

Application of Natural Channel Design (NCD) Principles in Agricultural Drainage

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The historic approach to at-surface agricultural drainage has predominantly employed straightened ditches and watercourses of trapezoidal configuration. While generally effective at moving water off the landscape, the agricultural industry is experiencing ever-increasing regulatory and fiscal pressure to reduce negative environmental impacts and ever-increasing costs associated with the routine maintenance (e.g., dredging and clean-out) of such systems. It is hypothesized that the implementation of Natural Channel Design (NCD) principles represents a potential solution insofar as such systems are designed to provide a dynamically stable environment wherein sediment transport is in balance, neither aggrading nor degrading.

Stantec provided seed funding in support of a research and development project testing this hypothesis, with external sources (provincial / municipal) required to implement any proposed works. The project involves a literature review, the selection of an appropriate site, stakeholder liaison, design, construction, and monitoring of a demonstration project to quantifiably illustrate the efficacy of NCD application in the municipal drainage context. As a pilot project, the approach applies a variety and/or combination of NCD techniques, including:

- a nested channel or 2-stage ditch, aligning with current research priorities of provincial agencies (OMAFRA) and arguably the most readily accepted amongst landowners
- the use of riparian vegetation for erosion control, nutrient management, and habitat enhancement
- increased sinuosity, and
- instream grade control structures to prevent down-cutting and potentially allow for a straighter channel (dissipating energy vertically vs. horizontally in a sinuous channel).

Recognizing financial considerations as a predominant consideration in such project, the project also includes an evaluation of impacts of capital (construction) and operational (maintenance) costs.