



BURNSIDE



South Innisfil Creek Drain

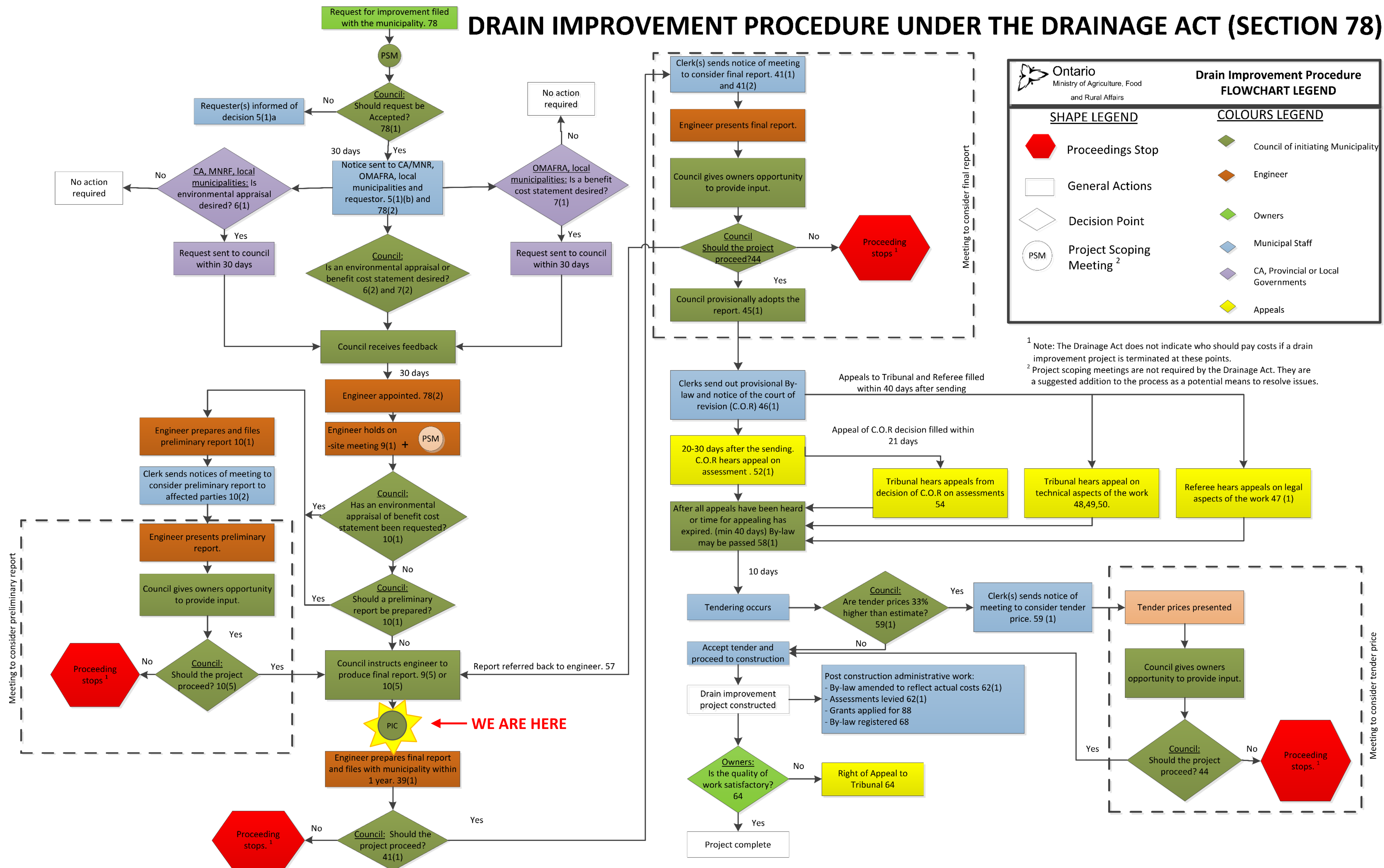
Public Information Centre

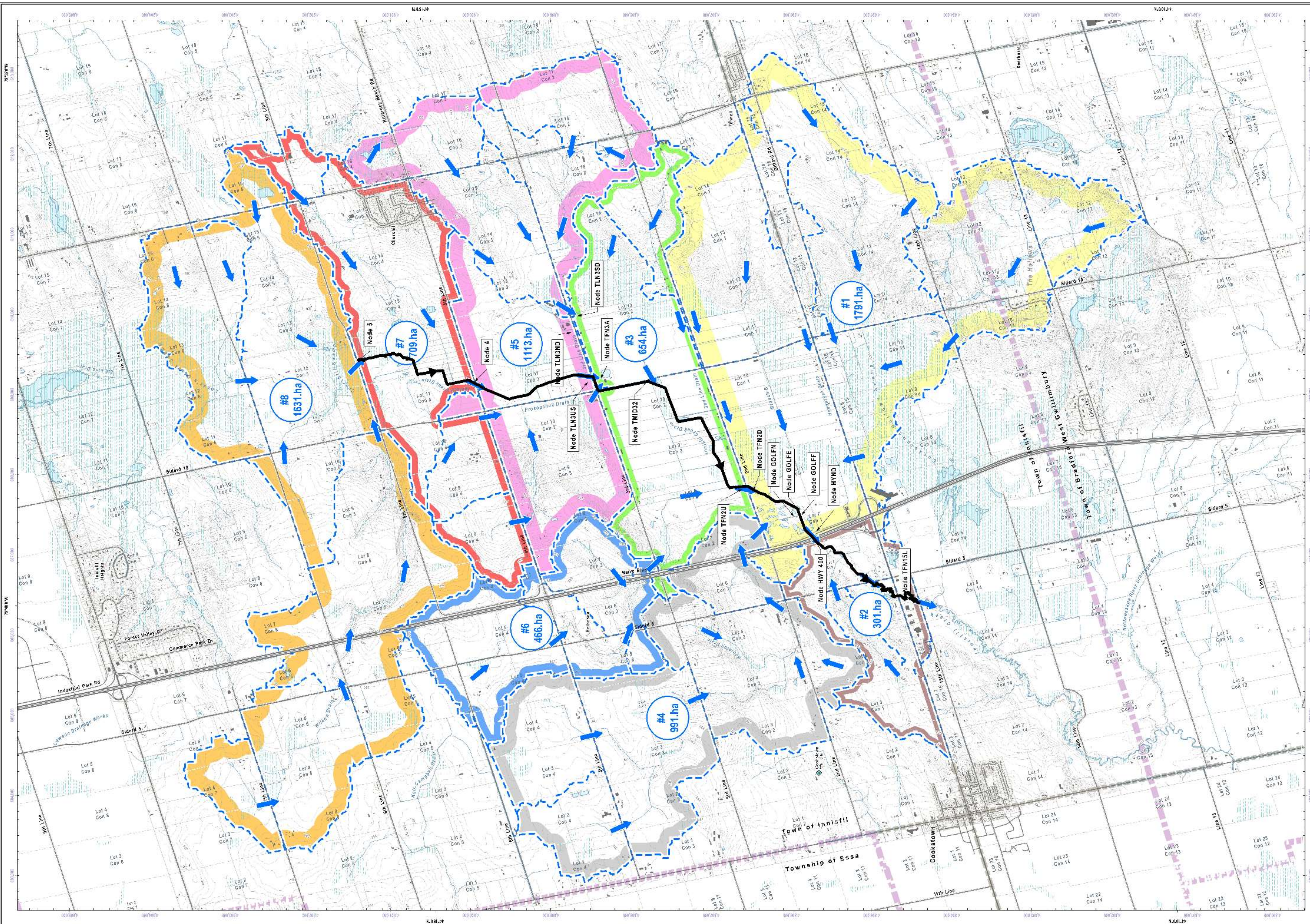
Friday, February 23, 2017
4:00 – 7:00 p.m.

Town Hall, Community Room
2101 Innisfil Beach Road
Innisfil ON L9S 1A1

Municipal Drain Process

DRAIN IMPROVEMENT PROCEDURE UNDER THE DRAINAGE ACT (SECTION 78)





LEGEND

- Drainage Node (Color-coded)
- Sub-Catchment (Color-coded)
- Lot (Numbered)
- Street (Labeled)
- Highway (Labeled)
- Water Body (Blue)
- Boundary (Dashed Line)
- Scale (0 to 2000 Meters)
- North Arrow

TOWN OF INNISFIL

BURNSIDE

SOUTH INNISFIL CREEK DRAIN SUB-CATCHMENTS

Scale: 1/1

Project No: 20180322

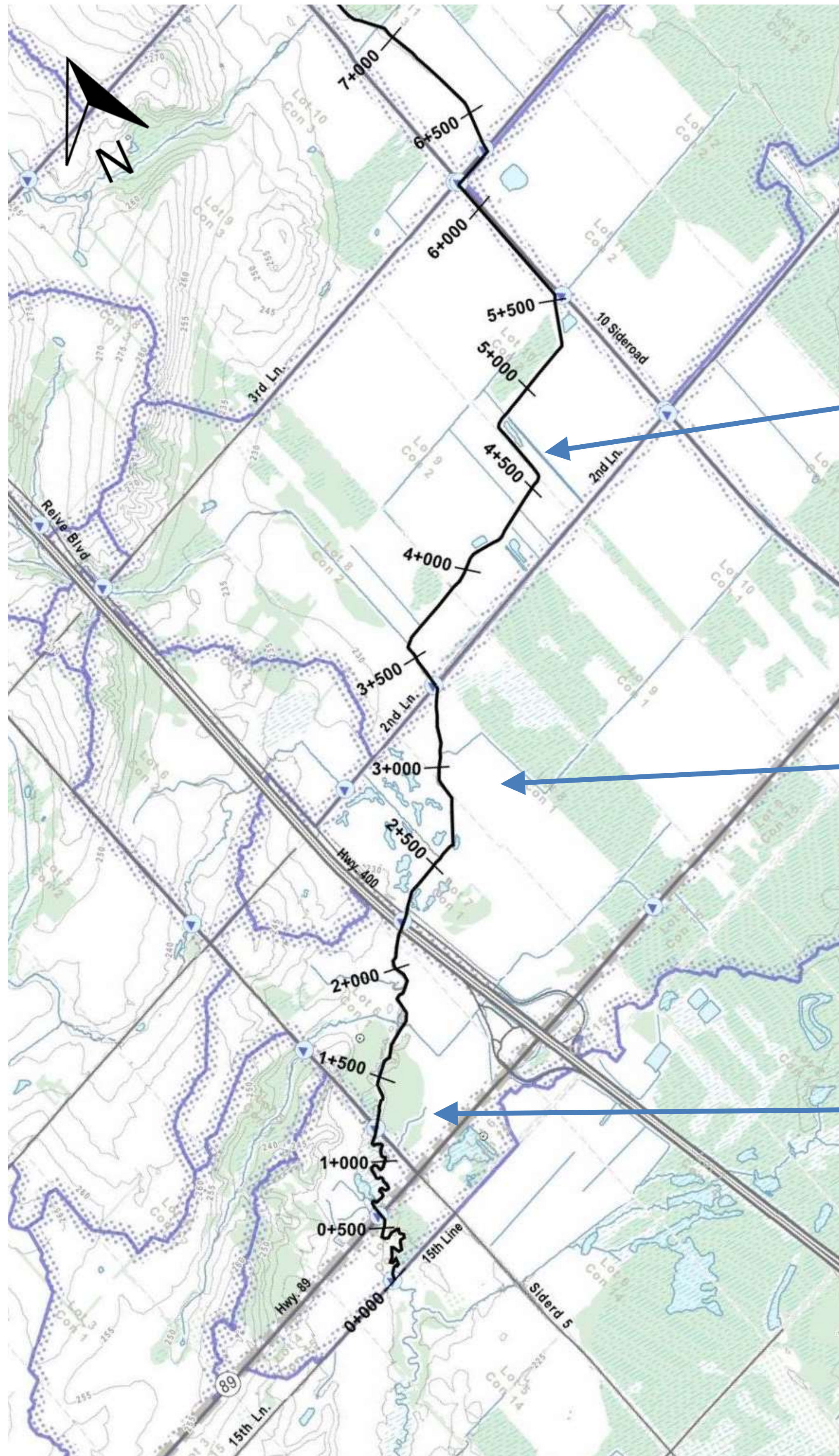
Issue: 1/1

NOTES:

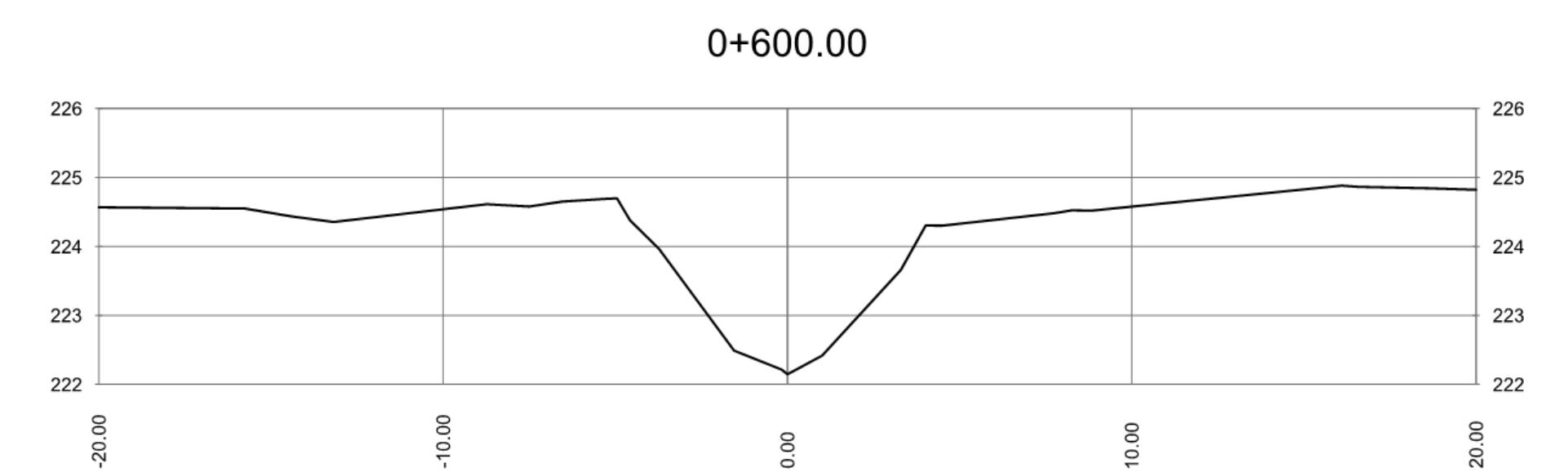
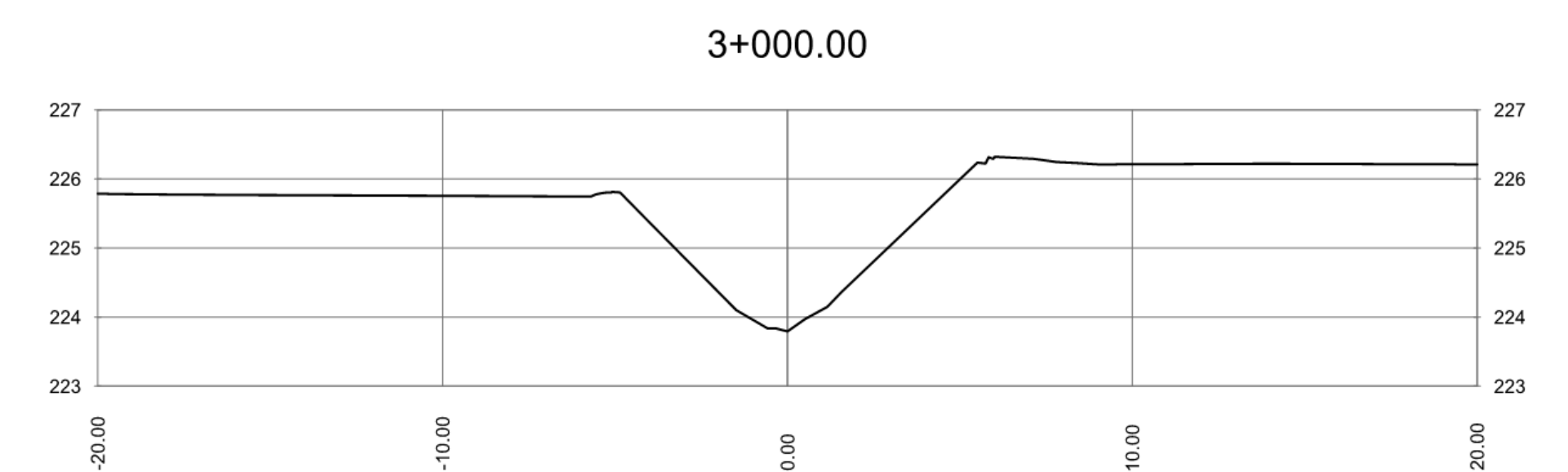
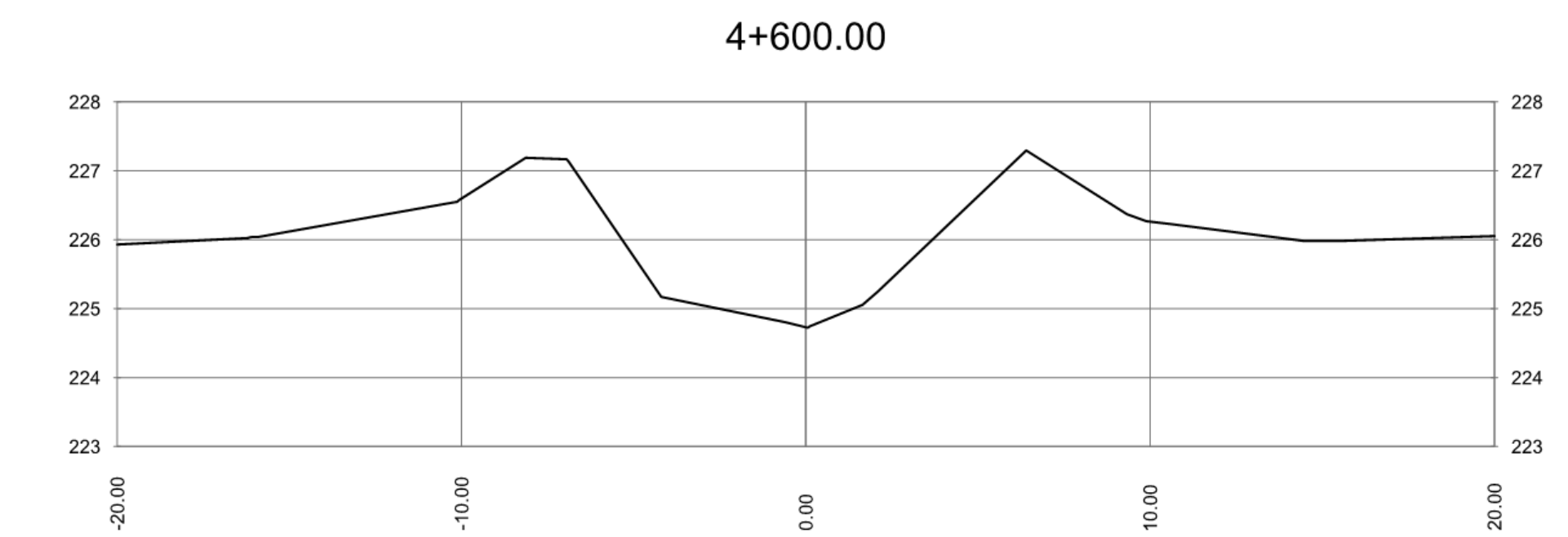
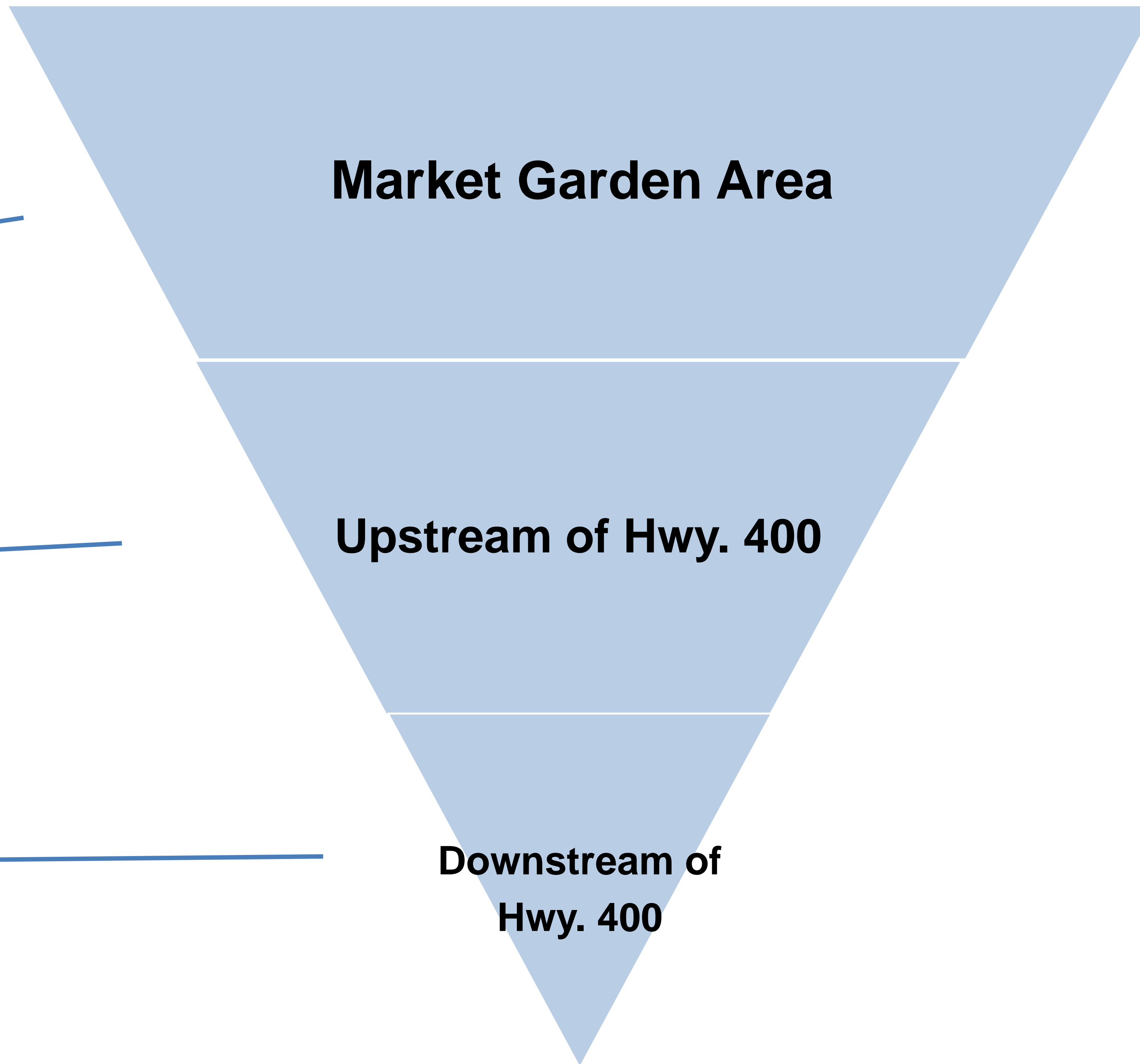
- This map was prepared for the purpose of illustrating the sub-catchments of the South Innisfil Creek Drain.
- This map is not to be used for any other purpose without the written consent of Burns & Associates Inc.
- The information on this map is based on the data provided to Burns & Associates Inc. by the Town of Innisfil and the Township of Essa.
- The information on this map is not to be used for any other purpose without the written consent of Burns & Associates Inc.

Existing Drain Capacity

The drain cross section is narrower at the downstream end than it is at the upstream end; this causes a "funnel effect".



Relative Channel Capacity
(for representative purposes only)



Peak Flow Summary Tables

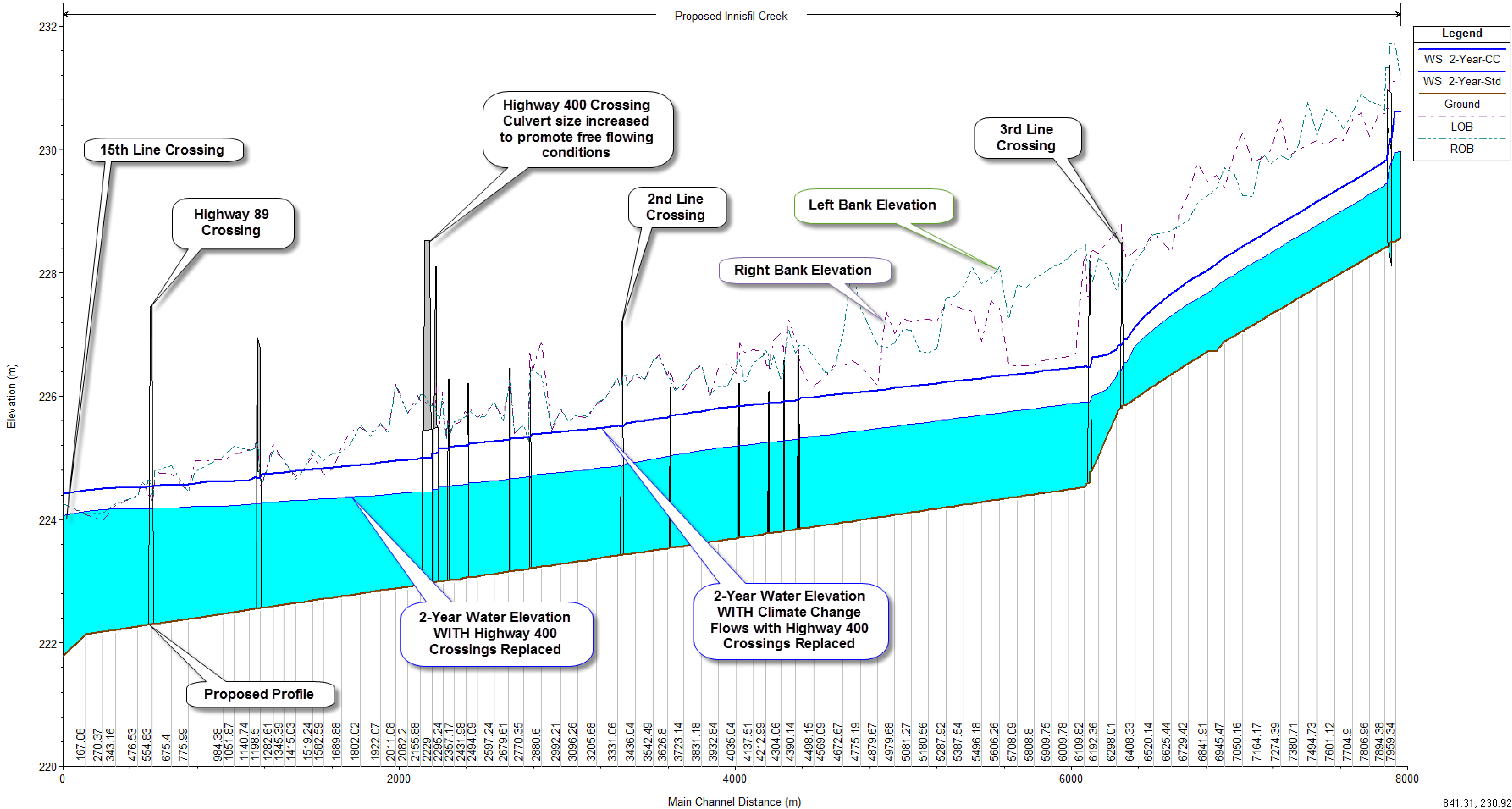
Burnside 2-Year Peak Flow Summary Table

FLOW NODE	FLOW NODE DESCRIPTION	2-Year
		m3/s
NODE 5	TOTAL FLOW AT THE 5TH LINE	3.86
NODE 4	TOTAL FLOW AT THE 4TH LINE	5.44
TLN3ND	TOTAL FLOW WITHIN 3RD LINE NORTH DITCH	0.46
TLN3SD	TOTAL FLOW WITHIN 3RD LINE SOUTH DITCH	1.48
TLN3US	TOTAL FLOW U/S OF THE 3RD LINE	3.17
TFN3A	OUTLET TO 3RD LINE (MAIN DRAIN)	8.35
TMID32	TOTAL FLOW AT CONFLUENCE BETWEEN 3RD LINE AND 2ND LINE	8.77
TFN2U	TOTAL FLOW UPSTREAM OF THE 2ND LINE	10.71
TFN2D	TOTAL FLOW DOWNSTREAM OF THE 2ND LINE	11.51
GOLFE	TOTAL FLOW TO FLOW NODE GOLFE (GOLF COURSE EAST)	11.12
GOLFN	TOTAL FLOW TO FLOW NODE GOLFN (GOLF COURSE NORTH)	2.49
TGOLF	TOTAL FLOWS FROM GOLF NORTH AND GOLF EAST	13.43
HYND	FLOWS FROM HNYDCZAK DRAIN UPSTREAM OF HWY 400	1.79
HWY400	TOTAL FLOW AT HWY 400	13.64
TFN15L	TOTAL FLOW AT THE 15TH LINE	12.89

Peak Flow Summary Comparison Table at Highway 400

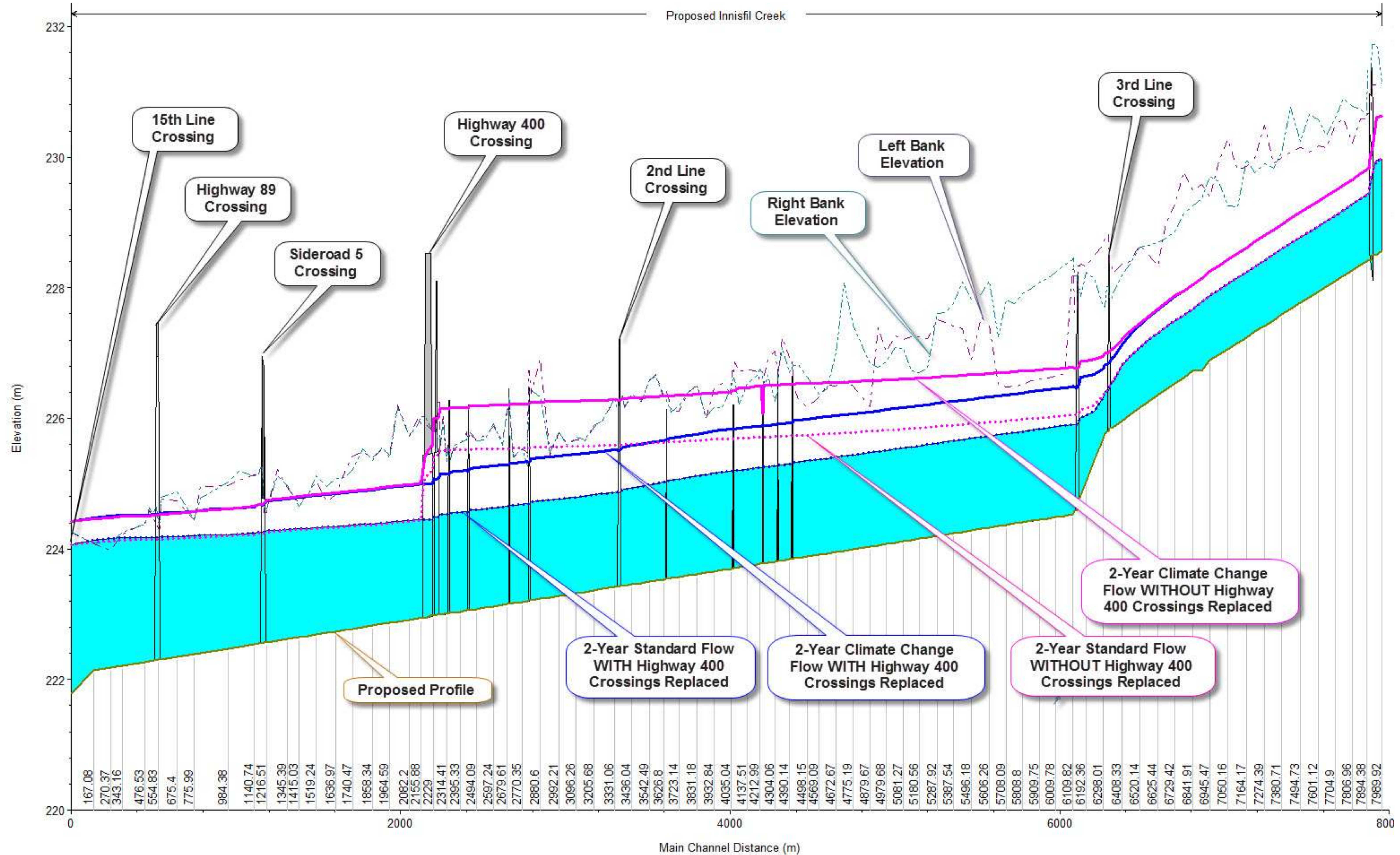
Return Interval	RJB m3/s	Dillon (Pre)	Dillon (Post)	AECOM m3/s	MacLaren (NVCA) m3/s	URS 2003 (Ex.) m3/s
		m3/s	m3/s			
2-Year	13.64	27.19	26.85	-	-	-
5-Year	26.87	66.5	65.37	12.6	8.3	-
10-Year	39.41	94.24	92.7	15.6	10.3	-
25-Year	61.56	127.67	125.54	18.6	12.3	-
50-Year	77.7	-	-	22.8	15.1	22.8
100-Year	93.92	189.1	186.25	26.1	17.3	81.9
Regional	290.47	-	-	81.9	70.3	-

HEC-RAS Hydraulic Model – Proposed Drain Profile Ultimate Condition



841.31, 230.92

HEC-RAS Hydraulic Model – Proposed Drain Profile With and Without Highway 400 Crossing Replacements



The Highway 400 crossings have been observed to restrict the 2-year peak flows and increase water surface elevations approximately 4300m upstream of the crossings to the 3rd Line

Hwy. 400 Crossing

- The existing Hwy. 400 crossing (culverts) cause approx. 1.0 m of backwater upstream of Hwy. 400; this extends approx. 4,300 m upstream and past the 3rd Line.
- The culvert inverts (bottoms) need to be lowered and the diameters enlarged to allow for better conveyance of flow(s) and increased capacity in the upstream channel.
- The MTO Design Criteria for a highway crossing is much greater than the typical Design Standard for an open municipal drain.
- Studies prepared for MTO indicate that the South Innisfil Creek Drain Hwy. 400 culverts (i.e. Culvert 44) need to be replaced.
- There will quite likely be timing differences between the MTO scheduled culvert replacements and the scheduled improvements to the South Innisfil Creek Drain.



Hwy. 400 Crossing (continued)

Communications and Discussions with MTO to date:

- Meeting on March 27, 2017 with MTO Staff - MTO staff were informed that the culverts need to be replaced.
- Meeting on June 23, 2017 with Morrison Hershfield, Consultant to MTO for Interim Improvements of Hwy 400/89 Interchange (2018 – 2019 construction).
- Effort is being made to have the MTO construction limits for the Interim Improvements expanded to include the South Innisfil Creek Drain Hwy. 400 crossing culverts.
- Correspondence to MTO to date:
 - June 23, 2017 – Confirmed existing culvert crossings need to be replaced and lowered;
 - July 27, 2017 – Provided the proposed invert elevation for the new culvert crossing(s); and
 - October 18, 2017 – Follow up on MTO's position.
- Comments on the Environmental Assessment Addendum made by the Town of Innisfil.
- Comments on the Environmental Assessment Addendum made by Burnside.
- Town of Innisfil is lobbying MTO for an earlier replacement of Hwy. 400 culvert crossings.

Background Aquatic Ecological Information Review

- **The South Innisfil Creek Drain is a D-Rated Municipal Drain upstream of 4th Line. Downstream of the 4th Line it is unrated. Fish communities found in Class ‘D’ drains are generally more sensitive to disturbances.**
- Sensitive fish species have historically been observed within the Innisfil Creek Drain by the MNRF, NVCA and private consulting firms. These species include: Brook Trout, Rainbow Trout (steelhead), Longnose Dace and Mottled Sculpin.
- South Innisfil Creek is a cold-water watercourse upstream of Highway 89. Downstream of Highway 89 it is a cool-water watercourse.
- The Nottawasaga Valley Conservation Authority (NVCA) 2013 Innisfil Creek Subwatershed Health Check describes the water quality downstream of 3rd Line as Impaired. Upstream of 3rd Line it is “below potential” then becoming “unimpaired.” Overall stream health is poor and declining.
- Aquatic Species-At-Risk do not inhabit the South Innisfil Creek Drain within the proposed area of the work or downstream, as per 2017 DFO SAR Critical Habitat Mapping.
- Habitat for regulated terrestrial species (Snapping Turtle and Eastern Musk Turtle) is present within the South Innisfil Creek Drain. These species are not protected under the Endangered Species Act (ESA).
- Other Terrestrial Species protected under the ESA are potentially present within the South Innisfil Creek Drain watershed (i.e. the Bobolink).
- Regulated Habitat under the ESA may describe the following: specific features of the area a species depends on; specific geographic boundaries; or areas currently unoccupied by the species.



Bobolink

Existing Aquatic Habitat Conditions and Future Work

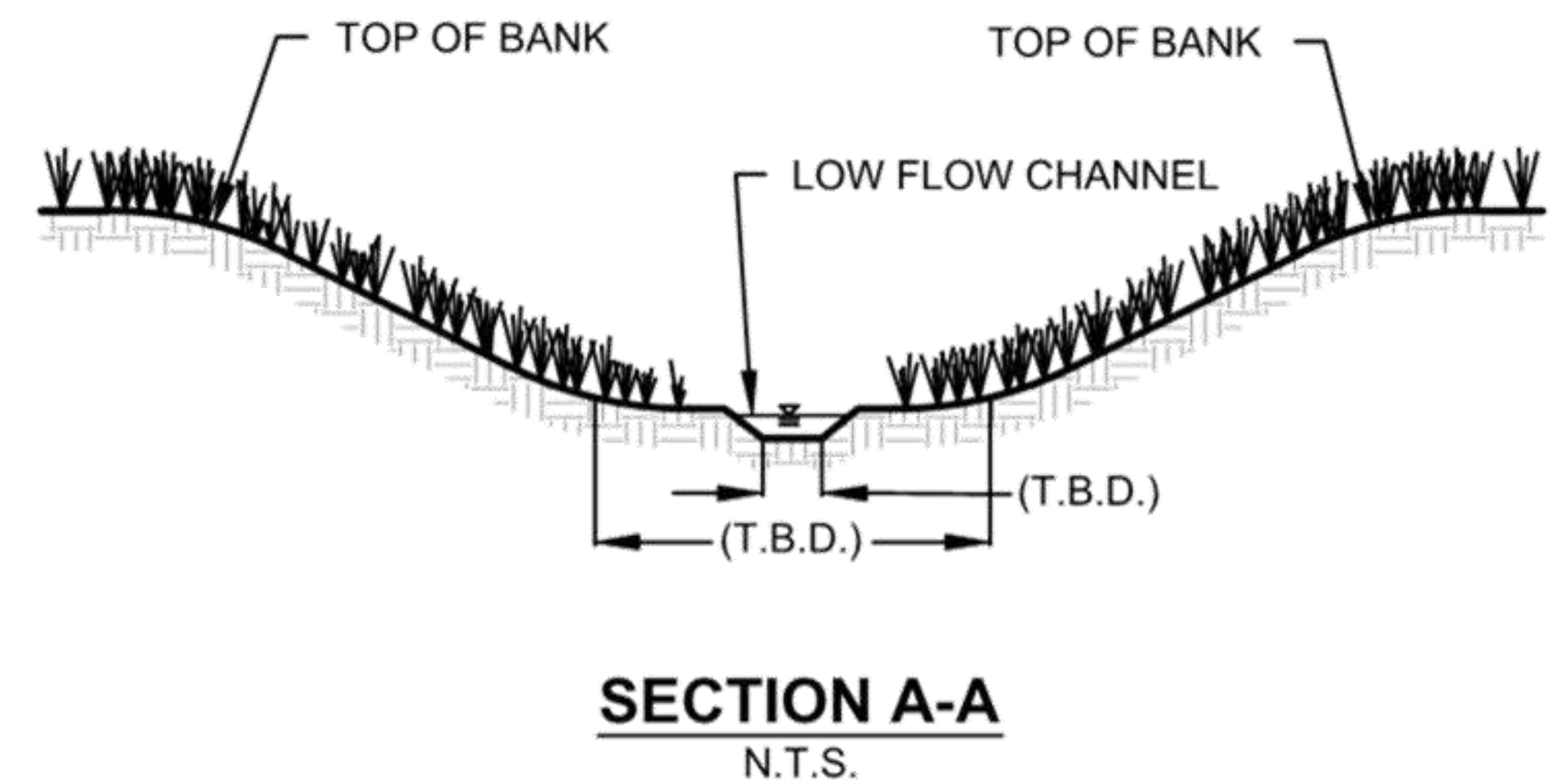
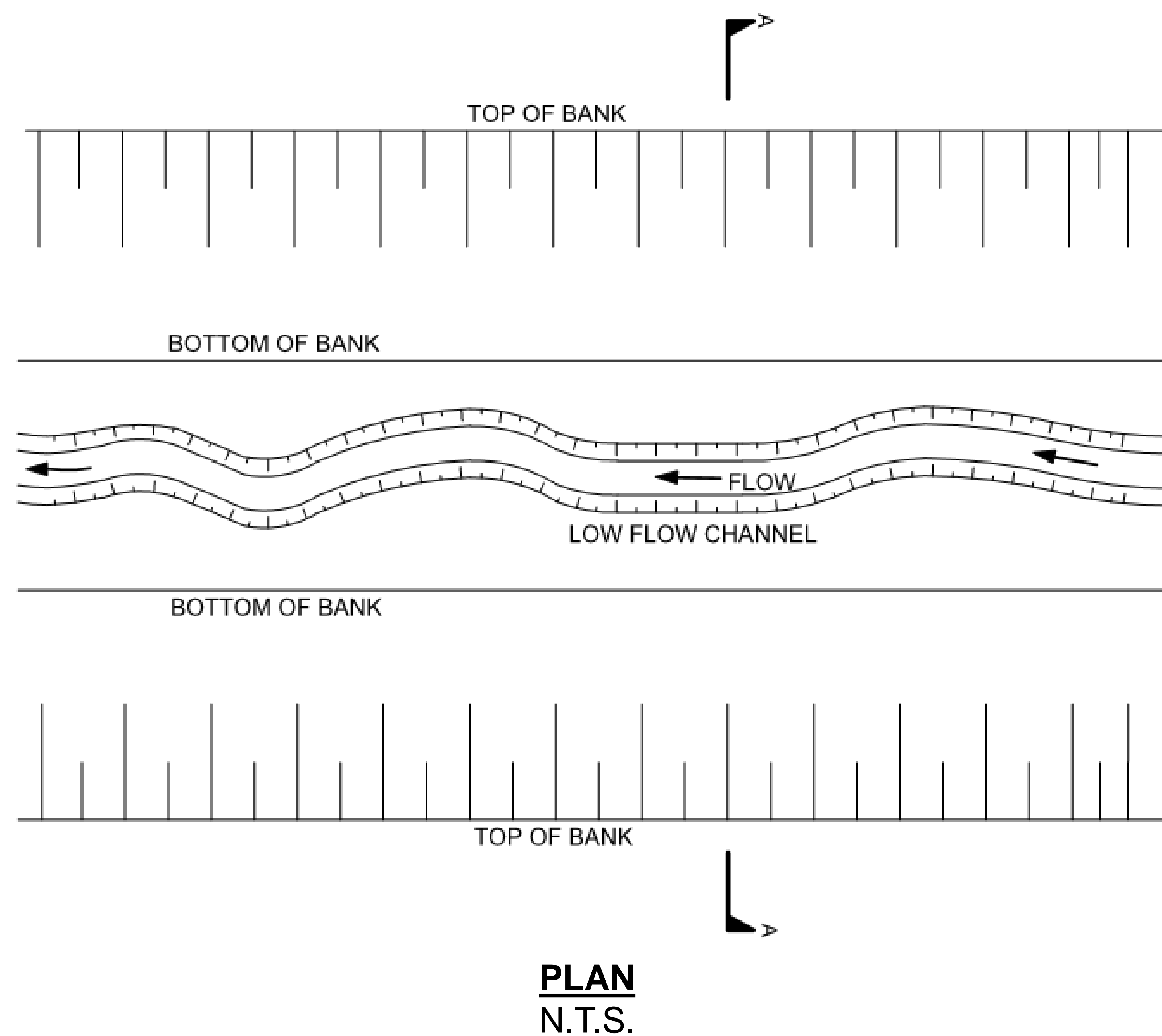
- October 2017: Burnside Aquatic Ecology staff performed a preliminary assessment of aquatic habitat at road right-of-ways: 4th Line, 3rd Line, 2nd Line, Highway 400, 5th Sideroad and Highway 89.
- From 4th Line downstream to Highway 89, fish habitat exists based on stream permanency, the presence of a defined bed and bank and in-stream cover.
- The double CSP culverts beneath Reive Boulevard and Highway 400 are perched and restrict the flow of water during storm events and spring run-off.

Burnside will submit a Request for Project Review to the Department of Fisheries and Oceans Canada (DFO) after Burnside has visited and assessed the drain in further detail this spring and the design is finalized. If it is deemed that the project will cause “serious harm” to fish and fish habitat it will require Authorization from DFO.

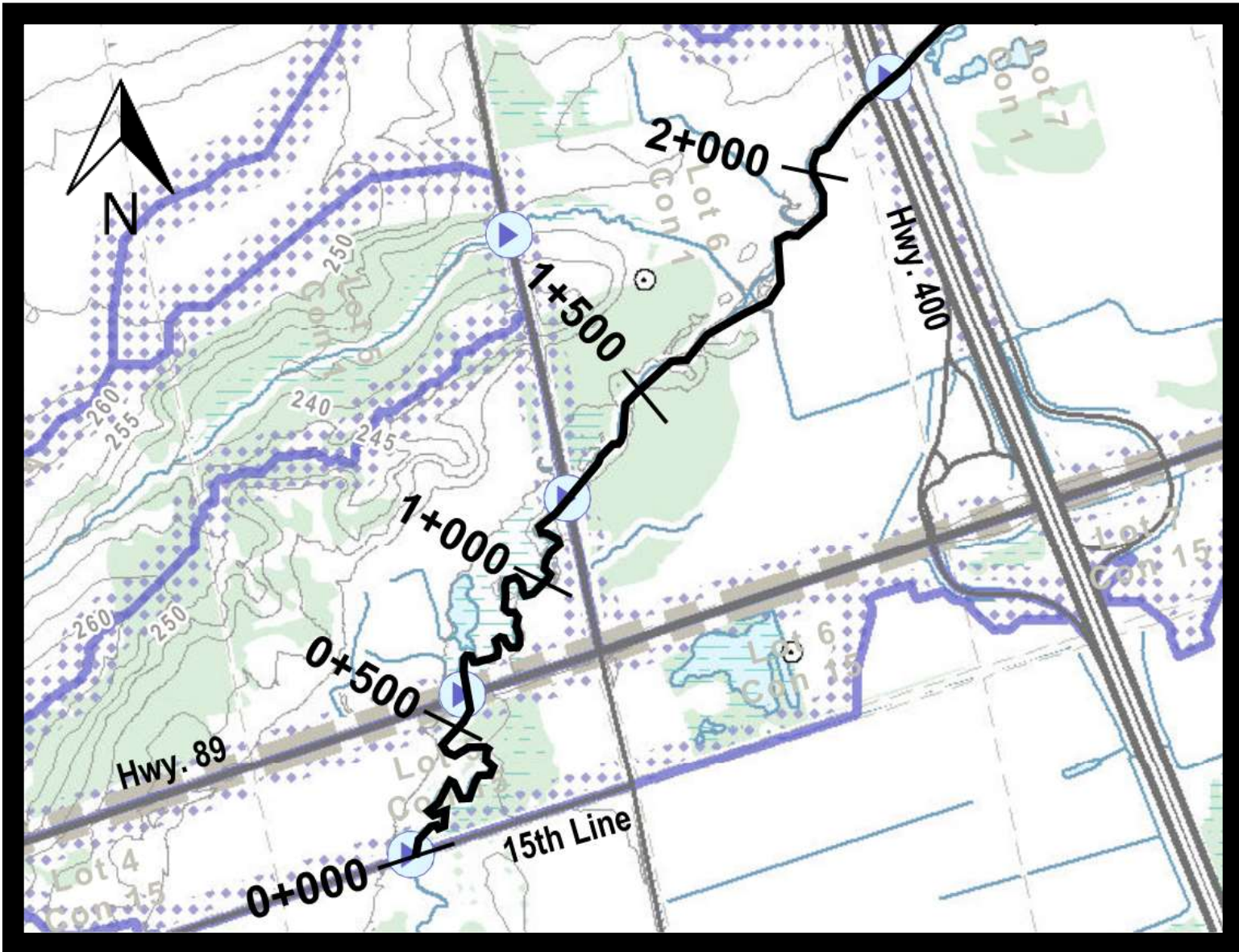


Low Flow Channel

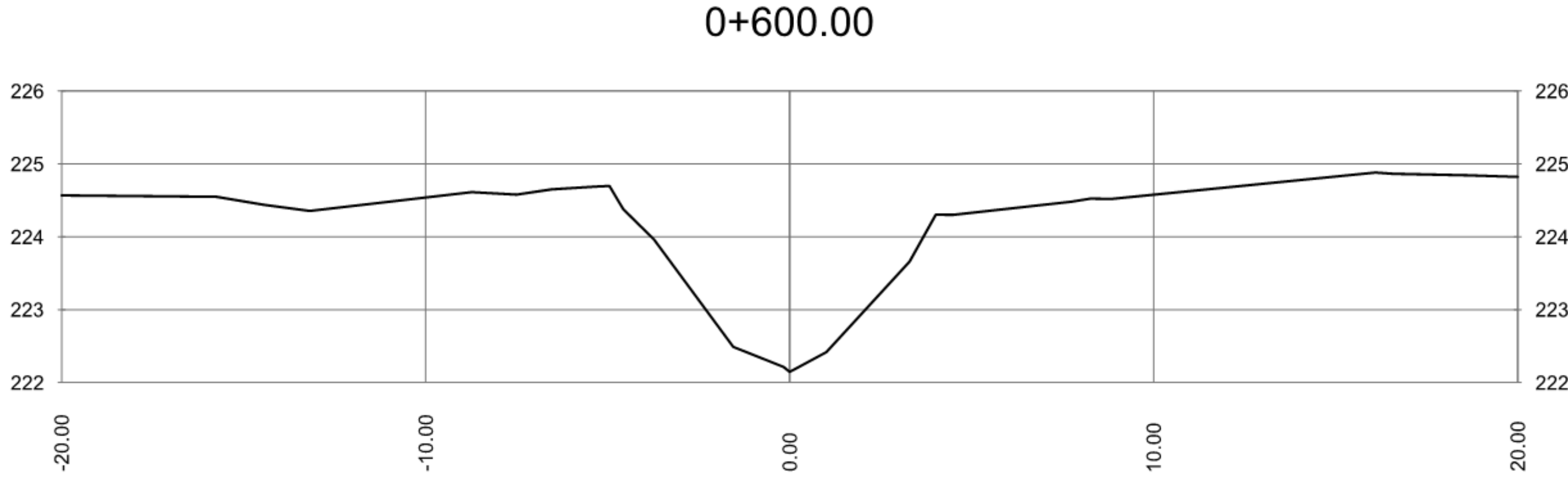
- **Low flow channels are a typical requirement in channel design and DFO Approvals**
- Low flow channels can be constructed using simple methods that will improve bank stability and hopefully reduce future drain maintenance.
- Low flow channels will confine base flow to maintain thermal stability compared to wide shallow channel conditions.
- Low flow channels, if properly designed, will provide stable conditions to support fish and fish habitat (which is required by DFO).



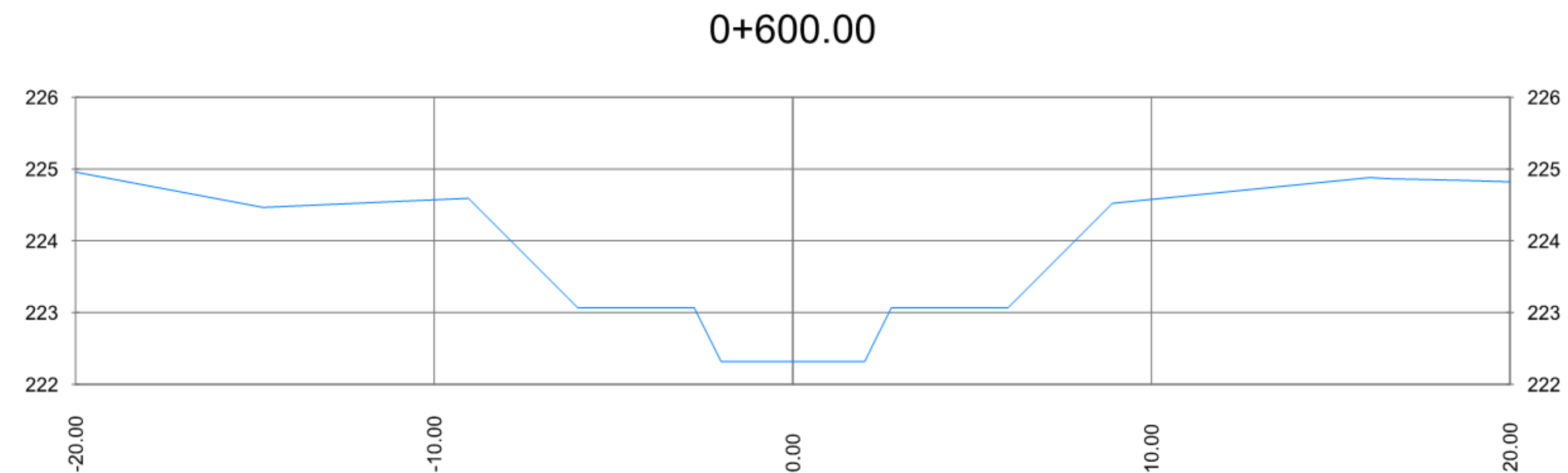
Downstream of Highway 400



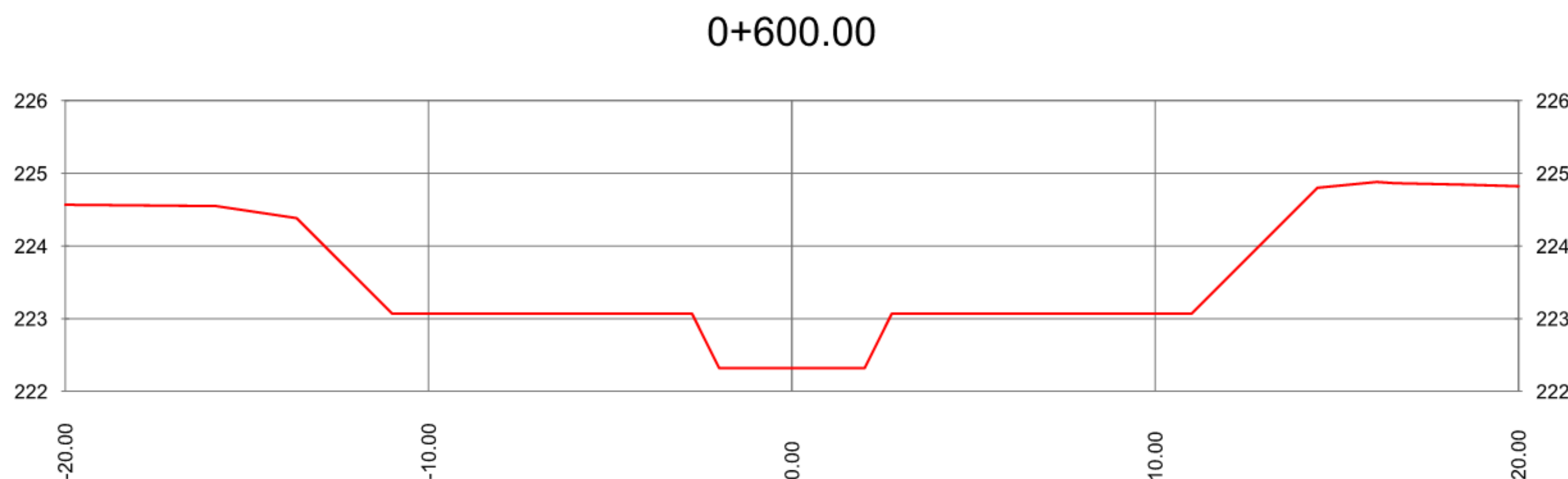
**Key Plan
(Not to Scale)**



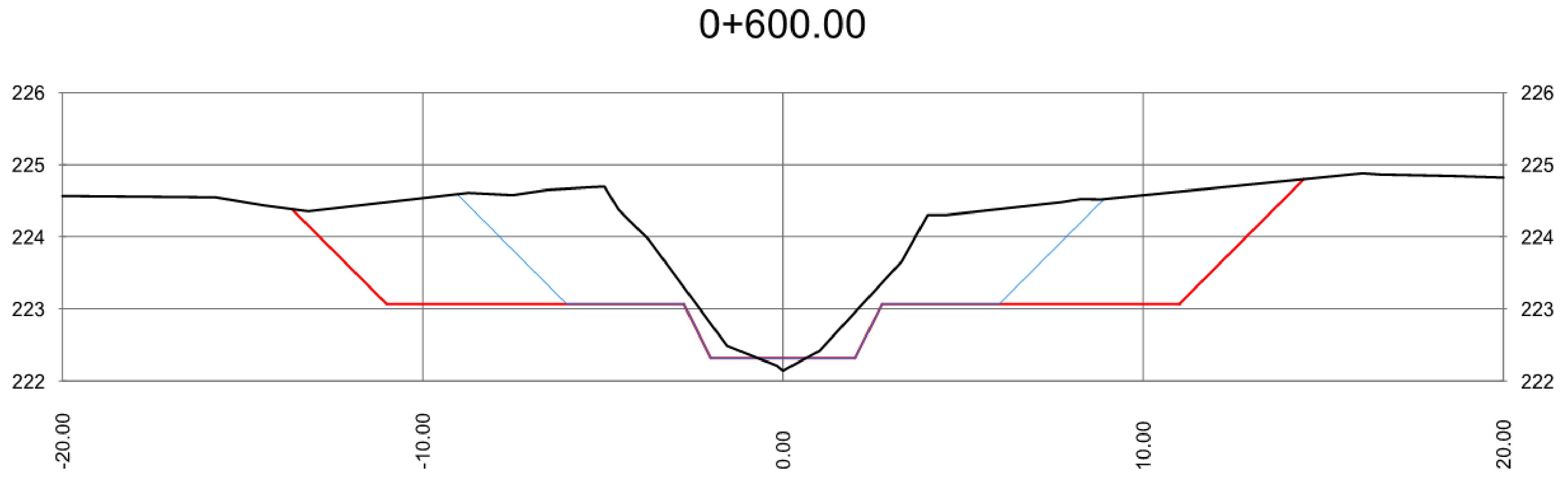
Existing Channel



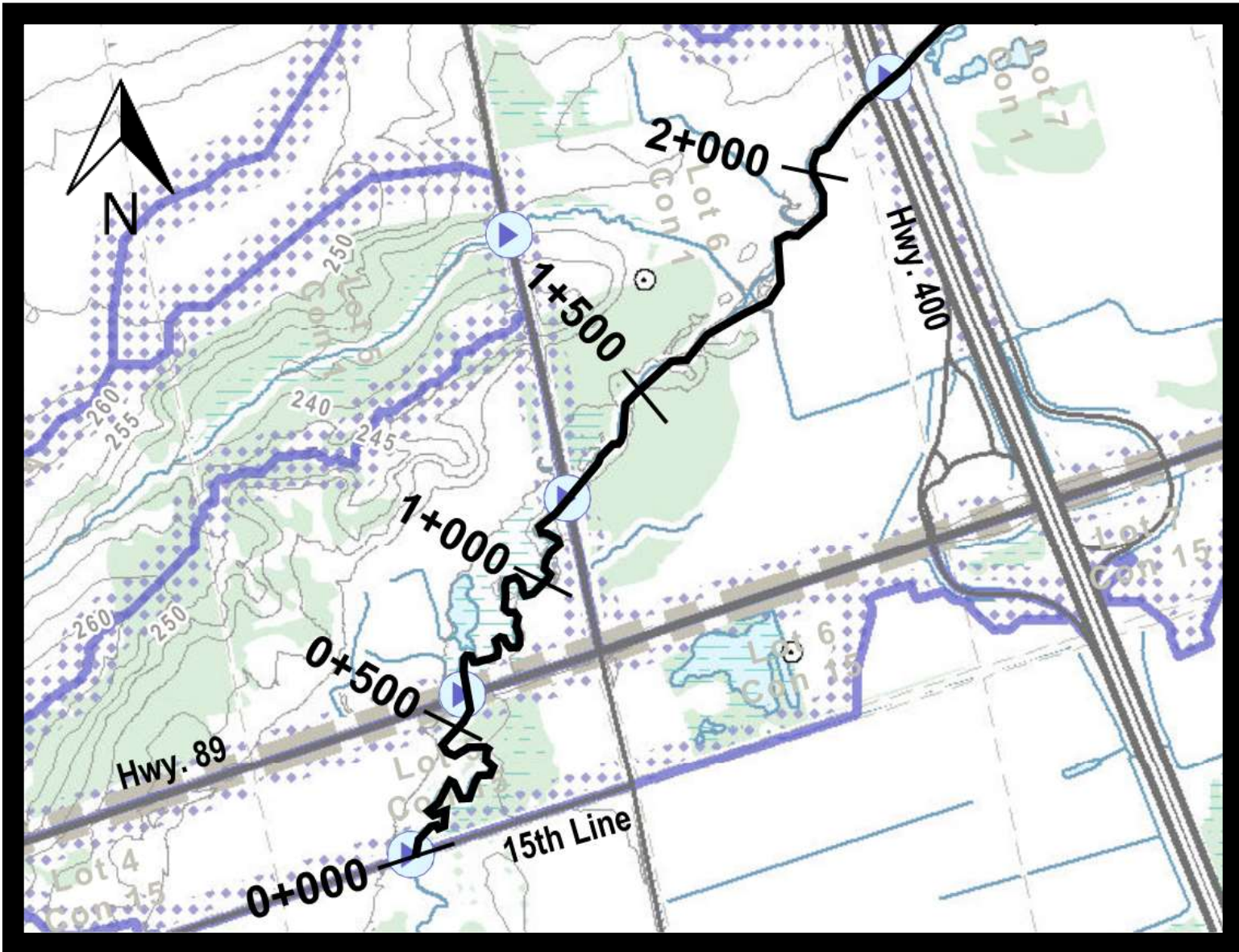
2-Year Standard Design



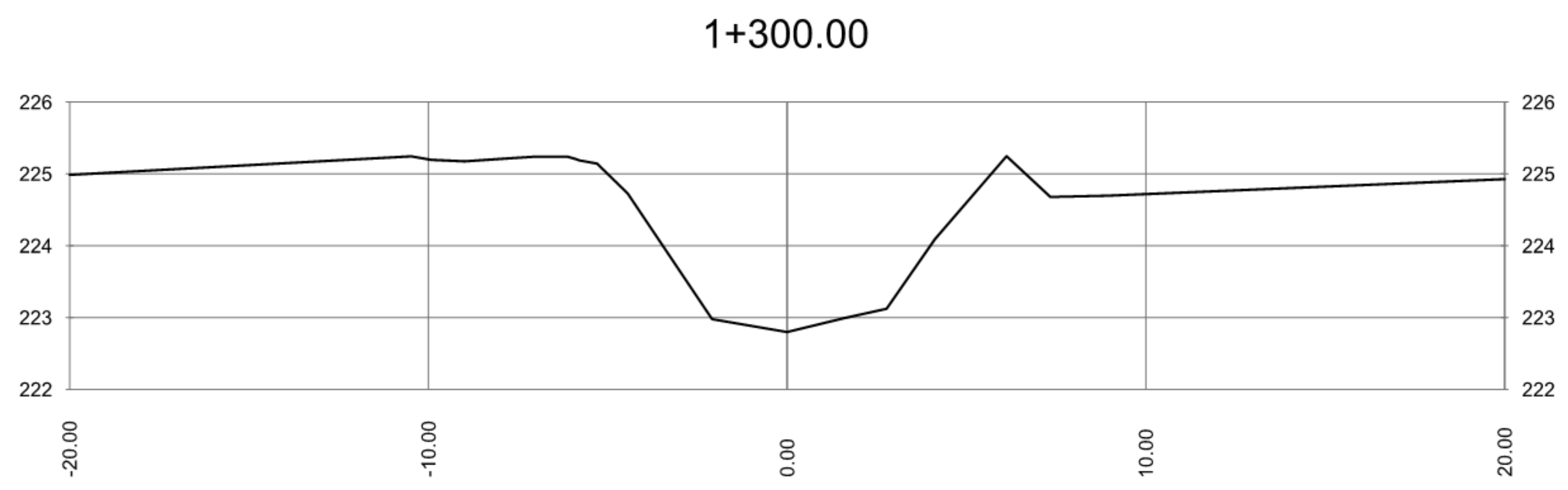
2-Year Climate Change Adjusted Design



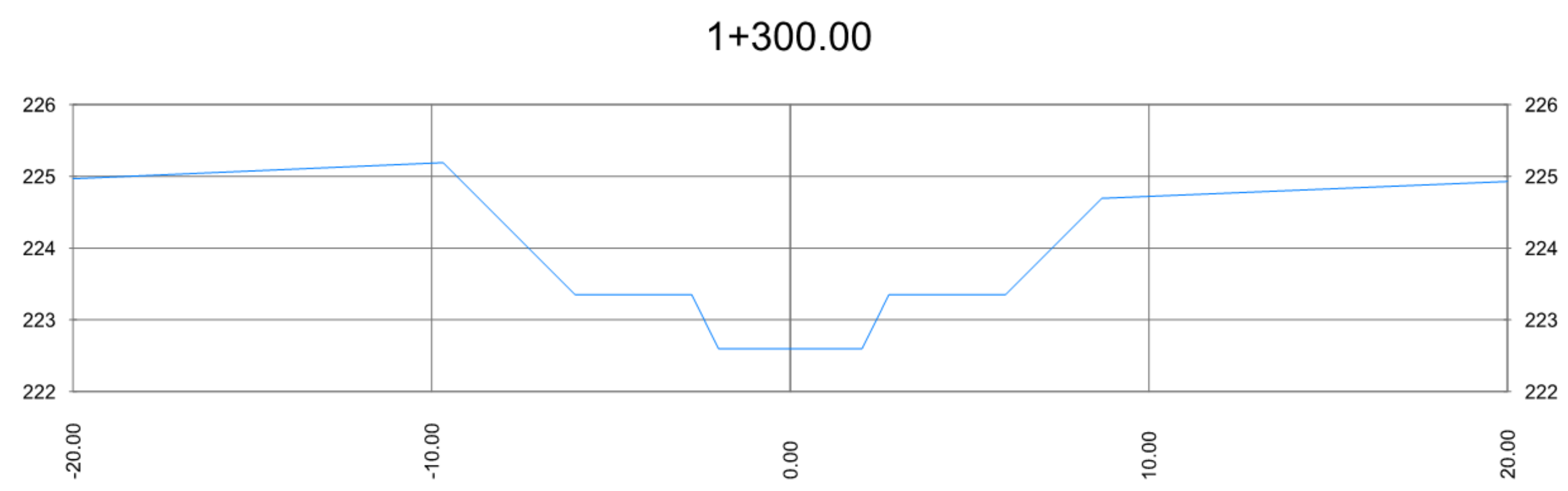
Downstream of Highway 400



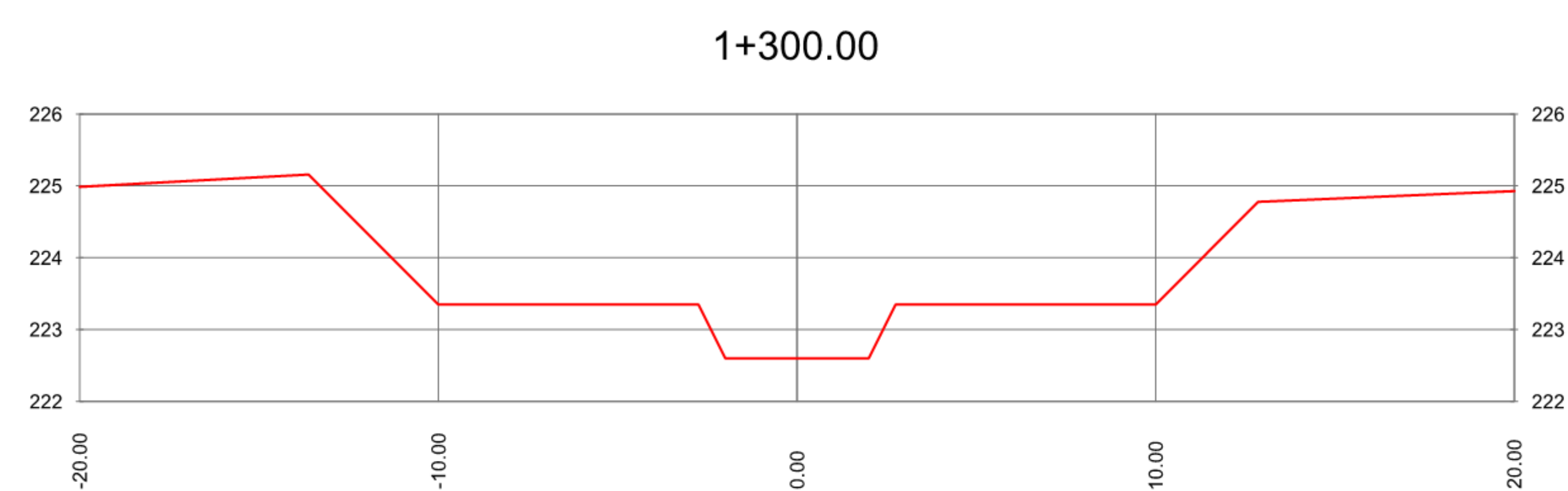
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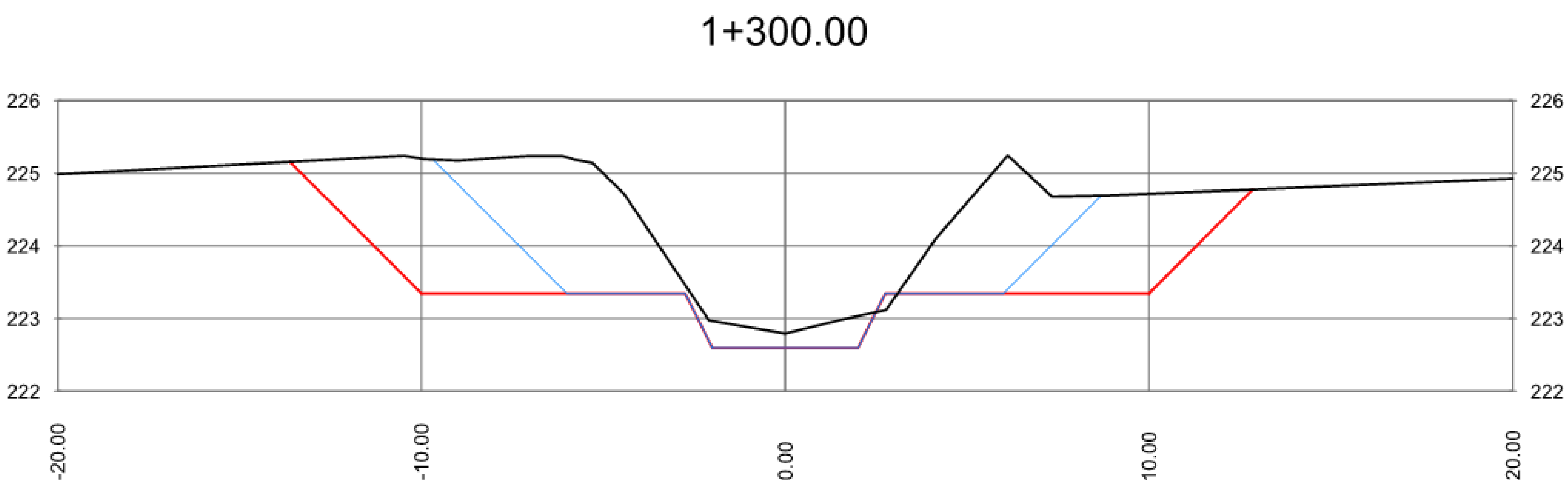
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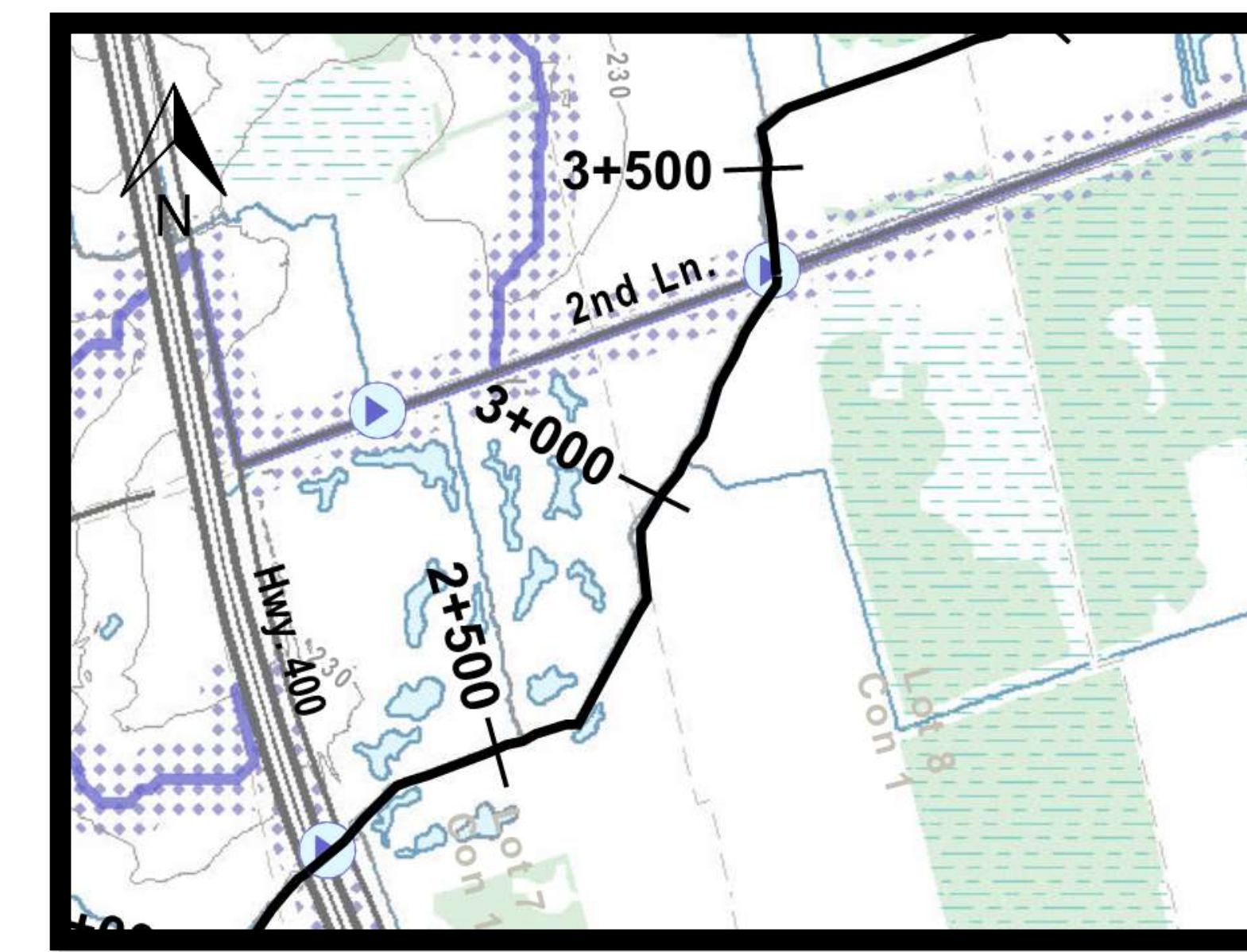
2-Year Standard Design



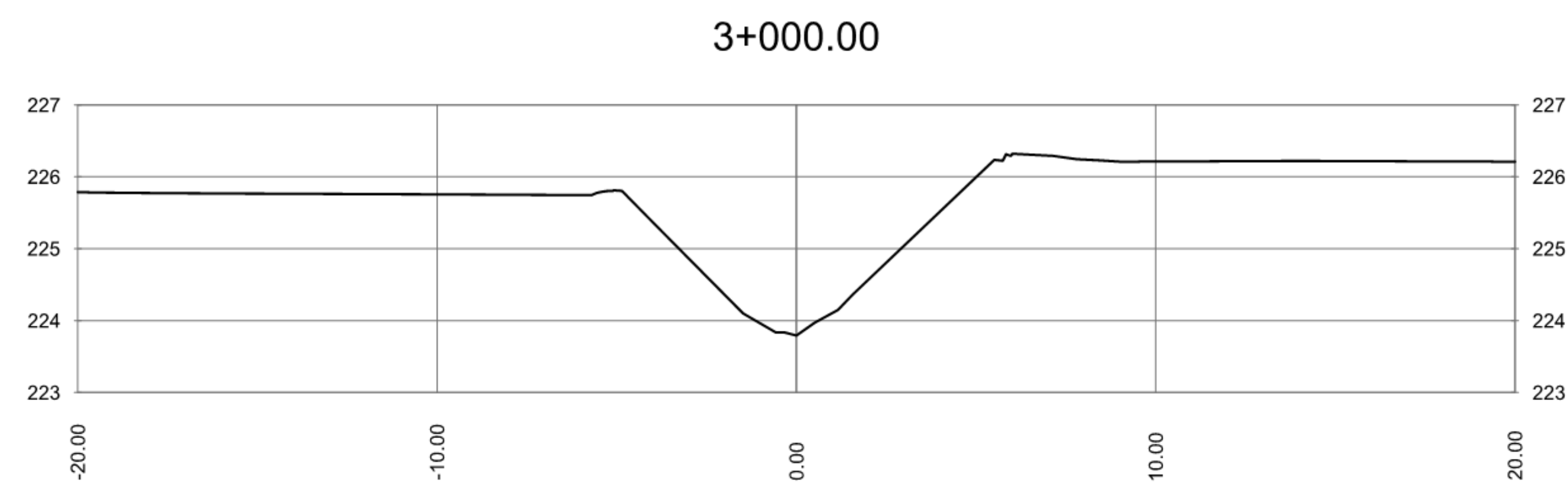
2-Year Climate Change Adjusted Design



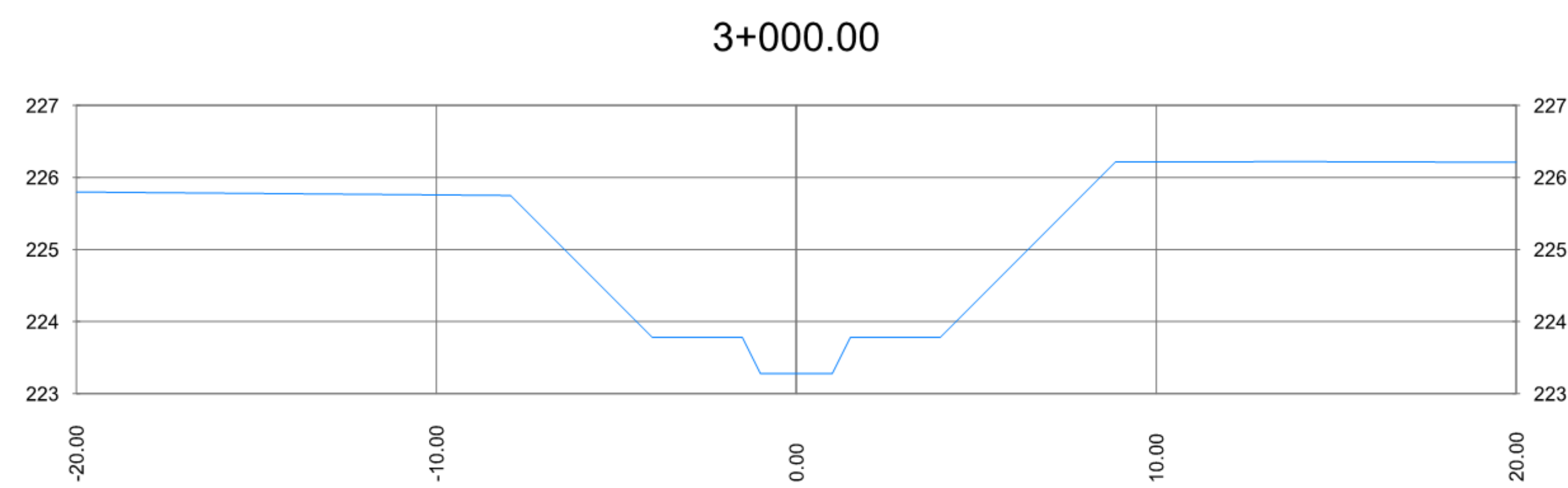
Upstream of Hwy. 400



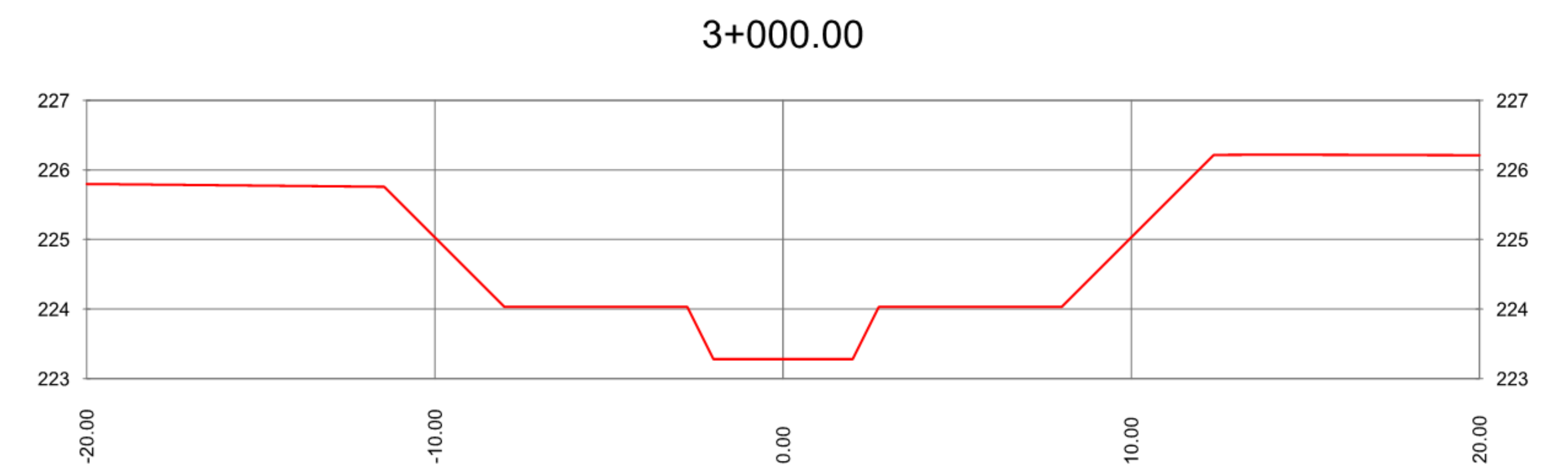
**Key Plan
(Not to Scale)**



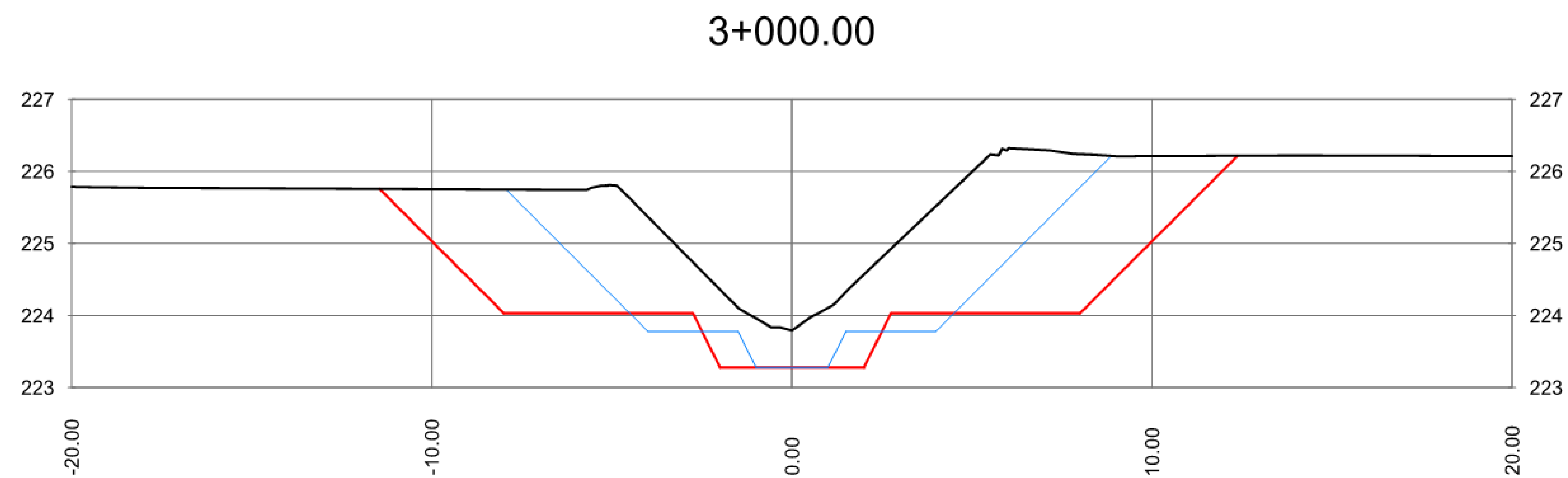
Existing Channel



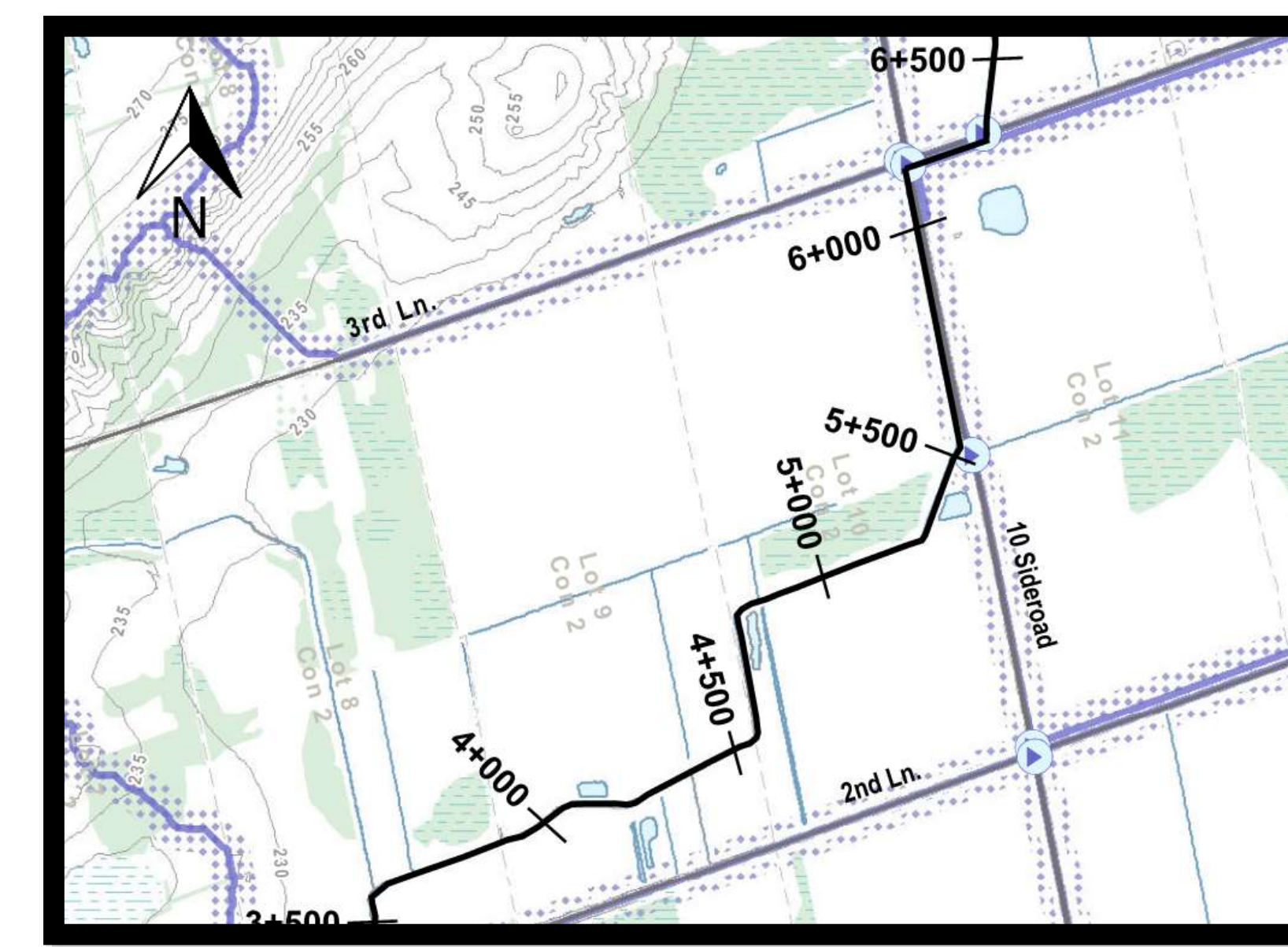
2-Year Standard Design



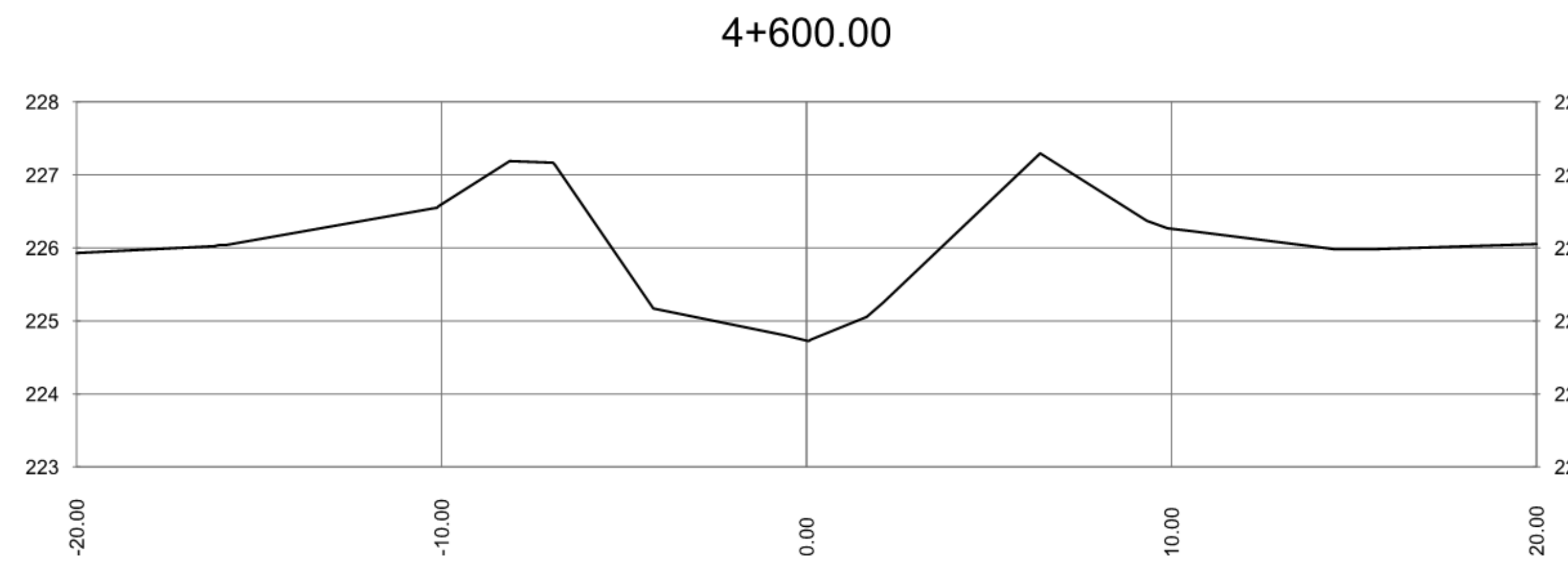
2-Year Climate Change Adjusted Design



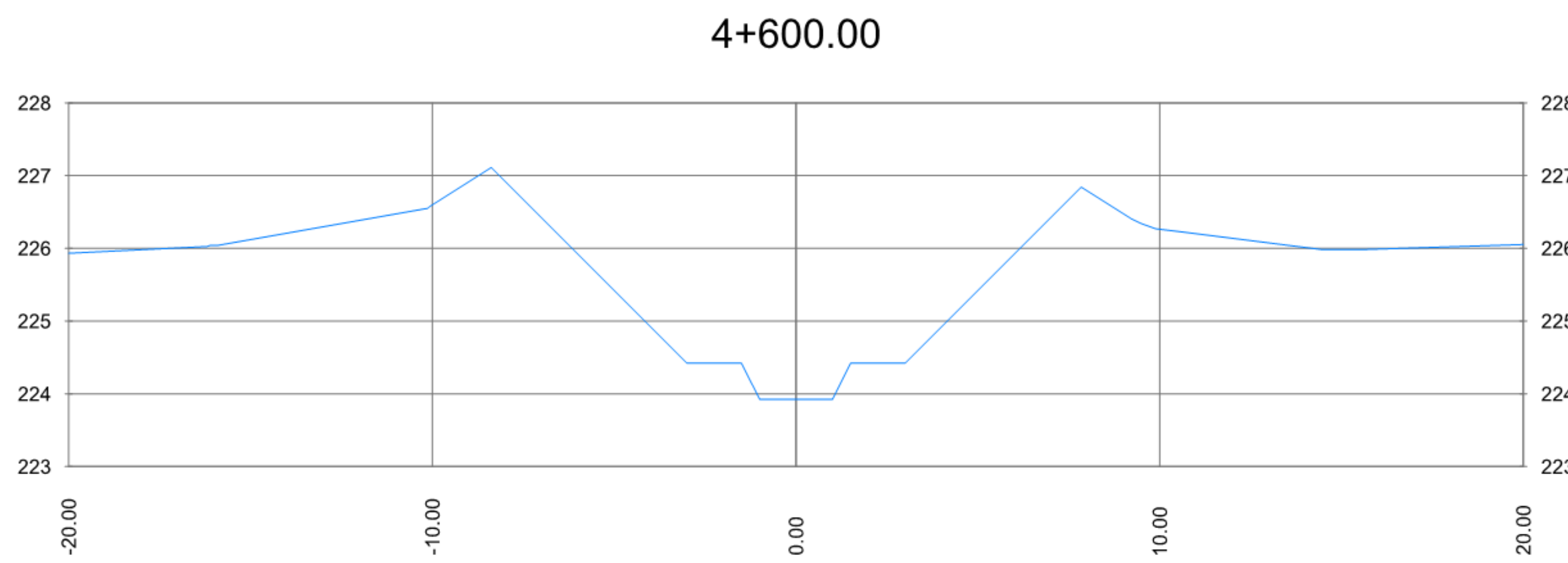
Market Garden Area



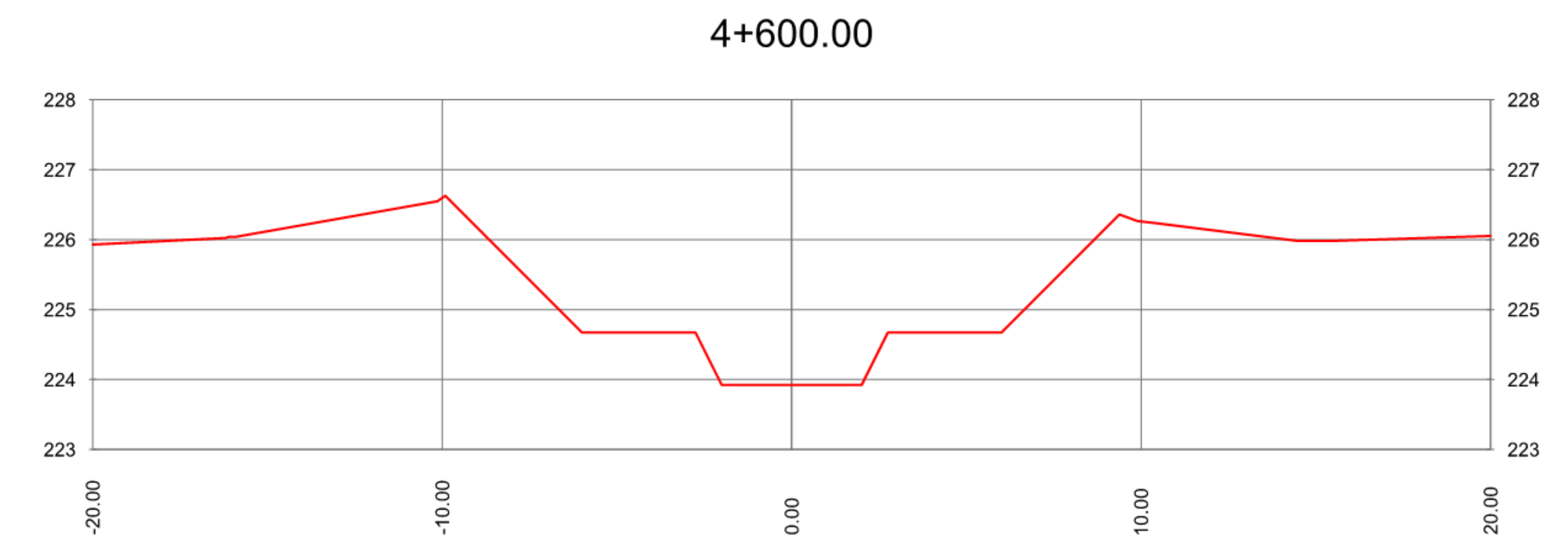
**Key Plan
(Not to Scale)**



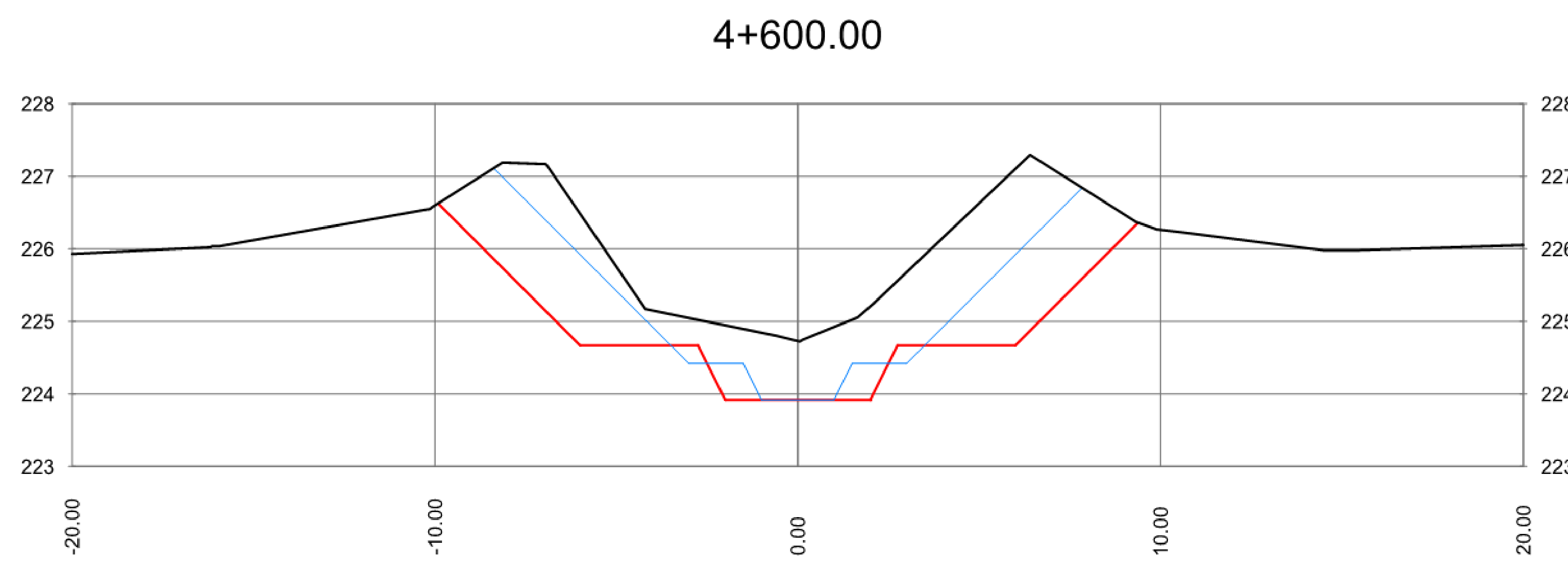
Existing Channel



2-Year Standard Design



2-Year Climate Change Adjusted Design



Factors Affecting Project Cost

These factors may affect the overall project cost and/or individual property assessments compared to Dillon Consulting's 2013 report on the South Innisfil Creek Drain.

Positive

- Remove dyke construction
- Reduce pond construction
- Remove deep foundations on farm crossings (anticipate some settlement of crossings)
- Distribute the estimated cost of the project as per the assessment schedule(s) over a larger catchment area
- Increased cost of the Hwy. 400 culvert crossing(s) replacement will be to the MTO (Section 26)
- Increased cost of the Reive Blvd. culvert crossings replacement will be to the Town of Innisfil (Section 26)
- Retain 2nd Line bridge (with some improvements); increased cost to the Town of Innisfil (Section 26)

Negative

- Inflation since Dillon Consulting's 2013 report
- Additional engineering expense
- Improvements to the 2nd Line bridge; the addition of struts or a slab
- Increased allowances due to increased land values
- Mitigation of impacts to fisheries and environment

Thank You

If you have any feedback on this project please fill out a comment card

We appreciate your attendance, comments and feedback