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HALIFAX
REGIONAL MUNICIPALITY

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Halifax Regional Council
Committee of the Whole
May 24, 2005

TO: Mayor Kelly and Members of Halifax Regional Council

SUBMITTED BY: George McLellan, Chief Administrative Officer

Dan English, Deputy Chief Administrative Officer

DATE: May 19, 2005

SUBJECT: **Underground Utilities Feasibility Study**

ORIGIN

- April 2, 2004, Halifax Regional Council Awarded RFP 04-028 - Underground Utilities Feasibility Study to Kinectrics Inc.
- April 20, 2005 staff report which circulated the consultant's report to Council.
- April 26, 2005 Council tabled the consultant's report until a presentation could be scheduled at a future Committee of the Whole meeting.

RECOMMENDATION

It is recommended that HRM Council authorize staff to undertake the following activities:

1 Develop a Joint Trench Agreement in cooperation with the utilities;

2 Pending adoption of a Joint Trench Agreement, prepare recommendations regarding the type of developments which should have underground services as well as the type of services to be placed underground; and,

3 Develop a plan to expand the existing pole-free zone, pending negotiation of cost sharing agreements, and delineation of responsibilities amongst utilities and HRM.

BACKGROUND

The Underground Utilities Feasibility Study was undertaken due to concerns HRM had about the potential impact Nova Scotia Power's expanded tree trimming policy would have on the appearance and character of the community. Following significant power outages in the Region, the scope of the study was expanded to examine whether underground services would significantly enhance service reliability for the community.

Beyond a general interest in these issues on behalf of the community, HRM also has a regulatory interest. By amending its subdivision bylaws, HRM could require that electrical/telecommunications utilities be placed underground in new developments. The scope of the study therefore included analysis of the costs and benefits of underground services to ensure that all of the relevant factual information was available to Council prior to debating the issue and making a decision. Consultation was also undertaken with the affected utilities and the development industry to ensure the study's information and analysis was accurate.

The primary focus of the report was analysing the costs and benefits of overhead services versus underground services in areas of new development. There is a brief examination of options for improving the aesthetics and reliability of overhead services within existing developed areas of the Region. Options for a small expansion of the existing downtown "pole-free" or underground wiring zone are also explored. This discussion places particular emphasis upon coordination with other capital works projects such as streets, sewer and water lines in order to manage costs and disruption.

DISCUSSION

Staff have reviewed the consultant's report and accept the information presented in the report.

Range of Options

The consultant's analysis of underground and overhead services shows that this is not simply an either/or option. In addition to analysing the costs of the region's current overhead service standards, the report analyses:

- four types of development (suburban and urban residential, industrial, and downtown);
- three options for the amount and type of services which may be placed underground (all underground, underground only on local streets, and only place low voltage wires and telecom wires underground); and
- three standards of construction (separate trenches, common trench and common trench with a reduced amount of conduit).

These options produce varying results with respect to community appearance and reliability. They also produce dramatically different costs. Caution should therefore be exercised before selecting and legislating a specific underground services regime for the Region.

There is merit in moving towards adopting an underground services policy. Seven of Canada's ten largest municipalities require underground services in new residential developments. In contrast, only one requires it in industrial areas. The consultant's study indicates that the driving factor in adopting a residential underground services policy has been the improvement in community appearance by eliminating unsightly above ground wiring.

Standards and Costs

It is recognized that underground services are more costly to install and these costs will in one form or another be passed on to home buyers. Whether that cost is acceptable to the public can be determined at a public hearing. (A public hearing will be required before introducing mandatory underground services regulations into the Municipality's subdivision bylaws). Having said that, HRM should ensure that underground services costs are as reasonable as possible prior to making any decisions. As the consultant's report shows, the current construction standards and practices within the region are inconsistent with those commonly used throughout North America. Immediately requiring the installation of underground services, without addressing the issue of adopting new design and construction practices would result in construction costs which are 2-4 times greater than needed. It is incumbent upon the Municipality to ensure that the burden of needless expenses are not introduced. The first step towards an underground services policy therefore is the introduction of appropriate design and construction standards.

There are two factors which drive the extra costs of constructing underground services in HRM. These are the current practices:

- of separate trenches, routing and conduits for power and telecom utilities, rather than a common trench; and

- the use of conduit for secondary utilities rather than armoured cable.

Management

Common trenches for all the utility providers requires cooperation amongst all parties, some of whom are competitors. Having said that, this has been achieved elsewhere. Commercial and joint ownership agreements will be required, as will a common design standard for the underground civil infrastructure. A high level of cooperation will also be required by and with the development industry. The Nova Scotia Utility and Review Board will also be involved in approving these changes.

Another challenge is with respect to ownership of underground civil infrastructure. De-regulation of the telecommunications industry has added complexity. There is a need to ensure underground civil infrastructure is designed to accommodate future growth, and to provide a fair level of access to all telecommunication utilities. In a competitive environment, no one telecommunication utility will want to pay 100% of the cost of underground civil infrastructure. Arrangements must be in place to either cost share, or for an independent third party to develop and own the civil infrastructure, then lease space to the telecommunication utilities.

Staff have begun preliminary discussions on these issues with the various utilities and industry. A management model or "Joint Trench Agreement" needs to be developed which includes:

- technical standards and location criteria;
- ownership and maintenance responsibilities; and
- access rights to the infrastructure.

Staff is optimistic that this can be achieved. To date, the discussions with the affected stakeholders have been positive and productive. The insights gained from consultation with Nova Scotia Power and the Urban Development Institute in particular have been very helpful.

BUDGET IMPLICATIONS

There are no budget implications for 2005/06. An expanded pole free zone may necessitate spending in future fiscal years towards underground civil infrastructure projects.

MULTI-YEAR FINANCIAL IMPLICATIONS

This report complies with the Municipality's Multi-Year Financial Strategy, the approved Operating, Capital and Reserve budgets, policies and procedures regarding withdrawals from the utilization of Capital and Operating reserves, as well as any relevant legislation.

ALTERNATIVES

HRM Council could choose to retain the status quo with overhead services. This not the recommended option, because it places the traditional treed urban streetscape at risk.

ATTACHMENTS

Executive Summary - Kinetrics Report

Additional copies of this report, and information on its status, can be obtained by contacting the Office of the Municipal Clerk at 490-4210, or Fax 490-4208.

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Underground Utilities Feasibility Study for Halifax Regional Municipality

Kinectrics Report: 10986-001-RA-0001-R01

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EXECUTIVE SUMMARY

The purpose of this study was to:

- provide HRM with information in response to the recent NSPI (Nova Scotia Power Inc.) requirements that negatively impact the aesthetics of HRM streetscapes;
- undertake a cost-benefit analysis of installing underground services for various development scenarios in HRM;
- review financing options available to HRM for underground services;
- confirm whether or not the following public perception is correct: having underground utility services will solve or reduce the power outage problems that HRM has experienced recently; and
- look at what some other cities in Canada are doing with regard to underground utility servicing.

Cost/benefit analysis

The cost benefit analysis identified cost items and benefit items. Where possible, a dollar figure was estimated and assigned to each item. The cost items were based on three different system designs, present practice, all utilities (i.e. power, cable, telephone) sharing a trench, and direct burial of low voltage lines as armoured cable. These assumptions are critical to the analysis because the present practice can be double the lowest cost estimate. Most cities that install their utilities underground use common trenches. However the difficulty of achieving this in HRM should not be underestimated. A commercial and joint ownership agreement would need to be negotiated and agreed upon as well as a technical common trench standard. To achieve this some direction from the NSURB might be required, however it has been achieved in other cities so there are models on which to base an agreement. Similarly a change to direct burial of low voltage lines close to houses would require negotiation with the utilities involved.

The benefit items included: improved aesthetics, improved utility reliability, increased number and size of street trees (which addressed improved air quality, reduced wind speed, reduced heating and cooling costs), reduced damage from motor vehicle accidents, and reduced tree trimming costs. Only some of these benefits could be assigned a dollar value. The largest benefit, improved aesthetics (which includes effects on the mental and emotional health of residents and the overall quality of life), cannot be assigned a dollar value.

In all development scenarios analyzed, the costs outweighed the quantifiable benefits by a margin of 5 to 15 times. Therefore, the decision to place utilities underground must be based on the weight a municipality places on aesthetic benefits.

Options for HRM

The development scenarios analyzed in this study include the following:

- Downtown: place all utilities on all streets underground
- Industrial: place all utilities on all streets underground
- Urban Residential: place all utilities on all streets underground
- Urban Residential: place all utilities on local streets underground
- Urban Residential: place only service drops (lines from street to house) underground
- Suburban Residential: place all utilities on all streets underground
- Suburban Residential: place all utilities on local streets underground
- Suburban Residential: place only service drops (lines from street to house) underground

A first option for HRM is to put all low voltage and communication lines (service drops) underground in new residential areas. These are the most visible wires because they are closest to the ground and they cross the street to reach individual buildings. The cost has been estimated to vary between $1,400 and $3,800 per lot above the cost of an overhead system. The variation is dependent on dwelling unit density and the direct burial option.

The suitability of requiring underground lines in new residential areas depends on the willingness of the residents to pay the increased costs. There is a concern that the requirement for underground wires may drive the price of houses within HRM above the marketable value and thus encourage development just outside the HRM boundary.

This option, in which only the low voltage and communication lines are buried, does not allow space for more street trees because the high voltage power lines still are overhead. It does however improve the visual aesthetics because most of the impact of overhead lines comes from the lower voltage wires that are larger in diameter and closer to the observer.

A second option for HRM is to put all utility lines in new residential areas underground. The increased cost of this has been estimated as $2,500 to $5,500 per lot, again depending on the lot size and whether the direct burial of low voltage lines option is used. Putting all lines underground would allow the placement of large trees along the street in a similar manner to that of most existing streets. The quantifiable benefits would offset $600 to $750 of the cost per lot.

In terms of the downtown areas, there is an existing HRM policy, introduced in 1977, to convert the overhead lines to underground in an area of downtown Halifax called "The short term pole free zone". This policy allows for the undergrounding of utilities in the downtown area with a 50/50 cost sharing arrangement between HRM and NSPI (MTT have also agreed to this). NSPI has confirmed they are still prepared to honour this

agreement within the existing designated area. Extending the pole free zone may not be possible unless another agreement can be reached with NSPI.

It has been found that it is feasible to convert areas of existing overhead lines to underground in high priority commercial retail areas. Three examples are: Spring Garden Road between Robie street and Brunswick street at an estimated cost of 1.7 million dollars; Gottingen Street between Cogswell street and North street at an estimated cost of 1.7 million dollars; and Quinpool Road between Robie street and Connaught Avenue at an estimated cost of $ 1.9 million dollars. This equates to approximately $1000 - $1200 per metre of road.

The conversion of more widespread areas, such as the Capital District, would only be feasible if spread over a long time period. The estimated cost for the entire capital district would be 40.7 million dollars.

For both industrial development and rural (un-serviced) residential development, it is less feasible to install underground utilities. These development scenarios have substantially higher costs per lot and significantly lower benefits.

Financing options

There are three financing options for covering the cost of putting utilities underground. The first option is that the property owner pays the difference in cost between installing overhead and underground. (The utility pays the base cost of what it would be for overhead). This is done either directly in the purchase price of the property, indirectly through an improvement tax imposed by the Municipality, or through a premium on the power bill.

The second option has higher levels of government cover the cost. This is usually done in areas with heritage recognition.

The third option has the utilities pay the cost of the underground system. This option is only possible where the utility regulator i.e. Nova Scotia Utility and Review Board (NSURB) requires it or it is mandated in Provincial Legislation. For example, it is used in the province of Quebec in downtown areas.

Other assumptions addressed

It is often assumed that in areas where rock terrain is prevalent, the rock blasting necessary can increase the cost of placing utilities underground. There are several areas of HRM where rock blasting is required. However, in many of these areas, the construction method for new development is to blast a large trench for water and sewer services, so a larger blast area to accommodate utilities is not a major impediment. For existing development where rock must be blasted, the increased cost is approximately 20% of the total cost.

An alternative to putting electric power lines underground is to require overhead systems to be designed using covered cable systems, such as Hendrix cable. This allows trees to be trimmed much closer to the lines and improves reliability. The increased capital cost is at least 25% over an equivalent conventional overhead system. The benefits of reduced

outages due to tree contact, lower tree trimming costs, and increased urban tree canopy reduce the net increased cost to about 10%. Benefits of improved appearance is only achieved if the lines are hidden by trees because the covered cables are larger and spaced close together, increasing their visual presence if they are not hidden by trees.

Reliability is not necessarily improved by having underground utilities. This is because underground equipment has its own failures and many power outages are caused by failure at the higher voltage systems that are located above ground. Placing all distribution lines underground could reduce outages by about 50%, but the costs of doing this are prohibitive. Placing utility lines underground only in new residential areas will reduce outages by up to 50% in the new area if the new development is large enough to require an entire circuit (>500 houses). For small in-fill developments reliability would improve a very small amount since the outages on the short supply lines affect very few houses. Having underground service drops (from streets to houses) would improve reliability even less. This is because it is only during extreme weather events (i.e. hurricanes or severe ice storms) when overhead lines can be torn off the sides of buildings that the low voltage lines have significant failures.

Other cities in Canada

Within the last 25 years, seven of the ten largest Canadian cities as well as other cities around the world have been requiring all electric power and communication lines to be installed underground in new residential areas. This requirement is driven by the benefit of having an improved streetscape appearance and having more space in urban areas for large trees.

In all development scenarios, costs outweigh the quantifiable benefits, some by a large margin. A municipal decision has to be based on the weight given to the un-quantifiable benefits, such as aesthetics.