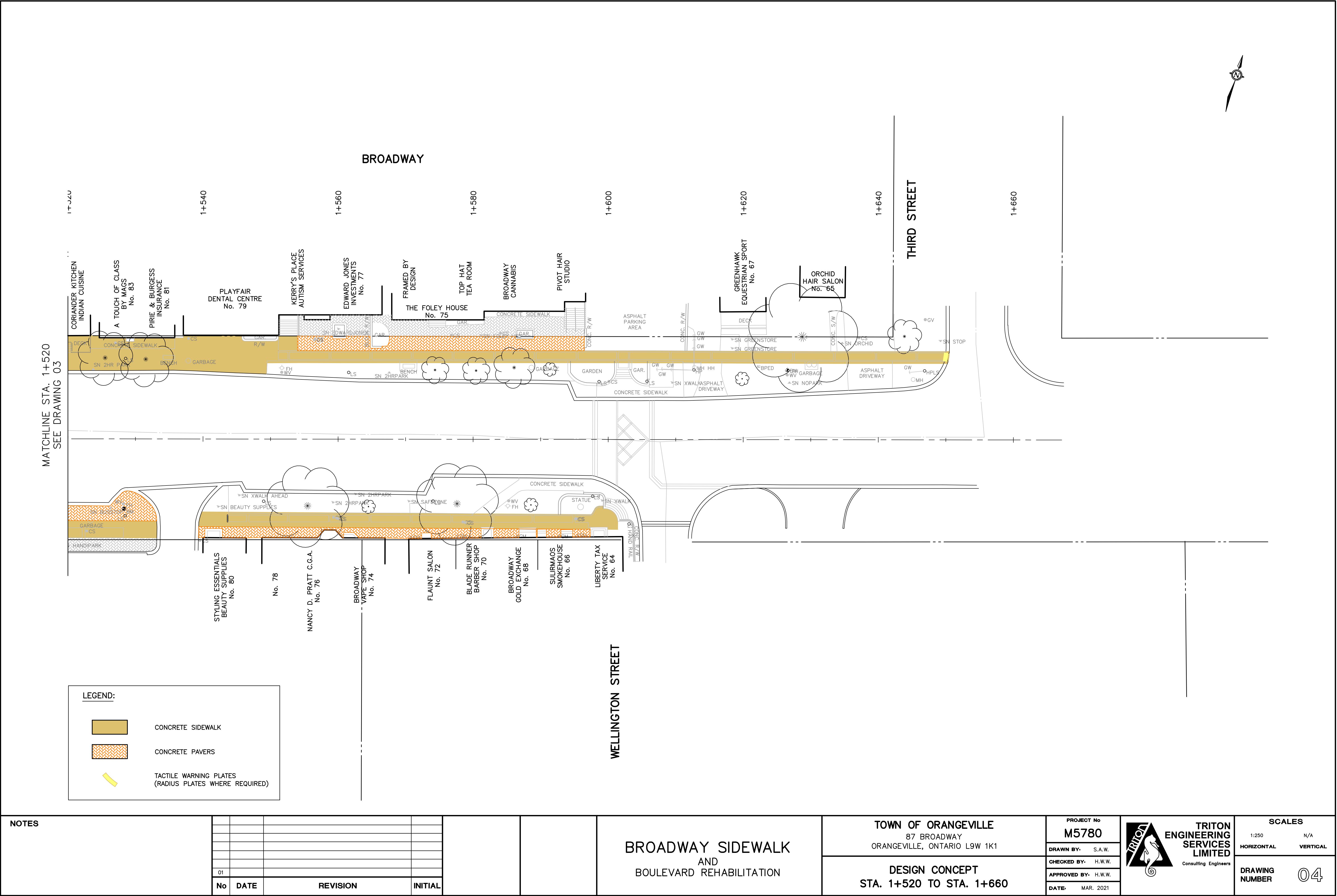
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DATE: MARCH 2021
SCALE: N.T.S.



FIGURE No.

3





MATCHLINE STA. 1+520
SEE DRAWING 03

LEGEND:

CONCRETE SIDEWALK

CONCRETE PAVERS

TACTILE WARNING PLATES
(RADIUS PLATES WHERE REQUIRED)

| | | | | | | | | | | |
|-------|----|------|----------|---------|--|--|--|--|-------------------|----------|
| NOTES | | | | | BROADWAY SIDEWALK AND BOULEVARD REHABILITATION | TOWN OF ORANGEVILLE 87 BROADWAY ORANGEVILLE, ONTARIO L9W 1K1 DESIGN CONCEPT STA. 1+520 TO STA. 1+660 | PROJECT No M5780 DRAWN BY: S.A.W. CHECKED BY: H.W.W. APPROVED BY: H.W.W. DATE: MAR. 2021 |  TRITON ENGINEERING SERVICES LIMITED Consulting Engineers | SCALES | |
| | | | | | | | | | 1:250 | N/A |
| | | | | | | | | | HORIZONTAL | VERTICAL |
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APPENDIX C

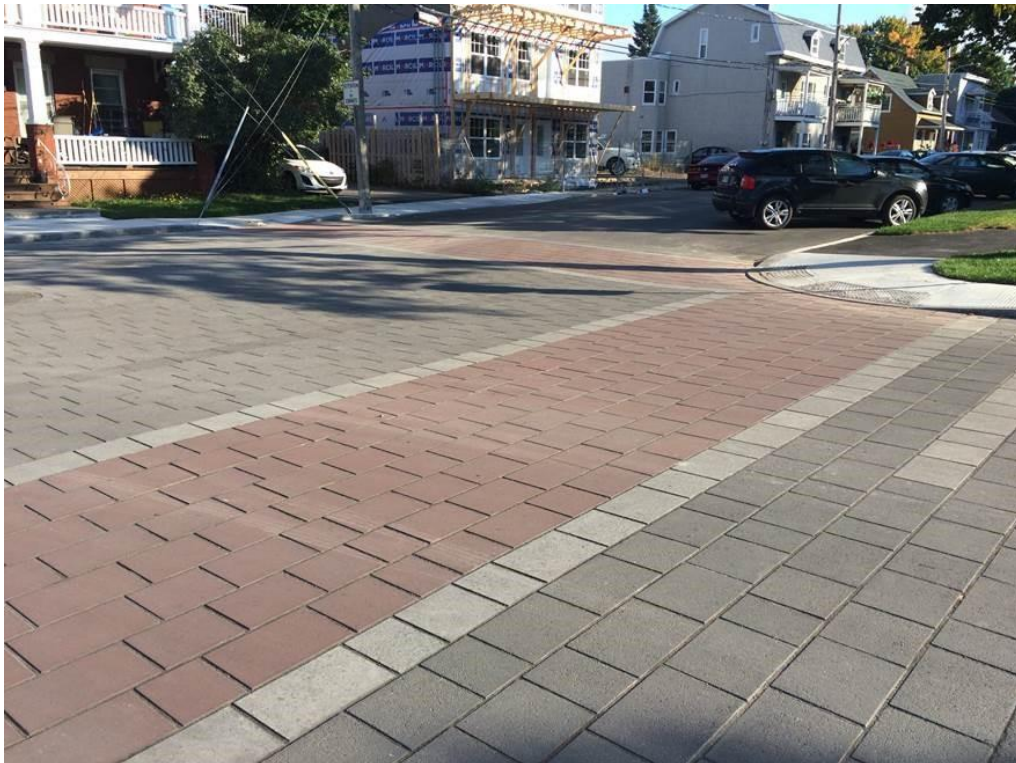
Concrete Paver Samples



Concrete Paver Samples



Concrete Paver Samples



Concrete Paver Samples

