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CITY OF VANCOUVER

ADMINISTRATIVE REPORT

Report Date: March 29, 2009
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Meeting Date: April 21, 2009

TO: Vancouver City Council

FROM: General Manager of Engineering Services

SUBJECT: Autodesk-Hansen Implementation Project Funding

RECOMMENDATION

THAT Council approve a transfer of Capital Budget funding totalling $4.0 million from the following 2006-2008 Engineering Capital Budgets to the Autodesk-Hansen Implementation Project:

2006-2008 Sewer Capital Budgets	$500,000
2006-2008 Waterworks Capital Budgets	$2,000,000
2006-2008 Streets Capital Budgets	$1,380,000
2006-2008 Street Lighting Capital Budgets	$120,000
	$4,000,000

GENERAL MANAGER'S COMMENTS

The Autodesk-Hansen Implementation project has experienced a number of challenges which have made it impossible to complete the originally intended scope of work within the approved project budget. A significant budget increase of $4 million, or 46% is required to complete the project.

This increase relates to a number of factors, which are mostly related to unanticipated or underestimated technical complexities in the original project design, the effort involved in adapting existing systems and migrating huge volumes of existing data, project delays due to staff turnover, the 2007 work-stoppage, and the need to supplement internal staff resources with consulting expertise.

This project remains extremely important to improving the City's ability to manage our public works infrastructure. I strongly recommend that Council approve the budget increase. The reduced scope alternative would provide improvements in Sewers and in Waterworks only, and would not provide cross-departmental and Corporate integration of systems that the

complete project would provide. If the project scope is curtailed now we will eventually want to expand the functionality to the originally intended scope. Deferring that work to the future would ultimately cost more and the City would lose many of the project benefits for a number of years.

COUNCIL POLICY

There is no applicable Council Policy.

SUMMARY

The Autodesk-Hansen Implementation Project is an enterprise-level software implementation project which will generate significant improvements in the areas of customer service, work management, asset management, coordination of on-street activities and operational performance measurement.

This project is an element of the Infrastructure Management Strategy originally approved by Council in 2004. Work began on implementation in early 2007. Due to a variety of factors which are described in this report, it is not currently possible to deliver the originally conceived scope of the project within the original approved budget.

This report outlines the background and current status of the Autodesk-Hansen Implementation Project, its anticipated service and business benefits, and presents options for proceeding.

The recommendation of this report is to provide the necessary funding to enable full project completion, with the source of the additional funding request being projected favourable variances within the 2006-2008 Engineering Capital Budgets. If Council does not support this recommendation, this report also provides an alternative option to end the project within the original budget, but with a significantly reduced scope and corresponding reduction in business value.

PURPOSE

The purpose of this report is to request that Council approve a project budget increase of $4.0 million, with the source of funds to be projected favourable variances within the 2006-2008 Engineering Capital Budgets. This would allow for full completion of the Autodesk-Hansen project, and would allow the City to achieve the originally anticipated benefits associated with the project.

BACKGROUND

A) Infrastructure Management Strategy and the Autodesk-Hansen Implementation Project

There are an estimated $8 billion dollars worth of infrastructure such as roads, water and sewer facilities, street lighting and traffic signals under the stewardship of the Engineering Services Department. Effective management of this infrastructure requires being able to answer the following basic questions:

- What do we own?
- How do we maintain it?

- Where is it?
- When do we replace it?
- What is its condition?
- What do we do first?
- What is its value?

It has long been recognized that existing systems for answering these questions were not adequate. In the absence of an available enterprise-wide system, many managers resorted to developing their own systems and business processes. This resulted in many problems such as lack of coordination of infrastructure planning between business units, inability to integrate and share data with corporate systems, lack of consistency in analysis and a proliferation of small standalone systems.

An Infrastructure Management Strategy to address these issues was presented to Council in 2004 and received approval (http://vancouver.ca/ctyclerk/cclerk/20041214/a18.htm) . Subsequent to Council's approval of this strategy in 2004, and prior to the City entering into a contract with any software vendor, two additional business issues emerged. The Public Sector Accounting Board (PSAB), which establishes the generally accepted accounting principles (GAAP) for the public sector, adopted a new standard for the accounting and reporting of tangible capital assets (infrastructure, land, buildings, equipment, and computers). The new standard, effective for fiscal year 2009, requires local governments to report tangible capital assets at amortized historical costs on a functional basis. In addition, in response to an internal audit of the Capital Budget process, a full review of the capital budget process was conducted in 2004. In that review, it became evident that the current system utilized for the City's capital budgeting was very limited.

The requirements resulting from these emerging issues were added to the scope of the Infrastructure Management Strategy, and a Request for Proposals was issued in May, 2005 to seek existing software solutions. No single solution was able to meet the City's needs; instead a hybrid solution was identified. `

This solution involved the use of software delivered through a joint venture between Autodesk Inc. and Hansen Information Technologies Inc. ("Autodesk-Hansen") as a platform for managing non-financial infrastructure information integrated to the City's SAP enterprise-wide platform for managing financial information.

In September 2006, Council approved this hybrid solution (http://vancouver.ca/ctyclerk/cclerk/20060928/documents/cs3.pdf) . After complex and lengthy contractual negotiations, the project formally kicked-off in the first quarter of 2007. At this point, the Infrastructure Management Strategy consisted of the four following sub-projects:

- Implementation of the Project Systems/Investment Management (PS/IM) modules of SAP, to provide improved management of capital budgets and expenditures.
- Implementation of the BI (Business Intelligence) module of SAP, to provide improved reporting and scenario-building capabilities regarding both financial and non-financial strategic objectives.
- Compliance with Public Sector Accounting Board (PSAB) standards regarding the reporting of the City's assets on its financial statements.

- Implementation of Autodesk-Hansen software to provide significantly improved capabilities in the areas of customer service, work management, asset management, right of way management and performance measurement.

These four initiatives are managed under the umbrella of a Program and all inter-project issues are being coordinated by the Project Management Office of the Information Technology Department. Each project is in turn managed by its own project manager and steering committee. The focus of this report is the fourth project on the above list, the Autodesk-Hansen Implementation Project.

B) Description of Autodesk-Hansen Software Implementation Project Business Benefits

As mentioned above, the Autodesk-Hansen Implementation Project is an enterprise-level software implementation project which will generate significant improvements in the areas of customer service, work management, asset management, coordination of on-street activities and operational performance measurement.

The following sections outline the various ways in which the new software and associated standardized business processes will be of use in addressing existing business issues.

i) Customer Service

- Automated integration between 311 and Autodesk-Hansen software, eliminating the need for manual re-entry of information and allowing 311 operators to track details regarding follow-up on service requests. Significant milestones in the handling of the service request will be passed back from the Autodesk-Hansen software to the 311 system.

- Organization and prioritization of requests for service and follow-up work to ensure consistent quality service.

ii) Work Management

- Ability to carry out improved planning, scheduling, tracking and reporting of construction, operating and maintenance activities.
- Improved coordination of work across the department, with other departments and with outside agencies and service providers / contractors.
- Reduced contractor delays and penalties related to changes in scope for unplanned/uncoordinated work.
- Improved efficiencies in capital planning and the ability to report asset units built per dollar spent.
- Standardized business processes.

iii) Asset Management

- Ability to identify assets owned and/or maintained by the department, both by type and by location.
- Improved environmental stewardship through optimizing the useful life of infrastructure, thereby reducing both lifecycle costs and the probability of utility failures.
- Ability to implement comprehensive condition assessment systems.

- Ability to evaluate maintenance alternatives and implement cost-effective condition based or reliability based preventative maintenance plans.
- Ability to develop rational and cost-effective replacement plans.
- Ability to prioritize work based on lifecycle analysis.
- Ability to comply with PSAB accounting rules regarding valuation of public works assets.

iv) Right-of-way Management

- Ability to schedule and coordinate disparate activities on public rights-of-way to minimize neighbourhood and businesses impacts, as well as protect the right-of-way as a public asset and optimize pavement lifecycles.
- Integrated coordination of construction, maintenance and special events in public right-of-way.
- Improved coordination of major construction crews with enhanced planning and scheduling that would help reduce traffic delays/closures.

v) Operational Performance Measurement

- Increased transparency of public works management expenditures.
- Reduced total cost of ownership of assets through better decision making.
- Key performance measures tracked.
- Ability to decommission stand-alone legacy systems
- Ability to benchmark performance against ourselves, other municipalities, and private sector.
- Ability to search, query, and report on information from a variety of sources in existing and proposed systems and databases.
- Historical information on key performance indicators.

DISCUSSION

A. Project Status

The Autodesk-Hansen Implementation Project is the most complex IT implementation project ever carried out in the Engineering Services department. The project currently involves a core team of 10 full-time staff, with a further 19 Information Technology staff contributing to the project on a part-time basis while continuing to perform their regular duties. Project management is being carried out by Quartech Consulting Inc. under a professional services contract with the City.

The first phase of go-live ("Release 1") is scheduled for 4th quarter 2009 and will involve Sewer and Waterworks branches. The software will be implemented through the rest of the Engineering Services department in Release 2, which is scheduled for 3rd quarter 2010.

Since the initial kick-off in 2007, the project has successfully reached several project milestones, and has confirmed that when fully implemented, the Autodesk-Hansen software will deliver the anticipated business benefits. Since early 2008, however, the project has encountered several issues which have become obstacles to completion within the original budget:

- Unanticipated technical difficulties related to ensuring that existing GIS (Geographical Information System) applications are able to function together with the new Autodesk-Hansen software. To resolve these most cost-effectively, an Autodesk product called Topobase must be acquired.
- Greater than originally-expected staffing requirements needed to migrate data from many existing standalone branch-level systems to the new enterprise-wide platform.
- Increased hardware and software costs for the development, testing and production environments.
- Other factors including an unfavourable US dollar exchange rate, higher than planned project management costs and the need to address gaps in skills using the services of specialist consultants.

B. Options

A full review of the project has been carried out, which has resulted in the development of a revised budget projection. This new budget provides sufficient funding to address the above issues, together with sufficient contingency to deal with further issues should they arise. Other scenarios have also been investigated, including reducing the scope of the project and re-sequencing of project phases.

This review has produced the following two options:

Option 1 - Continue with original scope and schedule

i) Description

- Continue to implement the Autodesk-Hansen software across all branches in the Engineering Services department.
- Maintain originally-planned scope and functionality.
- Completion of project in 3rd Quarter, 2010.

ii) Cost

- Incremental cost of $4.0 million above the existing budget.

iii) Personnel Implications

- Eight additional temporary staff will be hired:
  - EA III
  - Programmer Analyst
  - Data Services Analyst
  - Programmer Analyst for data migration (x2)
  - Quality Assurance/Testing Lead (Systems Analyst II)
  - Business Process Re-engineer (Systems Analyst II)
  - Project Controller

iv) Pros

- Able to achieve all business benefits as outlined earlier in the report.

v) Cons

- Significant increase to original capital budget.

Option 2 - Reduce scope to work within existing budget

i) Description

- Deliver what business value is possible without exceeding the existing budget by implementing the Topobase software, completing the development of a foundation work management software platform and carrying out a full Autodesk-Hansen implementation for **only** Release 1 (Water and Sewer) users.
- Leave all other Engineering Branches using existing ad-hoc asset management systems indefinitely. At a later date, a future "Phase 2" project could configure the remaining Engineering department's branch-specific functionality and migrate the asset data so as to fully enable work management and customer service.

ii) Cost

- No incremental cost. Work would be completed within the existing capital budget. However, should the system be expanded to meet the original scope at a later date, additional capital costs will be incurred, greater than the current cost of Option 1 due to likely need for systems reconfiguration, increase in labour costs, additional contract costs etc.

iii) Personnel Implications

- Four additional temporary staff would be required

    - EA III
    - Programmer Analyst
    - Quality Assurance/Testing Lead (Systems Analyst II)
    - Business Process Re-engineer (Systems Analyst II)

iv) Pros

- No increase to budget required in the short term.

v) Cons

- Failure to realize department-wide solutions for customer service, work management and operational performance measurement.
- Failure to establish common business processes for all elements of the Infrastructure Management Strategy across the department.
- Potential to only realize asset management benefits related to water and sewer assets ($2.2 million per year instead of $5.1 million per year).
- Re-planning of all project activities, including those which involve the software vendors' resources, would be required.

- Further consideration would have to be given to the impact on other City technology projects currently underway that are dependent on the Autodesk-Hansen implementation. There would certainly be implications for the PSAB compliance project and the 311 implementation, since both projects would have to re-examine assumptions that they had made regarding the availability of the Autodesk-Hansen software to deliver functionality. There is a high probability that costs would increase in those projects to recover from the lack of functionality originally planned to be delivered by Autodesk-Hansen.
- A number of significant unknowns still exist about this option. If Council directs staff to pursue this option, it is expected that a subsequent report back on a detailed implementation plan will be required.

C. Recommendation

Staff recommend that Council approve Option 1. Completion of the project to its originally planned scope would create an enterprise-level software platform which would:

- Significantly improve the City's ability to keep track of its tangible assets including the condition of those assets. Under Option 2, only about 55% of the City's public works assets by value would be managed by the Autodesk-Hansen software.
- Provide support for better decisions on lifecycle management of assets from an integrated, cross-departmental perspective, thereby reducing overall asset lifecycle costs. The estimated annual benefit achievable through extending the economic life of the City's public works assets is $5.1 million per year, compared to $2.2 million per year for Option 2.
- Improve service to the public through a set of standardized, rationalized and documented business processes across the department (eliminating over 40 ad-hoc systems currently being used).
- Improve efficiency through the ability to set performance benchmarks, objectives and measure progress against these benchmarks.
- Support the existing PSAB compliance project and 311implementation.

Reducing the scope of the project to maximize the value of what can be achieved within the existing budget would significantly reduce the business benefits of the implementation, as noted above.

D. Project Components Requiring Funding

Completing the Autodesk-Hansen project in accordance with the original scope and schedule will require a budget increase of $4.0 million. Details of the issues which have driven project costs higher are provided in Appendix A.

FINANCIAL IMPLICATIONS

A. Original Approved Budget and Spend to Date

The approved budget for the Autodesk-Hansen Implementation project was $8,641,000, which was increased by funding transfers totalling $337,400 to bring the current budget to $8,978,400. As of February 28, 2009 expenditures against this budget are $6,413,000.

Source of Funding

A detailed review of the 2006-2008 Engineering Capital Budgets was undertaken and potential sources of funding were identified based on expenditures to date and projected future expenditures to complete proposed programs. The current analysis of the programs noted below indicates that there is sufficient funding available to contribute the indicated funding to the Autodesk-Hansen Implementation project while still completing the programs as proposed.

If Council supports the recommendation of this report, funding in the amount of $4.0 million will be transferred from the following 2006-2008 Engineering Capital Budgets.

Capital Program	Funding Transfer	Proposed Transfer as a % of Total 2006-2008 Capital Budgets
2006-2008 Sewer Capital Budgets	$500,000	0.7%
2006-2008 Waterworks Capital Budgets	$2,000,000	3.7%
2006-2008 Streets Capital Budgets	$1,380,000	1.3%
2006-2008 Street Lighting Capital Budgets	$120,000	2.2%
	$4,000,000	

Details regarding specific programs affected by the above funding transfer are contained in Appendix B.

CONCLUSION

This report requests that Council approve a project budget increase of $4.0 million, with the source of funds to be reallocations within existing 2006-2008 Engineering Capital Budgets. This will allow for full implementation of the Autodesk-Hansen software, and will allow the City to achieve the originally anticipated benefits associated with the project.

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Appendix A

Details of Project Components Requiring Funding

GIS Application Migration Effort $1.09 million

The Engineering department currently uses a collection of custom developed applications to create and maintain the GIS representation of assets the department is responsible for. There are approximately 60 of these applications; each tailored to the requirements a particular type of asset. These applications required continuous development effort from three people for over two years plus significant effort from several other staff.

As a result of the Autodesk-Hansen implementation, these existing "legacy" GIS applications needed to be migrated to work with new Autodesk software standards. The approach to this migration anticipated in the original budget involved re-programming each of the 60 legacy applications. This effort started in 2007, but encountered technical barriers which necessitated a major replanning effort in mid-2008.

During this replanning, an Autodesk product named Topobase was identified as an off-the-shelf solution which could overcome the technical barriers. Using Topobase will also greatly reduce the effort overall because the need for custom development is eliminated. Implementing Topobase would primarily require configuration of the product and migrating existing asset data.

Topobase is currently in use by over 500 organizations world wide.

The cost increase associated with this change includes an assessment phase for confirming the gap-fit (already completed at a cost of $227,000 CAD) and the deployment phases.

Data Migration Effort $0.90 million

Like many other projects, the Autodesk-Hansen implementation project was affected by the job action in 2007. As part of a recovery planning process, an estimate was completed in November 2007 to reflect the longer project duration by 5 months and the associated additional costs. However this was done before the full completion of the impact assessment of the strike on data migration activities and its scope and schedule. As a result, the resources required to keep up with the data migration schedule were underestimated.

Shortly thereafter the project manager resigned, along with the Technical Lead and the Business Lead in February 2008. The latter two roles were directly responsible for compiling and then executing the data migration plan. The City was unable to fill these three roles with suitable candidates for several months.

Under the leadership of a new project manager in mid-2008 a new data migration plan was developed. However, the adjusted timeline was no longer viable with the existing resources. Thus additional resources are now required to complete this most complex and critical piece of the project.

Hardware and Software: $0.73 million

Additional hardware and software is required to deal with disaster recovery/business continuity and customer service licenses.

Disaster recovery and business continuity performance:

The designs from 2006 for the proposed development and production environments have been determined to be insufficient. This is mainly due to:

a) Lack of Hansen environment statistics and infrastructure sizing documentation from the vendor in 2006.
b) Unexpected growth in the development environment, coupled with experience gathered from early bench-testing statistics in October 2008.
c) Lack of prior provision for true disaster recovery , Business Continuity plans and capabilities.

This new configuration will address stability, robustness and full disaster recovery ability.

Software: Additional customer service licenses

An examination of the production environment determined that an additional 100 Hansen customer service module licenses will likely be required, compared to the original estimate.

General Project Expenses $0.88 million

Additional resources are required for a number of general project criteria, these include:

Consulting Expenses
Specialist consultants from the existing vendors on the contract have been used from time to time to address skills gaps, to bring specialist knowledge or integration skills to maintain quality of deliverables, to fill critical needs or address identified risks. These included:

- Additions to the complex SAP interfaces
- Reporting best practices
- Hardware architecture & planning
- Data Modeling
- Testing and business process redesign

US$ Exchange Rate Variances
The exchange rate used to develop the original budget in 2006 was CAD 88 cents to the US dollar. The project made some gains on these payments from late 2007 to mid-2008 when the CAD was at parity with the USD. However, the exchange rate has deteriorated significantly since mid-2008 and thus those gains have long since been eroded and continue to remain in the negative with the CAD having dropped to as low as 74 cents. This component is based on an exchange rate of CAD 77.5 cents to the US dollar.

Project Management Staffing
Following the resignation of the full time employee project manager in late 2007, and the inability to find a suitable replacement candidate via several recruiting strategies, the City acquired the services of a project manager via contract (RTS 7296) at a cost considerably higher than had been budgeted for the role. Other alternatives, such as reassigning existing resources, were given consideration but were determined to be not feasible due to workload

issues in other areas and the particular need for the skills of an experienced senior project manager

Miscellaneous
Numerous other small factors result in this total variance, including costs allocated to Blueprinting costs, PST liability costs, etc.

Contingency	**$0.40 million**

Even though the project is well-advanced, risks remain that new, currently unanticipated issues will arise. Project Management "best practice" recommends that provision be made for costs associated with as-yet-unknown new issues.

Appendix B

Details of 2006 – 2008 Engineering Capital Programs identified as sources of funding.

Capital Program	Funding Transfer	Proposed Transfer as a % of Total 2006-2008 Capital Budget
2006-2008 Sewer Main Reconstruction Program	$500,000	0.9%
2006-2008 Waterworks Infrastructure Replacement Program	$200,000	0.5%
2006-2008 Waterworks Addressing Growth Program	$1,200,000	18.2%
2006-2008 Waterworks Investigation, Monitoring & Control Program	$400,000	34.8%
2006-2008 Waterworks Miscellaneous Water Quality Projects	$200,000	16.1%
	$2,000,000	
2006-2008 Streets Infrastructure Program	$80,000	0.5%
2006-2008 Streets Local Area Traffic Plan Program	$600,000	4.4%
2006-2008 Streets Major Projects	$700,000	1.4%
	$1,380,000	
2006-2008 Street Lighting Renovate and Upgrade Plant Program	$120,000	2.3%
	$4,000,000	

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