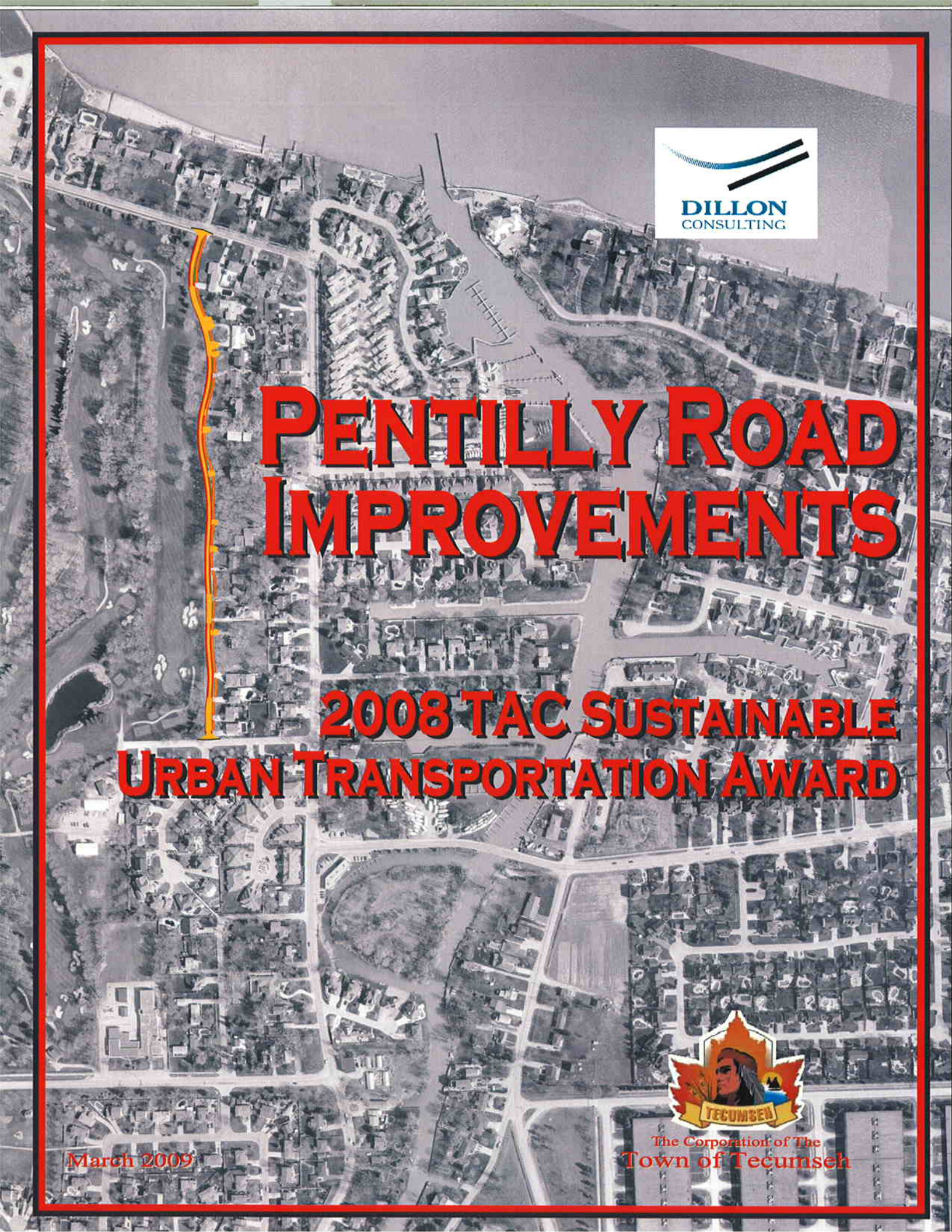


DILLON CONSULTING

PENTILLY ROAD IMPROVEMENTS

2008 TAC SUSTAINABLE URBAN TRANSPORTATION AWARD

March 2009

The Corporation of The
Town of Tecumseh

1.0 EXECUTIVE SUMMARY

Background

As a result of growth in infrastructure needs that resulted from development across the Country over many decades, municipalities are now finding it increasingly challenging to implement improvements as this infrastructure ages, both from the point of view of cost effectiveness and impacts to the environment and neighbouring communities. More than ever, sustainable design approaches are gaining acceptance as a means of addressing these current challenges. Sustainable design approaches are causing proponents to reassess conventional industry standards as a key means of striking an appropriate balance between meeting acceptable servicing requirements, while recognizing the need to minimize impacts on the environment and communities.

The Town of Tecumseh initiated the Pentilly Road Improvements project in 2005 based on the results of a Roads Needs Study. Dillon Consulting Limited was retained to assist in its planning, design and implementation. What started out as a conventional approach to reconstruction and infrastructure improvements quickly evolved into the implementation of a sustainable green road design, which has since come to gain notable acceptance in the community, and continues to inspire the Town in its quest to adopt sustainability as a standard.

The primary objectives of the 'green road' design approach were to address the need for:

- Traffic calming;
- Minimizing environmental impacts;
- Control of stormwater runoff quality and quantity;
- Minimize social impacts (character) of established neighbourhoods; and
- Preserving the use and function of established local roadway environments.

The Pentilly Road Improvements project, from inception through to implementation, is a testament to the success that can be realized by adopting a collaborative and open-minded approach to sustainable infrastructure improvements. We are pleased to herein outline the planning and design process and resulting sustainable design features that were instrumental in the successful implementation of the Pentilly Road Improvements project.

2. DEVELOPMENT AND ENHANCEMENT OF SUSTAINABLE URBAN TRANSPORTATION

Pentilly Road is an existing rural roadway located in the Town of Tecumseh, Ontario. As illustrated in Figures 1 and 2 in the attached Supporting Documents, a corridor approximately 560m in length was identified for road and infrastructure improvements. The road was an established community corridor with significant character, adorned by mature trees, a narrow pavement, and complimented by exclusive properties, and a Golf Course vista.

The Pentilly Road Improvements began with the short-term goal of addressing deficiencies within a corridor of the existing rural roadway; specifically, deteriorating pavement conditions, deficient storm drainage, and a noted lack of adequate pedestrian facilities. However, it was the Town's focus on alternative reconstruction solutions that quickly grew into a breadth of longer-term objectives; of developing a unique standard for the corridor improvements that could be

applied to other similar neighbourhoods, and specifically, a unique standard for a sustainable future.

In addition to the basic need for improving the infrastructure condition and level of service of the roadway, the project objectives expanded to include environmental and social considerations such as;

- Minimizing impacts to existing boulevard trees;
- Providing a degree of stormwater management in terms of both quality and quantity controls;
- Maintaining and enhancing, where possible, the existing vegetation within the corridor to preserve the benefits to local air quality and ambient temperature;
- Improving pedestrian safety through provision of separate facilities;
- Traffic calming to improve public safety;
- Limiting changes to the corridor features, to preserve the neighbourhood character;
- Public consultation to develop a partnering approach with the neighbourhood community.

The result of these objectives was the implementation of a sustainable green design on Pentilly Road, which preserved the character and function of the local roadway, while providing associated environmental and social benefits. The results are best illustrated in Figures 3 and 4, and the Before/After Photographs in the attached Supporting Documents.

Features of the 'green road' design that were incorporated in the Pentilly Road Improvements project include:

- Decreasing the perceived traveled road width:
  - The narrower width of asphalt pavement (4.3 m) results in a perception of reduced traveled road width. The effective road width of 6.74 m is achieved by providing an at-grade concrete border and structural grass on both sides of the asphalt surface, which allows for the safe, albeit slower movement of two-way traffic.
  - Structural grass is used to provide a 'soft' edge to the roadway, while still providing the ability to support short-term vehicle loading (parking, passing, etc). This also provides extra passing room for larger vehicles, including emergency and municipal service vehicles, if required.

- Stormwater Management
  - By using a longer flow path and an increased surface roughness (vegetation), the peak runoff can be delayed.
  - Contoured, vegetated swales can be used to detain stormwater.

- Landscape Enhancement
  - Extensive planting of trees and shrubs provides aesthetic benefits, contributes to traffic calming (edge friction) and contributes to the control of stormwater runoff.
  - Increasing evaporation and transpiration assists to create a 'carbon sink', which increases the absorption of carbon dioxide and increasing oxygen levels.

- Irregular Roadway Alignment
  - The narrower pavement width provides opportunities to design an irregular roadway alignment within the right-of-way, which has both aesthetic benefits and also contributes to traffic calming.

The balance of a reduced paved surface and increased natural surfaces in the road cross section allows for the integration of a much needed pedestrian sidewalk, and further increased safety of pedestrian traffic by providing a comfortable distance between the sidewalk and the paved roadway. This is illustrated in Figure 3 in the attached Supporting Documents.

The perceived reduction in the paved roadway width, combined with a meandering alignment, promotes traffic calming, and preserves the existing character of the roadway, including mature trees and existing vegetated surfaces. The use of naturalized drainage features promotes infiltration and cleansing of stormwater runoff from minor events, and reduces potential contributions to urban stormwater pollution in collection and conveyance systems. The green design for Pentilly Road effectively fulfills all of the typical objectives for a reconstruction project, while minimizing the social and environmental impacts, and promoting increased social benefits of community safety, and preserving the charm of an established cornerstone community.

Construction of the improvements proceeded in May 2006, and was substantially completed in October of the same year. The final construction cost was approximately $ 1.06 Million. Though some components of the initial construction cost were higher than comparative costs for typical urban road reconstruction, such as the use of golpla pavers and installation of a structural grass system, which were not standard practices within the surrounding municipalities, the Town willingly adopted the construction as a first step in its commitment to being at the forefront of a sustainable future. Green road designs are being developed today in the surrounding neighbourhoods, and it is expected that more use of the techniques, and more familiarity with the design, construction, and materials will help to establish a cost effective construction alternative in the future. Furthermore, since its initial construction, maintenance has been found to be similar to that required for typical road cross sections, and the benefits are overwhelmingly in support of the design. More implementation of these features will help to establish best practices for maintenance and construction, and augment the potential savings in implementing a more sustainable development.

3. DEGREE OF INNOVATION

This project was implemented in the following stages:

- Project Initiation and Identification of Alternative Solutions
- Public Consultation and Preliminary Design
- Detailed Design and Applications for Funding
- Tender and Construction

Project Initiation and Identification of Alternative Solutions

This project was implemented with the involvement of the neighbourhood community and with the support of the Town's administration and Council. With the heightened interest in this project that was developing, it became clear that public input would be essential to the successful

implementation of this project. The Town of Tecumseh took an open-minded approach when faced with public concerns over the negative impacts of a conventional reconstruction approach on their long-established neighbourhood, and turned a potential conflict into an opportunity that now has wider community application and benefits.

Public Consultation and Preliminary Design

In anticipation of the public concerns, several alternative roadway improvement options were initially identified, including:

- One-way southbound rural cross section
- One-way southbound urban cross section
- Two-way rural cross section (Do Nothing)
- Two-way urban cross section with sidewalks on one side only.

However, based on public feedback, it became clear that an innovative approach would be required to strike an appropriate balance between achieving the required infrastructure improvements, while mitigating the environmental and social impacts of these improvements that the public had concerns with.

On January 19, 2006, a public information meeting was held to present the alternatives and to obtain feedback that would be considered in finalizing the preferred design. The alternatives included:

- Sustainable road design, including an asphalt pathway on one side of the road.
- Conventional urban cross section, including a concrete sidewalk on one side of the road.

During the process of considering alternative roadway improvement solutions, the Town of Tecumseh came across an article in the July 15, 2005 publication of the Daily Commercial News, which described an innovative approach of sustainable roadway design recently completed in Vancouver, British Columbia. As it turned out, this was a project in which Dillon Consulting Limited was involved, and based on Dillon's understanding of the project, it was determined that this would be a viable alternative that should be considered for the Pentilly Road improvements.

This approach turned out to be very effective, and resulted in overwhelming support for the 'green road' alternative. Furthermore, the Town of Tecumseh saw an opportunity to establish this as a unique design standard for corridor improvements that could be applied to other similar neighbourhoods, in what is known as the "saucer area" of the Town.

The preliminary design for the 'green road' alternative was subsequently completed with the following objectives in mind:

- Minimize impacts to existing boulevard trees;
- Provide a degree of storm water management for both quality and quantity controls;
- Maintain and enhance where possible, the existing vegetation within the corridor;
- Improve pedestrian safety through provision of a separate pathway;
- Incorporate a measure of traffic calming to improve public safety;

- Preserve the neighbourhood character; and
- Maintain a partnering approach with the neighbourhood community.

Detailed Design and Applications for Funding

Because this design standard was relatively new, we relied on the following resources to develop the detailed design for this project:

- Design details from the previous projects, including;
  - Street Edge Alternatives (SEA) Project in Seattle, Washington; and
  - "The Road Ahead" project on Crown Street in Vancouver, in which Dillon Consulting Limited was involved in design and construction administration.
- Construction industry feedback on methods of construction; and
- Product supplier feedback on product implementation and materials specifications.

The detailed design and preparation of contract documents for this project was completed in February 2006.

In March 2005, the Town submitted an application for Federal Gas Tax funding under the Municipal Funding Agreement based on the sustainability outcomes of the investment in this roadway improvement project. The sustainability outcomes confirmed for this project in terms of the objectives outlined above, including the added benefits associated with incorporating the reuse of existing granular materials from the site, resulted in the Town being successful in receiving funding for approximately half the project construction costs. The quantifiable environmental benefits included:

- Benefits associated with the use of recycled and reclaimed materials
  - $50,000 cost savings in new materials
  - 10,900 kg reduction in CO_2 emissions
  - 2070 L reduction in fuel consumption
- The benefits of saving 11 trees from removal results in preserving 132 kg of CO_2 generated per year.

Tender and Construction

This project was tendered in early March 2006. Construction began in early May 2006, and was substantially completed by October 2006.

As the construction activities began, and throughout the construction period, the public was kept regularly informed of the contractor's schedule, including any specific measures requiring their cooperation to accommodate the construction activities.

In particular, it became a challenge to maintain site access during road construction due to this narrow pavement cross section. With the cooperation of the contractor and the public, this roadway was constructed in two separate stages, during which time driveway access was eliminated in half of the project at a time to allow full road construction in stages. This allowed for a shorter construction duration, while maintaining a higher degree of public safety.

The implementation of the green road design in this neighbourhood is certainly substantiation to the potential for "cross-Canada" innovation of sustainable green road designs. The inspiration from a similar objective undertaken in Vancouver, in collaboration with the community and its many resources and ideas led to the successful implementation of a fitting sustainable design in a unique community in southern Ontario.

The project resulted in an integrated, holistic approach to planning and decision-making by taking into account the various needs (infrastructure improvements, environmental enhancements, tree canopy protection, enhancement of unique neighbourhood streetscape features, safe and functional community linkages) and balancing them against one another to come to a viable and appropriate solution that fit the community. This required a clear understanding of the various interests and proper identification of the key stakeholders. This required a decision-making process that took into account the interests of the public, Council, professionals (engineer, planner, treasurer, public works representatives) and the various regulations and policies that establish the framework within which these types of matters are addressed. The final project, as constructed, is a testament to the success of this approach.

4. TRANSFERABILITY TO OTHER CANADIAN COMMUNITIES AND ORGANIZATIONS

This approach was first used in North America on the Street Edge Alternatives (SEA) Project in Seattle, Washington in early 2000. The project was well received by the public and since its successful completion; the concepts of 'green road' design have gained popularity, particularly on the North American west coast. This innovative approach to roadway design was first introduced to Canada shortly thereafter with "The Road Ahead" project on Crown Street in the City of Vancouver; a project in which Dillon Consulting Limited was also involved in providing consulting engineering services.

The project has regard to, and implements a number of policies that are identified in the municipality's Official Plan. The Official Plan stresses the importance of parkland and open spaces in creating the unique characteristic of the Villages, while recognizing the need for improved pedestrian linkages and natural or "green" pathways. It is anticipated that the project elements will be applied in other areas of this community. The project elements can be applied on other streets in this community, and in fact, in communities across the country. It provides a local example of how infrastructure can be enhanced to meet current day design standards while having regard for the unique characteristics of the neighbourhoods in which the work is undertaken.

5. ADDED VALUE

Communications and Partnerships

A key partnership was developed with the Beachgrove Golf Course, which is located along the west side of Pentilly Road. Meetings were held regularly with the Golf Course representatives to address the following issues:

- Impacts to existing ash trees, including their proposed replacement;
- Storm drainage requirements that were to be incorporated into the design of the drainage improvements;

- Regrading of lands adjacent to the Pentilly Road right-of-way;
- Agreement to encroach in part, the roadside drainage swales onto the Golf Course lands where it was beneficial to improve surface grading and to limit impacts to trees and other features within the right-of-way;
- Confirmation of their liability concerns with the pedestrian pathway location relative to golf course uses; and
- Coordination of construction activities, including required changes to their irrigation system.

Benefits of 'Green Road' Design

The benefits of the Pentilly Road Improvements 'green road' design include:

- Controlling stormwater runoff to limit impacts to downstream storm drainage outlets where capacity limitations exist. In addition, there is a degree of improvement to runoff quality associated with these techniques.
- Traffic calming to improve public safety.
- Minimizing impacts and/or enhancing the existing vegetation to improve local air quality and contribute to local ambient temperatures.
- By limiting changes to the character of this established neighbourhood using the 'green road' approach, social impacts are limited and may be enhanced through a renewed right-of-way that is aesthetically pleasing, natural and 'soft-edged'.

The result is an aesthetically pleasing design, which effectively promotes traffic calming, enhances comfortable and accessible use to pedestrian traffic, and serves to reduce environmental impacts to the surrounding community.

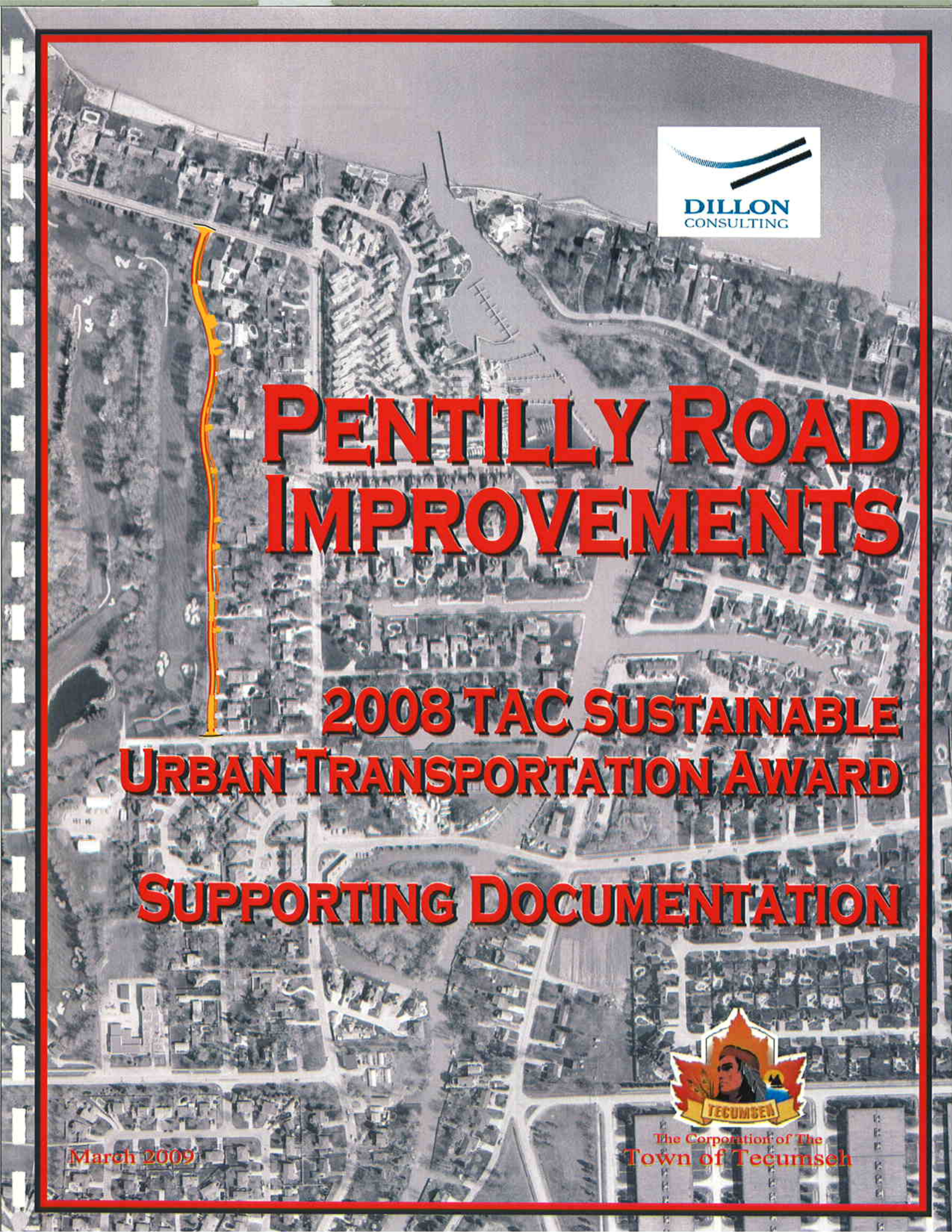
Photos and Video Presentation

In support of this submission for a sustainable community award, before/after photographs and a video presentation have been included in the Supporting Documentation package to more fully describe the project outcomes. The video presentation included on the enclosed CD highlights the perspectives of the neighbourhood community and representatives of the Town of Tecumseh and Dillon Consulting Limited. Copies of this presentation are enclosed and form part of this awards submission.

6. RELATED INITIATIVES AND OTHER RELEVANT INFORMATION

Project Funding

The Town of Tecumseh confirms their receipt of a funding contribution for the implementation of the Pentilly Road Improvements project. Federal Gas Tax funding for approximately half of the project construction cost of $1.06 Million was received under the Municipal Funding Agreement based on the confirmed sustainability outcomes of the investment in this roadway improvement project, as previously outlined herein.



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2008 TAC SUSTAINABLE URBAN TRANSPORTATION AWARD

SUPPORTING DOCUMENTATION

March 2009

The Corporation of The Town of Tecumseh

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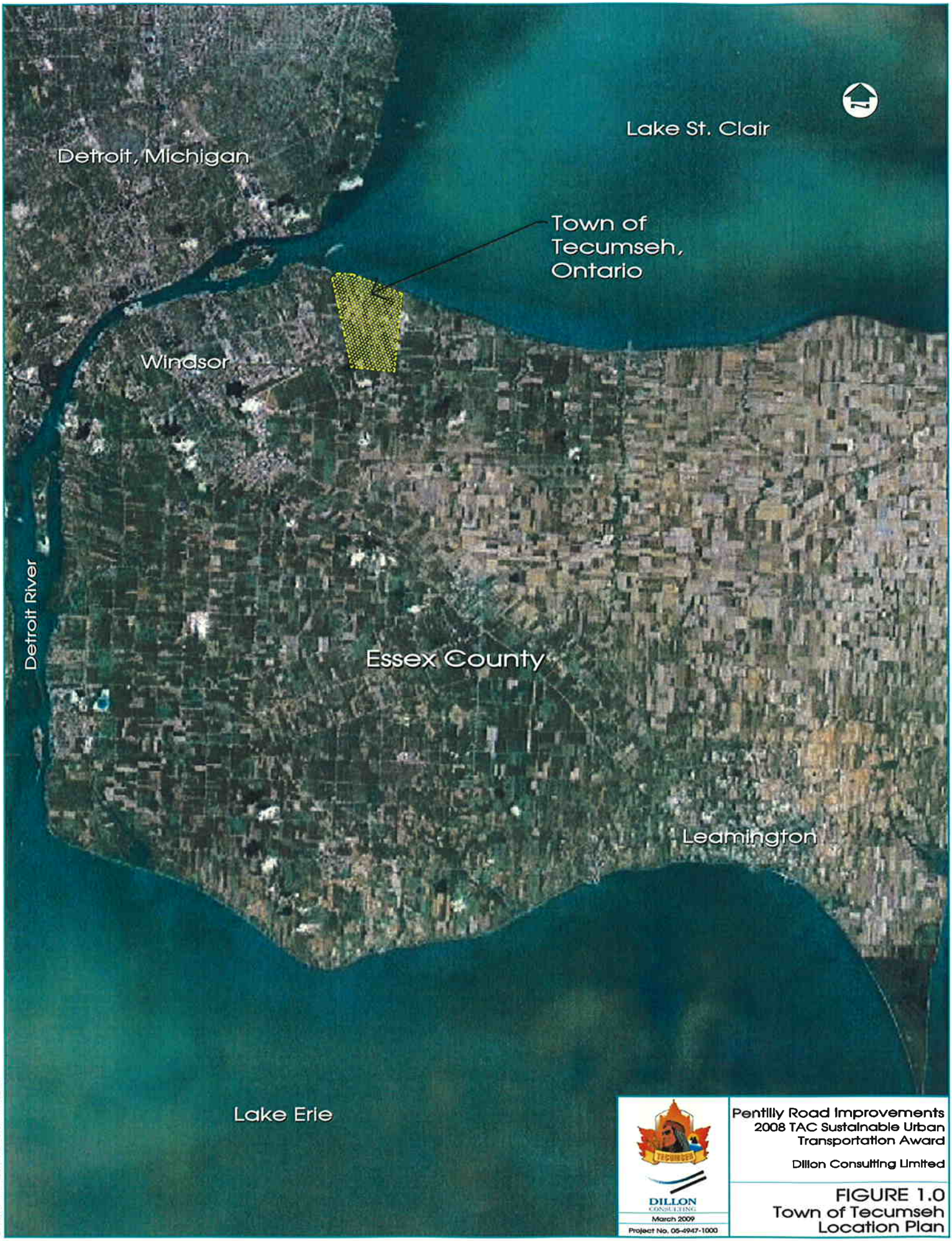

Pentilly Road Improvements
2008 TAC Sustainable Urban Transportation Award

Dillon Consulting Limited

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March 2009

Project No. 05-4947-1000

FIGURE 1.0
Town of Tecumseh
Location Plan

Pentilly Road Improvements
2008 TAC Sustainable Urban Transportation Award

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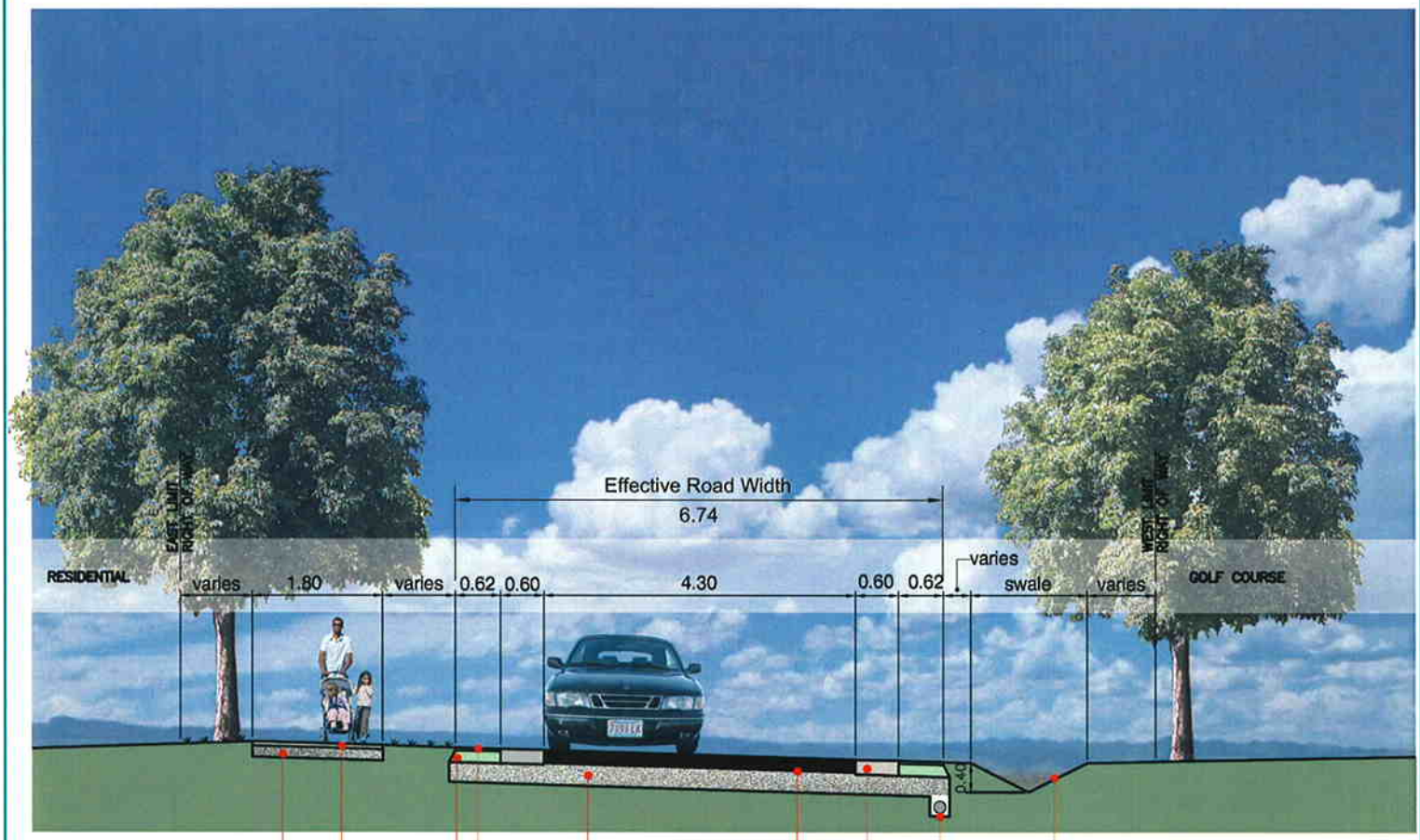
March 2009

Project No. 06-4947-1000

FIGURE 2.0

Saucer Area



150mm granular 'A'

60mm asphalt

asphalt

granular 'A'

200mm concrete gutter

150mm dia. perferated subdrain

Golpla paver - Structural Grass

165mm structural soil

slope varies (2.5:1 preferred)

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March 2009

Project No. 05-4947-1000

Pentilly Road Improvements
2008 TAC Sustainable Urban Transportation Award

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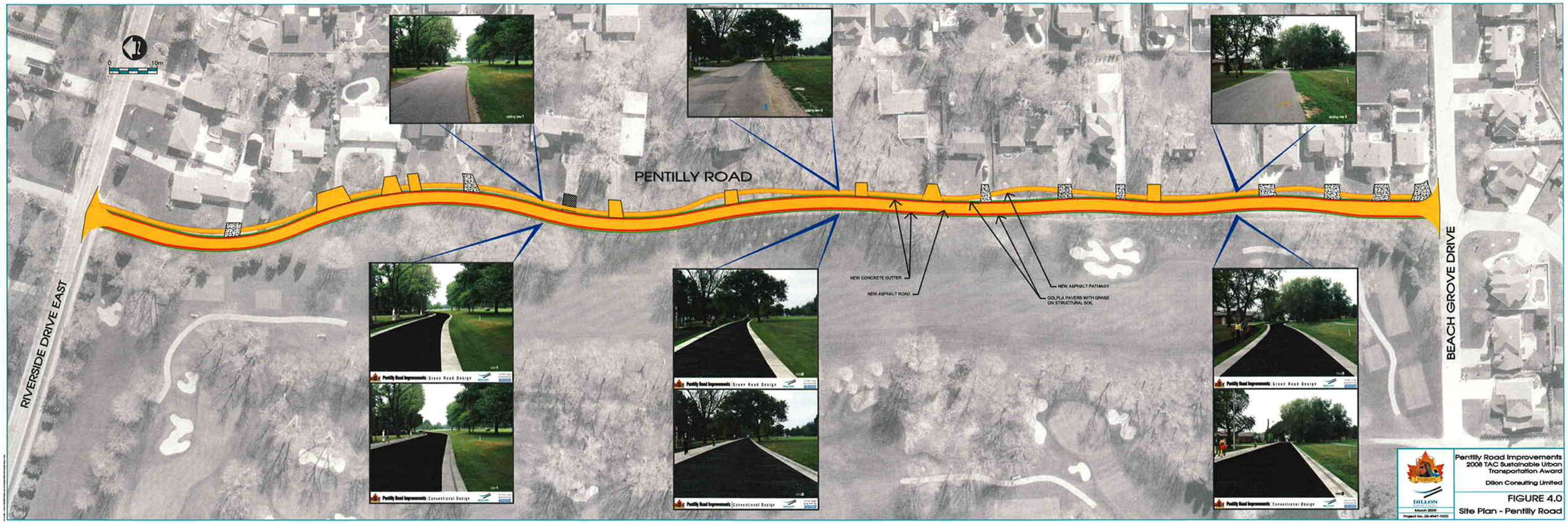
FIGURE 3.0
Typical "Green Road" Cross Section



Pentilly Road Improvements
2008 TAC Sustainable Urban Transportation Award

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March 2009

Project No. 08-4147-1030

FIGURE 4.0
Site Plan - Pentilly Road

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Before
Approximate South End of Pentilly Road

After
Approximate South End of Pentilly Road

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TECUMSEH

Before
Approximate Middle of Pentilly Road

After
Approximate Middle of Pentilly Road

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Before
Approximate Middle North of Pentilly Road

After
Approximate Middle North of Pentilly Road

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Before
North End of
Pentilly Road

After
North End of
Pentilly Road

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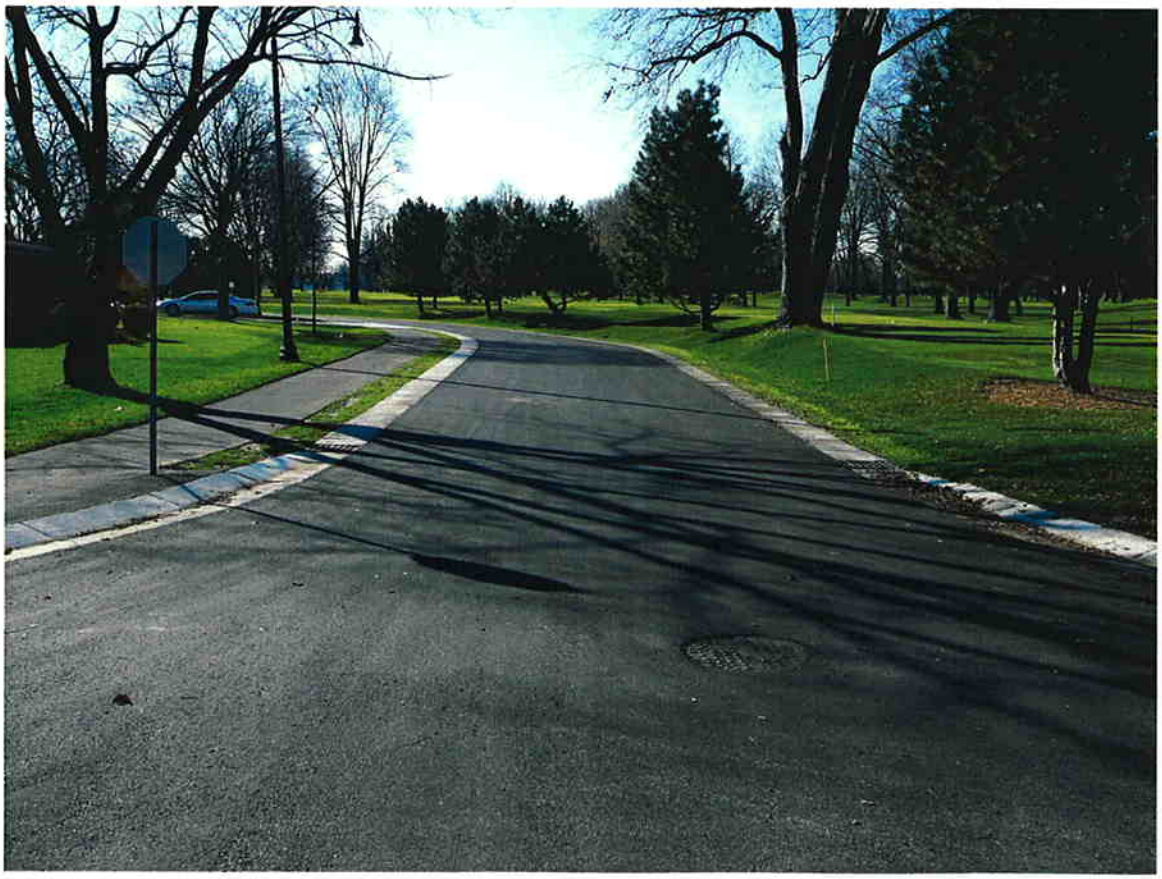
Before
North End of Pentilly Road at Riverside Drive



After
North End of Pentilly Road at Riverside Drive