January 27th, 2010 Project Number: 108536

Susan Murphy
Project Manager, Mattamy Homes
123 Huntmar Drive
Ottawa, ON K2S 1B9

Dear Susan:

Re: Mattamy Homes Richmond – Channelization/ Berm Modifications Analysis, North of Perth Street

We are please to provide the following preliminary assessment of Van Gaal Drain channelization upstream of Perth Street and its impact on the effect of the berms on flood levels in the Van Gaal Drain upstream of Perth Street as discussed at the January 14, 2010 meeting with Rideau Valley Conservation Authority and City of Ottawa staff.

Should you have any questions, please contact me.

AECOM Canada Ltd.

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Introduction:

A berm has been constructed on the Arbuckle lands, as illustrated in **Figures 1 and 2**, with 30m offsets from the Van Gaal Drain north of Perth Street following consultation with the RVCA. The RVCA has developed floodline mapping, as illustrated in **Figure 1**, based on the recent report prepared by J.F. Sabourin & Associates: *Floodplain Mapping Report for the Van Gaal and Arbuckle Municipal Drains in the Village of Richmond (November, 2009)*. The JFSA report and floodplain mapping does not acknowledge the berms north of Perth Street. AECOM had been retained by Mattamy Homes for water resources work associated with their Richmond development. AECOM was asked by Mattamy to assess the impact of the berm on flood levels (see letter report October 8th 2009) which was submitted to the RVCA. Our analysis concluded that the increase in flood level is confined to Mr. Arbuckle's property and would not be a concern to adjacent landowners.

Following the deferral by the RVCA Board on the matter of the Van Gaal Drain Flood Plain Mapping – Final Report, a meeting took place on January 14, 2010 with Mattamy Homes, their consultants, RVCA and City staff. The purpose of the meeting was to continue discussion on the hydrologic analysis that produced the Van Gaal Flood Plain Mapping and to consider further revisions to the flood plain mapping that may be warranted in view of the grading changes (berms) in the study area. At this meeting, the RVCA staff suggested a potential solution that would involve widening the cross-sectional area of the watercourse (below bank full level) north of Perth Street. This solution would return the water surface profile to its original "pre-berm" position by increasing the conveyance capacity.

Mattamy Homes concurred in principle with the solution offered by the RVCA and agreed that AECOM would undertake further preliminary assessment of this solution which is contained in this report.

Assessment:

To this end, the HEC-RAS model used in the floodline analysis was modified by developing an overbank "terrace" at selected cross sections where measurable water level difference were computed by the berms. These terraces were started at the top of the drain bank in order to avoid impacting fish habitat and were run for approximately 10m towards the berms to the west of the drain. Since the Spring runoff event appears to be dominant upstream of Perth Street, the HEC-RAS Spring geometry (with an overbank mannings "n" of 0.05 rather than 0.08 for Summer) was used to assess the impact of the proposed channelization works. The location of the berm and "terraces" are illustrated in cross-section in **Figure 3.**

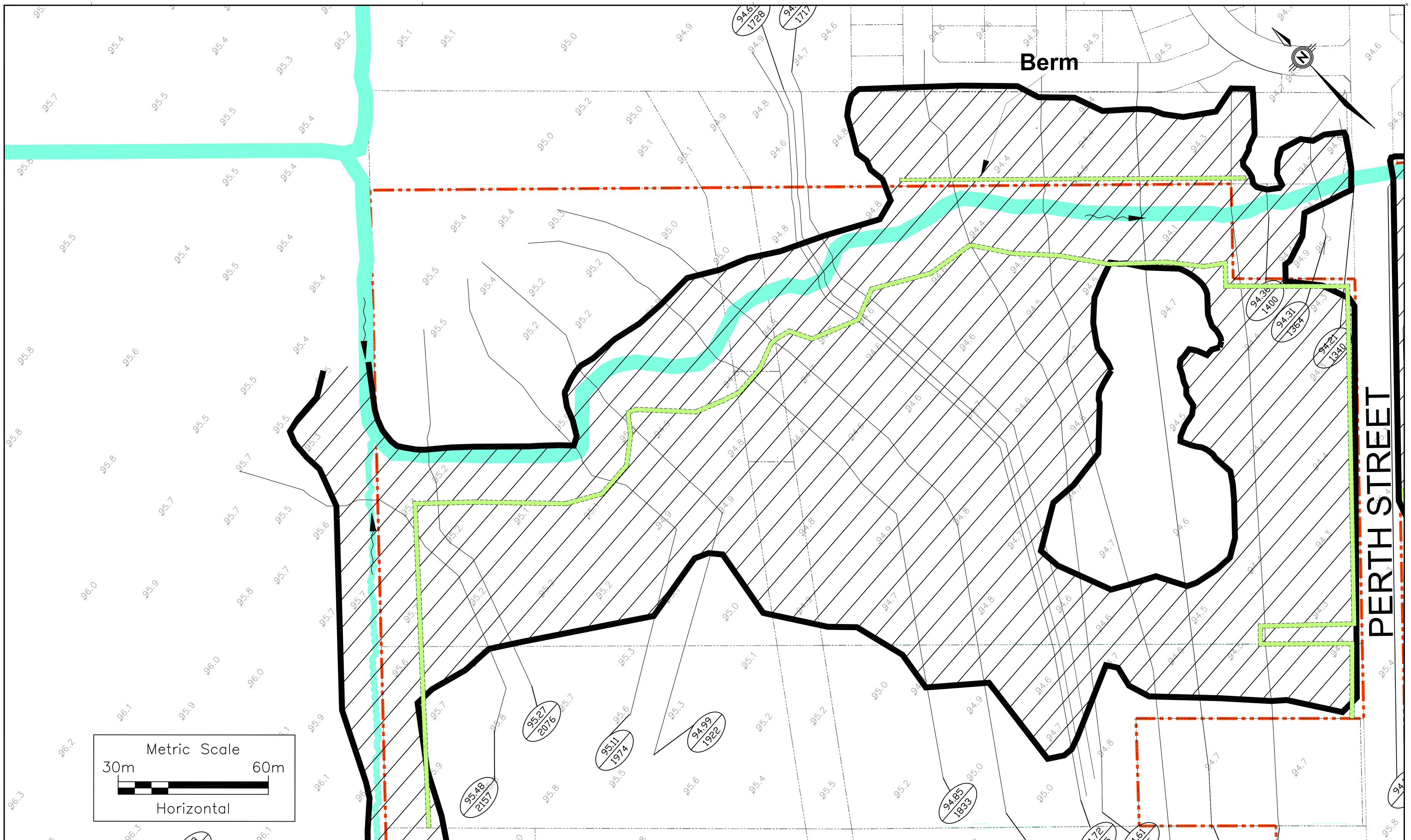
A comparison of the "RVCA floodline" and "the channelization/berm floodline" for 1:100 Year flood levels for Spring events is provided in **Table 1** and the resulting floodline (ultimate) from the channelization/berm works is illustrated in **Figure 2**. It can be seen that there is no increase in 1:100 Year Spring flood level for the Van Gaal Drain upstream of Perth Street.

Conclusion:

It is apparent that the proposed terracing to the west overbank of the Van Gaal Drain would maintain flood levels in the Van Gaal Drain at or below those estimated in the recent Van Gaal Drain Floodline Mapping Report (JFSA – 2009). The channelization/berm modifications would result in a new floodline as illustrated in **Figure 2**.

Report Prepared By:

Paul Frigon, P.Eng.
Senior Engineer, Water



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CLIENT: Mattamy Homes

DRAWN BY:	CHECKED BY:
CO	PF
DESIGNED BY:	APPROVED BY:
PF	
SCALE:	DATE:
NTS	28/01/10

PROJECT: Mattamy - Richmond

DRAWING: Figure 1: Van Gaal Drain Floodlines JFSA November 2009

PROJECT No. :

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PROJECT: Mattamy - Richmond

DRAWING: Figure 2: Van Gaal Drain Ultimate Floodlines With Berms & Channelisation

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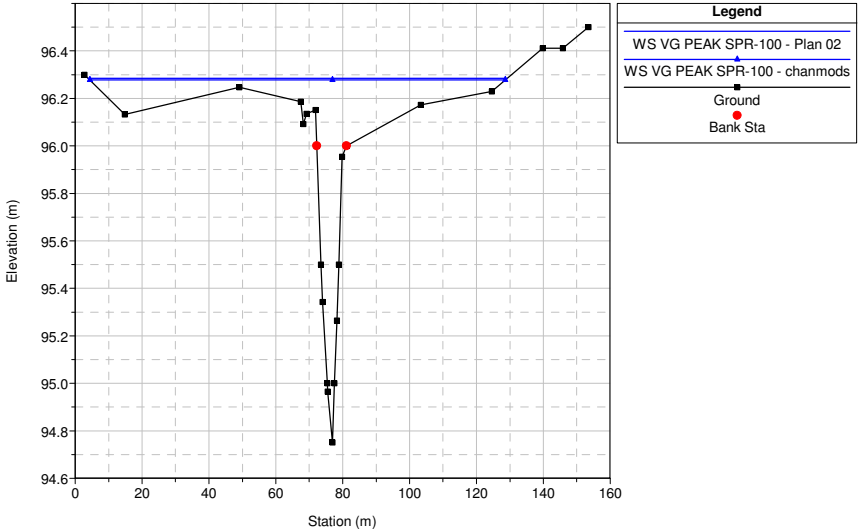

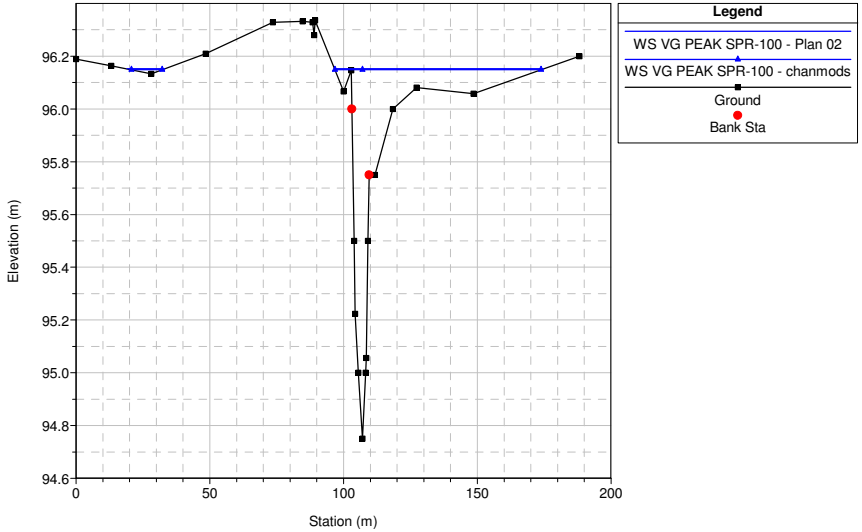

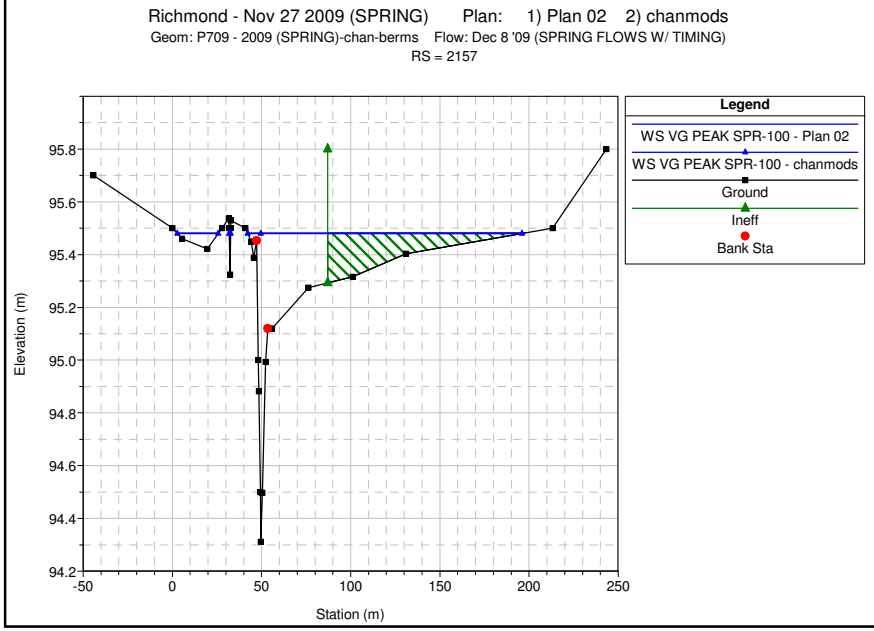

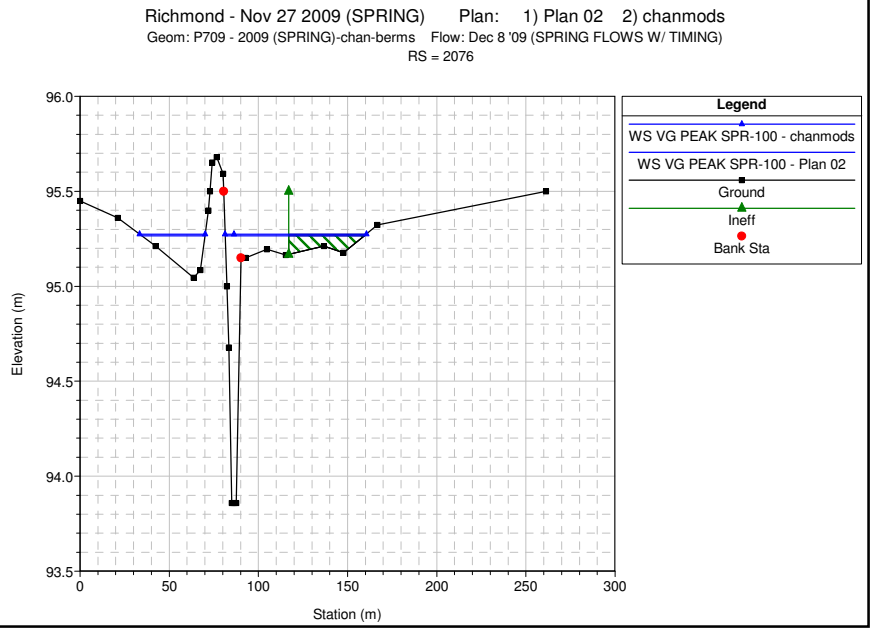

Figure 3a - Proposed Cross Sections

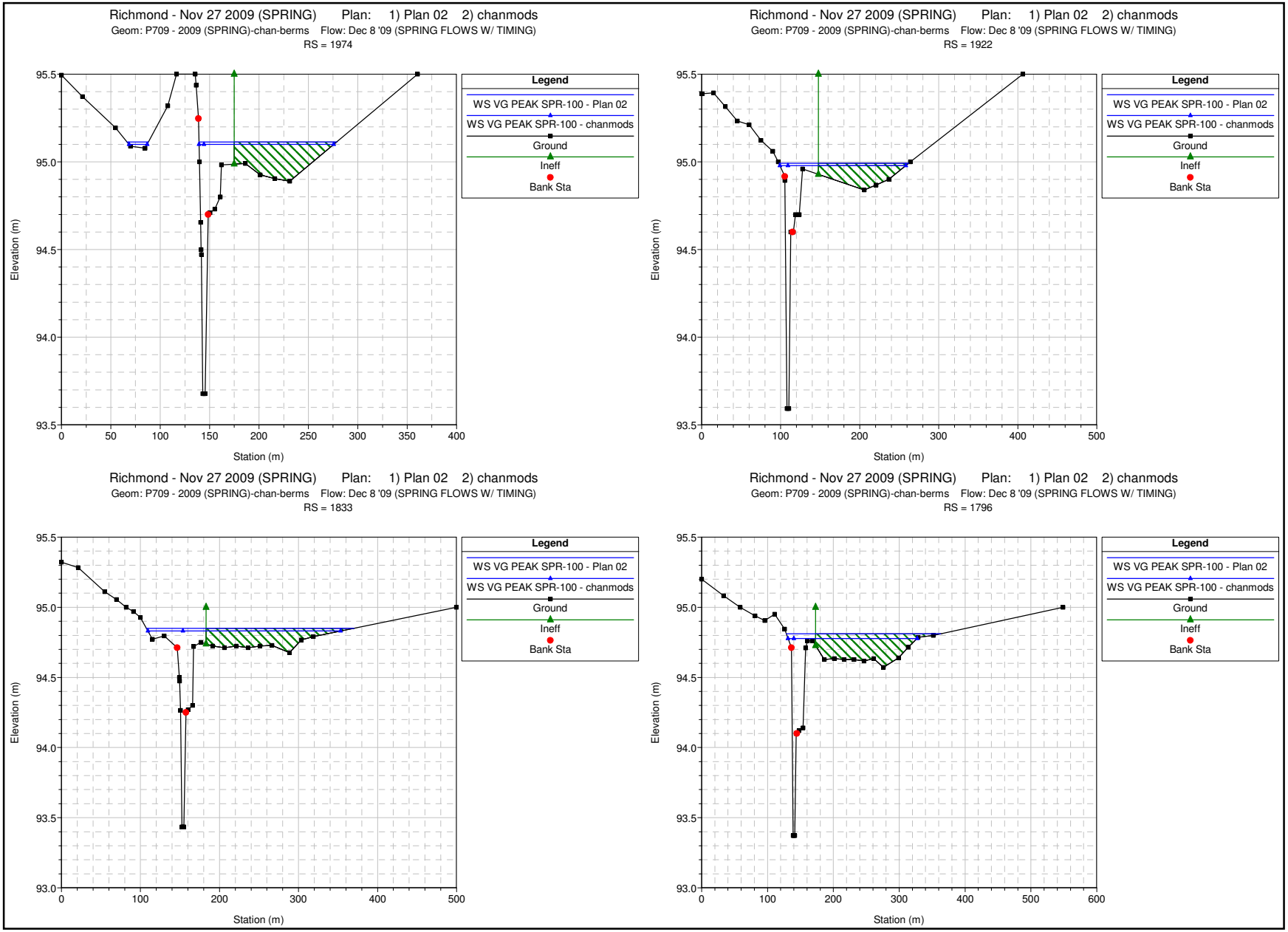

Figure 3b - Proposed Cross Sections

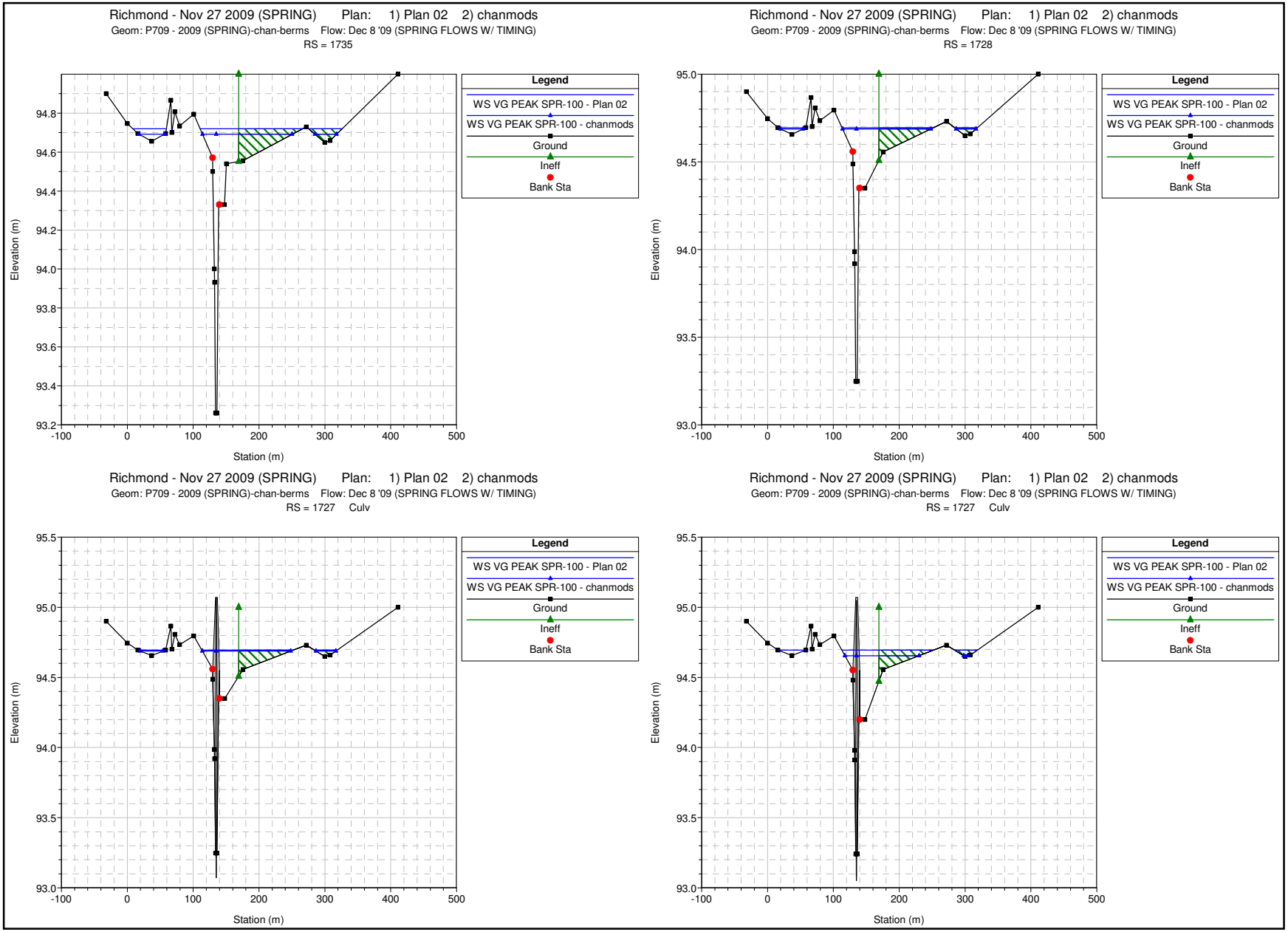

Figure 3c - Proposed Cross Sections

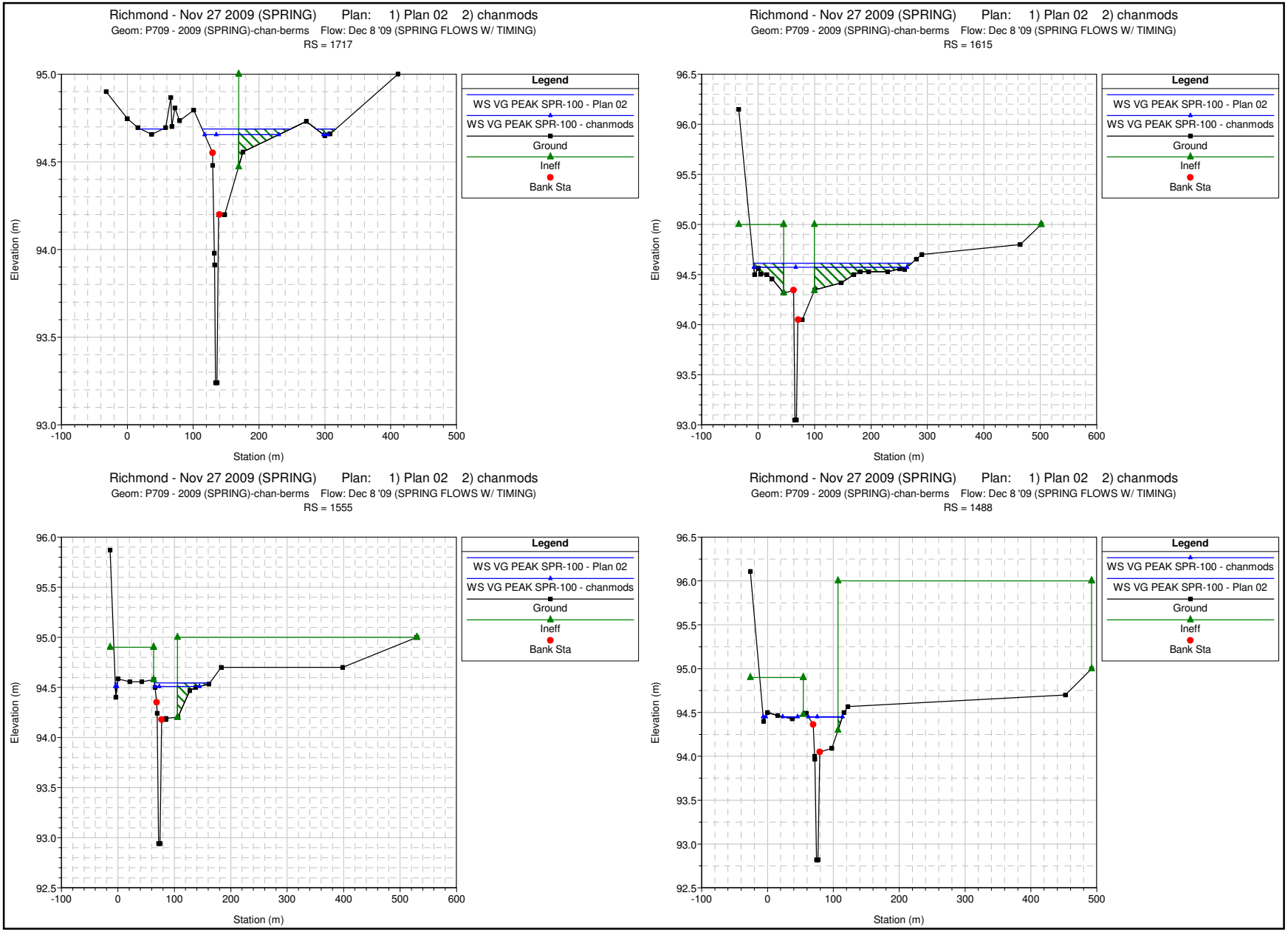

Figure 3d- Proposed Cross Sections

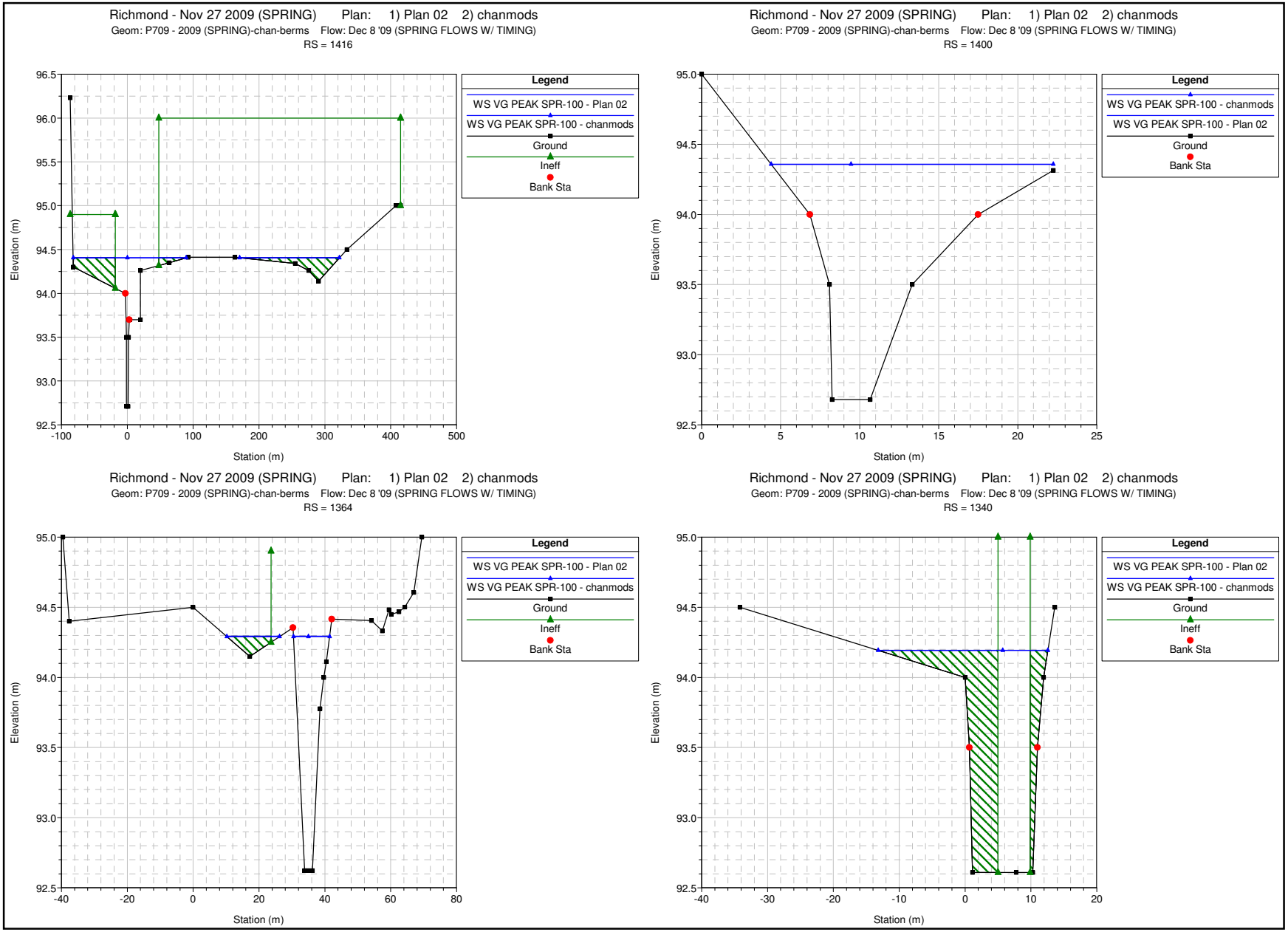

Figure 3e - Proposed Cross Sections

HEC-RAS River: Van Gaal Drain Reach: Reach 2 Profile: VG PEAK SPR-100

Reach	River Sta	Profile	Plan	Q Total	W.S. Elev	Vel Chnl	Flow Area	Top Width	Volume	Hydr Depth C
				(m3/s)	(m)	(m/s)	(m2)	(m)	(1000 m3)	(m)
Reach 2	2554	VG PEAK SPR-100	Plan 02	8.3	96.28	0.8	20	125	68	0.9
Reach 2	2554	VG PEAK SPR-100	chanmods	8.3	96.28	0.8	19	124	70	0.9
Reach 2	2478	VG PEAK SPR-100	Plan 02	8.3	96.15	1.1	13	92	67	1.0
Reach 2	2478	VG PEAK SPR-100	chanmods	8.3	96.15	1.1	13	88	68	1.0
Reach 2	2157	VG PEAK SPR-100	Plan 02	8.3	95.48	1.0	22	180	61	0.6
Reach 2	2157	VG PEAK SPR-100	chanmods	8.3	95.48	1.1	14	178	63	0.6
Reach 2	2076	VG PEAK SPR-100	Plan 02	10.8	95.27	1.2	17	113	60	0.9
Reach 2	2076	VG PEAK SPR-100	chanmods	10.8	95.27	1.2	15	116	61	0.9
Reach 2	1974	VG PEAK SPR-100	Plan 02	10.8	95.11	0.9	26	160	58	0.9
Reach 2	1974	VG PEAK SPR-100	chanmods	10.8	95.10	1.1	15	155	59	0.9
Reach 2	1922	VG PEAK SPR-100	Plan 02	10.8	94.99	1.2	18	147	57	0.8
Reach 2	1922	VG PEAK SPR-100	chanmods	10.8	94.98	1.2	12	159	58	0.8
Reach 2	1833	VG PEAK SPR-100	Plan 02	10.8	94.85	0.9	32	259	54	0.8
Reach 2	1833	VG PEAK SPR-100	chanmods	10.8	94.83	1.0	18	244	55	0.8
Reach 2	1796	VG PEAK SPR-100	Plan 02	10.8	94.81	0.8	36	229	53	0.9
Reach 2	1796	VG PEAK SPR-100	chanmods	10.8	94.78	1.0	16	196	54	1.0
Reach 2	1735	VG PEAK SPR-100	Plan 02	10.8	94.72	1.0	25	259	51	0.8
Reach 2	1735	VG PEAK SPR-100	chanmods	10.8	94.69	1.0	17	207	52	0.8
Reach 2	1728	VG PEAK SPR-100	Plan 02	10.8	94.69	1.1	19	214	51	0.8
Reach 2	1728	VG PEAK SPR-100	chanmods	10.8	94.69	0.9	19	198	52	0.9
Reach 2	1727			Culvert						
Reach 2	1717	VG PEAK SPR-100	Plan 02	10.8	94.69	1.1	18	200	51	0.8
Reach 2	1717	VG PEAK SPR-100	chanmods	10.8	94.65	0.8	20	119	52	0.9
Reach 2	1615	VG PEAK SPR-100	Plan 02	10.8	94.61	0.6	48	280	47	1.0
Reach 2	1615	VG PEAK SPR-100	chanmods	10.8	94.57	0.7	25	271	48	1.1
Reach 2	1555	VG PEAK SPR-100	Plan 02	10.8	94.55	0.9	23	102	45	1.1
Reach 2	1555	VG PEAK SPR-100	chanmods	10.8	94.51	0.9	18	82	46	1.1
Reach 2	1488	VG PEAK SPR-100	Plan 02	10.8	94.45	1.0	14	69	44	1.0
Reach 2	1488	VG PEAK SPR-100	chanmods	10.8	94.45	0.8	20	78	45	1.0
Reach 2	1416	VG PEAK SPR-100	Plan 02	10.8	94.41	0.7	46	328	42	1.2
Reach 2	1416	VG PEAK SPR-100	chanmods	10.8	94.40	0.8	28	324	42	1.2
Reach 2	1400	VG PEAK SPR-100	Plan 02	10.8	94.36	1.0	12	18	42	1.0
Reach 2	1400	VG PEAK SPR-100	chanmods	10.8	94.36	1.0	12	18	42	1.0
Reach 2	1364	VG PEAK SPR-100	Plan 02	10.8	94.29	1.1	11	27	41	0.9
Reach 2	1364	VG PEAK SPR-100	chanmods	10.8	94.29	1.1	10	27	41	0.9
Reach 2	1340	VG PEAK SPR-100	Plan 02	11.6	94.19	1.5	8	26	41	1.6
Reach 2	1340	VG PEAK SPR-100	chanmods	11.6	94.19	1.5	8	26	41	1.6
Reach 2	1339			Culvert						
Reach 2	1312	VG PEAK SPR-100	Plan 02	12.2	94.12	1.5	8	13	40	1.6
Reach 2	1312	VG PEAK SPR-100	chanmods	12.2	94.12	1.5	8	13	40	1.6

Plan 02 = JFSA 2009

chanmods = ultimate with berms and channelisation

Table 1:

Summary Floodlines