TETRA TECH

PROJECT SHEET

Integration of Underground Utilities with Pavement Management System in Fort Saskatchewan, SK

Client	Start Date	Deighton Contact	Reference
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The water, sanitary, and storm water infrastructure renewal backlog is of growing concern to Canadian municipalities. The construction of these infrastructure assets has typically followed urban growth cycles. Even in a relatively young municipality such as Ft. Saskatchewan, older infrastructure installed from the middle of the previous century is at or approaching the end of its expected service life.

Asset Inventory and Replacement Values

The primary source for data on the City's water mains, sanitary sewers, and storm sewers was the data stored in the City's ESRI ArcGIS. By averaging the install dates of the City's underground utilities, a map of the location distribution of pipes by their decade of installation was created. From this map, it was clear that development in certain areas within the city occurred approximately at the same time, and it was fair to assume that any future renewal or replacement of pipes would also occur approximately on a neighborhood-by neighborhood basis.

Pipe Condition

A set of Weibull cumulative distributions were created in MS Excel® to depict a set of deterioration curves for pipes with different expected service lives (ESLs). The ESL is defined as the period of time over which the asset is actually available for use and able to provide the required level of service at an acceptable risk; for example, without unforeseen costs of disruption for maintenance and repair. The pipe ESLs were based on common practice at other municipalities, with some of the ESLs subsequently revised based on the experience of municipal staff at the City. The ESLs used for this assignment ranged from 50 years for concrete and vitrified clay tile sewers, 60 years for asbestos cement water mains, 80 years for all PVC mains, and 100 years for concrete storm mains.

Utility Pipe Interventions

- *Software* - dTIMS enabled optimized decision making and mathematical deterioration modelling of infrastructure assets and the development of short, medium, and long-term forecasts of pipe renewal and replacement costs.

- *Best Practice* - A review of best practice documentation from the Water Environment Research Foundation (WERF) helped identify the potential intervention options available for the inspection, renewal, and replacement of pipes, and to develop a process flow chart defining the pipe intervention decision-points and associated costs available for programming into the software tool.

- *Unit Cost Tables* - A range of tables were developed showing pipe unit costs which were differentiated by activity, pipe type, diameter and reinstatement (outside or inside a road, and the thickness of asphalt), and whether one or more pipes in a right of-way is being replaced. These unit costs tables were prepared in MS Excel and used as lookup tables from the software analysis tool to calculate the total costs of intervention per main segment.

- *Pipe Intervention Process Flow* - Defined intervention process flow governing the decision making on when and how to intervene on the pipes (flowchart).

- *Coordination of Infrastructure Works* - In terms of the planning for road corridor asset renewal and replacement, piecemeal or "silo based" planning results. For example, utility staff making cuts into newly paved roads to perform a utility pipe or service connection replacement, and an irate public that rightly questions whether their tax dollars are spent in the most efficient manner.