

ENVIRONMENT COMMITTEE

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*HIS WORSHIP, THE MAYOR  
AND COUNCILLORS*

**SUBJECT: ALTERNATE STREET DESIGN CONCEPT**

**RECOMMENDATIONS:**

1. THAT Council authorize staff to proceed to Phase 2 – Demonstration Project Selection and Design as described in Section 7.0 in this report.
2. THAT Council approve a funding allocation of up to \$80,000 from the Gaming Fund to finance the Phase 2 work program.
3. THAT staff report back to the Environment Committee and Council upon completion of the Phase 2 program.

**REPORT**

The Environment Committee, at its Open meeting held on 2006 March 21, received and adopted the *attached* report requesting approval to proceed to Phase 2 of a pilot project based on an alternate street design concept to improve roadway stormwater management. The Committee noted that Phase 2 includes selection of a demonstration site and preparation of a detailed design.

Respectfully submitted,

Councillor Dan Johnston  
Chair

Councillor Pietro Calendino  
Vice Chair

Councillor Lee Rankin  
Member

COPY – CITY MANAGER  
DIRECTOR PLANNING & BUILDING  
DIRECTOR ENGINEERING  
DIRECTOR FINANCE

**TO:** CHAIR AND MEMBERS  
ENVIRONMENT COMMITTEE

**DATE:** 2006 March 10

**FROM:** DIRECTOR ENGINEERING

**FILE:** 31000-40

**SUBJECT:** ALTERNATE STREET DESIGN CONCEPT

**PURPOSE:** To seek Committee and Council approval to proceed to Phase 2 of a pilot project based on an alternate street design concept to improve roadway stormwater management.

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**RECOMMENDATION:**

1. **THAT** the Committee recommend to Council that:
  - a. staff be authorized to proceed to Phase 2 – Demonstration Project Selection and Design as described in Section 7.0 in this report;
  - b. a funding allocation of up to \$80,000 from the Gaming Fund to finance the Phase 2 work program be approved; and
  - c. staff report back to the Committee and Council upon the completion of the Phase 2 program.

**REPORT****1.0 INTRODUCTION**

In December 2003, Council approved a report from the Environment Committee that outlined a multi-phase project to investigate an alternate street design concept to improve roadway stormwater management.

The objective of the alternate street design concept is to reduce stormwater run-off from impervious street surfaces to City streams and the environment. The concept is built on Council approved stormwater management principles of flood protection, sedimentation control and water quality enhancement. In 2003, Council also approved a comprehensive stormwater management policy on impervious area reduction and better flood protection which provides the framework for the discussion on the alternate street design concept in this report.

## 2.0 A REVIEW ON THE DEVELOPMENT OF THE ALTERNATE STREET DESIGN CONCEPT

Urbanization and traditional development often result in the creation of more impervious surfaces which in turn increases peak storm run-off in storm sewers and the receiving streams. Research studies have indicated that when impervious area in a watershed increases, the stream environment begins to show sign of degradation due to increased frequency of peak flows and erosion, and elevated pollutant loadings in the run-off. Reducing imperviousness in an urban setting by retaining the natural absorbent landscape, promoting pervious surfaces and ground infiltration will provide the means of improving urban stormwater and the receiving environment.

One of the means to achieve the impervious area reduction goal is to introduce permeable or porous elements such as porous pavement and infiltration swales in the traditional roadway design. This approach had led to the evolution of alternate street design concept which is gaining popularity and recognition in many communities including the cities of Portland, Seattle and Vancouver, and the Burnaby Mountain UniverCity development (see Appendix A). The concept of the alternate street design has the following objectives:

- a) reduce peak roadway run-off rates and volumes to the receiving environment;
- b) reduce pollutants in roadway run-off;
- c) improve neighbourhood amenities; and
- d) increase public awareness and support of better urban run-off management practices to protect the natural environment.

## 3.0 COUNCIL APPROVED PROGRAM

In December 2003, Council received a report from the Environment Committee outlining a multi-phase pilot project to investigate the applicability of the alternate street design concept in the City. The pilot project included the following phases:

- Phase 1 – Feasibility study to develop conceptual design and cost estimates for the alternate street design concept.
- Phase 2 – Detailed design to confirm final design parameters and explore funding sources and to select a site for a demonstration project.
- Phase 3 – Project implementation to advance the project to construction and to develop a post-construction monitoring program.

The report was considered by Council and the recommendation to proceed with Phase 1 of the work program was approved.

#### 4.0 CURRENT PROJECT STATUS

Since Council's adoption of the Environment Committee report in December 2003, staff have retained an engineering consultant to conduct the feasibility study. The study examined various elements of the design concept and investigated the cost benefits of the design components and the budgetary requirements. The study is now complete and the key findings are highlighted as follows:

##### **Technical Considerations:**

- a) The perviousness of a conventional urban roadway complete with curb and gutter and sidewalks, is approximately 35%. The 35% account for the grassed boulevard areas between the curbs/sidewalks and the property line.
- b) The perviousness of a roadway could be increased incrementally from 35% to 100% using different innovative design elements such as permeable asphalt, porous concrete, infiltration swales and absorbent landscape.
- c) For a 10 year storm, the run-off rate from a conventional urban roadway of 35% pervious surface is approximately 18.4 l/s. For the same storm, the calculations show that the surface run-off from the road could be reduced to almost zero if the perviousness is increased to 90% or higher. Two years of flow monitoring by the City of Seattle on its first alternate street design project concluded that the total volume of stormwater run-off from the road has reduced by 98% for a two year storm event.
- d) The 90% pervious roadway (Figure 1) can be achieved with the use of the following design elements:
  - Permeable Asphalt: The use of permeable asphalt will allow the road width be kept at the current City standards without compromising parking and traffic safety requirements.
  - Infiltration Swale: For properties with front street driveway access, culvert placement will be required in the infiltration swales. The application of infiltration swale will be better suited for streets with rear lot access.

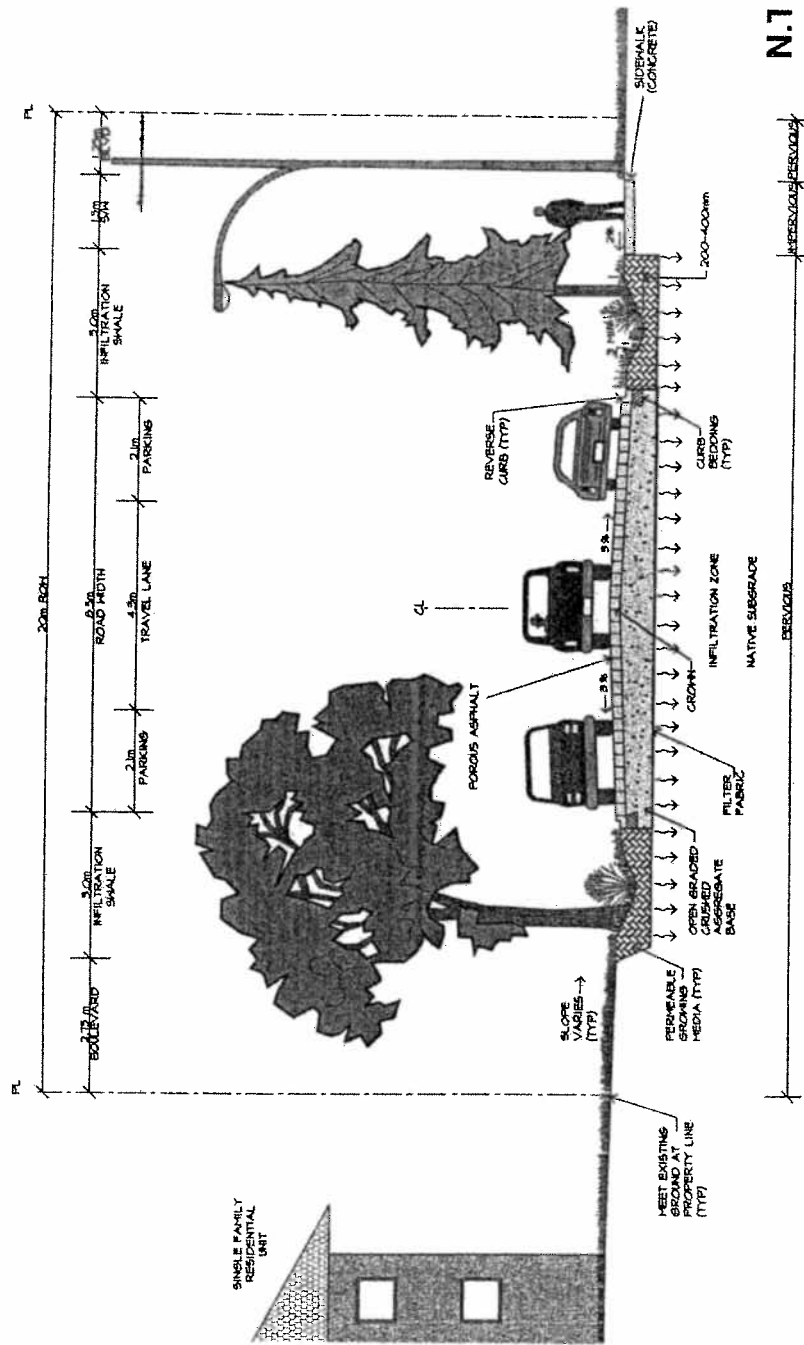


Figure 1: 90% Pervious Roadway

To: Environment Committee  
 From: Director Engineering  
 Re: Alternate Street Design Concept  
 2006 March 08 ..... Page 5

e) The 100% pervious roadway (Figure 2) can be achieved by using the design features as described under the 90% pervious roadway plus:

- Porous concrete / asphalt / pavers for sidewalks.

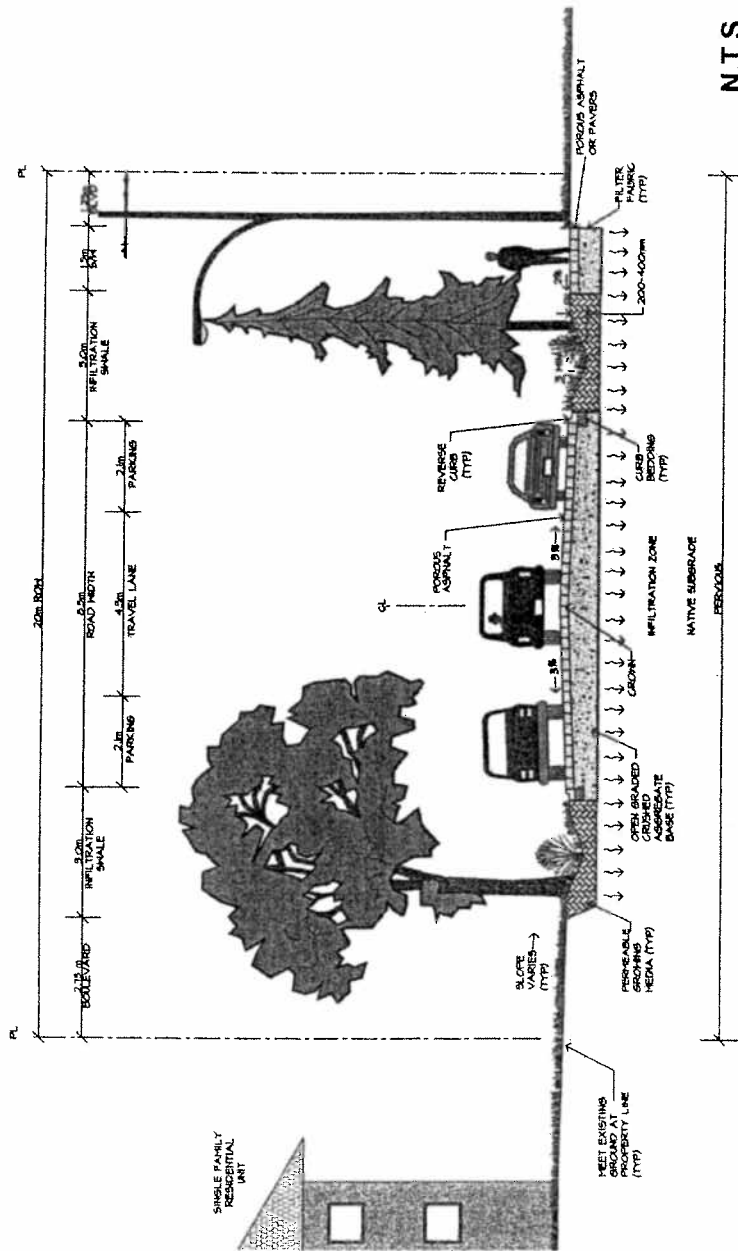


Figure 2: 100% Pervious Roadway

- f) Other levels of roadway perviousness (50% and 60%) were examined but the cost benefits are lower than that of the 90% and 100% pervious roadway concepts.

**Cost Considerations:**

- g) The alternate street design is more expensive than the conventional street design due to the higher construction cost for the permeable pavement structure and for the infiltration swales. The construction cost premium for the 90% and 100% pervious roadway design above the baseline standard design is approximately 30% and 36% respectively.
- h) Maintenance costs associated with an alternate street design will be higher than those for the conventional design. The additional maintenance costs are related to the upkeep of the landscaped swales and the more frequent sweeping of the porous road surfaces.

In summary, based on the technical study commissioned by the City, there are significant local environmental benefits that can be gained by using the alternate street design concept. Pilot projects implemented by the cities of Seattle and Vancouver (Crown St, Marine Dr to 48th Ave) have also given favourable reviews in run-off reduction by adopting a design concept employing narrower pavement and infiltration swales.

Without compromising traffic flow, public safety and residential on-street parking needs, staff recommend that the existing City roadway width standards be kept for the alternate street design concept. It is anticipated that the use of permeable asphalt will have the same, if not better drainage benefits as that offered by the narrow pavement design used in the Seattle and Vancouver examples. Having conducted the feasibility study, it can be concluded that the alternate street design concept offers local and watershed scale environmental benefits through peak flow reduction, groundwater recharge and run-off contaminant loadings reduction. Although the alternate street design concept may not be applicable for all streets and neighbourhoods in the City due to grades, soil conditions and traffic considerations, it is integral to a broader solution to address the urban run-off problem in an environmentally sensitive watershed.

**5.0 POTENTIAL CITY DEMONSTRATION SITE**

Many communities in North America have embraced the sustainable growth principles and applied them in their land use and infrastructure development plans. Burnaby, through Council adopted environmental and stormwater management policies, has applied many best management practices in City and development projects to achieve the goal of sustainable growth and environmental protection.

Pilot projects on the alternate street design concept implemented by the cities of Seattle and Vancouver have yielded positive results on stormwater run-off reduction. The study conducted by the City's engineering consultant also supports the concept and confirms its potential environmental benefits. Therefore, it is advisable that the City to proceed to the development phase including the selection of a demonstration site and preparation of detailed design. Based on the results of the engineering study, it is recommended that the 90% pervious level be used as the design objective for the demonstration project. The ideal site for the demonstration project should have a road profile gradient of less than 3% with well drained sub-surface soils. The site should also be located in the residential part of a watershed with fish bearing streams. Although many areas within the City fall within these criteria, the Byrne Creek watershed is one of the most important environmental assets for the City and is recommended to be the host watershed for the demonstration project. The Byrne Creek watershed has a long history of environmental protection and community stewardship. The following highlights a few of the environmental characteristics of the watershed:

- A well preserved stream corridor from Fraser River to the headwater.
- A significant fisheries resource in Byrne Creek.
- An active stewardship group dedicated to the protection of the aquatic environment in the Byrne creek corridor
- Recent urban renewal and redevelopment projects within the watershed have also incorporated stormwater best management practices into the site design
- Both the City and the Byrne Creek Streamkeepers have put in significant effort in restoring and creating fish habitat and spawning areas in Byrne Creek
- The City in partnership with Environment Canada, Ministry of Environment and the Byrne Creek Streamkeepers under the Georgia Basin Ecosystem Initiative have undertaken an inspection and education program within the watershed to reduce pollution of stormwater
- The 2006 Provisional Capital Program have made provisions to update the stormwater management plan for the Byrne Creek watershed

By locating a demonstration project in the Byrne Creek watershed, it would further increase public awareness on the stormwater issue and reinforce the past and ongoing environmental initiatives and commitments in the watershed.



## **6.0 PROJECT COST ESTIMATES AND FINANCING**

Preliminary construction cost estimates were prepared for each option of the alternate street design concept. For the 90% pervious option, the estimated project cost is approximately \$700,000. Subject to Council approval of this report, staff would include this demonstration project in the 2007 Capital Budget discussion. Staff will also investigate possible funding assistance under the FCM Green Municipal Fund Program. The Green Municipal Fund was established by the Federal Government to stimulate investment in innovative municipal environmental projects that advance the progress of sustainable development in Canadian municipalities. Staff will also explore other potential funding partners and submit applications as appropriate. As this demonstration project is advanced as part of the City's environmental goal, it is recommended that any municipal funds required for this project be funded from the Casino Gaming Fund.

## **7.0 RECOMMENDED COURSE OF ACTION**

Based on the foregoing discussion, it is recommended that staff be authorized to proceed with Phase 2 of the work program which would include the following components:

- a) Staff to work with members of the Environment Committee to review the site selection criteria and select a street segment (one block) for the demonstration project.
- b) Staff to work with property owners / residents on the selected street to provide the residents with a clear understanding of the goal, objectives and scope of the project and to seek input from the residents.
- c) Staff to retain a consultant to prepare detailed design and construction cost estimates for the project.
- d) Upon completion of the above, staff to bring a report back to the Committee and Council providing further detailed information on the demonstration project and budget requirement for Council's consideration and approval.

## **8.0 CONCLUSION**

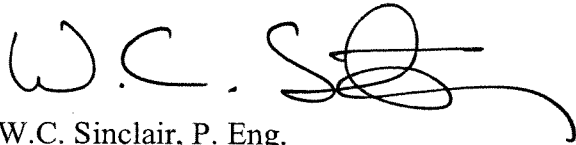
As part of a commitment to the environmental protection goal both locally and regionally, Burnaby has invested and stimulated investment by others in many environmentally sustainable developments in the City. The implementation of best stormwater management practices is one of the many examples of environmental initiatives and actions carried out by the City.

To: Environment Committee  
From: Director Engineering  
Re: Alternate Street Design Concept  
2006 March 08 ..... Page 9

Recent studies on the alternate street design concept to reduce imperviousness and to enhance stormwater run-off management have concluded that the concept is technically feasible and offers significant improvements in run-off management although it is not as cost competitive as the conventional design,.

This report outlines a phased approach that the City may adopt to work towards a pilot demonstration project in the Byrne Creek watershed. The demonstration project would offer the City a further opportunity to work with the local stewardship group and area residents in the development of a detailed design plan based on the alternate street concept and to demonstrate Burnaby's leadership and commitment in sustainable urban development practices.

Therefore, it is recommended that the action plan as outlined in Section 7.0 in this report be approved and an allocation of up to \$80,000 from the Gaming Fund be authorized to finance the proposed work program.



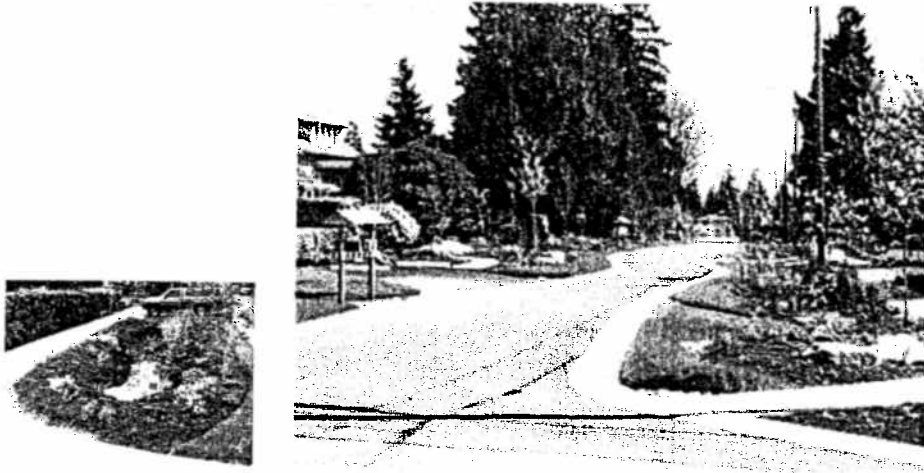
W.C. Sinclair, P. Eng.  
DIRECTOR ENGINEERING

LSC:jb  
Attachment (Appendix A)

Copied to: City Manager  
Director Planning and Building  
Director Finance

# APPENDIX A – EXAMPLES OF ALTERNATE STREET DESIGN

## City of Seattle – Pilot Project



## City of Vancouver – Pilot Project Crown Street, Marine Drive – 48<sup>th</sup> Avenue

