



CITY OF VANCOUVER

ADMINISTRATIVE REPORT

Date: October 20, 2004
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TO: Vancouver City Council

FROM: General Manager of Engineering Services

SUBJECT: Engineering, Local Improvements - Lane Treatment Standard and Options

RECOMMENDATION

- A. THAT Council endorse Centre Strip Lane Paving as the City's new standard low cost lane treatment for all residential lanes and that Full Width Lane Paving continue to be the standard lane treatment for commercial/industrial functioning lanes.
- B. THAT Council approve the Country Lane treatment as another residential lane improvement option made available through the Local Improvement process.
- C. THAT the annual increase to Engineering's Operating Budget for the current and future costs of maintenance associated with each Centre Strip Lane Paving treatment and each Country Lane treatment be 2% of the total cost of construction.

GENERAL MANAGER'S COMMENTS

The General Manager of Engineering RECOMMENDS approval of the proposed new lane treatment standard, options and maintenance strategy, noting that these changes are consistent with the Corporate Management Team's direction of incorporating enhanced sustainability into all the City Operations as a 'way of doing business'.

COUNCIL POLICY

On July 6, 2004, Council approved a revised cost share division for Residential Lane Paving Projects such that the City pays 30% and the Property Owners pay 70% of the total project costs.

On July 9th 2002, Council approved the design and construction of a "Country Lane" demonstration project with no requirement for property owner funding, with the entire funding of \$150,000 to be provided from the City.

On May 14th 2002, Council authorized Local Improvement Staff to pursue other, more sustainable street and lane improvement projects, as demonstration projects, acknowledging that the City's standard portion of funding may initially be increased.

Policies governing the Local Improvement process are set out in the Vancouver Charter and Local Improvements Procedure by-law.

PURPOSE

The purpose of this report is to obtain City Council's approval of a new, more environmentally sustainable lane treatment standard, as well as its approval of other lane treatment options, including the Country Lane option, that would be available through the Local Improvement process. This report also requests Council's approval to initiate a maintenance strategy associated with the more environmentally sustainable lane treatments.

BACKGROUND

Traditionally, lane treatments or improvements in Vancouver, as well as other North American cities, have consisted primarily of full width asphalt paving. In the past, this full width treatment was the only formal lane improvement available in most urban environments and has resulted in being the lane treatment of choice by the majority. However, in the last few years Engineering staff have been developing more environmentally sustainable lane treatment and improvement options. These options have included the low cost Centre Strip Lane Paving option and the Country Lane option. The City of Vancouver's Country Lanes Pilot Project was awarded the American Public Works Association's 2003 Technical Innovation Award.

DISCUSSION

Sustainability

Rebuilding, maintaining, and improving the City of Vancouver's infrastructure in a sustainable way through innovative design and implementation of public works is a tangible demonstration that the City and its staff are working to ensure that Vancouver remains one of the world's most liveable cities.

In accordance with the growing emphasis on sustainable principles endorsed by the City of Vancouver, staff have been investigating, designing, constructing, monitoring and experimenting with alternatives to traditional lane and street designs. To date, we have

constructed a number of Centre Strip Lane Paving improvements, have completed three examples of the Country Lane treatment option, and are well underway with the construction of Phase 1 of Crown Street, Vancouver's First Sustainable Street.

The primary aim in developing alternative lane treatment options is to provide an environmentally positive lane treatment by using natural storm water drainage and filtration. This would reduce the discharge to the sewer system, replenish groundwater, reduce peak flows into local creeks and streams and keep any contaminants, such as heavy metals or oil, as close to the source as possible. As well, the aim is to increase green space, resulting in improved local air quality. This direction is supported by the Site Design Manual for BC Communities which states

"Blocks function as living space and define transportation corridors, they can also play an important role in the ecological function of the neighbourhood.... The best place to mitigate the bulk of storm water consequences of urbanization is at the source - in the yards and on the streets."

Country Lane Paving

As a pilot project, three Country Lanes were constructed. Each lane used various surface materials and different construction techniques, (see attached report in Appendix I for full details of each lane), all with various degrees of success. Although all three have been successful in achieving their environmental and social benefits, their cost remain high as they are double the cost of Full Width Lane Paving.

Country Lane Paving option photos

Newly Constructed



Current Condition



When the Country Lane pilot project was initiated, staff believed that after constructing 3 of these individual lanes there would arise a clear choice and that the costs would gradually become somewhat comparable to Full Width Paving costs. This did not occur; once the pros and cons of each lane and their varying components were examined it became obvious there wasn't a clear direction developing. (See attached spreadsheet - Appendix II) Nor is there experience available from other jurisdictions that we can follow. It is clear from our investigations, as well as from our award of the 2003 Technical Innovation Award from the American Public Works Association, that we are one of the leaders in sustainable lane designs.

Centre Strip Lane Paving

Notwithstanding that an unimproved gravel lane can have similar environmental benefits than those resulting from Centre Strip or Country Lane treatments, the public have consistently requested that these gravel lanes be formally improved. In the past, the public concerns with gravel lanes have usually involved dust, noise, potholes, maintenance, ease of vehicle travel and appearance. Up until recently, these concerns have been addressed with the construction of a Full Width Lane Paving project. While the public preference still seems to be for Full Width Paving, there is growing concern from some property owners over aesthetics, environment and safety issues associated with Full Width Paving. It must be noted that although the City has offered the Centre Strip option for nearly 10 years there has only been a handful that have been constructed, as the majority continue to prefer the lower maintenance choice of Full Width Paving.



Photograph of One of Vancouver's Existing Center Strip Lane Paving Projects

In the past the costs to the Property Owners has been the same for both the Centre Strip and the Full Width, as the total costs were just grouped together and averaged out. This was justified as the machine placed asphalt down the middle of the lane is done most efficiently, while either side of the machined strip is manually done at a far higher cost. So in the Full Width case, the paver would place asphalt as wide as 16 feet and the City crews would then hand place asphalt on each of the two foot sides. In the past in Vancouver, for Centre Strip Lane Paving, the paver would efficiently machine place a narrower asphalt strip leaving wider side portions to be completed manually. These longer driveway connections were then

completed at great care and expense, ensuring that each individual Property Owner was more than satisfied with their connection. Not only were these longer connections more costly, the landscaped sides were also costly as City crews brought in different materials such as drain rock, topsoil and turf or seed to complete the green landscaped portions of these lanes.



Photograph of
District of North Vancouver's
Low Cost Center Strip Lane Paving

Following a tour by District of North Vancouver's staff of one of Vancouver's Country Lanes, Vancouver staff investigated North Vancouver's Centre Strip Paving work. Their Centre Strip Paving is significantly less costly than ours and consists of approximately 10 to 12 foot wide, machine placed asphalt pavement on little gravel base, centred in their narrower lane right-of-way, leaving undisturbed permeable fringes either side of the pavement. They then place only two feet of asphalt apron for each driveway, making the Property Owners responsible from there to their driveway surface, as well as responsible for any additional landscaping.

Full Width Lane Paving

Full Width Lane Paving has been the City's standard lane treatment for as long as staff can remember. Staff feel that due to the negative environmental impacts, the safety issues and the aesthetic concerns, that Full Width Paving should no longer be the City's standard (see table on following page). Council should be aware however, that a large portion of the population prefer the low maintenance Full Width Paving and may not be satisfied with Centre Strip or Country Lane.

Residential Lane Treatment Alternatives and Considerations

Considerations	Full Width Option	Center Strip Standard	Country Lane Option
Approximate Costs (typical 400ft)	\$48,000 (\$120 per linear ft)	\$24,000 (\$60 per linear ft)	\$96,000 (\$240 per linear ft)
Storm water Permeability	0%	60-70%	over 90%
Green Space	Negative	Neutral	Positive
Maintenance (% of construction costs per year)	minimum (0-0.5%)	Slightly increased (1-2%)	Significantly increased (Over 2%)
Filters Contaminants	Minimal	Better	Best
Improves Air Quality	Negative	Better	Best
Traffic Calming	Poor	Better	Best
Improves Sense of Community	Poor	Better	Best
Life Expectancy Before Rehabilitation	40 - 60 years	30 - 40 years	20 - 40 years
Staffing/Resources	Minimal	More	Most

It is apparent from the above table that both the Centre Strip and Country Lane treatments are far superior to Full Width Paving in the environmental and social benefit areas. Although Full Width doesn't do well environmentally or socially, it does have a longer design life and requires less maintenance than the environmental alternatives. However, aesthetically both environmental designs, with their green areas, are more pleasing than a Full Width Paved Lane, with the Country Lane option most appealing with its more natural appearance. While both these environmental designs do a good job of allowing natural storm water absorption, reducing storm water sewer system discharges, increasing vegetation to filter the storm water and improve air quality, the Country Lane results are slightly better as it has more permeable

surfaces and green space. The filtration aspect of these environmental alternatives is becoming more and more important as the consensus is to try and keep contaminants such as oils and heavy metals as close to their source as possible. This makes the potential for future clean up of these contaminants near the ground surface, much easier, especially with such methods as bioremediation, in which soil bacteria transforms the oils to carbon dioxide and water. Another benefit of these designs is the traffic calming that appears to result from the visual narrowing of the asphalt for the Centre Strip case and from the vehicles having to follow the narrow wheel paths in the Country Lane situation. A couple of other benefits resulting from both environmental lane treatments are the building of neighbourhood relationships and the sense of community that develops as neighbours communicate more with each other as they look after their lane's green space.

Recommended Residential Lane Standard and Options

In order to address the public's request for lane improvements and also retain most of the environmental benefits of a gravel lane, we recommend the low cost Centre Strip Lane Paving as the City's new standard lane treatment for residential lanes. And although the Centre Strip is not quite as environmentally positive as the Country Lane option, for two main reasons we recommend it. Firstly, the cost of constructing the Centre Strip standard is about half the costs of the non-environmentally sensitive Full Width Paving option and about one quarter the cost of a Country Lane. Secondly, due to the maintenance costs of the structural grass middle of the Country Lanes, their maintenance is found to be much higher than that of the Centre Strip. Although the Centre Strip Paving does present some maintenance costs associated with erosion, it is believed that the environmental benefits over Full Width make it a balanced choice as our new standard.

By offering a lower cost Centre Strip Standard similar to the District of North Vancouver, we hope to increase the acceptance and demand for this new City standard. In order to achieve this acceptance, staff will have to lower Property Owners' expectations of their driveway connections, along with the price they pay for the new lane standard. This would not preclude each owner from requesting their own asphalt paved driveway connection at their additional cost or from looking after the green landscaped portions of their lanes. Staff plan to carefully monitor the construction costs of these future low cost Centre Strip lane standard and are optimistic that the proposed costs, which are similar to North Vancouver's costs, can generally be kept near one half the costs of Full Width Paving. Furthermore, we intend to investigate construction methods, design details and material selection to ensure the City gets good value from this new standard. However, once again, we have to caution Council that there is likely a large segment of the population that will not be satisfied with this new standard lane treatment.

Noting the higher construction and maintenance costs of the Country Lanes, staff believe they are not suitable as the City Lane Standard, but should be made available only as an option. Furthermore, to be somewhat cautious, we suggest that the proposed Country Lane option be limited to single family residential areas. As well, in order to offer the Country Lanes as a Local Improvement option, we believe each lane will continue to require individual attention and design and further suggest that the adjacent community continue to have some input into these designs. The additional staffing required for these individual designs will be discussed later in this report.

Staff believe that Full Width Lane Paving in residential areas should not be eliminated entirely, but should only be an option available at Engineering's discretion. Some particular situations, where Engineering would be willing to support Full Width Paving in residential areas, are on steeper lanes due to potential erosion, in lanes with potential drainage problems and those lanes with high volumes of traffic that would result in increased maintenance concerns.

Furthermore, the Engineering Department recommends that, due to the volume of vehicle traffic, as well as the number of heavy service and delivery vehicles, that Full Width Paving remain the City's lane treatment standard for commercial and industrial functioning lanes. Staff believe that in commercial/industrial areas, maintenance costs of the landscaped portions of Centre Strip lanes would also be far too great.

Maintenance

Although our Local Improvement process has a well established procedure to initiate and construct new residential streets and lanes, we have never developed a formal maintenance or rehabilitation strategy or long range plan associated with any of our residential streets and lanes. To date, Engineering Streets Operations crews make lane and street repairs based primarily on complaints and only a very few residential streets and lanes have ever been reconstructed. However, our limited experience with Centre Strip Pavements and Country Lanes suggests that maintenance will be greater than for Full Width Pavements. In an effort to ensure there is a plan and funds to begin to address the increased costs to maintain these more environmentally sustainable lane treatment options, we are proposing that the annual Operating Budget be increased by 2% of the total cost of construction for each new environmentally positive lane.

Staffing

As noted previously, additional staffing is required for the individual designs and community involvement associated with the Country Lane options. As well, additional work is required initially with the design details and construction methods, until we can become efficient in the delivery of the new Centre Strip standard. This staffing requirement to design, manage, and implement these more environmentally sustainable lane treatment options will be provided by efficiencies being developed in the survey area of the Streets Design branch, as well as cost savings in the Streets Administrative branch, and will be reported to Council in a separate report. Furthermore, in this staff reorganization report, the initial staffing required to develop a formal streets and lanes maintenance/rehabilitation strategy and Long Range Plan will also be addressed.

FINANCIAL IMPLICATIONS

As established by Council in July of this year, all Residential Lane Paving Projects are funded 30% by the City and 70% by the Property Owners. Without Council's approval of this report's recommendations, staff would have been using a total construction cost of \$119.50 per linear foot for Full Width Paving to establish Property Owners 70% share for residential lane projects. This rate is based on the costs of lane construction of the previous year, plus cost of inflation.

However, with Council's approval of this report, Full Width would no longer be the City standard and would only become an option once approved by Engineering. Therefore, with Council's approval, we will be quoting Property Owners their 70% share based on: \$60.00 per linear foot (determined by the total project costs), for the new City Standard Centre Strip Lane Paving projects; \$120/In. ft. for Full Width Lane Paving option offered only at Engineering's discretion in residential areas; and \$240/In. ft. for the Country Lane option, which would now be available.

The cost of constructing the three Country Lanes ranged from \$230 to \$300 per linear foot, (See Appendix II for more details), with total maintenance costs of the three being just above 2% of the total cost of construction. Staff feel that from the experience gained to date on these innovative lanes, that a cost of \$240 linear foot is realistic.

RESIDENTIAL LANE ALTERNATIVES AND THEIR ASSOCIATED COSTS

	Center Strip Lane	Full Width Lane	Country Lane
Construction Costs (per centerline foot)	\$60.00	\$120.00	\$240.00
Property owners' share per half (70% w/ no relief) (per centerline foot)	\$21.00	\$42.00	\$84.00
Property owners' total costs per 33ft lane (no relief)	\$693.00	\$1,386.00	\$2,772.00
Property owners cost per year if paid over 15 years	\$71.35	\$142.70	\$285.41
Increase to annual Operating Budget due to maintenance of Sustainable Lane treatments for a typical 400 foot long lane	\$480	\$0	\$1920

Staff believe that the initial costs of maintaining both the Centre Strip and the Country Lane treatments will be reduced as the permeable grass areas become better established. We also optimistically predict a design life of up to 40 years before either of these options will need serious work and/or rehabilitation. In 2005, for an average lane length of 400 feet, the budget would be increased by \$480 for each Centre Strip and by \$1920 for each Country Lane. As in the past few years, Staff expect about 20 to 25 new lanes to be constructed yearly, with only a couple being Country Lanes. Therefore the resulting yearly increase to the operating budget from these environmentally positive lanes is anticipated to be less than \$20,000.

CONCLUSION

Staff believe that the recommendations contained within this report will continue to place the City of Vancouver as a leader in sustainable lane treatments. Endorsing the environmentally positive Centre Strip Lane Paving as the City's standard and making the innovative Country Lane option available to its residents is just another step in ensuring that Vancouver remains one of the world's most liveable cities.

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Appendix I (pdf document)

Appendix II

Country Lane Components- Pros and Cons

Lane 1 E 27th Avenue	Lane 2 Maple Street	Lane 3 Yale Street
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Driving Strips			
Used	Formal/Cast in place concrete	Gravel placed in Golpla in strips	Roller Compacted Dry Mix concrete
Pros	1. Provides good support 2. No signs of wear	1. No signs of wear	1. Easier to Place
Cons	1. Labour intensive (requires several concrete pours) 2. Hard to cast - narrow area	1. Provides little extra strength 2. Suitable for light loads 3. Gravel dislodged by rain water	1. Spalling and crumbling at edges
Maintenance	1. Reconstruction (costly and labour intensive)	1. Replace gravel (very inexpensive) 2. Replace Golpla (costly)	1. Reconstruction (costly and labour intensive)

Structural Grass			
Used	Sod pressed into Geoblock Soil and seed placed in Golpla	Grass pre grown in Golpla	Soil and seed in Golpla
Pros	1. Soil and seed growing well	1. Pre grown grass adds to strength	1. Cheaper than pre grown grass
Cons	1. Sod pressed into Geoblock results in over compaction 2. Sod Damaged by vehicle traffic	1. Pre grown grass is expensive 2. Heavier, harder to install.	1. grass did not take well (summer) 2. Some residents not watering
Maintenance	1. Mowing and Watering (Done by residents)	1. Mowing and Watering (Done by residents)	1. Mowing and Watering (Done by residents)

Structural Grass Containment			
Used	Geoblock in Center Strip Golpla in Outer Strips	Entirely Golpla	Golpla in Outer Strips
Pros	1. No signs of strain or wear 2. Golpla Shows	1. No Transitions Golpla/Concrete 2. No signs of strain or wear	1. No signs of strain or wear
Cons	1. Geoblock deteriorates fast 2. Golpla flexing @ Transitions 3. Considerable settlement	1. Gravel dislodged by rain water 2. Golpla difficult to bend	1. Golpla lifting at concrete transitions 2. Gravel dislodged by drips 3. Settlement under Golpla
Maintenance	1. Can be replaced in .3 m Strips (labour intensive)	1. Can be replaced in .3 m Strips (labour intensive)	1. Can be replaced in .3 m Strips (labour intensive)

Driveway Connections			
Used	Permeable Pavers	Broken Concrete	Golpla filled with gravel
Pros	1. Aesthetically pleasing	1. Aesthetically pleasing	1. Lower cost option 2. easy to place
Cons	1. Labour intensive Placement 2. Expensive	1. Labour Intensive Placement 2. Expensive 3. breaking under load	1. Not suitable for heavy traffic loads 3. Gravel dislodged by drips
Maintenance	1. Remove and Replace (labour intensive)	1. Remove and Replace (labour intensive)	1. Can be replaced in .3 m Strips (costly and labour intensive) 2. Replace Gravel (inexpensive)

Lane 1 E 27th Avenue	Lane 2 Maple Street	Lane 3 Yale Street
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Lane entrances			
Used	Concrete Apron	Permeable Pavers	Old Granite Pavers - Existing CoV Supply
Pros	1. High Strength	1. Aesthetically pleasing 2. Allows water infiltration to soil	1. Aesthetically pleasing 2. Allows water infiltration to soil
Cons	1. Difficult to install 2. Doesn't allow water infiltration	1. Possibility of settlement 2. Labour intensive placement 3. Expensive	1. Possibility of settlement 2. Labour intensive placement
Maintenance	1. Reconstruction (costly and labour intensive)	1. Remove and Replace (costly and labour intensive)	1. Remove and Replace (costly and labour intensive)

Topsoil			
Used	Placed in Golpla and seeded Base for Sod in Geoblock	Placed between Broken Concrete and Seeded	Placed in Golpla and Seeded
Pros	1. Grass taking well in Golpla	1. Grass Taking Well	1. Less Settlement than pure topsoil
Cons	1. Difficulty to distribute to specifications in Golpla resulted in over compacted sod	1. Not readily available (has to be mixed)	1. Soil Contained sticks which cause golpla to flex
Maintenance	Possible re-seeding	Possible re-seeding	Possible re-seeding

Construction Costs	approx \$230 per linear foot	approx \$300 per linear foot	approx \$240 per linear foot
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Center Strip Paving costs approx \$ 60.00 per centerline foot Full Width Paving costs approx. \$120.00 per centerline foot

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