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REVISION INFORMATION SHEET

ONTARIO PROVINCIAL STANDARDS FOR ROADS AND PUBLIC WORKS

VOLUME 3 MUNICIPAL AND PROVINCIAL COMMON DRAWINGS FOR ROADS, BARRIERS, DRAINAGE, SANITARY SEWERS, WATERMAINS, AND STRUCTURES

MANUAL REVISION #68

November 2015

UPDATING ONTARIO PROVINCIAL STANDARDS FOR YOUR USE

Each roads and public works owner (Owner) is responsible for determining implementation dates and directions for use of Ontario Provincial Standards; therefore, manual holders are cautioned about immediately discarding superseded and cancelled standards.

ACCESSING AND OBTAINING ONTARIO PROVINCIAL STANDARDS

The Ontario Provincial Standards for Roads and Public Works (OPS) manuals and the latest published updates for each of the eight OPS manuals are available as follows:

- Available electronically on the OPS/MTO website. Online access to the current, updated, and archived standards; indexes; OPS User Notes; and publication Revision Information Sheets are available free of charge at the site.
(<http://www.rags.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage>)
- Hard-copy format available from Publications Ontario by telephone at 1-800-668-9938 or online. Updates and OPS manuals are available for a cost-recovery fee.
(www.publications.serviceontario.ca)
- The eight OPS manuals of standards are available on one CD in PDF format. The OPS drawings published in Volumes 3 and 4 are available in AutoCAD format on a separate CD. These CDs are available from Publications Ontario or by telephone at 1-800-668-9938 or online for a cost-recovery fee. The updates are not available on CDs as an update package.
(www.publications.serviceontario.ca)

At the Publications Ontario web page, you can type "Ontario Provincial Standards," "OPS," "OPSS," or "OPSD" in the search box, and all related products for the Ontario Provincial Standards will be listed, click on the item you wish to purchase, add the item to your cart, then follow the instructions to complete your order. If trying to order an OPS product online from Publications Ontario and it is shown as Out of Stock, you can backorder the product by telephone at 1-800-668-9938.

In order to receive the Municipal Engineers Association (MEA) purchase price, MEA members should visit the MEA website (www.municipalengineers.on.ca/) for the MEA Publications Ontario order form for hard-copy manuals and CDs.

MTO employees should contact Simon Leung, Account Representative at Publications Ontario, by email (simon.leung@ontario.ca) to set up an account in order to receive the MTO purchase price for technical publications, including the Ontario Provincial Standards.

Links to Publications Ontario and the Ontario Provincial Standards on the MTO Library website are available on the OPS website (www.ops.on.ca). Also on this site under News and Activities are notices for updates and changes in OPS.

Questions should be directed by email to Ontario.Prov.Standards@ontario.ca.

YOU SHOULD REGISTER YOUR OPS MANUALS AND CDs

Users of OPS do not receive notices of OPS updates as they had in the past. Methods of notification from Publications Ontario for the future are being investigated, and you will be informed of them as they become available. In the interim, an email will be sent to OPS users who have registered their OPS manuals and CDs with OPS.

Owners of OPS manuals, who have not yet done so, are requested to register their OPS hard-copy manuals and CDs with Ontario.Prov.Standards@ontario.ca. The registration form and submission instructions are available on the OPS website (www.ops.on.ca), Miscellaneous Info, OPS Forms.

WAITING TO HEAR FROM YOU

If you have a suggestion to revise a standard or you have a standard that works in your ministry, municipality, or area, send it to the Head, OPS Administration, for review and possible inclusion into the Ontario Provincial Standards.

THIS MANUAL IS REVISED AS FOLLOWS:

Index Pages Volume 3

Please remove the entire index and replace with the attached revised index.

Standard Drawings Volume 3

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
204.010	2	204.010	3	“BOULDER TREATMENT, CUT SECTIONS - SUBGRADE” This drawing has been reaffirmed with no changes to technical information.
219.100	1	219.100	2	“LIGHT-DUTY STRAW BALE BARRIER” See Summary of Revisions.
219.110	1	219.110	2	“LIGHT-DUTY SILT FENCE BARRIER” See Summary of Revisions.
		219.120	0	“LIGHT-DUTY FIBRE ROLL BARRIER” This is a New Drawing.
219.130	1	219.130	2	“HEAVY-DUTY SILT FENCE BARRIER” See Summary of Revisions.
		219.131	0	“HEAVY-DUTY WIRE-BACKED SILT FENCE BARRIER” This is a New Drawing.
219.150	1	219.150	2	“SANDBAG BARRIER” See Summary of Revisions.
		219.160	0	“FIBRE ROLL GRADE BREAKS” This is a New Drawing.
219.180	1	219.180	2	“STRAW BALE FLOW CHECK DAM” See Summary of Revisions.
219.190	1			“SILT FENCE FLOW CHECK DAM” This drawing has been cancelled.
		219.191	0	“FIBRE ROLL FLOW CHECK DAM” This is a New Drawing.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
219.200	1	219.200	2	“SANDBAG FLOW CHECK DAM” This drawing has been reaffirmed with no changes to technical information.
219.210	1	219.210	2	“TEMPORARY ROCK FLOW CHECK DAM, V-DITCH” See Summary of Revisions.
219.211	1	219.211	2	“TEMPORARY ROCK FLOW CHECK DAM, FLAT BOTTOM DITCH” See Summary of Revisions.
219.220	1	219.220	2	“SEDIMENT TRAP IN DITCH” See Summary of Revisions.
219.230	3	219.230	4	“TEMPORARY SLOPE DRAIN FOR SEDIMENT TRAP ” See Summary of Revisions
219.231	0	219.231	1	“TEMPORARY BERM BARRIER FOR SLOPE DRAIN” See Summary of Revisions.
219.240	1	219.240	2	“SEDIMENT TRAP FOR DEWATERING” Title revised from Dewatering Trap to Sediment Trap for Dewatering.
219.260	1	219.260	2	“TURBIDITY CURTAIN” Plan view, Inflection point label revised to Change in direction. Section A-A view, Mooring line label revised with removal of “19mm nylon or polypropylene rope”.
219.261	1	219.261	2	“TURBIDITY CURTAIN, SEAM DETAIL” Oblique view, Ballast label revised with removal of “8mm steel chain”.
302.010	1	302.010	2	“MEDIAN CROSSEOVERS FOR SERVICE AND EMERGENCY VEHICLES” This drawing has been reaffirmed with no changes to technical information. Title revised.
310.010	1	310.010	2	“CONCRETE SIDEWALK” Notes 2, 3, A and B have been updated.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
310.020	1	310.020	2	“CONCRETE SIDEWALK ADJACENT TO CURB AND GUTTER” Notes 2, 3, A and B have been updated.
310.030	-	310.030	1	“CONCRETE SIDEWALK RAMPS AT SIGNALIZED INTERSECTIONS” The entire standard has been updated based on MTOD 310.030, which is in compliance with AODA requirements.
		310.031	0	“CONCRETE SIDEWALK RAMPS AT SIGNALIZED INTERSECTIONS WITH INTERSECTING CROSSWALKS” This is a New Drawing. The entire standard has been updated based on MTOD 310.031, which is in compliance with AODA requirements.
		310.033	0	“CONCRETE SIDEWALK RAMPS AT UNSIGNALIZED INTERSECTIONS” This is a New Drawing. The entire standard has been updated based on MTOD 310.033, which is in compliance with AODA requirements.
		310.039	0	“CONCRETE SIDEWALK RAMPS TACTILE WALKING SURFACE INDICATORS COMPONENT” This is a New Drawing. The entire standard has been updated based on MTOD 310.039, which is in compliance with AODA requirements.
310.040	1	310.040	2	“UTILITY ISOLATION IN CONCRETE SIDEWALKS” This drawing has been reaffirmed with no changes to technical information.
310.050	1	310.050	2	“CONCRETE SIDEWALK DRIVEWAY ENTRANCE DETAILS” This drawing has been reaffirmed with no changes to technical information.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
310.060	1	310.060	2	“JOINT DETAIL FOR CONCRETE PEDESTRIAN CROSSWALK AT SIGNALIZED AND ALL-WAY STOP CONTROLLED INTERSECTIONS” This drawing has been reaffirmed with no changes to technical information however the title has been updated in order to better reflect the content of the drawing.
401.081	0	401.081	1	“CAST IRON, SQUARE FRAME FISH TYPE COVER” See Summary of Revisions.
508.010	1	508.010	2	“ROUTING AND SEALING CRACKS UP TO 20mm WIDTH IN ASPHALT PAVEMENT” This drawing has been reaffirmed with no changes to technical information.
802.020	2	802.020	3	“FLEXIBLE PIPE ARCH EMBEDMENT AND BACKFILL EARTH EXCAVATION” Note 1 rewritten to include reference to OPSD 805.020.
802.023	2	802.023	3	“FLEXIBLE PIPE ARCH EMBEDMENT AND BACKFILL ROCK EXCAVATION” Note 1 rewritten to include reference to OPSD 805.020.
802.024	2	802.024	3	“FLEXIBLE PIPE ARCH EMBEDMENT IN EMBANKMENT ORIGINAL GROUND: EARTH OR ROCK” Note 1 rewritten to include reference to OPSD 805.020.
802.030	2	802.030	3	“RIGID PIPE BEDDING, COVER, AND BACKFILL TYPE 1 OR 2 SOIL - EARTH EXCAVATION” This drawing has been reaffirmed with no changes to technical information.
802.031	2	802.031	3	“RIGID PIPE BEDDING, COVER, AND BACKFILL TYPE 3 SOIL - EARTH EXCAVATION” This drawing has been reaffirmed with no changes to technical information.
802.032	2	802.032	3	“RIGID PIPE BEDDING, COVER, AND BACKFILL TYPE 4 SOIL - EARTH EXCAVATION” This drawing has been reaffirmed with no changes to technical information.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
802.033	2	802.033	3	“RIGID PIPE BEDDING, COVER, AND BACKFILL ROCK EXCAVATION” This drawing has been reaffirmed with no changes to technical information.
802.034	2	802.034	3	“RIGID PIPE BEDDING AND COVER IN EMBANKMENT, ORIGINAL GROUND: EARTH OR ROCK” This drawing has been reaffirmed with no changes to technical information.
802.050	2	802.050	3	“HORIZONTAL ELLIPTICAL RIGID PIPE BEDDING, COVER, AND BACKFILL TYPE 1 OR 2 SOIL - EARTH EXCAVATION” This drawing has been reaffirmed with no changes to technical information.
802.051	2	802.051	3	“HORIZONTAL ELLIPTICAL RIGID PIPE BEDDING, COVER, AND BACKFILL TYPE 3 SOIL - EARTH EXCAVATION” This drawing has been reaffirmed with no changes to technical information.
802.052	2	802.052	3	“HORIZONTAL ELLIPTICAL RIGID PIPE BEDDING, COVER, AND BACKFILL TYPE 4 SOIL - EARTH EXCAVATION” This drawing has been reaffirmed with no changes to technical information.
802.053	2	802.053	3	“HORIZONTAL ELLIPTICAL RIGID PIPE BEDDING, COVER, AND BACKFILL, ROCK EXCAVATION” This drawing has been reaffirmed with no changes to technical information.
802.054	2	802.054	3	“HORIZONTAL ELLIPTICAL RIGID PIPE BEDDING AND COVER IN EMBANKMENT, ORIGINAL GROUND: EARTH OR ROCK” This drawing has been reaffirmed with no changes to technical information.
803.010	2	803.010	3	“BACKFILL AND COVER FOR CONCRETE CULVERTS WITH SPANS LESS THAN OR EQUAL TO 3.0M” This drawing has been reaffirmed with no changes to technical information.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
803.030	2	803.030	3	“FROST TREATMENT - PIPE CULVERTS FROST PENETRATION LINE BELOW BEDDING GRADE” This drawing has been reaffirmed with no changes to technical information.
803.031	3	803.031	4	“FROST TREATMENT - PIPE CULVERTS FROST PENETRATION LINE BETWEEN TOP OF PIPE AND BEDDING GRADE” This drawing has been reaffirmed with no changes to technical information.
806.040	2	806.040	3	“HEIGHT OF FILL TABLE, POLYVINYL CHLORIDE GRAVITY SEWER PIPE, 210, 320, AND 625kPa” This drawing has been reaffirmed with no changes to technical information.
807.010	2	807.010	3	“HEIGHT OF FILL TABLE, REINFORCED CONCRETE PIPE – CONFINED TRENCH, CLASS: 50-D, 65-D, 100-D, 140-D” This drawing has been reaffirmed with no changes to technical information.
807.030	2	807.030	3	“HEIGHT OF FILL TABLE, REINFORCED CONCRETE PIPE – EMBANKMENT, CLASS: 50-D, 65-D, 100-D, 140-D” This drawing has been reaffirmed with no changes to technical information.
807.040	1	807.040	2	“HEIGHT OF FILL TABLE, NON-REINFORCED CONCRETE PIPE – CLASS 3” This drawing has been reaffirmed with no changes to technical information.
807.050	2	807.050	3	“HEIGHT OF FILL TABLE, HORIZONTAL ELLIPTICAL CONCRETE PIPE, CLASS HE-A, HE-I, HE-II, HE-III AND HE-IV” This drawing has been reaffirmed with no changes to technical information.
911.130	0	911.130	1	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, CAST-IN-PLACE, TYPE A, INSTALLATION” See Summary of Revisions.
911.131	0	911.131	1	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, CAST-IN-PLACE, TYPE C, INSTALLATION” See Summary of Revisions.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
911.132	0	911.132	1	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, CAST-IN-PLACE, TALL WALL, INSTALLATION” See Summary of Revisions.
911.133	0			“GUIDE RAIL SYSTEM, NON-REINFORCED CONCRETE BARRIER, INSTALLATION – BRIDGE MEDIAN” This drawing has been cancelled.
911.134	0	911.134	1	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, INSTALLATION – MEDIAN CONCRETE BARRIER TO STRUCTURE” See Summary of Revisions.
		911.135	0	“GUIDE RAIL SYSTEM, CONCRETE ROADSIDE BARRIER, CAST-IN-PLACE OR SLIPFORMED, INSTALLATION” This is a New Drawing.
911.173	0	911.173	1	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, TYPE M CONNECTION, INSTALLATION – TEMPORARY RESTRAINT SYSTEM, TRANSITION TO PERMANENT CONCRETE BARRIER” See Summary of Revisions.
911.174	0	911.174	1	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, TYPE M CONNECTION, COMPONENT - THREE BEAM TRANSITION” See Summary of Revisions.
911.230	0	911.230	1	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, MEDIAN END TREATMENT, INSTALLATION” See Summary of Revisions.
911.231	1			“GUIDE RAIL SYSTEM, CONCRETE BARRIER, SHOULDER END TREATMENT, INSTALLATION” This drawing has been cancelled.
911.380	0	911.380	1	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, PERMANENT TRANSITION, INSTALLATION AT BRIDGE PIERS” See Summary of Revisions.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
911.381	1	911.381	2	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, PERMANENT TRANSITION INSTALLATION, ROADSIDE CONCRETE BARRIER TO STRUCTURE” This drawing has been reaffirmed with no changes to technical information. Title revised.
911.382	0	911.382	1	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, DOWEL CONNECTION DETAIL” See Summary of Revisions.
		911.383	0	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, PERMANENT TRANSITION INSTALLATION AT LIGHTING POLE AND SIGN SUPPORT FOOTINGS” This is a New Drawing.
911.430	0	911.430	1	“GUIDE RAIL SYSTEM, CONCRETE BARRIER, TEMPORARY - LEAVING END TREATMENT, INSTALLATION – DIVIDED HIGHWAY” See Summary of Revisions.
		923.006	0	“ENERGY ATTENUATOR, CRASH CUSHION, QUADGUARD SUPER WIDE SYSTEM, COMPONENT – REINFORCED CONCRETE PAD” This is a New Drawing.
		923.192	0	“ENERGY ATTENUATOR, CRASH CUSHION, QUADGUARD SUPER WIDE SYSTEM, INSTALLATION – TEMPORARY, UNIDIRECTIONAL” This is a New Drawing.
		923.193	0	“ENERGY ATTENUATOR, CRASH CUSHION, QUADGUARD SUPER WIDE SYSTEM, INSTALLATION – TEMPORARY, BIDIRECTIONAL” This is a New Drawing.
		923.194	0	“ENERGY ATTENUATOR, CRASH CUSHION, QUADGUARD SUPER WIDE SYSTEM, INSTALLATION – PERMANENT UNIDIRECTIONAL” This is a New Drawing.
		923.195	0	“ENERGY ATTENUATOR, CRASH CUSHION, QUADGUARD SUPER WIDE SYSTEM, INSTALLATION – PERMANENT BIDIRECTIONAL” This is a New Drawing.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
924.135	0	924.135	1	“ENERGY ATTENUATOR, CRASH CUSHION, ACZ-350 SYSTEM, INSTALLATION – TEMPORARY CONCRETE BARRIER” Bays renumbered and Table A added.
1101.010	3	1101.010	4	“PRECAST VALVE CHAMBER 1200mm AND 1500mm DIAMETER” This drawing has been reaffirmed. Reference to OPSD 110.011 was removed since that drawing is no longer active. No changes to technical information were made.
1109.010	1	1109.010	2	“CATHODIC PROTECTION FOR METALLIC WATERMAIN SYSTEMS” This drawing has been reaffirmed. No changes to technical information were made.
1109.011	1	1109.011	2	“CATHODIC PROTECTION FOR PVC WATERMAIN SYSTEMS” This drawing has been reaffirmed. No changes to technical information were made.
1109.012	0	1109.012	1	“CATHODIC PROTECTION OF EXISTING METALLIC WATERMAINS, EXPOSED SERVICE OR PIPE METHOD” This drawing has been reaffirmed. No changes to technical information were made.
1109.013	0	1109.013	1	“ANODE INSTALLATION OVER PIPE METHOD FOR EXISTING METALLIC WATERMAINS” This drawing has been reaffirmed. No changes to technical information were made.
1109.014	0	1109.014	1	“HORIZONTAL ANODE BANK AT SERVICE” This drawing has been reaffirmed. No changes to technical information were made.
1109.015	0	1109.015	1	“VERTICAL ANODE BANK AT SERVICE” This drawing has been reaffirmed. No changes to technical information were made.
1109.025	0	1109.025	1	“WATERPROOFING OF SPLICES” This drawing has been reaffirmed. No changes to technical information were made.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
		1109.030	0	“INSULATION FOR SEWERS AND WATERMAINS IN SHALLOW TRENCHES” This is a New Drawing.
3311.900	1	3311.900	2	“DECK GIRDERS, STEEL BOX ACCESS HATCH” See Summary of Revisions.
		3920.100	0	“PRECAST REINFORCED CONCRETE BOX CULVERT WITH HEIGHT OF FILL $\geq$ 0.6M” This is a New Drawing.
		3920.110	0	“PRECAST REINFORCED CONCRETE BOX CULVERT WITH HEIGHT OF FILL $<$ 0.6M” This is a New Drawing.

SUMMARY OF REVISIONS TO OPSD 219.100

LIGHT-DUTY STRAW BALE BARRIER

- Section view, removed.
- Plan, end-run length revised 2m to 2.4m.
- Plan, Straw bale shape revised on corners to proper dimensions
- Plan, Note 2 added
- Section A-A, Earth surface revised to Original ground
- Section A-A, 600 label added.
- Isometric View, added.

SUMMARY OF REVISIONS TO OPSD 219.110

LIGHT-DUTY SILT FENCE BARRIER

- Perspective View, addition of end-run curve along barrier main run.
- Section view, removed.
- Plan view, modification of end-run angle to curve.
- Plan view, end-run length revised 2m to 3m.
- Plan view, 40m max added to main run label
- Plan view, addition of second fence and attachment joint.
- Joint Detail view added
- Section A-A, min added to 600mm label
- Section A-A, Earth surface revised to Original ground

SUMMARY OF REVISIONS TO OPSD 219.130

HEAVY-DUTY SILT FENCE BARRIER

- Perspective View, addition of end-run curve along barrier main run.
- Section view, removed.
- Plan view, modification of end-run angle to curve.
- Plan, end-run length revised 2m to 4m.
- Plan view, 40m max added to main run label
- Plan view, addition of second fence and attachment joint.
- Joint Detail view added.
- Section A-A, 200 label revised to 400; trench width.
- Section A-A, min added to 900mm label
- Section A-A, Earth surface revised to Original ground.

SUMMARY OF REVISIONS TO OPSD 219.150

SANDBAG BARRIER

- Perspective View, reduction in length of barrier main run.
- Plan View, addition of 350 Typ and 450 Typ bag dimensions.
- Section view, removed.
- Section A-A, Earth surface revised to Original ground.
- Section A-A, addition of 150 Typ bag dimension.

SUMMARY OF REVISIONS TO OPSD 219.180

STRAW BALE FLOW CHECK DAM

- Section C-C view, addition of Trench depth dimension
- Section C-C view, correction of width to 1275

SUMMARY OF REVISIONS TO OPSD 219.210

TEMPORARY ROCK FLOW CHECK DAM, V-DITCH

- Plan Spillway view, Limits of geotextile added.
- Plan Spillway view, Anchor trench added.
- Title, Temporary added.

SUMMARY OF REVISIONS TO OPSD 219.211

TEMPORARY ROCK FLOW CHECK DAM, FLAT BOTTOM DITCH

- Plan Spillway view, Limits of geotextile added.
- Plan Spillway view, Anchor trench added.
- Title, Temporary added.

SUMMARY OF REVISIONS TO OPSD 219.220

SEDIMENT TRAP IN DITCH

- Plan view, realigned excavated basin to match width of ditch.
- Title, "Excavated" deleted.

SUMMARY OF REVISIONS TO OPSD 219.230

TEMPORARY SLOPE DRAIN FOR SEDIMENT TRAP

- Perspective View, addition of rock under and around end pipe.
- Perspective View, deletion of rock flow check dam.
- Section view, addition of rock under end pipe.
- Section view, chute revised to slope drain.
- Section view, deletion of excavated from sediment trap OPSD 219.220 label.
- Notes 1, addition of per OPSD 810.010.
- Notes 2, deletion of "Inlet end section shall have a minimum grade of 3%".
- Notes 2, addition of use OPSD 801.020 for corrugated steel.
- Title, Chute for Excavated Sediment Trap revised to Temporary Slope Drain for Sediment Trap.

SUMMARY OF REVISIONS TO OPSD 219.231

TEMPORARY BERM BARRIER FOR SLOPE DRAIN

- Plan view, chute revised to slope drain.
- Plan view, addition of Geotextile or plastic sheeting
- Section A-A view, addition of Note 1 label.
- Section A-A view, chute revised to slope drain
- Section A-A view, addition of Geotextile or plastic sheeting label
- Section A-A view, addition of 3% grade label
- Notes, addition of note 1.
- Title, modified Temporary Berm Barrier For Slope Drain

SUMMARY OF REVISIONS TO OPSD 401.081

CAST IRON, SQUARE FRAME FISH TYPE COVER

- Reference to stainless steel pins revised to 19 mm dia hinge pin.

SUMMARY OF REVISIONS TO OPSD 911.130

GUIDE RAIL SYSTEM, CONCRETE BARRIER, CAST-IN-PLACE, TYPE A, INSTALLATION

- Type A-3 view added.
- Existing Notes 1, A, and B deleted. Other Notes reordered.
- New Notes 2, 3, 4, and 5 added.

SUMMARY OF REVISIONS TO OPSD 911.131

GUIDE RAIL SYSTEM, CONCRETE BARRIER, CAST-IN-PLACE, TYPE C, INSTALLATION

- Existing Notes A, and C deleted. Other Notes reordered.
- New Notes 2 added.

SUMMARY OF REVISIONS TO OPSD 911.132

GUIDE RAIL SYSTEM, CONCRETE BARRIER, CAST-IN-PLACE, TALL WALL, INSTALLATION

- Type TW-3 view added
- Existing Notes 1, A, and B deleted. Other Notes reordered.
- New Notes 2, 3, 4 and 5 added.

SUMMARY OF REVISIONS TO OPSD 911.134

GUIDE RAIL SYSTEM, CONCRETE BARRIER, INSTALLATION – MEDIAN CONCRETE BARRIER TO STRUCTURE

- Title revised.
- Elevation view, steel reinforcement details deleted.
- Existing Cross Section On Bridge Deck view deleted.
- Existing Chase Detail deleted.
- Existing Dowel Detail view; renamed to Dowel Connection Detail, width of expansion joint added, and the hole diameter for the steel dowel revised from 300 to 30 mm.
- Note B, steel reinforcement deleted and dowel requirements added.

SUMMARY OF REVISIONS TO OPSD 911.173

GUIDE RAIL SYSTEM, CONCRETE BARRIER, TYPE M CONNECTION, INSTALLATION – TEMPORARY RESTRAINT SYSTEM, TRANSITION TO PERMANENT CONCRETE BARRIER

- Plan view, asphalt pavement label deleted.
- Elevation view; reference to OPSD 911.231 revised to 911.135, reference to OPSD 911.160 deleted, and steel pin label revised.
- New Note 1 added.

SUMMARY OF REVISIONS TO OPSD 911.174

GUIDE RAIL SYSTEM, CONCRETE BARRIER, TYPE M CONNECTION, COMPONENT – THREE BEAM TRANSITION

- Reference to OPSD 911.231 revised to 911.135 throughout drawing.
- Elevation view was revised to reflect OPSD 911.172. Concrete pavement or bridge deck revised to concrete approach slab and extended, reference to OPSD 911.162 deleted, and bolt assemblies replaced with steel pins.

SUMMARY OF REVISIONS TO OPSD 911.230

GUIDE RAIL SYSTEM, CONCRETE BARRIER, MEDIAN END TREATMENT, INSTALLATION

- Shoulder width revised from 1.0 to 2.6 m min.
- Existing Table 1 deleted.
- New Note 2 added.

SUMMARY OF REVISIONS TO OPSD 911.380

GUIDE RAIL SYSTEM, CONCRETE BARRIER, PERMANENT TRANSITION, INSTALLATION AT BRIDGE PIERS

- OPSD 911.380 has been split into two drawings, OPSD 911.380 and new OPSD 911.383, for clarity. OPSD 911.380 for bridge piers and OPSD 911.383 for lighting pole and sign support footings.
- 40:1 flare rate replaced with a table for various posted speeds.
- Existing Note 1 deleted. Other note reordered.
- Existing Note 2 revised.
- New Notes 2 and 3 added.

SUMMARY OF REVISIONS TO OPSD 911.382

GUIDE RAIL SYSTEM, CONCRETE BARRIER, DOWEL CONNECTION DETAIL

- Dowel Connection Detail, Type I view; width of expansion joint added and filler type specified.
- Existing Note 1 deleted.
- New Notes 1 and B added. Other note reordered.

SUMMARY OF REVISIONS TO OPSD 911.430

GUIDE RAIL SYSTEM, CONCRETE BARRIER, TEMPORARY – LEAVING END TREATMENT, INSTALLATION – DIVIDED HIGHWAY

- Existing temporary connection of temporary concrete barriers to bridge abutments, retaining walls, permanent concrete barriers, etc. has been deleted. The temporary concrete barriers have been redesigned as a leaving end treatment at various posted speeds.
- Title revised.

SUMMARY OF REVISIONS TO OPSD 3311.900

DECK GIRDERS, STEEL BOX ACCESS HATCH

- Outside Face – Elevation view, addition of B-B labels.
- Section A-A view, 50mm, Typ label added.
- Section A-A view, “Cope corner” label added.
- Section A-A view, three welding point labels added, two near the top and one near the bottom.
- Section A-A view, 75 and 25 labels added.
- Section A-A view, 45° label added.
- Section A-A view, “Fitted condition” and “Connection PL 14x120” added.
- Section B-B view, added.
- Detail A view, 12mm changed to 14mm on “100x14mm min transverse stiffener label”.
- Notes: 1, addition of “hot-dip” and, removal of “according to CSA G164” and “according to ASTM A 325M, Type 3”.
- Notes: 2, moved “bolts shall be ASTM A325M, Type 3” to Notes: 3.
- Notes: 3, added.

MANUAL REVISION RECORD

Municipal and Provincial Common

Volume 3 – Drawings for Roads, Barriers, Drainage, Sanitary Sewers, Watermains, and Structures

This record should remain in the manual at all times. Revisions are numbered sequentially. This sheet should be filled in after each revision has been placed into the manual. It will quickly indicate to users whether the contents of the manual are up-to-date.

REVISION NUMBER	REVISION DATE	ENTERED BY	REVISION NUMBER	DATE	ENTERED BY
51	APRIL 2005	Included in new manuals	77		
52	NOV 2005	Included in new manuals	78		
53	NOV 2006	Included in new manuals	79		
54	APRIL 2007	Included in new manuals	80		
55	NOV 2007	Included in new manuals	81		
56	APRIL 2008	Included in new manuals	82		
57	NOV 2008	Included in new manuals	83		
58	NOV 2009	Included in new manuals	84		
59	APRIL 2010	Included in new manuals	85		
60	NOV 2010	Included in new manuals	86		
61	APRIL 2011	Included in new manuals	87		
62	NOV 2011	Included in new manuals	88		
63	NOV 2012	Included in new manuals	89		
64	APRIL 2013	Included in new manuals	90		
65	NOV 2013	Included in new manuals	91		
66	NOV 2014	Included in new manuals	92		
67	APRIL 2015	Included in new manuals	93		
68	NOV 2015	Included in new manuals	94		
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DATE	OPSD NO.	REV.	TITLE
DIVISION 100 - ABBREVIATIONS			
2010 11	100.010	4	Abbreviations, General A-C
2006 11	100.011	1	Abbreviations, General D-J
2009 11	100.012	2	Abbreviations, General L-R
2009 11	100.013	4	Abbreviations, General S-W
2006 11	100.050	1	Abbreviations, Building Descriptions
2006 11	100.060	1	Abbreviations, Geotechnical
2006 11	101.010	1	Topography Plan Features, Monument Features
2006 11	101.011	1	Topography Plan Features, Ground Features
2006 11	101.012	1	Topography Plan Features, Road Features
2006 11	101.013	1	Topography Plan Features, Barrier and Vegetation Features
2006 11	101.014	1	Topography Plan Features, Utility Features
2006 11	101.015	1	Topography Plan Features, Drainage Features
2006 11	101.016	1	Topography Plan Features, Miscellaneous Features
2008 11	101.017	3	Topography Plan Features, Right-of-Way Features
2006 11	102.010	1	Removals, Legend
2006 11	103.010	1	New Construction, Legend 1
2008 04	103.011	2	New Construction, Legend 2
2007 11	104.010	0	Miscellaneous Symbols
DIVISION 200 - GRADING			
2009 11	200.010	2	Earth/Shale Grading, Undivided Rural
2009 11	200.020	2	Earth/Shale Grading, Divided Rural
2009 11	201.010	2	Rock Grading, Undivided Rural
2009 11	201.020	2	Rock Grading, Divided Rural



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DATE	OPSD NO.	REV.	TITLE
2009 11	202.010	2	Slope Flattening Using Surplus Excavated Material On Earth or Rock Embankment
2013 11	202.020	3	Drainage Gap for Slope Flattening on Rock or Granular Embankment
2009 11	202.030	5	Roadway Widening for Guide Rail End Treatments and Transitions
2009 11	202.031	0	Roadway Widening for Steel Beam Energy Attenuating Terminal Approach End
2011 11	202.032	1	Roadway Widening for Steel Beam Energy Attenuating Terminal Leaving End and Constrained Approach End
2011 11	202.033	0	Roadway Widening, Single Sided Energy Attenuating Terminals, Approach End
2010 11	203.010	3	Embankments Over Swamp, New Construction
2010 11	203.020	3	Embankments Over Swamp, Existing Slope Excavated to 1H:1V
2010 11	203.030	3	Embankments Over Swamp, Existing Slopes Maintained
2010 11	203.040	3	Embankments Over Swamp at Pipe Culvert ≤ 1500 mm
2015 11	204.010	3	Boulder Treatment, Cut Sections - Subgrade
2009 11	205.010	2	Transition Treatment, Earth Cut to Earth Fill
2009 11	205.020	2	Transition Treatment, Rock Cut to Rock Fill
2009 11	205.030	2	Transition Treatment, Rock Cut to Earth Fill
2009 11	205.040	2	Transition Treatment, Earth Fill to Rock Fill and Earth Fill to Granular Fill
2009 11	205.050	2	Transition Treatment, Rock Cut to Earth Cut
2014 11	205.060	3	Frost Heave Treatment
2009 11	206.010	1	Granular Courses, Undivided Rural
2009 11	206.020	1	Granular Courses, Divided Rural
2008 11	206.050	1	Subdrain Pipe, Connection and Outlet, Rural
2007 11	207.010	2	Concrete Pavement on Open Graded Drainage Layer, Divided Highway
2007 11	207.020	2	Composite Pavement on Open Graded Drainage Layer, Divided Highway



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2005 11	207.030	1	Concrete and Composite Pavement on Open Graded Drainage Layer, Urban Section
2008 11	207.041	3	Subdrain Pipe, Open Graded Drainage Layer, Hot Mix Asphalt, Concrete, or Composite Pavement
2008 11	207.044	4	Subdrain Pipe, Connection and Outlet, Open Graded Drainage Layer
2013 11	208.010	3	Benching of Earth Slopes
2009 11	209.010	1	Rural Pavement Widening
2009 11	209.011	2	Rural Pavement Widening, Curb with Gutter
2010 04	209.020	2	Widening Existing Rock Cut with Grade Rise
2010 11	210.010	1	Tangent Shoulders, Rural
2010 11	210.020	1	Superelevated Shoulders, Rural
2013 11	210.070	3	Granular Sealing
2010 11	211.010	2	Partially Paved Shoulders, Existing Pavement Maintained
2010 11	211.020	2	Partially Paved Shoulders, Existing Pavement Resurfaced
2009 11	212.010	1	Resurfacing with Crossfall Correction with Hot Mix Asphalt, Tangent Section
2009 11	212.020	1	Resurfacing with Crossfall Correction with Hot Mix Asphalt, Superelevated Section
2009 11	212.030	1	Resurfacing, Existing Crossfall Maintained
83 12 01	213.01	0	Pavement Widening On Curves, Widening On Both Sides of Curve With or Without Spirals
83 12 01	213.02	0	Pavement Widening on Curves, Widening on Inside of Curves With or Without Spirals
2007 11	214.010	1	Single-Lane Ramp Grading for Asphalt Pavement with Granular Base and Shoulder
2007 11	214.020	1	Single-Lane Ramp Grading for Asphalt Pavement with Granular Base and Asphalt Shoulder
2007 11	214.030	2	Single-Lane Ramp Grading for Asphalt Pavement with Granular Base, Asphalt Shoulder, and Curb with Gutter
2007 11	215.010	1	Two-Lane Ramp Grading for Asphalt Pavement with Granular Base and Asphalt Shoulder



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DATE	OPSD NO.	REV.	TITLE
2007 11	215.020	1	Two-Lane Ramp Grading for Asphalt Pavement with Granular Base, Asphalt Shoulder, and Curb with Gutter for Tangent Section
2007 11	215.030	2	Two-Lane Ramp Grading for Asphalt Pavement with Granular Base, Asphalt Shoulder, and Curb with Gutter for Superelevated Section
2006 11	216.010	1	Boulevard Treatments, Urban Section
2008 11	216.020	1	Hot Mix, Concrete, and Composite Pavement On Granular Base, Urban Section
2008 11	216.021	2	Subdrain Pipe, Connection and Outlet, Urban
2011 11	217.050	2	Access to Hydrant Across Ditch
2011 11	217.060	2	Utility Pole Setting Depth at Ditch Locations
2015 11	219.100	2	Light-Duty Straw Bale Barrier
2015 11	219.110	2	Light-Duty Silt Fence Barrier
2015 11	219.120	0	Light-Duty Fibre Roll Barrier
2015 11	219.130	2	Heavy-Duty Silt Fence Barrier
2015 11	219.131	0	Heavy-Duty Wire-Backed Silt Fence Barrier
2015 11	219.150	2	Sandbag Barrier
2015 11	219.160	0	Fibre Roll Grade Breaks
2015 11	219.180	2	Straw Bale Flow Check Dam
2015 11	219.191	0	Fibre Roll Flow Check Dam
2015 11	219.200	2	Sandbag Flow Check Dam
2015 11	219.210	2	Temporary Rock Flow Check Dam, V-Ditch
2015 11	219.211	2	Temporary Rock Flow Check Dam, Flat Bottom Ditch
2015 11	219.220	2	Sediment Trap In Ditch
2015 11	219.230	4	Temporary Slope Drain for Sediment Trap
2015 11	219.231	1	Temporary Berm Barrier for Slope Drain
2015 11	219.240	2	Sediment Trap for Dewatering



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DATE	OPSD NO.	REV.	TITLE
2015 11	219.260	2	Turbidity Curtain
2015 11	219.261	2	Turbidity Curtain, Seam Detail
2007 11	220.010	0	Barrier for Tree Protection
2000 11	221.010	0	Temporary Water Passage System, Culvert in Watercourse
2000 11	221.020	0	Temporary Water Passage System, Pumping and Piping
2000 11	221.030	0	Temporary Water Passage System, Temporary Channel or Culvert Outside Watercourse
2000 11	221.040	0	Temporary Waterbody Crossing, Fill and Culvert
2000 11	221.050	0	Temporary Waterbody Crossing, Ford
2014 11	222.010	1	Rootwad Structures for Waterbody Banks
2013 11	222.020	0	Large Woody Debris for Waterbody Banks
2013 11	222.030	0	Stone Lunkers
2013 11	222.040	0	Wood Lunkers
2014 11	222.050	0	Riffles on Streambeds
2014 11	222.060	0	Pools in Streambeds
2014 11	222.070	0	Rocky Ramps on Streambeds
2014 11	222.080	0	Low Flow Channel
2014 11	222.090	0	Baffles in a Culvert
DIVISION 300 - ENTRANCES			
2011 11	300.010	2	Side Road Intersection, Fill
2011 11	300.020	2	Side Road Intersection, Cut
2010 11	301.010	2	Rural Entrances to Roads on Fill
2010 11	301.020	2	Rural Entrances to Roads in Earth Cut
2010 11	301.030	2	Rural Entrance, Rock Cut
2015 11	302.010	2	Median Crossovers for Service and Emergency Vehicles



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DATE	OPSD NO.	REV.	TITLE
2009 11	304.010	1	Shoulder Treatment, Sideroad Intersections
2015 11	310.010	2	Concrete Sidewalk
2015 11	310.020	2	Concrete Sidewalk Adjacent to Curb and Gutter
2015 11	310.030	1	Concrete Sidewalk Ramps at Signalized Intersections
2015 11	310.031	0	Concrete Sidewalk Ramps At Signalized Intersections With Intersecting Crosswalks
2015 11	310.033	0	Concrete Sidewalk Ramps At Unsignalized Intersections
2015 11	310.039	0	Concrete Sidewalk Ramps Tactile Walking Surface Indicators Component
2015 11	310.040	2	Utility Isolation in Concrete Sidewalks
2015 11	310.050	2	Concrete Sidewalk Driveway Entrance Details
2015 11	310.060	2	Joint Detail for Concrete Pedestrian Crosswalk at Signalized and All-Way Stop Controlled Intersections
2009 11	350.010	1	Urban Industrial, Commercial, and Apartment Entrances
2009 11	351.010	1	Urban Residential Entrance
DIVISION 400 - FRAMES AND GRATES			
2013 11	400.001	1	Hoisting Hook Rib for Cast Iron Frames for Catch Basins, Maintenance Holes, and Valve Chambers
2013 11	400.010	2	Cast Iron, Square Frame with Square Overflow Type Dished Grate for Catch Basins, Herring Bone Openings
2013 11	400.020	2	Cast Iron, Square Frame with Square Flat Grate for Catch Basins, Herring Bone Openings
2013 11	400.021	0	Cast Iron, Square Frame for Curb Inlet Overflow
2013 11	400.030	2	Cast Iron, Square Frame with Square V Grate for Catch Basins, Herring Bone Openings
2013 11	400.040	2	Cast Iron, One-Piece Frame and Flat Square Grate for Temporary Installation, Herring Bone Openings
2014 11	400.070	5	Cast Iron, Raised Square Frame with Circular Flat Grate for Catch Basins, Herring Bone Openings
2013 11	400.080	2	Cast Iron, Side Inlet for Catch Basins



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DATE	OPSD NO.	REV.	TITLE
2013 11	400.081	2	Cast Iron, Curb Inlet Frame with Two-Piece Raised Cover for Catch Basins Out of Roadway
2014 11	400.082	4	Cast Iron, Raised Curb Inlet Frame with Cover for Catch Basins Out of Roadway
2013 11	400.090	2	Cast Iron, Curb Inlet Overflow for Catch Basins
2013 11	400.100	2	Cast Iron, Square Frame with Square Flat Grate for Catch Basins, Perforated Openings
2013 11	400.110	2	Cast Iron, Square Frame with Square Overflow Type Flat Grate for Catch Basins, Perforated Openings
2013 11	400.120	2	Cast Iron, Square Frame with Birdcage Grate for Catch Basins
2013 11	401.010	3	Cast Iron, Square Frame with Circular Closed or Open Cover for Maintenance Holes
2013 11	401.020	3	Cast Iron, Circular Frame with Circular 745 mm Cover for Maintenance Holes
2013 11	401.030	3	Cast Iron, Square Frame with Circular Watertight Cover for Maintenance Holes
2015 04	401.040	4	Cast Iron, Raised Square Frame with Circular Closed or Open Cover for Maintenance Holes
2015 04	401.050	4	Cast Iron, Raised Square Frame with Circular Watertight Cover for Maintenance Holes
2013 11	401.060	3	Cast Iron, Circular Locking Cover for Maintenance Holes
2014 11	401.080	0	Cast Iron, Curb inlet Fish Type Cover for Catch Basins Out of Roadway
2015 11	401.081	1	Cast Iron, Square Frame Fish Type Cover
2014 11	402.010	3	Cast Iron, Square Frame with Circular Cover and Plug for Valve Chambers
2014 11	402.011	3	Cast Iron, Square Frame with Vented Circular Cover and Plug for Valve Chambers
2015 04	402.020	4	Cast Iron, Raised Square Frame with Circular Cover and Plug for Valve Chambers
2015 04	402.021	3	Cast Iron, Raised Square Frame with Vented Circular Cover and Plug for Valve Chambers
2014 11	402.030	4	Cast Iron, Rectangular Frame with Two-Piece Cover for Meter and Valve Chambers
2013 11	403.010	2	Galvanized Steel, Honey Comb Grating for Ditch Inlets



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DATE	OPSD NO.	REV.	TITLE
2012 11	403.011	0	Raised Bar Grate for Ditch Inlet, 600 x 600 mm
2012 11	404.010	1	Aluminum Safety Platform and Ladder for Rectangular Precast Concrete Valve Chambers
2013 11	404.020	3	Aluminum Safety Platform for Circular Maintenance Holes
2013 11	404.021	2	Aluminum Safety Platform for 1500 mm Diameter Circular Maintenance Holes with Drop Pipe
2013 11	404.022	2	Aluminum Safety Platform for 1800 mm Diameter Circular Maintenance Holes with Drop Pipe
2013 11	405.010	3	Maintenance Hole Steps, Hollow
2013 11	405.020	3	Maintenance Hole Steps, Solid
2013 11	406.010	2	Aluminum Ladder for Maintenance Holes
DIVISION 500 - PAVING			
2009 11	500.010	0	Turning Basins for Terminated Rural Roadways
2009 11	500.020	0	Turning Basins for Terminated Urban Roadways, Residential
2009 11	500.030	0	Turning Basins for Terminated Urban Roadways, Industrial and Commercial
2010 11	501.010	1	Bus Bays
2009 11	502.010	1	Access Lanes for Rear Lots
2011 11	503.010	1	Concrete Ripple Strip
2012 11	504.010	1	Raised Traffic Island
2009 11	506.010	1	Hot Mix Resurfacing Treatment at Structure Approaches
2015 11	508.010	2	Routing and Sealing Cracks Up to 20 mm Width in Asphalt Pavement
2008 11	508.020	2	Sealing or Resealing of Joints and Cracks in Concrete Pavement and Concrete Base
2013 11	509.010	2	Pavement Reinstatement for Utility Cuts
2000 11	512.010	0	Concrete Steps, Slab on Grade with Footings
2000 11	512.011	0	Concrete Steps, Slab on Grade



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DATE	OPSD NO.	REV.	TITLE
2010 11	514.010	1	Extruded Expanded Polystyrene Frost Heave Treatment, 25 mm Thickness
2010 11	514.020	1	Extruded Expanded Polystyrene Frost Heave Treatment, 40 mm Thickness
2008 11	551.010	1	Concrete and Composite Pavement Joint Spacing
2008 11	551.020	1	Concrete and Composite Pavement Joint Layout at Converging or Diverging Lanes
2008 11	551.030	2	Concrete and Composite Pavement Skewed Joint Layout at Intersections
2008 11	551.031	2	Concrete and Composite Pavement Right Angle Joint Layout at Intersections
2008 11	551.032	2	Concrete and Composite Pavement Utility Isolation
2008 11	552.010	1	Concrete Pavement Joint Details
2008 11	552.020	1	Composite Pavement Joint Details
2008 11	552.050	2	Load Transfer Device, Skewed Contraction Joint, Concrete or Composite Pavement
2008 11	552.051	2	Load Transfer Device, Right Angle Contraction Joint, Concrete or Composite Pavement
2008 11	552.060	2	Load Transfer Device, Skewed Expansion Joint, Concrete or Composite Pavement
2008 11	552.061	2	Load Transfer Device, Right Angle Expansion Joint, Concrete or Composite Pavement
2008 11	553.010	1	Concrete Pavement in Gore Areas
2008 11	553.020	1	Composite Pavement in Gore Areas
2008 11	554.010	1	Concrete Pavement Shoulder Terminal
2008 11	554.020	1	Composite Pavement Shoulder Terminal
2008 11	555.010	1	Concrete Pavement Approach Treatment to Hot Mix and Composite Pavements and Structure Approaches
2008 11	555.020	1	Composite Pavement Approach Treatment to Hot Mix and Concrete Pavements and Structure Approaches
2010 11	560.010	5	Composite or Exposed Concrete Pavements, Full Depth Concrete Slab Repair Layout
2010 11	560.020	2	Exposed Concrete Pavement, Full Depth Concrete Slab Repair, Joint Details



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DATE	OPSD NO.	REV.	TITLE
2008 11	560.025	0	Concrete Pavement and Concrete Base, Cross-Stitching Longitudinal Cracks
2010 11	560.030	1	Composite Pavement, Full Depth Concrete Slab Repair, Joint Details
2010 11	560.040	1	Partial Depth Repairs in Concrete Pavement
2006 11	561.010	1	Interlocking Concrete Pavers on Granular Base
2006 11	561.020	1	Interlocking Concrete Pavers on Concrete or Asphalt Base
2006 11	561.030	1	Interlocking Concrete Pavers for Retrofit Crosswalk Installation

DIVISION 600 - CURBS AND GUTTERS

2012 11	600.010	2	Concrete Barrier Curb with Wide Gutter
2012 11	600.020	2	Concrete Semi-Mountable Curb with Wide Gutter
2012 11	600.030	2	Concrete Mountable Curb with Wide Gutter
2012 11	600.040	2	Concrete Barrier Curb with Standard Gutter
2012 11	600.060	2	Concrete Semi-Mountable Curb with Standard Gutter
2012 11	600.070	2	Concrete Barrier Curb with Standard Gutter, Two Stage Construction
2012 11	600.080	2	Concrete Barrier Curb with Narrow Gutter
2012 11	600.090	2	Concrete Semi-Mountable Curb with Narrow Gutter
2012 11	600.100	2	Concrete Mountable Curb with Narrow Gutter
2012 11	600.110	2	Concrete Barrier Curb
2013 11	601.010	2	Asphalt Curb and Asphalt Curb with Gutter
2012 11	603.020	2	Precast Concrete Curb
2012 11	604.010	2	90° Concrete Outlet for Concrete Curb with Gutter
2013 11	604.020	2	90° Asphalt Outlet for Asphalt Curb with Gutter
2012 11	605.010	2	45° Concrete Outlet for Concrete Curb with Gutter
2013 11	605.020	2	30° and 45° Asphalt Outlets for Asphalt Curb with Gutter



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2012 11	605.030	2	45° Concrete Outlet for Concrete Curb with Gutter at End of Run
2013 11	605.040	2	Asphalt Spillways
2012 11	606.010	2	600 mm Radius Barrier Bullnose
2012 11	606.020	2	600 mm Radius Mountable Bullnose
2012 11	606.030	2	800 mm Radius Bullnose, Curb with Gutter Twin Inlet
2012 11	607.010	2	Over 600 mm Radius Mountable Bullnose
2012 11	607.020	2	Over 600 mm Radius Barrier Bullnose
2012 11	608.010	2	Method of Termination for Concrete Curb with Gutter
2009 11	610.010	1	Catch Basin Frame with Grate Installation at Curb with Gutter
2006 11	610.020	2	Catch Basin Frame with Grate Shoulder Installation at Concrete Barrier
2009 11	610.030	1	Frame with Grate Installation for Inlet Type Catch Basins

DIVISION 700 - CATCH BASINS AND MANHOLES

2014 11	701.010	5	Precast Concrete Maintenance Hole, 1200 mm Diameter
2014 11	701.011	5	Precast Concrete Maintenance Hole, 1500 mm Diameter
2014 11	701.012	5	Precast Concrete Maintenance Hole, 1800 mm Diameter
2014 11	701.013	5	Precast Concrete Maintenance Hole, 2400 mm Diameter
2014 11	701.014	4	Precast Concrete Maintenance Hole, 3000 mm Diameter
2014 11	701.015	4	Precast Concrete Maintenance Hole, 3600 mm Diameter
2014 11	701.021	4	Maintenance Hole Benching and Pipe Opening Alternatives
2014 11	701.030	4	Precast Concrete Maintenance Hole Components, 1200 mm Diameter, Tapered Top and Flat Cap
2014 11	701.031	2	Precast Concrete Maintenance Hole Components, 1200 mm Diameter, Riser and Monolithic Base



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2014 11	701.032	2	Precast Concrete Maintenance Hole Components, 1200 mm Diameter, Base Slab
2014 11	701.040	4	Precast Concrete Maintenance Hole Components, 1500 mm Diameter, Transition Cone and Slabs
2014 11	701.041	2	Precast Concrete Maintenance Hole Components, 1500 mm Diameter, Riser and Bases
2014 11	701.050	4	Precast Concrete Maintenance Hole Components, 1800 mm Diameter, Transition Slabs
2014 11	701.051	2	Precast Concrete Maintenance Hole Components, 1800 mm Diameter, Riser and Base Slab
2014 11	701.060	4	Precast Concrete Maintenance Hole Components, 2400 mm Diameter, Transition Slab
2014 11	701.061	2	Precast Concrete Maintenance Hole Components, 2400 mm Diameter, Riser and Base Slab
2014 11	701.070	3	Precast Concrete Maintenance Hole Components, 3000 mm Diameter, Transition Slab
2014 11	701.071	2	Precast Concrete Maintenance Hole Components, 3000 mm Diameter, Riser and Base Slab
2014 11	701.080	3	Precast Concrete Maintenance Hole Components, 3600 mm Diameter, Transition Slab
2014 11	701.081	2	Precast Concrete Maintenance Hole Components, 3600 mm Diameter, Riser and Base Slab
2010 11	701.100	2	Frost Strap Installation
2014 11	702.040	3	Precast Concrete Ditch Inlet Maintenance Hole - Type A, 1200 x 1200 mm
2014 11	702.050	3	Precast Concrete Ditch Inlet Maintenance Hole - Type B, 1200 x 1200 mm
2014 11	703.011	2	Precast Concrete Single Inlet Flat Cap, 1500 mm Diameter
2014 11	703.012	2	Precast Concrete Single Inlet Flat Cap, 1800 mm Diameter
2014 11	703.013	2	Precast Concrete Single Inlet Flat Cap, 2400 mm Diameter
2014 11	703.014	2	Precast Concrete Single Inlet Flat Cap, 3000 mm Diameter
2014 11	703.015	2	Precast Concrete Single Inlet Flat Cap, 3600 mm Diameter



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DATE	OPSD NO.	REV.	TITLE
2014 11	703.021	2	Precast Concrete Twin Inlet Flat Cap, 1500 mm Diameter
2014 11	703.022	2	Precast Concrete Twin Inlet Flat Cap, 1800 mm Diameter
2014 11	703.023	2	Precast Concrete Twin Inlet Flat Cap, 2400 mm Diameter
2014 11	703.024	2	Precast Concrete Twin Inlet Flat Cap, 3000 mm Diameter
2014 11	704.010	3	Precast Concrete Adjustment Units for Maintenance Holes, Catch Basins, and Valve Chambers
2008 11	704.011	1	High Density Polyethylene Adjustment Units for Maintenance Holes, Catch Basins, and Valve Chambers
2013 04	704.012	0	Expanded Polystyrene (EPS) Adjustment Units for maintenance Holes, Catch Basins, and Valve Chambers
2014 11	705.001	0	Concrete Catch Basin Apron, Mountable Curb with Wide Gutter
2014 11	705.002	0	Concrete Catch Basin Apron, Barrier Curb with Standard Gutter
2014 11	705.010	3	Precast Concrete Catch Basin, 600 x 600 mm
2014 11	705.020	3	Precast Concrete Twin Inlet Catch Basin, 600 x 1450 mm
2014 11	705.030	3	Precast Concrete Ditch Inlet, 600 x 600 mm
2014 11	705.040	3	Precast Concrete Ditch Inlets, 600 x 1200 mm
2014 11	706.010	3	Precast Concrete Ditch Inlets, 600 x 1200 mm with 1500 mm Diameter Flat Cap
2014 11	706.020	3	Precast Concrete Ditch Inlets, 600 x 1200 mm with 1800 mm Diameter Flat Cap
2014 11	706.030	3	Precast Concrete Ditch Inlet - Type A, 600 x 1200 mm with 2400 mm Diameter Flat Cap
2014 11	706.031	2	Precast Concrete Ditch Inlet - Type B, 600 x 1200 mm with 2400 mm Diameter Flat Cap
2014 11	706.040	3	Precast Concrete Ditch Inlet - Type A, 600 x 1200 mm with 3000 mm Diameter Flat Cap
2014 11	706.041	2	Precast Concrete Ditch Inlet - Type B, 600 x 1200 mm with 3000 mm Diameter Flat Cap



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DATE	OPSD NO.	REV.	TITLE
2014 11	707.010	3	Precast Concrete Maintenance Hole Manufactured Tee
2011 11	708.010	2	Catch Basin Connection for Rigid Main Pipe Sewer
2011 11	708.020	3	Support for Pipe at Catch Basin or Maintenance Hole
2011 11	708.030	2	Catch Basin Connection for Flexible Main Pipe Sewer
2013 11	710.010	3	Capping Existing Structures, Maximum 4.0 m Cover

DIVISION 800 - CULVERTS AND DRAINS

2012 11	800.010	2	Concrete Pipe Culvert and Sewer Extensions Using Corrugated Steel Pipe, Temporary Conditions
2012 11	800.011	2	Concrete Rigid Frame Box and Open Culvert Extensions Using Corrugated Steel Pipe, Temporary Conditions
2012 11	801.010	2	Cut End Finish Circular Pipe and Pipe-Arch, Corrugated Steel Pipe
2012 11	801.020	1	End Section Details, Corrugated Steel Pipe
2012 11	801.030	2	Bevel Details, Circular and Pipe-Arch Structural Plate, Corrugated Steel Pipe
2012 11	801.040	2	Culvert and Sewer Safety Slope End Treatment Notes and Tables
2012 11	801.041	2	Culvert and Sewer Safety Slope End Treatment, Assembly Details
2012 11	801.042	2	Culvert and Sewer Safety Slope End Treatment, Connection Details
2012 11	801.043	2	Culvert and Sewer Safety Slope End Treatment, Installation Details
2015 11	802.010	4	Flexible Pipe Embedment and Backfill, Earth Excavation
2014 11	802.013	3	Flexible Pipe Embedment and Backfill, Rock Excavation
2014 11	802.014	3	Flexible Pipe Embedment in Embankment, Original Ground: Earth or Rock
2015 11	802.020	3	Flexible Pipe Arch Embedment and Backfill, Earth Excavation
2015 11	802.023	3	Flexible Pipe Arch Embedment and Backfill, Rock Excavation



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DATE	OPSD NO.	REV.	TITLE
2015 11	802.024	3	Flexible Pipe Arch Embedment in Embankment, Original Ground: Earth or Rock
2015 11	802.030	3	Rigid Pipe Bedding, Cover, and Backfill, Type 1 or 2 Soil - Earth Excavation
2015 11	802.031	3	Rigid Pipe Bedding, Cover, and Backfill, Type 3 Soil - Earth Excavation
2015 11	802.032	3	Rigid Pipe Bedding, Cover, and Backfill, Type 4 Soil - Earth Excavation
2015 11	802.033	3	Rigid Pipe Bedding, Cover, and Backfill, Rock Excavation
2015 11	802.034	3	Rigid Pipe Bedding and Cover in Embankment, Original Ground: Earth or Rock
2015 11	802.050	3	Horizontal Elliptical Rigid Pipe Bedding, Cover, and Backfill, Type 1 or 2 Soil - Earth Excavation
2015 11	802.051	3	Horizontal Elliptical Rigid Pipe Bedding, Cover, and Backfill, Type 3 Soil - Earth Excavation
2015 11	802.052	3	Horizontal Elliptical Rigid Pipe Bedding, Cover, and Backfill, Type 4 Soil - Earth Excavation
2015 11	802.053	3	Horizontal Elliptical Rigid Pipe Bedding, Cover, and Backfill, Rock Excavation
2015 11	802.054	3	Horizontal Elliptical Rigid Pipe Bedding and Cover in Embankment, Original Ground: Earth or Rock
2011 11	802.095	1	Clay Seal for Pipe Trenches
2015 11	803.010	3	Backfill and Cover for Concrete Culverts with Spans Less Than or Equal to 3.0 m
2015 11	803.030	3	Frost Treatment - Pipe Culverts, Frost Penetration Line Below Bedding Grade
2015 11	803.031	4	Frost Treatment - Pipe Culverts, Frost Penetration Line Between Top of Pipe and Bedding Grade
2006 11	804.030	1	Concrete Headwall for Pipe Less Than 900 mm Diameter
2006 11	804.040	0	Concrete Headwall for Sewer or Culvert Pipe Outlet
2013 11	804.050	1	Grating for Concrete Endwall
2014 11	805.010	2	Height of Fill Table, Round Corrugated Steel Pipe and Structural Plate Corrugated Steel Pipe
2014 11	805.020	2	Height of Fill Table, Corrugated Steel Pipe-Arch and Structural Plate Corrugated Steel Pipe-Arch



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DATE	OPSD NO.	REV.	TITLE
2014 11	805.030	2	Height of Fill Table, Spiral Rib Round Pipe
2014 11	805.040	2	Height of Fill Table, Spiral Rib Pipe-Arch
2014 11	806.020	2	Height of Fill Table, Dual Wall Corrugated Polyethylene Gravity Sewer Pipe, 320 kPa and RSC 160
2014 11	806.021	2	Height of Fill Table, Closed Profile Wall Polyethylene Pipe, RSC 160 and RSC 250
2014 11	806.022	2	Height of Fill Table, Dual Wall Corrugated Polyethylene Gravity Sewer Pipe, RSC 100 and RSC 160
2014 11	806.023	0	Height of Fill Table, Solid Wall Polyethylene Pipe, SDR 32.5
2013 11	806.030	0	Height of Fill Table, Dual and Triple Wall Corrugated Polypropylene Gravity Sewer Pipe, 320 kPa
2015 11	806.040	3	Height of Fill Table, Polyvinyl Chloride Gravity Sewer Pipe, 210, 320, and 625 kPa
2014 11	806.060	1	Height of Fill Table, Polyvinyl Chloride Pressure Pipe for Different Dimension Ratios
2015 11	807.010	3	Height of Fill Table, Reinforced Concrete Pipe - Confined Trench, Class 50-D, 65-D, 100-D, and 140-D
2015 11	807.030	3	Height of Fill Table, Reinforced Concrete Pipe - Embankment, Class 50-D, 65-D, 100-D, and 140-D
2015 11	807.040	2	Height of Fill Table, Non-Reinforced Concrete Pipe, Class 3
2015 11	807.050	3	Height of Fill Table, Horizontal Elliptical Concrete Pipe, Class HE-A, HE-I, HE-II, HE-III, and HE-IV
2013 11	809.010	3	Perforated Pipe Subdrain in Granular Trench Main Storm Sewer Connection to Drainage Structure
2013 11	810.010	2	General Rip-Rap Layout for Sewer and Culvert Outlets
2013 11	810.020	2	General Rip-Rap Layout for Ditch Inlets
2006 11	812.010	0	Cut Off Wall for Structural Plate Pipe Arch and Circular CSP

DIVISION 900 - FENCING, GUIDE RAILS

2015 11	911.130	1	Guide Rail System, Concrete Barrier, Cast-In-Place, Type A, Installation
2015 11	911.131	1	Guide Rail System, Concrete Barrier, Cast-In-Place, Type C, Installation



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DATE	OPSD NO.	REV.	TITLE
2015 11	911.132	1	Guide Rail System, Concrete Barrier, Cast-In-Place, Tall Wall, Installation
2015 11	911.134	1	Guide Rail System, Concrete Barrier, Installation - Median Concrete Barrier to Structure
2015 11	911.135	0	Guide Rail System, Concrete Roadside Barrier, Cast-In-Place Or Slipformed, Installation
2013 11	911.140	1	Guide Rail System, Concrete Barrier, Precast I-Lock Connection, Installation - Temporary and Permanent
2013 11	911.143	1	Guide Rail System, Concrete Barrier, Precast I-Lock Connection, Type TW, Installation - Permanent
2013 11	911.150	0	Guide Rail System, Concrete Barrier, Type J Connection, 4m Length, Installation - Temporary
2013 11	911.151	0	Guide Rail System, Concrete Barrier, Type J Connection, 6m Length, Installation - Temporary
2013 11	911.160	0	Guide Rail System, Concrete Barrier, Type M Connection, Installation - Temporary 1
2013 11	911.161	0	Guide Rail System, Concrete Barrier, Type M Connection, Installation - Temporary 2
2013 11	911.162	0	Guide Rail System, Concrete Barrier, Type M Connection, Installation - Temporary Restraint System, Pinned to Asphalt Pavement
2013 11	911.163	0	Guide Rail System, Concrete Barrier, Type M Connection, Installation - Temporary Restraint System, Strapped to Concrete
2013 11	911.164	0	Guide Rail System, Concrete Barrier, Type M Connection, Installation - Temporary Restraint System, Strapped to Concrete with Asphalt Surface
2013 11	911.167	0	Guide Rail System, Concrete Barrier, Type m Connection, Installation - Temporary Restraint System, Bolted Through Concrete
2013 11	911.168	0	Guide Rail System, Concrete Barrier, Type M Connection, Installation - Temporary Restraint System, Bolted Through Concrete with Asphalt Surface
2014 11	911.170	1	Guide Rail System, Concrete Barrier, Type M Connection, Installation - Temporary Restraint System, Transition to Pinned TCB



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DATE	OPSD NO.	REV.	TITLE
2014 11	911.171	1	Guide Rail System, Concrete Barrier, Type M Connection, Installation - Temporary Restraint System, Transition to Strapped TCB
2014 11	911.172	1	Guide Rail system, Concrete Barrier, Type M Connection, Installation - Temporary Restraint System, Transition to Bolted TCB
2015 11	911.173	1	Guide Rail System, Concrete Barrier, Type M Connection, Installation - Temporary Restraint System, Transition to Permanent Concrete Barrier
2015 11	911.174	1	Guide Rail System, Concrete Barrier, Type M Connection, Component - Thrie Beam Transition
2013 11	911.180	0	Guide Rail System, Concrete Barrier, Type T Connection, 4.0m Length, Installation - Temporary
2013 11	911.181	0	Guide Rail System, concrete Barrier, Type T Connection, 6.0m Length, Installation - Temporary
2015 11	911.230	1	Guide Rail System, Concrete Barrier, Median End Treatment Installation
2014 11	911.232	1	Guide Rail System, Concrete Barrier, Energy Attenuator, Installation - Temporary
2001 11	911.330	0	Guide Rail System, Concrete Barrier, Temporary Transition Installation - Rail Method, Concrete Barrier to Temporary Concrete Barrier
2013 11	911.340	0	Guide Rail System, Concrete Barrier, Temporary Concrete Barrier Transition, Installation - Temporary
2015 11	911.380	1	Guide Rail System, Concrete Barrier, Permanent Transition, Installation at Piers and Poles
2015 11	911.381	2	Guide Rail System, Concrete Barrier, Permanent Transition Installation, Roadside Concrete Barrier to Structure
2015 11	911.382	1	Guide Rail System, Concrete Barrier, Dowel Connection Detail
2015 11	911.383	0	Guide Rail System, Concrete Barrier, Permanent Transition Installation At Lighting Pole And Sign Support Footings



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2015 11	911.430	1	Guide Rail System, Concrete Barrier, Temporary - Leaving End Treatment, Installation – Divided Highway
2010 11	912.101	2	Guide Rail System, Steel Beam, Rail, Component
2010 11	912.102	1	Guide Rail System, Steel Beam, Channel, Component
2010 11	912.103	1	Guide Rail System, Steel Beam, Plastic Offset Blocks, Component
2010 11	912.104	2	Guide Rail System, Steel Beam, Steel Post with Wooden Offset Block, Component
2010 11	912.105	1	Guide Rail System, Steel Beam, Base Plate, Component
2008 11	912.130	2	Guide Rail System, Steel Beam, Steel Post with Wooden Offset Block Assembly, Installation - Single Rail
2013 11	912.135	0	Guide Rail System, Steel Beam, Steel Post with Steel Offset Block Assembly, Adjustment - Single Rail
2010 11	912.140	2	Guide Rail System, Steel Beam, Wooden Post Assembly, Installation - Single Rail
2010 11	912.141	2	Guide Rail System, Steel Beam, Wooden Post Assembly, Installation - Double Rail
2013 11	912.145	0	Guide Rail System, Steel Beam, Wooden Post Assembly, Adjustment - Single Rail
2010 11	912.234	1	Guide Rail System, Steel Beam, End Treatment, Installation - Leaving End Collector Median
2010 11	912.235	1	Guide Rail System, Steel Beam, Leaving End Treatment, Installation
2010 11	912.240	0	Guide Rail System, Steel Beam, Treatment at Culverts with Minimal Cover Installation - Single Rail
2002 11	912.330	1	Guide Rail System, Steel Beam, Temporary Transition Installation - Rail Method, Single Steel Beam to Temporary Concrete Barrier
2002 11	912.331	1	Guide Rail System, Steel Beam, Temporary Transition Installation, Single Steel Beam to Temporary Concrete Barrier
2008 11	912.380	1	Guide Rail System, Steel Beam, Permanent Transition Installation, Channel Termination, Median
2002 11	912.381	1	Guide Rail System, Steel Beam, Permanent Transition Installation, Single Steel Beam to 3 Cable, Divided Highway



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DATE	OPSD NO.	REV.	TITLE
2009 11	912.382	3	Guide Rail System, Steel Beam, Permanent Transition Installation, Steel Beam With Eccentric Loader to 3 Cable, Divided and Undivided Highway
2010 11	912.401	1	Guide Rail System, Steel Beam, Structure Connection, Component - Rail and Channel
2010 11	912.430	3	Guide Rail System, Steel Beam, Structure Connection
2008 11	912.480	2	Guide Rail System, Steel Beam, Permanent Connection Installation, Single Steel Beam to Concrete Barrier
2008 11	912.481	2	Guide Rail System, Steel Beam, Permanent Connection Installation, Double Steel Beam to Concrete Barrier
2010 11	912.530	1	Guide Rail System, Steel Beam, Structure Approach Treatment, Installation - Rural Highway
2008 11	912.531	2	Guide Rail System, Steel Beam, Installation - Entrances and Intersecting Roadways
2008 11	912.532	1	Guide Rail System, Steel Beam, Barricade, Installation
2008 11	913.101	1	Guide Rail System, Cable, Component - Cable Fittings
2008 11	913.102	1	Guide Rail System, Cable, Component - Concrete Anchor Blocks
2008 11	913.103	1	Guide Rail System, Cable, Component - Wooden Post Base Plate
2008 11	913.130	1	Guide Rail System, Cable, Installation - Shoulder
2014 11	913.131	0	Guide Rail System, Cable, Installation - Entrances and Intersecting Roads
2013 11	913.135	0	Guide Rail System, Cable, Adjustment - Shoulder
2013 11	921.101	1	Energy Attenuator, General, Installation - Granular Approach Pad, Median
2011 11	922.131	2	Energy Attenuator, Crash Cushion, QuadTrend System, Installation - Concrete Barrier
2011 11	922.133	2	Energy Attenuator, Crash Cushion, QuadTrend System, Installation - Concrete Pad and Rear Cable Anchor Block
2010 11	922.180	2	Energy Attenuator, End Treatment, Steel Beam Energy Attenuating Terminal, Sequential Kinking Terminal System with Wooden Posts, Installation



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DATE	OPSD NO.	REV.	TITLE
2010 11	922.181	2	Energy Attenuator, End Treatment, Steel Beam Energy Attenuating Terminal, Sequential Kinking Terminal System with Steel Posts, Installation
2013 11	922.330	3	Energy Attenuator, End Treatment, Crash-Cushion Attenuating Terminal (CAT-350) System, Assembly
2013 11	922.401	2	Energy Attenuator, End Treatment, Eccentric Loader Terminal System, Component - Loader Assembly
2013 11	922.402	2	Energy Attenuator, End Treatment, Eccentric Loader Terminal System, Component - Rail and Cable Attachment
2013 11	922.410	2	Energy Attenuator, End Treatment, Eccentric Loader Terminal System, Assembly - Loader Detail
2013 11	922.430	7	Energy Attenuator, End Treatment, Eccentric Loader Terminal System, Installation - Layout and Post
2010 11	922.530	5	Energy Attenuator, End Treatment, Steel Beam Energy Attenuating Terminal, Extruder Terminal System with Wooden Posts, Installation
2010 11	922.532	2	Energy Attenuator, End Treatment, Steel Beam Energy Attenuating Terminal, Extruder Terminal System with Steel Posts, Installation
2011 11	923.001	3	Energy Attenuator, Crash Cushion, Narrow Systems, Component - Reinforced Concrete Pad
2005 11	923.002	0	Energy Attenuator, Crash Cushion, Component - Anchor Assembly
2011 11	923.004	0	Energy Attenuator, Crash Cushion, Wide Systems, Component - Reinforced Concrete Pad
2011 11	923.005	0	Energy Attenuator, Crash Cushion, Extra Wide Systems, Component - Reinforced Concrete Pad
2015 11	923.006	0	Energy Attenuator, Crash Cushion, Quadguard Super Wide System, Component – Reinforced Concrete Pad
2011 11	923.180	1	Energy Attenuator, Crash Cushion, QuadGuard System, Installation - Temporary, Unidirectional
2011 11	923.181	1	Energy Attenuator, Crash Cushion, QuadGuard System, Installation - Temporary, Bidirectional
2011 11	923.182	1	Energy Attenuator, Crash Cushion, QuadGuard System, Installation - Permanent, Unidirectional
2011 11	923.183	1	Energy Attenuator, Crash Cushion, QuadGuard System, Installation - Permanent, Bidirectional
2011 11	923.184	0	Energy Attenuator, Crash Cushion, QuadGuard Wide System, Installation - Temporary, Unidirectional



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2011 11	923.185	0	Energy Attenuator, Crash Cushion, QuadGuard Wide System, Installation - Temporary, Bidirectional
2011 11	923.186	0	Energy Attenuator, Crash Cushion, QuadGuard Wide System, Installation - Permanent, Unidirectional
2011 11	923.187	0	Energy Attenuator, Crash Cushion, QuadGuard Wide System, Installation - Permanent, Bidirectional
2011 11	923.188	0	Energy Attenuator, Crash Cushion, QuadGuard Extra Wide System, Installation - Temporary, Unidirectional
2011 11	923.189	0	Energy Attenuator, Crash Cushion, QuadGuard Extra Wide System, Installation - Temporary, Bidirectional
2011 11	923.190	0	Energy Attenuator, Crash Cushion, QuadGuard Extra Wide System, Installation - Permanent, Unidirectional
2011 11	923.191	0	Energy Attenuator, Crash Cushion, QuadGuard Extra Wide System, Installation - Permanent, Bidirectional
2015 11	923.192	0	Energy Attenuator, Crash Cushion, Quadguard Super Wide System, Installation – Temporary, Unidirectional
2015 11	923.193	0	Energy Attenuator, Crash Cushion, Quadguard Super Wide System, Installation – Temporary, Bidirectional
2015 11	923.194	0	Energy Attenuator, Crash Cushion, Quadguard Super Wide System, Installation – Permanent Unidirectional
2015 11	923.195	0	Energy Attenuator, Crash Cushion, Quadguard Super Wide System, Installation – Permanent Bidirectional
2013 11	923.201	2	Energy Attenuator, Crash Cushion, Connecticut Impact Attenuation System, Component - Steel Cylinder
2013 11	923.202	2	Energy Attenuator, Crash Cushion, Connecticut Impact Attenuation System, Component - Polyethylene Lid
2013 11	923.204	2	Energy Attenuator, Crash Cushion, Connecticut Impact Attenuation System, Component - Concrete Backwall
2013 11	923.242	2	Energy Attenuator, Crash Cushion, Connecticut Impact Attenuation System, Installation
2013 11	923.244	1	Energy Attenuator, Crash Cushion, Connecticut Impact Attenuation System, Installation - Long Median Hazard
2013 11	923.245	2	Energy Attenuator, Crash Cushion, Connecticut Impact Attenuation System, Installation - Short Median Hazard
2011 11	923.280	1	Energy Attenuator, Crash Cushion, TRACC System, Installation - Temporary, Unidirectional



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2011 11	923.281	1	Energy Attenuator, Crash Cushion, TRACC System, Installation - Temporary, Bidirectional
2011 11	923.282	1	Energy Attenuator, Crash Cushion, TRACC System, Installation - Permanent, Unidirectional
2011 11	923.283	1	Energy Attenuator, Crash Cushion, TRACC System, Installation - Permanent, Bidirectional
2011 11	923.380	1	Energy Attenuator, Crash Cushion, TAU II System, Installation - Temporary, Unidirectional
2011 11	923.381	1	Energy Attenuator, Crash Cushion, TAU II System, Installation - Temporary, Bidirectional
2011 11	923.382	1	Energy Attenuator, Crash Cushion, TAU II System, Installation - Permanent, Unidirectional
2011 11	923.383	1	Energy Attenuator, Crash Cushion, TAU II System, Installation - Permanent, Bidirectional
2011 11	923.384	0	Energy Attenuator, Crash Cushion, TAU II Wide System, Installation - Temporary, Unidirectional
2011 11	923.385	0	Energy Attenuator, Crash Cushion, TAU II Wide System, Installation - Temporary, Bidirectional
2011 11	923.386	0	Energy Attenuator, Crash Cushion, TAU II Wide System, Installation - Permanent, Unidirectional
2011 11	923.387	0	Energy Attenuator, Crash Cushion, TAU II Wide System, Installation - Permanent, Bidirectional
2011 11	923.388	0	Energy Attenuator, Crash Cushion, TAU II Extra Wide System - TL-2, Installation - Temporary, Unidirectional
2011 11	923.389	0	Energy Attenuator, Crash Cushion, TAU II Extra Wide System - TL-2, Installation - Temporary, Bidirectional
2011 11	923.390	0	Energy Attenuator, Crash Cushion, TAU II Extra Wide System - TL-3, Installation - Temporary, Unidirectional
2011 11	923.391	0	Energy Attenuator, Crash Cushion, TAU II Extra Wide System - TL-3, Installation - Temporary, Bidirectional
2011 11	923.392	0	Energy Attenuator, Crash Cushion, TAU II Extra Wide System - TL-2, Installation - Permanent, Unidirectional
2011 11	923.393	0	Energy Attenuator, Crash Cushion, TAU II Extra Wide System - TL-2, Installation - Permanent, Bidirectional
2011 11	923.394	0	Energy Attenuator, Crash Cushion, TAU II Extra Wide System - TL-3, Installation - Permanent, Unidirectional
2011 11	923.395	0	Energy Attenuator, Crash Cushion, TAU II Extra Wide System - TL-3, Installation - Permanent, Bidirectional



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2010 11	923.480	0	Energy Attenuator, Crash Cushion, Smart System, Installation - Temporary, Unidirectional
2010 11	923.481	0	Energy Attenuator, Crash Cushion, Smart System, Installation - Temporary, Bidirectional
2010 11	923.482	0	Energy Attenuator, Crash Cushion, Smart System, Installation - Permanent, Unidirectional
2010 11	923.483	0	Energy Attenuator, Crash Cushion, Smart System, Installation - Permanent, Bidirectional
2011 11	923.530	1	Energy Attenuator, Crash Cushion, Box Beam Bursting Energy Absorbing Terminal, Installation - Layout
2011 11	923.531	1	Energy Attenuator, Crash Cushion, Box Beam Bursting Energy Absorbing Terminal, Installation - Impact Head and Post
2011 11	924.131	0	Energy Attenuator, Crash Cushion, ABSORB 350 System, Installation - Temporary Concrete Barrier
2015 11	924.135	1	Energy Attenuator, Crash Cushion, ACZ-350 System, Installation - Temporary Concrete Barrier
2013 11	925.010	0	Guide Rail System, Thrie Beam, Component - Rail
2013 11	925.030	0	Guide Rail System, Thrie Beam, Component - Terminal Connector
2012 11	971.101	3	Fence, Highway, In Earth, Shale, Loose Rock, Or Friable Rock, Installation
2012 11	971.102	1	Fence, Highway, In Solid Rock, Installation
2012 11	972.101	2	Fence, Chain-Link, Component - Barbed Wire
2012 11	972.102	2	Fence, Chain-Link, Component - Gate
2012 11	972.130	2	Fence, Chain-Link, Installation - Roadway
2012 11	972.131	2	Fence, Chain-Link, Installation - Concrete Barrier
2012 11	972.132	0	Fence, Chain-Link, Details and Table
2009 11	980.101	2	Pedestrian Barricade, Installation
2009 11	982.101	1	Splash Guard, Pedestrian, Installation
2014 11	984.101	1	Post Mounted Delineator, Installation
2010 11	984.201	0	Energy Attenuator, End Treatment, Delineation, Installation - Approach End



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DATE	OPSD NO.	REV.	TITLE
2010 11	984.202	0	Energy Attenuator, End Treatment, Delineation, Installation - Leaving End
2010 11	984.203	0	Energy Attenuator, Crash Cushion, Delineation, Installation - Temporary
2010 11	984.204	0	Energy Attenuator, Crash Cushion, Delineation, Installation - Permanent
2013 11	984.205	0	Energy Attenuator, Crash Cushion, Connecticut Impact Attenuation System, Delineation, Installation - Permanent
2013 11	985.110	0	Small Sign Support System, Single Breakaway Wooden Post, 89x89mm, 89x140mm, 140x140mm, and 140x148mm, Installation - Single Post Assembly
2013 11	985.210	0	Small Sign Support System, Double Breakaway Wooden Post, 89x89mm and 89x140mm, Installation - Double Post Assembly
2013 11	985.220	0	Small Sign Support System, Double Breakaway Wooden Post, 140x140mm and 140x184mm, Installation - Double Post Assembly
2013 11	987.101	0	Small Sign Support System, Lap Splice Rib-Bak Breakaway System, Components
2013 11	987.110	0	Small Sign Support, Lap Splice Rib-Bak Breakaway System, Installation - Single Post Assembly
2013 11	987.210	0	Small Sign Support System, Lap Splice Rib-Bak Breakaway System, Installation - Double Post Assembly
2013 11	987.310	0	Small Sign Support System, Lap Splice Rib-Bak Breakaway System, Installation - Triple Post Assembly
2013 11	989.110	0	Small Sign Support System, Sqr-Loc Perforated Steel Square Sign Post System, Installation - Single Post Assembly
2013 11	989.210	0	Small Sign Support System, Sqr-Loc Perforated Steel Square Post System, Installation - Double Post
2014 11	990.110	1	Small Sign Support System, Non-Breakaway U-Flange Post, Installation - Single Post Assembly
2014 11	991.130	3	Expanded Metal Anti-Glare Screen, Installation - Concrete Barrier
2014 11	991.131	3	Expanded Metal Anti-Glare Screen, Installation - Steel Beam Guide Rail with Wooden Post
2012 11	991.132	2	Expanded Metal Anti-Glare Screen, Installation - Chain-Link Fence



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DATE	OPSD NO.	REV.	TITLE
DIVISION 1000 - SANITARY SEWERS			
2011 11	1003.010	2	Cast-in-Place Maintenance Hole Drop Structure Tee
2011 11	1003.020	2	Cast-in-Place Maintenance Hole Drop Structure Wye
2013 11	1003.030	3	Internal Drop Structure for Existing Maintenance Hole
2013 11	1003.031	2	Internal Drop Structure for New Maintenance Hole
2011 11	1006.010	2	Sewer Service Connections for Rigid Main Pipe Sewer
2011 11	1006.020	2	Sewer Service Connections for Flexible Main Pipe Sewer
DIVISION 1100 - WATERMAINS			
2014 11	1100.010	3	Cast-in-Place Chamber for Valves Up to 350 mm Diameter
2014 11	1100.011	2	Piping Layout for Butterfly and Gate Valves Up to 350 mm Diameter in Cast-in-Place Chambers
2015 11	1101.010	4	Precast Valve Chamber, 1200 mm and 1500 mm Diameter
2013 11	1101.012	2	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 1800 x 2400 mm Components
2013 11	1101.013	2	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 1800 x 2400 mm, Riser and Base
2013 11	1101.014	2	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 1800 x 2400 mm, Thrust Blocks
2013 11	1101.015	2	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 1800 x 2400 mm, Chimney and Cap
2013 11	1101.016	2	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 2400 x 3000 mm Components
2013 11	1101.017	2	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 2400 x 3000 mm Riser and Base
2013 11	1101.018	3	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 2400 x 3000 mm Thrust Blocks
2013 11	1101.019	2	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 2400 x 3000 mm Chimney and Cap
2013 11	1101.020	3	Valve Operator
2013 11	1101.030	0	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 3000 x 3000 mm Components



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DATE	OPSD NO.	REV.	TITLE
2013 11	1101.031	0	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 3000 x 3000 mm Riser and Base
2013 11	1101.032	0	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 3000 x 3000 mm Thrust Blocks
2013 11	1101.033	0	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 3000 x 3000 mm Chimney and Cap
2013 11	1101.040	0	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 3600 x 3000 mm Components
2013 11	1101.041	1	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 3600 x 3000 mm Riser and Base
2013 11	1101.042	0	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 3600 x 3000 mm Thrust Blocks
2013 11	1101.043	0	Precast Concrete Valve Chamber with Poured-in-Place Thrust Blocks, 3600 x 3000 mm Chimney and Cap
2013 11	1103.010	2	Concrete Thrust Blocks for Tees, Plugs, and Horizontal Bends
2013 11	1103.020	3	Concrete Thrust Blocks for Vertical Bends
2013 11	1103.021	0	Dimension Tables for Concrete Thrust Blocks for Vertical ends
2013 11	1104.010	3	Water Service Connection, 19 and 25 mm Diameter Sizes
2013 11	1104.020	2	Water Service Connection, 32, 38, and 50 mm Diameter Sizes
2013 11	1104.030	2	Blow Off Installation
2013 11	1105.010	2	Hydrant Installation
2014 11	1107.010	2	Piping Layout for Water Meters 50 mm and Smaller in Chambers
2014 11	1107.020	2	Piping Layout for Water Meters 75 to 250 mm in Chambers with By-Pass
2014 11	1107.030	2	Piping Layout for Water Meters in Building with By-Pass
2013 11	1108.010	2	Cast-in-Place Water Meter Chamber for 75 to 250 mm Meters
2015 11	1109.010	2	Cathodic Protection for Metallic Watermain Systems
2015 11	1109.011	2	Cathodic Protection for PVC Watermain Systems



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DATE	OPSD NO.	REV.	TITLE
2015 11	1109.012	1	Cathodic Protection of Existing Metallic Watermains, Exposed Service or Pipe Method
2015 11	1109.013	1	Anode Installation Over Pipe Method for Existing Metallic Watermains
2015 11	1109.014	1	Horizontal Anode Bank at Service
2015 11	1109.015	1	Vertical Anode Bank at Service
2015 11	1109.025	1	Waterproofing of Splices
2015 11	1109.030	0	Insulation For Sewers And Watermains In Shallow Trenches
DIVISION 3000 - STRUCTURES			
2010 11	3000.100	2	Foundation, Piles, Steel H-Pile Driving Shoe
2010 11	3000.150	1	Foundation, Piles, Steel H-Pile Splice
2010 11	3000.201	1	Foundation, Piles, Steel HP 310 Oslo Point
2010 11	3001.100	1	Foundation, Piles, Steel Tube Pile Driving Shoe
2010 11	3001.150	1	Foundation, Piles, Steel Tube Pile Splice
2010 11	3002.200	1	Foundation, Piles, Steel Sheet Pile Anchorage
2010 11	3003.100	1	Foundation, Piles, Wooden Pile Driving Shoe
2010 11	3003.150	1	Foundation, Piles, Wooden Pile Head Protection
2010 11	3090.100	1	Foundation, Frost Penetration Depths for Northern Ontario
2010 11	3090.101	1	Foundation, Frost Penetration Depths for Southern Ontario
2010 11	3101.150	1	Walls, Abutment, Backfill, Minimum Granular Requirement
2010 11	3101.200	1	Walls, Abutment, Backfill, Rock
2010 11	3102.100	1	Walls, Abutment, Backfill Drain
2010 11	3120.100	2	Walls, Retaining, Concrete Toe Wall
2010 11	3121.150	1	Walls, Retaining, Backfill, Minimum Granular Requirement



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DATE	OPSD NO.	REV.	TITLE
2011 04	3190.100	2	Walls, Retaining and Abutment, Wall Drain
2011 11	3290.100	1	Piers, Cutwater Assembly
2010 11	3310.100	1	Deck, Girders, Concrete, Method of Obtaining Screed Elevations
2011 11	3310.150	1	Deck, Girders, Concrete, Positive Moment Connection at Piers
2010 11	3311.100	1	Deck, Girders, Steel, Method of Obtaining Screed Elevations
2015 11	3311.900	2	Deck, Girders, Steel Box, Access Hatch
2011 11	3329.100	1	Deck, Reinforcement, Supports for Reinforcing Steel for Slab Depths 300 mm or Less
2011 11	3329.101	1	Deck, Reinforcement, Supports for Reinforcing Steel for Slab Depths Greater Than 300 mm
2011 11	3332.100	1	Deck, Round Voids, Form Supports and Tie-Downs
2010 11	3333.100	1	Deck, Round Voids, Drains
2010 11	3333.101	1	Deck, Trapezoid Void, Drains
2011 11	3339.100	1	Deck, Voids, Access Hatch for Concrete Bridges, Assembly
2011 11	3339.101	1	Deck, Voids, Access Hatch for Concrete Bridges, Installation
2014 11	3340.100	2	Deck, Drains with Downspout
2014 11	3340.102	2	Deck, Drains with Sloped Downspout
2012 11	3340.150	2	Deck, Drains with Transverse Bar Openings
2012 11	3340.153	2	Deck, Drains, Median with Transverse Bar Openings
2012 11	3340.200	2	Deck, Drains with Downspout Modification for Addition of Asphalt to Existing Structure
2012 11	3340.201	2	Deck, Drains, with Sloped Downspout Modification for Addition of Asphalt to Existing Structure
2012 11	3340.250	2	Deck, Drains, with Transverse or Longitudinal Bar Openings, Modification for Addition of Asphalt to Existing Structure
2012 11	3349.100	2	Deck, Drains, Drainage of New Deck Below Asphalt Wearing Surface

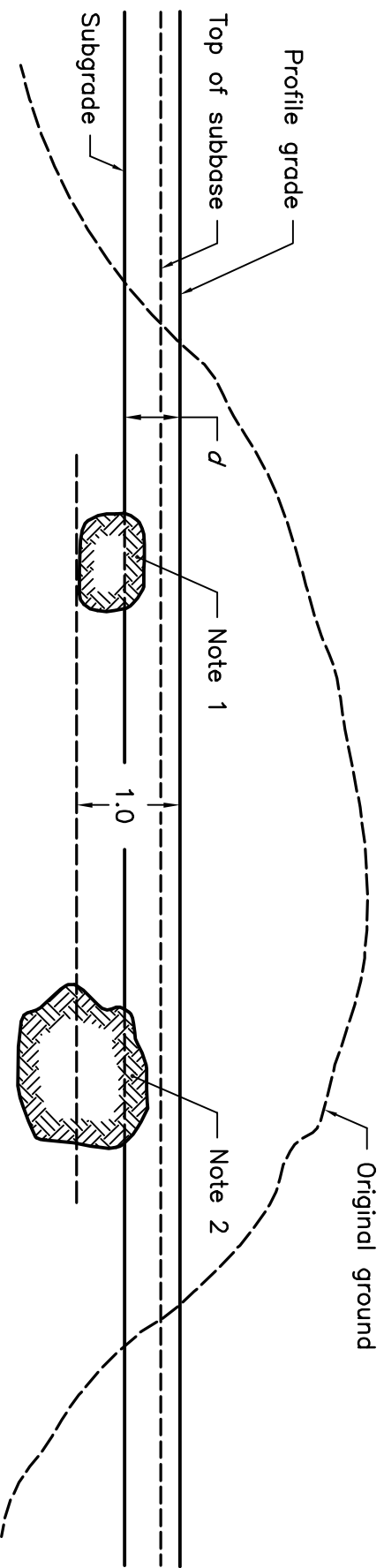


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DATE	OPSD NO.	REV.	TITLE
2012 11	3349.101	2	Deck, Drains, Drainage of Existing Deck Below Asphalt Wearing Surface
2011 11	3360.100	1	Deck, Light Pole Bases, Structures with Barrier Walls
2011 11	3360.200	1	Deck, Light Pole Bases, Structures with Parapet Walls
2008 11	3370.100	2	Deck, Waterproofing Hot Applied Asphalt Membrane with Protection Board
2008 11	3370.101	2	Deck, Waterproofing Hot Applied Asphalt Membrane at Active Cracks Greater Than 2 mm Wide and Construction Joints
2012 11	3390.100	2	Deck, Drip Channel
2005 11	3390.150	0	Falsework Clearance to Traffic Lanes
2010 11	3419.100	1	Barriers and Railings, Steel Beam, Guide Rail and Channel Anchorage
2010 11	3419.150	1	Barriers and Railings, Steel, Single Railing Anchorage
2010 11	3419.155	1	Barriers and Railings, Steel, Double Railing Anchorage
2012 11	3900.100	1	Utilities, Duct Location
2011 11	3900.150	1	Utilities, Duct Termination at Bridge Approaches
2015 11	3920.100	0	Precast Reinforced Concrete Box Culvert With Height Of Fill $\geq 0.6\text{m}$
2015 11	3920.110	0	Precast Reinforced Concrete Box Culvert With Height Of Fill $< 0.6\text{m}$
2010 11	3940.150	2	Figures in Concrete, Warning Message, Layout
2010 11	3940.151	2	Figures in Concrete, Warning Message, Letters
2013 11	3941.200	2	Figures in Concrete, Site Number and Date, Layout
2011 11	3950.100	1	Joints, Concrete Expansion and Construction on Structure



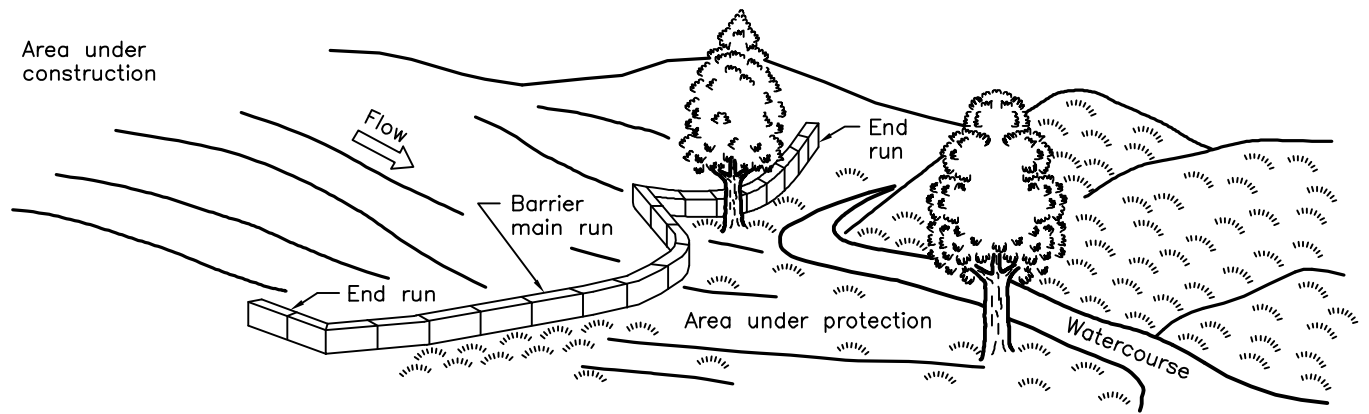
LEGEND:

d = Depth of roadbed granular

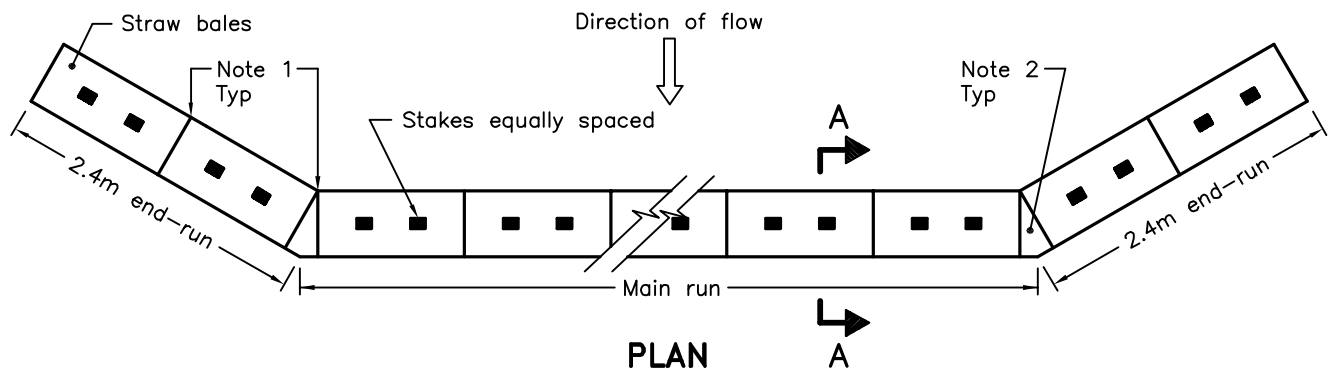
NOTES:

- 1 Boulders partially within depth d but not deeper than 1.0m below profile grade shall be removed completely.
- 2 Boulders partially within depth d but deeper than 1.0m below profile grade shall be shattered to 0.6m below subgrade and then excavated to a minimum of 0.3m below subgrade.
- A Excavation below subgrade shall be backfilled with approved material.
- B Profile grade and subgrade lines apply across the transverse section.
- C All dimensions are in metres unless otherwise shown.

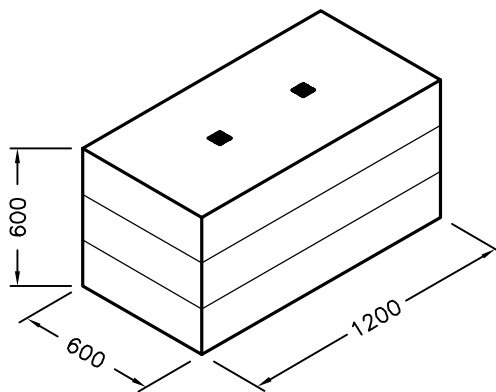
ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev 3
BOULDER TREATMENT CUT SECTIONS—SUBGRADE			
		OPSD 204.010	



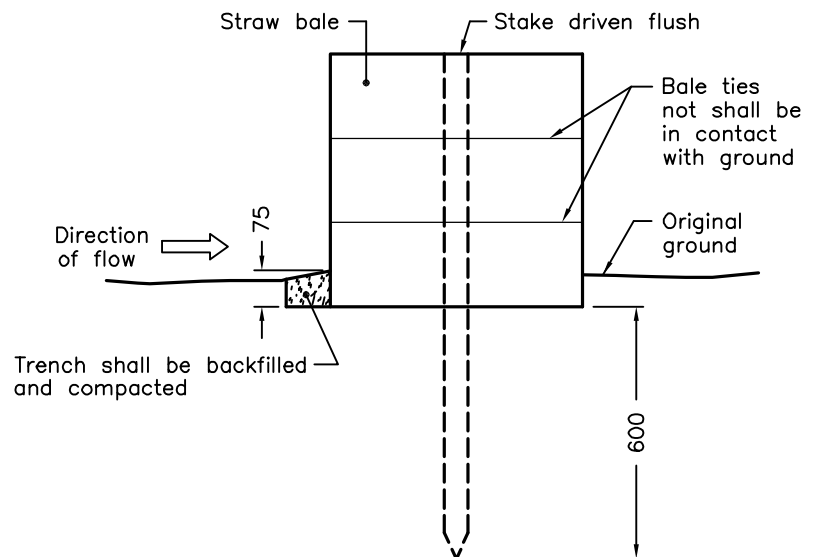
PERSPECTIVE VIEW



PLAN



ISOMETRIC VIEW



SECTION A-A

NOTES:

- 1 Straw bales shall be butted tightly against adjoining bales to prevent sediment flow through barrier.
- 2 Caulk and compact gaps with loose straw.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

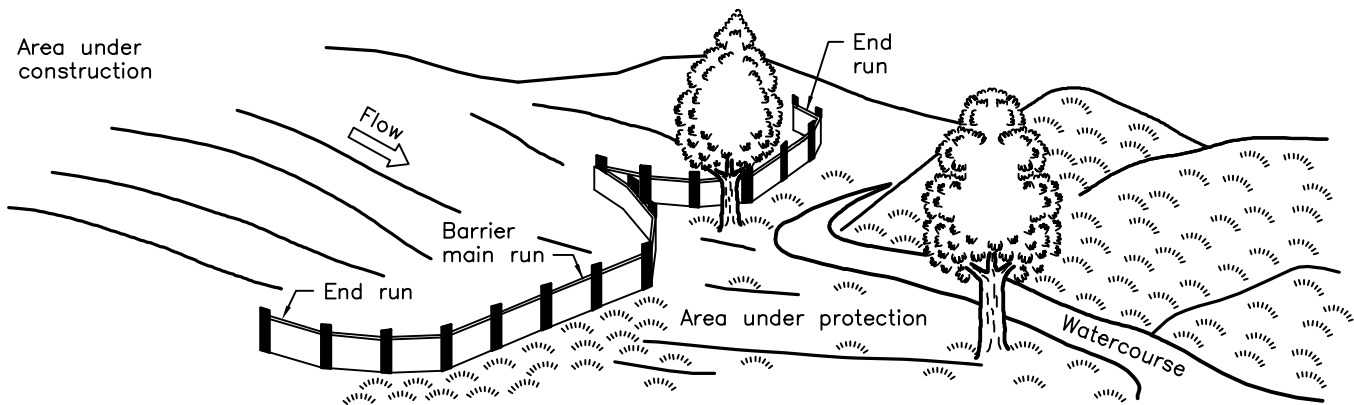
Nov 2015

Rev 2

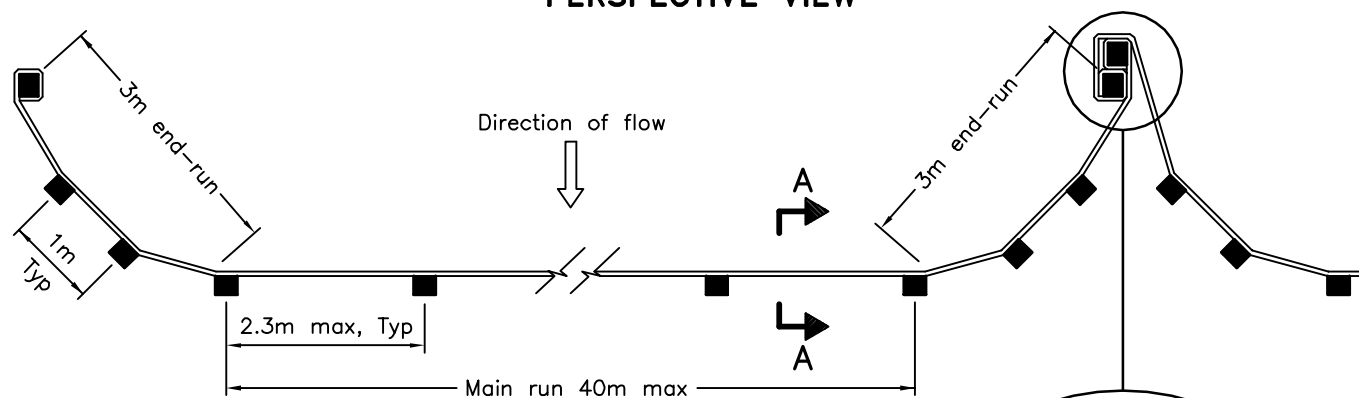
**LIGHT-DUTY
STRAW BALE BARRIER**

OPSD 219.100

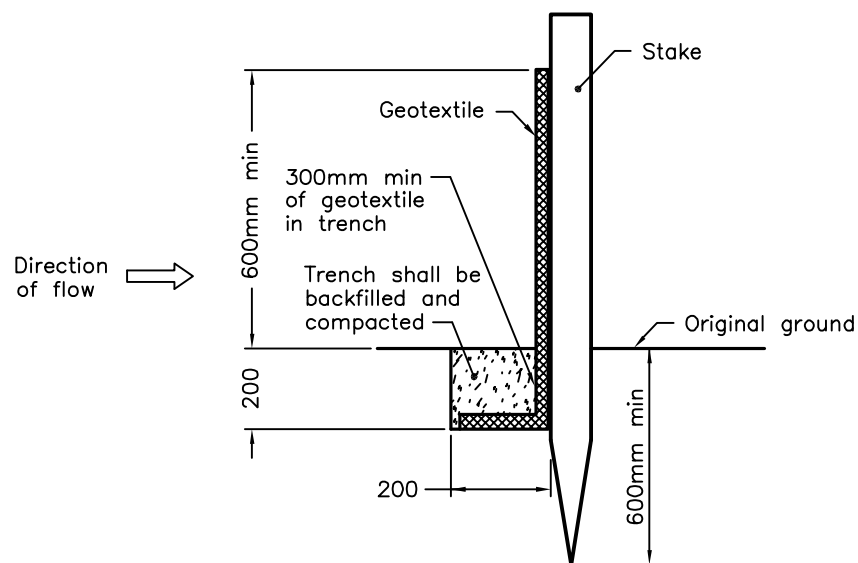




PERSPECTIVE VIEW



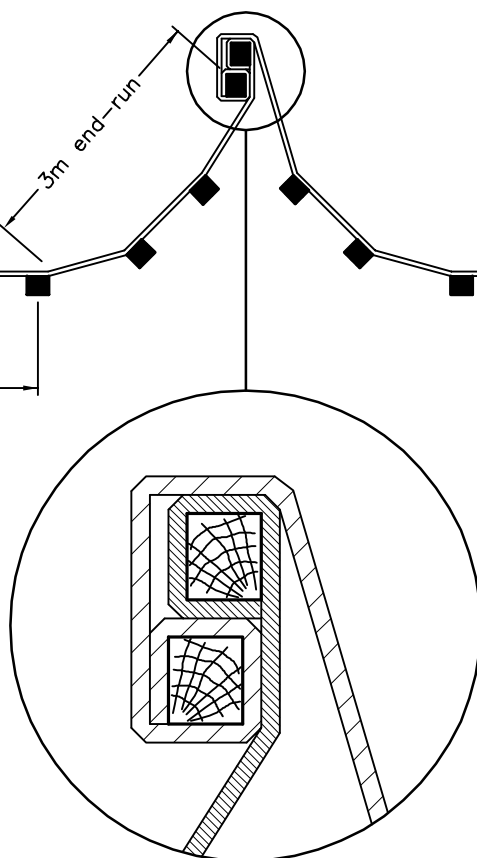
PLAN



SECTION A-A

NOTE:

A All dimensions are in millimetres unless otherwise shown.



JOINT DETAIL

ONTARIO PROVINCIAL STANDARD DRAWING

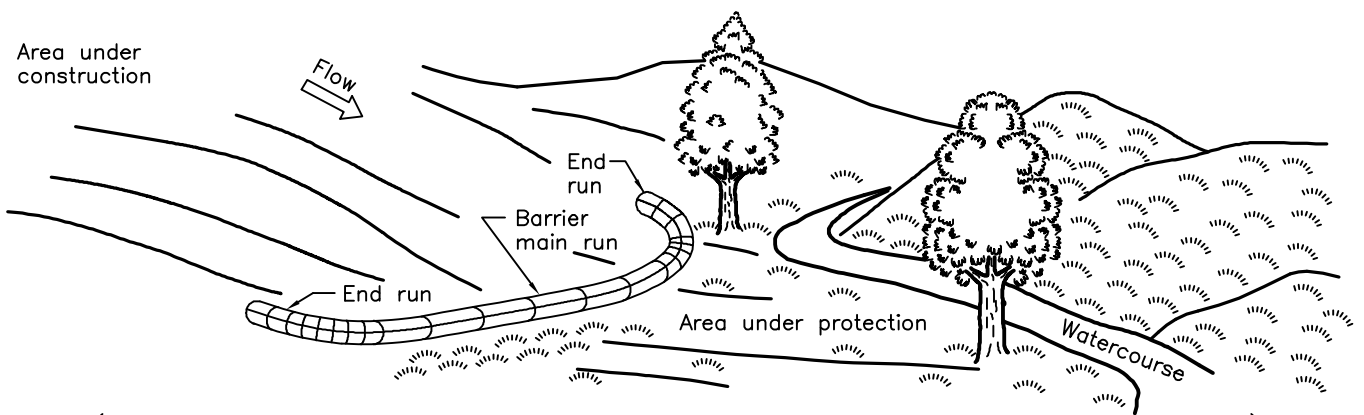
Nov 2015

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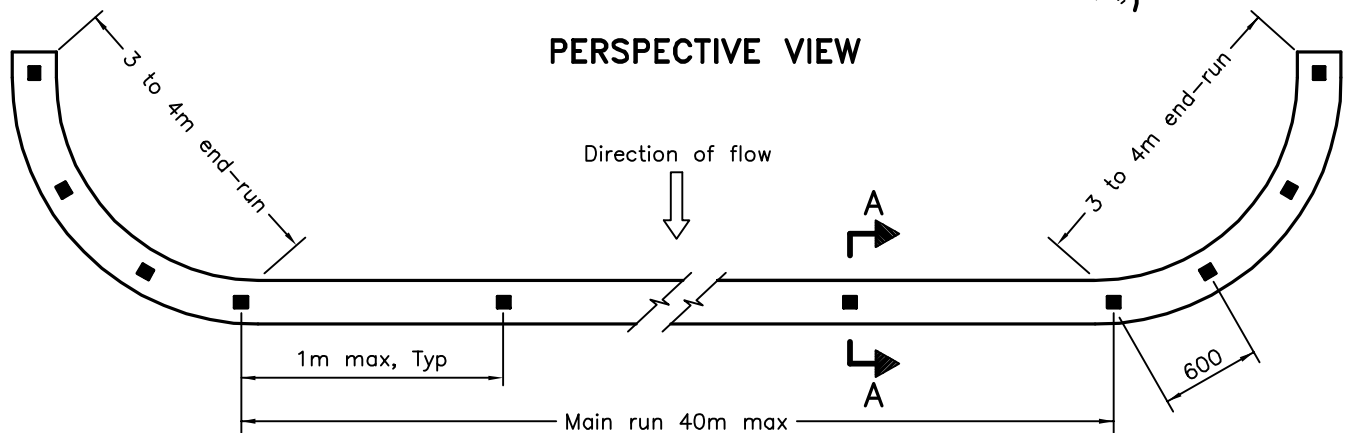
**LIGHT-DUTY
SILT FENCE BARRIER**



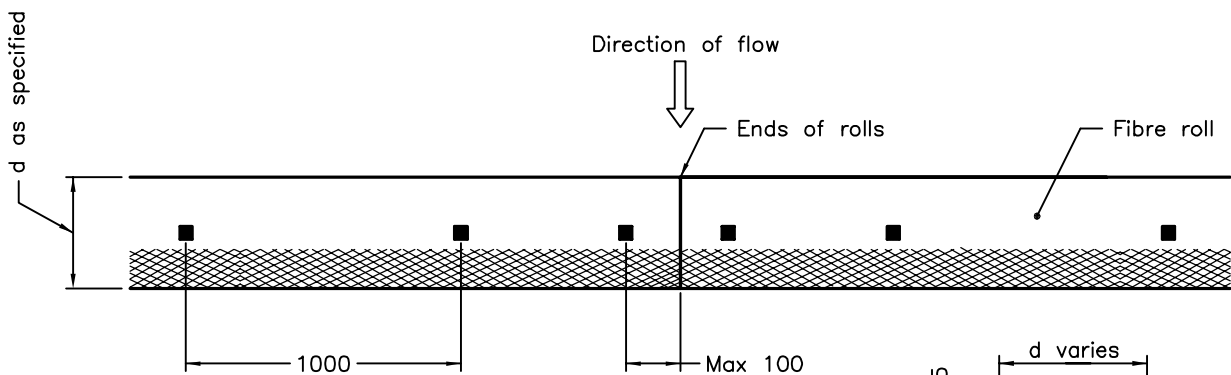
OPSD 219.110



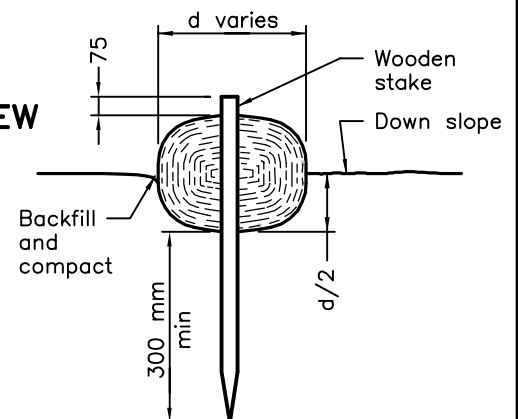
PERSPECTIVE VIEW



PLAN



FIBRE ROLL PLAN VIEW



SECTION A-A

NOTES:

- 1 Remove all surface obstructions greater than 50mm from ground surface.
- 2 Ends of rolls shall be butted tightly together.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

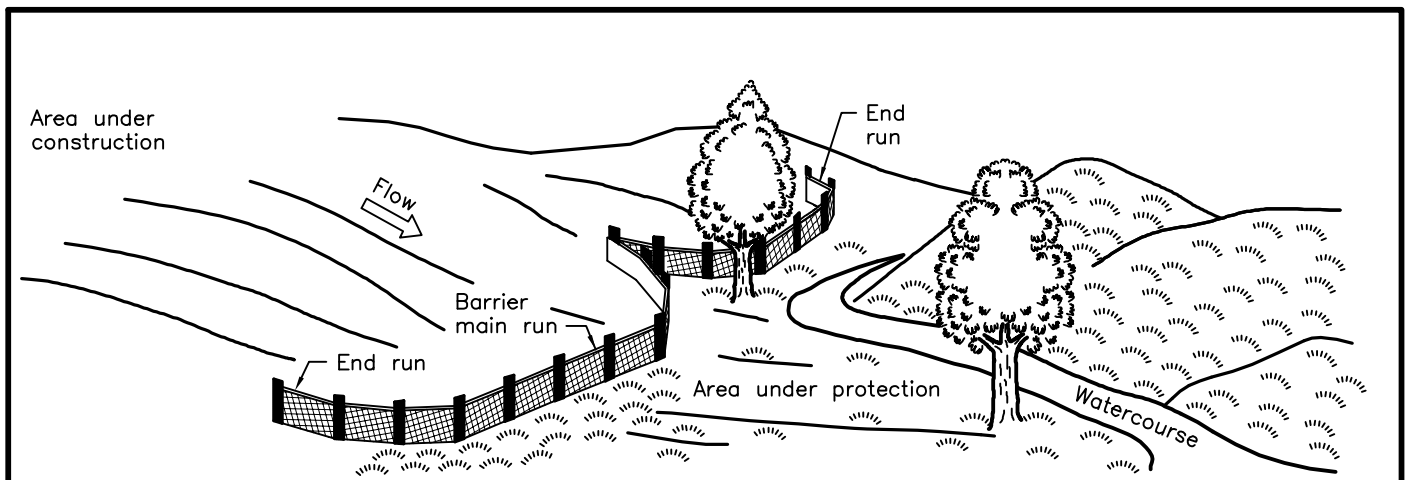
Nov 2015

Rev 0

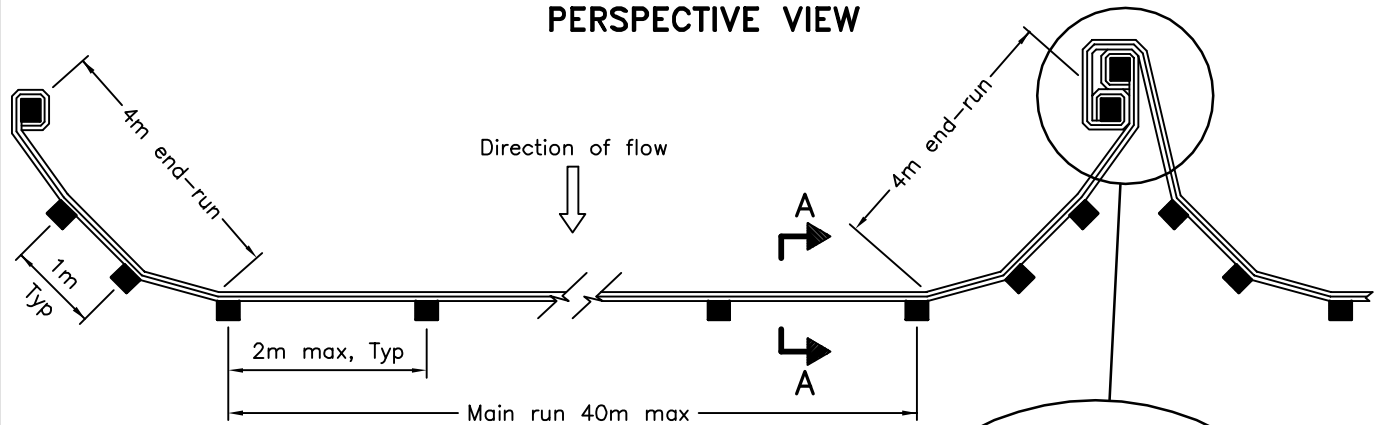
**LIGHT-DUTY
FIBRE ROLL BARRIER**



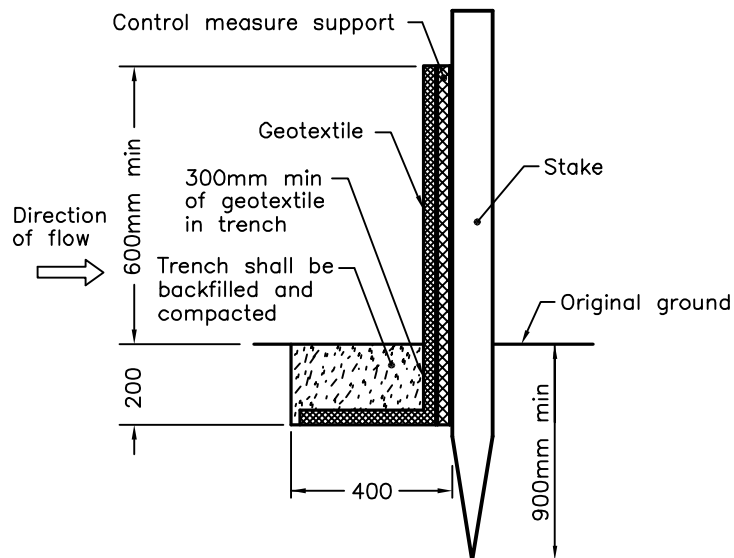
OPSD 219.120



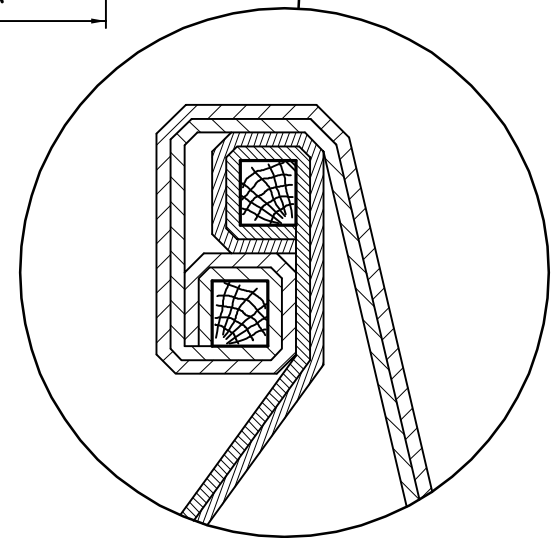
PERSPECTIVE VIEW



PLAN



SECTION A-A



JOINT DETAIL

NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

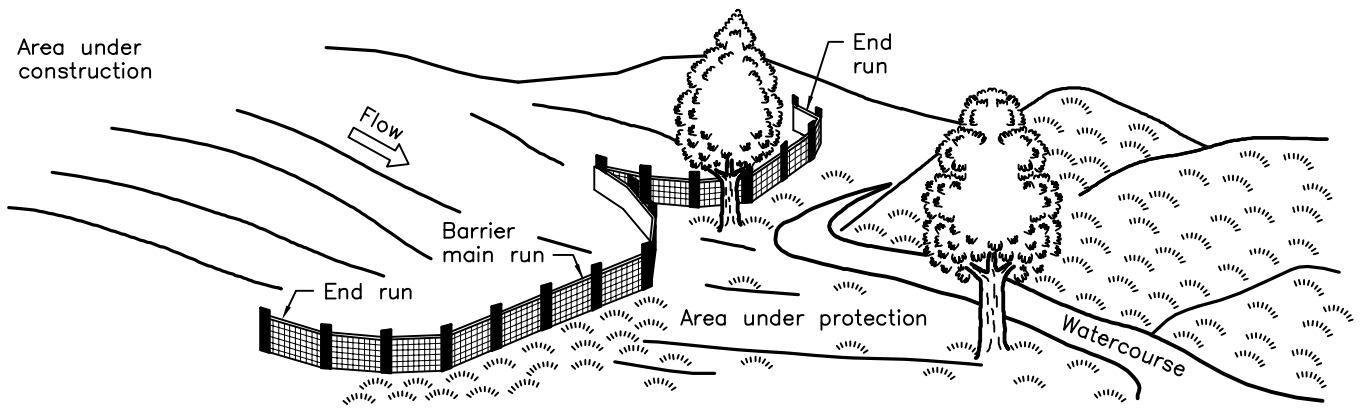
Nov 2015

Rev 2

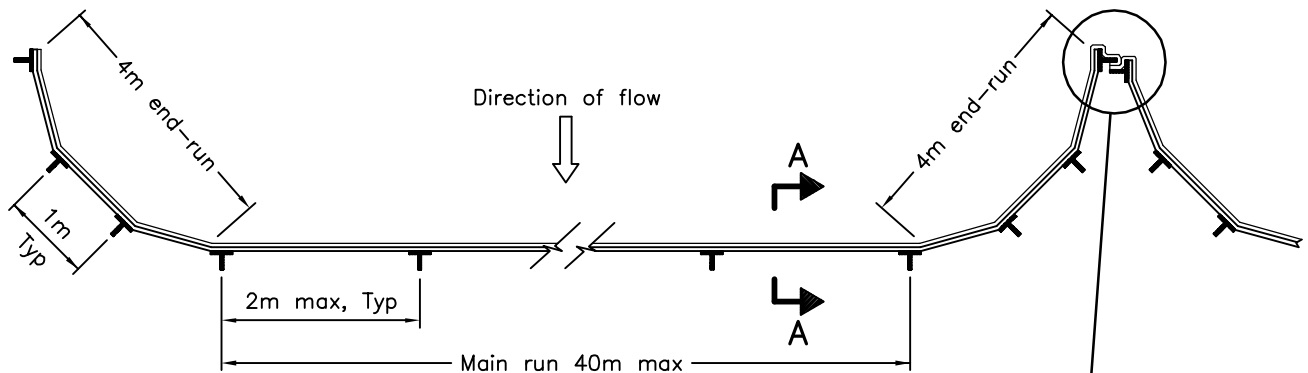
**HEAVY-DUTY
SILT FENCE BARRIER**



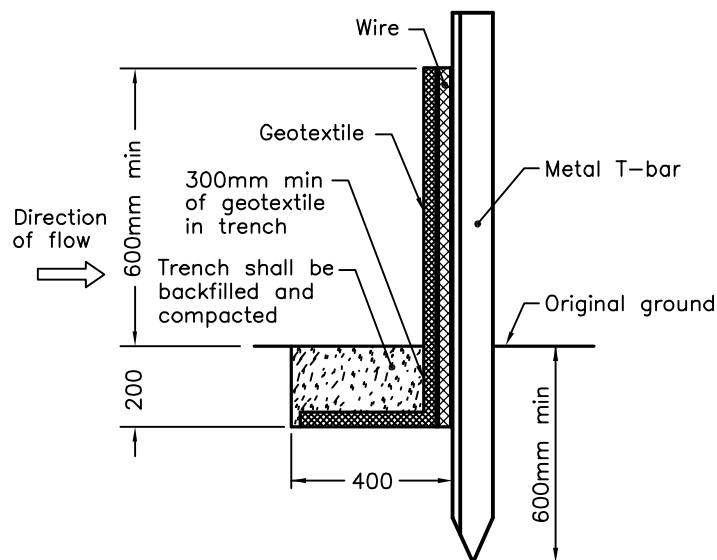
OPSD 219.130



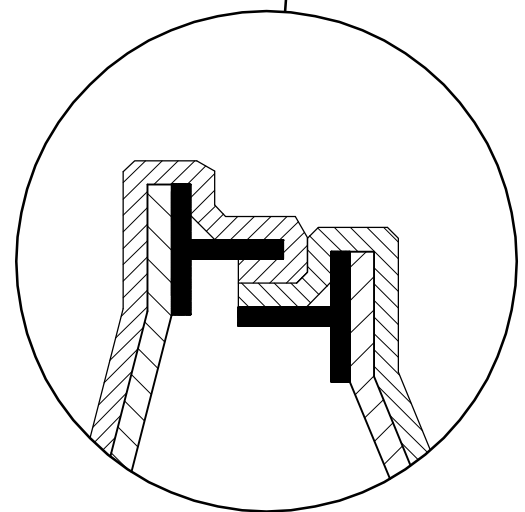
PERSPECTIVE VIEW



PLAN



SECTION A-A



JOINT DETAIL

NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

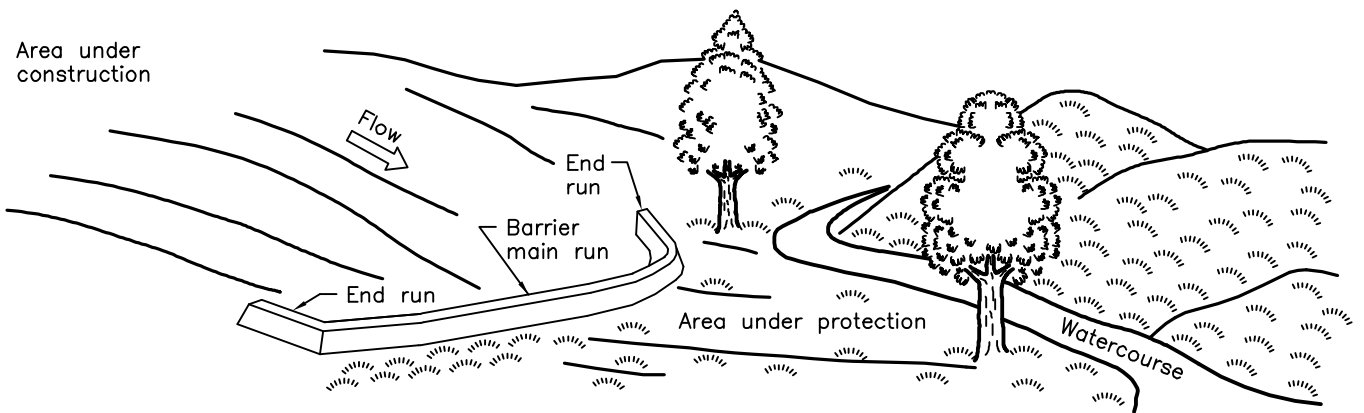
Nov 2015

Rev 0

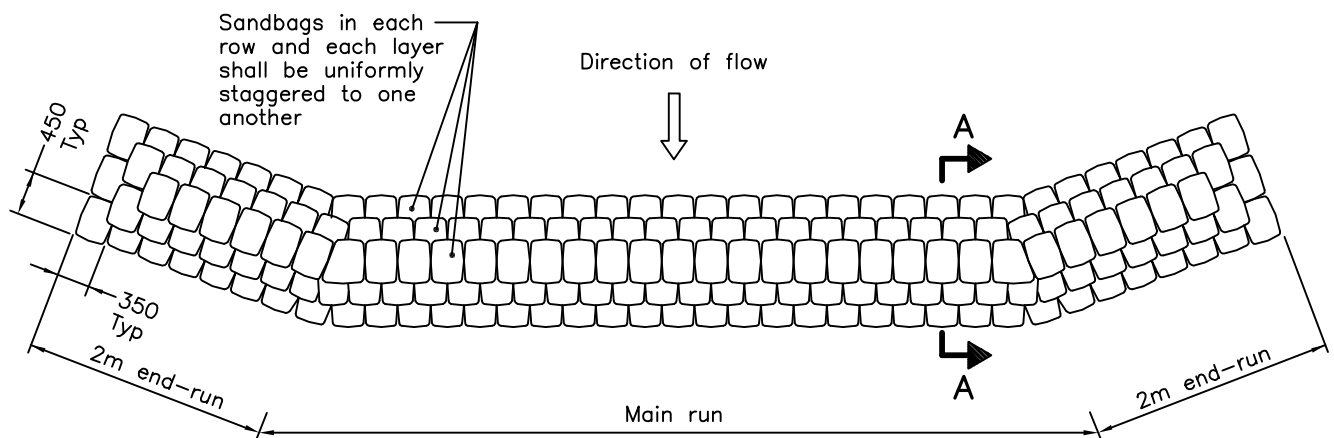
**HEAVY-DUTY WIRE-BACKED
SILT FENCE BARRIER**



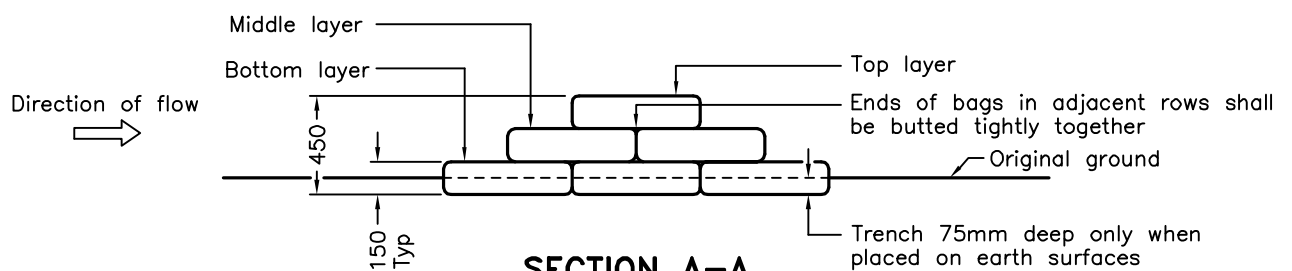
OPSD 219.131



PERSPECTIVE VIEW



PLAN



SECTION A-A

NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

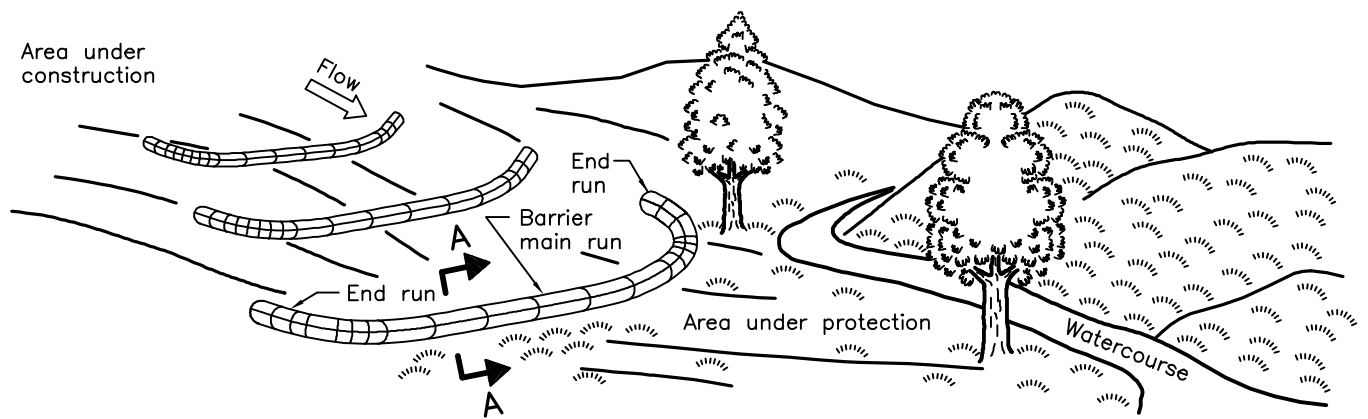
Nov 2015

Rev 2

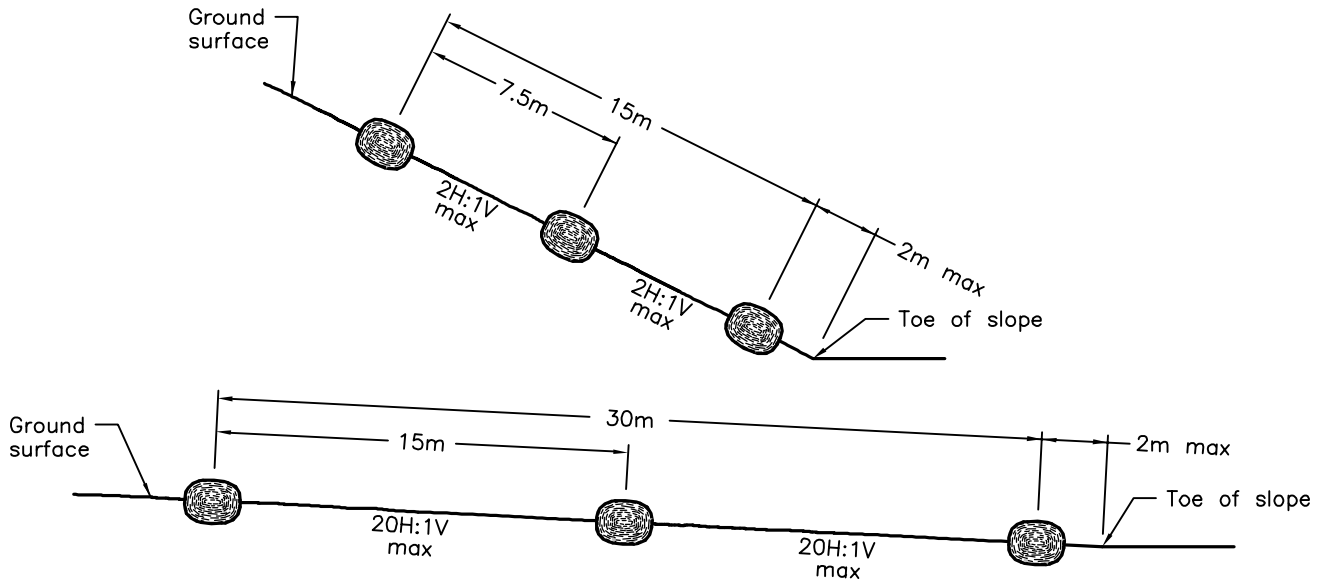
SANDBAG BARRIER

OPSD 219.150

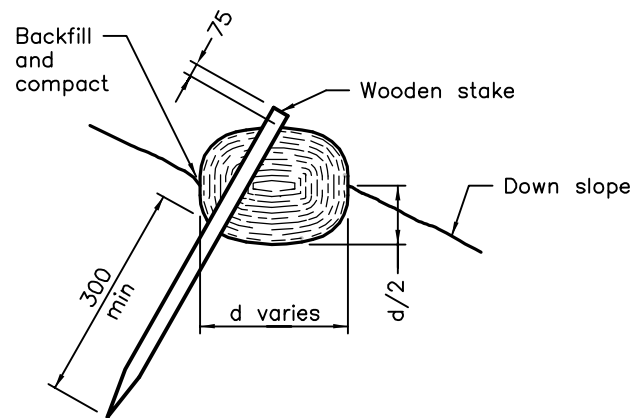




PERSPECTIVE VIEW



FIBRE ROLL SLOPE



SECTION A-A

NOTES:

1 Remove all surface obstructions greater than 50mm from ground surface.

A This OPSD shall be read in conjunction with OPSD 219.120.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

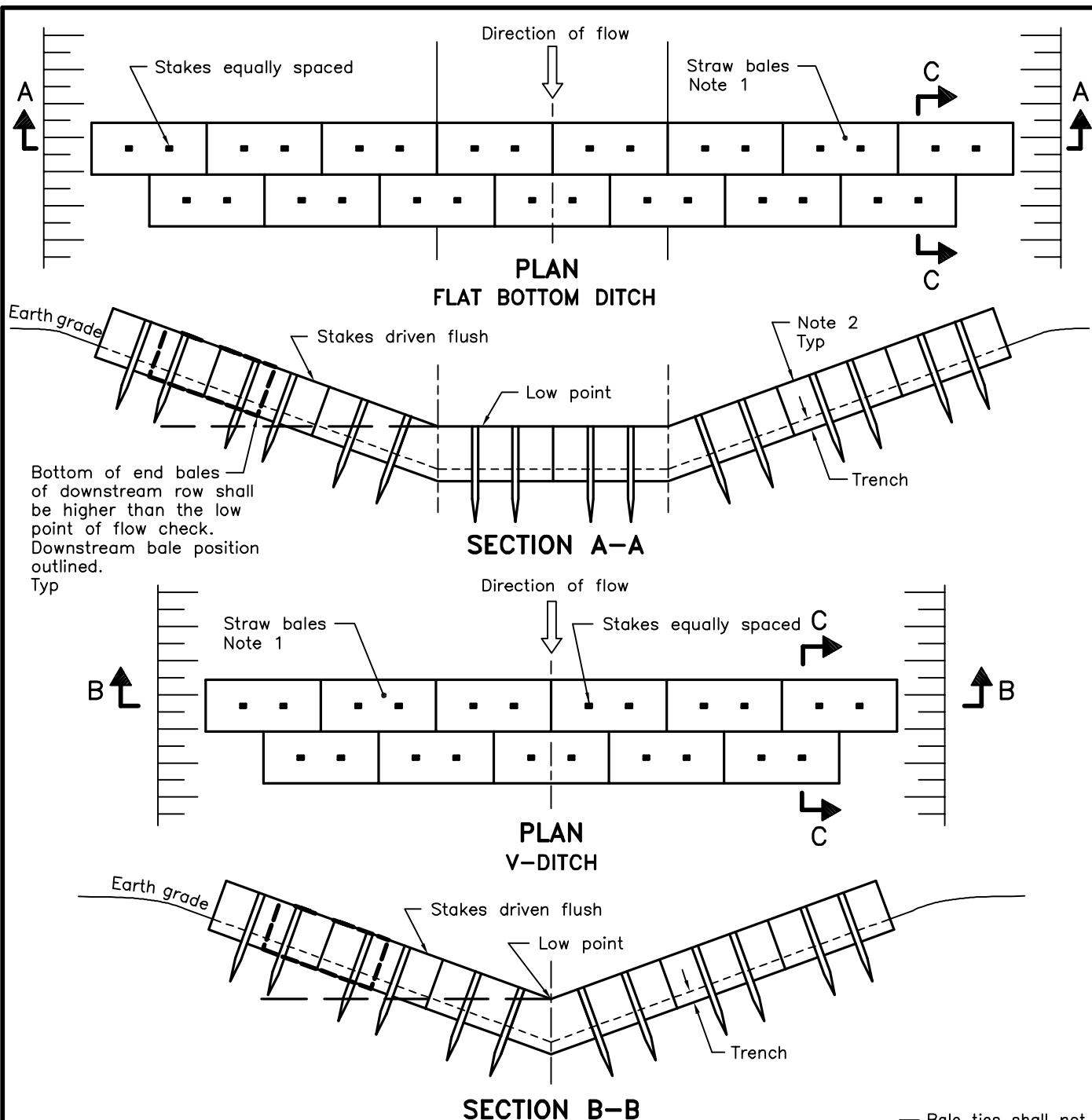
Nov 2015

Rev 0

FIBRE ROLL GRADE BREAKS

OPSD 219.160





NOTES:

- 1 Number of bales varies and shall suit ditch.
- 2 Straw bales shall be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

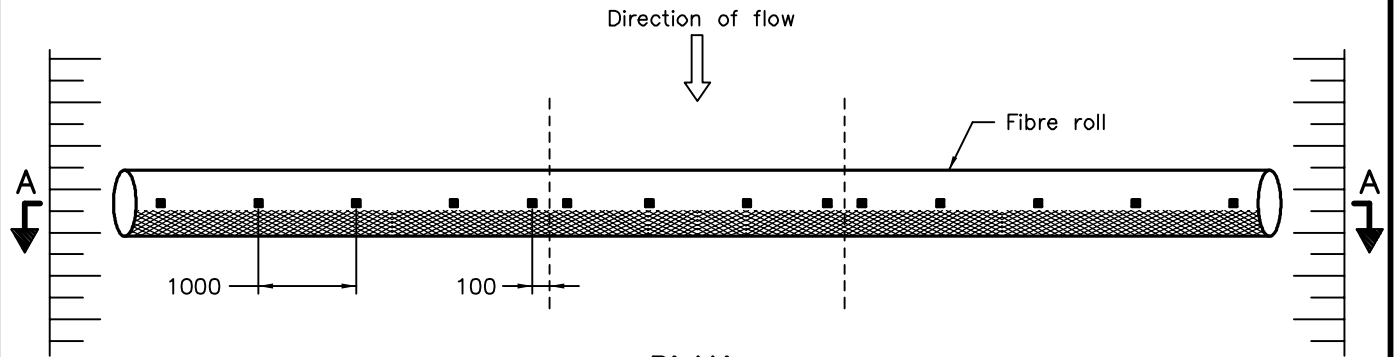
Nov 2015

Rev 2

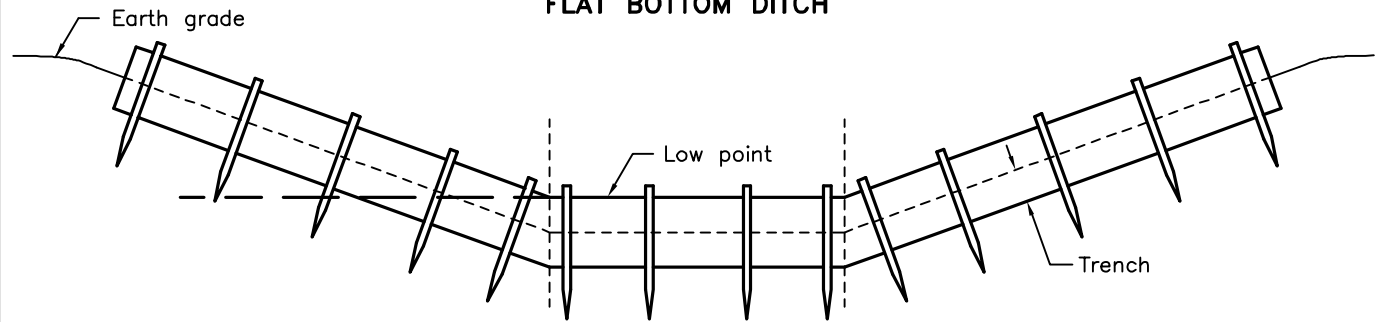
STRAW BALE FLOW CHECK DAM

OPSD 219.180

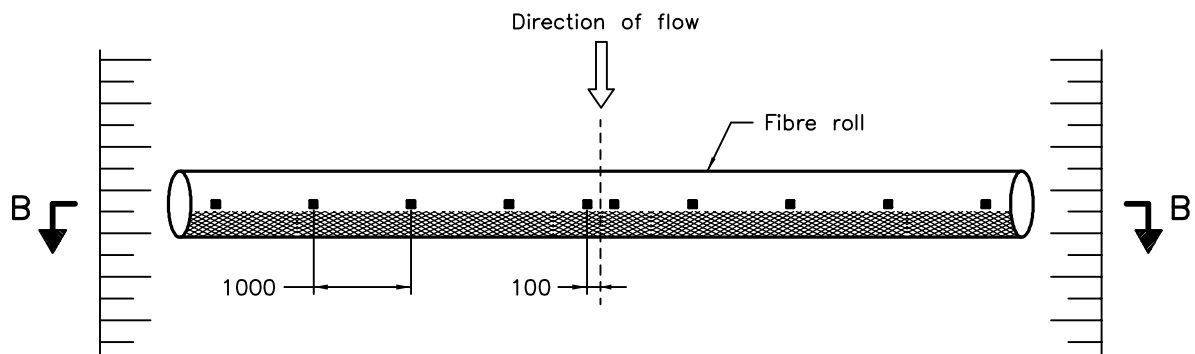




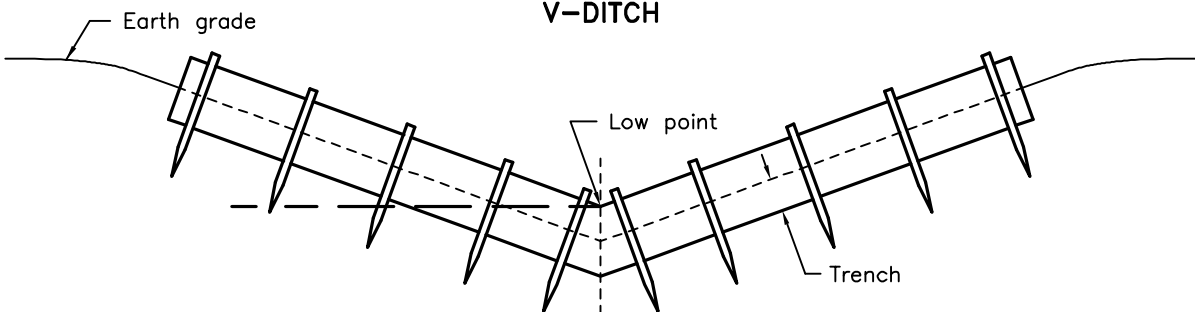
**PLAN
FLAT BOTTOM DITCH**



SECTION A-A



**PLAN
V-DITCH**



SECTION B-B

NOTES:

A Refer to OPSD 219.120 Section A-A installation detail.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

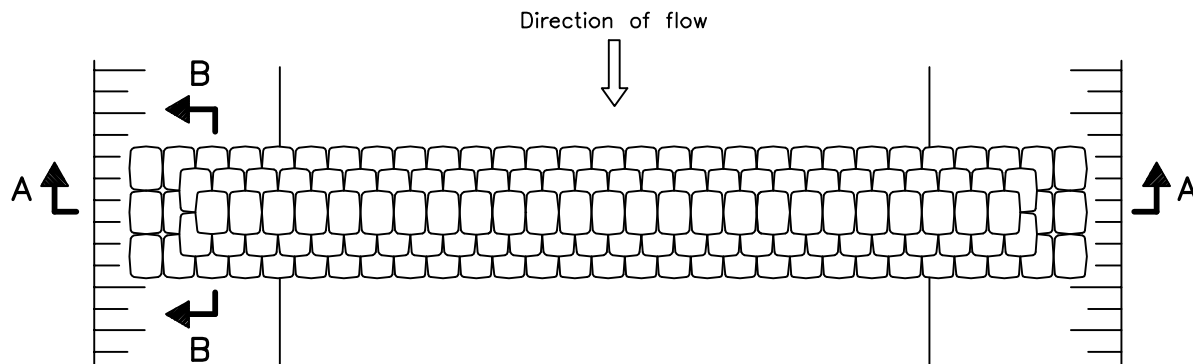
Nov 2015

Rev 0

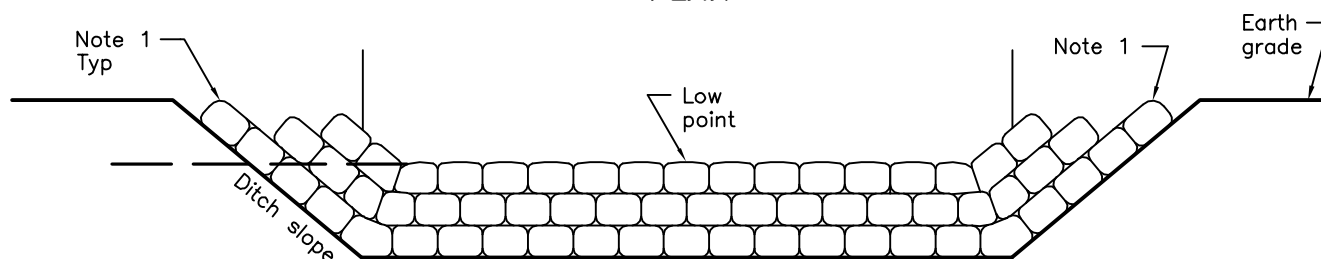
FIBRE ROLL FLOW CHECK DAMS



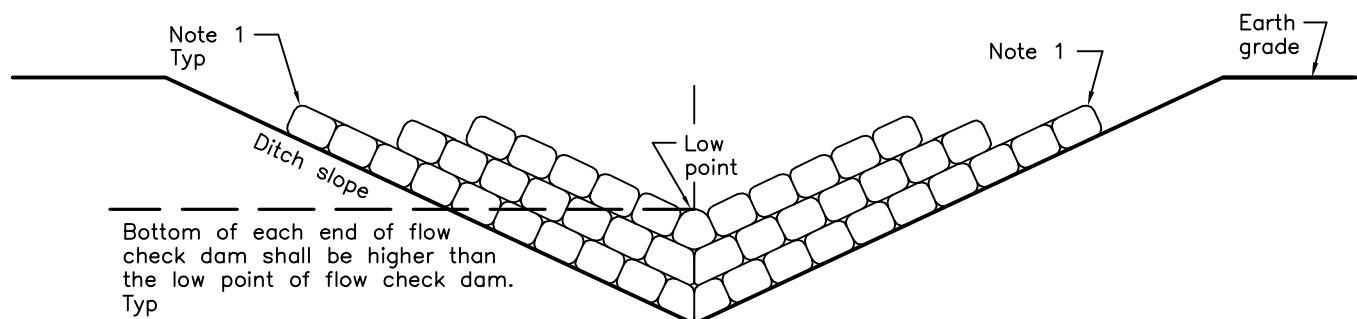
OPSD 219.191



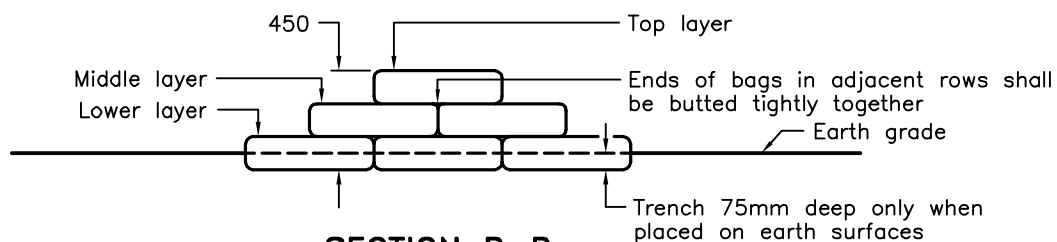
PLAN



**SECTION A-A
FLAT BOTTOM DITCH**



**SECTION A-A
V-DITCH**



SECTION B-B

NOTES:

- 1 Sufficient sandbags shall be placed to prevent end scouring.
- 2 For sandbag dimensions see OPSD 219.150.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

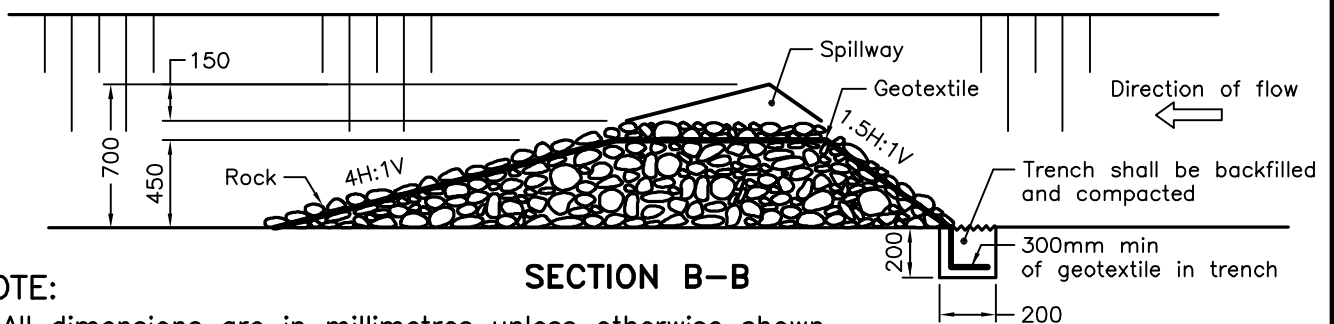
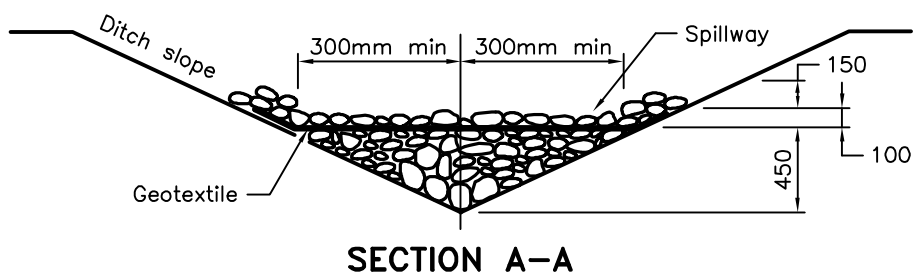
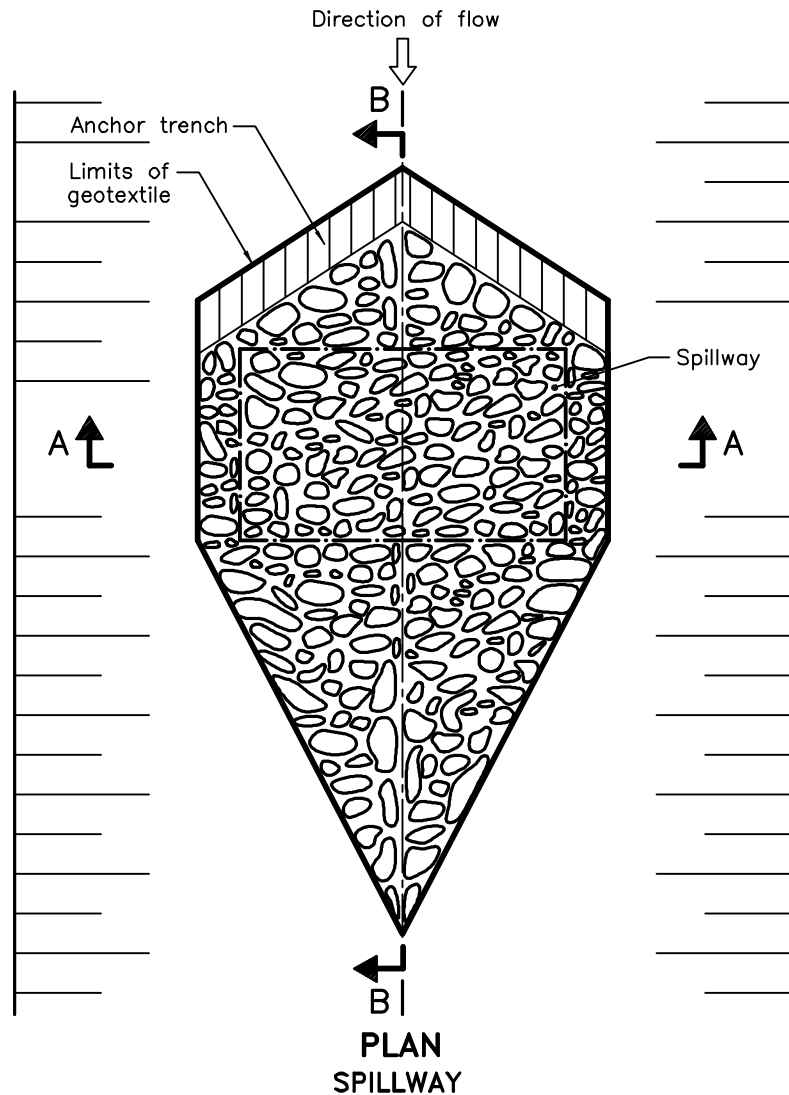
Nov 2015

Rev 2

SANDBAG FLOW CHECK DAM

OPSD 219.200





NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

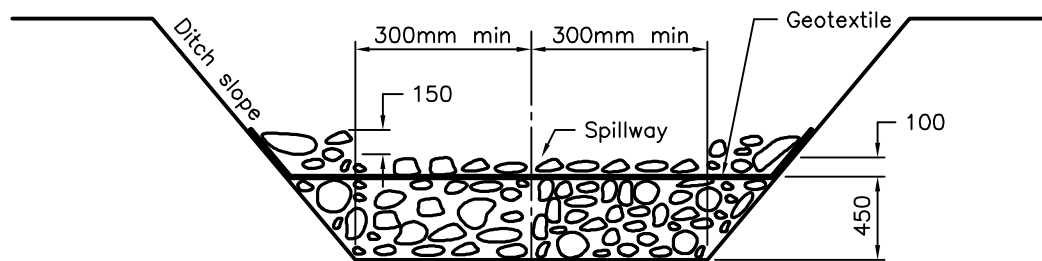
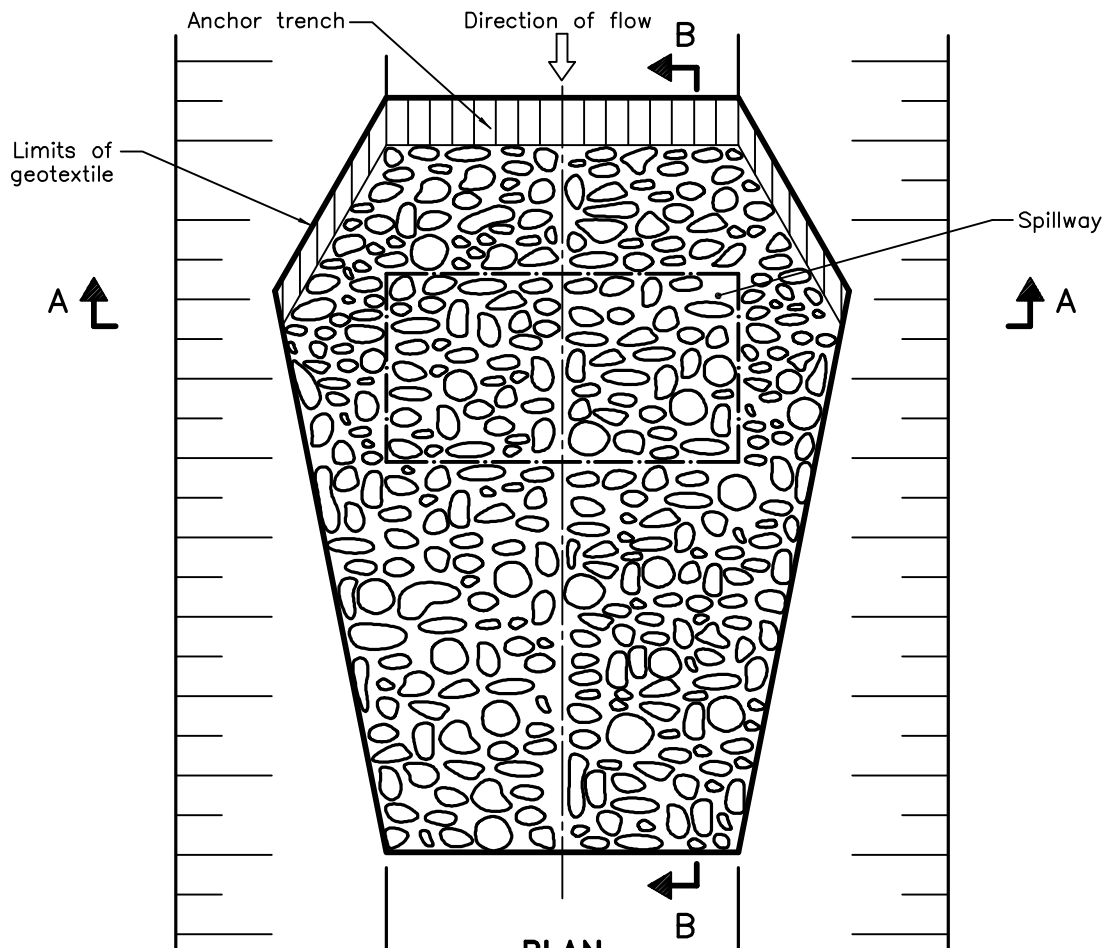
Nov 2015

Rev 2

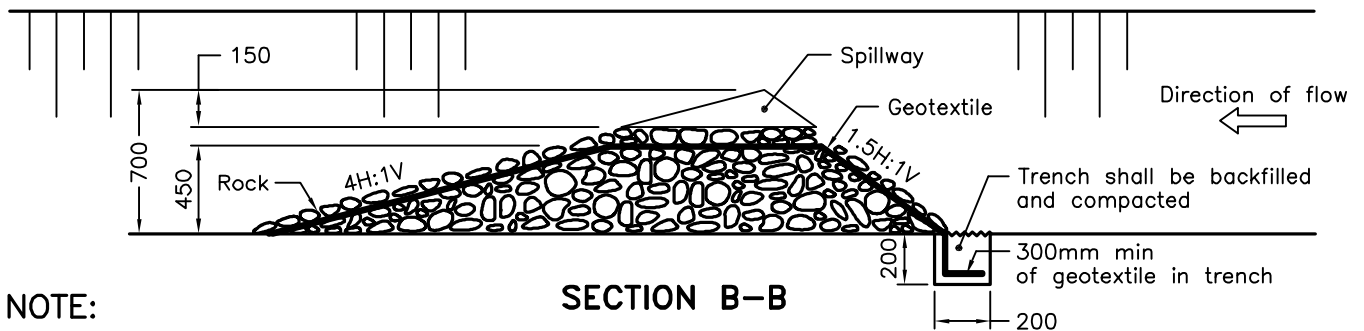
TEMPORARY
ROCK FLOW CHECK DAM
V-DITCH



OPSD 219.210



SECTION A-A



SECTION B-B

NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

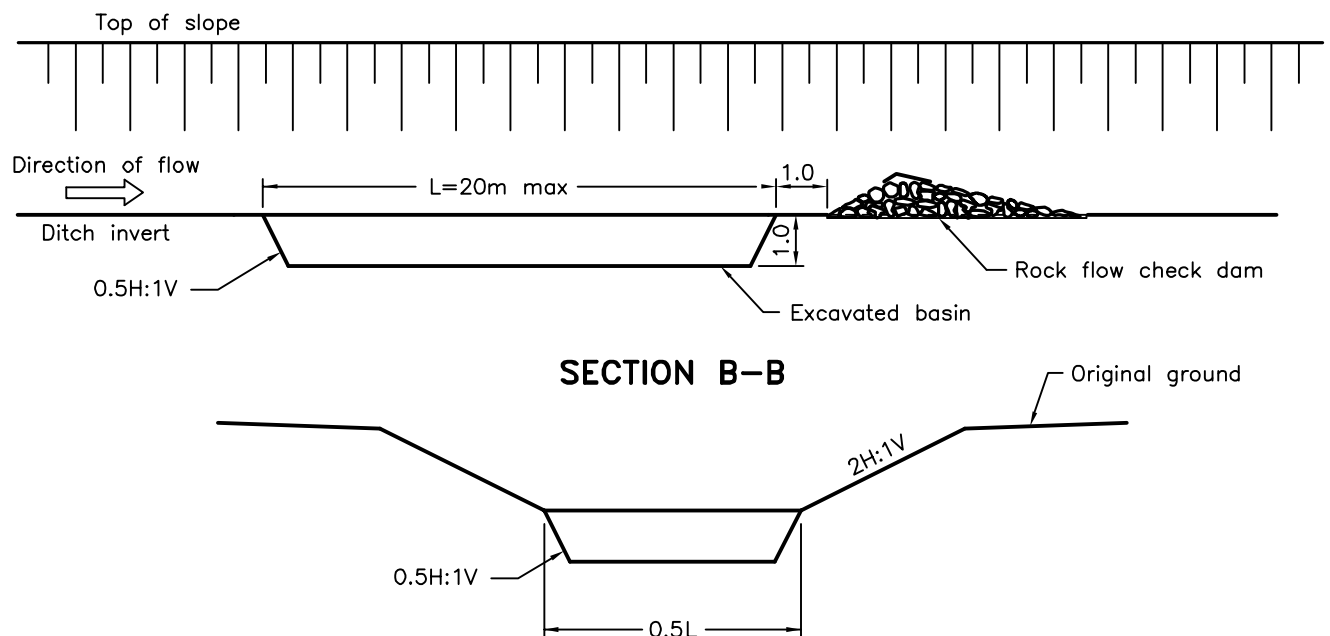
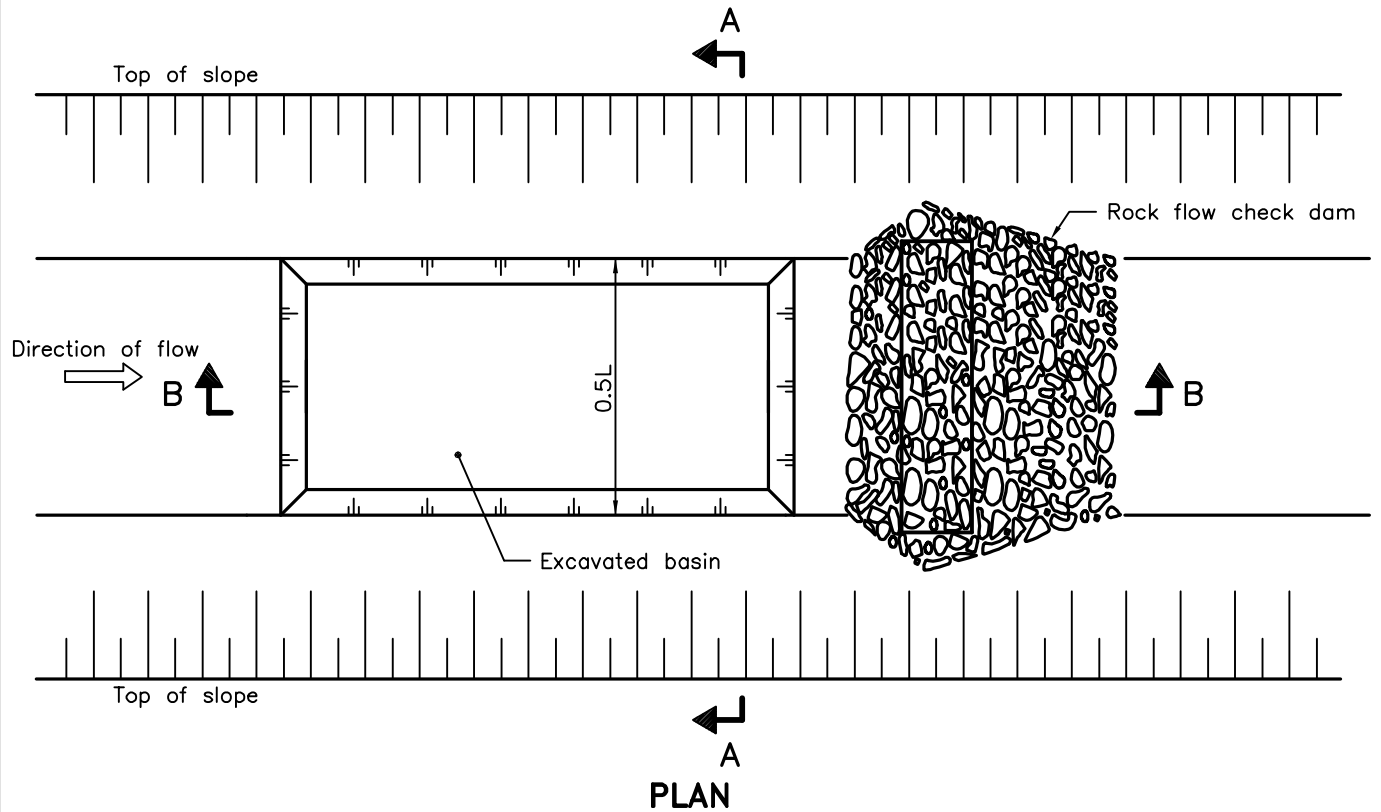
Nov 2015

Rev 2

**TEMPORARY
ROCK FLOW CHECK DAM
FLAT BOTTOM DITCH**



OPSD 219.211



NOTES:

A Ditch cross-section upstream or downstream of sediment trap may be flat bottom or V-shaped. Flat bottom shown.

B This OPSD shall be read in conjunction with OPSD 219.210 or 219.211.

C All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

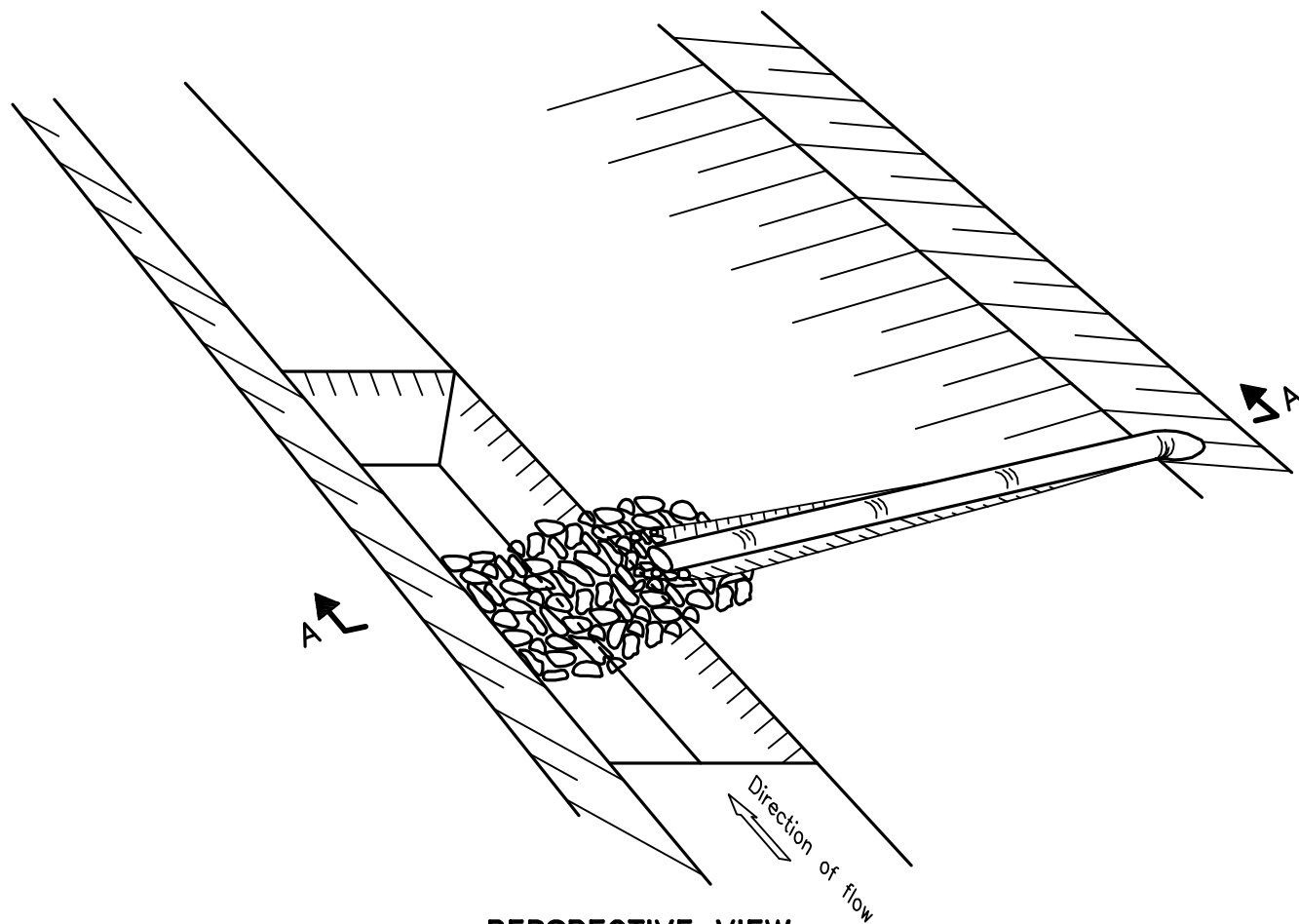
Nov 2015

Rev 2

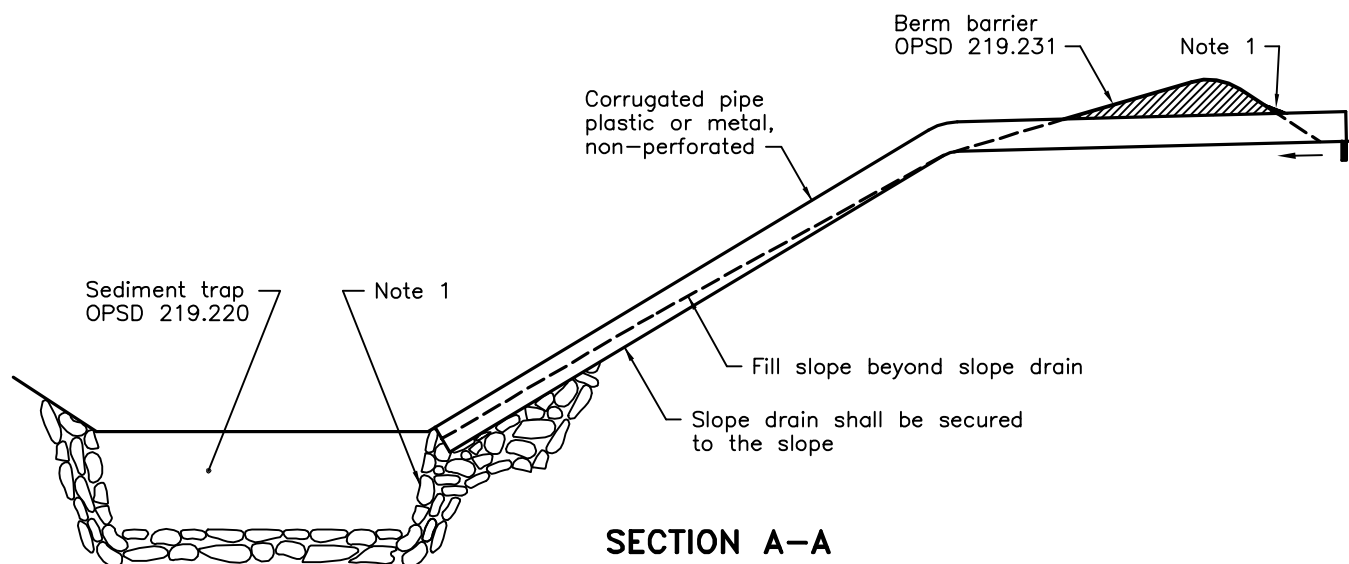
SEDIMENT TRAP IN DITCH



OPSD 219.220



PERSPECTIVE VIEW



SECTION A-A

NOTES:

1 Scour protection according to OPSD 810.010.

ONTARIO PROVINCIAL STANDARD DRAWING

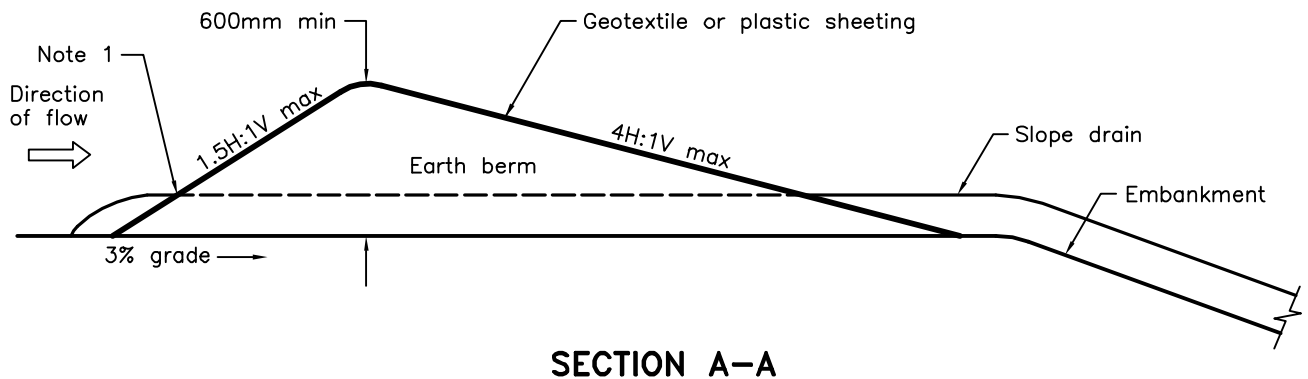
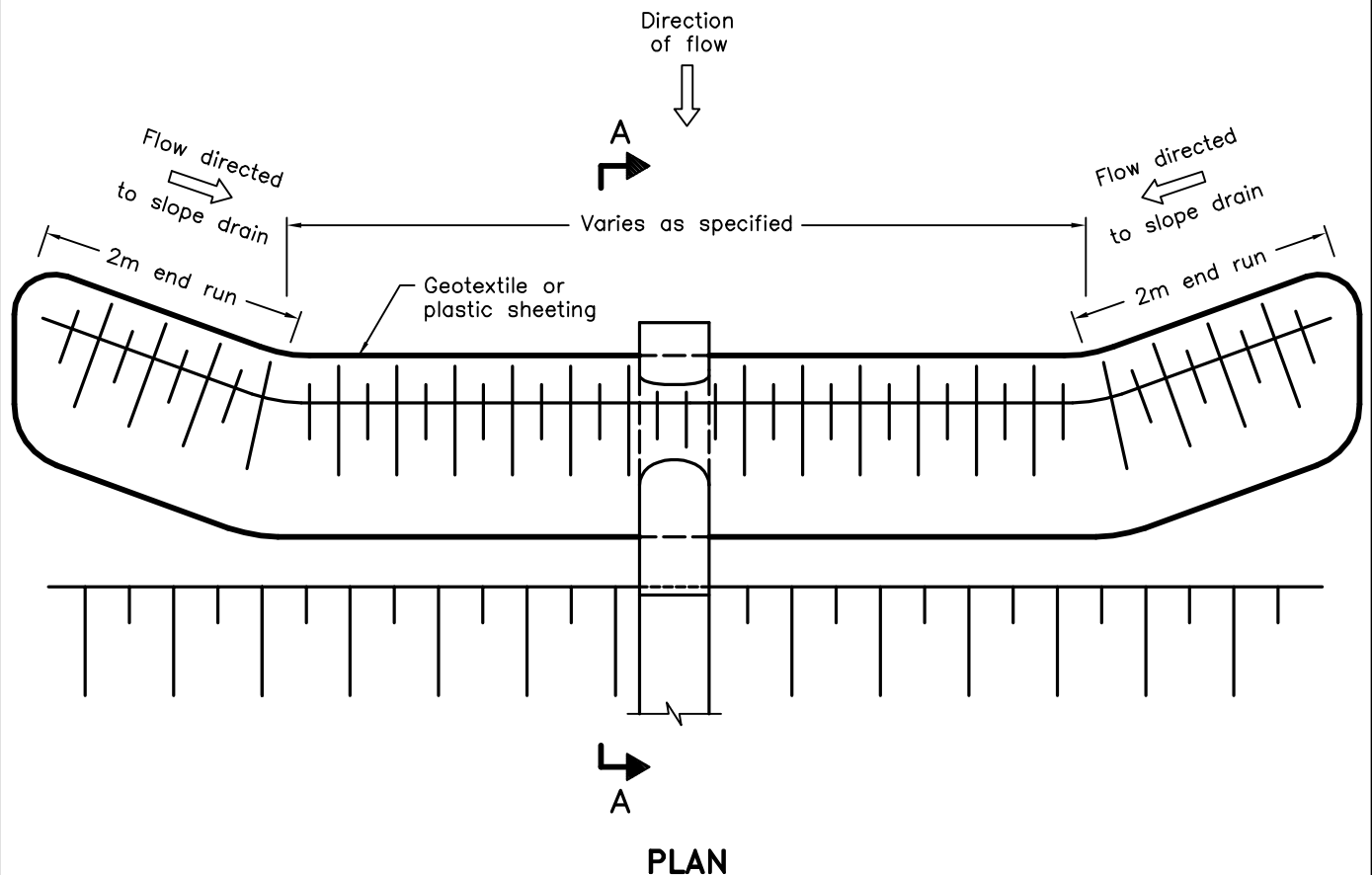
Nov 2015

Rev 4

**TEMPORARY SLOPE DRAIN FOR
SEDIMENT TRAP**

OPSD 219.230





NOTES:

1 Scour protection according to OPSD 810.010.

A This OPSD shall be read in conjunction with OPSD 219.230.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

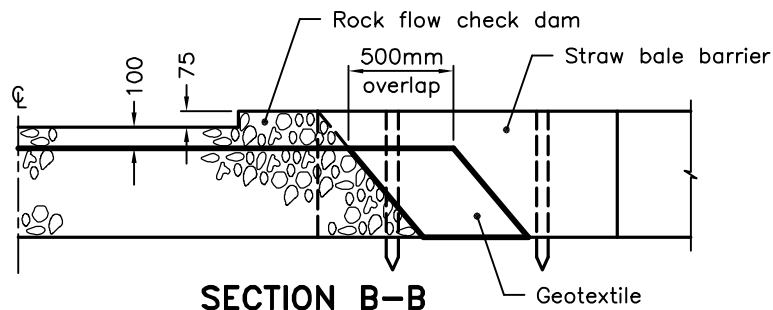
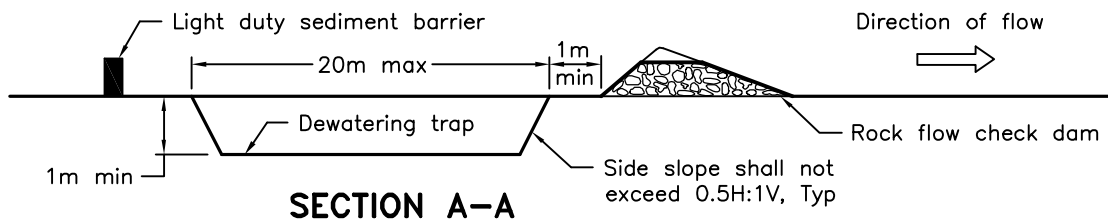
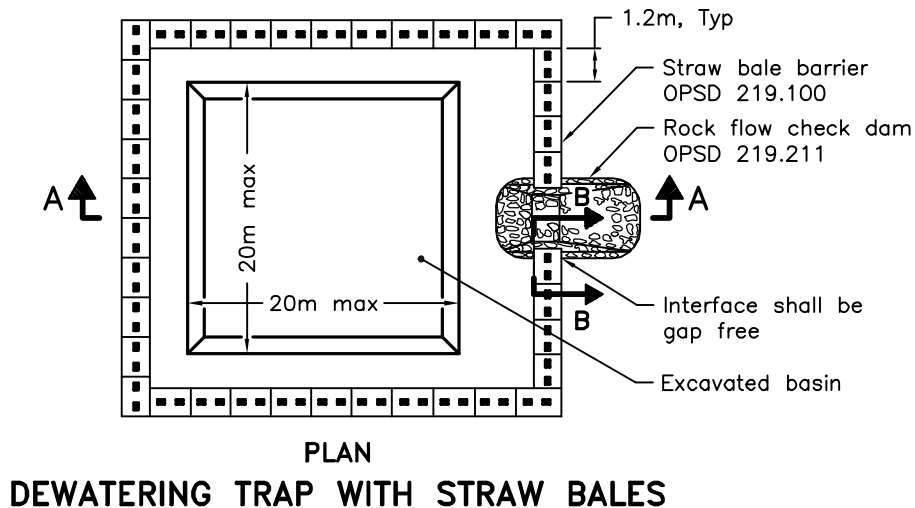
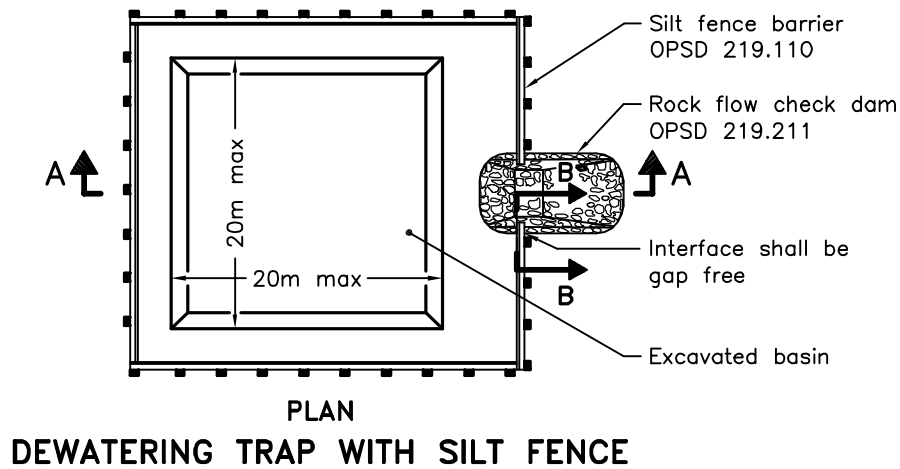
Nov 2015

Rev 1

**TEMPORARY BERM BARRIER
FOR SLOPE DRAIN**

OPSD 219.231





NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

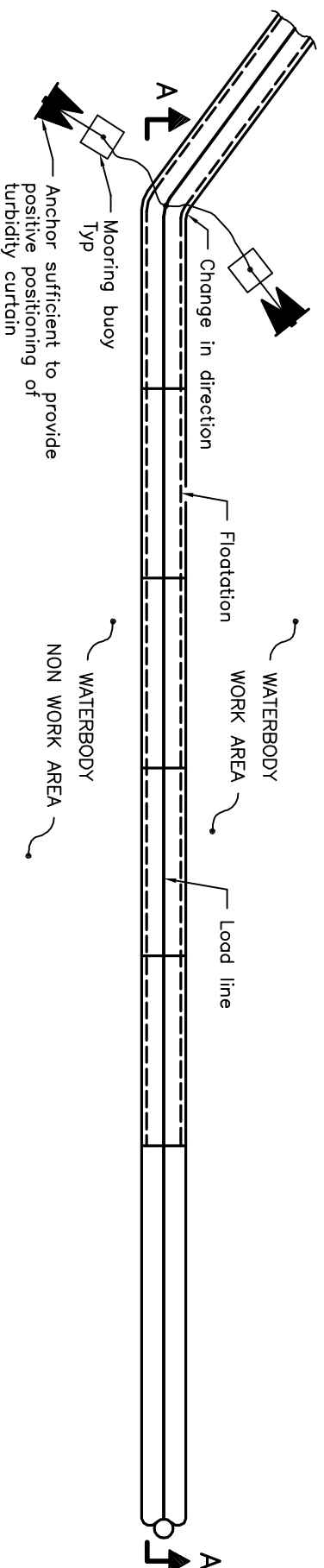
Nov 2015

Rev 2

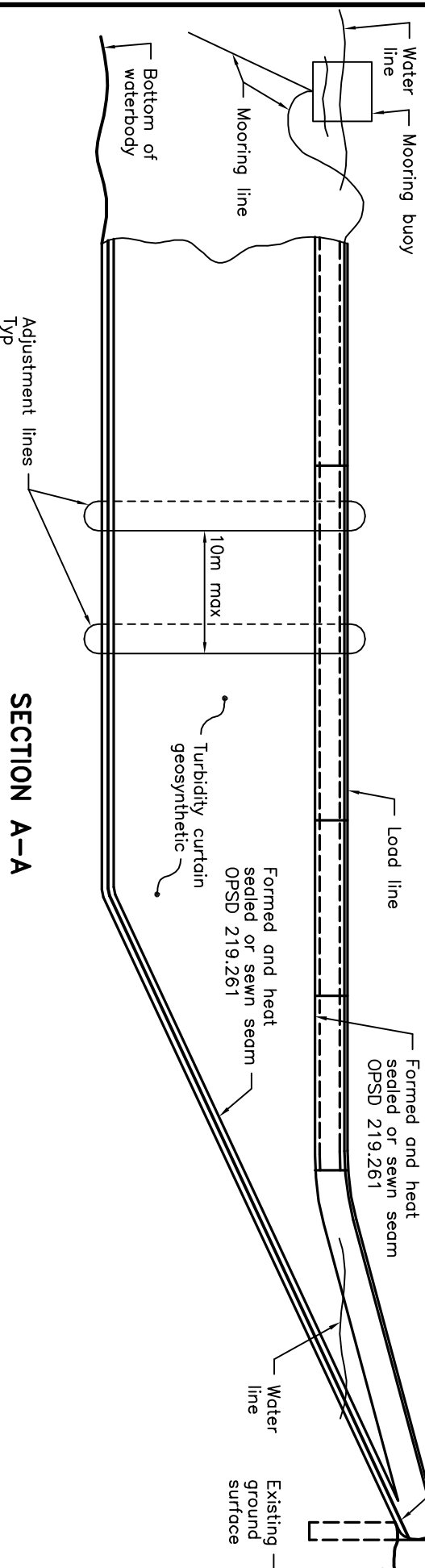
SEDIMENT TRAP FOR DEWATERING

OPSD 219.240





PLAN

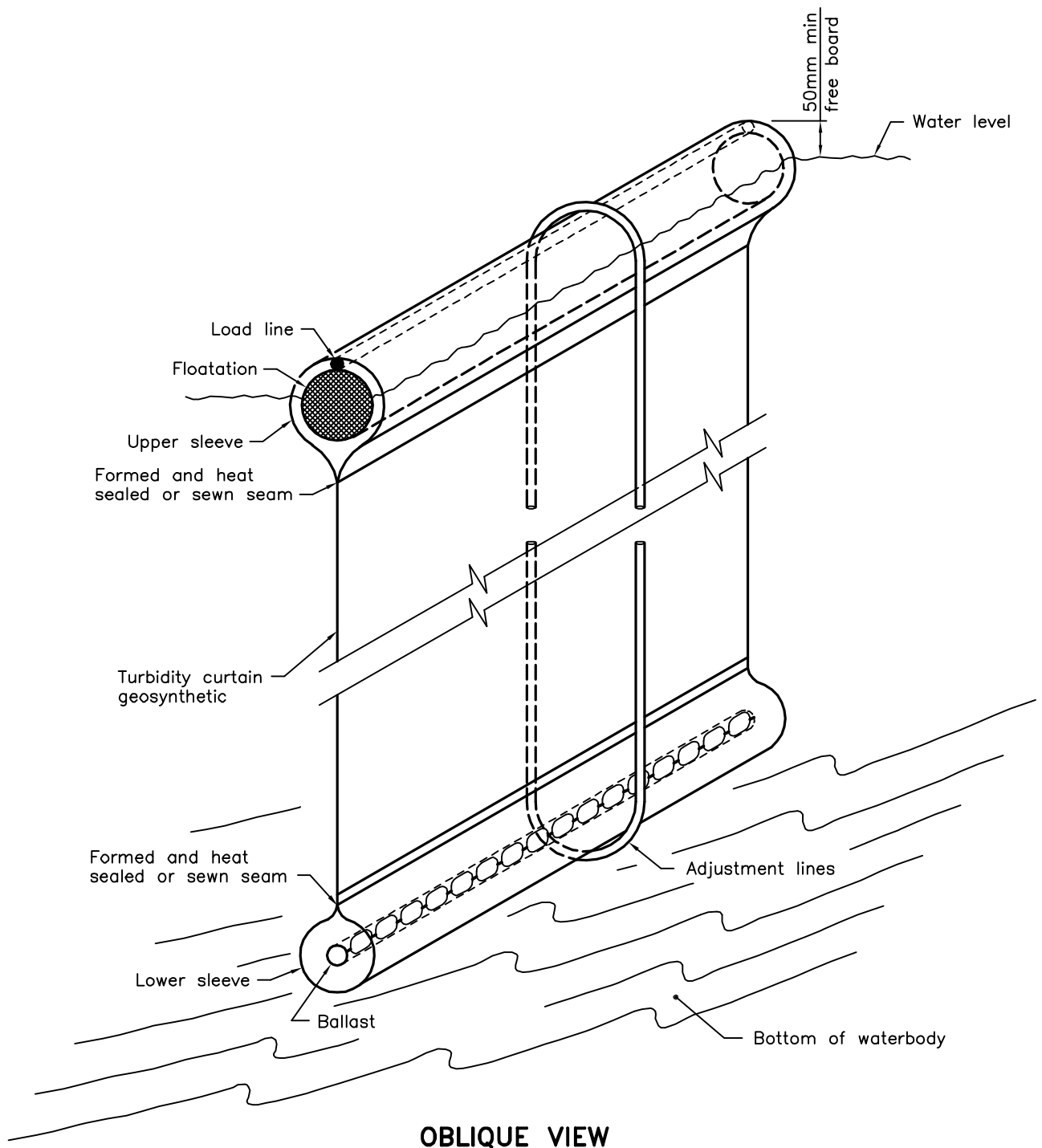


SECTION A-A

NOTES:

A All dimensions are in millimeters unless otherwise shown.

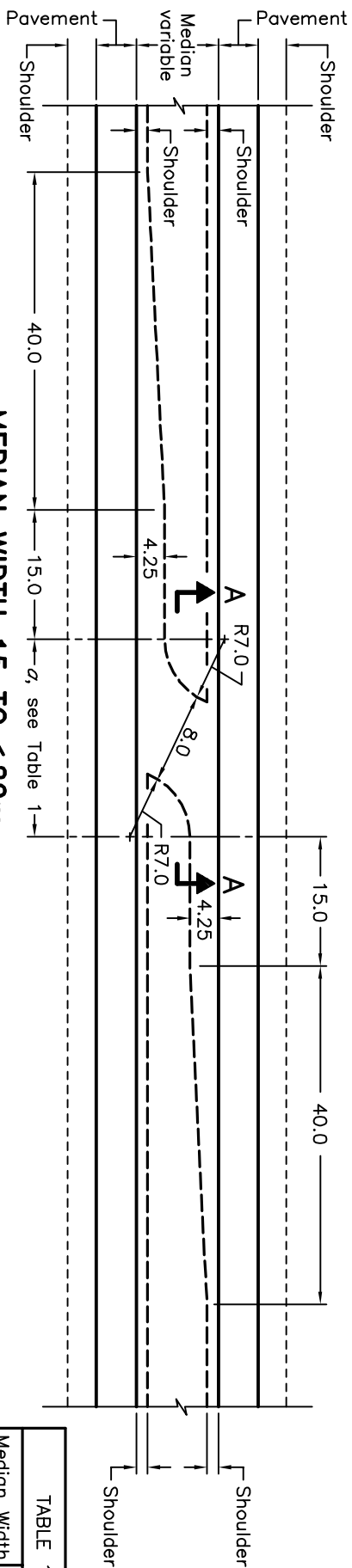
ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev 2	
TURBIDITY CURTAIN				
OPSD 219.260				



NOTES:

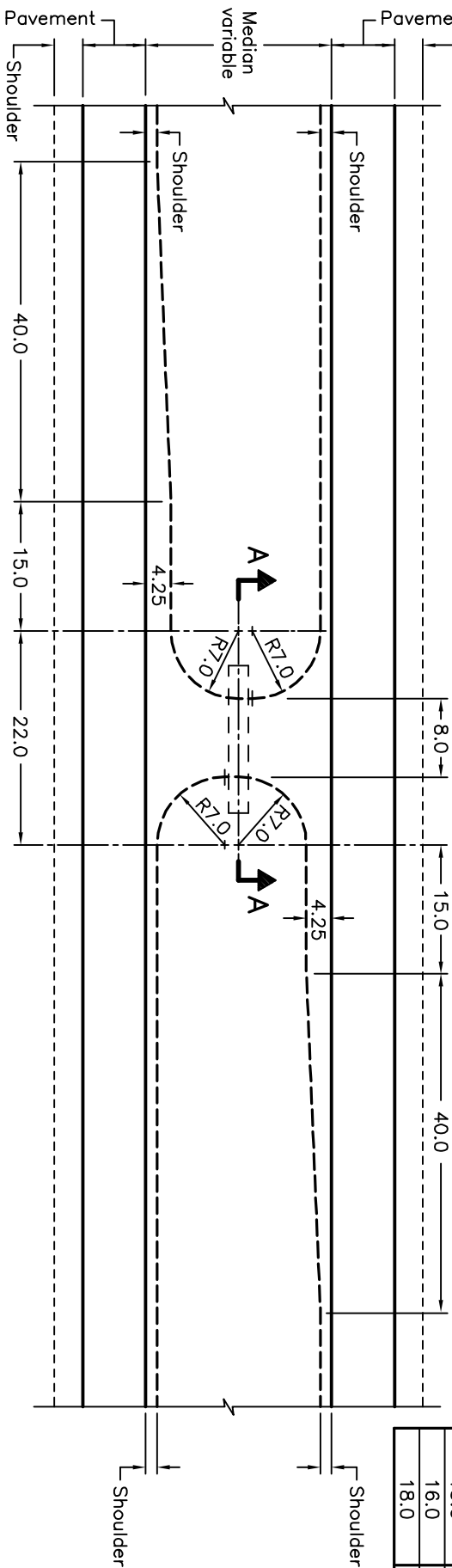
A All dimensions are in millimeters.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev	2	
TURBIDITY CURTAIN SEAM DETAIL		----- -----			
		OPSD 219.261			



MEDIAN WIDTH 15 TO < 20m

TABLE 1	
Median Width	<i>d</i>
15.0	20.68
16.0	21.02
18.0	21.54

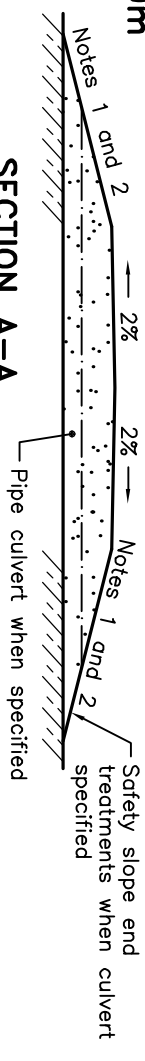


NOTES:

- 1 Slope shall be 10H:1V without a culvert.
 - 2 Slope shall be 6H:1V with a culvert.
- A No signs, guide rails, etc., are to be placed within the turning arc.
- B All dimensions are in metres unless otherwise shown.

MEDIAN WIDTH $\geq 20m$

SECTION A-A



ONTARIO PROVINCIAL STANDARD DRAWING

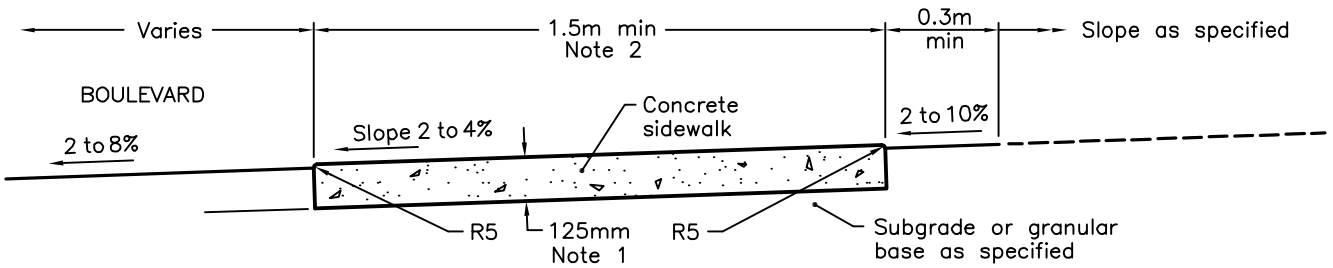
Nov 2015 Rev 2

MEDIAN CROSSOVERS

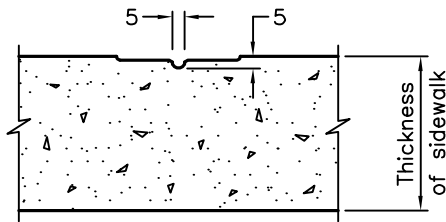
FOR SERVICE AND EMERGENCY VEHICLES

OPSD 302.010

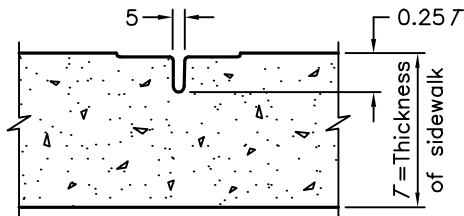




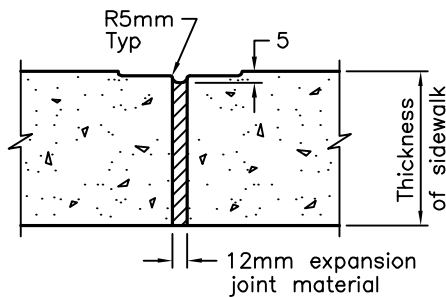
TYPICAL SECTION



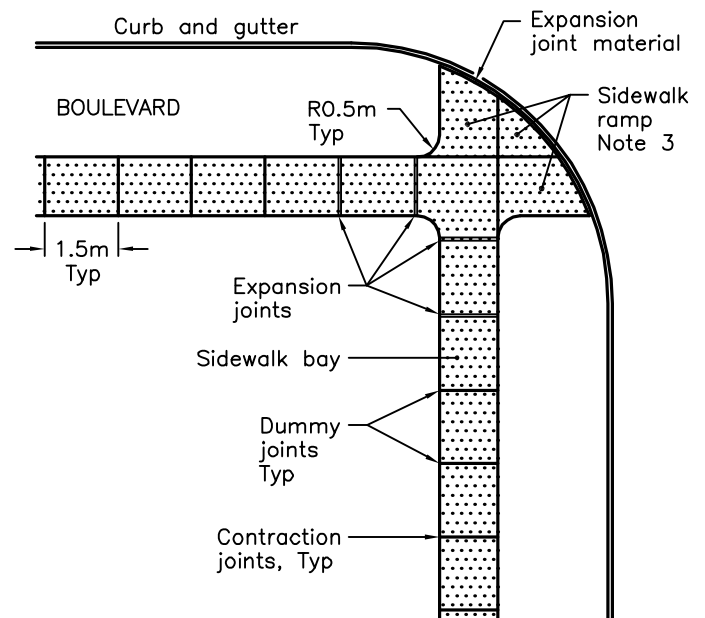
DUMMY JOINT (OPTIONAL)



CONTRACTION JOINT



EXPANSION JOINT



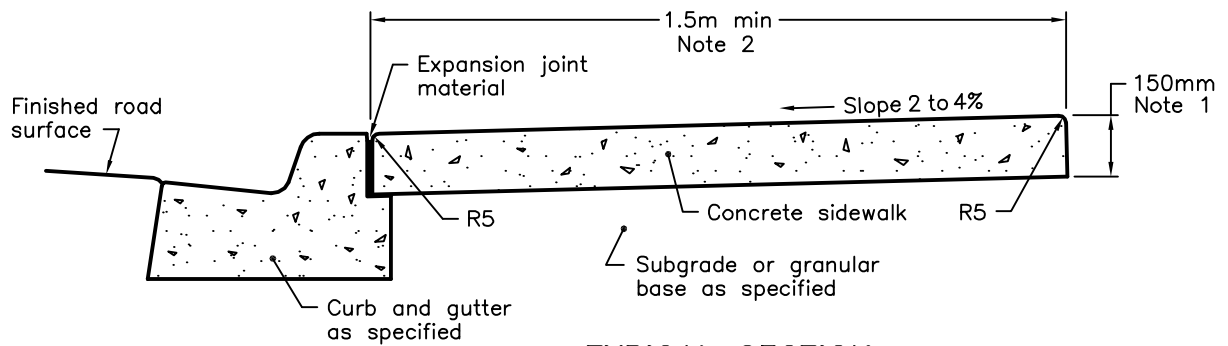
JOINT LAYOUT

NOTES:

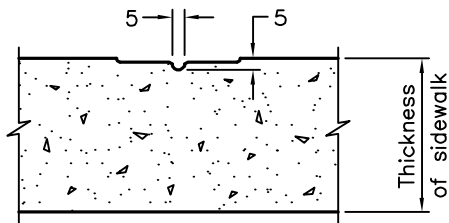
- 1 Sidewalk thickness at residential driveways and adjacent to curb shall be 150mm. At commercial and industrial driveways, the thickness shall be 200mm.
- 2 Sidewalk width shall be wider when specified.
- 3 This OPSD shall be read in conjunction with OPSD 310.030, 310.031, 310.032, 310.033 and 310.039.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev	2	
CONCRETE SIDEWALK		-----			

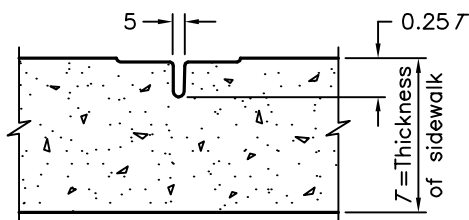
		OPSD 310.010			



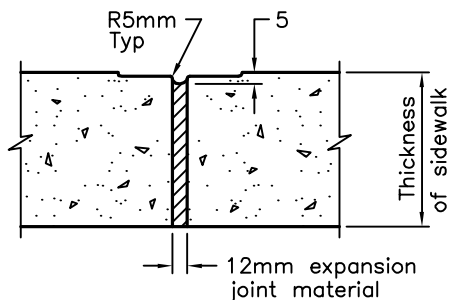
TYPICAL SECTION



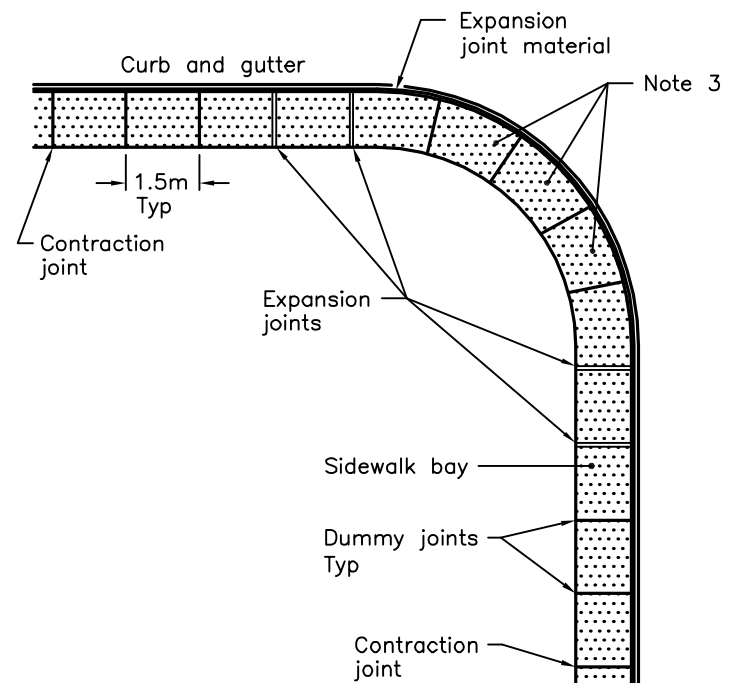
DUMMY JOINT



CONTRACTION JOINT



EXPANSION JOINT



JOINT LAYOUT

NOTES:

- 1 At commercial and industrial driveways, the thickness shall be 200mm.
 - 2 Sidewalk width shall be wider when specified.
 - 3 This OPSD shall be read in conjunction with OPSD 310.030, 310.031, 310.032, 310.033 and 310.039.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

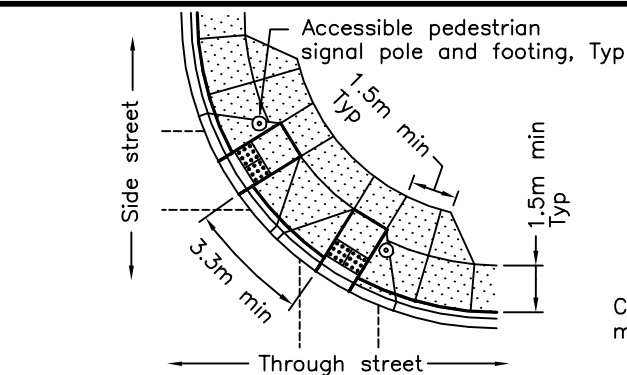
Nov 2015

Rev 2

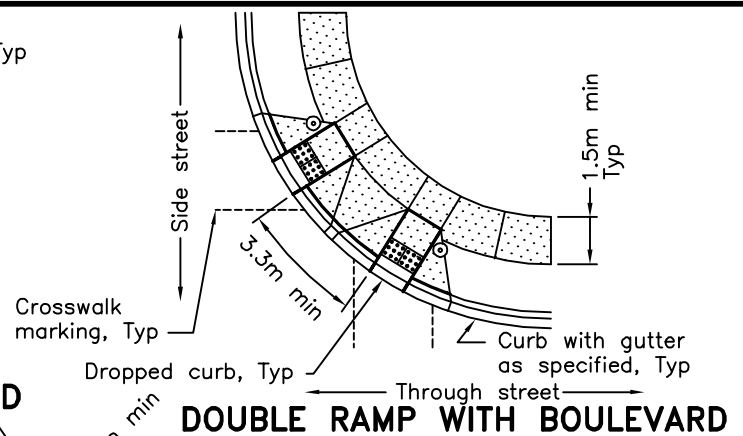
**CONCRETE SIDEWALK
ADJACENT TO CURB AND GUTTER**

OPSD 310.020

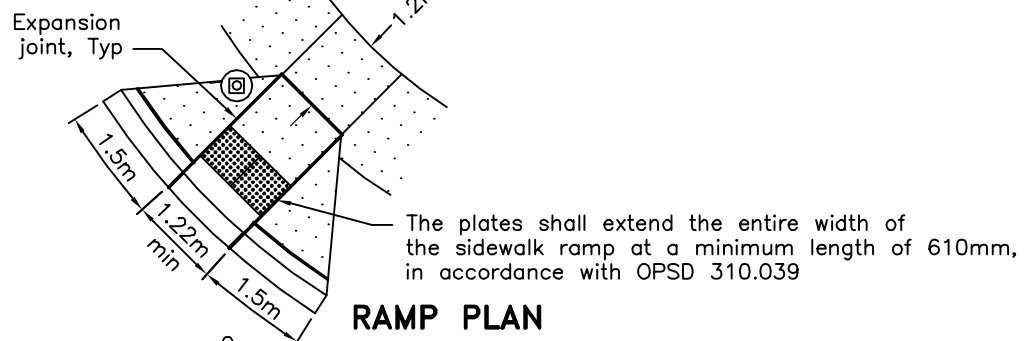




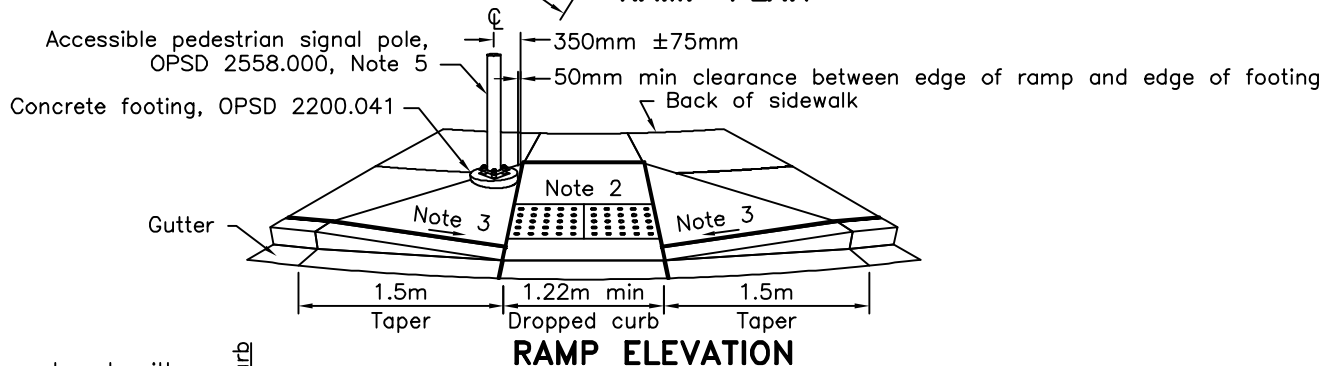
DOUBLE RAMP WITHOUT BOULEVARD



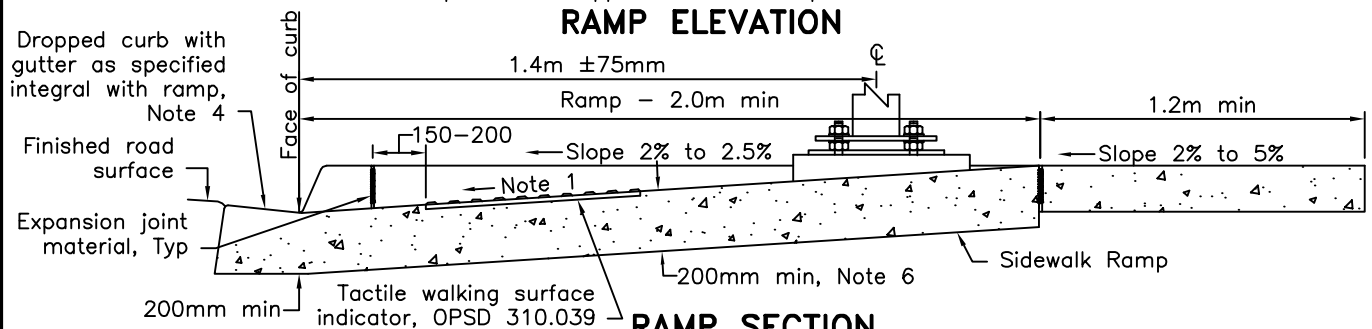
DOUBLE RAMP WITH BOULEVARD



RAMP PLAN



RAMP ELEVATION



RAMP SECTION

NOTES:

- 1 Slope of ramp shall not exceed 8%.
- 2 Cross slope of ramp shall not exceed 2% in either direction.
- 3 Cross slope of flared side of ramp shall not exceed 8%.
- 4 Dropped curb at ramp shall be modified to eliminate 30 mm step at gutter.
- 5 Accessible pedestrian signal to have tactile arrow that aligns with direction of crosswalk.
- 6 Minimum thickness of ramp is 200mm. Minimum thickness of sidewalk and flared sides adjacent to ramp is 150mm.
- A Where only one crosswalk is present at an intersection, only one curb ramp is required.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

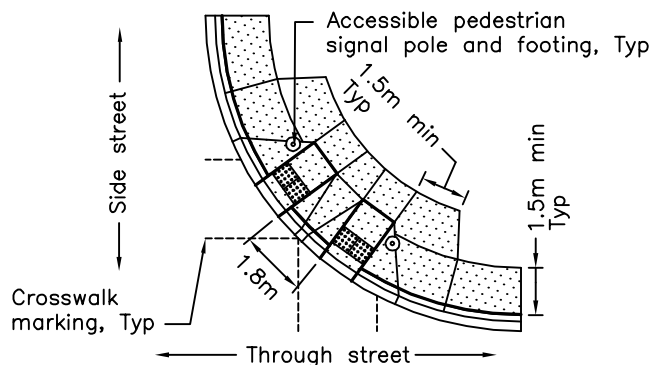
Nov 2015

Rev 1

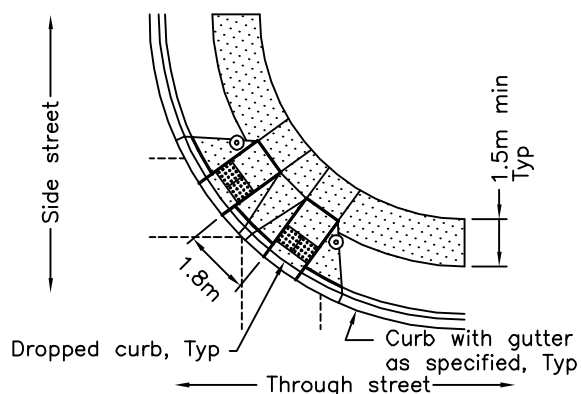
**CONCRETE SIDEWALK RAMPS AT
SIGNALIZED INTERSECTIONS**

OPSD 310.030

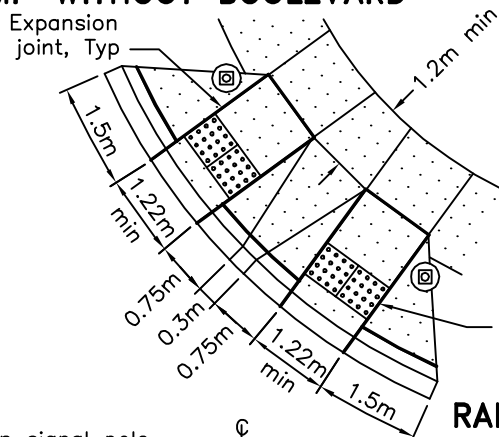




DOUBLE RAMP WITHOUT BOULEVARD

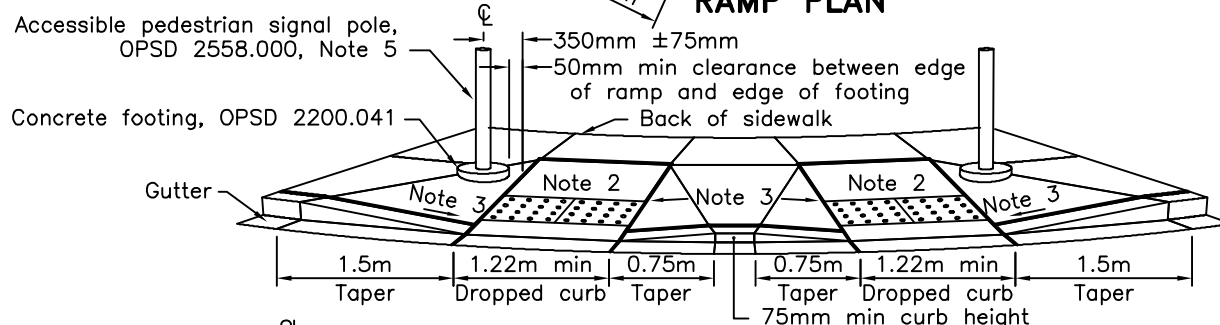


DOUBLE RAMP WITH BOULEVARD

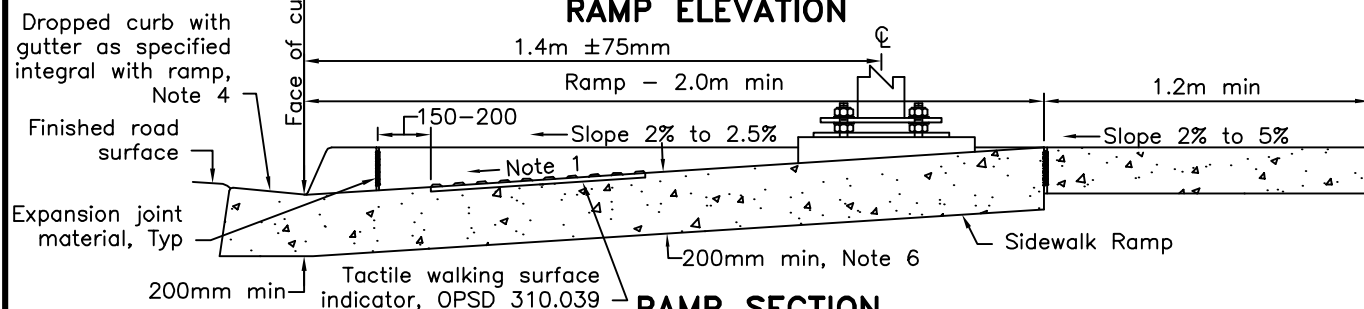


The plates shall extend the entire width of the sidewalk ramp at a minimum length of 610mm, in accordance with OPSD 310.039

RAMP PLAN



RAMP ELEVATION



RAMP SECTION

NOTES:

- 1 Slope of ramp shall not exceed 8%.
- 2 Cross slope of ramp shall not exceed 2% in either direction.
- 3 Cross slope of flared side of ramp shall not exceed 8%.
- 4 Dropped curb at ramp shall be modified to eliminate 30 mm step at gutter line.
- 5 Accessible pedestrian signal to have tactile arrow that aligns with direction of crosswalk.
- 6 Minimum thickness of ramp is 200mm. Minimum thickness of sidewalk and flared sides adjacent to ramp is 150mm.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015

Rev 0

**CONCRETE SIDEWALK RAMPS AT
SIGNALIZED INTERSECTIONS WITH
INTERSECTING CROSSWALKS**

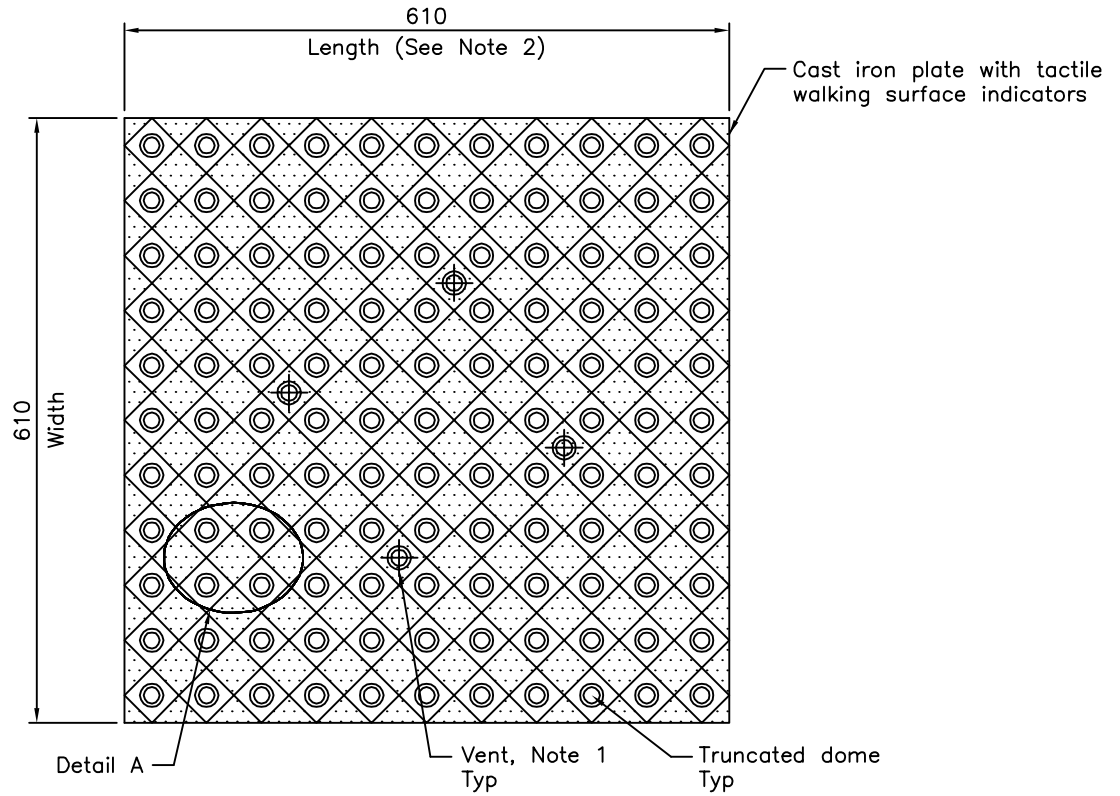
OPSD 310.031





A All dimensions are in millimetres unless otherwise shown.

OPSD 310.033

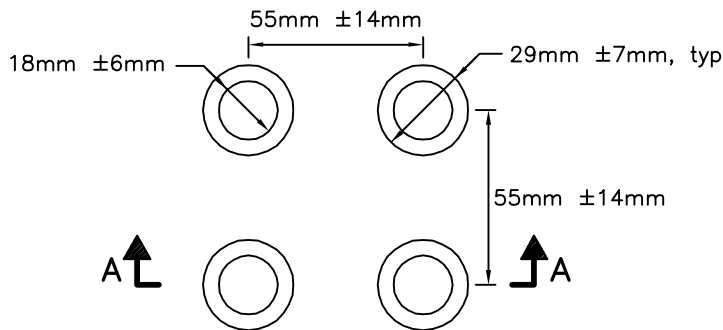


PLAN

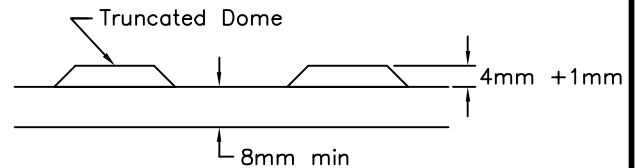


ELEVATION

Ribs as specified
by manufacturer



**DETAIL A
TRUNCATED DOMES PLAN**



SECTION A-A

NOTES:

- 1 Vents shall be as specified by the manufacturer.
- 2 Length of plate may be increased to suit the curb depression width.
- A Adjacent cast iron plates shall be permanently connected using a locking mechanism and any hardware shall be hot dipped galvanized.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

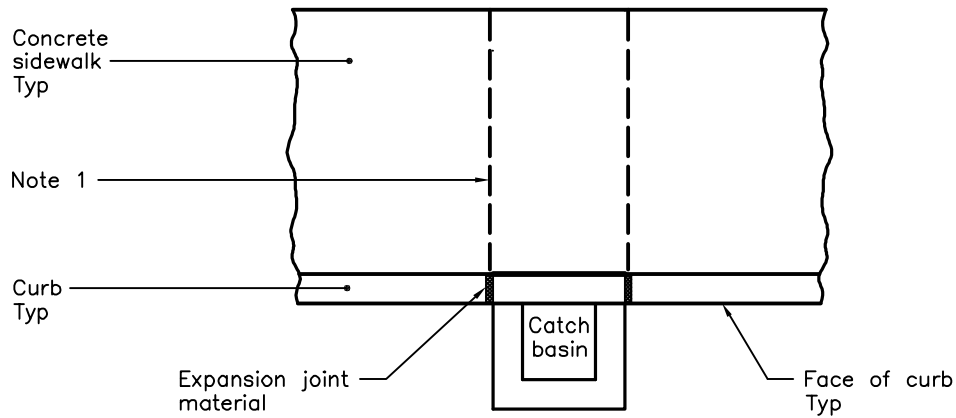
Nov 2015

Rev 0

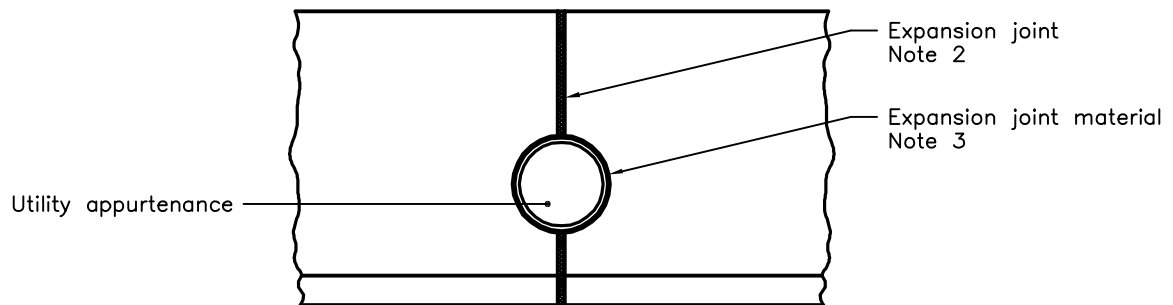
**CONCRETE SIDEWALK RAMPS
TACTILE WALKING SURFACE
INDICATORS COMPONENT**



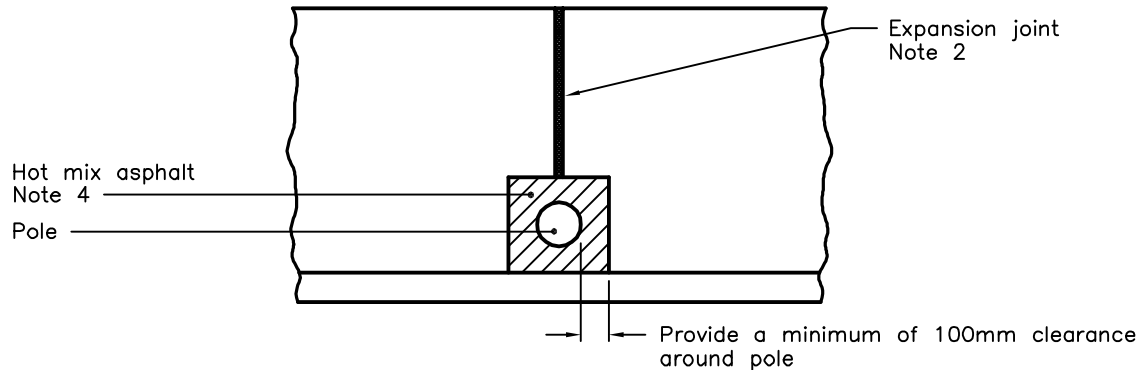
OPSD 310.039



CATCH BASIN



UTILITY APPURTENANCE



UTILITY POLE

NOTES:

- | | |
|--|---|
| <p>1 Expansion joint through sidewalk is required when curb and gutter is poured integral with sidewalk.</p> <p>2 Adjust joints to coincide with centre of utility, with minimum slab length of 1m.</p> <p>3 Expansion joint material shall be placed around Utility appurtenance flush with concrete surface.</p> | <p>4 For concrete alternative use expansion joint material around boxout.</p> <p>A For expansion joint detail, see OPSD 310.010.</p> <p>B All dimensions are in millimetres unless otherwise shown.</p> |
|--|---|

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015

Rev 2

**UTILITY ISOLATION
IN CONCRETE SIDEWALKS**

OPSD 310.040





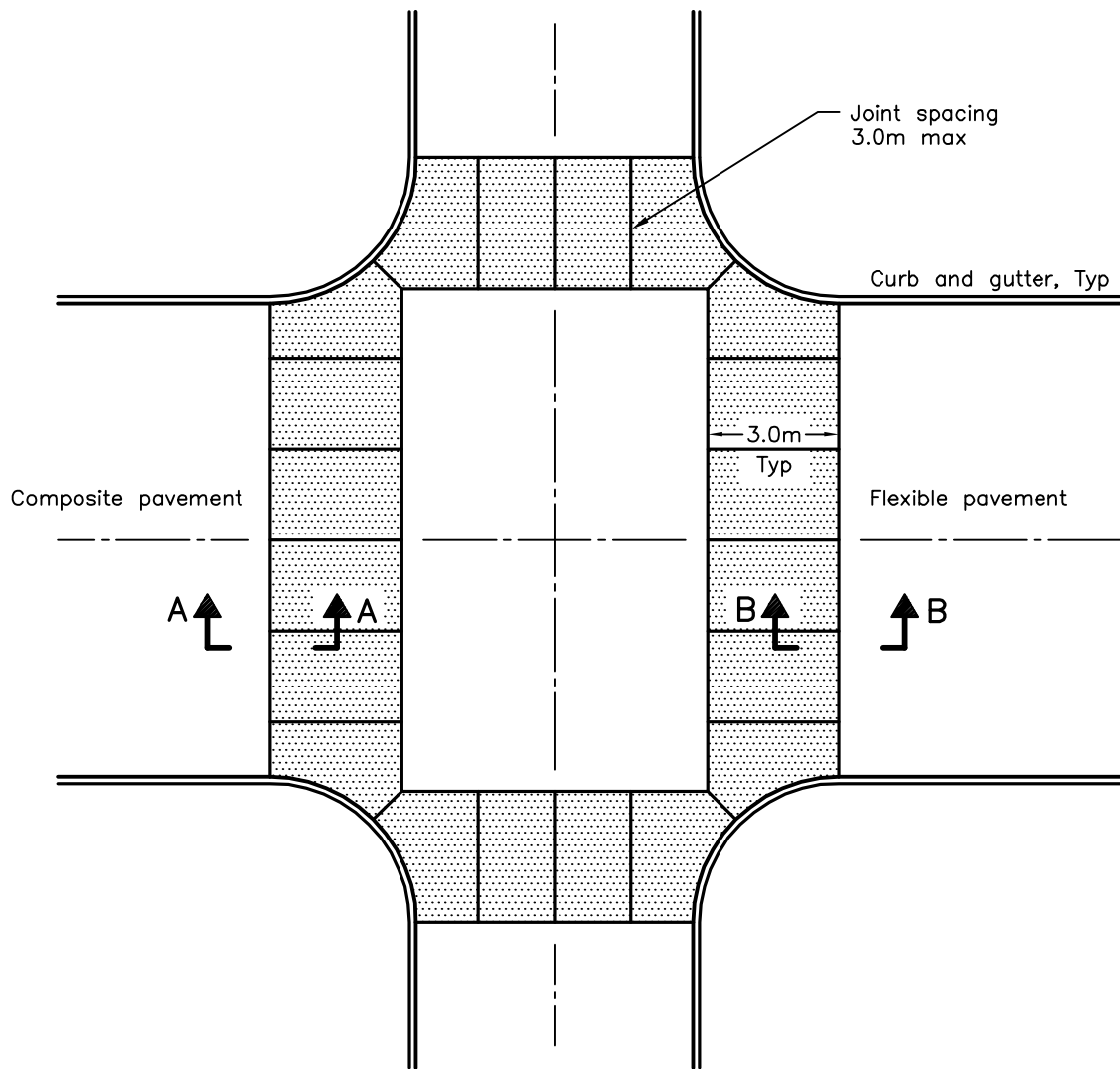
**SIDEWALK WITHOUT BOULEVARD
SECTION A-A**



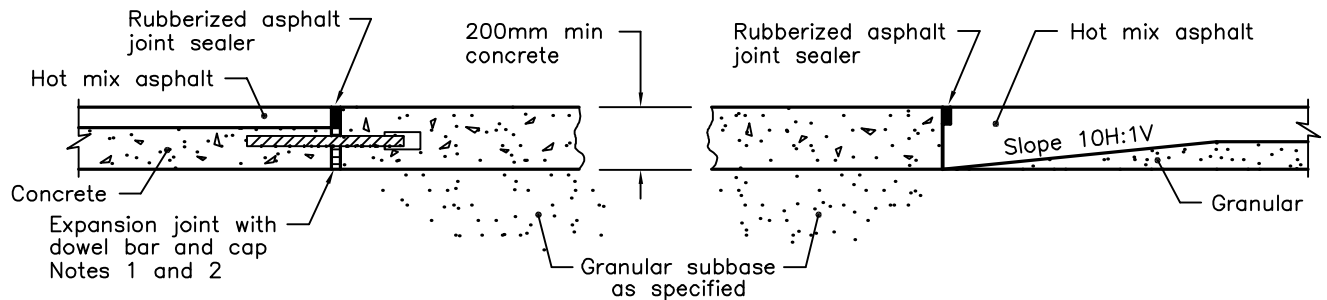
1 At commercial and industrial driveways, the thickness shall be 200mm.

A For contraction joint detail, see OPD 310.010.

B All dimensions are in millimetres unless otherwise shown.



PLAN



**COMPOSITE PAVEMENT
SECTION A-A**

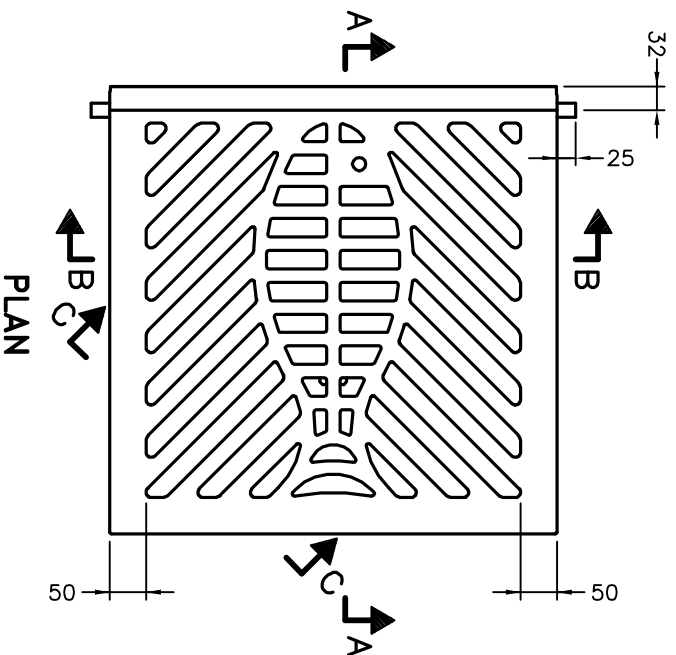
**FLEXIBLE PAVEMENT
SECTION B-B**

NOTES:

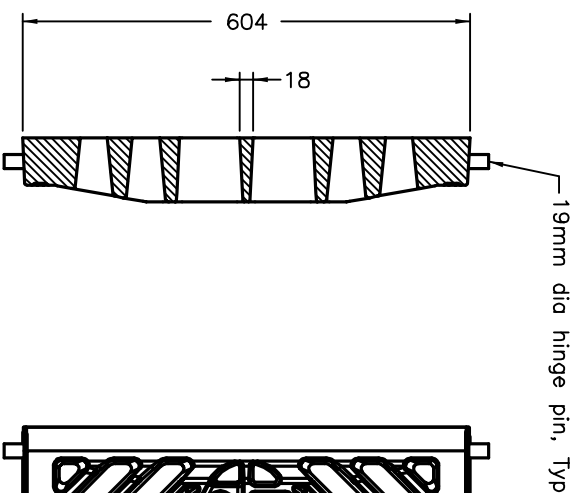
- 1 For expansion joint detail, see OPSD 552.020.
- 2 Dowel bar with cap shall be installed at 300mm centres.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	2	
JOINT DETAIL FOR CONCRETE PEDESTRIAN CROSSWALK AT SIGNALIZED AND ALL-WAY STOP CONTROLLED INTERSECTIONS	-----			

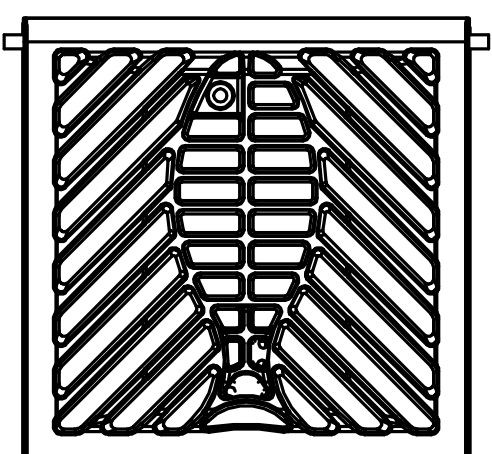
OPSD 310.060				



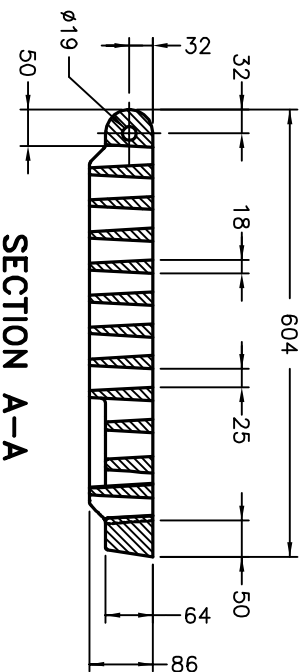
PLAN



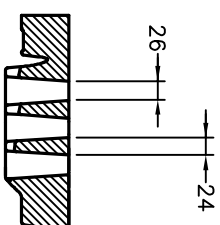
SECTION B-B



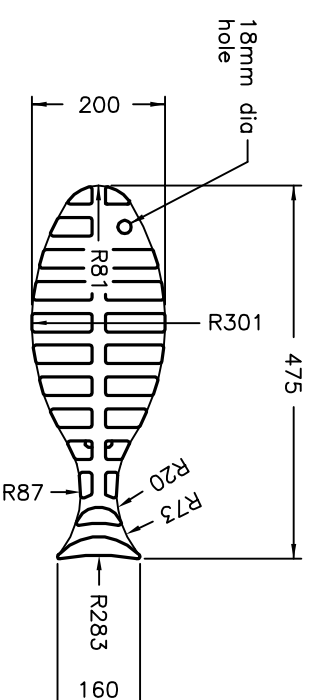
BOTTOM VIEW



SECTION A-A



SECTION C-C



FISH DETAIL

NOTE:

- A This OPSD shall be read in conjunction with OPSD 400.020.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

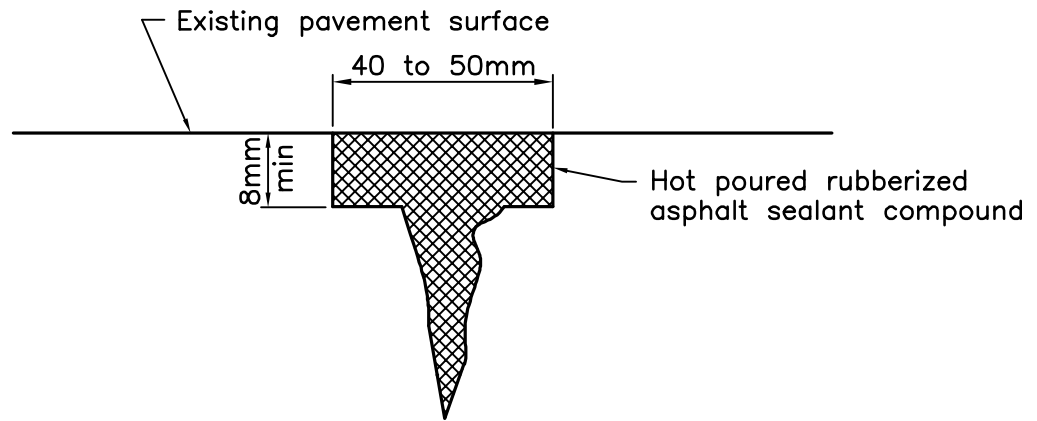
Nov 2015 Rev 1

CAST IRON, SQUARE FRAME

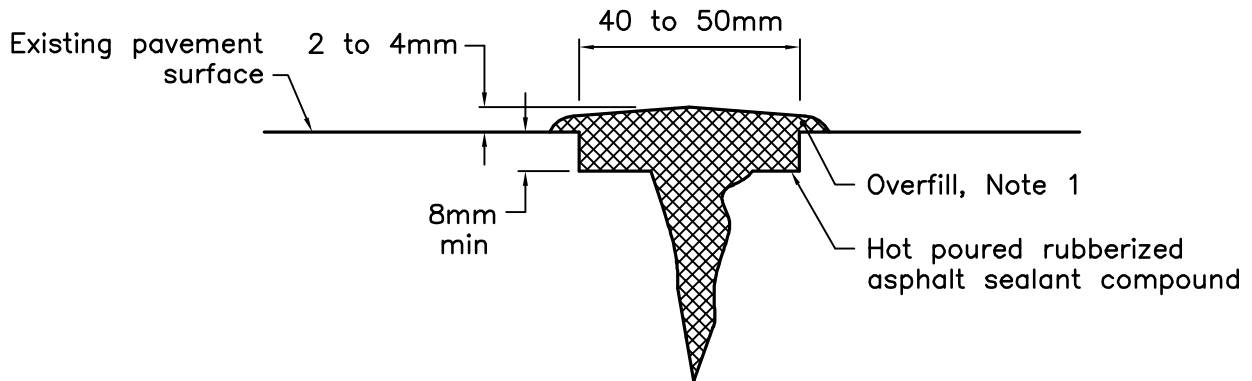
FISH TYPE COVER

OPSD 401.081

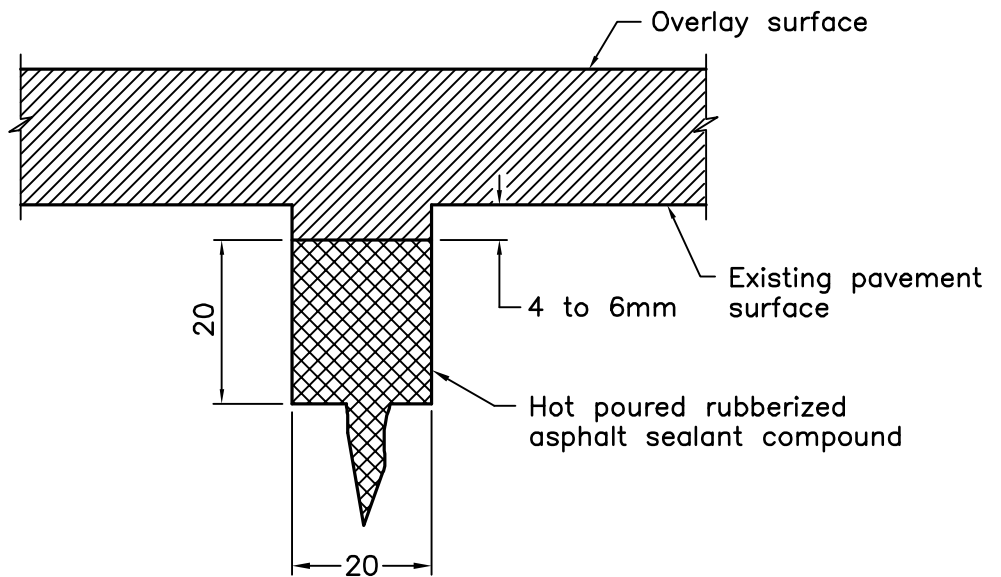




FLUSH FILL OF CRACKS WITHOUT OVERLAY



OVERFILL OF CRACKS WITHOUT OVERLAY



CRACKS WITH ASPHALT OVERLAY

NOTE:

- 1 Final overfill geometry after cooling of sealant material.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

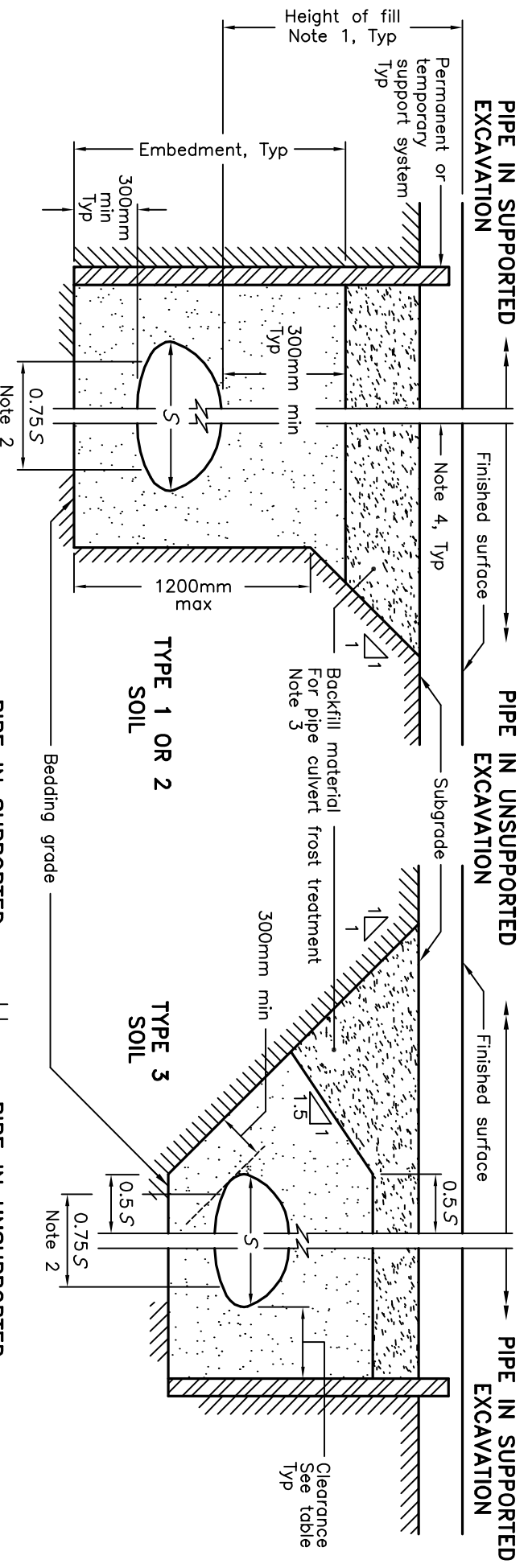
Nov 2015

Rev 2

ROUTING AND SEALING CRACKS
UP TO 20mm IN WIDTH
IN ASPHALT PAVEMENT

OPSD 508.010





LEGEND:

S – Span of pipe arch

NOTES:

- 1 Height of fill is measured from the finished surface to top of pipe. Height of fill over pipe shall be according to OPSD 805.020.
- 2 For width 0.75S, granular material shall be uncompacted for its full depth and fine graded to shape of bottom of the pipe arch.
- 3 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
- 4 Condition of excavation is symmetrical about centreline of pipe.

A Granular material placed in the haunch area, other than the area included in Note 2, shall be compacted prior to placing and compacting the remainder of the embedment material.

B Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.

C All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015

Rev 3

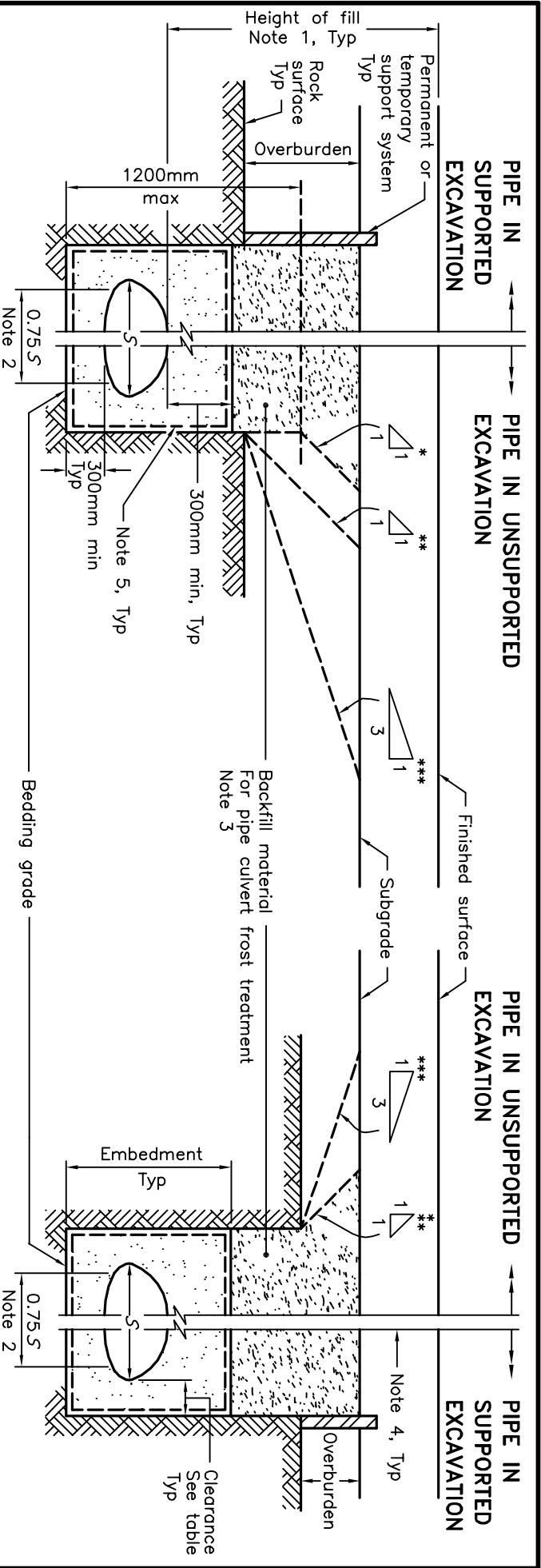
FLEXIBLE PIPE ARCH
 EMBEDMENT AND BACKFILL
 EARTH EXCAVATION

CLEARANCE TABLE	
Pipe Span mm	Clearance mm
900 or less	300
Over 900	500

Backfill material
 For pipe culvert frost
 treatment, Note 3



OPSD 802.020



ORIGINAL ROCK < 1200mm ABOVE TRENCH BOTTOM

NOTES:

- 1 Height of fill is measured from the finished surface to top of pipe.
 - Height of fill over pipe shall be according to OPSD 805.020.
 - 2 For width 0.75S, granular material shall be uncompacted for its full depth and fine graded to shape of bottom of the pipe arch.
 - 3 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
 - 4 Condition of excavation is symmetrical about centreline of pipe.
 - 5 Embedment material shall be wrapped in non-woven geotextile when specified.
- A Granular material placed in the haunch area, other than the area included in Note 2, shall be compacted prior to placing and compacting the remainder of the embedment material.
- B Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
- C Fractured rock shall be treated as Type 1 soil.
- D All dimensions are in metres unless otherwise shown.

ORIGINAL ROCK ≥ 1200mm ABOVE TRENCH BOTTOM

LEGEND:

- S – Span of pipe arch
- * – Type 1 or 2 soil
- ** – Type 3 soil
- *** – Type 4 soil

CLEARANCE TABLE	
Pipe Span mm	Clearance mm
900 or less	300
Over 900	500

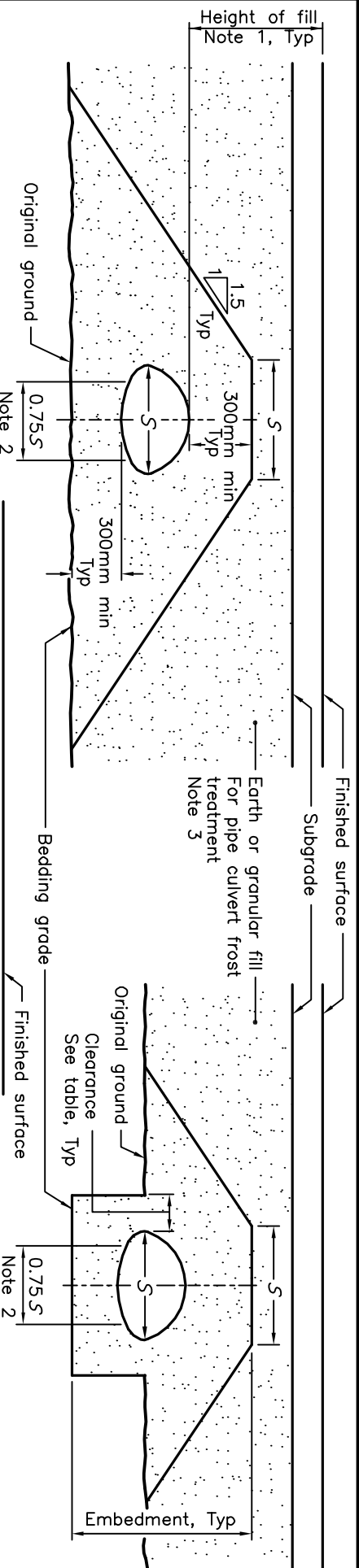
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 3

**FLEXIBLE PIPE ARCH
EMBEDMENT AND BACKFILL
ROCK EXCAVATION**

OPSD 802.023





PIPE INVERT ABOVE ORIGINAL GROUND

PIPE INVERT AT OR BELOW ORIGINAL GROUND

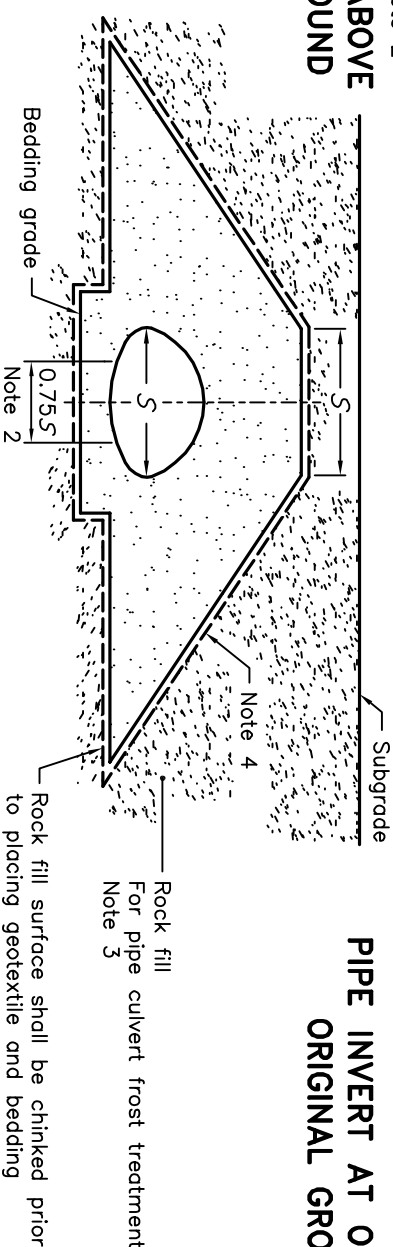
LEGEND:

S – Span of pipe arch

NOTES:

- 1 Height of fill is measured from the finished surface to top of pipe.
Height of fill over pipe shall be according to OPSD 805.020.
 - 2 For width 0.75S, granular material shall be uncompacted for its full depth and fine graded to shape of bottom of the pipe arch.
 - 3 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
 - 4 Embedment material shall be wrapped in non-woven geotextile when specified.
- A Granular material placed in the haunch area, other than the area included in Note 2, shall be compacted prior to placing and compacting the remainder of the embedment material.

PIPE EMBEDMENT WITH ROCK FILL UNDER AND OVER THE PIPE

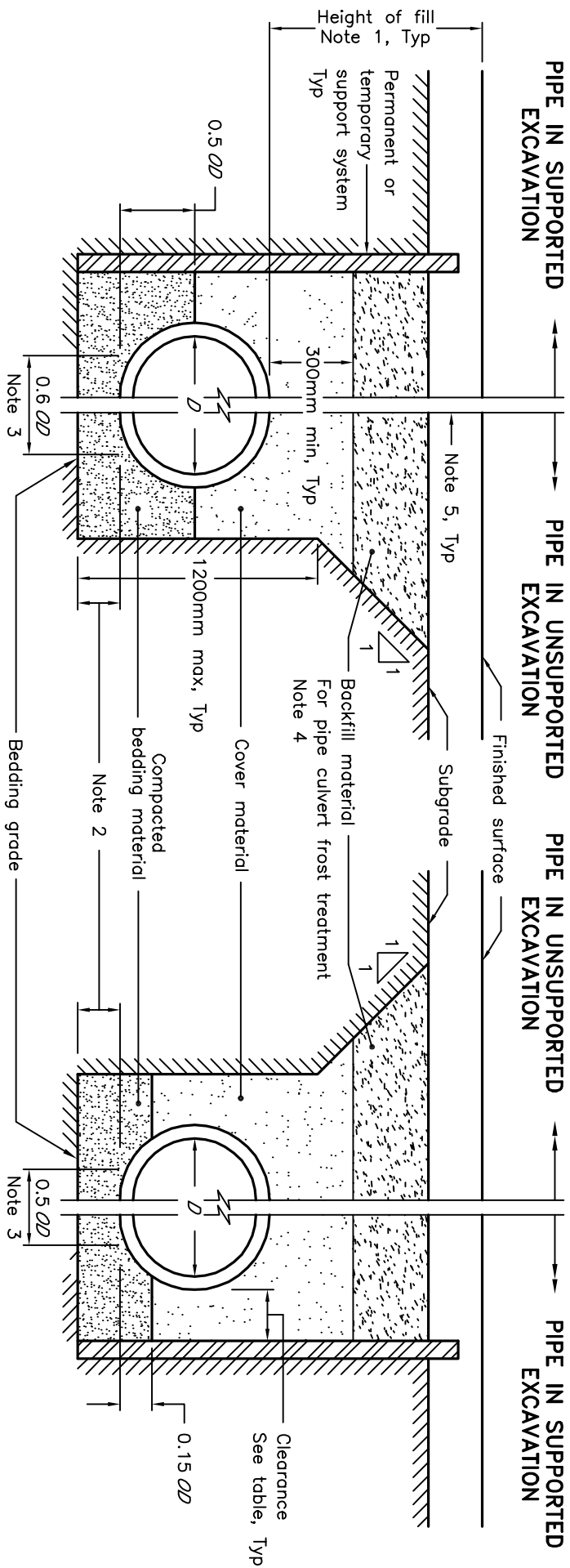


CLEARANCE TABLE	
Pipe Span mm	Clearance mm
900 or less	300
Over 900	500

B All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev 3
FLEXIBLE PIPE ARCH EMBEDMENT IN EMBANKMENT			
ORIGINAL GROUND: EARTH OR ROCK		OPSD 802.024	





CLASS B BEDDING

CLASS C BEDDING

NOTES:

- 1 Height of fill is measured from the finished surface to top of pipe.
 - 2 The minimum bedding depth below the pipe shall be $0.15D$. In no case shall this dimension be less than 150mm or greater than 300mm.
 - 3 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
 - 4 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
 - 5 Condition of excavation is symmetrical about centreline of pipe.
- A Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
- B All dimensions are in metres unless otherwise shown.

LEGEND:

D – Inside diameter

OD – Outside diameter

CLEARANCE TABLE	
Pipe Inside Diameter mm	Clearance mm
900 or less	300
Over 900	500

ONTARIO PROVINCIAL STANDARD DRAWING

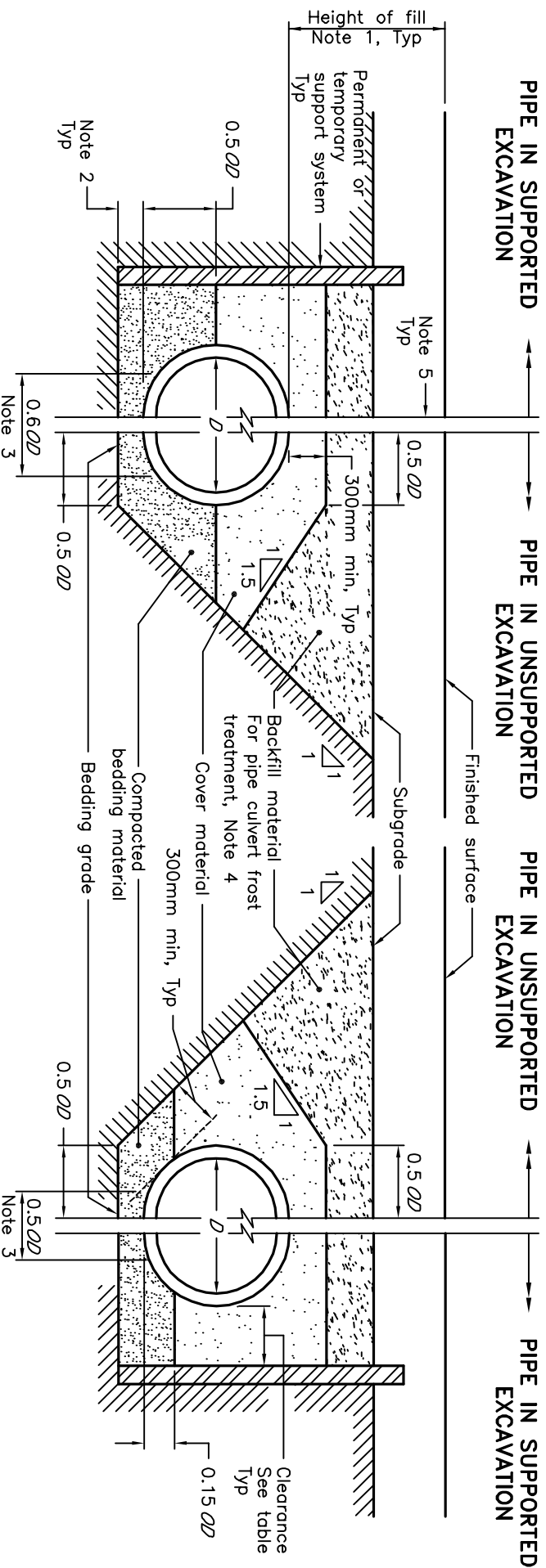
Nov 2015 Rev 3

RIGID PIPE BEDDING,
COVER, AND BACKFILL

TYPE 1 OR 2 SOIL – EARTH EXCAVATION

OPSD 802.030





CLASS B BEDDING

CLASS C BEDDING

NOTES:

- 1 Height of fill is measured from the finished surface to top of pipe.
 - 2 The minimum bedding depth below the pipe shall be $0.15D$. In no case shall this dimension be less than 150mm or greater than 300mm.
 - 3 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
 - 4 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
 - 5 Condition of excavation is symmetrical about centreline of pipe.
- A Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
- B All dimensions are in metres unless otherwise shown.

LEGEND:

D – Inside diameter
 OD – Outside diameter

CLEARANCE TABLE	
Pipe Inside Diameter mm	Clearance mm
900 or less	300
Over 900	500

ONTARIO PROVINCIAL STANDARD DRAWING

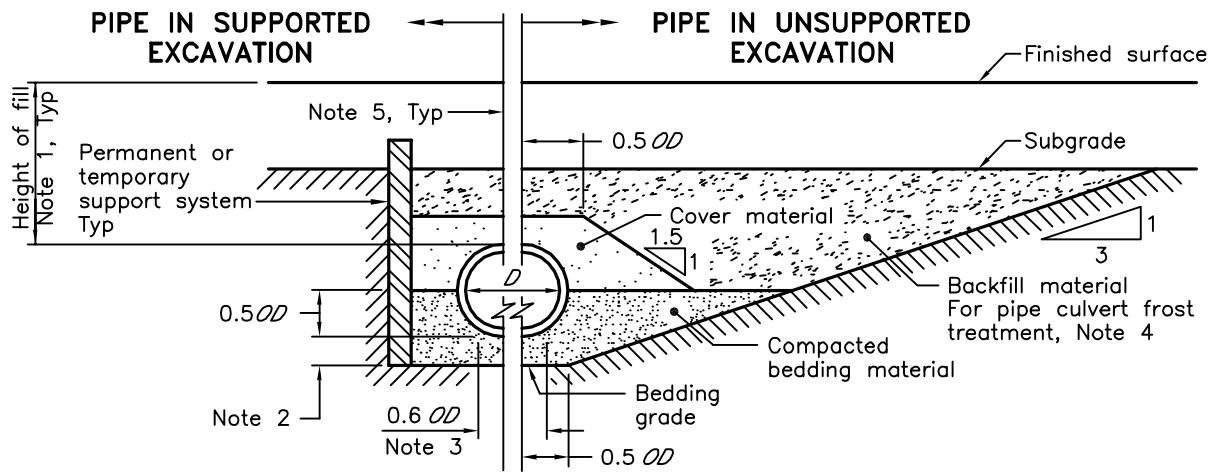
Nov 2015 Rev 3

RIGID PIPE BEDDING,
 COVER, AND BACKFILL

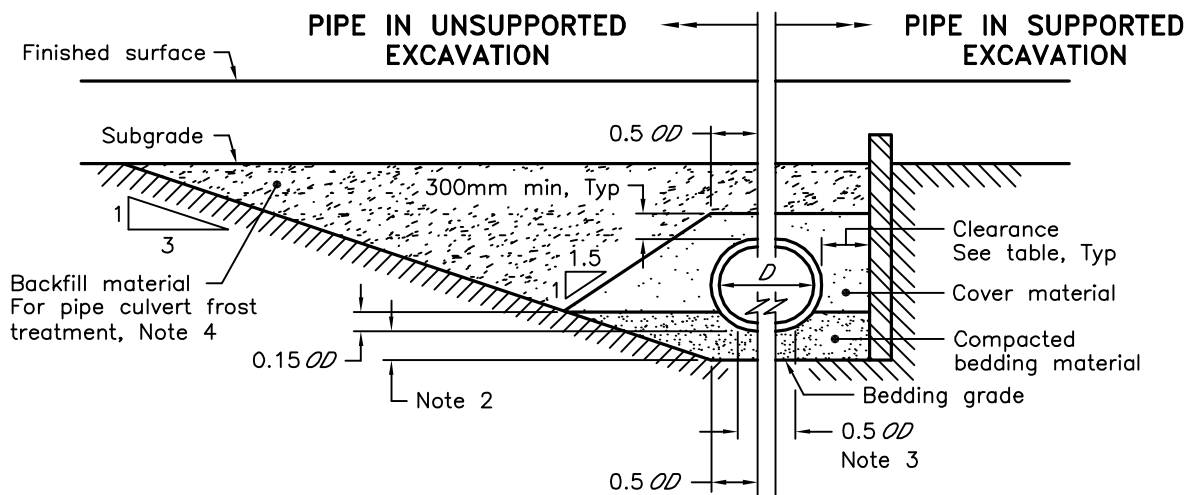
TYPE 3 SOIL – EARTH EXCAVATION



OPSD 802.031



CLASS B BEDDING



CLASS C BEDDING

LEGEND:

D – Inside diameter
 OD – Outside diameter

CLEARANCE TABLE	
Pipe Inside Diameter mm	Clearance mm
900 or less	300
Over 900	500

NOTES:

- 1 Height of fill is measured from the finished surface to top of pipe.
- 2 The minimum bedding depth below the pipe shall be $0.15D$.
In no case shall this dimension be less than 150mm or greater than 300mm.
- 3 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
- 4 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
- 5 Condition of excavation is symmetrical about centreline of pipe.
- A Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
- B All dimensions are in metres unless otherwise shown.

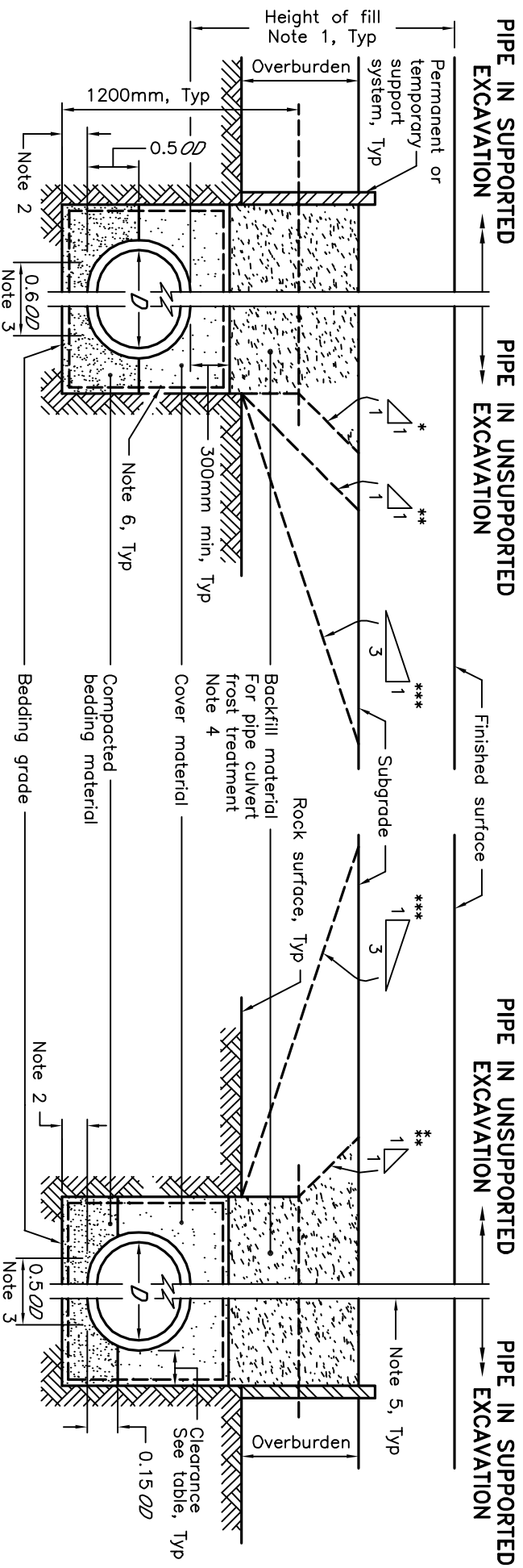
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 3

**RIGID PIPE BEDDING,
 COVER, AND BACKFILL
 TYPE 4 SOIL – EARTH EXCAVATION**

OPSD 802.032





CLASS B BEDDING

CLASS C BEDDING

NOTES:

- 1 Height of fill is measured from the finished surface to top of pipe.
- 2 The minimum bedding depth below the pipe shall be 0.25D. In no case shall this dimension be less than 150mm or greater than 300mm.
- 3 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
- 4 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
- 5 Condition of excavation is symmetrical about centreline of pipe.
- 6 Embedment material shall be wrapped in non-woven geotextile when specified.

LEGEND:

- D – Inside diameter
- OD – Outside diameter
- * – Type 1 or 2 soil
- ** – Type 3 soil
- *** – Type 4 soil

CLEARANCE TABLE	
Pipe Inside Diameter mm	Clearance mm
900 or less	300
Over 900	500

- A Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
- B Fractured rock shall be treated as Type 1 soil.
- C All dimensions are in metres unless otherwise shown.

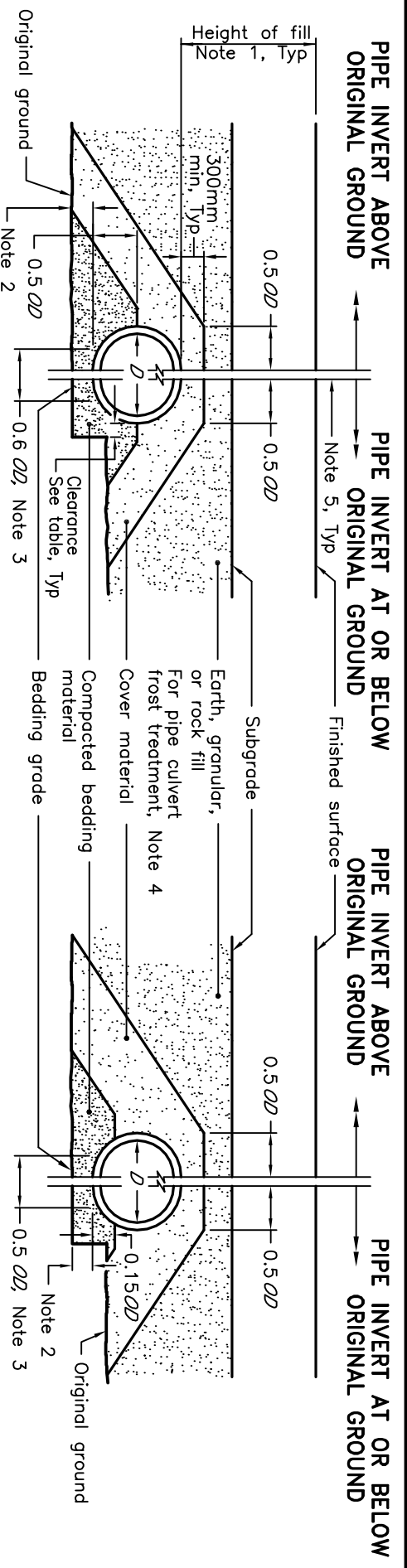
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 3

**RIGID PIPE BEDDING,
COVER, AND BACKFILL
ROCK EXCAVATION**

OPSD 802.033

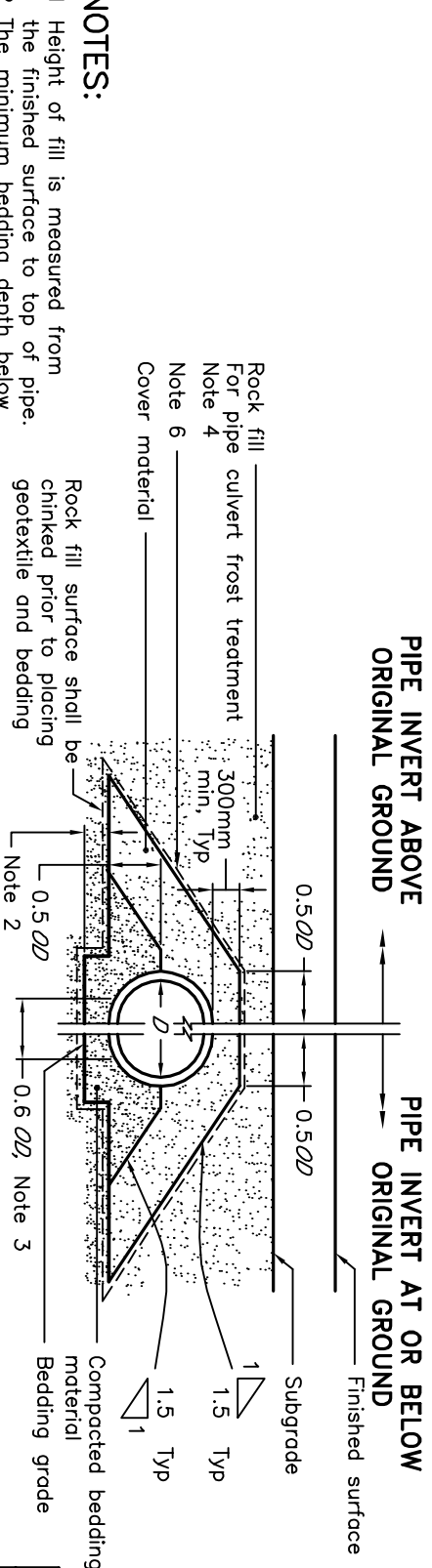




CLASS B BEDDING

EARTH AND ROCK EXCAVATION

CLASS C BEDDING



LEGEND:

D – Inside diameter
 OD – Outside diameter

CLEARANCE TABLE

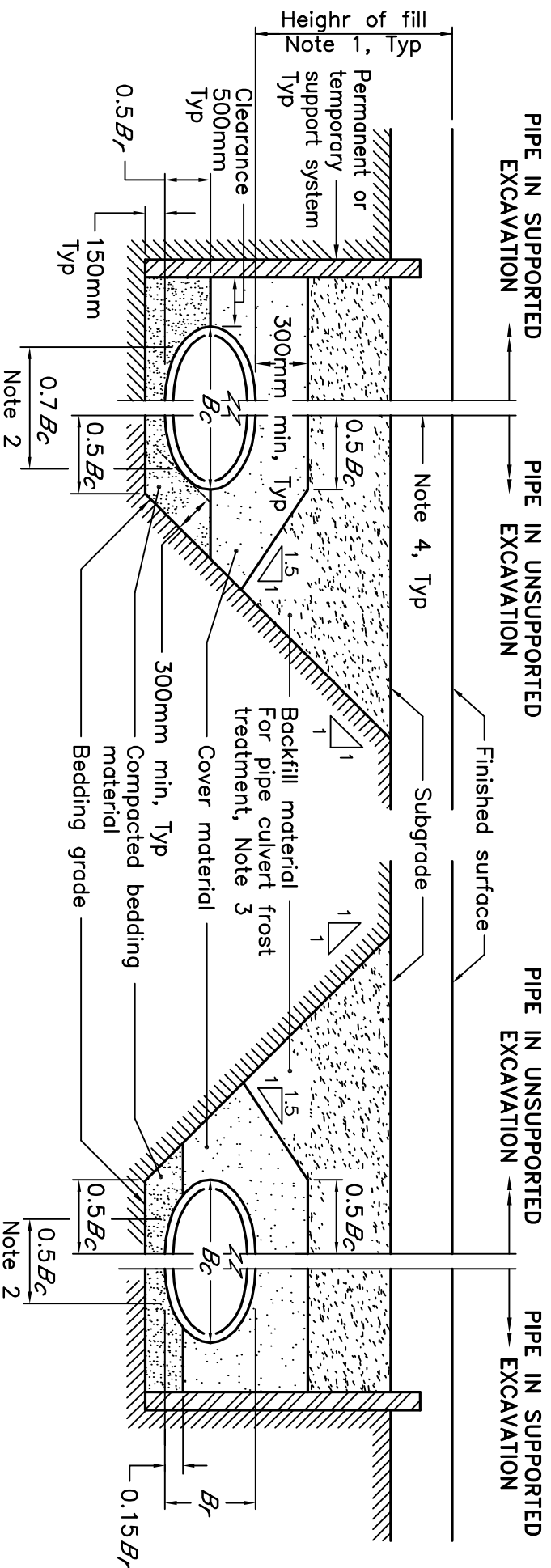
Pipe Inside Diameter mm	Clearance mm
900 or less	300
Over 900	500

PIPE BEDDING AND COVER WITH ROCK FILL UNDER AND OVER THE PIPE

NOTES:

- 1 Height of fill is measured from the finished surface to top of pipe.
- 2 The minimum bedding depth below the pipe shall be $0.15D$, except on a rock foundation where the minimum bedding depth shall be $0.25D$. In no case shall the minimum dimension be less than 150mm or greater than 300mm.
- 3 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
- 4 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
- 5 Condition of excavation is symmetrical about centreline of pipe.
- 6 Bedding and cover material shall be wrapped in non-woven geotextile when specified.

A All dimensions are in metres unless otherwise shown.



CLASS B BEDDING

CLASS C BEDDING

NOTES:

- 1 Height of fill is measured from the finished surface to top of pipe.
- 2 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
- 3 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
- 4 Condition of excavation is symmetrical about centreline of pipe.

LEGEND:

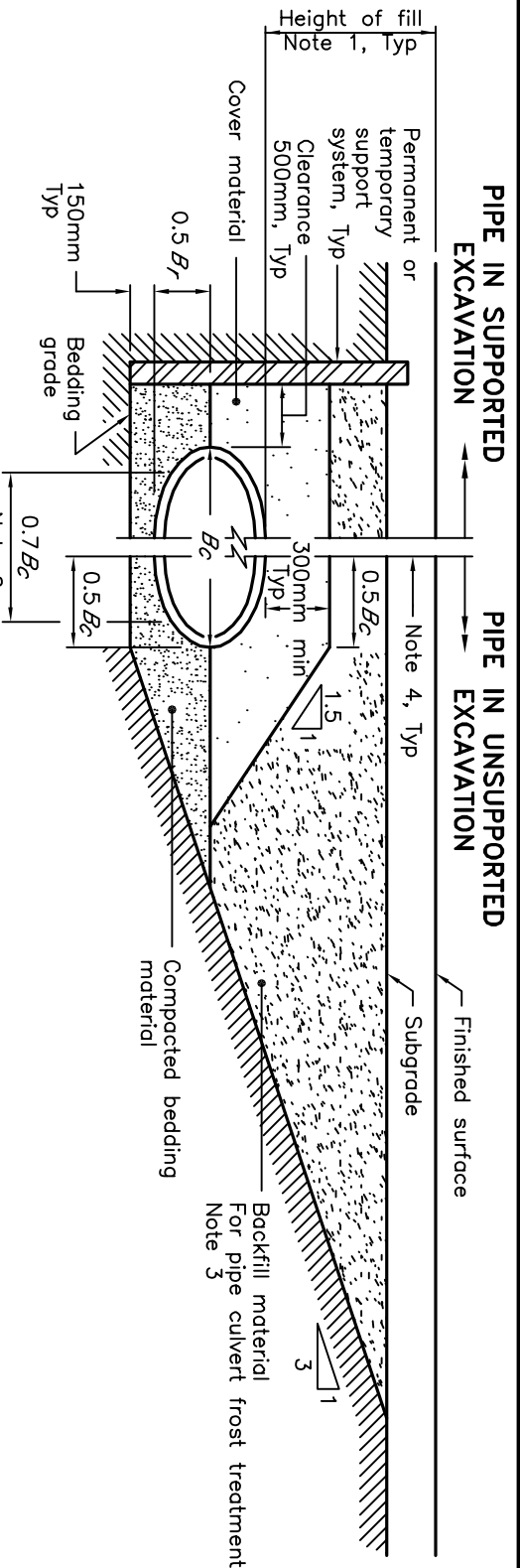
B_c = Outside horizontal span
 B_r = Outside vertical rise

A Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.

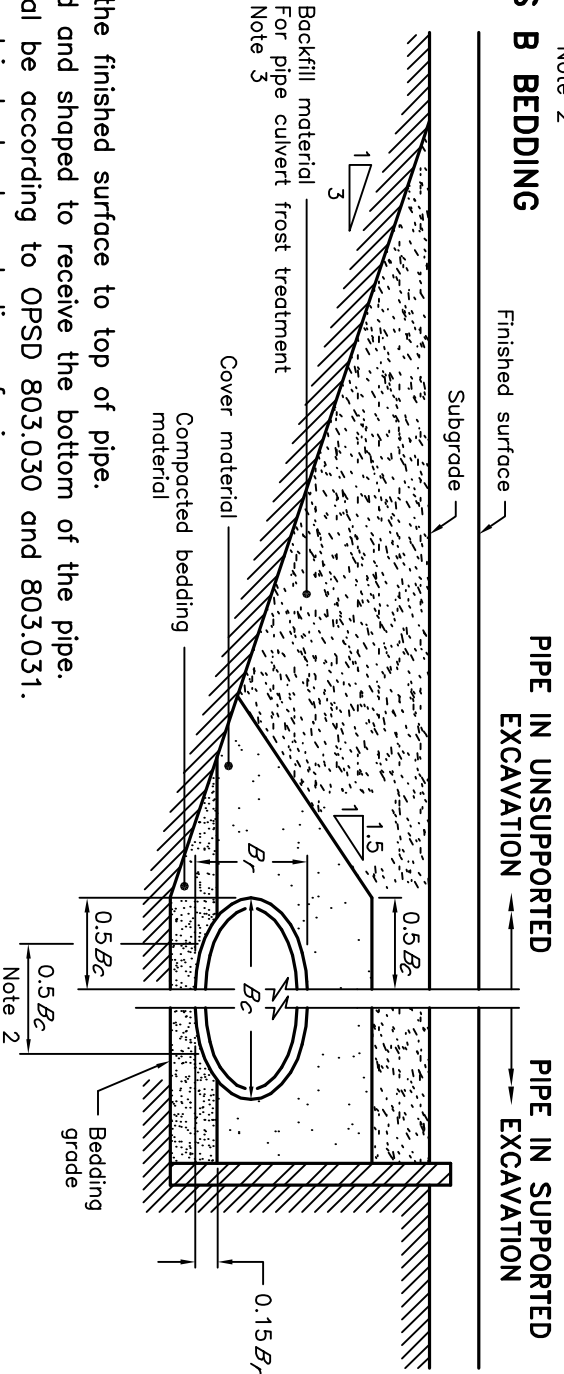
B All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 3
HORIZONTAL ELLIPTICAL RIGID PIPE BEDDING, COVER, AND BACKFILL TYPE 3 SOIL – EARTH EXCAVATION		
	OPSD 802.051	





CLASS B BEDDING



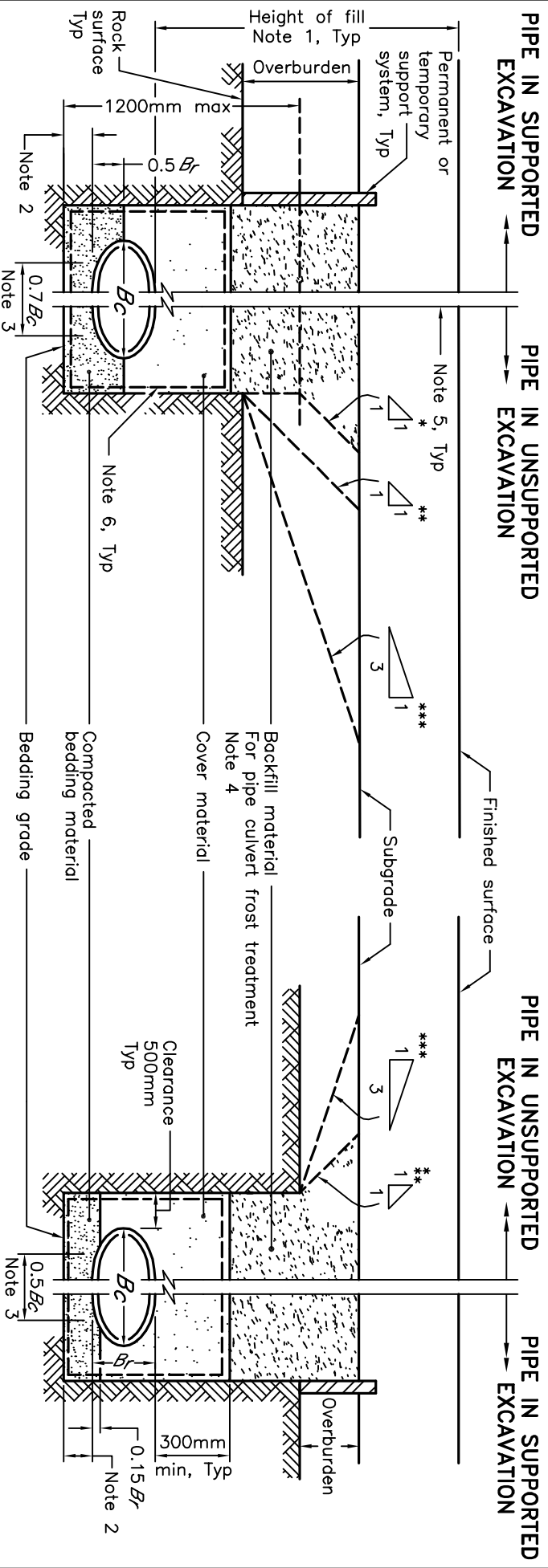
CLASS C BEDDING

LEGEND:
 B_c = Outside horizontal span
 B_r = Outside vertical rise

- NOTES:**
- 1 Height of fill is measured from the finished surface to top of pipe.
 - 2 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
 - 3 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
 - 4 Condition of excavation is symmetrical about centreline of pipe.
- A Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
- B All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING			Nov 2015	Rev	3	
HORIZONTAL ELLIPTICAL RIGID PIPE BEDDING, COVER, AND BACKFILL			----- ----- -----			
TYPE 4 SOIL – EARTH EXCAVATION			OPSD 802.052			





CLASS B BEDDING

CLASS C BEDDING

NOTES:

- 1 Height of fill is measured from the finished surface to top of pipe.
- 2 The minimum bedding depth below the pipe shall be 0.25 B_c . In no case shall this dimension be less than 150mm or greater than 300mm.
- 3 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
- 4 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
- 5 Condition of excavation is symmetrical about centreline of pipe.
- 6 Embedment material shall be wrapped in non-woven geotextile when specified.

LEGEND:

- B_c = Outside horizontal span
 B_r = Outside vertical rise
 * - Type 1 or 2 soil
 ** - Type 3 soil
 *** - Type 4 soil

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 3

HORIZONTAL ELLIPTICAL RIGID PIPE BEDDING,

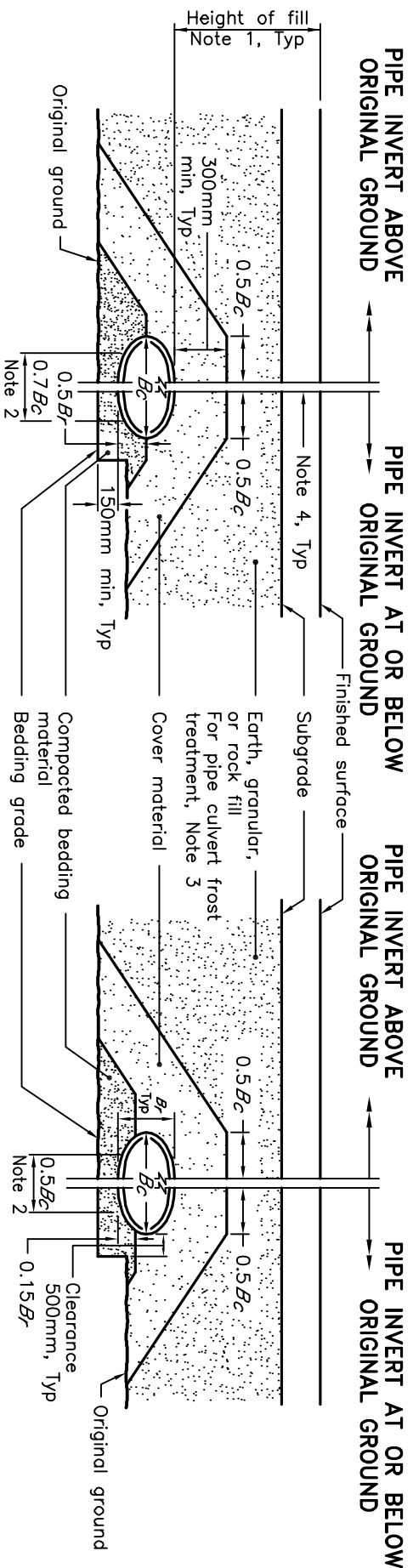
COVER, AND BACKFILL

ROCK EXCAVATION



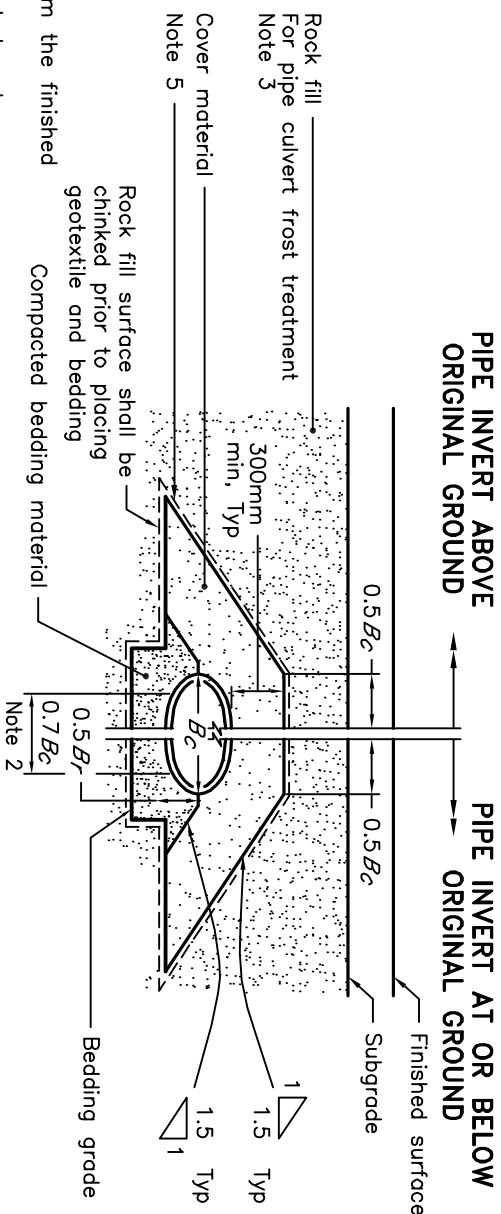
OPSD 802.053

- B Fractured rock shall be treated as Type 1 soil.
 C All dimensions are in metres unless otherwise shown.



CLASS B BEDDING

CLASS C BEDDING



LEGEND:

B_c = Outside horizontal span
 B_r = Outside vertical rise

NOTES:

- 1 Height of fill is measured from the finished surface to top of pipe.
 - 2 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
 - 3 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
 - 4 Condition of excavation is symmetrical about centreline of pipe.
 - 5 Bedding and cover material shall be wrapped in non-woven geotextile when specified.
- A All dimensions are in metres unless otherwise shown.

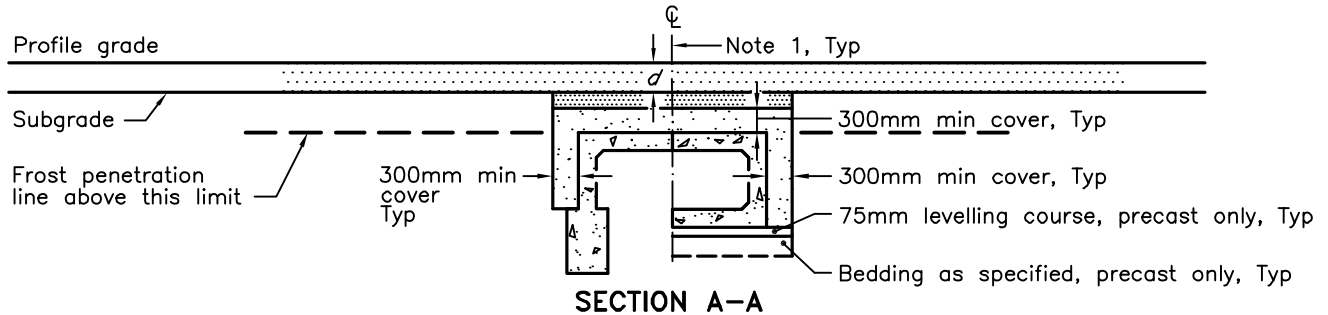
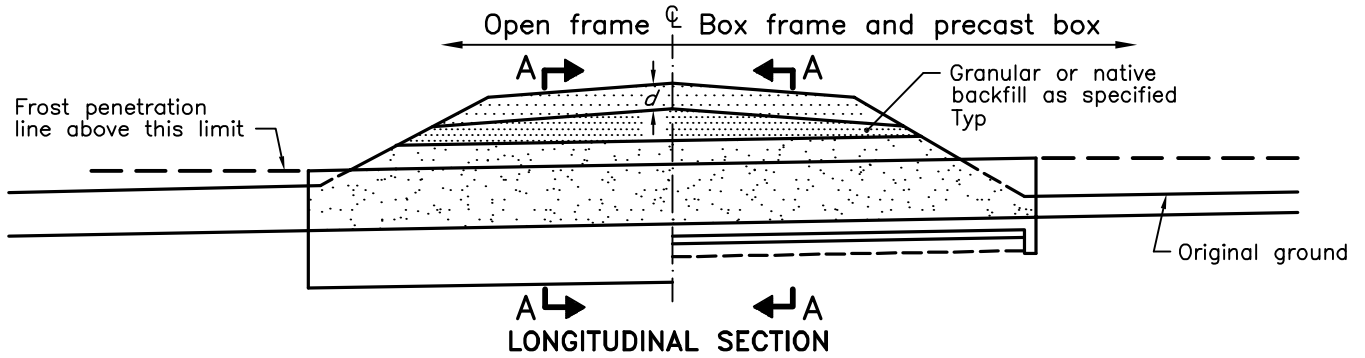
**PIPE BEDDING AND COVER
WITH ROCK FILL UNDER AND OVER THE PIPE**

ONTARIO PROVINCIAL STANDARD DRAWING

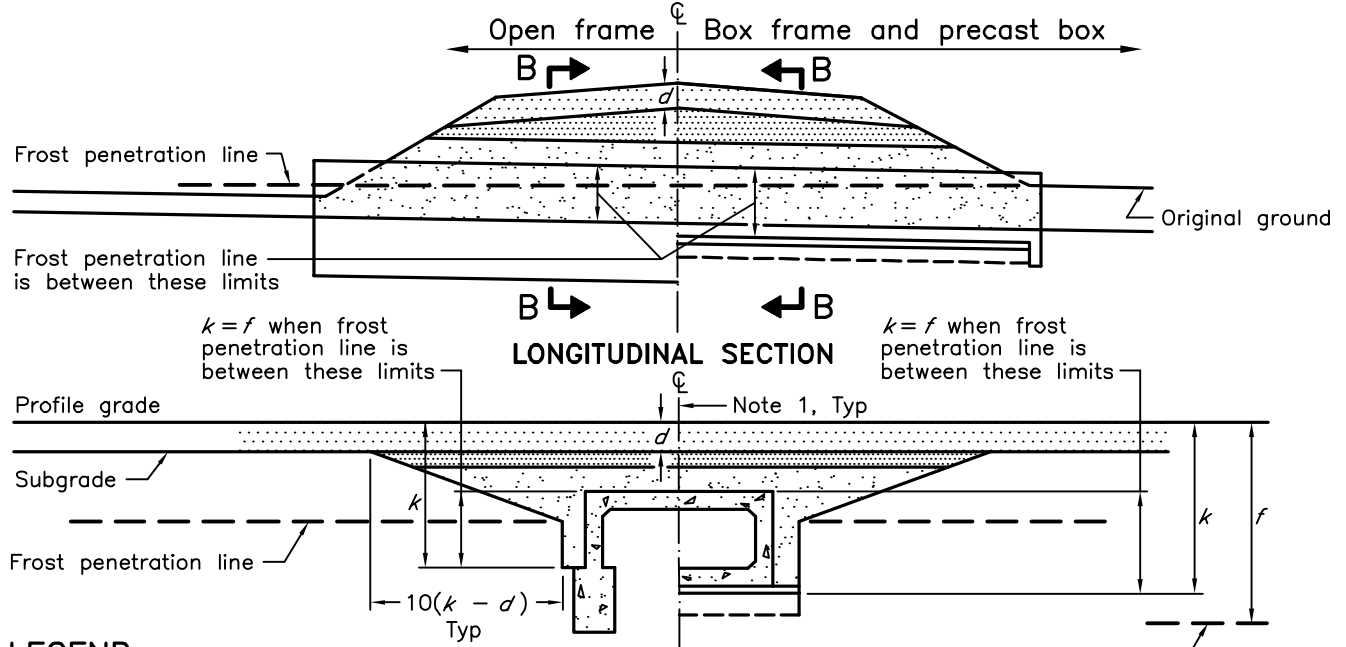
**HORIZONTAL ELLIPTICAL RIGID PIPE
BEDDING AND COVER IN EMBANKMENT
ORIGINAL GROUND: EARTH OR ROCK**



FROST PENETRATION LINE AT OR ABOVE TOP OF CULVERT



FROST PENETRATION LINE BELOW TOP OF CULVERT



LEGEND:

- d = depth of roadbed granular
- k = depth of frost treatment below profile grade
- f = depth of frost penetration below profile grade

NOTES:

- 1 Condition of frost treatment symmetrical about centreline of culvert.
- A Bedding, levelling, and cover material shall be granular as specified.
- B The depth of roadbed granular shall be 600mm minimum.
- C The maximum depth of frost treatment shall be bottom of box frame or top of footing.
- D All dimensions are in millimetres unless otherwise shown.

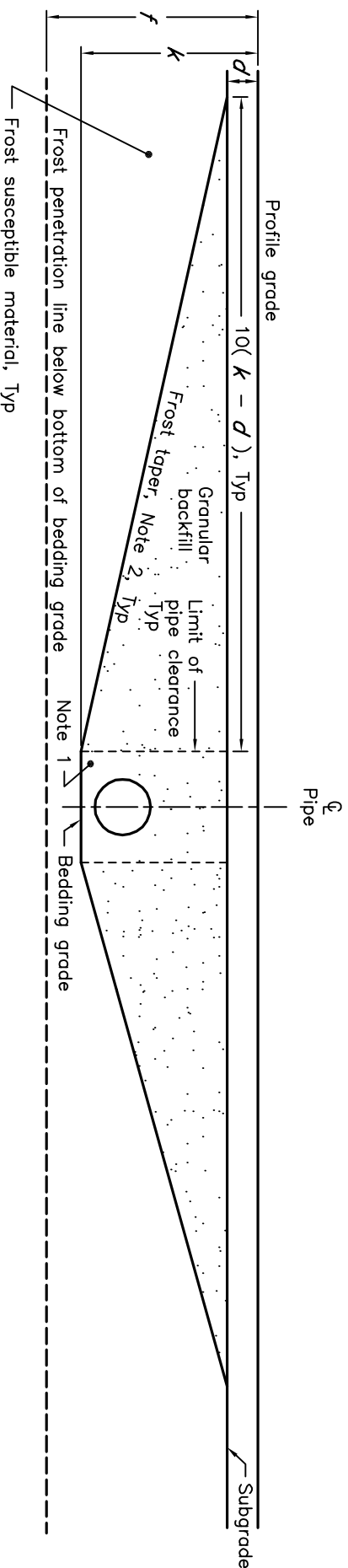
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 3

**BACKFILL AND COVER FOR
CONCRETE CULVERTS WITH SPANS
LESS THAN OR EQUAL TO 3.0M**

OPSD 803.010





FROST TREATMENT RIGID AND FLEXIBLE PIPE

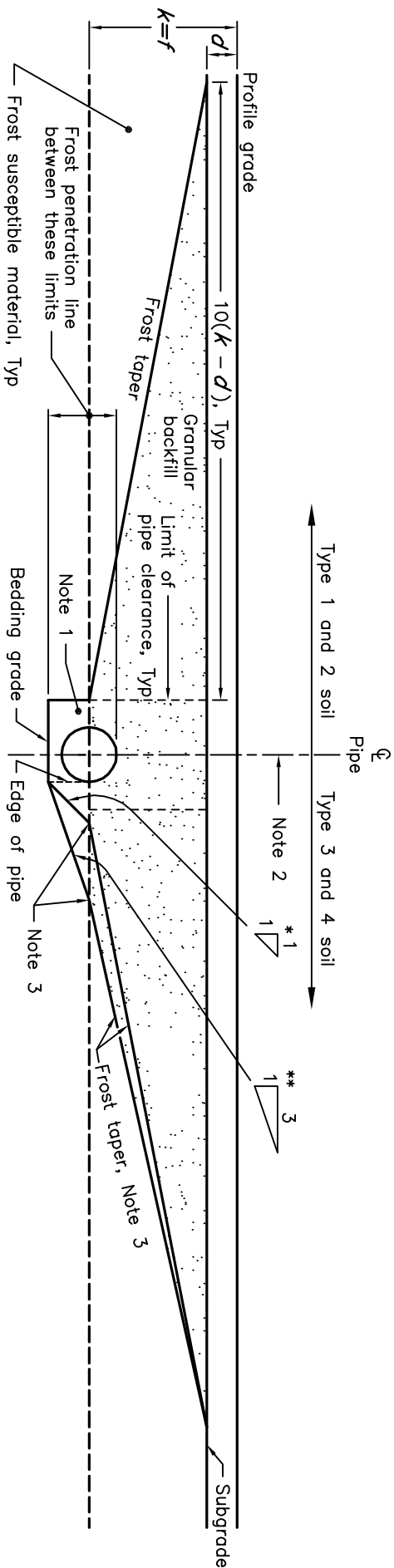
NOTES:

- 1 Pipe embedment or bedding, cover, and backfill shall be according to:
 - a) Flexible OPSD 802.010, 802.013, 802.014, 802.020, 802.023, and 802.024.
 - b) Rigid — OPSD 802.030, 802.031, 802.032, 802.033, 802.034, 802.050, 802.051, 802.052, 802.053, and 802.054.
- 2 Frost tapers shall start at bedding grade.

LEGEND:

- d —depth of roadbed granular
- k —depth of frost treatment below profile grade
- f —depth of frost penetration below profile grade

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev	3	
FROST TREATMENT – PIPE CULVERTS FROST PENETRATION LINE BELOW BEDDING GRADE		----- ----- -----			
OPSD 803.030					



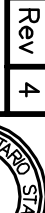
FROST TREATMENT RIGID AND FLEXIBLE PIPE

NOTES:

- 1 Pipe embedment or bedding, cover, and backfill shall be according to:
 - a) Flexible OPSD 802.010, 802.013, 802.014, 802.020, 802.023, and 802.024.
 - b) Rigid – OPSD 802.030, 802.031, 802.032, 802.033, 802.034, 802.050, 802.051, 802.052, 802.053, and 802.054.
- 2 Condition of frost treatment symmetrical about centreline of pipe.
- 3 Frost tapers shall start at the intersection of the 1H:1V or 3H:1V slope and the frost penetration line.
- A Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.

LEGEND:

- d – depth of roadbed granular
 k – depth of frost treatment below profile grade
 f – depth of frost penetration below profile grade
 * – Type 3 soil
 ** – Type 4 soil

ONTARIO PROVINCIAL STANDARD DRAWING		
FROST TREATMENT – PIPE CULVERTS FROST PENETRATION LINE BETWEEN TOP OF PIPE AND BEDDING GRADE		
Nov 2015	Rev 4	
OPSD 803.031		

PIPE DIA mm		AREA m ²	TRENCH WIDTH	MAXIMUM HEIGHT OF FILL					
				210 kPa Stiffness PSM DR 41		320 kPa Stiffness PSM DR 35 and PS 320		625 kPa Stiffness PSM DR 28	
				≤ Trench Width	> Trench Width	≤ Trench Width	> Trench Width	≤ Trench Width	> Trench Width
100	0.008	0.40	9	7.2	9	7.5	13.5	8.2	
135	0.014	0.54	9	7.2	9	7.5	13.5	8.2	
150	0.020	0.95	9	7.2	9	7.5	13.5	8.2	
200	0.030	1.00	9	7.2	9	7.5	N/A	N/A	
250	0.050	1.05	9	7.2	9	7.5	N/A	N/A	
300	0.070	1.10	9	7.2	9	7.5	N/A	N/A	
375	0.110	1.20	9	7.2 *	9	7.5 *	N/A	N/A	
450	0.160	1.25	9	7.2 **	9	7.5 **	N/A	N/A	
525	0.220	1.30	9 *	7.2 **	9 *	7.5 **	N/A	N/A	
600	0.280	1.40	9 *	7.2 **	9 *	7.5 **	N/A	N/A	
675	0.360	1.50	9 *	7.2 **	9 *	7.5 **	N/A	N/A	
750	0.440	1.60	9 *	7.2 **	9 *	7.5 **	N/A	N/A	
900	0.640	1.70	9 **	7.2 **	9 **	7.5 **	N/A	N/A	

NOTES:

- For installations in Type 4 soil, height of fill shall be calculated from first principles.
- For installations in Type 3 soil, height of fill shall be calculated from first principles.
- Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
- Minimum height of fill over top of pipe shall be 300mm or one pipe diameter, whichever is greater.
- The table is based on backfill density of 1900 kg/m³.
- This OPSD shall be read in conjunction with OPSD 802.010 and 802.013.

- LEGEND:**
- * Note 1
 - ** Note 1 and 2
 - N/A Not Available
- E Height of fill greater than 9.0m shall be calculated from first principles.
- F All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev 3
HEIGHT OF FILL TABLE POLYVINYL CHLORIDE GRAVITY SEWER PIPE 210, 320, and 625kPa			

PIPE DIA mm	BEDDING CLASS	CONFINED TRENCH			
		50-D	65-D	100-D	140-D
		MAXIMUM HEIGHT OF FILL			
300	A	5.1	11.8	NL	NL
	B	2.9	3.9	7.4	NL
	C	2.2	3.1	5.1	10.2
375	A	6.5	NL	NL	NL
	B	3.0	4.1	8.8	NL
	C	2.4	3.2	5.7	12.8
450	A	7.6	NL	NL	NL
	B	3.1	4.4	10.0	NL
	C	2.5	3.4	6.2	13.2
525	A	8.5	NL	NL	NL
	B	3.3	4.7	10.9	NL
	C	2.6	3.5	6.6	17.6
600	A	9.2	NL	NL	NL
	B	3.4	4.9	11.5	NL
	C	2.6	3.7	7.0	18.6
675	A	9.7	NL	NL	NL
	B	3.5	5.1	11.8	NL
	C	2.7	3.8	7.2	18.6
750	A	10.0	NL	NL	NL
	B	3.6	5.2	12.0	NL
	C	2.8	3.8	7.2	18.0
825	A	10.2	NL	NL	NL
	B	3.6	5.2	12.0	NL
	C	2.8	3.8	7.4	17.4
900	A	9.8	NL	NL	NL
	B	3.8	5.4	11.6	NL
	C	2.8	4.0	7.4	16.0
975	A	6.2	9.6	NL	NL
	B	3.4	4.6	8.0	14.4
	C	2.8	3.8	6.0	9.6
1050	A	6.4	9.8	NL	NL
	B	3.6	4.6	8.2	14.6
	C	2.8	3.8	6.2	9.8
1200	A	6.8	10.4	NL	NL
	B	3.6	4.8	8.4	15.0
	C	3.0	3.8	6.4	10.2
1350	A	7.0	10.8	NL	NL
	B	3.8	5.0	8.6	15.2
	C	3.2	4.0	6.4	10.4
1500	A	7.2	11.0	NL	NL
	B	3.8	5.0	8.8	15.2
	C	3.2	4.0	6.6	10.4
1650	A	7.4	11.2	NL	NL
	B	4.0	5.2	9.0	15.2
	C	3.4	4.2	6.8	10.6
1800	A	7.6	11.4	NL	NL
	B	4.0	5.2	9.0	15.2
	C	3.4	4.2	6.8	10.6

LEGEND:

NL = No Limit

NOTES:

A Height of fill is measured from the finished surface to top of pipe.

B The load factor used for the calculation of the variable bedding factor is: Class A bedding=2.8, Class B bedding=1.9, and Class C bedding=1.5.

C The excavation width is based on OPSD 802.030 and is the width of the excavation measured at the top of the pipe.

D Minimum height of fill over top of pipe shall be 600mm.

E Strength designations are 50-D, 65-D, 100-D, and 140-D according to CSA A257.2.

F The table is based on backfill density of 1900 kg/m³.

G For confined trench $K_{\mu}=0.130$.

H Conditions other than those indicated shall be calculated from first principles.

I All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015

Rev 3

HEIGHT OF FILL TABLE

REINFORCED CONCRETE PIPE – CONFINED TRENCH
CLASS 50-D, 65-D, 100-D, and 140-D

OPSD 807.010



PIPE DIA mm	BEDDING CLASS	POSITIVE PROJECTING EMBANKMENT			
		50-D	65-D	100-D	140-D
		MAXIMUM HEIGHT OF FILL			
300	A	4.5	6.0	9.0	12.9
	B	2.4	3.6	5.7	7.8
	C	1.8	2.7	4.5	6.3
375	A	4.8	6.0	9.6	13.5
	B	2.7	3.6	5.7	8.1
	C	2.1	3.0	4.8	6.6
450	A	4.8	6.3	9.9	13.8
	B	2.7	3.9	6.0	8.4
	C	2.1	3.0	4.8	6.9
525	A	4.8	6.6	9.9	14.1
	B	3.0	3.9	6.0	8.7
	C	2.4	3.0	5.1	7.2
600	A	5.1	6.6	10.2	14.4
	B	3.0	3.9	6.3	8.7
	C	2.4	3.3	5.1	7.2
675	A	5.1	6.6	10.2	14.4
	B	3.0	3.9	6.3	9.0
	C	2.4	3.3	5.1	7.2
750	A	5.1	6.6	10.5	14.7
	B	3.0	4.2	6.3	9.0
	C	2.4	3.3	5.1	7.5
825	A	5.1	6.9	10.5	14.7
	B	3.0	4.2	6.6	9.0
	C	2.4	3.3	5.4	7.5
900	A	5.1	6.9	10.5	15.0
	B	3.3	4.2	6.6	9.3
	C	2.4	3.3	5.4	7.5
975	A	5.4	6.9	10.8	15.0
	B	3.3	4.2	6.6	9.3
	C	2.4	3.3	5.4	7.5
1050	A	5.4	6.9	10.8	15.0
	B	3.3	4.2	6.6	9.3
	C	2.7	3.3	5.4	7.5
1200	A	5.4	7.2	11.1	15.6
	B	3.3	4.5	6.9	9.6
	C	2.7	3.6	5.7	7.8
1350	A	5.4	7.2	11.1	15.6
	B	3.3	4.5	6.9	9.6
	C	2.7	3.6	5.7	8.1
1500	A	5.7	7.2	11.1	15.6
	B	3.3	4.5	6.9	9.9
	C	3.0	3.6	5.7	8.1
1650	A	5.7	7.2	11.4	15.9
	B	3.6	4.5	6.9	9.9
	C	3.0	3.6	5.7	8.1
1800	A	5.7	7.2	11.4	15.9
	B	3.6	4.5	7.2	9.9
	C	3.0	3.9	5.7	8.1

NOTES:

- A Height of fill is measured from the finished surface to top of pipe.
 B For the positive projecting embankment, the load factor used for the calculation of the variable bedding factor is:
 Class A bedding=2.8, Class B bedding=1.9, and Class C bedding=1.5.
 C Minimum height of fill over top of pipe shall be 600mm.
 D Strength designations are 50-D, 65-D, 100-D, and 140-D according to CSA A257.2.
 E The table is based on backfill density of 1900 kg/m³.
 F For positive projecting embankment $K\mu=0.190$, $p=0.7$, and $r_{sd}=0.7$.
 G Conditions other than those indicated shall be calculated from first principles.
 H All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev	3	
HEIGHT OF FILL TABLE REINFORCED CONCRETE PIPE – EMBANKMENT CLASS 50–D, 65–D, 100–D, and 140–D		----- ----- -----			
		OPSD 807.030			

NOTES:

- A Height of fill is measured from the finished surface to top of pipe.
- B For the positive projecting embankment, the variable bedding factor corresponds to Class B and Class C, respectively.
- C Minimum height of fill over top of pipe shall be 600mm.
- D Class 3 designation according to CSA A257.1.
- E The table is based on backfill density of 1900 kg/m³.
- F For positive projecting embankment $K_u=0.190$, $p=0.7$, and $r_{sd}=0.7$.
- G Conditions other than those indicated shall be calculated from first principles.
- H All dimensions are in metres unless otherwise shown.

PIPE DIA mm	BEDDING CLASS	POSITIVE PROJECTING EMBANKMENT	
		CLASS 3	MAXIMUM HEIGHT OF FILL
150	B	9.5	
	C	7.8	
200	B	7.5	
	C	6.1	
250	B	5.5	
	C	4.5	
300	B	4.7	
	C	3.7	
375	B	4.3	
	C	3.5	
450	B	4.2	
	C	3.4	

PIPE DIA mm	RISE x SPAN mm	BEDDING CLASS	POSITIVE PROJECTING EMBANKMENT								CONFINED TRENCH					
			CLASS HE-A	CLASS HE-I	CLASS HE-II	CLASS HE-III	CLASS HE-IV	CLASS HE-A	CLASS HE-I	CLASS HE-II	CLASS HE-III	CLASS HE-IV				
			MAXIMUM HEIGHT OF FILL					MAXIMUM HEIGHT OF FILL								
900	730 x 1150	B	2.0	2.8	3.5	4.7	7.2	2.2	3.0	4.1	5.9	10.0				
		C	1.6	2.2	2.8	3.8	5.9	1.7	2.4	3.0	4.0	6.5				
1050	855 x 1345	B	2.1	2.8	3.6	4.7	7.3	2.3	3.1	4.2	6.0	10.0				
		C	1.7	2.3	2.9	3.8	5.9	1.8	2.5	3.1	4.0	6.6				
1200	975 x 1535	B	2.2	2.9	3.6	4.8	7.4	2.4	3.2	4.3	6.1	10.0				
		C	1.8	2.4	2.9	3.8	6.0	1.8	2.6	3.2	4.1	6.9				
1350	1095 x 1730	B	2.3	3.0	3.7	4.8	7.4	2.4	3.3	4.3	6.1	10.0				
		C	1.8	2.5	3.0	3.9	6.0	1.9	2.6	3.3	4.2	7.0				
1500	1220 x 1920	B	2.4	3.1	3.7	4.8	7.4	2.5	3.4	4.3	6.1	10.0				
		C	1.9	2.5	3.1	3.9	6.1	2.0	2.7	3.4	4.3	7.0				
1650	1340 x 2110	B	2.4	3.1	3.8	4.9	7.5	2.5	3.4	4.4	6.1	10.0				
		C	1.9	2.6	3.2	4.0	6.1	2.0	2.8	3.4	4.4	7.1				
1800	1465 x 2305	B	2.5	3.2	3.9	4.9	7.5	2.6	3.5	4.4	6.1	10.0				
		C	2.0	2.7	3.3	4.0	6.1	2.1	2.8	3.5	4.5	7.2				
1950	1585 x 2495	B	2.5	3.3	4.0	4.9	7.6	2.6	3.5	4.5	6.1	10.0				
		C	2.0	2.7	3.3	4.1	6.2	2.1	2.9	3.6	4.5	7.2				
2100	1705 x 2690	B	2.6	3.3	4.0	5.0	7.6	2.6	3.5	4.5	6.1	10.0				
		C	2.1	2.8	3.4	4.2	6.2	2.1	2.9	3.6	4.6	7.2				
2400	1950 x 3070	B	2.6	3.5	4.2	5.1	7.6	2.7	3.6	4.5	6.1	10.0				
		C	2.1	2.8	3.5	4.4	6.2	2.2	3.0	3.7	4.7	7.3				
2700	2195 x 3455	B	2.7	3.6	4.3	5.3	7.7	2.8	3.7	4.6	6.2	10.0				
		C	2.2	2.9	3.6	4.5	6.3	2.3	3.1	3.8	4.8	7.4				
3000	2440 x 3840	B	2.8	3.6	4.4	5.5	7.8	2.8	3.7	4.6	6.2	10.0				
		C	2.1	3.0	3.7	4.6	6.5	2.3	3.1	3.9	4.9	7.5				

NOTES:

- A Height of fill is measured from the finished surface to top of pipe.
- B For the positive projecting embankment and confined trench, the load factor used for the calculation of the variable bedding factor is: Class B bedding=1.9 and Class C bedding=1.5.
- C Minimum height of fill over top of pipe shall be 600mm.
- D The table is based on backfill density of 1900kg/m³.
- E For Confined Trench $K_u=0.130$, $p=0.7$, and $r_{sd}=0.7$.
- F For positive projecting embankment $K_u=0.190$, $p=0.7$, and $r_{sd}=0.7$.
- G Conditions other than those indicated shall be calculated from first principles.
- H This OPSD shall be read in conjunction with OPSD 802.050.
- I All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015

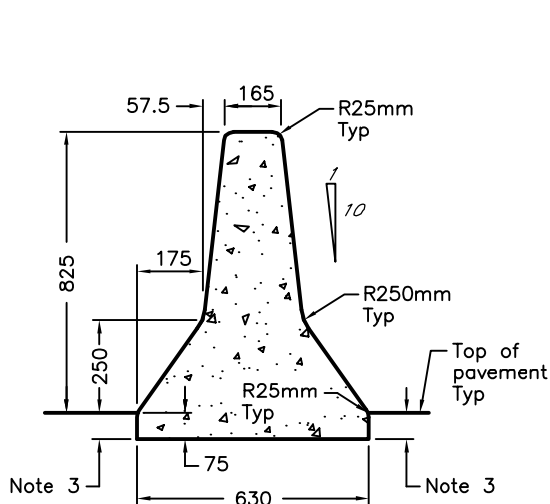
Rev 3

HEIGHT OF FILL TABLE

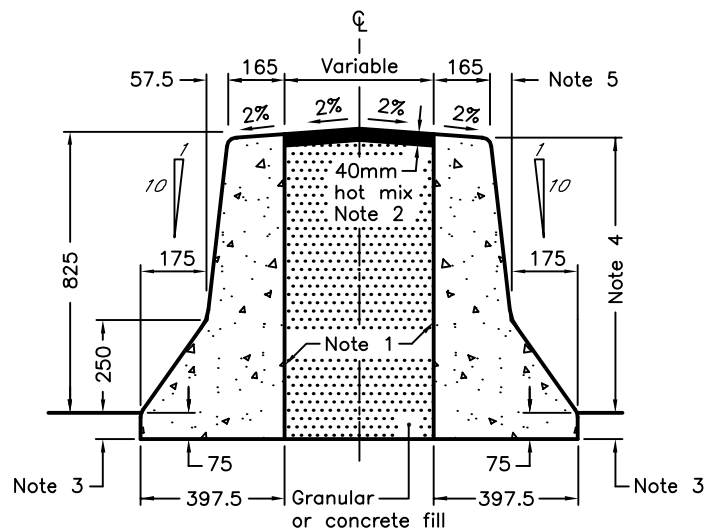
HORIZONTAL ELLIPTICAL CONCRETE PIPE

CLASS HE-A, HE-I, HE-II, HE-III, and HE-IV

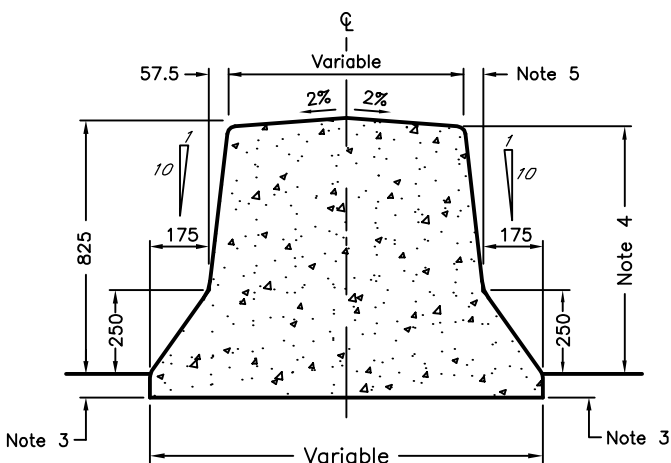
OPSD 807.050



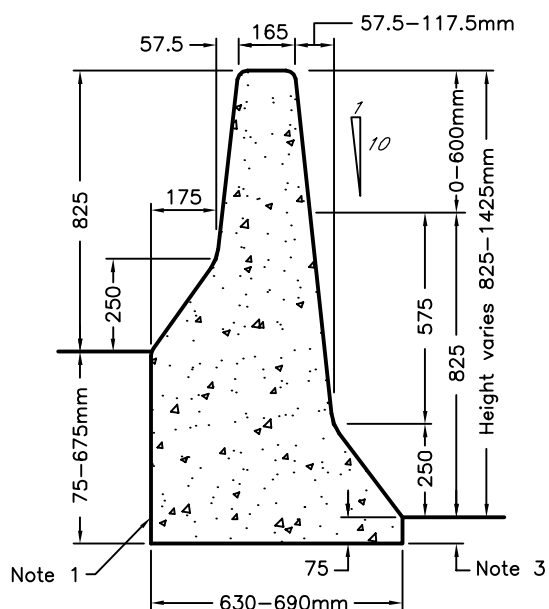
TYPE A



TYPE A-2



TYPE A-3



**TYPE A-1
ASYMMETRIC SECTION**

NOTES:

- 1 For slipforming procedure, a 1H:20V batter is acceptable.
 - 2 Hot mix not required when concrete fill is placed to the top of the concrete barriers.
 - 3 Embedment shall be 75mm into adjacent pavement.
 - 4 Height may vary from 825 to 1425mm in an asymmetric cross section.
 - 5 Width may vary from 57.5 to 117.5mm in an asymmetric cross section.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

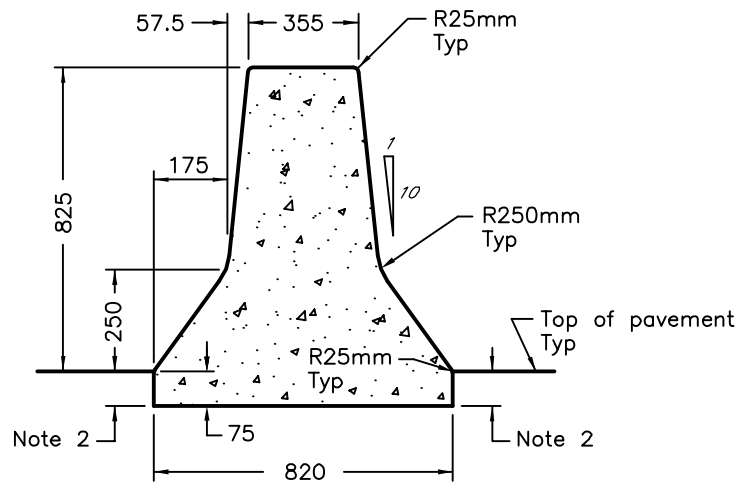
Nov 2015

Rev 1

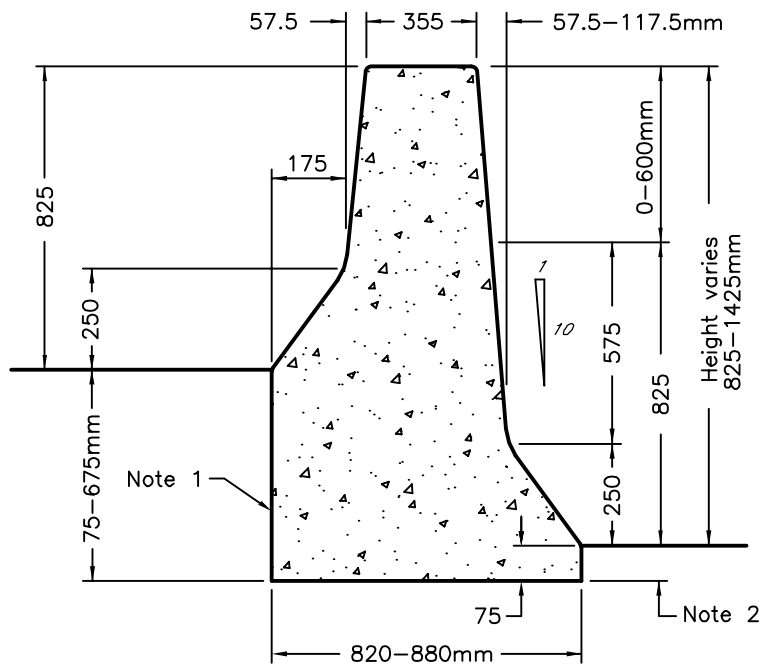
**GUIDE RAIL SYSTEM, CONCRETE BARRIER
CAST-IN-PLACE, TYPE A
INSTALLATION**



OPSD 911.130



TYPE C

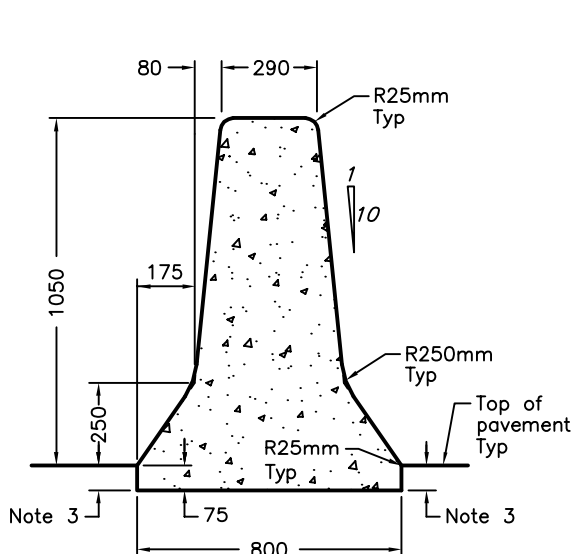


**TYPE C-1
ASYMMETRIC SECTION**

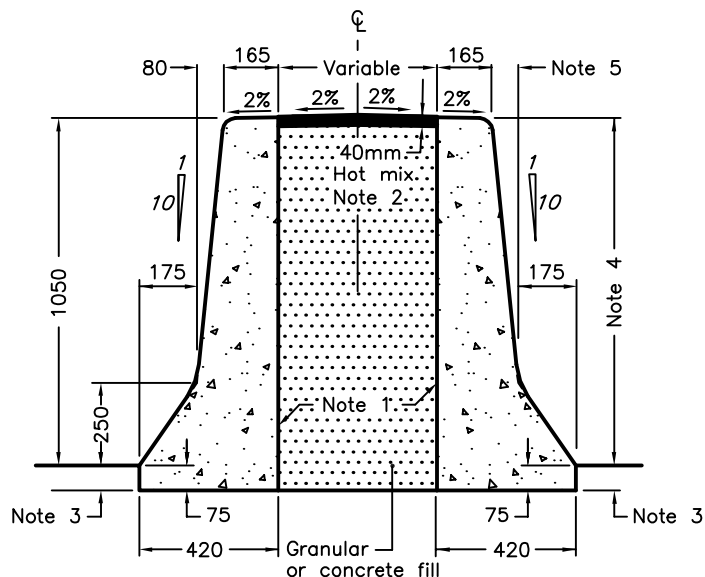
NOTES:

- 1 For slipforming procedure, a 1H:20V batter is acceptable.
 - 2 Embedment shall be 75mm into adjacent pavement.
- A OPSD 911.130 Type A-2 barrier shall be placed adjacent to bridge piers.
B All dimensions are in millimetres unless otherwise shown.

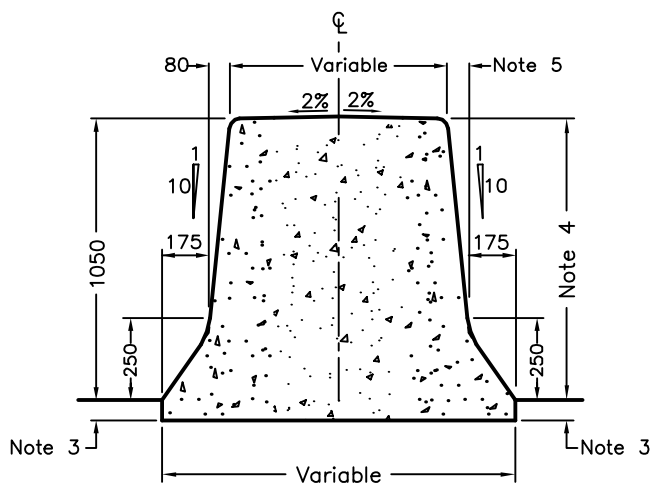
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	1	
GUIDE RAIL SYSTEM, CONCRETE BARRIER CAST-IN-PLACE, TYPE C INSTALLATION				
	OPSD 911.131			



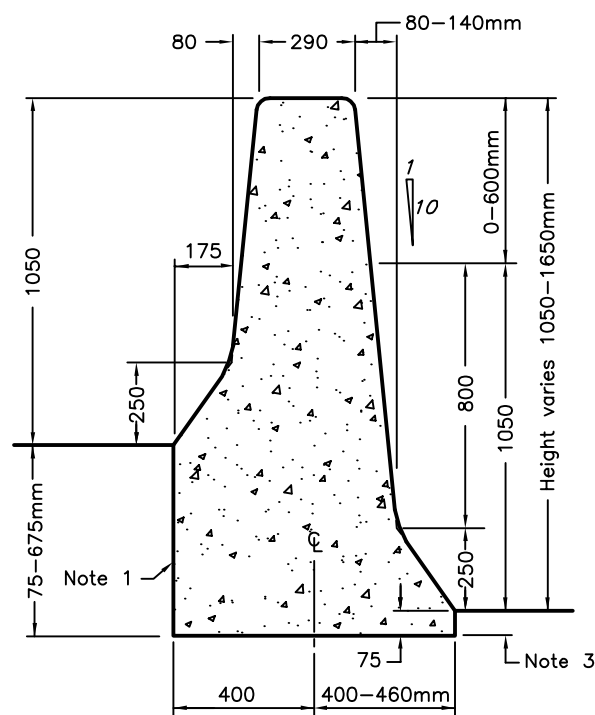
TYPE TW



TYPE TW-2



TYPE TW-3



**TYPE TW-1
ASYMMETRIC SECTION**

NOTES:

- 1 For slipforming procedure, a 1H:20V batter is acceptable.
 - 2 Hot mix not required when concrete fill is placed to the top of the concrete barriers.
 - 3 Embedment shall be 75mm into adjacent pavement.
 - 4 Height may vary from 1050 to 1650mm in an asymmetric cross section.
 - 5 Width may vary from 80 to 140mm in an asymmetric cross section.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

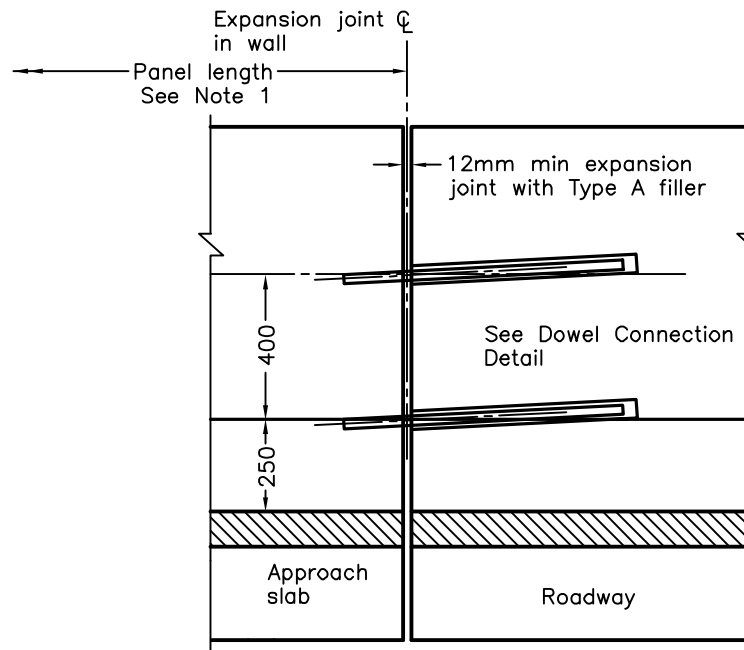
Nov 2015

Rev 1

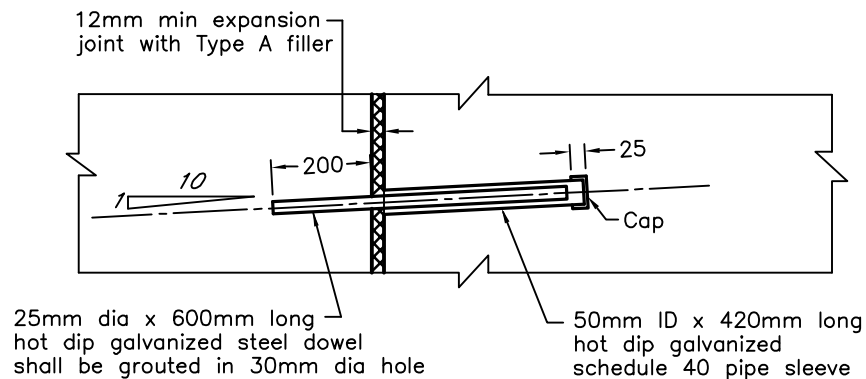
**GUIDE RAIL SYSTEM, CONCRETE BARRIER
CAST-IN-PLACE, TALL WALL
INSTALLATION**



OPSD 911.132



ELEVATION



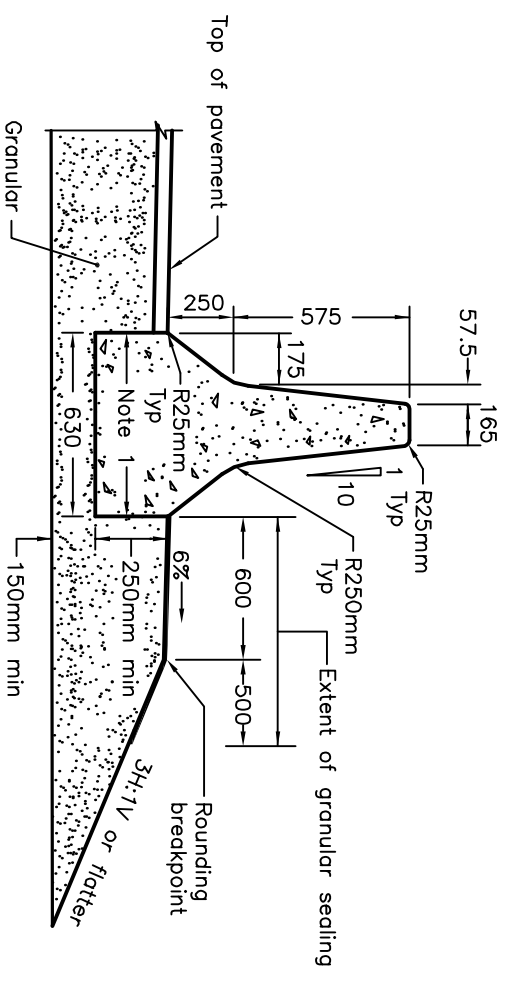
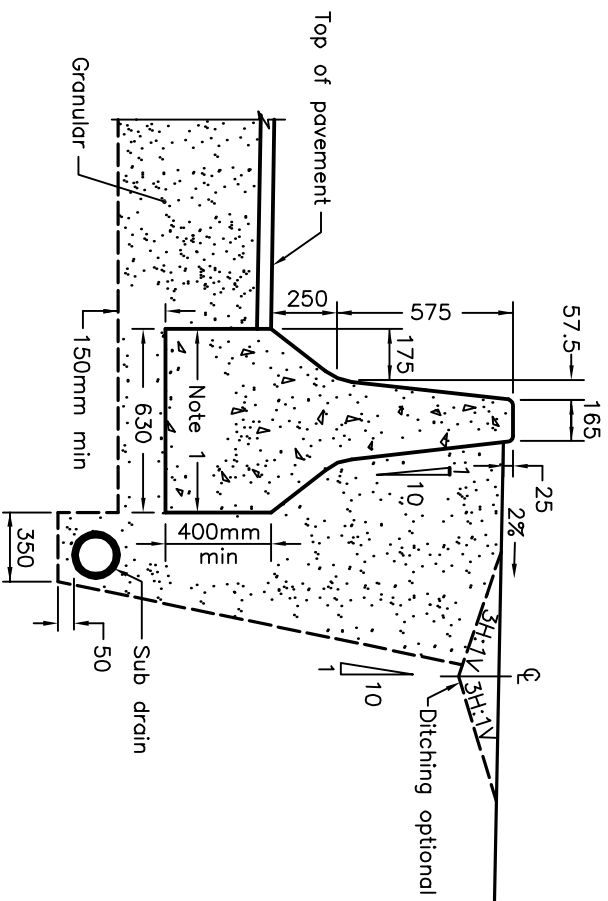
DOWEL CONNECTION DETAIL

NOTES:

- 1 Barrier panel length shall not exceed 6m.
- A This OPSD shall be read in conjunction with OPSD 911.130, 911.131, and 911.132.
- B All dowels shall be hot dip galvanized according to ASTM A123.
- C Cover on reinforcement shall be 70mm $\pm$ 20mm at all joints.
- D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	1	
GUIDE RAIL SYSTEM, CONCRETE BARRIER INSTALLATION – MEDIAN CONCRETE BARRIER TO STRUCTURE	-----			

OPSD 911.134				



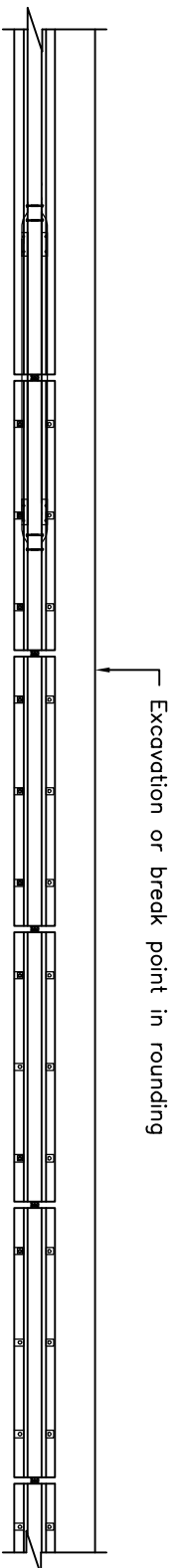
CUT SECTION

FILL SECTION

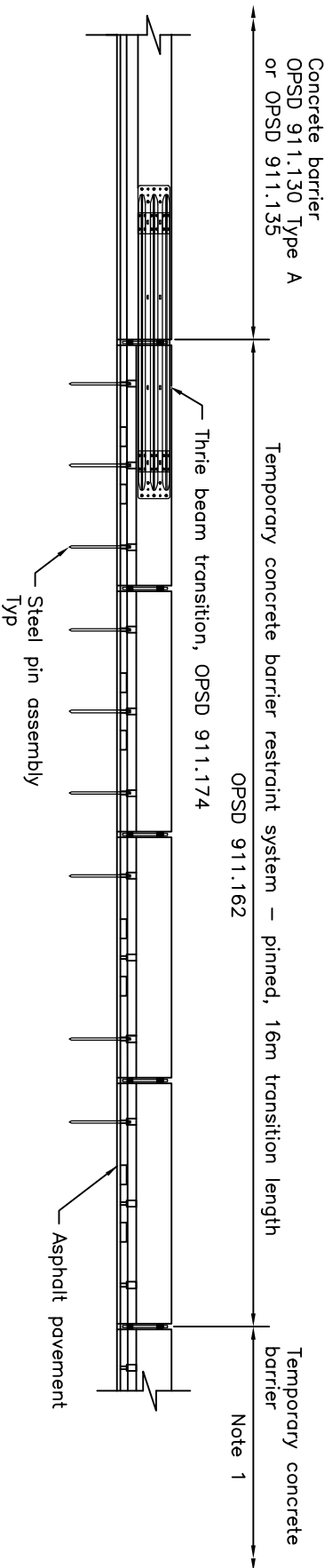
NOTES:

- 1 For slipforming procedure,
a 1H:20V batter is acceptable.
A All dimensions are in millimetres
unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev	0
GUIDE RAIL SYSTEM, CONCRETE ROADSIDE BARRIER CAST-IN-PLACE OR SLIPFORMED INSTALLATION				
		OPSD 911.135		



PLAN



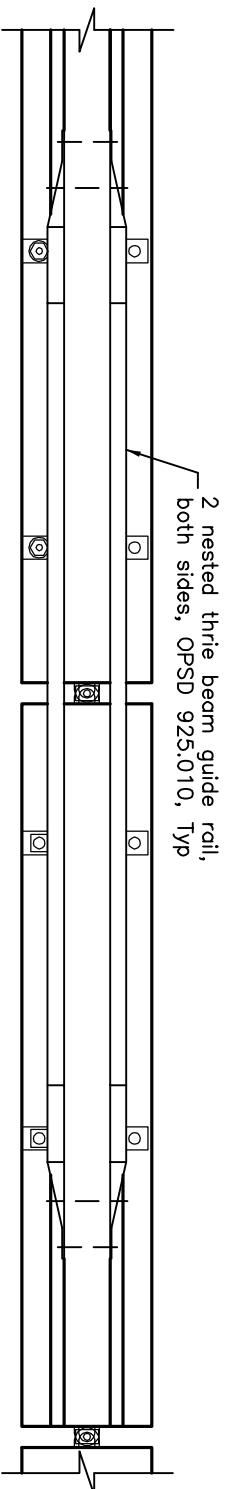
ELEVATION

NOTES:

- 1 Type M temporary concrete barrier shown. Transition to another connection type shall be completed according to OPSPD 911.340.
- A This OPSPD shall be read in conjunction with OPSPD 911.160 and 911.162.
- B System configuration meets NCHRP Report 350 TL-3.
- C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev 1
GUIDE RAIL SYSTEM, CONCRETE BARRIER			
TYPE M CONNECTION			
INSTALLATION - TEMPORARY RESTRAINT SYSTEM			
TRANSITION TO PERMANENT CONCRETE BARRIER			
OPSPD 911.173			

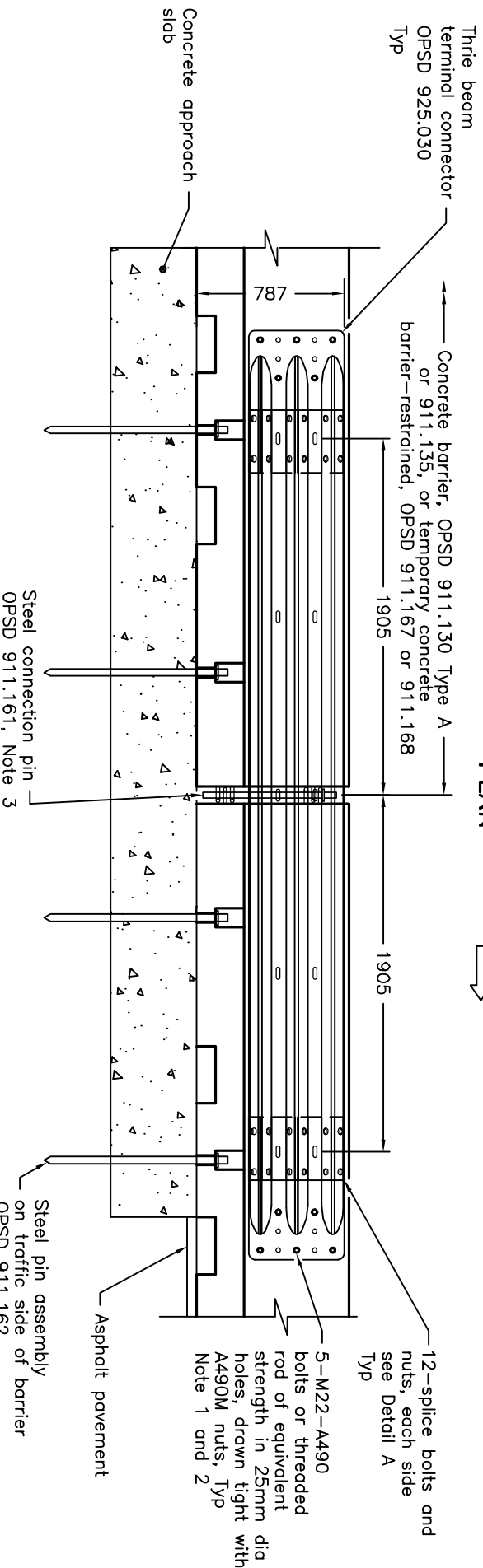




PLAN



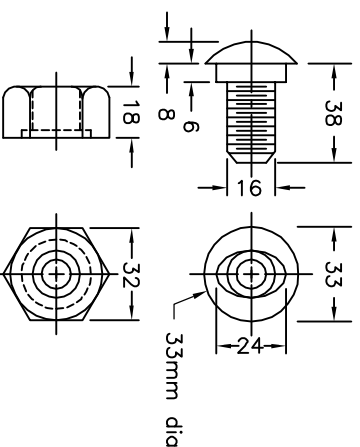
Traffic flow



ELEVATION

NOTES:

- 1 Alternative Hilti HIT HY200 with 22mm diameter HAS-E rods or equivalent, 95mm minimum embedment.
 - 2 Exposed bolt or threaded rod end saw-cut flush with face of nut.
 - 3 Steel connection pin not required with OPSD 911.130 or 911.135.
- A This OPSD shall be read in conjunction with OPSD 911.160.
 B System configuration meets NCHRP Report 350 TL-3.
 C All dimensions are in millimetres unless otherwise shown.



SPLICE BOLT AND NUT
DETAIL A

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015

Rev 1

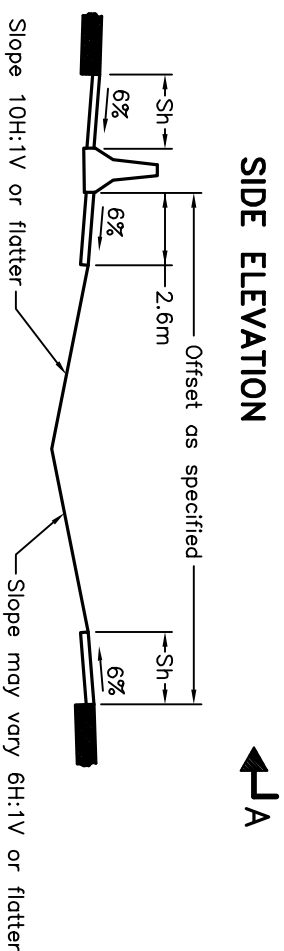
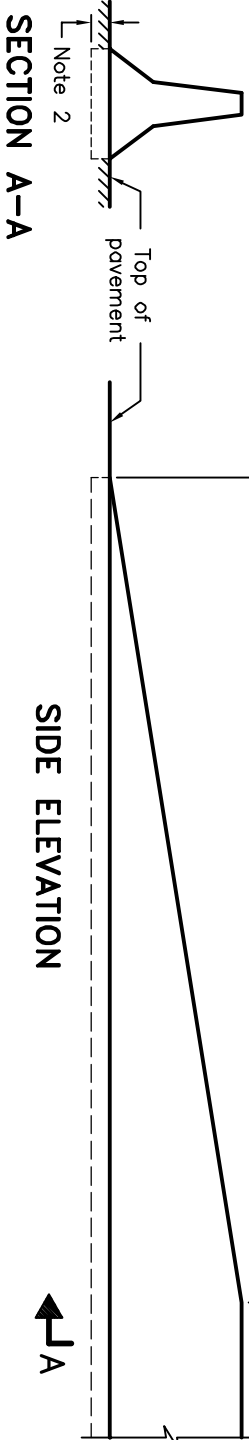
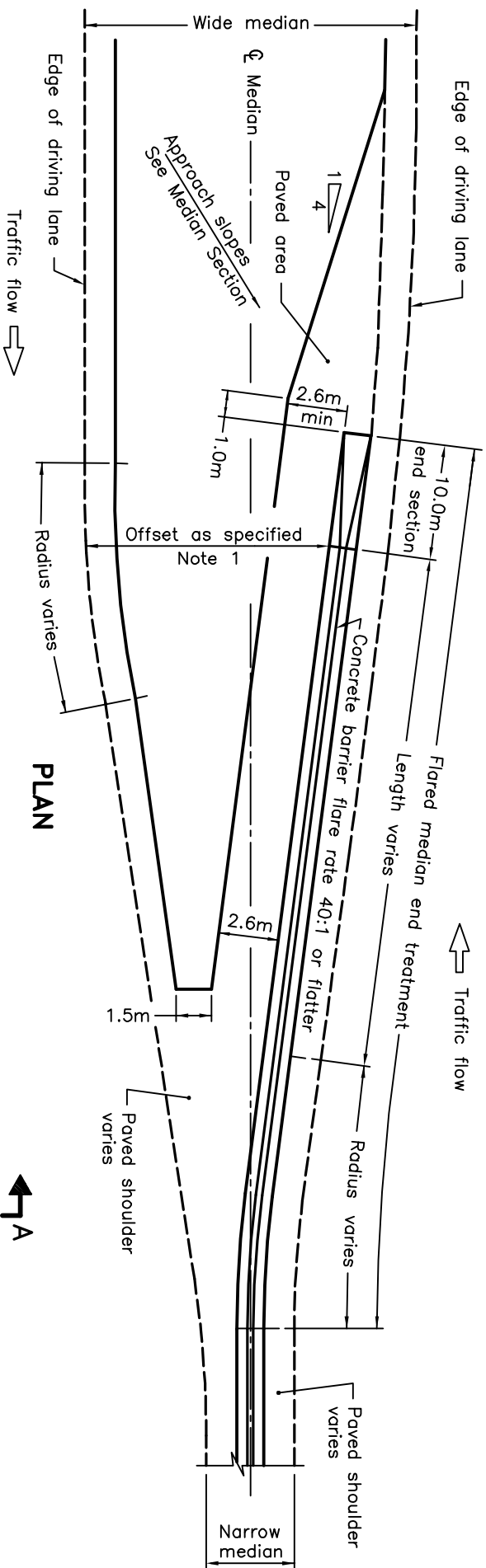
GUIDE RAIL SYSTEM, CONCRETE BARRIER

TYPE M CONNECTION

COMPONENT—THRIE BEAM TRANSITION

OPSD 911.174





MEDIAN SECTION

- 1 Where minimum clearance cannot be obtained, an approved end treatment or energy attenuator shall be installed.
- 2 Embedment shall be 75mm into adjacent pavement.

A This OPSP shall be read in conjunction with OPSP 911.130, 911.131, and 911.132.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

GUIDE RAIL SYSTEM, CONCRETE BARRIER

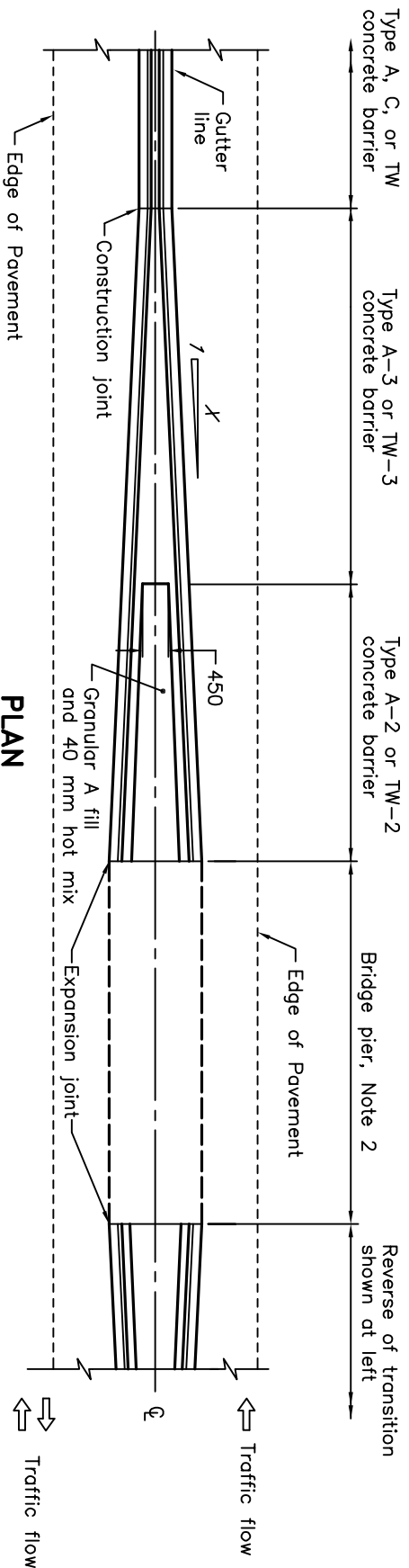
MEDIAN END TREATMENT

INSTALLATION

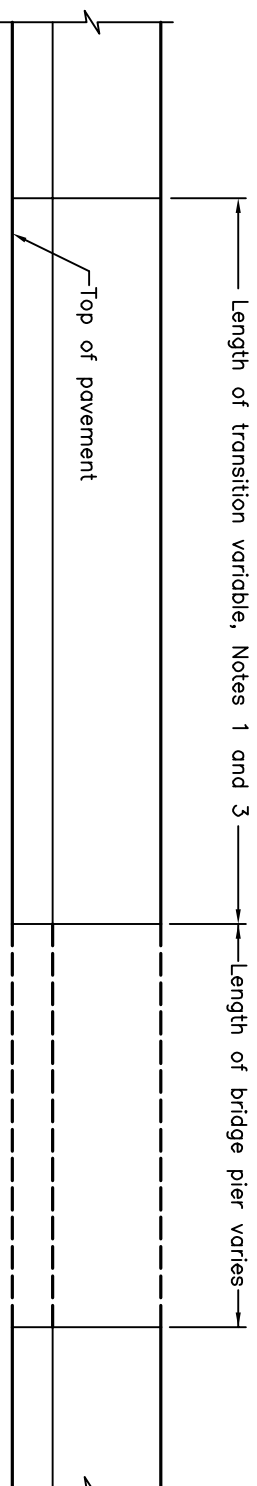
Nov 2015 Rev 1



OPSP 911.230



PLAN



ELEVATION

NOTES:

- 1 Transition length governed by flare rate and width of barrier at bridge pier according to Table 1 or as specified.
- 2 Length governed by bridge pier configuration. Concrete barrier and expansion joint details as specified.
- 3 Transition shall be one piece construction. No portion of the transition shall be slipformed.

- A This OPSP shall be read in conjunction with OPSP 911.130, 911.131, and 911.132.
- B All dimensions are in millimetres unless otherwise shown.

TABLE 1	
Flare	
POSTED SPEED km/h	X
100	32
90	30
80	26
70	24
60	21
50	18

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 1

**GUIDE RAIL SYSTEM, CONCRETE BARRIER
PERMANENT TRANSITION INSTALLATION**

AT BRIDGE PIERS

OPSP 911.380



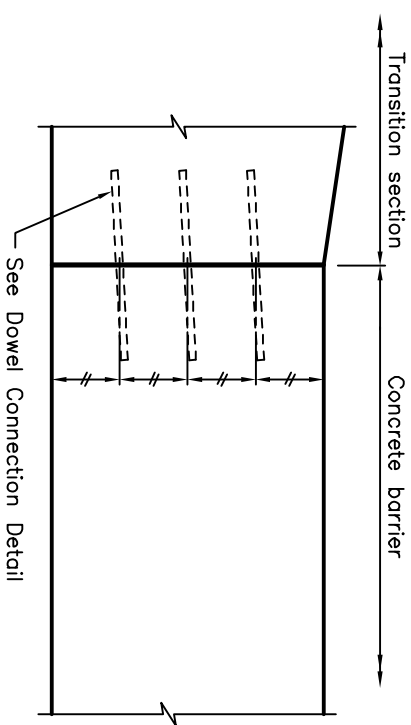
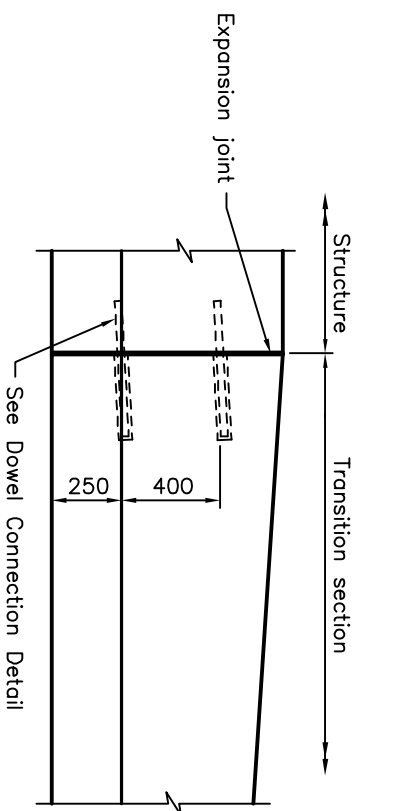


GUIDE RAIL SYSTEM, CONCRETE BARRIER PERMANENT TRANSITION INSTALLATION ROADSIDE CONCRETE BARRIER TO STRUCTURE

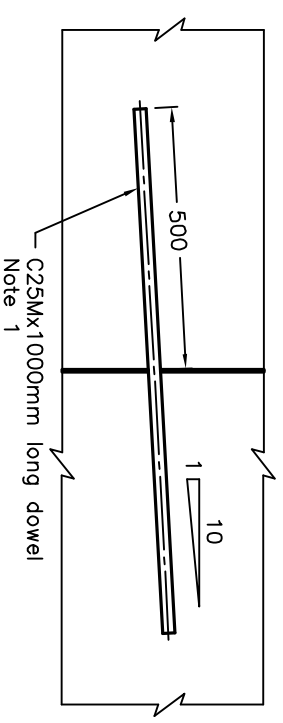
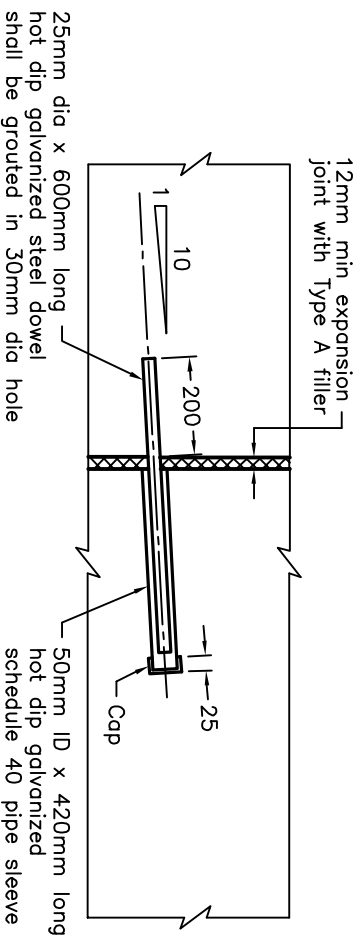
Nov 2015	Rev	2
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OPSD 911.381





DOWEL CONNECTION WITH EXPANSION JOINT TYPE I



DOWEL CONNECTION DETAIL TYPE 1

DOWEL CONNECTION DETAIL TYPE II

NOTES:

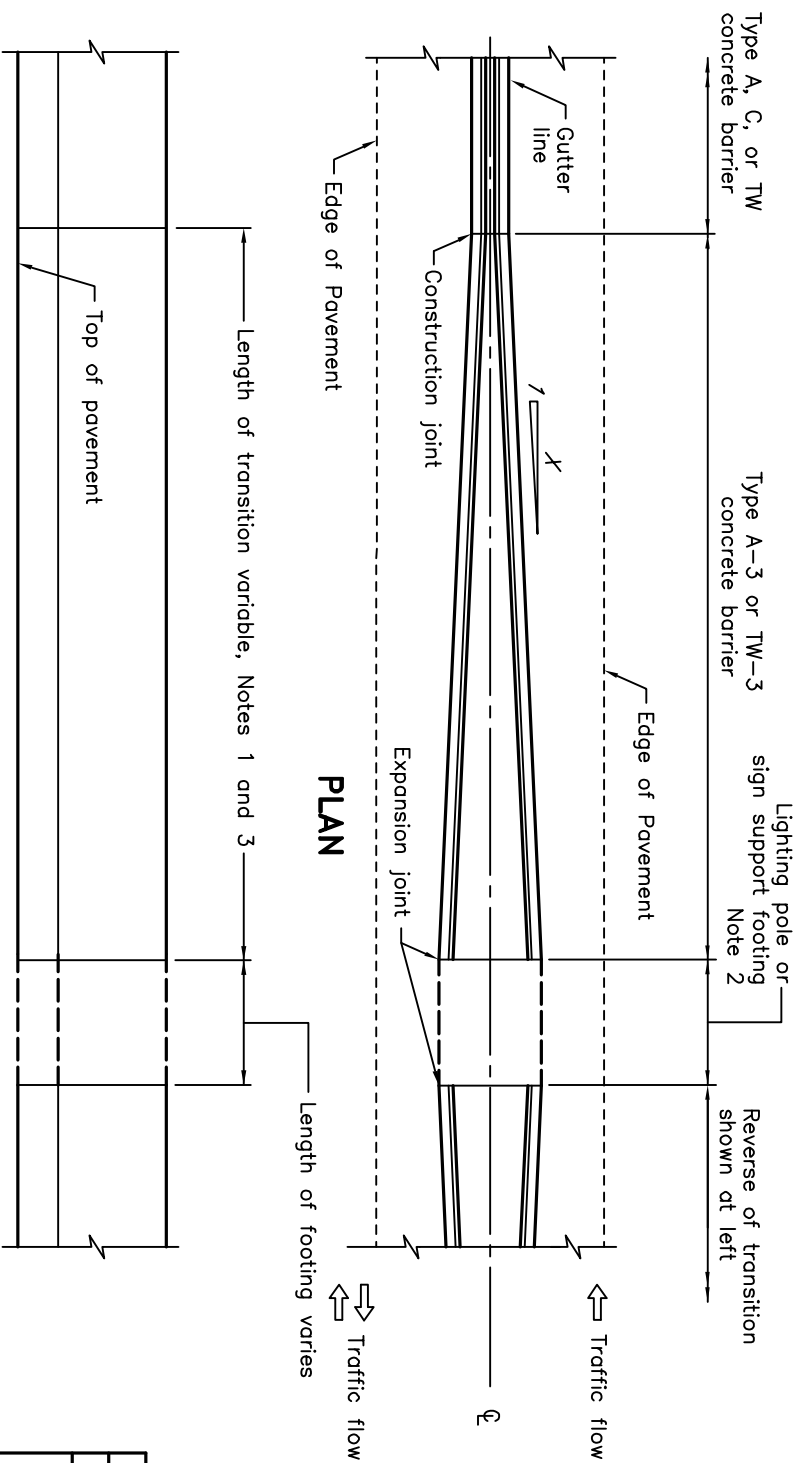
- 1 Dowel shall be placed along centreline of transition section.
- A This OPSD shall be read in conjunction with OPSD 911.381.
- B All dowels shall be hot dip galvanized according to ASTM A123.
- C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING			
Nov 2015	Rev	1	

GUIDE RAIL SYSTEM, CONCRETE BARRIER

DOWEL CONNECTION DETAIL

OPSD 911.382



ELEVATION

NOTES:

- 1 Transition length governed by flare rate and width of footing according to Table 1 or as specified.
- 2 Length governed by lighting pole or sign support footing. Concrete barrier and expansion joint details as specified.
- 3 Transition shall be one piece construction.

No portion of the transition shall be slipformed.

A This OPSD shall be read in conjunction with OPSD 911.130, 911.131, and 911.132.

B All dimensions are in millimetres unless otherwise shown.

TABLE 1	
Flare	
POSTED SPEED km/h	X
100	32
90	30
80	26
70	24
60	21
50	18

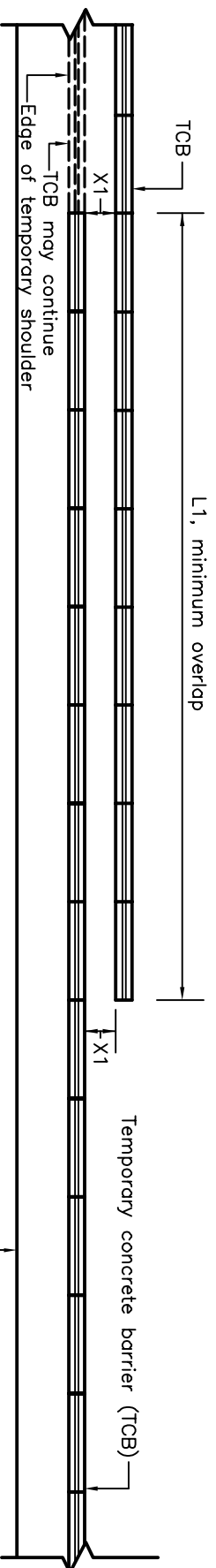
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 0

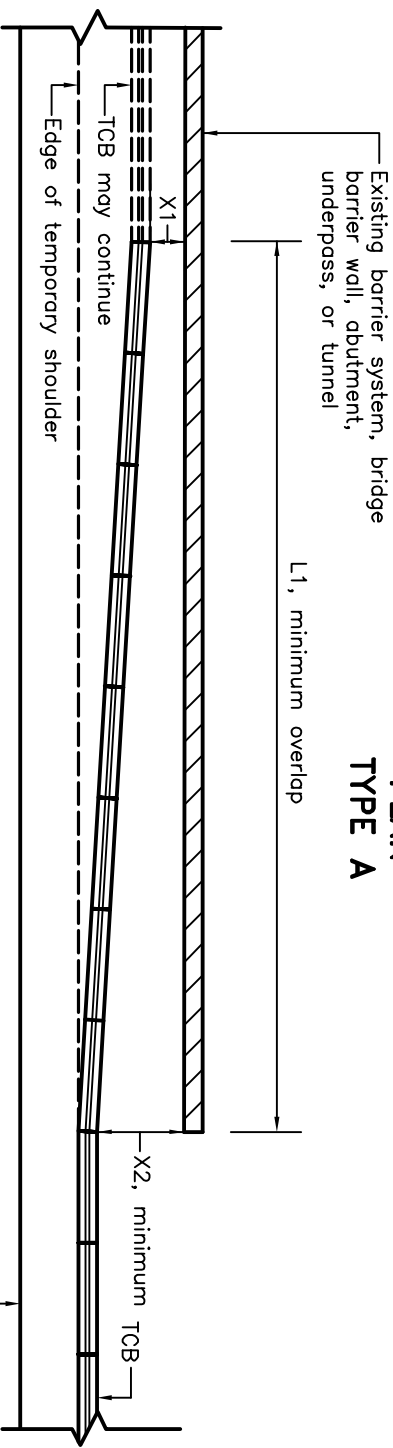
GUIDE RAIL SYSTEM, CONCRETE BARRIER
PERMANENT TRANSITION INSTALLATION
AT LIGHTING POLE
AND SIGN SUPPORT FOOTINGS

OPSD 911.383



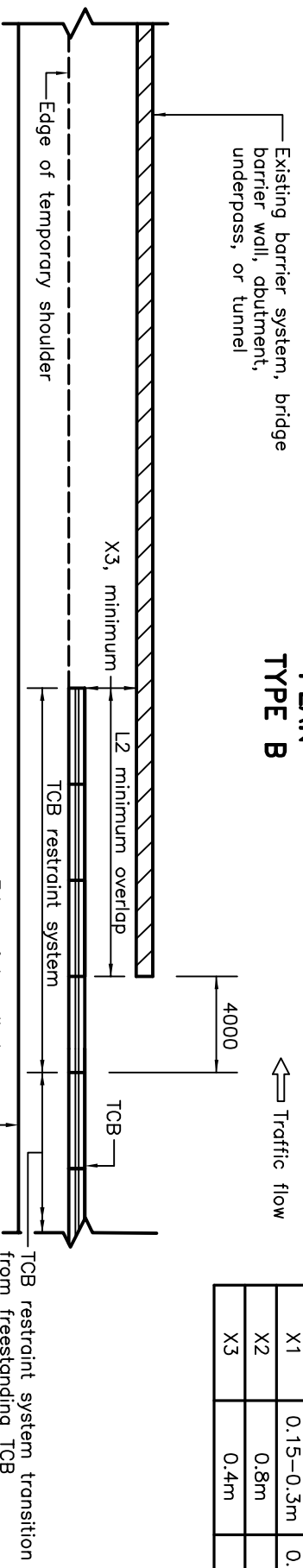


**PLAN
TYPE A**



**PLAN
TYPE B**

Dimension	Posted Speed (km/h)	
	< 70	≥ 70
L1	20m	32m
L2	12m	16m
X1	0.15–0.3m	0.15–0.3m
X2	0.8m	1.5m
X3	0.4m	0.6m

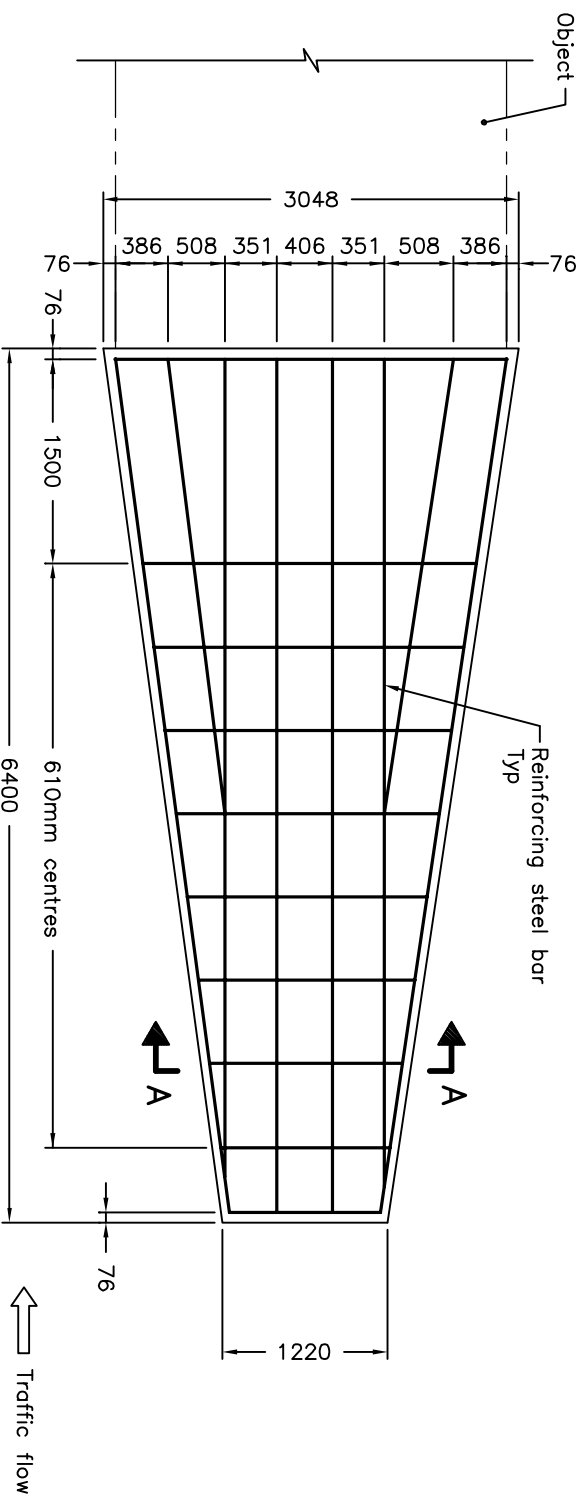


**PLAN
TYPE C**

NOTES:

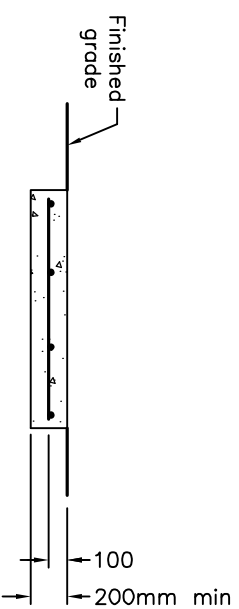
- A Roadside installation shown. For median application, use a mirror image.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev 1
GUIDE RAIL SYSTEM, CONCRETE BARRIER TEMPORARY – LEAVING END TREATMENT INSTALLATION – DIVIDED HIGHWAY			
OPSD 911.430			



PLAN

CONCRETE PAD FOR TL-3 SYSTEM CONFIGURATION

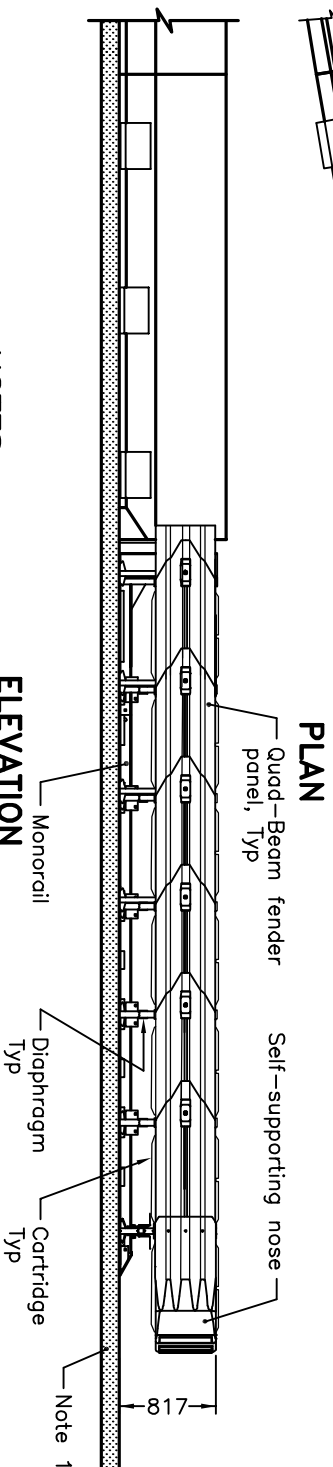
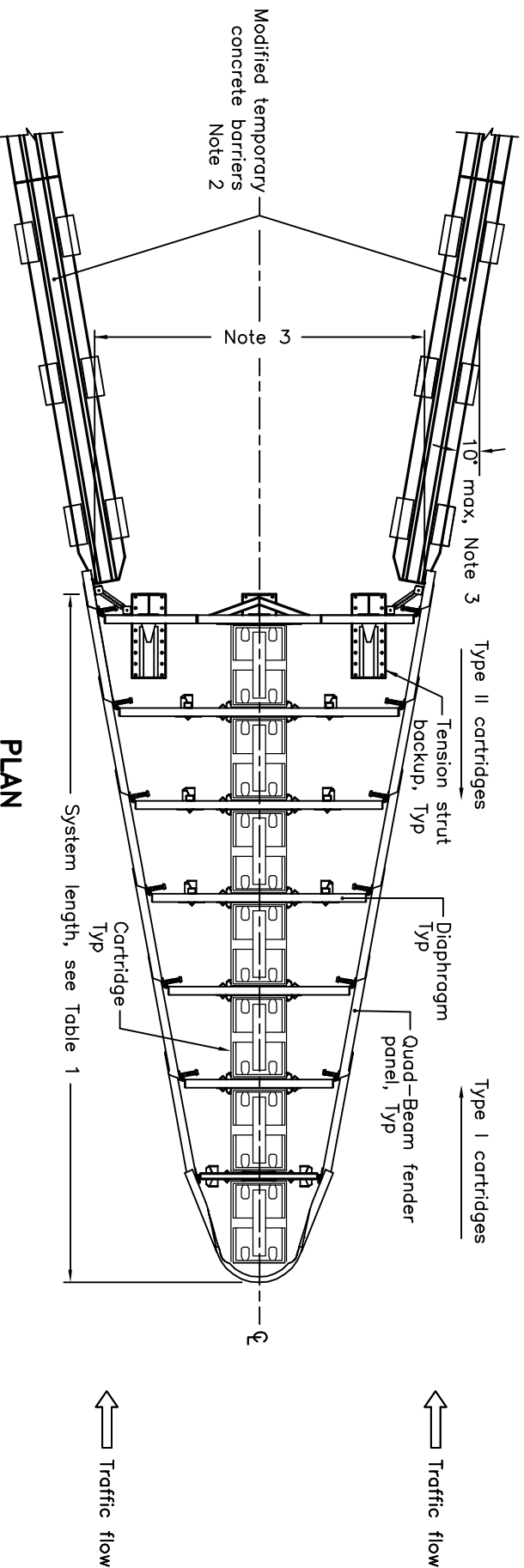


SECTION A-A

NOTES:

- A All reinforcing shall be 15M reinforcing steel bars.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev 0	
ENERGY ATTENUATOR, CRASH CUSHION				
QUADGUARD SUPER WIDE SYSTEM				
COMPONENT – REINFORCED CONCRETE PAD				
OPSD 923.006				



NOTES:

- 1 When system is placed on a concrete pad, the pad shall be according to OPSD 923.006.
 - 2 Adjacent temporary concrete barrier units shall be modified and anchored according to OPSD 923.002.
 - 3 Maximum width of object shall be 3200mm immediately behind the system. The sides of the objects shall taper rearward at a maximum 10° angle. Rear fender panels shall be able to slide rearward 762mm minimum.
- A Delineation shall be according to OPSD 984.203.
 B The system depicted here is a proprietary product.
 C System configuration meets NCHRP Report 350 test level.
 D All dimensions are in millimetres unless otherwise shown.

TABLE 1	
SYSTEM CONFIGURATION	TL-3
TYPE I CARTRIDGES FRONT REQ'D	4
TYPE II CARTRIDGES REAR REQ'D	3
SYSTEM LENGTH	6740
NOMINAL SYSTEM WIDTH	3200

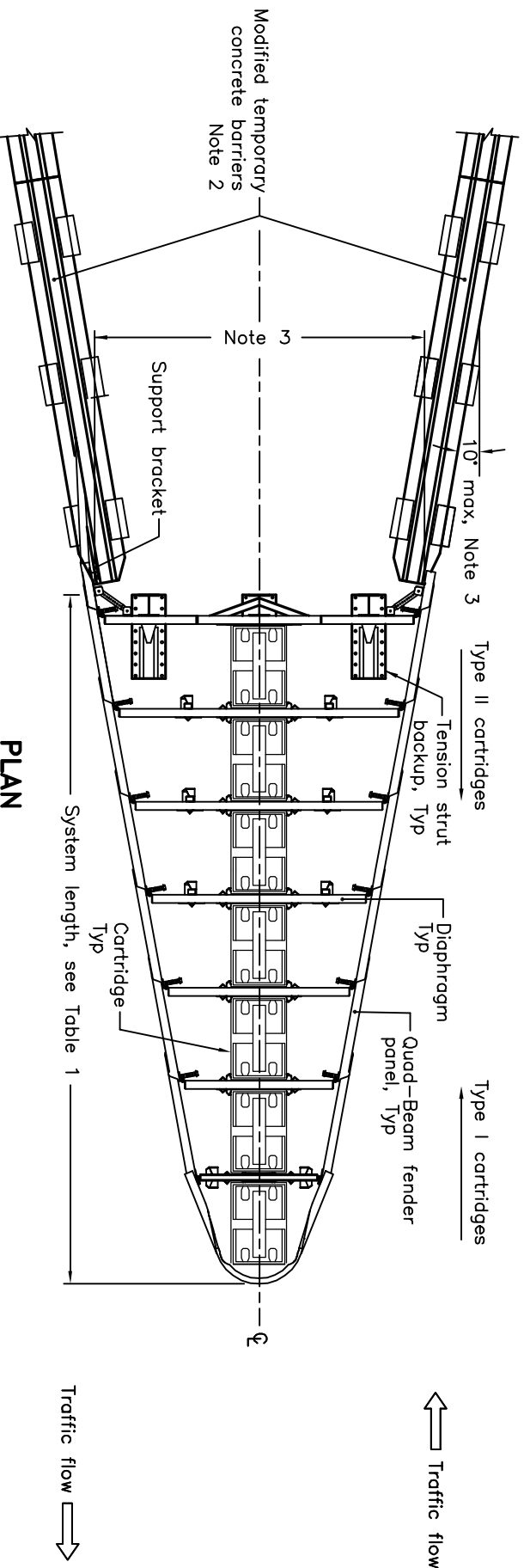
ONTARIO PROVINCIAL STANDARD DRAWING

ENERGY ATTENUATOR, CRASH CUSHION QUADGUARD SUPER WIDE SYSTEM INSTALLATION – TEMPORARY UNIDIRECTIONAL

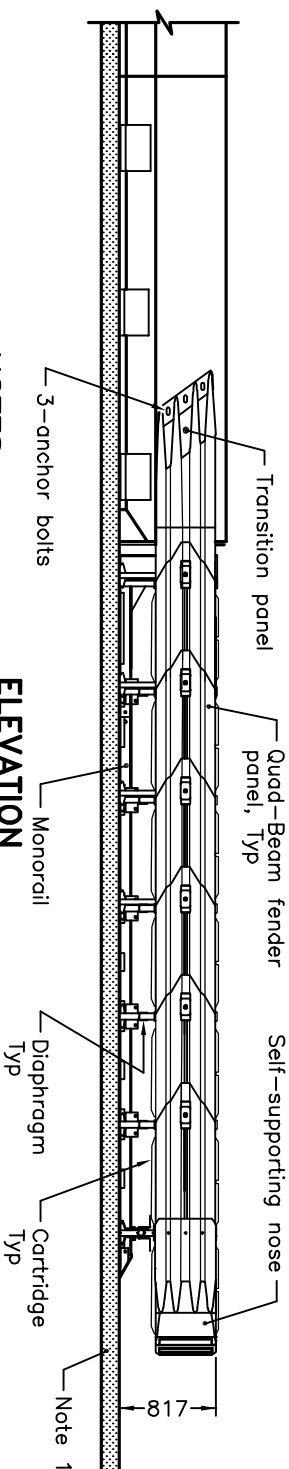
Nov 2015 Rev 0



OPSD 923.192



PLAN



ELEVATION

NOTES:

- 1 When system is placed on a concrete pad, the pad shall be according to OPSD 923.006.
 - 2 Adjacent temporary concrete barrier units shall be modified and anchored according to OPSD 923.002.
 - 3 Maximum width of object shall be 3200mm immediately behind the system. The sides of the objects shall taper rearward at a maximum 10° angle. Rear fender panels shall be able to slide rearward 762mm minimum.
- A Delineation shall be according to OPSD 984.203.
 B The system depicted here is a proprietary product.
 C System configuration meets NCHRP Report 350 test level.
 D All dimensions are in millimetres unless otherwise shown.

TABLE 1	
SYSTEM CONFIGURATION	TL-3
TYPE I CARTRIDGES FRONT REQ'D	4
TYPE II CARTRIDGES REAR REQ'D	3
SYSTEM LENGTH	6740
NOMINAL SYSTEM WIDTH	3200

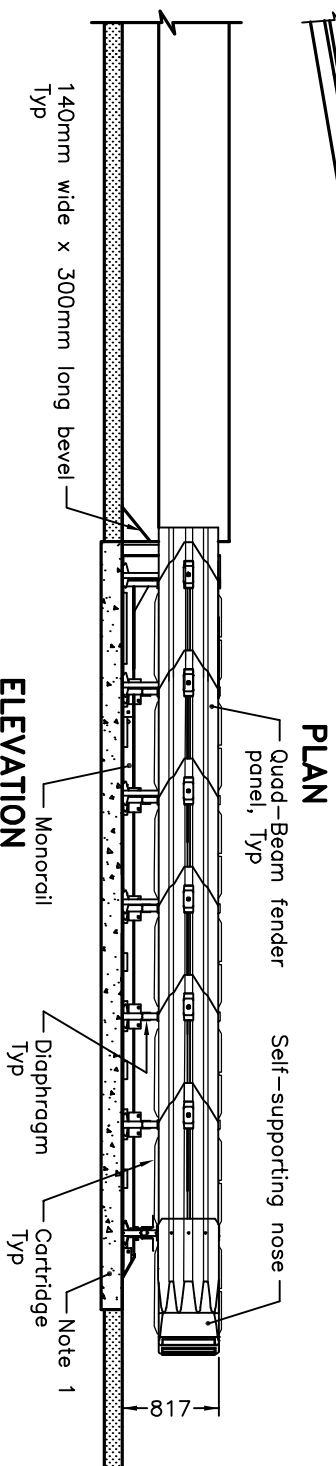
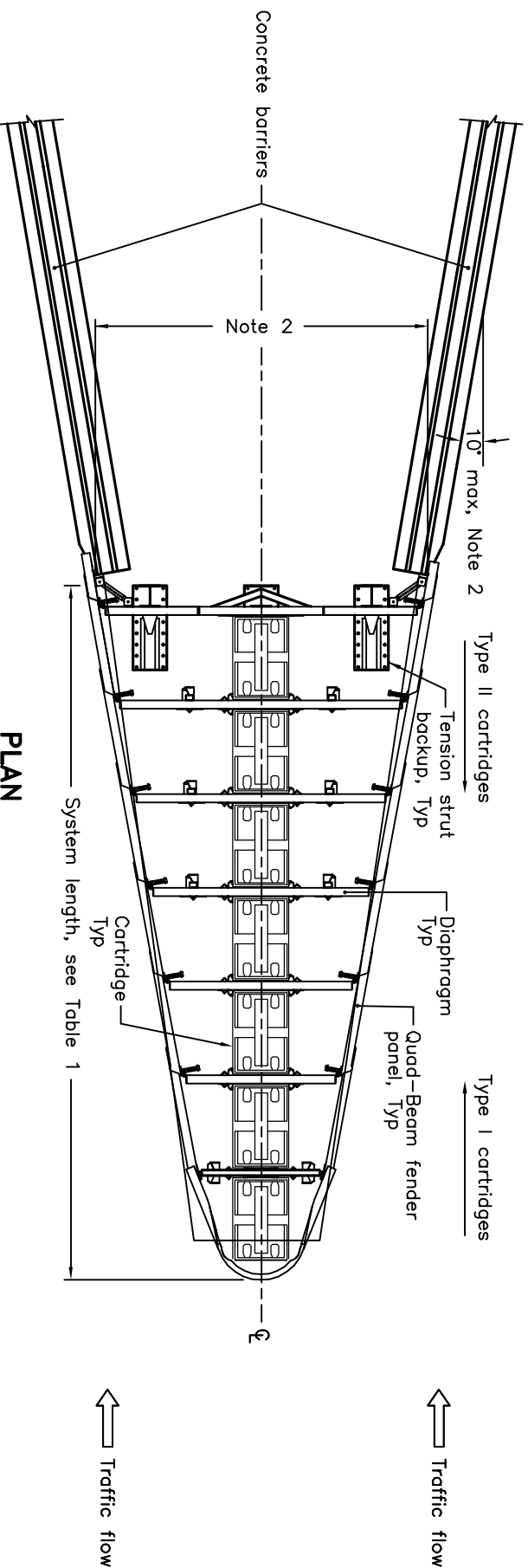
ONTARIO PROVINCIAL STANDARD DRAWING

ENERGY ATTENUATOR, CRASH CUSHION QUADGUARD SUPER WIDE SYSTEM INSTALLATION – TEMPORARY BIDIRECTIONAL

Nov 2015 Rev 0



OPSD 923.193



NOTES:

- 1 The system shall be anchored to concrete pad detailed in OPSD 923.006.
- 2 Maximum width of object shall be 3200mm immediately behind the system. The sides of the objects shall taper rearward at a maximum 10° angle. Rear fender panels shall be able to slide rearward 762mm minimum.
- A Delineation shall be according to OPSD 984.204.
- B The system depicted here is a proprietary product.
- C System configuration meets NCHRP Report 350 test level.
- D All dimensions are in millimetres unless otherwise shown.

TABLE 1	
SYSTEM CONFIGURATION	TL-3
TYPE I CARTRIDGES FRONT REQ'D	4
TYPE II CARTRIDGES REAR REQ'D	3
SYSTEM LENGTH	6740
NOMINAL SYSTEM WIDTH	3200

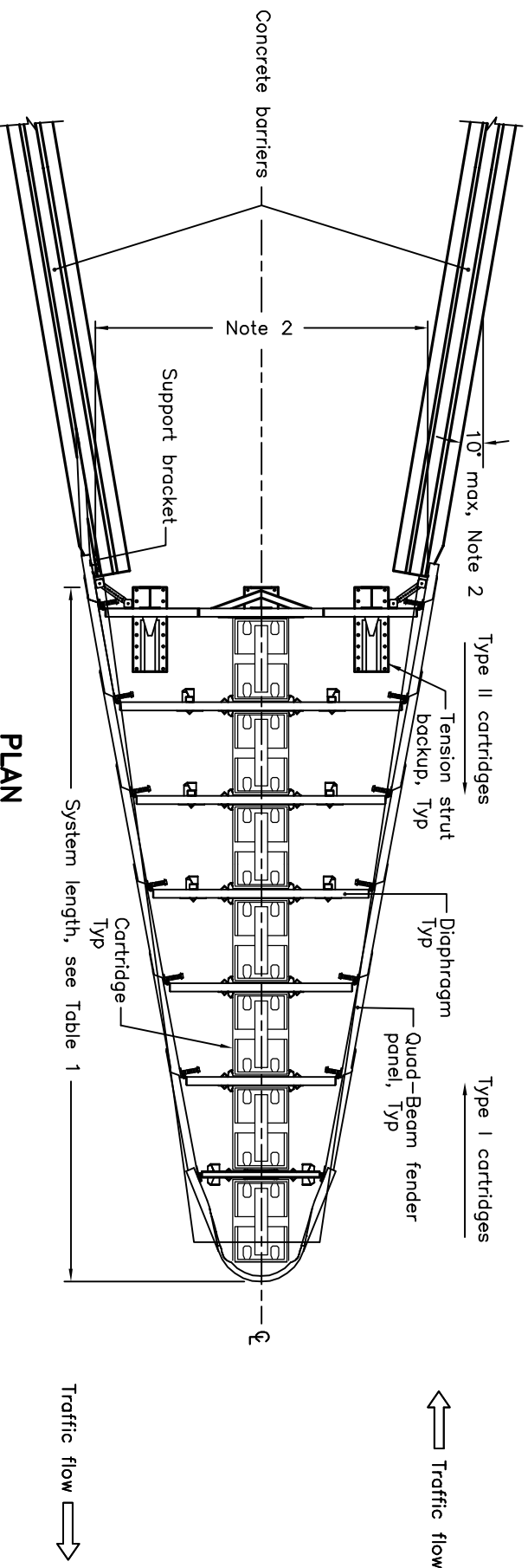
ONTARIO PROVINCIAL STANDARD DRAWING

ENERGY ATTENUATOR, CRASH CUSHION QUADGUARD SUPER WIDE SYSTEM INSTALLATION – PERMANENT UNIDIRECTIONAL

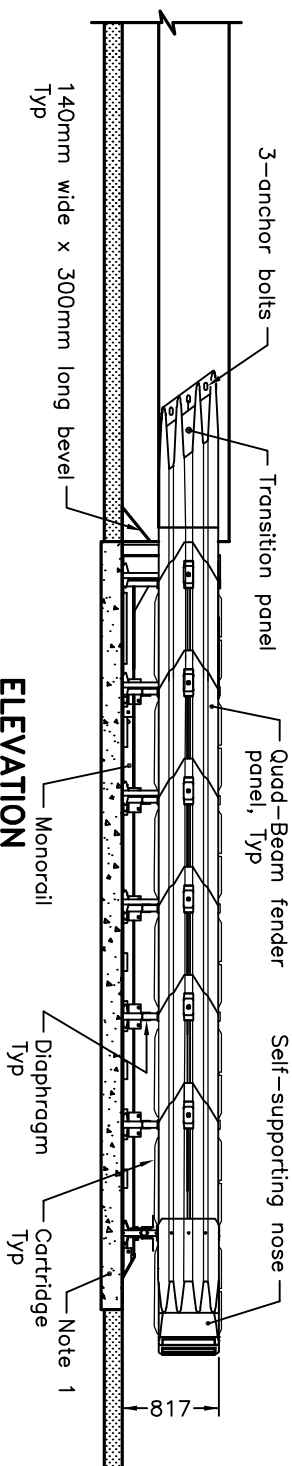
Nov 2015 Rev 0



OPSD 923.194



PLAN



ELEVATION

NOTES:

- 1 The system shall be anchored to concrete pad detailed in OPSD 923.006.
- 2 Maximum width of object shall be 3200mm immediately behind the system. The sides of the objects shall taper rearward at a maximum 10° angle. Rear fender panels shall be able to slide rearward 762mm minimum.
- A Delineation shall be according to OPSD 984.204.
- B The system depicted here is a proprietary product.
- C System configuration meets NCHRP Report 350 test level.
- D All dimensions are in millimetres unless otherwise shown.

TABLE 1	
SYSTEM CONFIGURATION	TL-3
TYPE I CARTRIDGES FRONT REQ'D	4
TYPE II CARTRIDGES REAR REQ'D	3
SYSTEM LENGTH	6740
NOMINAL SYSTEM WIDTH	3200

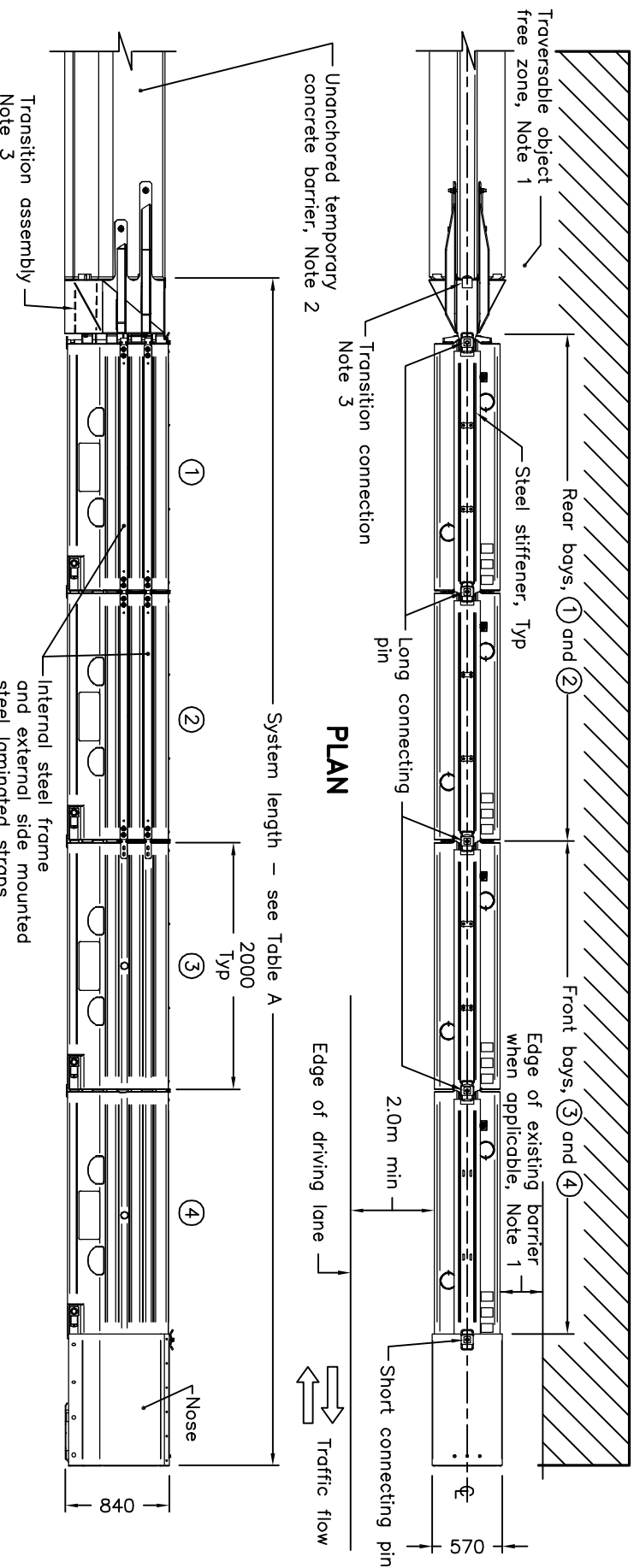
ONTARIO PROVINCIAL STANDARD DRAWING

ENERGY ATTENUATOR, CRASH CUSHION QUADGUARD SUPER WIDE SYSTEM INSTALLATION – PERMANENT BIDIRECTIONAL

Nov 2015 Rev 0



OPSD 923.195



NOTES:

- When placed adjacent to concrete barrier or steel beam guide rail, clearance shall be $\leq 0.3\text{m}$ or $\geq 3.0\text{m}$, otherwise minimum 6.0m wide traversable object free zone shall extend from nose for 22.0m minimum.
- First 16m of TCB shall be placed tangential to ACZ-350 system.
- Transition assembly and method of connection shall be according to manufacturer's specifications for temporary concrete barrier type used.

A Delineation shall be according to OPSD 984.203.

B System configuration meets NCHRP Report 350 test level, TL-2 and TL-3.

C The system depicted here is a proprietary product.

D All elements shall be filled with water. When temperature is predicted to fall below freezing, antifreeze agents according to manufacturer recommendations shall be used.

E All dimensions are in millimetres unless otherwise shown.

ELEVATION

TABLE A		
System Configuration	TL-2	TL-3
Bays	① ②	① ② ③ ④
System Length	5620	9620

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 1

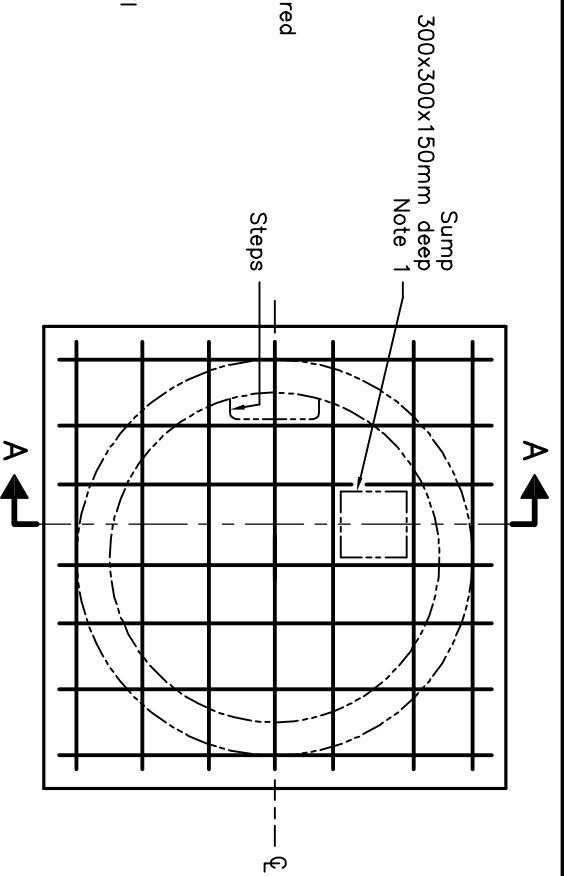
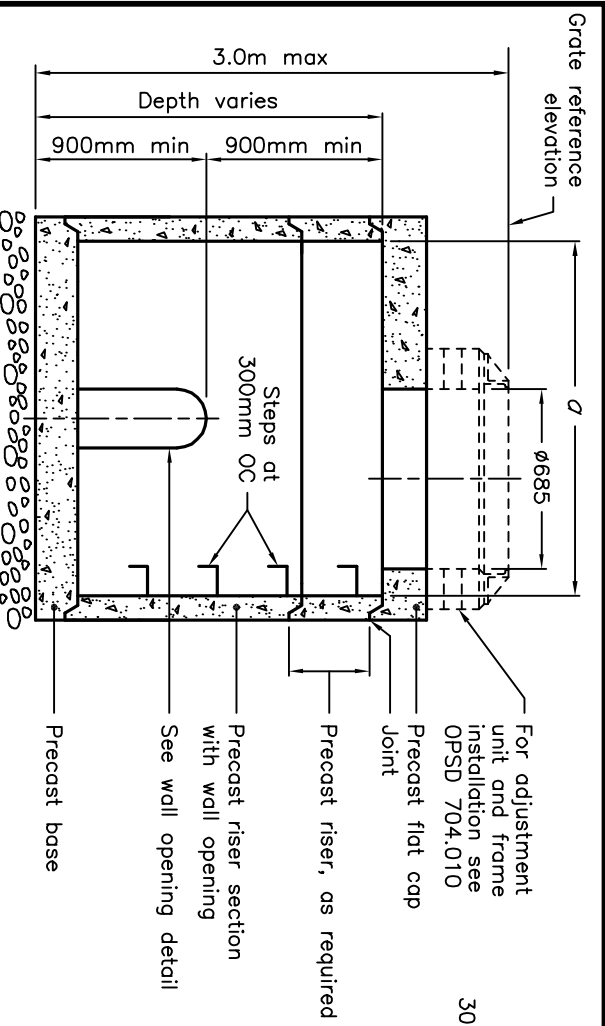
ENERGY ATTENUATOR, CRASH CUSHION

ACZ-350 SYSTEM

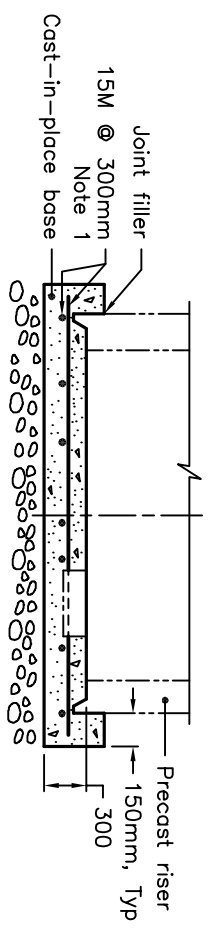
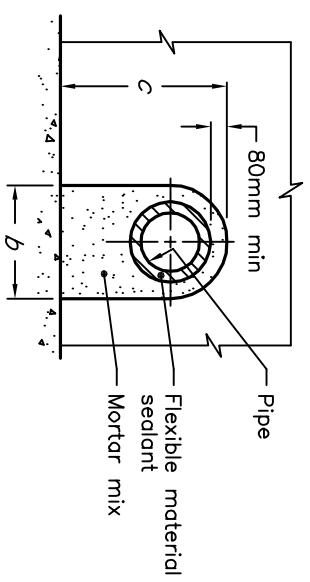
INSTALLATION-TEMPORARY CONCRETE BARRIER

OPSD 924.135





CAST-IN-PLACE BASE



SECTION A-A

NOTES:

1 Sump shall be placed to avoid associated appurtenances and step landing. Position steel reinforcement to maintain minimum 50mm cover at sump.

A This OPSD shall be read in conjunction with OPSD 701.030, 701.031, 701.032, 701.041, and 703.011.

B Bond breaker shall be used between the concrete and the fittings and appurtenances.

C All dimensions are in millimetres unless otherwise shown.

WALL OPENING DETAIL

Dimension	Pipe diameter	
	100 to 250mm	300 to 350mm
a	ø1200	ø1500
b	400	550
c	600	750

ONTARIO PROVINCIAL STANDARD DRAWING

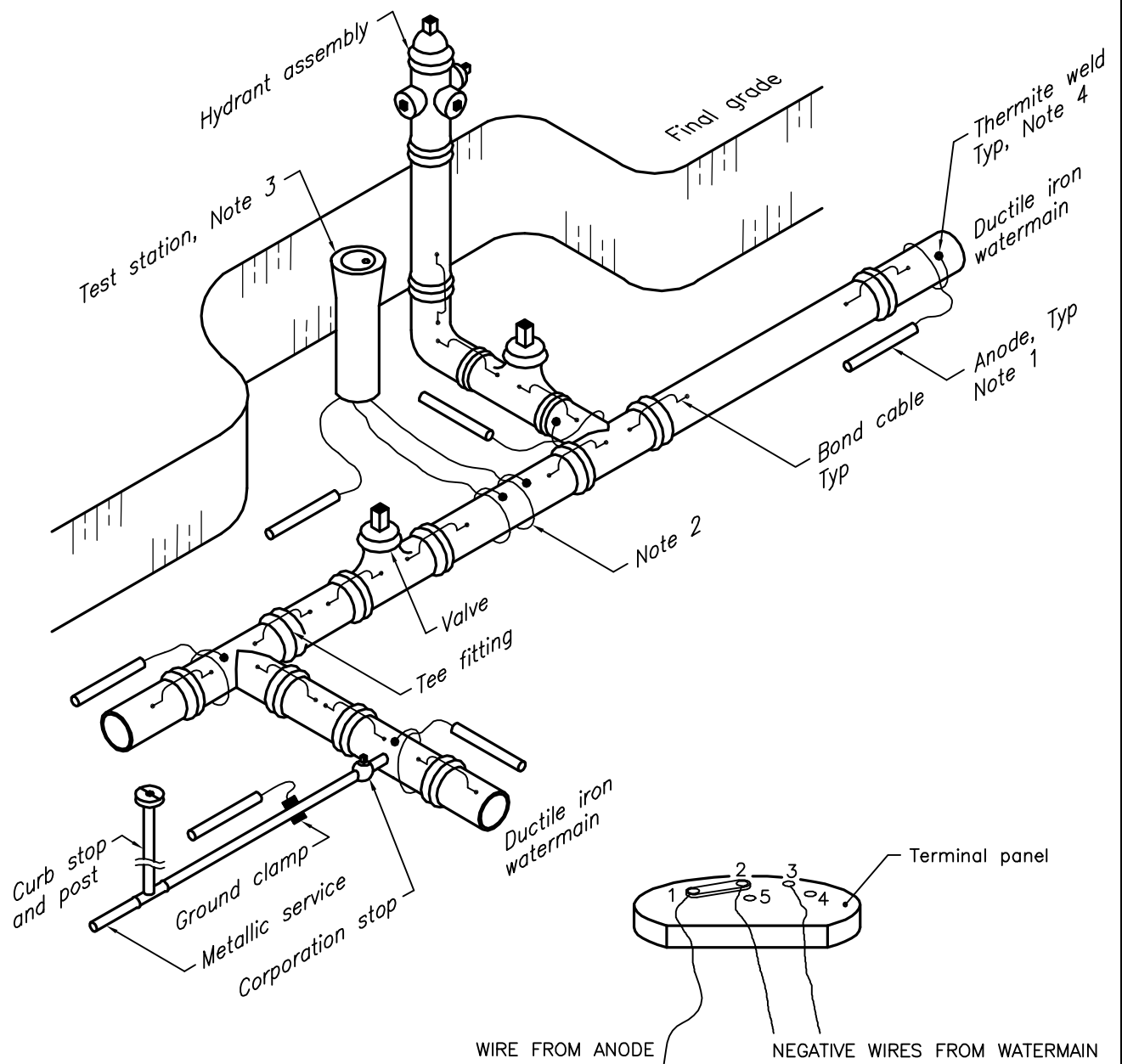
Nov 2015 Rev 4

PRECAST VALVE CHAMBER

1200mm AND 1500mm DIAMETER

OPSD 1101.010





**WIRING DETAIL
IN TEST STATION**

NOTES:

- 1 Anode shall be placed at least 1.0m away from the water system pipe and appurtenances and as deep as the bottom of the pipe and appurtenances. Minimum distance between anodes shall be 1.0m.
- 2 Anode connecting wires shall be loosely wrapped around pipes and fittings and knotted.
- 3 The test station shall be set flush with the final grade as shown or post-mounted.
- 4 Protective coating shall be applied to all thermite welds.

ONTARIO PROVINCIAL STANDARD DRAWING

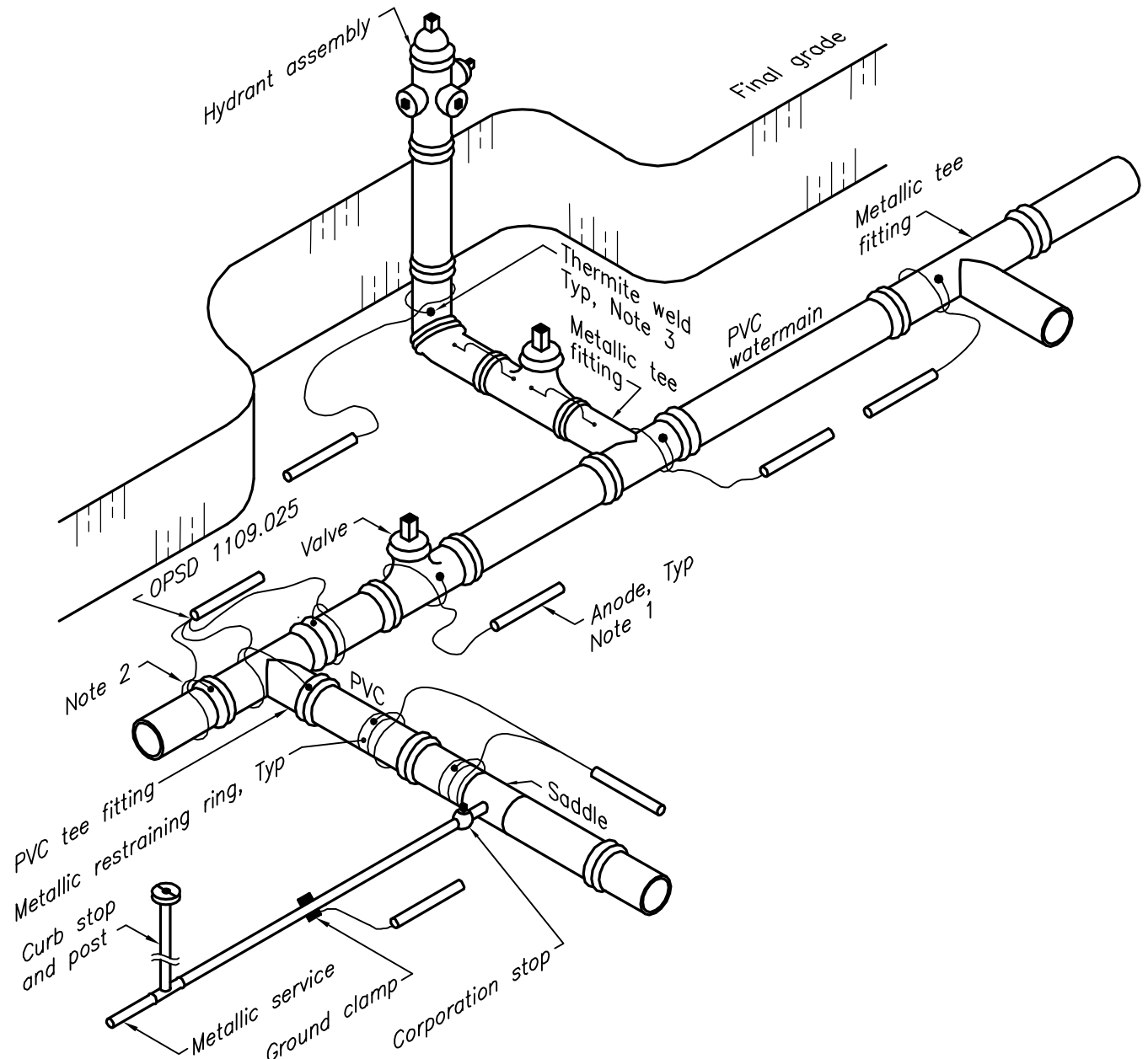
Nov 2015

Rev 2

**CATHODIC PROTECTION FOR
METALLIC
WATERMAIN SYSTEMS**



OPSD 1109.010



NOTES:

- 1 Anode shall be placed at least 1.0m away from the water system pipe and appurtenances and as deep as the bottom of the pipe and appurtenances. Minimum distance between anodes shall be 1.0m.
- 2 Anode connecting wire shall be loosely wrapped around pipes and fittings and knotted.
- 3 Protective coating shall be applied to all thermite welds.

ONTARIO PROVINCIAL STANDARD DRAWING

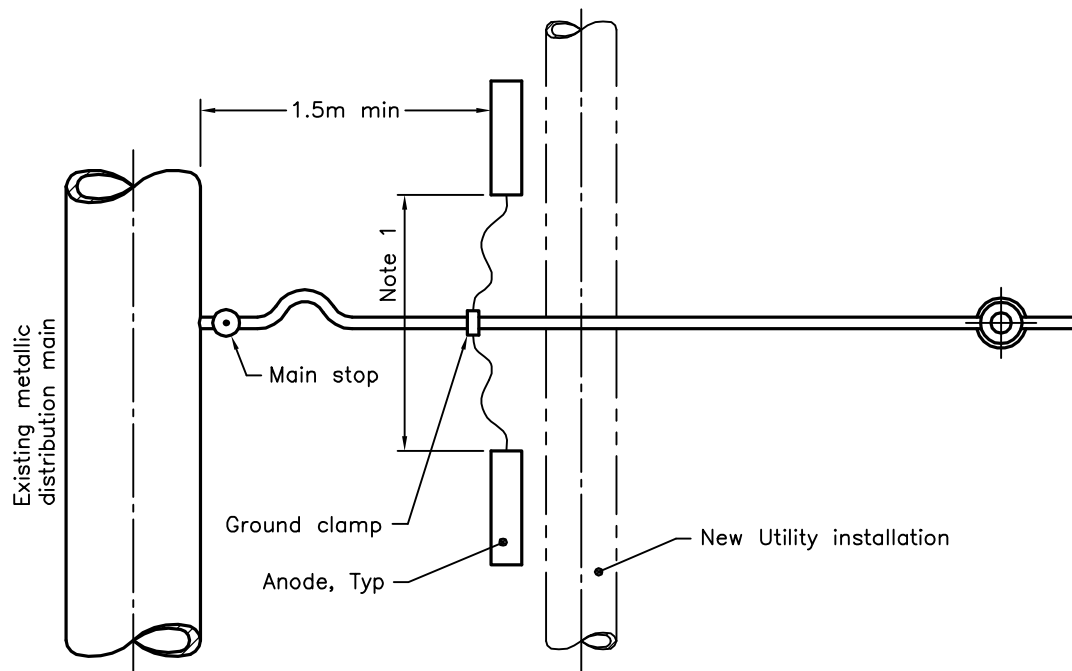
Nov 2015

Rev 2

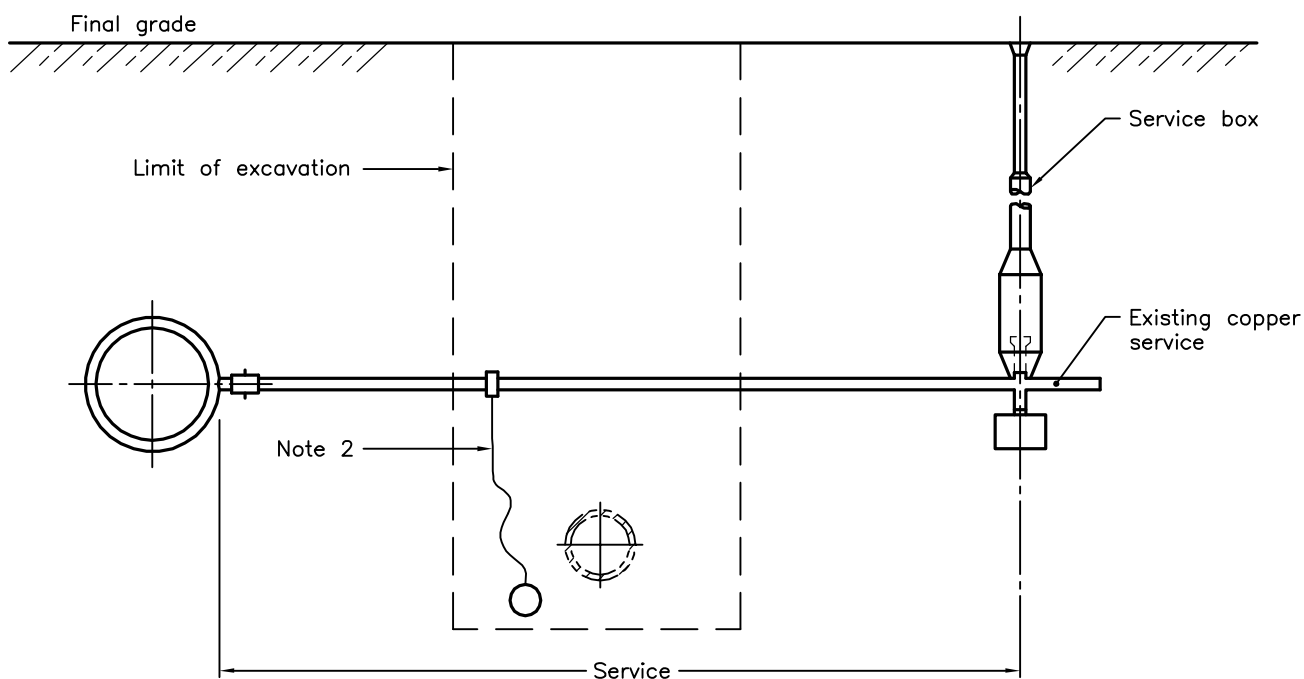
CATHODIC PROTECTION FOR PVC WATERMAIN SYSTEMS



OPSD 1109.011



PLAN



ELEVATION

NOTES:

- 1 Anodes shall be spaced as far apart as anode wires and excavation permit.
- 2 When the watermain is exposed, the connection may be made with a thermite weld on the existing watermain.

A All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

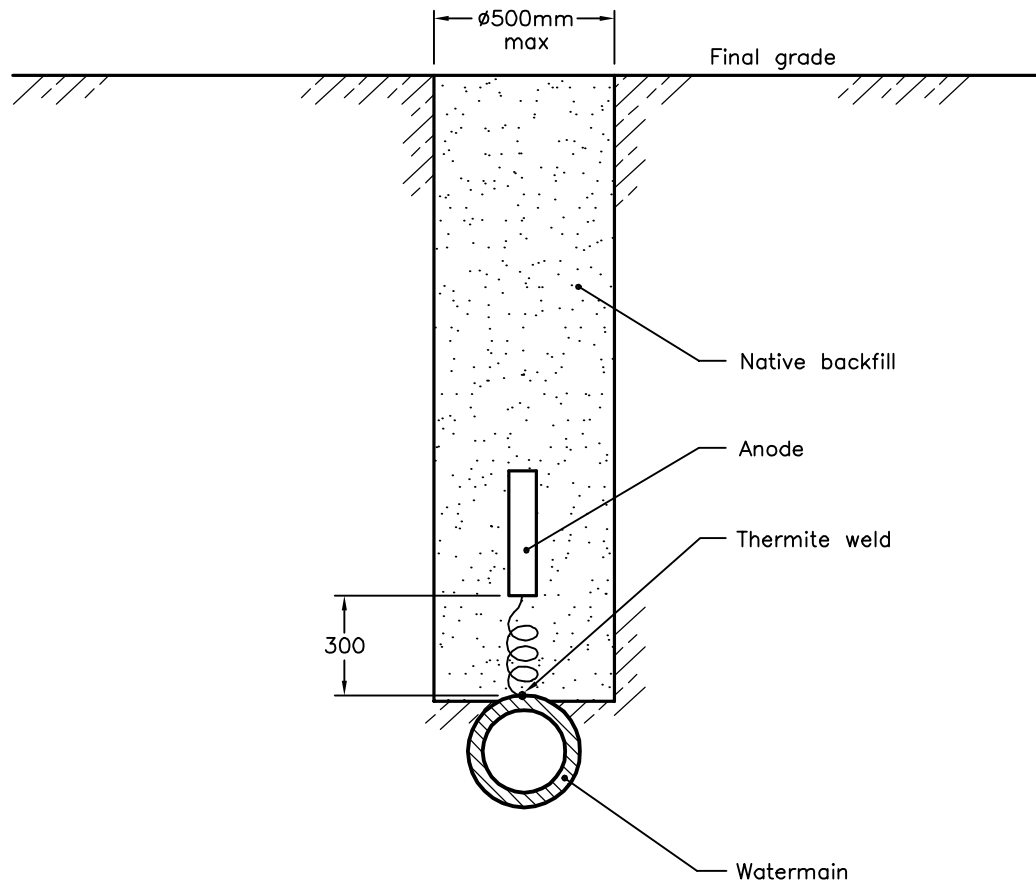
Nov 2015

Rev 1

CATHODIC PROTECTION OF EXISTING
METALLIC WATERMAINS
EXPOSED SERVICE OR PIPE METHOD

OPSD 1109.012

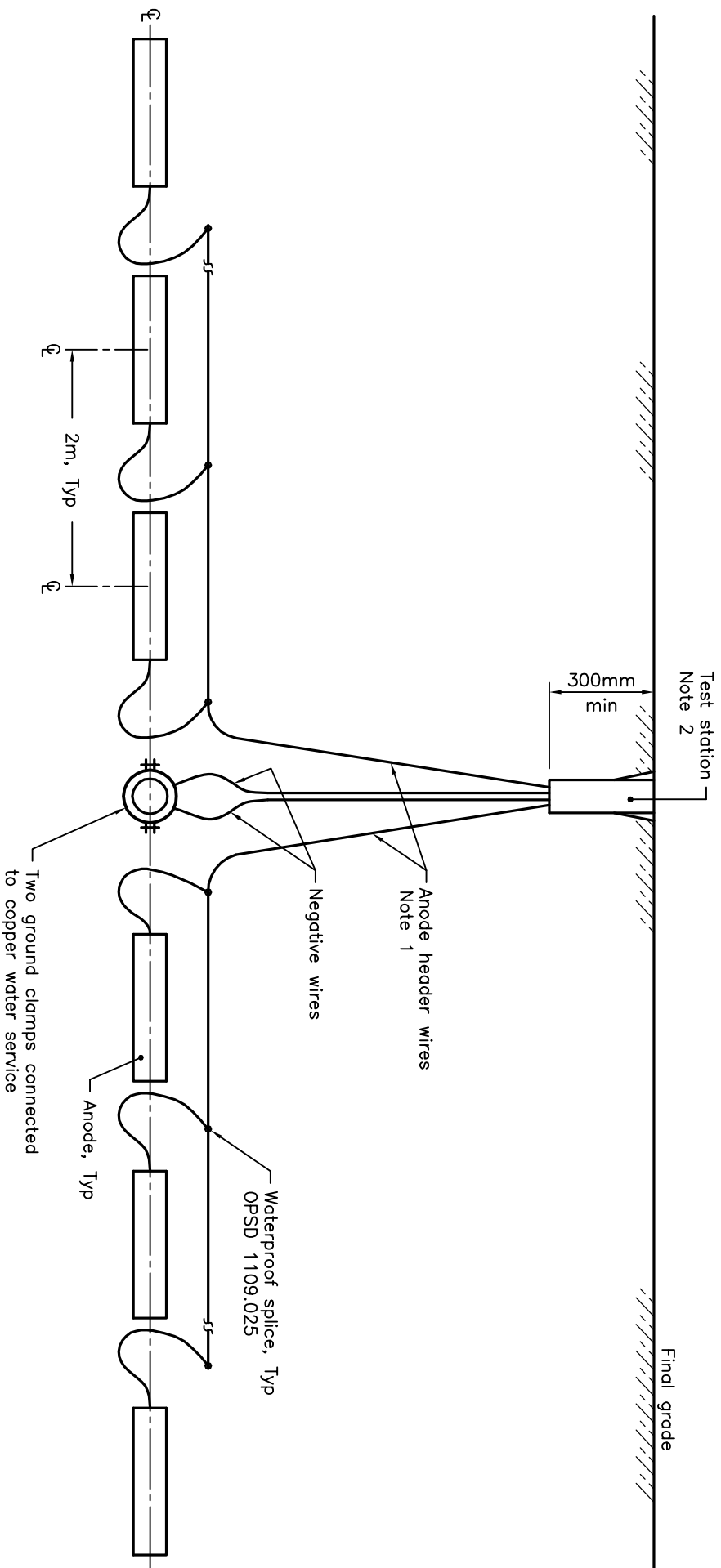




NOTES:

A All dimensions are in millimetres unless otherwise shown.

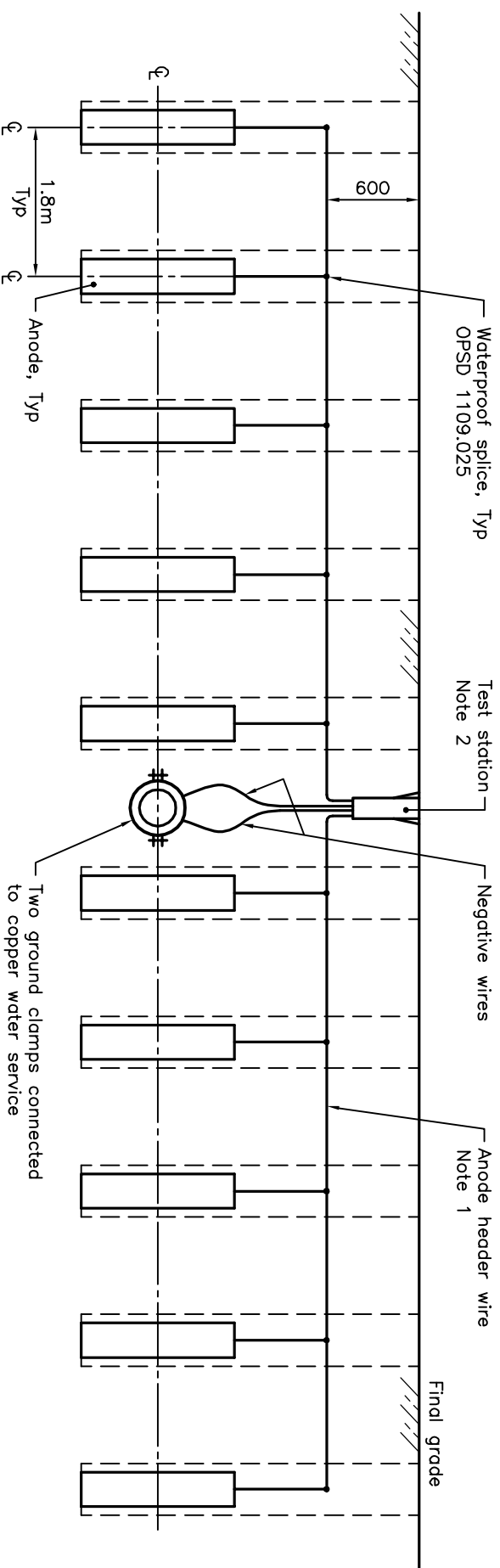
ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev	1	
ANODE INSTALLATION OVER PIPE METHOD FOR EXISTING METALLIC WATERMAINS		----- -----			
		OPSD 1109.013			



NOTE:

- 1 Header wire shall not be cut during splicing.
 - 2 Test station shall be flush-mounted or pole-mounted, as specified.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev 1	
HORIZONTAL ANODE BANK AT SERVICE				
OPSPD 1109.014				

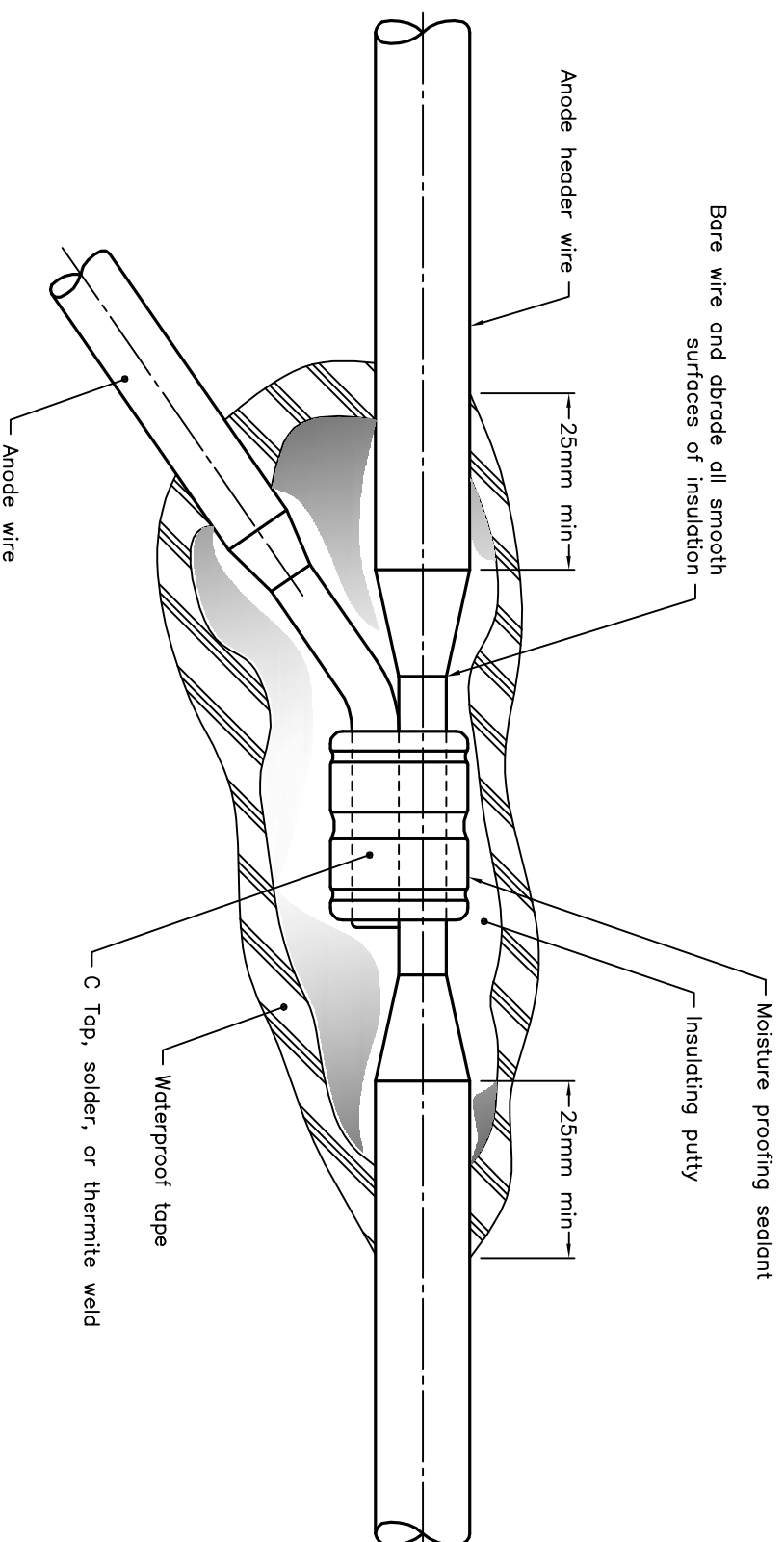


NOTE:

- 1 Header wire shall not be cut during splicing.
 - 2 Test station shall be flush-mounted or pole-mounted, as specified.
- A All dimensions are in millimetres unless otherwise shown.

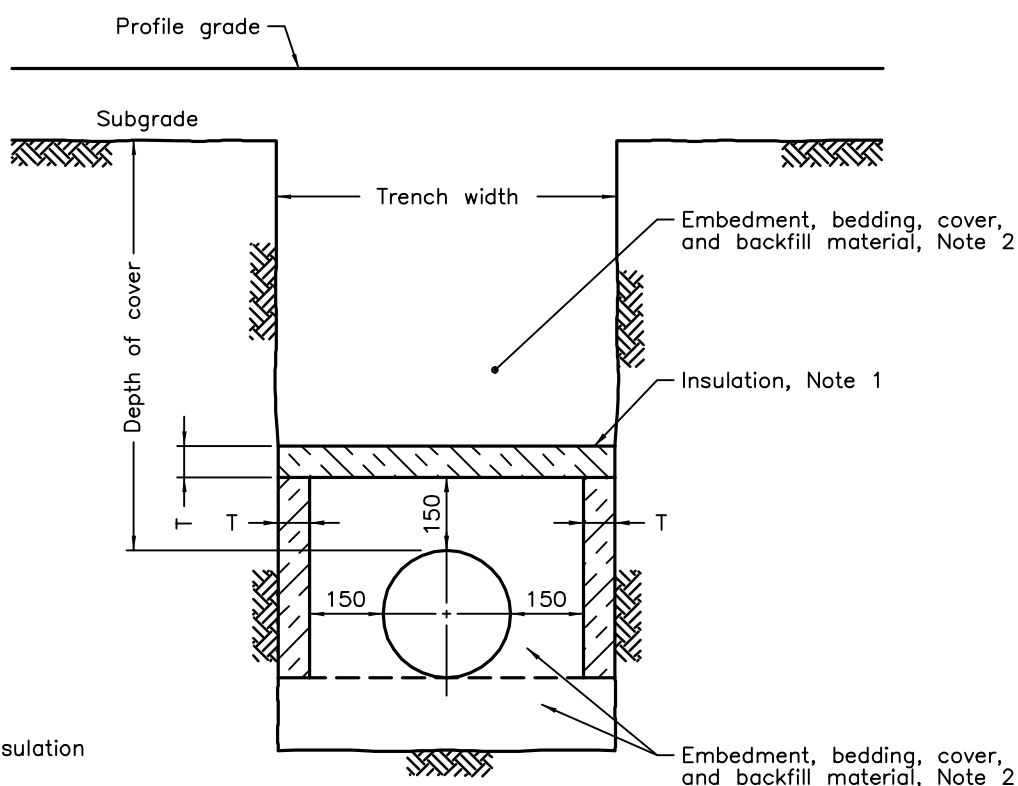
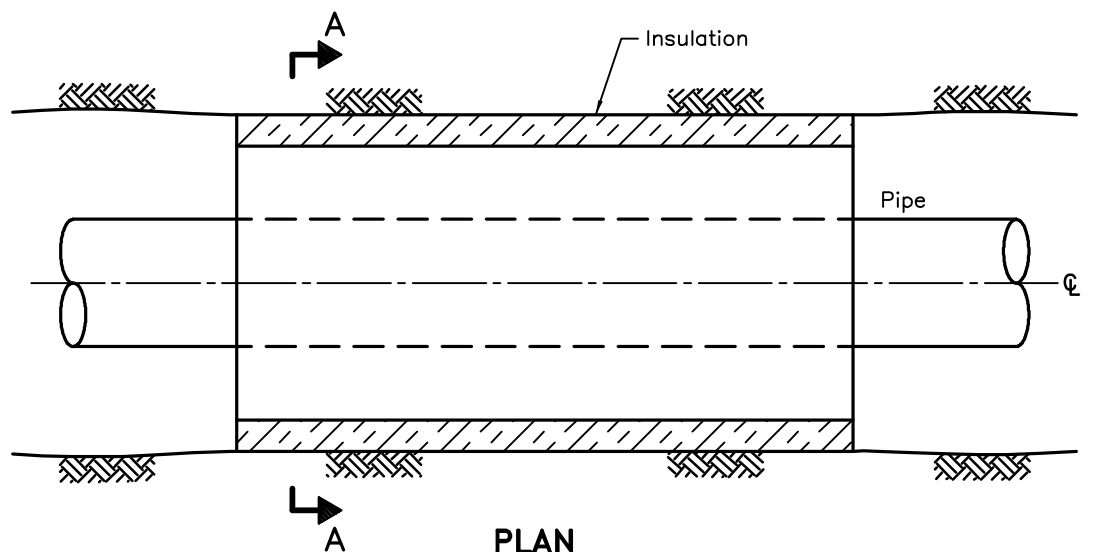
ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev 1
VERTICAL ANODE BANK AT SERVICE			
		OPSD 1109.015	





NOTE:
 A All dimensions are in millimetres
 unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING			Nov 2015		Rev 1		
WATERPROOFING OF SPLICES			----- ----- ----- -----				
OPSD 1109.025							



T = thickness of insulation

SECTION A-A TYPICAL PIPE INSULATION DETAIL

NOTES:

- 1 The insulation material shall be extruded polystyrene according to OPSS 1605 with a minimum compressive strength of 275 kPa.
- 2 Pipe embedment or bedding, cover, and backfill shall be according to:
 - a) Flexible OPSS 802.010, 802.013, 802.020, and 802.023.
 - b) Rigid - OPSS 802.030, 802.031, 802.032, 802.033, 802.050, 802.051, 802.052, and 802.053.
- A Minimum insulation thickness shall be 50mm.
- B Joints shall be staggered for multiple insulation sheets.
- C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

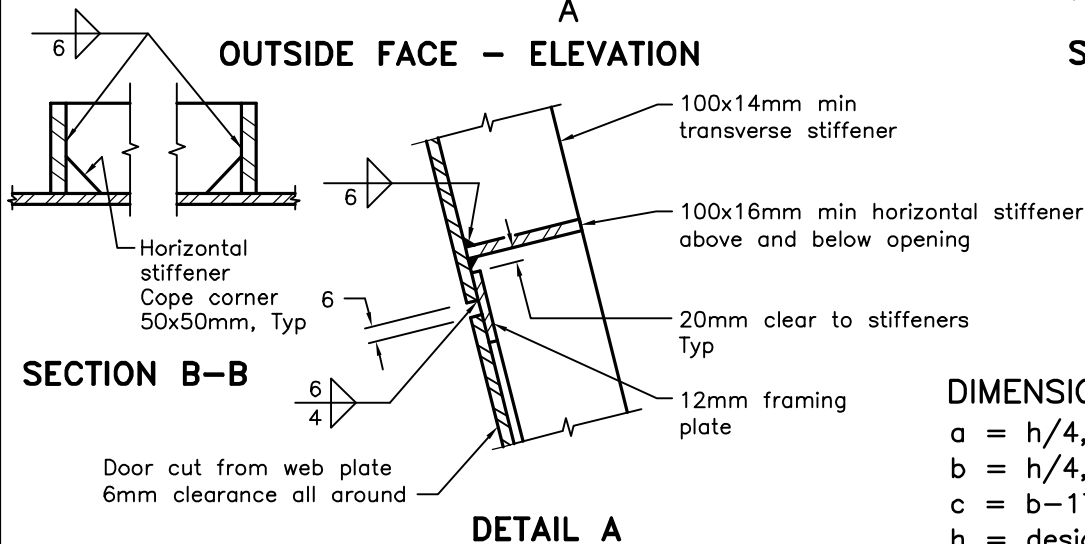
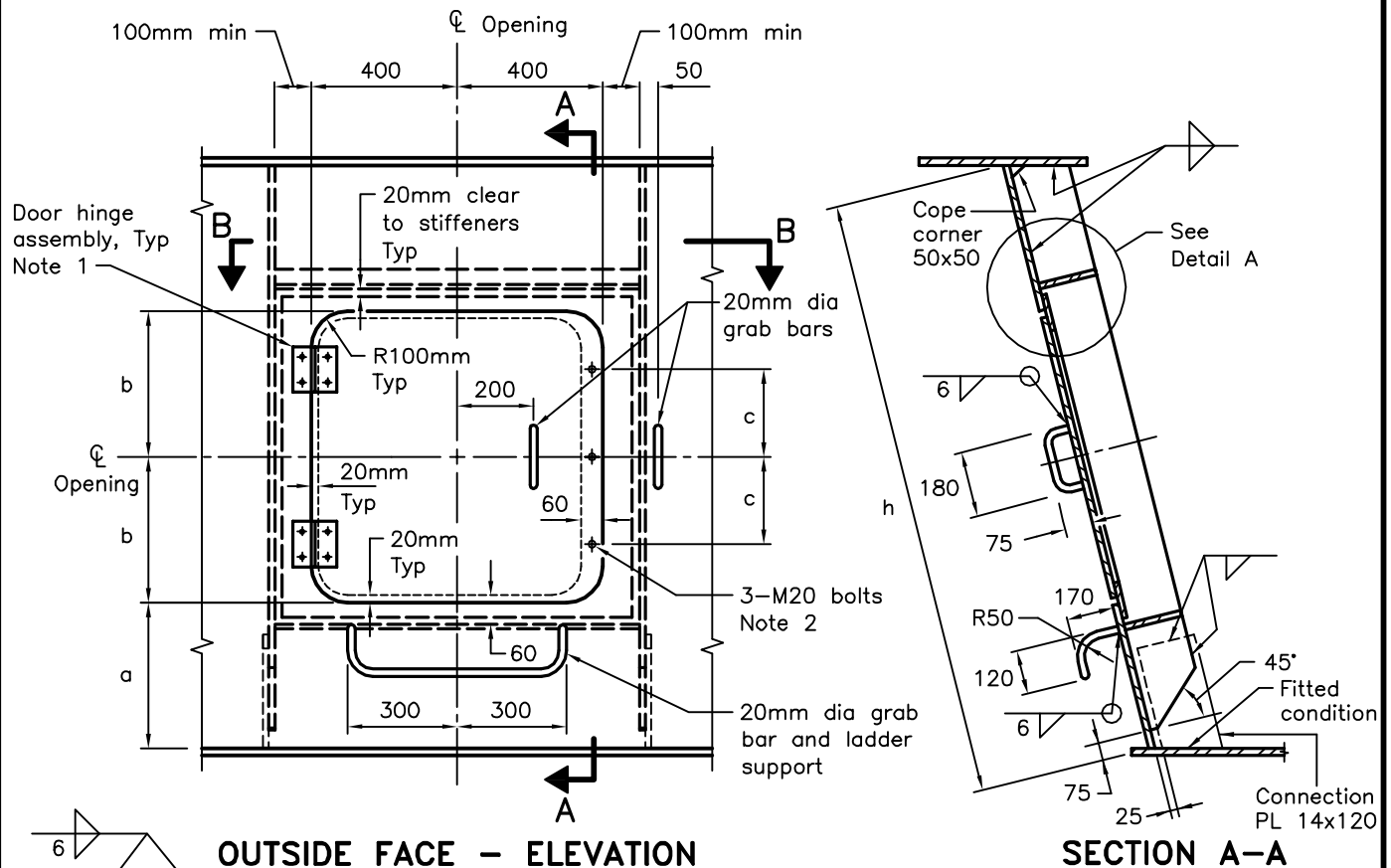
Nov 2015

Rev 0

INSULATION FOR
SEWERS AND WATERMAINS
IN SHALLOW TRENCHES

OPSD 1109.030





DIMENSIONS:

- $a = h/4$, Maximum 600mm
 $b = h/4$, Maximum 400mm
 $c = b - 175$
 h = designed web length

NOTES:

- Door hinges shall be fabricated from 6mm thick plate minimum and hot-dip galvanized. The door hinge assembly shall be attached using M16 bolts.
 - Install M20 bolts with nuts accessible on exterior of web and weld bolt heads from the inside to the framing plate.
 - Bolts shall be ASTM A325M, Type 3.
- A Hinges and grab bars shall be according to CSA G40.20/G40.21, Grade 300W. The remainder of the steel shall be the same as for the box girder.
- B Access hatch shall be placed on interior web of box girder only.
- C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

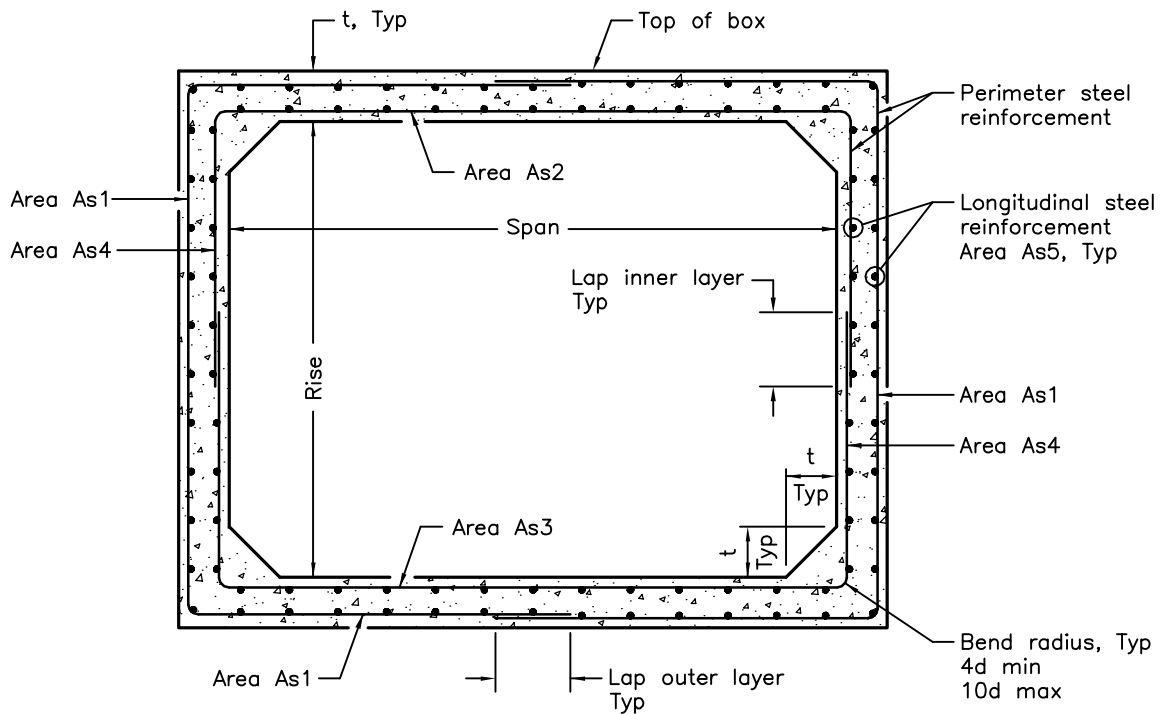
Nov 2015

Rev 2

DECK
 GIRDERS, STEEL BOX
 ACCESS HATCH



OPSD 3311.900

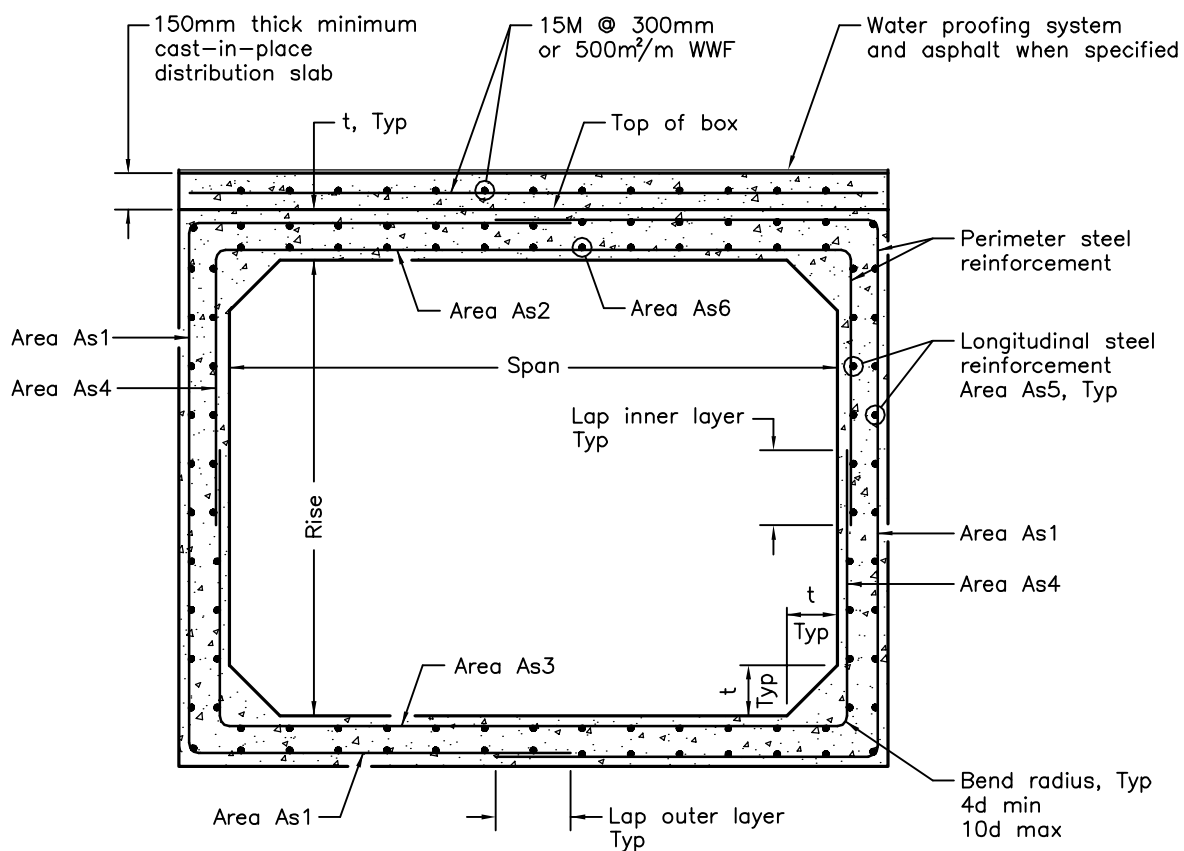


BOX UNIT CROSS-SECTION

NOTES:

- 1 For box units reinforced with WWF As1 to As5 shall be as specified.
- 2 As1 to As4 refer to minimum reinforcement areas required at indicated faces.
- 3 t = thickness of walls and slabs.
- 4 d = diameter of perimeter steel reinforcement.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	0	
PRECAST REINFORCED CONCRETE BOX CULVERT WITH HEIGHT OF FILL ≥ 0.6M				
	OPSD 3920.100			



BOX UNIT CROSS-SECTION

NOTES:

- 1 For box units reinforced with WWF As1 to As6 shall be as specified.
- 2 As1 to As4 refer to minimum reinforcement areas required at indicated faces.
- 3 t = thickness of walls and slabs.
- 4 d = diameter of perimeter steel reinforcement.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015

Rev 0

**PRECAST REINFORCED CONCRETE
BOX CULVERT
WITH HEIGHT OF FILL < 0.6M**

OPSD 3920.110

