3.0 ROADWAY DESIGN ELEMENTS AND SURFACE WATER IMPACTS

3.1 Alignment

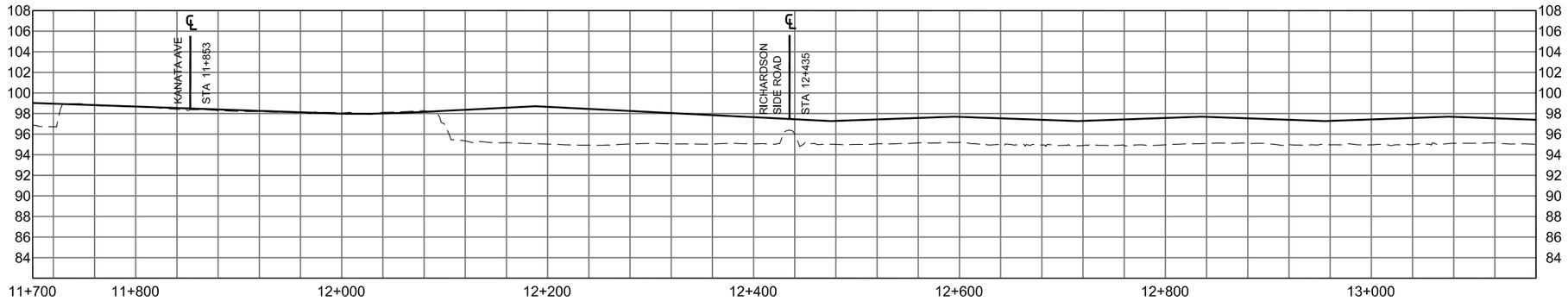
As shown in **Figure 1**, the road alignment from Richardson Side Road to approximately 2.1 kilometers westerly (Sta 12+100 to Sta 14+200) follows the Carp River. In this area the footprint of the roadway is within the Carp River regulatory floodplain and lies on low-lying clay soils. The alignment turns in an easterly direction and climbs out of the floodplain into the South March Highlands, an outcrop of the Canadian Shield. The alignment is designed to travel through Roger's Pass, a small pass between two large rock outcrops. The alignment then navigates between wetlands and rock outcrops through the Highlands to and connects with existing Terry Fox Drive at March Road on the southerly side of the Morgan's Grant subdivision. The north-easterly portion of the alignment borders a Natural Environment Area defined by the City of Ottawa's official plan. According to the Plan, "The Natural Environment Area designation applies to land having a high environmental value as assessed through federal, provincial and municipal studies. This designation identifies sensitive areas where development could unduly stress ecological functions and where careful management, restoration and enhancement are required." (Section 3.2.2).

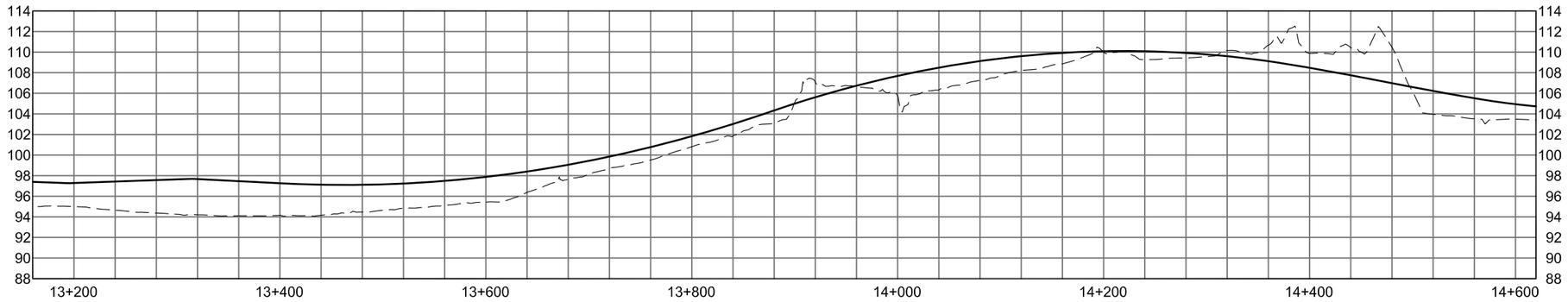
3.2 Profile

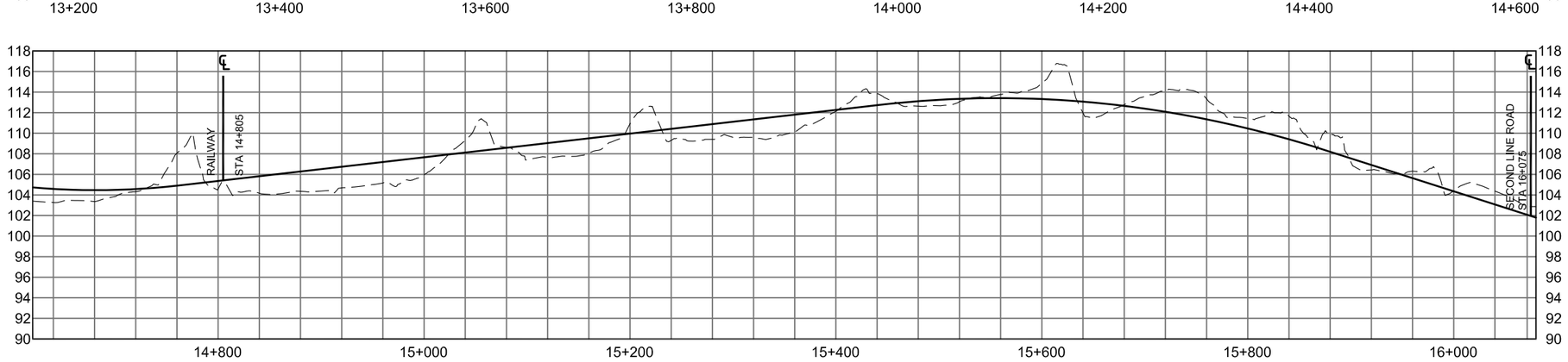
The roadway profile fits the previously constructed works south of Richardson Side Road and consists of a saw-tooth configuration through the Carp River floodplain (**Figure 4**). Since this portion of the project overlies clay soils which will be subject to long term consolidation, pre-loading and surcharging is required. The saw-tooth profile results in a drainage system that consists of several independent storm sewer systems. The drainage system design approach results in a significantly lower profile than that envisioned in the 2007 Draft report. The original drainage system design was based on a continuous storm sewer to a single outlet.

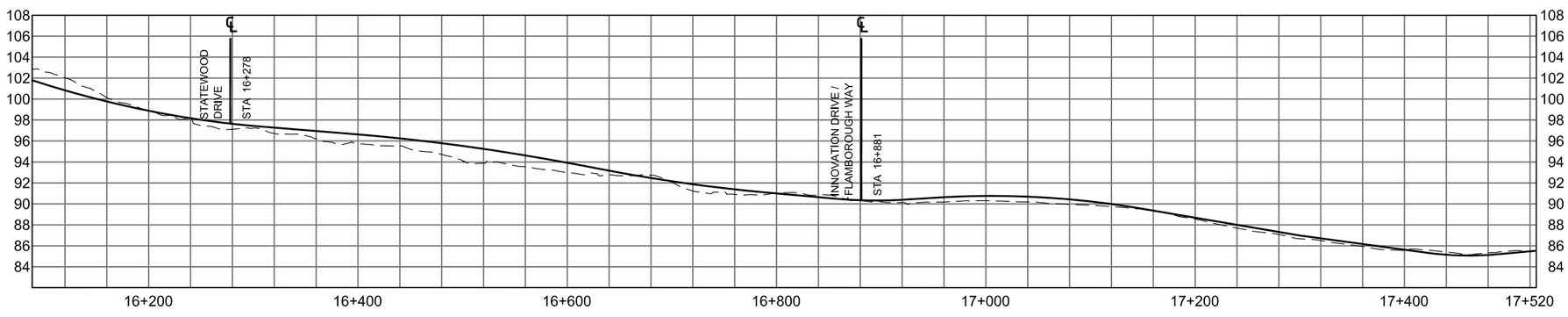
3.3 Cross-Section

SWM facilities, grading and drainage have been located and designed to accommodate the ultimate cross-section, as shown on **Figure 5**. Terry Fox Drive will be built in two phases with an initial 2-lane configuration constructed followed by a future expansion to 4 lanes when traffic demands warrant. The interim cross section will consist of two traffic lanes, a multi-use path, and sidewalk. The proposed 45-metre ROW will ultimately include four traffic lanes, cycling lanes, and a multi-use pathway on the east/south side of the road (i.e., the inside of the road). The impervious area within the ROW will drain via sheet flow into curbed median and edge-of-pavement gutters intercepted by curb-inlet catch basins. Catch basins will drain via a closed pipe storm sewer system located beneath the roadway. SWM facilities and features have been designed and located based on this ultimate roadway configuration.









LEGEND:

PROPOSED FINISHED GRADE

EXISTING GRADE

FIGURE 4

TERRY FOX DRIVE PROFILE
STA. 11+700 TO STA. 17+520

TERRY FOX DRIVE EXTENSION

RICHARDSON SIDE ROAD
TO SECOND LINE ROAD
STORMWATER MANAGEMENT
REPORT

DILLON CONSULTING

DATE: DECEMBER 2009

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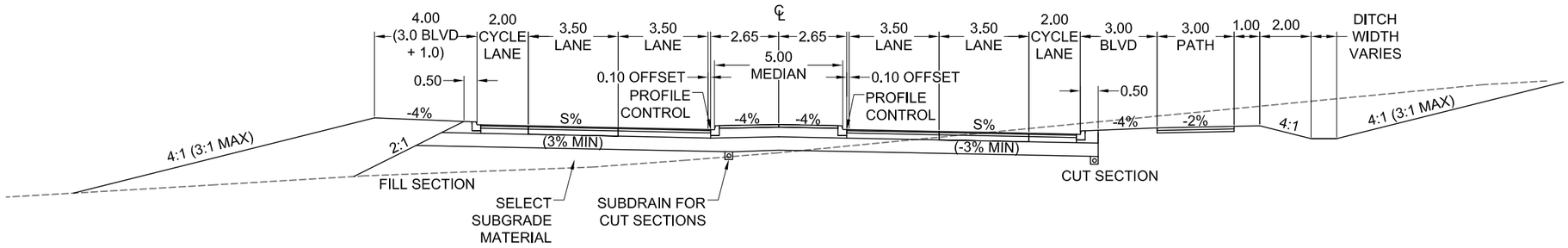
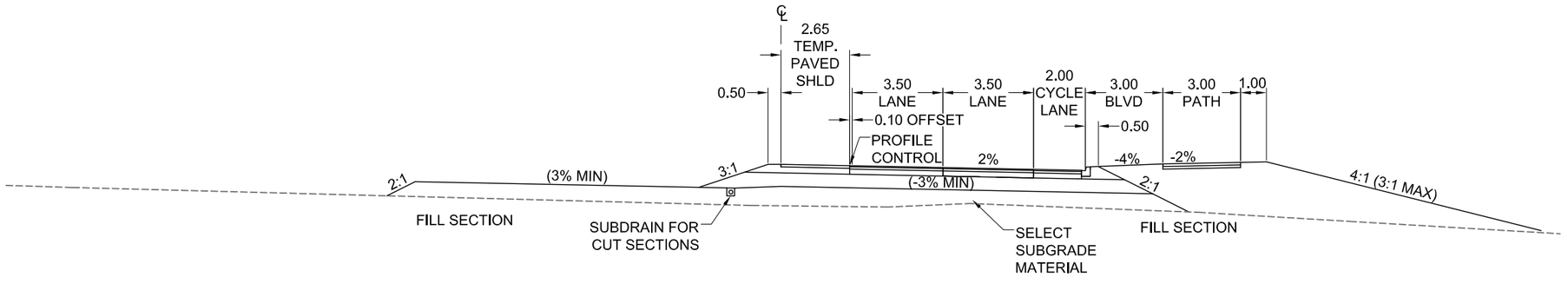
16 December 2009 12:03:35 PM G:\cad\2009\09-1518 Ottawa - Terry Fox Drive Final Design\Report Figures\SWM Report\FIG 4 Terry Fox Drive Profile.dwg



TERRY FOX DRIVE
TYPICAL ULTIMATE 4-LANE SUPERELEVATED SECTION



TERRY FOX DRIVE
TYPICAL INTERIM 2-LANE SECTION

LEGEND:

LIMIT OF CUT/FILL

ORIGINAL GROUND

NOTE:
ALL DIMENSIONS ARE SHOWN IN METRES UNLESS OTHERWISE NOTED.

FIGURE 5
TYPICAL INTERIM AND
FINAL CROSS-SECTIONS

TERRY FOX DRIVE
EXTENSION
RICHARDSON SIDE ROAD
TO SECOND LINE ROAD
STORMWATER MANAGEMENT
REPORT

DILLON CONSULTING

DATE: DECEMBER 2009

SCALE: 1:200

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16 December 2009 10:56:14 AM G:\cad\2009\09-1518 Ottawa - Terry Fox Drive Final Design\Report Figures\SWM Report\FIG 5 Interim and Final Cross-Section of Terry Fox Drive.dwg

The total percentage of impervious area within the right-of-way for the ultimate four-lane condition will be 58%, and the estimated volumetric runoff coefficient is calculated to be 75% for extreme design conditions (based on a runoff coefficient for the impervious areas of 100% and a runoff coefficient for granular materials of 40%).

3.4 Design Considerations

Construction of the proposed roadway has the following potential environmental impacts:

Water Quantity Impacts

- Displaced flood storage;
- Reduced infiltration and increased run-off volume;
- Reduction in the time of concentration resulting in increased peak flow rates;
- Increased flow velocities;
- Reduction of base flow in streams due to reduced infiltration and flow diversion;
- An increase in the frequency of erosive run-off events resulting from typical, highly frequent rain storms;
- Increased frequency of upstream flooding resulting from misdirection of overland drainage; and
- Habitat disruption.

Potential Water Quality Impacts

- Sediment transport as a result of erosion during construction process;
- Contaminant transported from the roadway and external lands, to the receiving system;
- Reduction in receiver assimilative capacity for contaminants resulting from a decrease in base-flow; and
- Increased run-off water temperature due to an increase in paved area and retention times within the SWM facilities.

In addition to the potential impacts of the project, the physical setting of the project provides a number of design considerations, which are described below.

Geophysical

According to recent geophysical analysis, the clay deposit along the Carp River requires special design considerations. According to Golder Associates, "The rate of settlement is highly dependent on the rate of drainage and traditionally in this clay deposit it is anticipated that settlement will continue to occur for several years after the roadway embankment has been constructed, which is unacceptable for roadways containing services and paved surfaces. Therefore the majority of the settlement will need to be accelerated by methods of installing artificial drainage within the silty clay and placing temporary surcharge loads on the embankment to have the settlement occur during or prior to the construction period."(Golder Associates, 2009). Furthermore, "where embankments

overlie areas of soft or firm grey silty clay they will settle by an amount that is relative to the height of the embankment." (Golder, 2003). Therefore, the higher the embankment through this stretch of road the more settlement can be expected and the more pre-loading required.

Natural Environment

Terry Fox Drive traverses several areas identified as providing important habitat to wood frogs, spring peepers, turtles and toads. Special design considerations are required to ensure that wildlife can move safely from one side of the road to the other. From the wildlife studies conducted to date, critical crossings should be placed within the 'saddle' area north to Station 15+350. The wet/dry crossings will also ensure that important biological linkages found in soils and water is maintained from protected lands on the easterly side of Terry Fox Drive and the natural lands on the westerly side of the alignment.

The wetlands indentified in the Shirley's Brook watershed have been identified as Provincially Significant Wetland (PSW) by the Ministry of Natural Resources (MNR). Special drainage design considerations are targeted to minimize the impact on these natural features. The ESR identifies that Terry Fox Drive crosses a PSW and identifies a loss of 0.5 ha of wetland in the potential impacts of the project. A detailed mitigation plan is required as part of the ESR (Table 7.2). Furthermore, in the project description discussion (Section 7.2.3) stormwater quality control measures are proposed for Terry Fox Drive including:

> *Maintaining existing drainage patterns where the existing road drains to wetland areas in lieu of direct discharge to a watercourse. It is important to note that total suspended solid loadings may result in the degradation of a wetland. Furthermore, the MNR would not allow any stormwater discharge to any provincially significant wetland since heavy metals and other pollutants are attached to TSS. Prior to discharging to a wetland, pre-treatment (i.e. removal of coarse particles) may be mandatory (p. 7-14).*