HIGHWAY STANDARDS BRANCH
PROVINCIAL ENGINEERING MEMORANDUM
Design and Contract Standards Office #2020-01, April 2, 2020

Implementing new Gravity Pipe Trenchless Technologies Design Guides and Gravity Pipe Design Approvals

Implementation

This memorandum is effective as of the date of issue.

Background

The Design and Contract Standards Office (DCSO) completed a consultant assignment in 2019 to develop trenchless technologies design guides for gravity pipe culverts and stormsewers. In total, 17 design guides were completed covering repair, rehabilitation, pipe replacement at the same location and pipe installation in a new location as alternatives to the ministry’s traditional open cut technology. Each design guide through a defined process assists designers in data collection, hydraulic, structural, durability and environmental design, and contract documentation.

As a part of the assignment, a Gravity Pipe Trenchless Technologies Selection Guide was also developed for appropriate trenchless technology identification based on the site specifics and hydraulic data inputs. The Selection Guide enables designers to specify an appropriate trenchless technology or multiple trenchless technologies for any culvert and/or stormsewer sites for the highway contract. It is designed to work with initial coarse site and hydraulic data inputs that can be refined as the designer progresses through the design analysis process of each identified trenchless technology option to finalize suitable trenchless technology options.

The MTO Gravity Pipe Trenchless Technologies Selection Guide and trenchless technology design guides can be accessed at Drainage & Hydrology website and at Project Management Best Practices website.

Should no suitable trenchless technology be identified through MTO Gravity Pipe Trenchless Technologies Selection Guide’s process, traditional open cut technology will be required to install a new culvert and/or stormsewer.

Policy

A. Pipe Culverts and Stormsewers Rehabilitation

Trenchless technologies for repair or rehabilitation are not directly subject to the Highway Drainage Design Standards (HDDS), however, the HDDS shall be used as benchmarks by which to assess the resultant hydraulic impacts of a repaired or rehabilitated culvert and/or stormsewer. Hydraulic impacts are based on application of the Provincial Engineering Memorandum (PEM) 2016-14 on MTO’s Climate Change Policy to establish existing hydraulic conditions.
Designers shall assess the significance of impacts on appropriate HDDS criteria in the following manner:

1. If all HDDS criteria are met, designers may specify the repair or rehabilitation trenchless technology(ies)’s specifications into the highway contract.

2. If one or more HDDS criteria are not achieved, designers shall exercise engineering judgement to determine the criticality of the exceedance(s) and:

   a. Where the level of exceedance is of low significance and can be accepted by the ministry in the short term until new culvert and/or stormsewer pipes can be installed, designers may specify the repair or rehabilitation trenchless technology(ies)’s specifications into the highway contract.

   b. Where exceedance is of higher significance and through the use of additional suitable mitigation measures can be decreased to an acceptable level in the short term until new culvert and/or stormsewer pipes can be installed, designers, after acquiring regional approvals to deviate from applicable HDDS criteria, may specify the repair or rehabilitation trenchless technology(ies)’s and required mitigation measures’ specifications into the highway contract.

   c. Where exceedance is of higher significance and cannot be decreased through the use of suitable mitigation measures, designers shall not specify such repair or rehabilitation trenchless technology(ies)’s into the highway contract.

B. Pipe Culverts and Stormsewers Replacement

For trenchless technologies to install a pipe replacement at the same location, HDDS criteria, in conjunction with the PEM 2016-14 on MTO’s Climate Change Policy, shall govern the new culvert’s and/or stormsewer’s design.

Designers shall assess HDDS criteria in the following manner:

1. If all HDDS criteria are met, designers may specify the pipe replacement trenchless technology(ies)’s specifications into the highway contract.

2. If one or more HDDS criteria are not achieved, however, through the use of additional suitable mitigation measures, the HDDS criteria can be met, designers may specify the pipe replacement trenchless technology(ies)’s and required mitigation measures’ specifications into the highway contract.

3. If one or more HDDS criteria are not achieved and through the use of additional suitable mitigation measures can be decreased to an acceptable level, designers, after acquiring regional approvals to deviate from applicable HDDS criteria, may specify the pipe replacement trenchless technology(ies)’s and required mitigation measures’ specifications into the highway contract.
4. If one or more HDDS criteria are not achieved and through the use of mitigation measures cannot be decreased to a level that can be accepted by the ministry, designers shall not specify the pipe replacement trenchless technology(ies).

C. New Pipe Installations

For trenchless technologies to install a pipe at a new location, HDDS criteria, in conjunction with the PEM 2016-14 on MTO’s Climate Change Policy, shall govern the new culvert’s and/or stormsewer’s design.

Designers shall assess HDDS criteria in the following manner:

1. The new pipe culvert’s and/or stormsewer’s design shall be sized to meet all applicable HDDS criteria and enable a one-time pipe rehabilitation trenchless technology to be used in the future to extend the culvert’s or stormsewer’s service life without compromising any HDDS criteria set as of date of design.

2. If one future rehabilitation cannot be achieved, the new pipe culvert’s and/or stormsewer’s design shall be sized to meet all applicable HDDS criteria and enable a one-time pipe replacement trenchless technology to be used in the future to replace the existing culvert or stormsewer without compromising any HDDS criteria set as of date of design.

3. If replacement cannot be achieved, the new pipe culvert’s and/or stormsewer’s design shall be sized to meet all applicable HDDS criteria and enable a one-time new pipe placement trenchless technology to be used in the future to install a new culvert or stormsewer at a new location without compromising any HDDS criteria set as of date of design.

D. Open Cut Installations

For open cut installations, HDDS criteria, in conjunction with the PEM 2016-14 on MTO’s Climate Change Policy, shall govern the new culvert’s and/or stormsewer’s design and be assessed in the following manner:

1. New pipe culvert’s and/or stormsewer’s design shall be sized to meet appropriate HDDS criteria and enable at least one or more, if possible, pipe rehabilitation trenchless technology applications to be used to extend the culvert’s or stormsewer’s service life without compromising any HDDS criteria set as of date of design.

2. If rehabilitation cannot be achieved, the new pipe culvert’s and/or stormsewer’s design shall be sized to meet all applicable HDDS criteria and enable a pipe replacement trenchless technology to be used to replace the existing culvert or stormsewer without compromising any HDDS criteria set as of date of design.
3. If replacement cannot be achieved, the new pipe culvert’s and/or storm sewer’s design shall be sized to meet all applicable HDDS criteria and enable a new pipe placement trenchless technology to be used to install a new culvert or storm sewer at a new location without compromising any HDDS criteria set as of date of design.

Designers shall be aware that some physical constraints such as height of fill or hydraulic performance requirements such as fish passage may limit or negate the ability to use the trenchless technology for current projects or as a future consideration.

**Approvals**

MTO’s New Gravity Pipe Approvals policy is as follows:

1. Specification of a sole pipe material for a highway contract when other pipe materials have been identified through the Gravity Pipe Design process must be approved by DCSO prior to designers specifying the sole pipe material requirements into a highway contract.

2. Specification of larger pipe sizes into a highway contract shall be as determined through the hydraulic design process to meet the requirements of this policy.

3. Specification of greater pipe material specifications into a highway contract are to be determined through the Gravity Pipe Design process and modified in accordance with the following guidelines:

   a. If the Design Service Life (DSL) of the culvert or storm sewer is equal to or greater than 50 years or where the DSL of the culvert or storm sewer is less than 50 years and the height of fill is greater than 3.0 m, each suitable pipe material specification identified through the design process shall be the greatest material specification available for each identified pipe material.

   b. If the DSL of the culvert or storm sewer is less than 50 years and the height of fill is less than 3.0 m, each identified pipe material specification shall be as identified through the design process. The specification may be upgraded to a greater pipe material if justified by the design team’s engineering judgement when encountering unique or special circumstances.

4. Any deviation from this policy in material and size specifications must receive DCSO approval.
Application to Design Assignments

This policy shall be implemented as follows:

1. For all new design assignments, designers shall apply this policy immediately.

2. For active design assignments, designers shall apply this policy only if the design assignment delivery schedules will not be significantly compromised.

3. For active design assignments, designers shall not apply this policy when the design assignment delivery schedules will be significantly compromised.

Designers should contact DCSO, Drainage Section for more information or assistance in the:

- Interpretation of this policy;
- Application of the Gravity Pipe Trenchless Technologies Selection Guide and design guides; and/or
- Preparation of any non-standard special provisions (NSSP) or standard special provisions (SSP) needed for their contracts until DCSO can finalize an OPSS_PROV for each trenchless technology option in the near future.

Mike Pearsall, P. Eng.
Manager, Design and Contracts Standards Office

Dan Remollino, P. Eng.
Director, Highway Standards Branch

c. Distribution List (see attached)

Appendix A: Implementation Details - MTO Gravity Pipe Trenchless Technologies Selection Process Chart
Distribution List

J. Graham Harkness, Assistant Deputy Minister and Chief Engineer, Provincial Highways Management, Asset Management

E. Doidge, Assistant Deputy Minister, Provincial Highways Management, Operations

Provincial Office:

D. Remollino, Director, Highway Standards Branch
T. Tuinstra, Director, Contract Management and Operations Branch
M. Pasqua, Director, Investment Strategies Branch
S. McInnis, Director, Alternative Delivery Branch
W. Kenedi, Manager, Bridge Office
S. Graham, Manager, Traffic Office
R. Berg, Manager, Geomatics Office
M. Pearsall, Manager, Design and Contract Standards Office
B. Lane, Manager, Materials Engineering and Research Office
K. Kernaghan, Head, Corridor Management & Property Section
D. Pateman, Manager, Contract Management Office
K. English, Manager, Contract Claims Office
B. Liegler, Manager, Contract Innovations Office
R. Hazra, Manager, Operations Office
S. Nichol, Manager, Investment Planning and Performance Office
S. Hand, Manager, Program Implementation Office
M. Naeem, Drainage Systems Engineer, Design Standards Section
O. Czajkowski, Drainage Systems Engineer, Design Standards Section
K. Shannon, Senior Engineer, Highway Design, Design Standards Section

Regional Managers of Engineering:

J. White, Central Region
J. Asghar, Northeastern Region
J. Long, Northwestern Region
J. Boparai, West Region
P. Makula, Eastern Region
P. Van Roon, Major Projects Office

Regional Managers of Operations:

P. Mathur, Central Region
K. Morphet, Northeastern Region
D. Schutte, Northwestern Region
M. Nadeau, West Region
R. Albino, Eastern Region
Regional Heads of Planning and Design:

- R. Kulathinal, Central Region
- J. Ranger, Northeastern Region
- D. Cooper, Northwestern Region
- G. Mahabir, West Region
- N. Meyers, Eastern Region

Regional Heads of Structural:

- V. Dimitrovski, Central Region
- S. Ismail, Northeastern Region
- A. Rahman, Northwestern Region
- A. Turnbull, West Region
- D. Miron, Eastern Region

Custodian, Project Management Best Practices Site
MTO GRAVITY PIPE TRENCHLESS TECHNOLOGIES
SELECTION PROCESS

Assessing Rehabilitation Options

Yes → HDDS criteria are met

No → Assessment of criticality

Low → Assessment of criticality

Significant → Assessing HDDS deviation

Yes → Possibility of mitigation

No → Assessing Replacement Options

HDDS criteria are met

No →

Yes →

Low → Assessment of criticality

Significant → Assessing HDDS deviation

Yes → Possibility of mitigation

No →

Proceed with assessed rehabilitation option

Proceed with assessed replacement option

Installation at a new location