

CULVERTS & BRIDGES

The following checklist has been compiled to assist the applicant in preparing their application for approval pursuant to Ontario Regulation 162/06. This checklist is valid for a period of six months following issuance. The level of detail required in the application will be dependent on the proposed works as well as the natural hazards, natural heritage system, and environmental conditions on site. We recommend that applicants contact Conservation Halton staff prior to submitting the application to determine what level of detail is deemed appropriate. **Note: Please be advised that even after all the information requested below is submitted and the application is deemed complete, additional information may be identified as the review progresses or as a result of changes to regulatory requirements.**

This checklist **must be returned** with the Permit application indicating in the appropriate spaces that all required information has been provided.

PROJECT TITLE:	DATE:
LOCATION:	FILE:
TIMING WINDOW RESTRICTION:	

		Applicable	Provided
General Submission Requirements			
Application Form	Completed and signed application form. <i>At a minimum, the landowner must sign the form. If an agent is representing the landowner, the agent must also sign the form.</i>	<input type="checkbox"/>	<input type="checkbox"/>
Application Fee	Non-refundable administrative fee as per category____ on the current year fee schedule attached to permit application at time of submission.	<input type="checkbox"/>	<input type="checkbox"/>
Electronically Submitted	All materials submitted electronically on a flash drive or through digital transfer.	<input type="checkbox"/>	<input type="checkbox"/>
Project Description	Description of, and rationale for, the proposed works including discussion of other alternatives considered. If a replacement structure is proposed, details regarding the current conditions of the existing structure are requested.	<input type="checkbox"/>	<input type="checkbox"/>
Photographs	Photographs of the watercourse, banks, adjacent vegetation and/or representative vegetation communities (if applicable) and existing crossing (if applicable) during ice-free conditions.	<input type="checkbox"/>	<input type="checkbox"/>
Drawings	____ () hard copy sets of all drawings, folded to 8½” x 11” in standard metric scale. See ‘Drawing Requirements’ section.	<input type="checkbox"/>	<input type="checkbox"/>
Reports	____ () hard copies and one (1) digital copy of reports listed under ‘Technical Study Requirements’.	<input type="checkbox"/>	<input type="checkbox"/>

		Applicable	Provided
Qualified Persons	Where a drawing or report is required to be prepared by a P.Geo., P.Eng., OALA, or OLS, it must be stamped, dated and signed.	<input type="checkbox"/>	<input type="checkbox"/>
Drawing Requirements			
Digital Copies	<p>Technical drawings and plans provided in the most recent version of AutoCAD and properly georeferenced to real world coordinates (i.e. NAD83, UTM, Zone 17). File formats in order of preference are dgn, dwg, and dxf.</p> <p>GIS data and mapping should be submitted in an acceptable ESRI format and be properly georeferenced to real world coordinates (i.e., NAD83, UTM, Zone 17). It is highly desirable that mapping related data be submitted in ArcGIS Geodatabase format, containing all spatial, attribute, metadata and spatial joins/data rules. ESRI shape file format is an acceptable alternative.</p>	<input type="checkbox"/>	<input type="checkbox"/>
Topographic Survey	<p>Detailed topographic survey of the site by an OLS or qualified P.Eng. extending a minimum 15m upstream and downstream of the limits of the proposed crossing, with information collected at 1m intervals along the creek. The survey is to identify/confirm/include items such as:</p> <ul style="list-style-type: none"> • Creek inverts, creek thalweg • Stream bank locations (top and bottom of bank) • Existing crossing details (low cord; obvert/invert, wing-walls, parapet walls, etc.) • Observed water level • Dams/weirs/knick points • Slopes/valley walls/retaining walls (top and bottom of bank) • Limits of wetland, staked by CH • Ditch lines • Benchmarks • Date surveyed, etc. 	<input type="checkbox"/>	<input type="checkbox"/>
Plan View(s)	<p>Plan view(s) showing existing conditions and proposed development conditions including:</p> <ul style="list-style-type: none"> • Detailed grading (clearly illustrate how the proposed works will blend in with the undisturbed areas) • Limit of work/disturbance • Watercourse (bankfull width) • Location of boreholes • Culvert/Bridges • Habitat features • Vegetation • CH staked wetland limit • Structures/buildings • Utilities/infrastructure • Location of cross-sections and profile views, etc. <p>• Location of approximate regulated limits (ARL) and applicable natural hazards, specifically:</p> <p>_____</p> <p>_____</p>	<input type="checkbox"/>	<input type="checkbox"/>
Aerial Photograph(s)	Plan view of the proposed works and limits of disturbance (or other, specifically _____), superimposed over top of a recent aerial photograph of the site. Please specify date of imagery.	<input type="checkbox"/>	<input type="checkbox"/>

		Applicable	Provided
Profile View(s)	Existing and proposed longitudinal profile view (s) of the structure and channel (extending a minimum 15m upstream and downstream of crossing) clearly illustrating the existing conditions and proposed development conditions. Drawings must clearly illustrate the works and its interface with the upstream and downstream watercourse reaches (creek invert, bank details) that are to remain undisturbed. Countersinking of closed bottom culverts must be clearly demonstrated.	<input type="checkbox"/>	<input type="checkbox"/>
Cross-sectional View(s)	Existing and proposed cross sectional views of the structure, wing walls, footings, etc, as well as the upstream and downstream watercourse. Bankfull width, creek inverts and low flow channel for fish passage must be illustrated. Countersinking of closed bottom culverts must be clearly demonstrated.	<input type="checkbox"/>	<input type="checkbox"/>
Habitat Features	Plan, section and profile details of proposed habitat features (e.g. pools, riffles, dead snags, woody debris, etc.), as well as tie-in to the proposed channel. Bank location (bankfull, low flow), must be clearly identified on the above noted plans.	<input type="checkbox"/>	<input type="checkbox"/>
Substrate Materials	Type, size/gradation and depth of appropriate substrate material. Analysis supporting the selected sizing must be provided. Details of granular mixtures proposed, or native material to fill the void spaces must also be included.	<input type="checkbox"/>	<input type="checkbox"/>
Existing Vegetation	A vegetation inventory is required (including scientific names, and ELC community mapping to vegetation type). A Tree Preservation Plan is also required. Tree protection fencing location and details must be illustrated on the drawings. Follow Conservation Halton's <i>Landscaping and Tree Preservation Guidelines</i> , available at www.conservationhalton.ca	<input type="checkbox"/>	<input type="checkbox"/>
Proposed Vegetation	Details on restoration, including a locally native, non-invasive seed mix for disturbed areas as well as compensatory trees and/or shrubs must be indicated on the drawings (including scientific names). Follow Conservation Halton's <i>Landscaping and Tree Preservation Guidelines</i> , available at www.conservationhalton.ca unless as directed below: _____	<input type="checkbox"/>	<input type="checkbox"/>
Staging, Phasing and Access Route Plans	Details regarding the sequence of construction with consideration of site management, best management practices, and aquatic/terrestrial timing window restrictions. The construction sequence should consider: <ul style="list-style-type: none"> • Vegetation removal, • In-stream works, • Wildlife rescue plans, • Seasonal timing of landscaping and bioengineering, • Stockpiling operations, etc. <p>The full limits of disturbance for access to the site must be delineated with details regarding temporary crossings (if applicable). Efforts to minimize the extent of the disturbance must be demonstrated.</p>	<input type="checkbox"/>	<input type="checkbox"/>

		Applicable	Provided
Erosion and Sediment Control Plans	Details regarding sediment and erosion control measures, site dewatering, equipment, materials, access to and from work area, monitoring, site supervision, etc. See <i>Erosion & Sediment Guidelines for Urban Construction</i> prepared by the Greater Golden Horseshoe Area Conservation Authorities (www.sustainabletechnologies.ca) for additional guidance.	<input type="checkbox"/>	<input type="checkbox"/>
	Above plan is to be prepared by a qualified professional (i.e. CISEC, CPESC or an approved equivalent).	<input type="checkbox"/>	<input type="checkbox"/>
Technical Study Requirements			
<i>(Studies pertaining to flooding and erosion hazards must be completed in accordance with the Ministry of Natural Resources & Forestry (MNRF) Technical Guidelines (2002).)</i>			
Hydraulic Analysis	A hydraulic analysis by a qualified P.Eng to verify that the proposed works will not increase flooding risks to life or property. The analysis must verify that there will be no increased flood levels on adjacent properties and no increased on-site flood risks. The assessment must be completed for the full range of rainfall events (typically 2, 5, 10, 25, 50, 100 year and Regional Storm). A hard copy and digital copy of all models must be provided and must be accompanied by a summary table of pre and post development flood elevations. The source of the hydraulic model must also be specified. A plan view drawing showing the existing and proposed flooding hazard limit as well as the location of hydraulic cross-sections overlain on an existing topographic mapping and/or grading plan (if grading changes are proposed) must be provided.	<input type="checkbox"/>	<input type="checkbox"/>
Additional Engineering Analysis	Demonstration by a qualified P.Eng that the crossing is providing the appropriate level of access/egress for the intended adjacent and surrounding land use. The appropriate access/egress criteria is: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Confirmation from a qualified P.Eng that the crossing meets the Ministry of Transportation requirements.	<input type="checkbox"/>	<input type="checkbox"/>
	Confirmation from a qualified P.Eng verifying that the proposed crossing can withstand the anticipated flood depths and velocities under Regulatory Storm conditions.	<input type="checkbox"/>	<input type="checkbox"/>
	Calculations by a qualified P.Eng for erosion protection works. Please note that where feasible, erosion protection measures should be buried by appropriate substrate within the natural channel boundary.	<input type="checkbox"/>	<input type="checkbox"/>

		Applicable	Provided
Geotechnical Assessment (Slope Stability)	A geotechnical slope assessment by a qualified P.Eng. The scope of the study must be determined through the completion of the Slope Stability Rating Chart (Table 4.2, MNR, Understanding Natural Hazards and Technical Guide for River and Stream Systems: Erosion Hazard Limit). Where the location of stable top of bank is required, staff will require plan and cross-sectional views that illustrate, at a minimum, the site's topographical information, location of watercourse, toe of slope, staked top of bank, recommended toe erosion allowance, recommended stable slope allowance and analyzed stable top of bank. The location of the analyzed cross-sections must be shown on plan view.	<input type="checkbox"/>	<input type="checkbox"/>
Geotechnical Assessment (Soil Investigation)	A geotechnical assessment by a qualified P.Eng for the purposes of mitigation of geotechnical risks at the site by providing recommendation for items such as footings, excavation limits, design parameters and construction. Indication of groundwater levels and potential for construction dewatering is required to determine if additional hydrogeological study is warranted.	<input type="checkbox"/>	<input type="checkbox"/>
Fluvial Geomorphic Assessment	<p>A fluvial geomorphological assessment by a qualified licenced professional (e.g. P.Geo.) with demonstrated expertise in natural channel design to verify that the design has adequately allowed for natural channel migration, fish/terrestrial passage, sediment transport, and minimizes the risk to infrastructure. The study is to include, but not be limited to;</p> <ul style="list-style-type: none"> • Details on how the proposed design provides a natural channel morphology consistent with anticipated drainage, gradient, and sediment transport regimes; • Channel migration, widening, potential downcutting/scour based on historical observations or acceptable modelling; • Potential changes in channel alignment and bank erosion in upstream and downstream reaches; • Appropriate bankfull flows, water depth and water velocities, and tractive forces. These parameters should be the same through the crossing as in upstream and downstream natural areas; • Natural bottom substrate matching upstream and downstream substrates (with due consideration given to the impacts of lack of vegetative control within the crossing); and • Bedload conveyance, ice jams and woody debris accumulation. 	<input type="checkbox"/>	<input type="checkbox"/>
Hydrogeological Assessment	A hydrogeological assessment by a qualified P.Eng or P.Geo. to study the potential impacts to surface/groundwater interactions related to dewatering, and discharge activities. The assessment must provide adaptive management, mitigation and monitoring strategies with considerations for discharge (quality and quantity of water), construction phasing, etc.	<input type="checkbox"/>	<input type="checkbox"/>

		Applicable	Provided
Aquatic Habitat Assessment	Detailed description and habitat map of in-stream and bank habitat features including bankfull width, pools, riffles, undercut banks, eroding banks, root wads and large woody debris, thalweg/low flow location, backwater areas, substrate type, etc. See the <i>Environmental Guide for Fish and Fish Habitat (MTO, June 2009)</i> for further guidance.	<input type="checkbox"/>	<input type="checkbox"/>
Additional Fisheries Requirements	Fish passage assessment based on the sustained and burst speeds of the weakest species for baseflow conditions up to a 2-year storm (unless otherwise advised by CH staff).	<input type="checkbox"/>	<input type="checkbox"/>
Ecological Study	An Ecological Study. Reference must be made to Conservation Halton's <i>Guidelines for Ecological Studies</i> , available at: www.conservationhalton.ca .	<input type="checkbox"/>	<input type="checkbox"/>
Terrestrial Passage	Details regarding the design of the culvert/bridge to accommodate wildlife passage, including details such as openness ratio, sightlines, target wildlife species, width of dry habitat under various flow conditions, plantings and fencing to direct wildlife and appropriate substrate within the culvert/bridge to facilitate wildlife movement.	<input type="checkbox"/>	<input type="checkbox"/>

Other Requirements		
Fisheries Act	<p>On November 25, 2013, amendments to the <i>Canadian Fisheries Act</i>, associated Applications for Authorization (under Paragraph 35(2) (b) of the Fisheries Act Regulations) and Information Requirements Regulations came into force. Depending on the scale of works, as you will be conducting a project in/near water, the proponent has responsibilities under the Fisheries Act to ensure serious harm to fish is avoided. Please refer to the Department of Fisheries and Oceans (DFO) website for additional information. Alternatively, questions can be directed to DFO by phone 1 855 852-8320 or email fisheriesprotection@dfo-mpo.gc.ca.</p>	
Endangered Species	<p>Staff are aware that the Ministry of Environment, Conservation and Parks has outstanding concerns with respect to species listed on the Species at Risk in Ontario list as it pertains to <i>the Endangered Species Act</i> (ESA) in the immediate area around this project. Please contact MOECP directly to determine what detailed project information will be required to begin the ESA approval process: SAROntario@ontario.ca</p>	<div style="background-color: #d9ead3; padding: 2px; border: 1px solid black; margin-bottom: 5px;">Applicable</div> <input type="checkbox"/>
Prepared by:		Signature: _____

Additional Design Considerations

- Opportunities to incorporate fluvial geomorphic considerations for replacement crossings are encouraged due to the potential to reduce future infrastructure risks and maintenance requirements as well as the potential for positive impacts on natural heritage systems.
- Current channel conditions should be replicated (i.e. hydrograph, habitat, slope, etc.) or rationale provided for changing these channel features.
- The crossing should be located at an appropriate reach, typically at a stable and relatively straight section of the watercourse (avoid meander bends). Typically crossings should be situated at right angles to the watercourse. All crossings must be designed to avoid constricting the waterway.
- Channel realignments associated with the crossing should be minimized.
- Closed bottom culverts should be countersunk by 10 to 15% and infilled with natural native materials to prevent future perched conditions and to facilitate fish passage. To maintain existing culvert capacity and depending on the current invert of the culvert, relative to the stream bed, the diameter of the culvert may need to be increased to account for the required countersinking.
- Substrate material must be appropriate for the fish community. Natural substrate should be utilized where appropriate. Voids of new substrate material should be filled to avoid subsurface flow.
- For clear span structures, abutments should be protected. Erosion protection measures should be buried with appropriate substrate within the natural channel boundary.
- Scaffolding to be used during construction and demolition must be designed to allow for fish passage, flood flows, and protection of the creek bed/banks.
- Instream work with heavy machinery should be minimized.
- Any existing crossing must be removed using appropriate techniques minimizing impact to the surrounding environment.
- Sawcutting must be performed in a way that will ensure no dislodged concrete pieces, including slurry chips and fines will enter the watercourse. An apparatus with a permeable layer component (exp. geotextile fabric) should be installed between the work area and watercourse to prevent such deleterious substances from entering into the watercourse.
- Work area should be isolated from flowing water. Phasing of works should allow construction to be performed in the dry.
- Settling or filtering of water pumped from work area must be addressed.
- For dewatering of the work area to facilitate construction, a Permit to Take Water (PTTW) is required from the Ministry of the Environment & Climate Change if dewatering is in excess of 50,000 litres per day http://www.ene.gov.on.ca/environment/en/industry/assessment_and_approvals/water_taking/STDPROD_075554.html
- Dry culverts may be required to supplement passage opportunities for terrestrial wildlife, particularly in circumstances where physical conditions do not allow for an adequately sized crossing associated with the creek or wetland.
- Turtles often use sunlit gravel road shoulders as nesting areas. These habitats are significant and, if present, should be retained or reinstated to provide similar conditions at project completion.
- In order to reduce the spread of invasive species, equipment should be thoroughly cleaned before being brought onsite. For guidance in this regard, please refer to the Clean Equipment Protocol for Industry, available online (http://www.ontarioinvasiveplants.ca/files/CleanEquipmentProtocol_Mar152013_D3.pdf)
- Enhanced sediment and erosion controls should be implemented in sensitive areas.
- Monitoring by the proponent after construction is crucial to verify the success of the project.
- Works should adhere to the Migratory Birds Convention Act. Should vegetation removal be required within the core breeding bird season (April 1st to August 31st), consultation with Environment Canada - Canadian Wildlife Services should be completed.