

**Transportation Association of Canada Environmental Achievement Award
Nomination Submission:**

Highway 26 New Wildlife Passage and Enhancements

Ontario Ministry of Transportation, Central Region

Nominees:

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and Environmental Office**

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Office**

Highway 26 New Wildlife Passage and Enhancements

Simple design changes opened up unique opportunities to enhance the environment on Highway 26 New, for wildlife and the aquatic ecosystem.

The Individual Environmental Assessment for Highway 26 New, located between Collingwood and Wasaga Beach, Ontario, was filed by the Ontario Ministry of Transportation (MTO) in 1992. Subsequent to that time numerous updates were made to the planned new alignment, incorporating environmental features and mitigation measures. Highway 26 New is a 4-lane, access-controlled facility extending 8.3 km between Collingwood and Wasaga Beach. The Highway opened to traffic in late 2012.

A major challenge of this project was accommodating the large population of deer. Their pathway to abandoned apple orchards (a major food source) from their forest cover was being severed by the original highway design. This would have posed a problem for deer and other wildlife, and would have also posed a significant safety hazard for the travelling public

On a site visit prior to the initiation of the detail design of the highway, MTO Planning and Environmental staff identified the opportunity to relocate the Nottawa Side Road cul-de-sac at Highway (Hwy) 26 New, by simply pulling it a short distance back from the new highway. This small, but creative, change in the location of the side road provided space for the design and implementation of a naturalized valley from the orchards between the cul-de-sac and the new highway. This section of side road had contained a small old steel pipe culvert, propped up by a few boards that conveyed intermittent water flows from the orchard, upstream. It also blocked fish movement under Nottawa Road. To facilitate both deer and fish passage, it was decided to remove the collapsed culvert and replace it with a 50 m long, open landscaped valley, incorporating natural channel design for the watercourse. (Figure 1).

The next step was to redesign the originally planned culverts under Hwy 26 New to provide deer and other wildlife passage from the orchards to the woods on the other side of Highway 26 New.

These small culverts were redesigned to become a wildlife crossing consisting of two large open structures underneath Highway 26 New, which was raised to accommodate them. The entrances to the structures are 8.5m wide and over 3.25 m high. The openness of the structures makes the passage attractive to deer as they can see the other side and any predators that might be in the crossing. The crossing was left open, but fenced, through the 16 m highway median to convey more light into this passage system.

Inside the deer and wildlife passage structures, the base is covered with grassed earth which is a suitable substrate for the deer as well as other smaller wildlife. Part of the passage is also lined in riverstone (rounded stones) mixed with sand and gravel to create a natural channel for the intermittent watercourse flows. There is a 1m section of grassed earth on the other side of the passage as well. Contract drawings, Reach 1 and Reach 2, in the appendix, illustrates the cross-section of the opening. Refer to figures 2 to 8.

These measures not only restore and maintain the pre-existing wildlife natural corridor, allowing deer to easily and safely pass from their sheltered woods to food locations on the other side of the highway, but also contribute greatly to the safety of the traveling public by helping to avoid vehicle-wildlife collisions.

The ecosystems of this and another small watercourses benefitted from natural channel design, with placement of larger rocks, riverstone, gravel and plantings, live stakes and brush layer treatment. Native species were utilized in plantings on the right of way around stormwater ponds, the wildlife passage and in streambanks, to blend with existing natural vegetation. Obstructions to fish passage were removed and improved upstream fish migration has been documented. The removal of the old perched steel culvert,(figure 2 to 4) eliminated a barrier to movement for both aquatic and terrestrial species. This watercourse was previously classified as a warm water intermittent stream, home to warm water bait fish such as minnows, sticklebacks and pumpkinseeds. Now, coldwater species such as rainbow trout have been documented in this enhanced watercourse. (Figure 6 and 10 and Contract drawing – Vegetation Restoration Plan).

The replacement of the small steel culvert upstream of the wildlife crossing with an open channel and valley has restored a passage that had been blocked for many years. The natural channel design utilized in two small watercourses on this project provides improved fisheries and aquatic habitat, with improved streambed substrate, meanders, pools and riffles. The newly stabilized stream banks protect the quality of the aquatic environment, with plantings, live stakes, brush bundles and the use of compost, injected with seed throughout to promote fast, dense growth of grasses, maintain moisture and prevent erosion. The watercourse at the wildlife passage has been restored such that large rainbow trout have been documented in what had formerly been warm water baitfish habitat for minnows and other small warm water fish. In addition, eight stormwater management ponds with significant landscaping were incorporated into the project to treat stormwater runoff for quality and quantity. (Figure 10)

Other wildlife measures on this project include 3 m high deer fencing, deer escape ramps as well as fencing to prevent deer from jumping off of a structure onto the highway below. (Figure 11)

Wildlife and man are often in conflict and the use of deer fencing with deer escape ramps, allows deer that wander onto the highway an opportunity to escape to safety away from traffic. These ramps were installed early during the construction phase and the deer were very curious, traversing the ramps prior to the installation of the fencing, allowing them the opportunity to get used to the ramps, before the highway was open to traffic.

Additional wildlife passage was provided through a second span under the bridge at the Batteaux River. In all but high flood conditions, the dry second span provides wildlife passage.

Some of the construction challenges included the deer population eating all of the new grass. Additional environmental measures, such as soil tackifiers and composted topsoil with grass seed for erosion control, totalling over \$0.5 million were added to the project during construction as a result of environmental monitoring. (Figure 9) Environmental monitoring requirements included a comprehensive, weekly inspection. When storm events were predicted, a warning was issued to the contractor to ensure that appropriate measures were taken with additional post-storm environmental inspection and remedial measures.

Specific, on going maintenance requirements have been developed for the wildlife passage system and associated environmental features on this project.

Although wildlife issues were apparent to Ministry Planning and Environmental staff at the initiation of the design stage of Highway 26 New, local input and expertise was encouraged and was offered by residents on wildlife, their movements and food sources in the area. Ministry staff and biology consultants consulted further with these residents and this input helped to define the parameters of the deer study as well as the mitigation measures for deer passage. One resident accompanied biologists to share his local knowledge.

This project is an excellent example of how a simple refinement of a design (the cul-de-sac- relocation) can foster a complete wildlife passage system that since its construction has been very well utilized, as evidenced by the multitude of hoof prints through the new valley and under hwy 26 New (figure 8).

Enhanced Environmental Features Costs:

The construction cost (tender value) of Highway 26 New was \$32.6 M. The cost of the environmental features of this project, itemized below, totalled \$ 4.6M or 14 % of the project cost.

- Wildlife/Deer Structure - \$1.8 M
- Deer ramps - \$0.3 M
- Deer Fence - > \$0.5 M
- Deer escape ramps - \$0.3 M
- Landscape plantings - > \$0.2 M
- Stormwater management ponds - > \$1 M
- Additional environmental mitigation during construction - > \$0.5 M

Examples of Environmental Measures in Contract Documentation:

Contract Drawing of the Deer/wildlife Passage Structure at Nottawa Side Road:

(Cross Sections of Reach 1 and Reach 2, Refer to Appendix)

This drawing shows the horizontal cross sections of the structures under Highway 26 New and associated open valley with natural channel design of the watercourse. This was accomplished by removing the old steel culvert and moving back the cull de sac on Nottawa Side Road

Contract Drawing of the Nottawa Side Road Water Course Restoration Plan:

(Vegetation Restoration Plan, Refer to Appendix)

This drawing shows the details and quantities of plantings, the natural channel design features such as meanders, rock substrate and placement and detailed instruction for planting.

APPENDIX

Figure 1 Highway 26 Wildlife Passage System

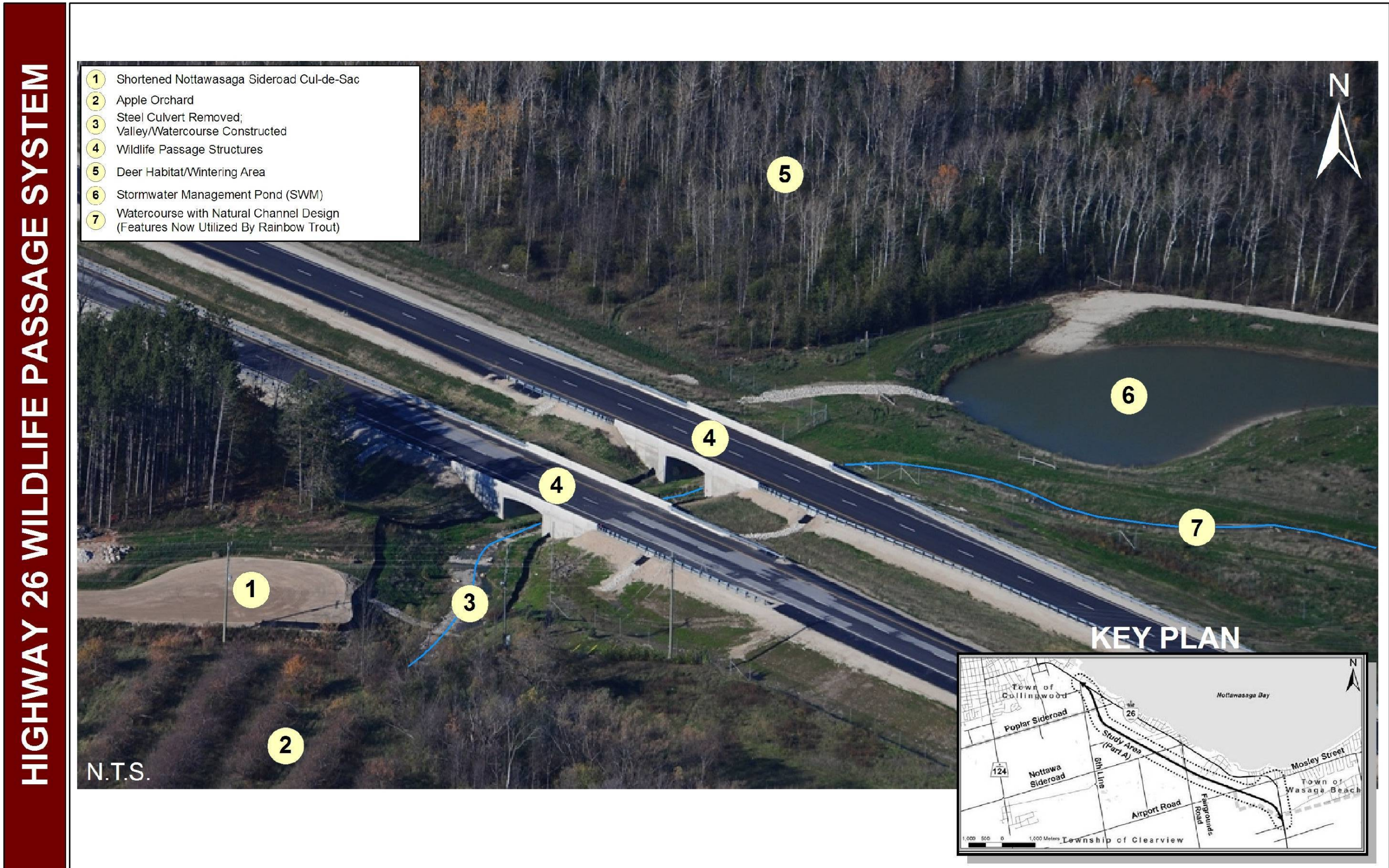




Figure 2 Old Steel Culvert Under Nottawa Side Road: This culvert was removed and the side road cull de sac pulled back to provide room to create a naturalized valley and watercourse with natural channel design features. This is located at the easterly side of the new highway.



Figure 3 Nottawa Side Road with Watercourse Channel Installed: The watercourse features and side slopes were installed and let stabilize prior to culvert removal.



Figure 4 Nottawa Side Road Valley and Water Course Completed "In the Dry": The old steel culvert has been removed, the channel substrate installed and the new valley opened to the abandoned orchards.



Figure 5 Construction of the Deer/Wildlife Crossing Structure: These two structures allow wildlife to pass under the new highway. The rectangles of river stone and the larger boulders are the initial stages of the installation of the naturalized channel for the small watercourse at Nottawa side Road.



Figure 6 View of Nottawa Side Road Watercourse with Completed Channel: Water now flows freely from the abandoned orchards, downstream through the deer/wildlife crossing. This watercourse is now utilized by rainbow trout. It was formerly home to only small baitfish such as minnows. Deer and other wildlife use the grassy areas to cross.



Figure 7 Open Area Between Wildlife Structures Allows Deer Good Visibility to Identify Predators and Safely Use the Passage



Figure 8 Deer Tracks in the Earth at the Wildlife Structure (deer fencing to the left)



Figure 9 Construction Challenges: Keeping up with the deer consuming all of the tasty fresh grass was a constant challenge. The deer removed all of the grass growth in this area in a couple of days.



Figure 10 One of the Eight Stormwater Management Ponds:

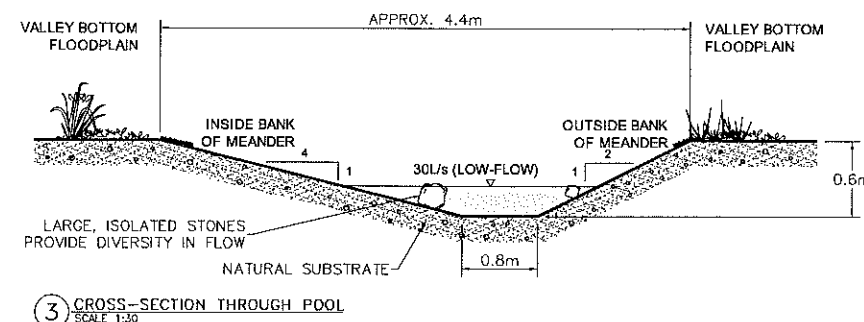
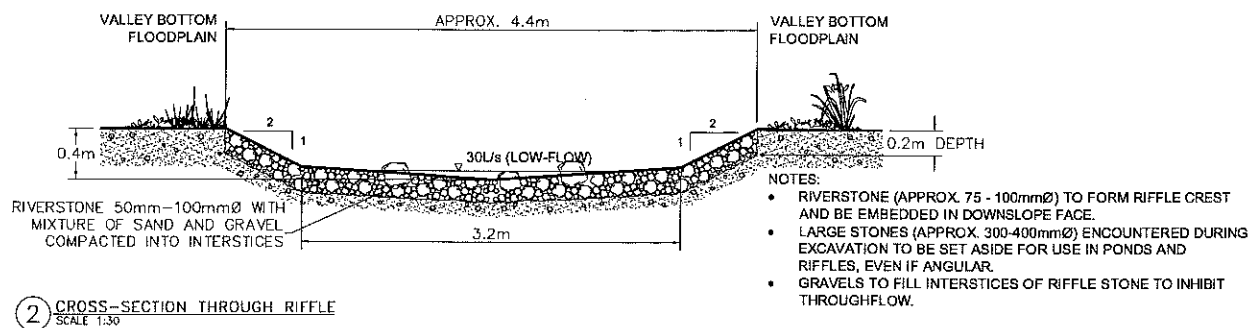
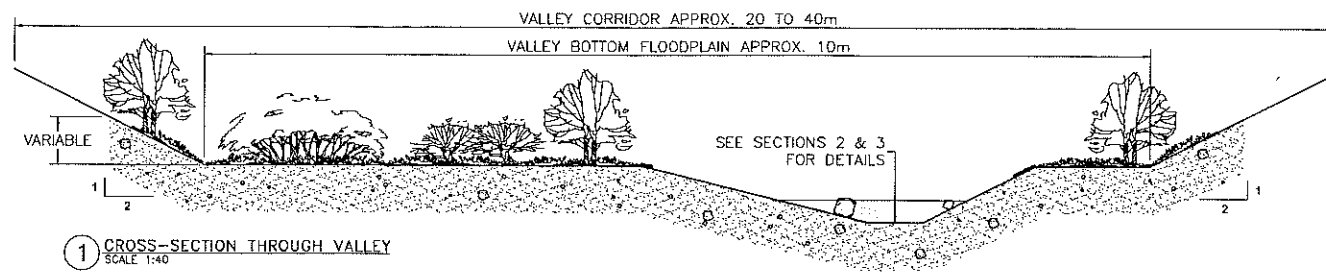
This stormwater management pond is adjacent to the naturalized watercourse at the downstream side of the deer/wildlife structure passage at Nottawa Side Road.



Figure 11 Deer Escape Ramp:

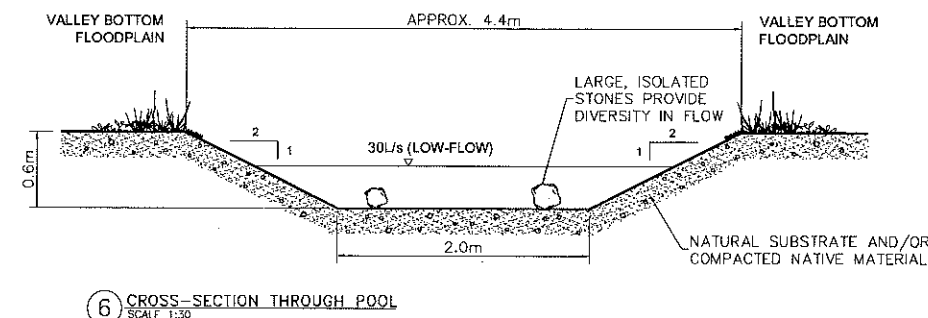
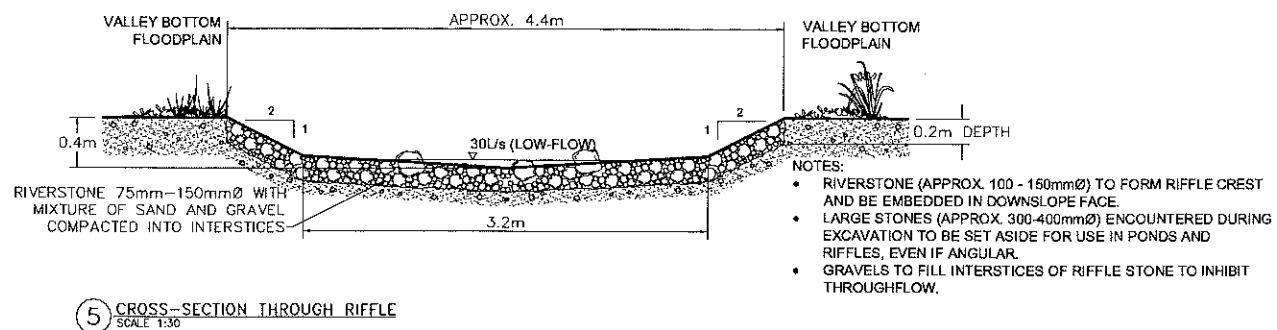
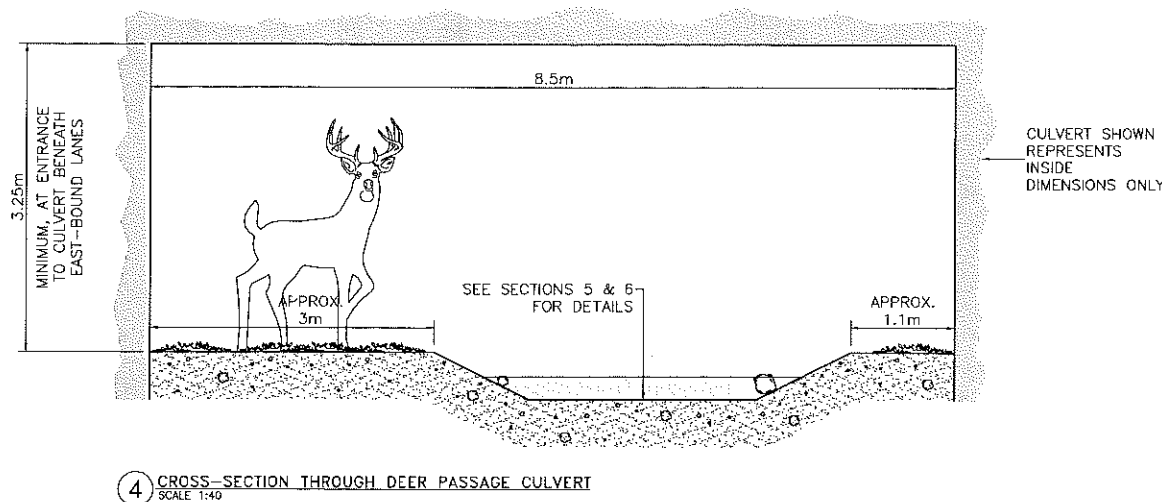
Grassed earthen deer escape ramps allow deer accidentally trapped inside the highway a n opportunity to run up the ramp and jump down to the soft sandy pad below in the other side of the 3m high deer fence. The straight rock wall at the fence line prevents the deer from jumping back onto the highway side.

Reach 1



- ROUNDED RIVERSTONE (SIZE RANGE AS NOTED)
- LARGE STONE (APPROX. 300-400mm) TO PROVIDE FLOW DIVERSITY ON RIFFLES AND IN POOLS
- NATURAL SUBSTRATE (TILL) (AND/OR COMPACTED NATIVE MATERIAL)

Reach 2



Scale as Noted

(When Plotted at ANSI D size - 22" x 34")

NOTE: VEGETATION SHOWN FOR ILLUSTRATIVE PURPOSES ONLY AND NOT TO SCALE. SEE DRAWING ENV-6 AND ENV-7 FOR PLANTING DETAILS.

DO NOT SCALE THIS DOCUMENT. ALL MEASUREMENTS MUST BE OBTAINED FROM STATED DIMENSIONS

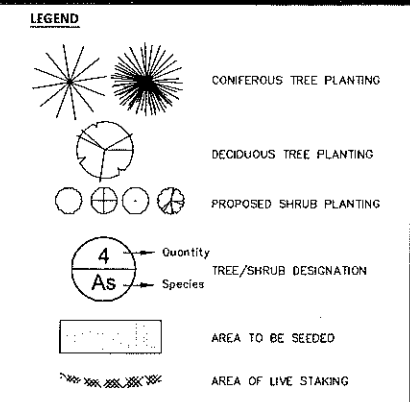
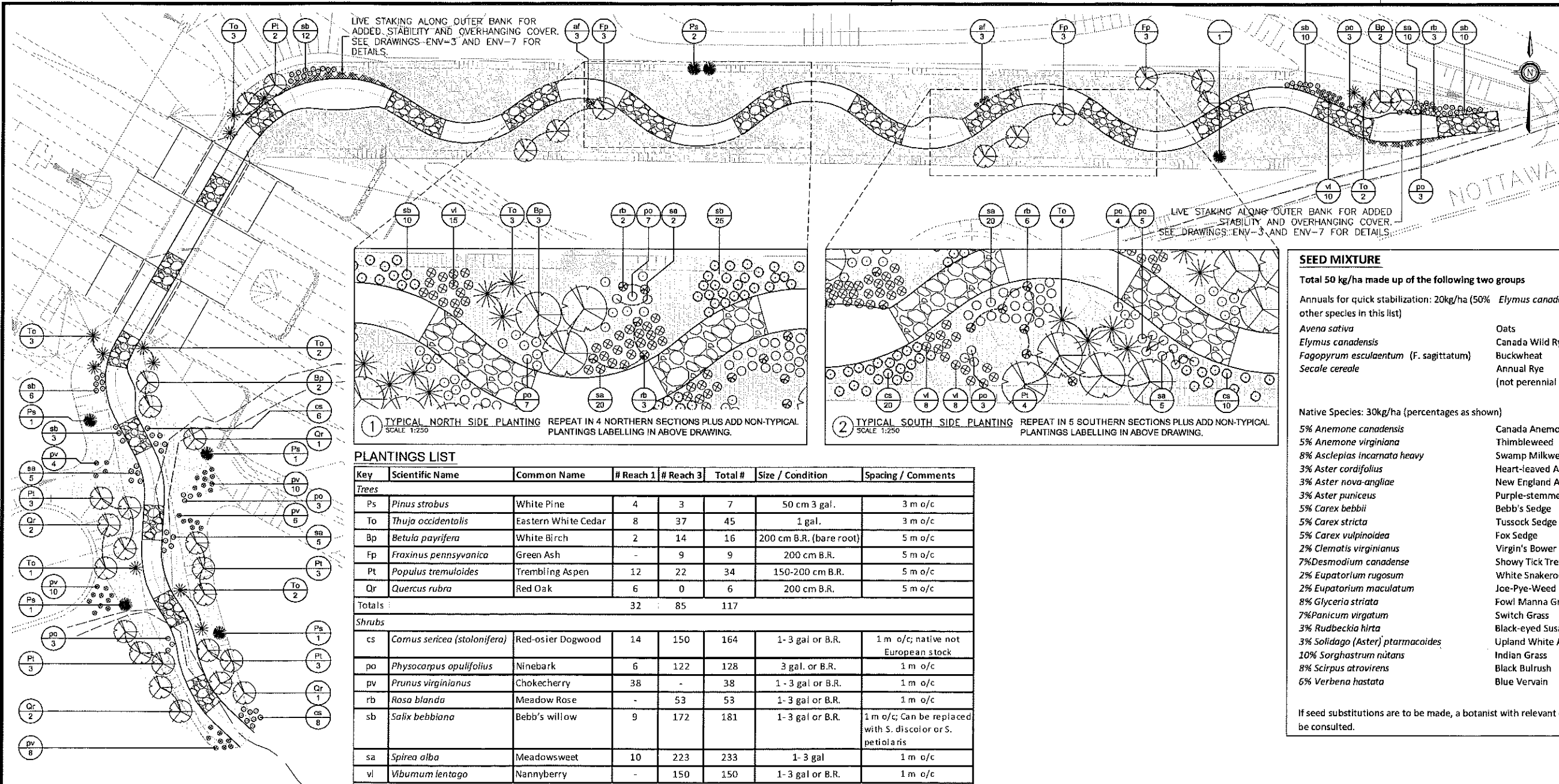
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Ministry of Transportation Highway 26 Realignment
Crossing 6 Channel Realignment
at Nottawa Sideroad
(MTO Station 24+138)

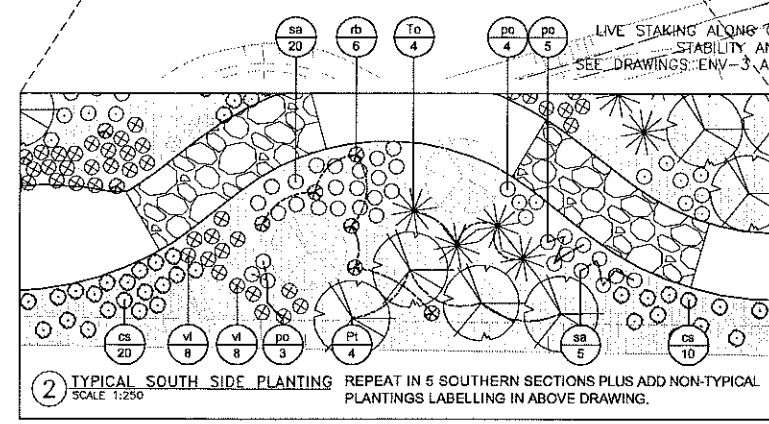
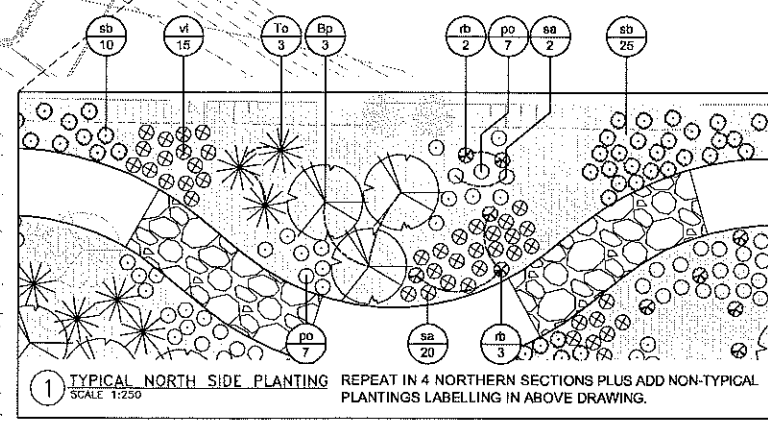
Cross-Sections - Reach 1 and 2

CONTRACT NUMBER	DATE	DRAWING NUMBER
2010-2010	March 2010	ENV-2
		SHEET NUMBER
		133



LIVE STAKING ALONG OUTER BANK FOR ADDED STABILITY AND OVERHANGING COVER. SEE DRAWINGS ENV-3 AND ENV-7 FOR DETAILS.

LIVE STAKING ALONG OUTER BANK FOR ADDED STABILITY AND OVERHANGING COVER. SEE DRAWINGS ENV-3 AND ENV-7 FOR DETAILS.



SEED MIXTURE

Total 50 kg/ha made up of the following two groups

Annuals for quick stabilization: 20kg/ha (50% *Elymus canadensis* and 50% of any other species in this list)

<i>Avena sativa</i>	Oats
<i>Elymus canadensis</i>	Canada Wild Rye
<i>Fagopyrum esculentum</i> (F. sagittatum)	Buckwheat
<i>Secale cereale</i>	Annual Rye
	(not perennial rye <i>Lolium perenne</i>)

Native Species: 30kg/ha (percentages as shown)

5% <i>Anemone canadensis</i>	Canada Anemone
5% <i>Anemone virginiana</i>	Thimbleweed
8% <i>Asclepias incarnata</i> heavy	Swamp Milkweed
3% <i>Aster cordifolius</i>	Heart-leaved Aster
3% <i>Aster nova-angliae</i>	New England Aster
3% <i>Aster puniceus</i>	Purple-stemmed Aster
5% <i>Carex bebbii</i>	Bebb's Sedge
5% <i>Carex stricta</i>	Tussock Sedge
5% <i>Carex vulpinoidea</i>	Fox Sedge
2% <i>Clematis virginiana</i>	Virgin's Bower
7% <i>Desmodium canadense</i>	Showy Tick Trefoil
2% <i>Eupatorium rugosum</i>	White Snakeroot
2% <i>Eupatorium maculatum</i>	Joe-Pye-Weed
8% <i>Glyceria striata</i>	Fowl Manna Grass
7% <i>Panicum virgatum</i>	Switch Grass
3% <i>Rudbeckia hirta</i>	Black-eyed Susan
3% <i>Solidago (Aster) ptarmacoides</i>	Upland White Aster
10% <i>Sorghastrum nutans</i>	Indian Grass
8% <i>Scirpus atrovirens</i>	Black Bulrush
6% <i>Verbena hastata</i>	Blue Vervain

If seed substitutions are to be made, a botanist with relevant experience should be consulted.

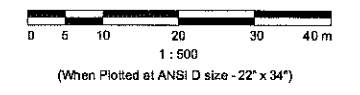
PLANTINGS LIST

Key	Scientific Name	Common Name	# Reach 1	# Reach 3	Total #	Size / Condition	Spacing / Comments
Trees							
Ps	<i>Pinus strobus</i>	White Pine	4	3	7	50 cm 3 gal.	3 m o/c
To	<i>Thuja occidentalis</i>	Eastern White Cedar	8	37	45	1 gal.	3 m o/c
Bp	<i>Betula papyrifera</i>	White Birch	2	14	16	200 cm B.R. (bare root)	5 m o/c
Fp	<i>Fraxinus pennsylvanica</i>	Green Ash	-	9	9	200 cm B.R.	5 m o/c
Pt	<i>Populus tremuloides</i>	Trembling Aspen	12	22	34	150-200 cm B.R.	5 m o/c
Qr	<i>Quercus rubra</i>	Red Oak	6	0	6	200 cm B.R.	5 m o/c
Totals			32	85	117		
Shrubs							
cs	<i>Cornus sericea (stolonifera)</i>	Red-osier Dogwood	14	150	164	1-3 gal or B.R.	1 m o/c; native not European stock
po	<i>Physocarpus opulifolius</i>	Ninebark	6	122	128	3 gal. or B.R.	1 m o/c
pv	<i>Prunus virginianus</i>	Chokecherry	38	-	38	1-3 gal or B.R.	1 m o/c
rb	<i>Rosa blanda</i>	Meadow Rose	-	53	53	1-3 gal or B.R.	1 m o/c
sb	<i>Salix bebbiana</i>	Bebb's willow	9	172	181	1-3 gal or B.R.	1 m o/c; Can be replaced with <i>S. discolor</i> or <i>S. petiolaris</i>
sa	<i>Spiraea alba</i>	Meadowsweet	10	223	233	1-3 gal	1 m o/c
vl	<i>Viburnum lentago</i>	Nannyberry	-	150	150	1-3 gal or B.R.	1 m o/c
Totals			77	870	947		
Ferns							
af	<i>Athyrium filix-femina</i>	Lady Fern	-	6	6	plugs	plant in two groups of three, 30 cm apart within cluster

- PLANTING NOTES**
- ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE ONTARIO OCCUPATIONAL HEALTH AND SAFETY ACT, REGULATION FOR CONSTRUCTION AND INDUSTRIAL PROJECTS AND ALL OTHER APPLICABLE LAWS, RULES AND REGULATIONS.
 - ALL WORKMANSHIP SHALL BE PERFORMED ACCORDING TO THE STANDARDS OF THE ONTARIO LANDSCAPE CONTRACTORS ASSOCIATIONS.
 - THE LANDSCAPE CONTRACTOR SHALL COORDINATE WORK WITH THAT OF OTHERS.
 - CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES.
 - ALL DISTURBED FLOODPLAIN AREAS ARE TO BE RESTORED/PLANTED/STABILIZED WHERE IDENTIFIED IN THE PLANTING PLAN (THIS DRAWING).
 - SEDIMENT & EROSION CONTROL FENCING TO REMAIN UNTIL DISTURBED AREAS HAVE BEEN STABILIZED AND RESTORATION PLANTINGS ARE COMPLETE AND HAVE BECOME ESTABLISHED. BIODEGRADABLE EROSION BLANKET PROTECTION MAY BE UTILIZED FOR STABILIZATION PURPOSES.
 - WHERE APPLICABLE ALL DISTURBED WATERCOURSE BED AND BANK AREAS ARE TO BE RESTORED IN ACCORDANCE WITH DETAILS PROVIDED ON THE CONTRACT DRAWINGS.
 - ALL CHANNEL BED WORK SHALL BE CONDUCTED IN THE DRY.

- ALL MATERIALS AND PLANTING LAYOUTS TO BE APPROVED BY ENVIRONMENTAL INSPECTOR, QUALIFIED BOTANIST, OR LANDSCAPE ARCHITECT PRIOR TO INSTALLATION. ALL SPECIES MUST BE NATIVE AND IN HEALTHY CONDITION. ALL PLANT MATERIAL MUST BE TAGGED WITH THE BOTANICAL NAME FROM THE SUPPLIER.
- CHECK AND VERIFY ALL DIMENSIONS AND QUANTITIES PRIOR TO COMMENCEMENT OF WORK. REPORT ANY DISCREPANCIES IN WRITING TO A QUALIFIED BOTANIST OR A LANDSCAPE ARCHITECT. QUANTITIES NOTED WITHIN THE PLAN SUPERSEDE THOSE IN THE PLANT SCHEDULE. ANY SUBSTITUTIONS OR FIELD ADJUSTMENTS NOT INDICATED IN THE PLANT LIST OR DRAWING ARE TO BE APPROVED BY A QUALIFIED BOTANIST OR A LANDSCAPE ARCHITECT.
- LANDSCAPE WORKS SUCH AS GRADING, SUBSOILING, TOPSOILING, PLANTING AND SEEDING SHALL BE CARRIED OUT WHEN SOIL MATERIALS ARE NOT IN A FROZEN OR WET CONDITION. TOPSOIL THAT IS ADDED TO SHRUB AND TREE PLANTING PITS SHALL BE A FERTILE, FRIABLE, NATURAL LOAM CONTAINING NOT LESS THAN 4% ORGANIC MATTER. AFTER THE ADDITION OF SOIL AMENDMENTS, THE ORGANIC MATTER CONTENT SHALL NOT EXCEED 30%. TOPSOIL SHALL BE FREE OF STONES, SUBSOIL, REFUSE OR OTHER EXTRANEUS MATERIAL AND BE CAPABLE OF SUSTAINING HEALTHY PLANT GROWTH.
- NATIVE TOPSOIL SHALL BE STRIPPED FROM THE SITE PRIOR TO ROUGH GRADING AND FILL OPERATIONS, STORED IN A LOCATION AGREED TO BY THE CLIENT AND THE TOWN. AFTER SUBSOILING (DECOMPACTION) OPERATIONS IT SHALL BE REAPPLIED TO ALL AREAS, EXCEPT WATER-LEVEL EROSION AND CONTROL STRUCTURES, TO A MINIMUM 200mm DEPTH.
- SUBSOILING SHALL BE CARRIED OUT AFTER FINAL ROUGH GRADING AND PRIOR TO NATIVE TOPSOILING BY UNIFORMLY LOOSENING CONSTRUCTION SITE COMPACTED SOILS TO MINIMUM 300mm DEPTH. A VIBRATING TINE AERATOR, CHISEL PLOUGH OR OTHER MECHANICAL DEVICE FOR RELIEVING COMPACTED SOIL CONDITIONS SHALL BE USED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- PLANTING OPERATIONS SHALL INCLUDE PLANTING PIT EXCAVATION, PLANTING, WATERING, PRUNING IF REQUIRED, MULCHING, AND PLANT AND LANDSCAPE AREAS MAINTENANCE UNTIL THE DATE OF FINAL APPROVAL.
- APPLY 250 GRAMS OR 1 CUP OF COMMERCIAL BONE MEAL TO THE SIDES OF ALL TREE PLANTING PITS PRIOR TO BACKFILLING. APPLY 175 GRAMS OR 1/2 CUP OF COMMERCIAL BONE MEAL TO THE SIDES OF ALL SHRUB AND VINE PLANTING PITS PRIOR TO BACKFILLING.
- PLANTING PIT BACKFILL TO CONSIST OF SOIL NATIVE TO THE SITE OR THE SAME GENERAL SOIL TYPE/CLASS NATIVE TO THE SITE.
- ALL BURLAP SHALL BE CUT AND BURIED BELOW SURFACE DURING PLANTING.
- WOODY PLANTINGS: IMMEDIATELY AFTER PLANTING, WOODY PLANTINGS SHALL BE WATERED. AFTER THIS INITIAL WATERING, WOOD CHIP MULCH SHALL BE APPLIED. SPREAD MULCH TO A 100mm DEPTH AROUND ALL TREES AND SHRUBS TO A DISTANCE OF 1 m RADIUS. MULCH SHALL CONSIST OF WOOD CHIPS OR COMPOST PREPARED TO MOE STANDARDS.

- SEEDING: SITE RESTORATION USING SEED, AS LISTED AND SHOWN ELSEWHERE ON THIS DRAWING. WILL OCCUR IMMEDIATELY FOLLOWING FINAL BANK GRADING AND SUBSURFACING. THESE AREAS ARE TO BE FINE GRADED FOR SEEDING. SEED SHALL BE APPLIED ACCORDING TO SUPPLIER'S SPECIFICATIONS. SEED MIXTURE IS TO CONSIST OF THAT SPECIFIED ELSEWHERE IN THIS DRAWING. IN SEEDED AREAS MULCH SHALL BE SPREAD TO A DEPTH OF 30 mm. MULCH SHALL CONSIST OF WOOD CHIPS OR COMPOST PREPARED TO MOE STANDARDS. SUBSEQUENT WATERING SHALL OCCUR FOLLOWING EVERY 5-DAY PERIOD WITHOUT RAIN UNTIL VIGOROUS GROWTH OCCURS. WATER SHALL BE UNIFORMLY APPLIED USING A SOFT SPRAY NOZZLE TO THOROUGHLY SOAK AREAS AND AVOID DAMAGE OR DISLODGING OF SOIL. APPLICATION OF SEED MIX TO OCCUR BETWEEN MID APRIL AND LATE SEPTEMBER TO ALLOW FOR 2-3 WEEK ESTABLISHMENT.
- PLANTINGS SHALL BE INSPECTED ONE AND TWO YEARS AFTER PLANTING. 80% SURVIVORSHIP OR GREATER PER SPECIES IS ACCEPTABLE AT BOTH TIMES. IF SURVIVORSHIP IS LOWER THEN PLANTS MUST BE REPLACED. AT THE TIME OF FINAL INSPECTION, 80% OF EACH SPECIES SHALL BE IN A HEALTHY, VIGOROUS GROWING CONDITION, PLANTED IN FULL ACCORDANCE WITH DRAWINGS AND NOTES HEREIN.



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Ministry of Transportation Highway 26 Realignment
Crossing 6 Channel Realignment
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(MTO Station 24+138)

Vegetation Restoration Plan

CONTRACT NUMBER	DATE	DRAWING NUMBER
2010-2010	March 2010	ENV-6
		SHEET NUMBER
		137