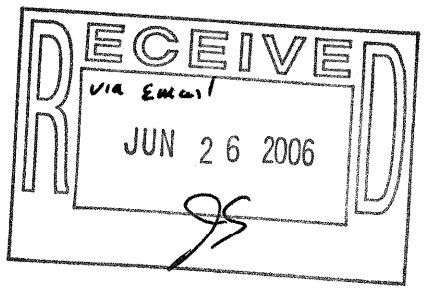
FAY, SPOFFORD & THORNDIKE, LLC
Engineers • Planners • Scientists

5 Burlington Woods
Burlington, MA 01803
Toll Free 800.835.8666
Tel 781.221.1000
Fax 781.229.1115
www.fstinc.com

June 23, 2006



Mr. Jay Szklut
Planning and Economic Development Manager
Town of Belmont
Zoning Board of Appeals
19 Moore Street
Belmont, MA 02478

Subject: The Residences at Acorn Park
Chapter 40B – Comprehensive Permit
Belmont, Massachusetts
Wastewater Management Systems Review

Dear Mr. Szklut:

The proposed development will periodically pump wastewater into Belmont's existing gravity system at a rate of approximately 90 –120 gallons per minute (gpm). The proposed force main will connect to the Town of Belmont's existing gravity sewer at the intersection of Garrison Road and Gilmore Road. Flow from Gilmore Road (8-inch) continues to Oliver Road (8-inch) and Brighton Street (15-inch) before discharging into Belmont's connection to the MWRA system on Flanders Road (36-inch).

Approximately 80% (60 miles) of Belmont's sewer system is tributary to the Flanders Road connection. The 15-inch connection on Brighton Street is located at the furthest downstream point in the system. Brighton Street and other low-lying areas in this vicinity have a history of surcharge and flooding problems during large storm events.

To analyze the impact of introducing additional flow, FST constructed a computer model of the existing gravity sewer sub-system tributary to the Brighton Street connection. A flow monitor was installed in the15-inch sewer at the intersection of Brighton Street and Hill Road during the period from 4/12/06 to 5/09/06. The flow monitoring data was used to develop baseline sanitary and infiltration flows specific the Brighton Street sub-system. As no large storm events occurred during the period while the meter was installed, data obtained from the MWRA for May 2006 was used to simulate conditions during a large storm event.

Analysis

Figure 1 illustrates the predicted peak flow hydraulic profile of the Brighton Street sub-system during normal conditions (April 2006) with the addition of the proposed flow. In Figure 1, the pink lines represent the physical boundaries of the sewer pipeline (i.e. invert and crown) and the blue area represents the level of flow. As can be seen from Figure 1, the predicted hydraulic gradeline (blue) is maintained safely within the pipeline (pink). Therefore, during normal conditions the existing gravity sewer system has sufficient capacity to accept additional flow from the proposed development.

Figure 2 illustrates the predicted hydraulic profile of the Brighton Street sub-system during a storm event condition (May 2006). As can be seen from Figure 2, the predicted hydraulic gradeline (blue) extends above the pipeline (pink). Therefore, during a storm event the existing gravity sewer system experiences surcharged conditions and does not have available capacity to accept additional flow from the proposed development.

Conclusions and Recommendations

The Town of Belmont's existing gravity sewer system experiences surcharge conditions during large storm events. The Brighton Street sewer sub-system has sufficient capacity to receive additional flows during normal conditions. However, the receipt of additional flows during large storm events will further exacerbate existing surcharge conditions.

FST recommends that the Town and developer negotiate an acceptable infiltration/inflow (I/I) removal program to help offset the proposed peak flows added to the system (e.g. X gallons removed for each 1 gallon average daily flow contributed). This type of arrangement has precedence in Belmont and many other MWRA member communities. On recent projects in which FST has been involved, the removal ratio has ranged from 4:1 to 10:1. FST estimates the cost to effectively remove I/I to be $1.50 per gallon. The developer's I/I contribution is calculated by multiplying the removal ratio gallons by the cost per gallon to remove.

Example:

Proposed Average Daily Flow:	50,000 gal
I/I Removal Ratio:	5 : 1
I/I Removal Cost:	$1.50/gal

Contribution = 50,000 x 5 x $1.50 = $375,000

Please feel free to contact me by email at jgould@fstinc.com or by telephone call to 781-221-1083, should you desire additional information or wish to discuss any aspect of this letter.

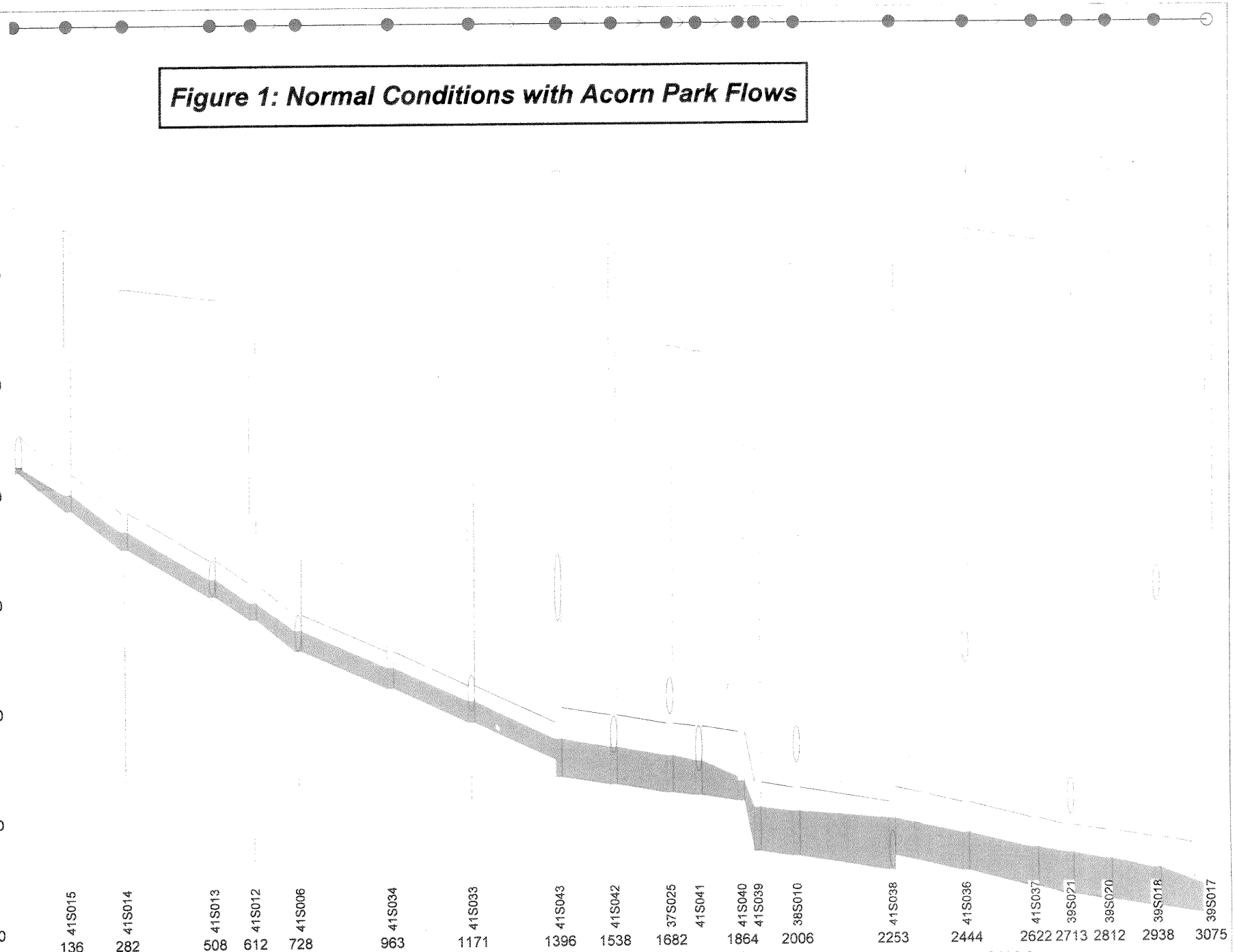
Very truly yours,
FAY, SPOFFORD & THORNDIKE, LLC.
By

Justin D. Gould, P.E.
Principal Engineer

Cc: (via email)
Mr. David Albrecht / Rizzo Associates

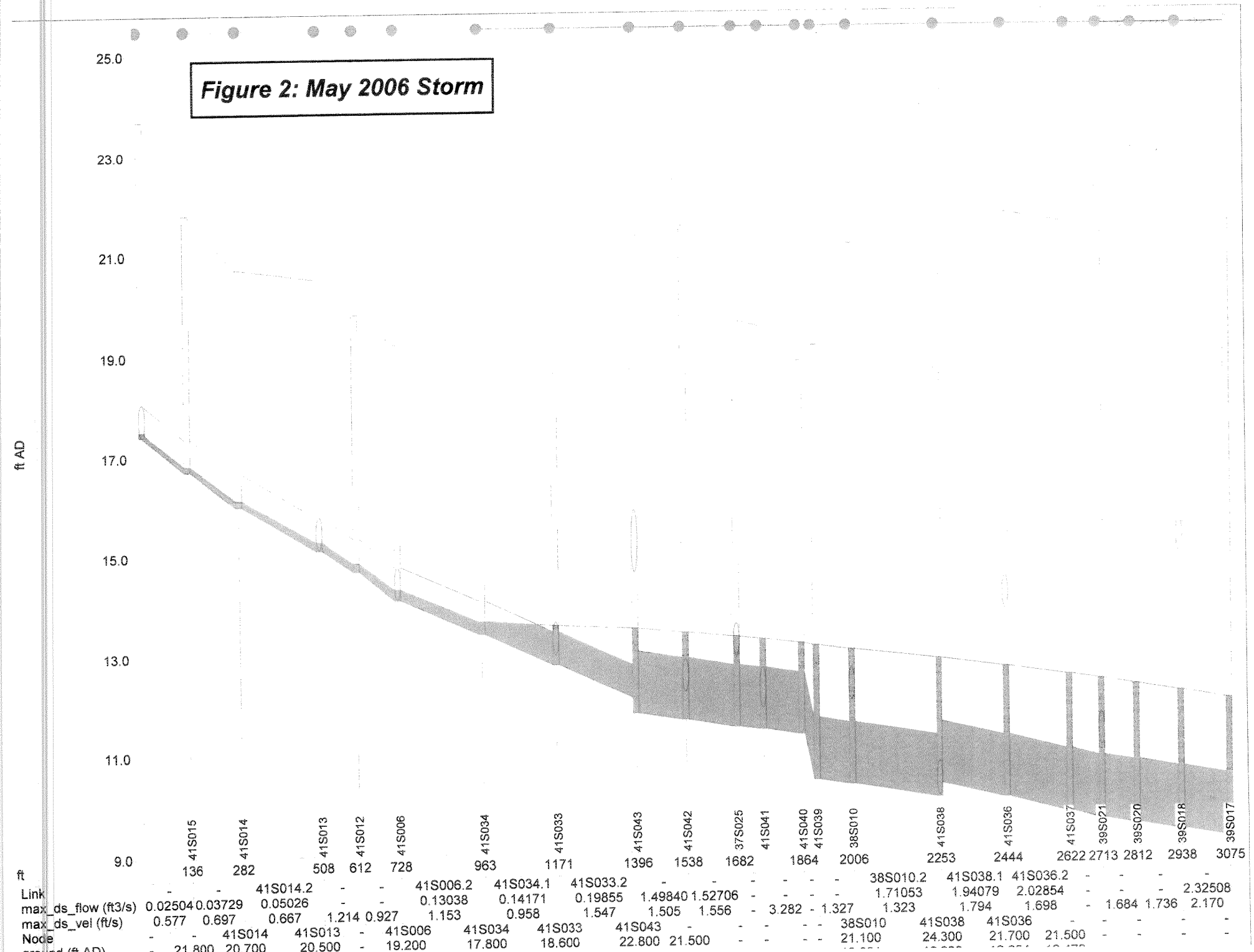
S:\JB-171B -BELMONT UPLANDS\B - WASTEWATER\062306_LETTER.DOC

Figure 1: Normal Conditions with Acorn Park Flows



ft																															
Link	-	-	41S014.2	-	-	41S006.2	41S034.1	41S033.2	-	-	-	-	-	-	38S010.2	41S038.1	41S036.2	-	-	-	-										
max_ds_flow (ft3/s)	0.01207	0.28449	0.29115	-	-	0.33018	0.34004	0.36666	1.07766	1.09385	-	-	-	-	1.19884	1.25429	1.27741	-	-	-	1.36376										
max_ds_vel (ft/s)	0.082	1.763	1.786	1.985	1.609	1.658	1.619	2.557	1.594	1.628	-	3.161	-	1.407	1.209	1.857	1.783	-	1.761	1.906	3.146										
Node	-	-	41S014	41S013	-	41S006	41S034	41S033	41S043	-	-	-	-	-	38S010	41S038	41S036	-	-	-	-										
ground (ft AD)	-	21.800	20.700	20.500	-	19.200	17.800	18.600	22.800	21.500	-	-	-	-	21.100	24.300	21.700	21.500	-	-	-										
	41S015	41S014	41S013	41S012	41S006	41S034	41S033	41S043	41S042	37S025	41S041	41S040	41S039	38S010	41S038	41S036	41S037	39S021	39S020	39S018	39S017										
	136	282	508	612	728	963	1171	1396	1538	1682	1864	2006	2253	2444	2622	2713	2812	2938	3075												

Figure 2: May 2006 Storm



ft																													
			136	282		508	612	728		963		1171		1396	1538	1682		1864	2006		2253	2444	2622	2713	2812	2938	3075		
Link	-	-		41S014.2	-	-		41S006.2		41S034.1		41S033.2	-	-	-	-	-	-	38S010.2		41S038.1	41S036.2	-	-	-	-			
max_ds_flow (ft3/s)	0.02504	0.03729		0.05026	-	-		0.13038		0.14171		0.19855	1.49840	1.52706	-	-	-	-	1.71053		1.94079	2.02854	-	-	-	-		2.32508	
max_ds_vel (ft/s)	0.577	0.697		0.667	1.214	0.927		1.153		0.958		1.547	1.505	1.556	-	3.282	-	1.327	1.323		1.794	1.698	-	1.684	1.736	2.170			
Node	-	-	41S014		41S013	-	41S006		41S034		41S033		41S043	-	-	-	-	-	38S010		41S038	41S036	-	-	-	-			
ground (ft AD)	---	21.800	20.700		20.500	-	19.200		17.800		18.600		22.800	21.500	-	-	-	-	21.100		24.300	21.700	21.500	-	-	-			