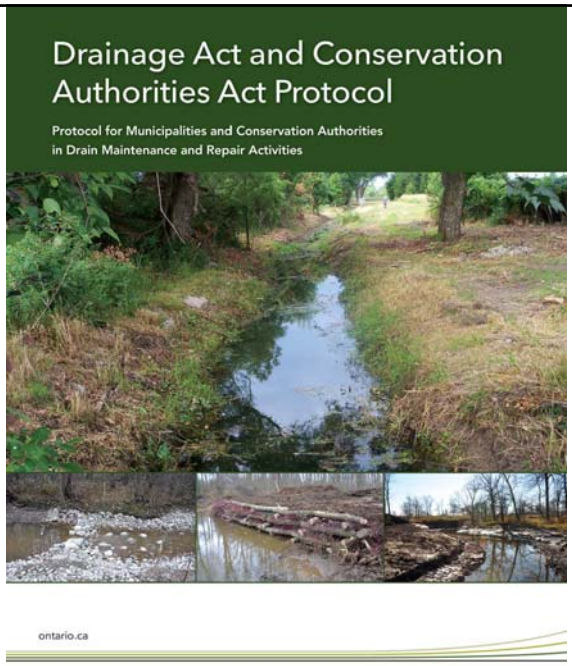

Erosion and Sediment Control – OPS Standards

John Kuntze P.Eng., Drainage Engineer
K. Smart Associates Ltd
Kitchener, Ontario

Erosion and Sediment

Definitions

Erosion is the disruption of soil structure by flowing water

Sediment is the soil particles carried by the flow and also refers to the soil particles once they have been deposited in a new location by flowing water

Erosion and Sediment

Erosion and Sediment

I list erosion first

Erosion - action that creates a result = sediment

- Erosion control is a preventative measure
- Sediment control is a reactive measure
- If you control erosion you have gained control over a sediment problem
- However, you cannot control all erosion so there should be a backup plan for sediment control

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act outside of *Regulated Wetland Limits*

L. Full Cleanout

Description of Typical Works

Removal of accumulated sediment in a drain including spreading of the spoil; the removal of vegetation in the bottom of the channel and removal of slope vegetation, including root removal; the removal of trees and other vegetation from the top of a bank; and access to the site.

Activity-Specific Mitigation Requirements

- There should be no appreciable change in grade with the removal of sediment.
- This work, including the disposal of the sediment, should be conducted in a manner consistent with the Engineer's Report and authorizing by-law
- Minimize *flooding* upstream and downstream.
- Perform work in no/low flow conditions to minimize sediment movement and *erosion*. Avoid work after recent precipitation or snowmelt.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain *maintenance* and *repair* projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush, debris and sediment in such a location as to minimize entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and *erosion*.
- Limit soil movement and *erosion*; use appropriate control measures before work begins and inspect and maintain those measures regularly until all disturbed areas are stabilized.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

Appropriate Control Measures

- My objective is to give some insight into control measures from an Engineer's point of view
- First are some construction planning steps outlined in the Standard Compliance Requirements

Work in the dry

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act outside of *Regulated Wetland Limits*

L. Full Cleanout

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Work in the dry

Disposal of excavated material

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act outside of *Regulated Wetland Limits*
L. Full Cleanout

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Removal of accumulated sediment in a drain including spreading of the spoil; the removal of vegetation in the bottom of the channel and removal of slope vegetation, including root removal; the removal of trees and other vegetation from the top of a bank; and access to the site.

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- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

Disposal of excavated material

- Check the Engineer's report for specification on disposal
- My specification is to place excavated material starting at least 1m back from the top of the ditch bank
- Greater setback may be required depending on quantity and quality of excavated material

Appropriate Control Measures

- Secondly, I want to review the control measures outlined on the second page or back side of the "Notification" document.

Appropriate Control Measures

NOTIFICATION OF DRAIN MAINTENANCE OR REPAIR SUBJECT TO:

- Federal *Fisheries Act*, s. 35(2) (Class Authorization)
- Federal *Species at Risk Act* (SARA), s. 32 (Individual Organisms), s. 33 (Residences) and s. 58 (Critical Habitat)
- Ontario *Endangered Species Act, 2007* (ESA, 2007), s. 9 (Species) and s. 10 (Habitat);
- Ontario *Conservation Authorities Act*, s. 28 Regulations (O. Reg 97/04-"Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses")

Please send this form separately to each applicable reviewing agency.
This notification form may be updated periodically to reflect current legislative requirements.

Reviewing agency use only.							
Reviewing agency:				File number:			
Municipality:							
Contact Name:							
Mailing Address:							
Phone#:		Fax#:		Email:			
Drain Name: *(as referred to under the Drainage Act)*				**Geographic Township:**			
Location: *(please attach a location map)*				**By-Law No.:**			
Work Zone*	**FROM**	Lot:	Conc:	**TO**	Lot:	Conc:	
Impact Zone†	**FROM**	Lot:	Conc:	**TO**	Lot:	Conc:	

Length of Work Zone: ________ Metres
* *Work Zone = part of the drain where the work is actually occurring*
† *Impact Zone = linear length of watercourse extending 1 km downstream of the bottom end of the Work Zone*

Dates of Proposed Work:			
START	Day:	Month:	Year:
FINISH	Day:	Month:	Year:

Drain Classification *(classification of drain will be verified by local Conservation Authority and/or Fisheries & Oceans Canada)*			**Drainage Activities Proposed:**
Drain Class	**Work Zone***	**Impact Zone†**	**Drain Type:**
A	☐	☐	**Drainage Act Section:**
B	☐	☐	**Maintenance/Repair Activities:**
C	☐	☐	
D	☐	☐	
E	☐	☐	
F	☐	☐	Other (please specify):
Unknown	☐	☐	Specify disposal of material, if applicable (e.g., location, method):
Natural Watercourse		☐	

Appropriate Control Measures

Pre-screening for location-specific attributes if known *(located along or adjacent to the watercourse or drain)*

Species at Risk (SARA/ESA)
Information for use by MNR/DFO as applicable

Is this drain covered under an ESA Exemption Agreement (S. 23 of O. Reg. 242/08)?
○ Yes ○ No

Species At Risk Act maps are available here:
http://www.conservationontario.ca/projects/DFO.html

Species at Risk present:
☐ Turtles ☐ Amphibians
☐ Snakes ☐ Mussels
☐ Fish ☐ Birds
☐ Plants

Other Considerations for Review Agencies (Please specify):

Sediment and Erosion Control Measures to be Used:

	Method	Notes
☐	Reseeding	Use native, non-invasive herbaceous material
	Erosion control mats:	Please specify:
☐	Temporary	
☐	Permanent	
☐	Two-stage/low-flow channel	See definition and diagram, Drainage Act and CA Act Protocol, Appendix III
☐	Light-duty straw bale barrier	See OPSD 219.100
☐	Light-duty silt fence barrier	See OPSD 219.110
☐	Heavy-duty silt fence barrier	See OPSD 219.130
	Flow check dams:	
☐	Straw bale	See OPSD 219.180
☐	Silt fence	See OPSD 219.190
☐	Rock, V-ditch	See OPSD 219.210
☐	Rock, flat-bottom ditch	See OPSD 219.211
☐	Staged cleanout	See definition, Drainage Act and CA Act Protocol
☐	Sediment traps	See OPSD 219.220
☐	Rip rap	See OPSS 511 unless specified in Engineer's Report
☐	Other Please specify:	

I, the undersigned, representing the above named municipality, hereby declare my intention to carry out the works or undertakings described above in the classified drain. Furthermore, I request that I be provided with the appropriate authorizations under the Fisheries Act, Conservation Authorities Act, or Endangered Species Act for the proposed work. I will carry out all activities relating to the project within the designated time frames and conditions as specified in the authorizations provided.

Signature: Date:
(Drainage Superintendent)

FOR INTERNAL USE:

CONSERVATION AUTHORITY: The classification of the municipal drain indicated above has been verified by this office. Receipt of notification form is acknowledged and will be assessed under the appropriate Conservation Authorities Act S. 28 regulation and the Drainage Act and Conservation Authorities Act Protocol. Signature of this form does not constitute permission under a Conservation Authorities Act S.28 regulation.	**SIGNED:** ________ Conservation Authority	**Date:** ________
MINISTRY OF NATURAL RESOURCES: Receipt of notification form is acknowledged and will be assessed in accordance with the Endangered Species Act, 2007 or, if applicable, in accordance with the agreement entered into between the Municipality and the Minister of Natural Resources under s. 23 of O. Reg. 242/08.	**SIGNED:** ________ District Office (MNR)	**Date:** ________
FISHERIES AND OCEANS CANADA: Receipt of notification form and verification of the drain classification by CA are acknowledged. A Class Authorization for a Class ___ Drain is issued pursuant to S 35(2) of the Fisheries Act.	**SIGNED:** ________ District Office (DFO)	**Date:** ________

Appropriate Control Measures

Sediment and Erosion Control Measures to be Used:		
	Method	**Notes**
☐	Reseeding	Use native, non-invasive herbaceous material
	Erosion control mats:	Please specify:
☐	Temporary	
☐	Permanent	
☐	Two-stage/low-flow channel	See definition and diagram, Drainage Act and CA Act Protocol, Appendix III
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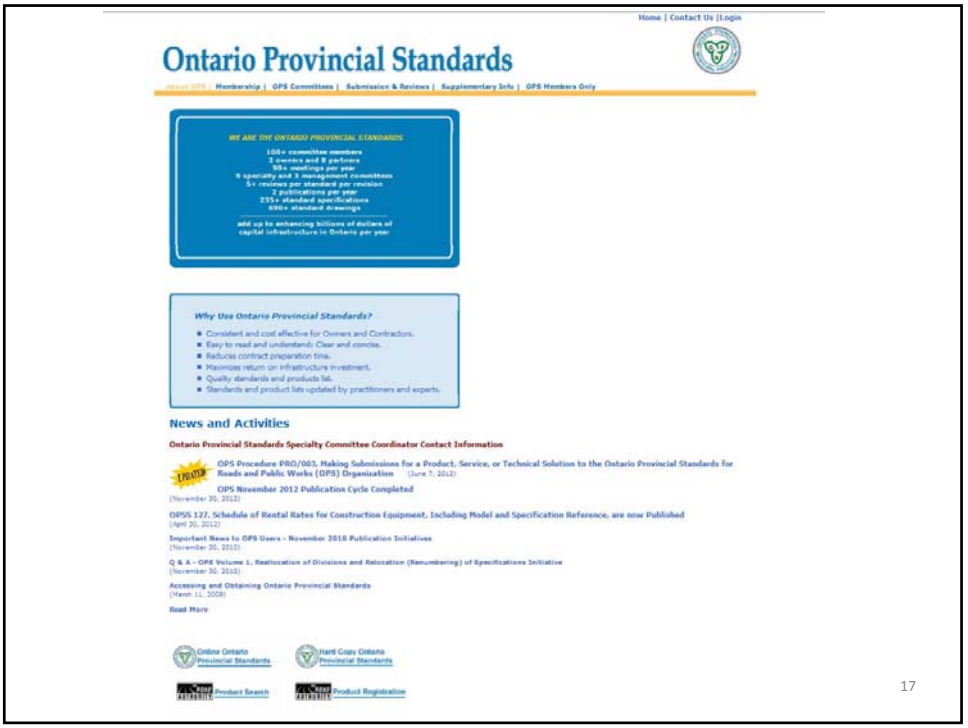
☐	Staged cleanout	See definition, Drainage Act and CA Act Protocol
☐	Sediment traps	See OPSD 219.220
☐	Rip rap	See OPSS 511 unless specified in Engineer's Report
☐	Other Please specify:	

Erosion and Sediment Control Standards

- Reference can be made to the OPS
- Ontario Provincial Standards
- Found online at www.ops.on.ca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OPS November 2012 Publication Cycle Completed
(November 30, 2012)
OPSS 127, Schedule of Rental Rates for Construction Equipment, Including Model and Specification Reference, are now Published
(April 20, 2012)
Important News to OPS Users - November 2010 Publication Initiatives
(November 30, 2010)
Q & A - OPS Volume 1, Reallocation of Divisions and Relocation (Renumbering) of Specifications Initiative
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The Ontario Provincial Standards for Roads and Public Works (OPS) organization completed the April 2012 publication cycle. A number of standards have been revised and are now available. All of the standards in the OPS library are available from this website and in hard-copy and CD versions from ServiceOntario Publications.
NOVEMBER 2010 PUBLICATION INITIATIVES
On November 30th the reallocation of 3 divisions of OPS Volumes 1, 5, and 7 and the relocation (renumbering) of 29 OPS specifications (OPSSs) in OPS Volume 1 were implemented as part of the November 2010 publication cycle. Check out the OPS website to gain familiarity with the new designations for the relocated OPSSs, the three finalized reallocated division titles, the examples of identifying relocated and referencing OPSSs, and more.
An updated Q & A document is available in the News and Activities portion of the OPS website.
NEXT SCHEDULED PUBLICATION DATE
April 30, 2013
MTO FORMS
Ontario Ministry of Transportation forms referenced in the Ontario Provincial Standards are available through the MTO RAQS website.
Attachments:
Accessing & Obtaining Ontario Provincial Standards - 2009-03.pdf
Important News to OPS Users - 2010-11.pdf
Standards Last Updated: 2012-11-30
Municipal & Provincial Common:
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OPS Volume 2 - Material Specifications
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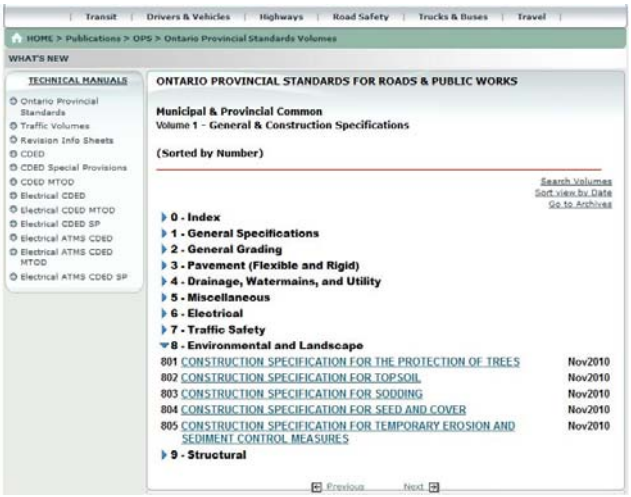
OPS Volume 4 - Drawings for Electrical Work



Section 805
text specifications for erosion and sediment control

ONTARIO
PROVINCIAL
STANDARD
SPECIFICATION

METRIC
OPSS 805
NOVEMBER 2010
(Formerly OPSS 577, November 2006)

CONSTRUCTION SPECIFICATION FOR TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

TABLE OF CONTENTS

805.01 SCOPE

This specification describes the requirements for the installation, maintenance, and removal of temporary erosion and sediment control measures and the removal of sediment accumulated by the control measure.

805.01.01 Specification Significance and Use

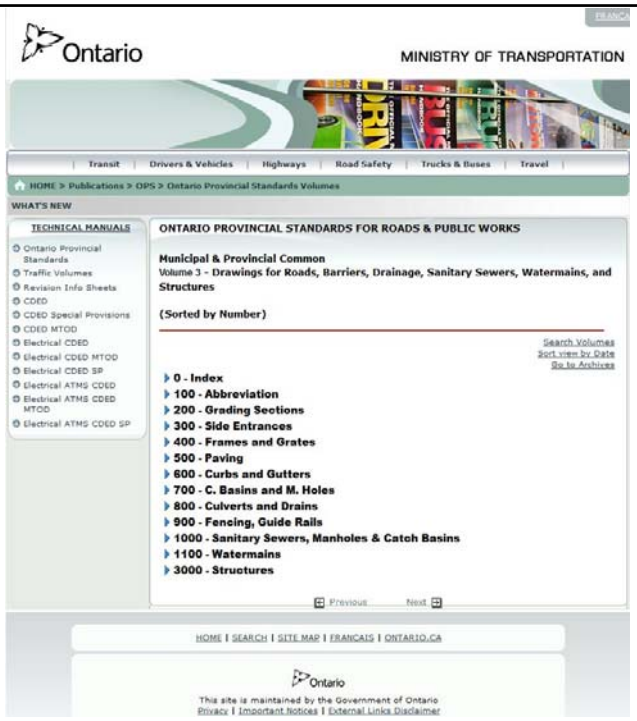
This specification has been developed for use in provincial- and municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities and the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

The text tends to be heavy duty stuff
It is more common to refer to the OPSD as per the Notice form
Ontario Provincial Standard Drawings which are referenced at the end of Section 805

Related Ontario Provincial Standard Drawings

OPSD 219.100	Light-Duty Straw Bale Barrier
OPSD 219.110	Light-Duty Silt Fence Barrier
OPSD 219.130	Heavy-Duty Silt Fence Barrier
OPSD 219.150	Sandbag Barrier
OPSD 219.180	Straw Bale Flow Check Dam
OPSD 219.190	Silt Fence Flow Check Dam
OPSD 219.200	Sandbag Flow Check Dam
OPSD 219.210	Temporary Rock Flow Check Dam V-Ditch
OPSD 219.211	Temporary Rock Flow Check Dam Flat Bottom Ditch
OPSD 219.220	Excavated Sediment Trap In Ditch
OPSD 219.230	Chute For Excavated Sediment Trap
OPSD 219.231	Berm Barrier
OPSD 219.240	Dewatering Trap
OPSD 219.260	Turbidity Curtain
OPSD 219.261	Turbidity Curtain Seam Detail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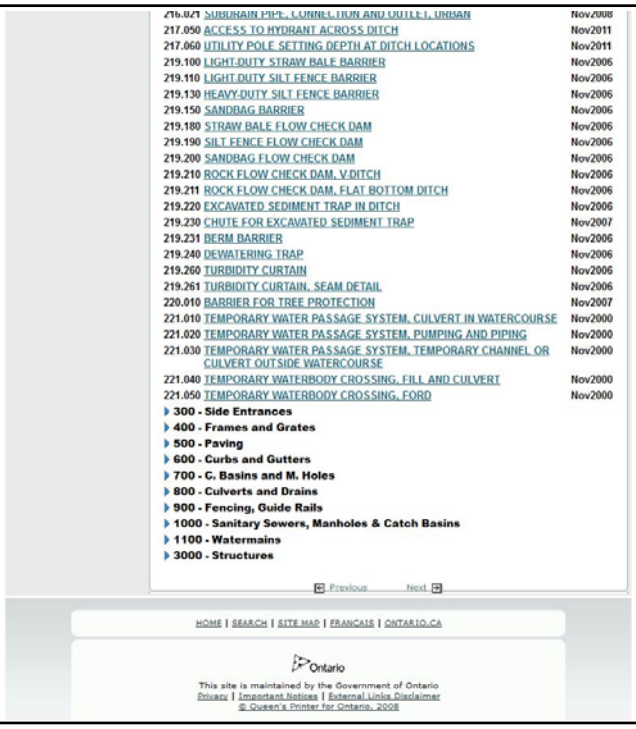
216.027 SUBDRAIN PIPE, CONNECTION AND OUTLET, URBAN Nov2008
217.050 ACCESS TO HYDRANT ACROSS DITCH Nov2011
217.060 UTILITY POLE SETTING DEPTH AT DITCH LOCATIONS Nov2011
219.100 LIGHT-DUTY STRAW BALE BARRIER Nov2006
219.110 LIGHT-DUTY SILT FENCE BARRIER Nov2006
219.130 HEAVY-DUTY SILT FENCE BARRIER Nov2006
219.150 SANDBAG BARRIER Nov2006
219.180 STRAW BALE FLOW CHECK DAM Nov2006
219.190 SILT FENCE FLOW CHECK DAM Nov2006
219.200 SANDBAG FLOW CHECK DAM Nov2006
219.210 ROCK FLOW CHECK DAM, V-DITCH Nov2006
219.211 ROCK FLOW CHECK DAM, FLAT BOTTOM DITCH Nov2006
219.220 EXCAVATED SEDIMENT TRAP IN DITCH Nov2006
219.230 CHUTE FOR EXCAVATED SEDIMENT TRAP Nov2007
219.231 BERM BARRIER Nov2006
219.240 DEWATERING TRAP Nov2006
219.260 TURBIDITY CURTAIN Nov2006
219.261 TURBIDITY CURTAIN, SEAM DETAIL Nov2006
220.010 BARRIER FOR TREE PROTECTION Nov2007
221.010 TEMPORARY WATER PASSAGE SYSTEM, CULVERT IN WATERCOURSE Nov2000
221.020 TEMPORARY WATER PASSAGE SYSTEM, PUMPING AND PIPING Nov2000
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221.040 TEMPORARY WATERBODY CROSSING, FILL AND CULVERT Nov2000
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OPS and OPSD

- There are several categories applicable to rural ditch maintenance

1. Light and Heavy Duty Sediment Barriers
2. Flow Check Dams
3. Excavated Sediment Traps

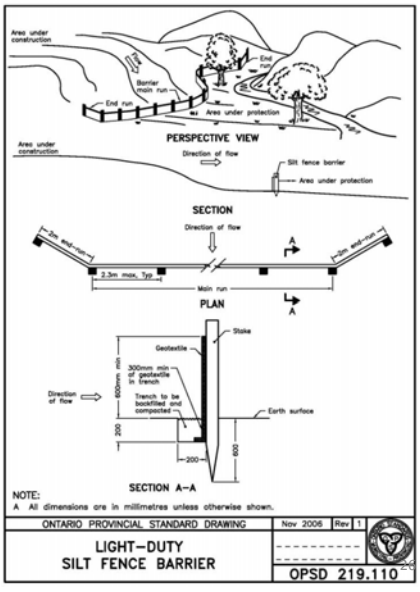
OPS and OPSD

1. Light and Heavy Duty Sediment Barriers

Materials

Silt fence

A geotextile supported by stakes



OPS and OPSD

1. Light and Heavy Duty Sediment Barriers

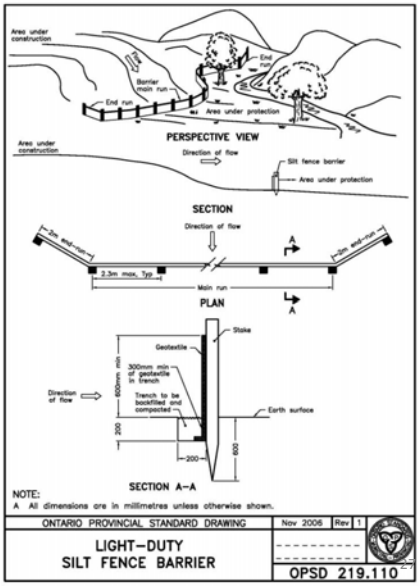
Materials

Silt fence

A geotextile supported by stakes

Straw bales

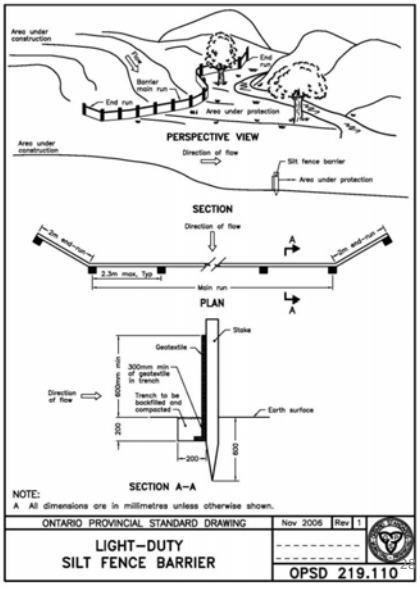
Sandbags for Heavy Duty Sediment Barriers



OPS and OPSD

1. Light and Heavy Duty Sediment Barriers

For most rural ditch cleanout work sediment barriers are usually not required if the spoil disposal is kept back from the top of bank



OPS and OPSD

2. Flow Check Dams

Materials

- Straw bales
- Silt Fence
- Sandbags
- Rock

OPS and OPSD

2. Flow Check Dams

Materials

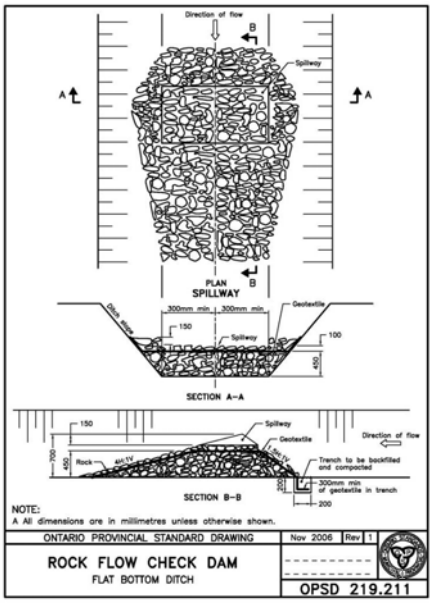
- Straw bales
- Silt Fence
- Sandbags
- Rock

- Silt fence and sandbags are not practical or effective in rural ditches
- I recommend rock check dams if site access is not a problem
- Straw bales can be used if site access is a problem

OPS and OPSD

Rock Check Dam

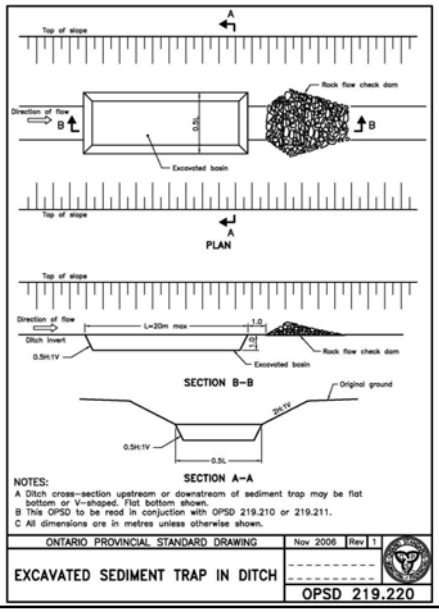
- I don't usually recommend the geotextile liner
- 300mm is usually high enough for rural ditches
- You do need to create the notch or spillway



OPS and OPSD

3. Excavated Sediment Trap

- Effective option on rural ditches
- Can be combined with a rock check dam

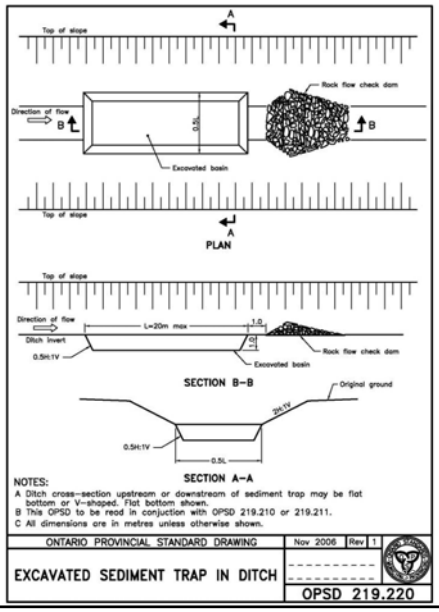


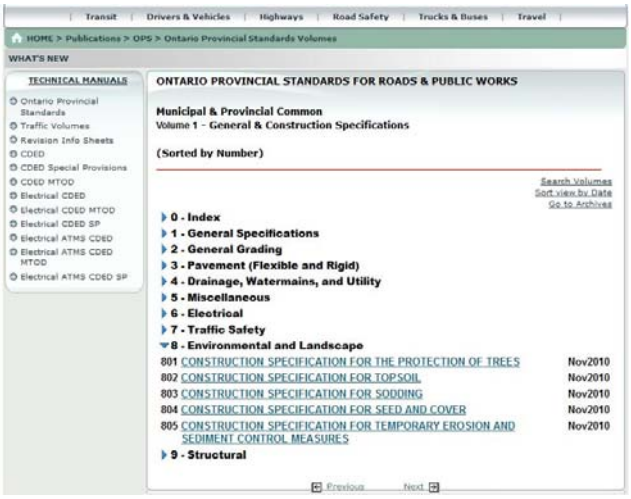
OPS and OPSD

3. Excavated Sediment Trap

For rural ditches I recommend some changes to the standard

- 1m depth is excessive
- 300-500mm depth is OK
- 10m length is OK
- Increased width not required





Final comments relate to Section 804 – Seed and Cover

Seeding has always been a standard form of erosion control

OPSS 804 – Seeding cover

- Seeding is more a long term erosion control measure
- Seeding cover is usually recommended to protect seeding which also provides an immediate form of erosion control
- On Notification form below seeding there is reference to “erosion control mats”
- OPSS 804 gives some assistance here

OPSS 804 – Seeding cover comparison

Appendix 804-A

SEEDING COVER APPLICATION TYPES

Cover Application Types	Cover Type Attributes	Selection Criteria
Straw	Chopped straw is applied to the seeded area via a straw mulch blower and is coated with a tackifier to hold it together. A time-tested method of providing cover and protection for germinating seedlings as well as short-term erosion control.	One of the default cover types. Straw has the advantage of being relatively cheap and providing good coverage. Straw cover application requires another piece of equipment and a labour intensive second application to properly apply the cover material.
Hydraulic Mulch	Hydraulic mulch is a processed fibre of wood, straw, cotton, cellulose pulp, or any combination of these materials. Hydraulic mulches provide a uniform absorptive mat that allows moisture to penetrate into the underlying soil, while providing cover for the germinating seed.	Hydraulic mulch is the other default mulch. It has the advantage of being easy to apply, using the same equipment when applying seed and fertilizer. It is low-cost and low-labour. Hydraulic mulch does not give the same degree of protection to the germinating grass as does straw. During extremes of temperature and moisture it will not perform as well as straw or other higher levels of erosion control.
Erosion Control Blanket (ECB)	ECBs are a family of products that are supplied in rolls. They are unrolled over the seeded earth area and stapled in place. ECBs provide a higher level of erosion control and protection for germinating seedlings. ECBs are machine woven mats with a variety of materials sandwiched between the two woven layers. Materials can be wood, coco or cotton fibre, straw, or any combination depending upon manufacturer.	ECBs should be specified in the contract preparation stage and not during construction. ECBs are specified on a project where erosion of soil slopes or soil ditches is expected to be a problem. ECBs have an advantage over hydraulic mulch in that the blanket is firmly attached to the underlying soil by staples, it is longer lasting and provides a superior growth medium for seedlings. It is more expensive and improper installation can result in poor end results leading to surface erosion.
Bonded Fibre Matrix (BFM)	BFM is a hydraulically applied product made of wood, cotton or cellulose pulp fibres. The fibres are bonded together by various means including mineral bonding agents or organic tackifiers. When applied, the BFM forms a viscous material, that upon drying creates a high strength, porous and erosion resistant mat.	BFMs are applied like hydraulic mulches and have a great similarity to hydraulic mulches, except BFMs have greater erosion resistance and create a thicker, firmer mat. BFMs should be specified where erosion of soil slopes or soil ditches is expected to be a problem and where hydraulic seeders can get access. BFMs are specified in the design stage and have also been substituted for ECBs during construction, although usually at the Contractor's request.

Erosion Control Blanket - installation

Ditch constructed – February 2011

Ditch before restoration – May 2011

Ditch after restoration – August 2011

Ditch after restoration – August 2011

Ditch after restoration – August 2011

Ditch after restoration – August 2011

Erosion and Sediment

Erosion Fixed

RIP RAP

- Rock rip rap is a common method for erosion control
- Notification form has reference to OPSS 511
- Reference should also be made to Engineer's report, newer reports will likely have specification for riprap

THANK YOU