Adding up the carbon count

Tool calculates emissions of carbon dioxide from city works projects, providing local governments a tool to show sustainability.

by Preston Creelman, P.Eng

Did you install a new watermain by horizontal directional drilling? Have you re-habilitated a corroded culvert by slip-lining? Can you up-size that old watermain by pipe-bursting?

If you answered yes to any of the above, you can also claim credit for reduction of carbon dioxide emissions using the Carbon Calculator program from the British Columbia chapter of the North American Society for Trenchless Technology (NASTT BC).

There are numerous initiatives by all levels of government to reduce greenhouse gas emissions and many cities are buying smart cars for city staff, selecting hybrid engines for public works trucks, installing programmable controllers to control heating and cooling in civic buildings, etc. Each of these programs have carbon dioxide reductions that can be calculated.

Now there is a tool that can determine the tonnage reduction of carbon dioxide by using a trenchless technology versus the traditional open-cut way of installing/replacing/rehabbing a watermains or sewer.

Sewer work generates CO_2

Each mile of sewer construction by open-cut method creates about 1,600 truck loads of material. Trucks haul away spoil and haul back good aggregate for backfill. Excavators are needed to remove material, loaders to replace material, packers to compact it, and pavers or rollers to re-pave it. Sometimes, dewatering pumps operate 24/7.

All of this equipment is burning fuel, which generates carbon dioxide. Since most utility lines run under city streets, while all this equipment is digging, hauling and packing, there are long lines of vehicle traffic waiting, idling or detouring around the site.

As for the street itself, the asphalt is hauled away, hopefully re-cycled, then re-heated and hauled back. In addition, that aggregate backfill that is hauled back had to be processed and delivered to a depot.

Created in early 2008, the Carbon Calculator allows inputs on many aspects of a project: street or boulevard surface, length, diameter and depth of pipe, days of traffic control, dewatering pumps, travel time to dump or depot, and others. Different scenarios can be entered and carbon dioxide emissions calculated within minutes.

These values can be analyzed as part of design criteria or at project's end to provide actual contribution to a city's sustainability initiatives. While it is not perfect, presently it is the only tool available which takes into account most of the variables that can be quantified for an infrastructure project and related fuel consumption viz-à-viz carbon dioxide emissions.

The program's value pre- and postproject was determined for two watermain replacement jobs in the City of Richmond, B.C. Horizontal Directional Drilling was used to install 2,000 of 4,400 total metres of Cobra Lock PVC Restrained Joint Pressure Pipe. The Carbon Calculator was run for excavation both under the street and the grassy boulevard; the result was a savings of 32.6 tonnes of emissions.

HDD reduced carbon cost

Before tendering a further 2,850 metres of watermain replacement, the city projected another 26.0 tonnes of carbon dioxide reduction if a major portion was installed by HDD. This total saving of 58.6 tonnes of emissions clearly illustrates the City of Richmond's commitment to maximizing sustainability. Realizing that not all watermain or sewer installations can be considered for trenchless construction, these "brown/dirtless" methods should at least be evaluated during preliminary design. And the time required to consider these "green" options is greatly reduced using the Carbon Calculator.

Preston Creelman is a production engineer with Royal Pipe Systems and past president of the B.C. chapter of NASTT.

Royal Pipe Systems
Reader Reply Card: 1142
Web link: baumpub.com/GB1142