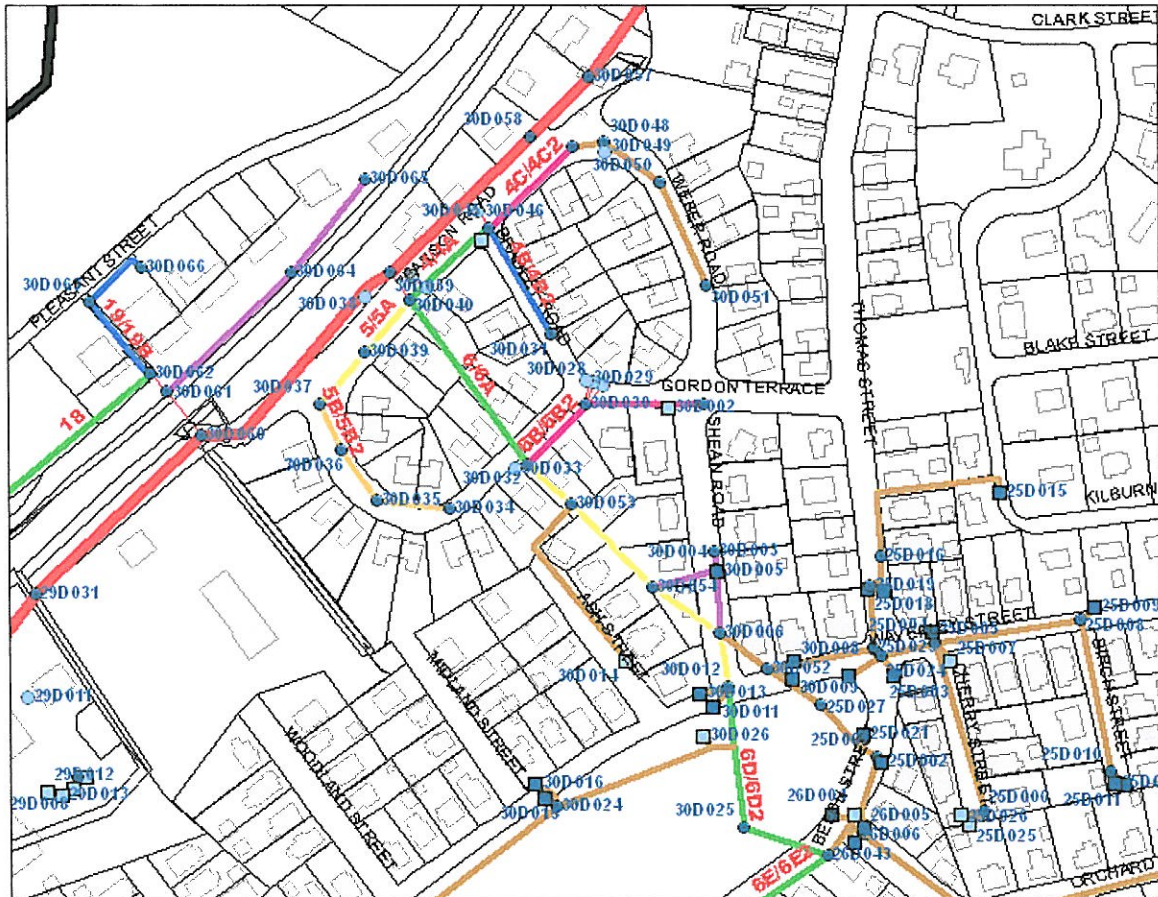


TOWN OF BELMONT, MASSACHUSETTS

Storm Water Sampling and Analysis Program Wellington Brook Tributary Area

AUGUST 2007



PREPARED BY:

FAY, SPOFFORD & THORNDIKE, LLC.
ENGINEERS • PLANNERS • SCIENTISTS
5 BURLINGTON WOODS
BURLINGTON, MASSACHUSETTS 01803



FAY, SPOFFORD &
THORNDIKE
5 Burlington Woods
Burlington, MA 01803
Toll Free: 800 835 8666
T: 781 221 1000
F: 781 229 1115
www.fstinc.com

August 7, 2007

Office of Community Development
Homer Municipal Building
19 Moore Street
Belmont, Massachusetts 02478

Attn: Mr. Glenn Clancy, Director

Subject: Belmont, Massachusetts
Storm Water Sampling and Analysis Program
Wellington Brook Tributary Area

Dear Mr. Clancy:

This report outlines Fay, Spofford & Thorndike's (FST) storm water sampling and analysis program in areas tributary to Wellington Brook. The purpose of the program was to identify sections of storm drain containing potential illicit connections (i.e. sources of contamination entering the storm water drainage system).

Study Area

The Wellington Brook runs northeasterly through Belmont, discharging into Clay Pit Pond. Clay Pit Pond discharges to Blair Pond and ultimately the Alewife Brook and Mystic River. Wellington Brook is culverted along most of its length with only a small day-lighted section from Common Street to the Belmont Public Library. The sampling program included all of Wellington Brook and the Clay Pit Pond discharge culvert to Brighton Street. Approximately 95,000 linear feet (18 miles) of storm drain, ranging in size from 12-inch diameter to a 10' x 4' box culvert, are included in the study area. This area was previously identified as Outfall No. 8 in the "Dry Weather Storm Water Discharge Sampling & Analysis Program" submitted to MADEP and USEPA in June 1999.

Dry Weather Sampling Methodology

Forty-five (45) storm drain connections were identified along the Wellington Brook. Two (2) sets of dry weather samples were collected at each connection (after at least 72 hours in which there was no precipitation and no snowmelt). Samples were analyzed for fecal coliform and all storm drain connections with at least one fecal coliform sample result above the threshold limit of 1000 colonies per 100ml were targeted for further investigation. Large target areas were delineated into smaller sub-areas and further dry weather sampling was conducted at the outlet of each sub-area. Areas that were dry (i.e. no sample collected) or with sample results below the threshold limit were eliminated from further investigation.

Sampling Results

A summary of sampling results is presented in Table 1 and illustrated in Figure 1. A total of 88 samples were taken at 74 locations throughout the Wellington Brook area. Locations with no access (e.g. buried manhole) or if access was unsuccessful (e.g. welded cover) are labeled as CNL (could not locate). These areas will require further investigation. Table 2 categorizes the ranges of fecal coliform sample results with the associated length of storm drain. A copy of the certified laboratory results for all samples is included in Appendix A.

TABLE 2

FECAL COLIFORM per 100mL	LENGTH (LF)
COULD NOT LOCATE	12,454
DRY	42,680
0 - 199	15,465
200 - 999	5,040
1,000 - 4,999	7,408
5,000 - 19,999	4,536
20,000 - 29,999	3,063
30,000 +	4,622

Review of Figure 1 shows one of the primary areas of concern is tributary to manhole 30D040 on Pearson Rd. (Samples 6/6A - 6I/6I2). This tributary area extends southeast to Slade St. and Brettwood Rd. All sample locations along this tributary line recorded at least one sample that exceeded 10,000 fecal colonies per 100mL.

Recommendations for Illicit Connection Identification

Phase 1 (2001/2002) and Phase 2 (2005) illicit connection investigations determined the combination of closed circuit televised (CCTV) inspection and simultaneous dye-water tracing, of both the sanitary sewer and storm drain in the target areas, to be the most effective method of identifying potential illicit connections. Therefore, it is recommended that this method be implemented in all areas exhibiting storm drain fecal coliform sample results above the threshold limit of 1000 colonies per 100ml.

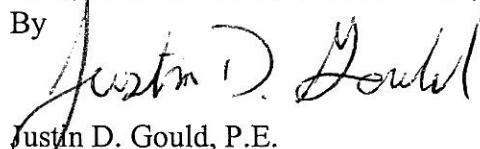
The total length of storm drain and adjacent sanitary sewer above 1000 fecal colonies per 100mL is approximately 19,600 ft and 17,500 ft, respectively (see Figure 2). The estimated cost to conduct cleaning and televised inspection of sanitary and storm drain sewers with concurrent dye testing of portions of the sanitary sewer pipelines and buildings as required to positively identify each illicit connection source and prepare a preliminary design report describing the recommended rehabilitation method and opinion of probable construction cost is **\$130,000**.

Should the Town elect to initially focus on a smaller target area, the total length of storm drain and adjacent sanitary sewer above 5000 fecal colonies per 100mL is approximately 12,200 ft and 11,300 ft, respectively (see Figure 3). The estimated cost to conduct cleaning and televised inspection of sanitary and storm drain sewers with concurrent dye testing of portions of the sanitary sewer pipelines and buildings as required to positively identify each illicit connection source and prepare a preliminary design report describing the recommended rehabilitation method and projected cost for each illicit connection is **\$82,000**.

It is anticipated that the recommended illicit connection identification work can be completed in approximately four months. We are available to meet with you to discuss the findings of this report at any time upon your request.

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

By


Justin D. Gould, P.E.
Principal Engineer

cc: Mr. Peter J. Castanino, Town of Belmont
Mr. Kevin Brander, MADEP
Mr. Ralph Jones, The Cadmus Group, Inc.

**BELMONT, MASSACHUSETTS
WELLINGTON BROOK - DRY WEATHER STORM WATER SAMPLING RESULTS**

TABLE 1

Manhole Number			Street	Sample # 1st/2nd	Fecal Coliform per 100 ml - Date Sampled									
Primary	Secondary	8/10/06			8/14/06	8/24/06	9/13/06	9/28/06	12/21/06	1/12/07	4/25/07	5/7/07	5/9/07	5/24/07
22D018		Hittinger St			CNL	CNL								
22D015		Baker St			DRY	DRY								
22D013		Baker St			DRY	DRY								
22D017		Easement			DRY	DRY								
22D057		Trowbridge St			SW	SW								
22D060		Underwood St			SW	SW								
36D003		Belmont High			DRY	DRY								
36D004		Belmont High			DRY	DRY								
36D037		Belmont High			DRY	DRY								
36D042		Concord Ave/ Belmont High			DRY	DRY								
23D042		Emerson St/ Concord Ave			CNL	CNL								
23D031		School St/ Orchard St	14/14A			>30000		5800						
	23D038	School St/ Orchard St	14B/14B2						4600			5700		
	23D038	School St/ Orchard St	14C/14C2						100			1300		
	23D014	School St/ Bow Rd	14D/14D2						2900			2500		
	23D014	School St/ Bow Rd	14E/14E2						1300			300		
23D045		Gooden St/ Concord Ave			DRY	DRY								
	23D028	Gooden St/ Orchard St	21/21B							100		<100		
	23D028	Gooden St/ Orchard St	22/22B							1100		100		
	24D040	Orchard St Bet. Gooden and Common	22C/22C2									<100	100	

**BELMONT, MASSACHUSETTS
WELLINGTON BROOK - DRY WEATHER STORM WATER SAMPLING RESULTS**

TABLE 1

Manhole Number		Street	Sample # 1st/2nd	Fecal Coliform per 100 ml - Date Sampled											
Primary	Secondary			8/10/06	8/14/06	8/24/06	9/13/06	9/28/06	12/21/06	1/12/07	4/25/07	5/7/07	5/9/07	5/24/07	6/27/07
	24D040	Orchard St Bet. Gooden and Common	22D/22D2									1200	DRY		
35D008		High School Athletic Field	15/15A			700	200								
31D007		Royal Rd/ Common St	3/3A	3480			5100								
31D007		Royal Rd/ Common St	2/2A	1280				600							
	57D030	Old Concord Rd/ Pleasant St	2B/2B2										100	100	
35D061		Leonard St/ Concord Ave	16/16A			400		200							
31D013		Royal Rd		DRY	DRY										
31D001		Royal Rd/ Clark St		CNL	CNL										
30D040		Pearson Rd	4/4A	1680		>30000									
	30D045	Pearson Rd/ Bradley Rd	4B/4B2						<100			<100			
	30D045	Pearson Rd from Weber Rd	4C/4C2									800	<100		
30D040		Pearson Rd	6/6A	>30000		>30000									
	30D032	Gorden Ter	6B/6B2						500				100		
	30D032	Gorden Ter	6C/6C2						23800				21000		
	30D012	Waverley St / Shean Rd	6D/6D2						>30000				26500		
	26D043	Beech St/ Bet. Orchard and Benjamin	6E/6E2						>30000		10400				
	17D047	Slade St/ Drew St	6F/6F2								1400	24100			
	17D047	Slade St/ Drew St	6G/6G2								4600	11400			

**BELMONT, MASSACHUSETTS
WELLINGTON BROOK - DRY WEATHER STORM WATER SAMPLING RESULTS**

TABLE 1

Manhole Number		Street	Sample # 1st/2nd	Fecal Coliform per 100 ml - Date Sampled											
Primary	Secondary			8/10/06	8/14/06	8/24/06	9/13/06	9/28/06	12/21/06	1/12/07	4/25/07	5/7/07	5/9/07	5/24/07	6/27/07
	17D009	Pierce Rd/ Brettwood Rd	6H/6H2											5900	13900
	17D009	Pierce Rd/ Brettwood Rd	6I/6I2											27600	1820
30D040		Pearson Rd	5/5A	27900		24500									
	30D037	Pearson Rd	5B/5B2						1100						
30D062		Pearson St	18/18A			DRY	>30000					<100			
	29D035	Pleasant St behind of Subaru	18B/18B2							620		<100			
30D062		Pleasant St near Subaru	19/19B							<20		<100			
26D019		Beech St		DRY	DRY										
29D021		Davis Rd		DRY	DRY										
27D060		Hawthorne St/ Irving St	8/8A		15900	24200									
	27D064	Hawthorne St/ Cambridge St	8B/8B2							<20		<100			
29D029		Waverley Ter		SW	SW										
27D057		C St		DRY	DRY										
29D032		B St		CNL	CNL										
29D030		Town Garage		DRY	DRY										
26D044		Leslie Rd		DRY	DRY										
26D025		Creeley Rd	9/9A		80		100								
14D012		Sabina Way		DRY	DRY										
14D061		Playground off Maple St	12/12A		3100		24400								
14D025		Bartlett Ave to Alma Ave	11/11A		5200		1300								
	13D015	Belmont St/Alma Ave	11B											12500	DRY
14D025		Bartlett Ave		DRY	DRY										
14D060		Bartlett Ave		CNL	CNL										
14D064		Trapelo Rd		CAPPED											

**BELMONT, MASSACHUSETTS
WELLINGTON BROOK - DRY WEATHER STORM WATER SAMPLING RESULTS**

TABLE 1

Manhole Number		Street	Sample # 1st/2nd	Fecal Coliform per 100 ml - Date Sampled											
Primary	Secondary			8/10/06	8/14/06	8/24/06	9/13/06	9/28/06	12/21/06	1/12/07	4/25/07	5/7/07	5/9/07	5/24/07	6/27/07
14D062		Trapelo Rd		DRY	DRY										
14D064		Trapelo Rd	10/10A		4300		8900								
	12D018	Trapelo Rd/ Bartlett Ave	10B/10/B2							340			400		
	12D085	Trapelo Rd/ Poplar St	10C/10C2							320	900				
	12D085	Trapelo Rd/ Poplar St	10D/10D2							1700	400				
14D003		Wilson Ave	17/17A				>30000	1950							
	12D075	Trapelo Rd Bet. Williston St and Poplar St	17B/17B2							80		<100			
14D068		Maple St/ Johnathan St	13/13A				17800								
14D068		Maple St		DRY	DRY										
	15D026	Chesnut St/ King St	20							SW	<100				
21D069		Bright Rd/ Concord Ave.	23/23B										<100	100	

SW = Standing Water

CNL = Could Not Locate MH or Drain

Primary Manhole Number = Initial Sample

Secondary Manhole Number = Follow-up Samples in Target Areas

APPENDIX A
CERTIFIED LABORATORY RESULTS

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: A102149
Client:
Attn: Justin Gould
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

Report Date: 8/11/06
Sample Taken At:

Belmont MA

Date Received: 8/10/06

CERTIFICATE OF ANALYSIS

Sample ID	Results Fecal Coliform per 100 ml
1. Sample #1	>30,000
2. Sample #2	1280
3. Sample #3	3480
4. Sample #4	1680
5. Sample #5	27,900
6. Sample #6	>30,000
11. Sample #6, DUP	>30,000

Detection Limit: <20
Method of Analysis: SM9222D

Massachusetts State Certified
Testing Laboratory #MA048


Michael P. Carlson, for
Thorstensen Laboratory, Inc.

RECEIVED,

AUG 15 '06

F.S.L.T.

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: A102211

Client:

Attn: Justin Gould

Fay, Spofford & Thorndike

5 Burlington Woods

Burlington, MA 01803

Date Received: 8/14/06

Report Date: 8/15/06

Sample Taken At:

Belmont MA

CERTIFICATE OF ANALYSIS

Sample ID	Results Fecal Coliform per 100 ml
1. Sample #7	380
2. Sample #8	15,900
3. Sample #9	80
4. Sample #10	4,300
5. Sample #11	5,200
6. Sample #12	3,100
7. Sample #13	28,900
8. Sample #13 DUP	29,700

Detection Limit: <20

Method of Analysis: SM9222D

Massachusetts State Certified
Testing Laboratory #MA048



Michael P. Carlson, for
Thorstensen Laboratory, Inc.

RECEIVED

AUG 17 '06

F.S.&T.

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: A102479
Client:
Attn: Justin Gould
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

Report Date: 8/28/06
Sample Taken At:

Belmont MA

Date Received: 8/14/06

CERTIFICATE OF ANALYSIS

Sample ID	Results Fecal Coliform per 100 ml
1. Sample #14	>30,000
2. Sample #15	700
3. Sample #16	400
4. Sample #4A	>30,000
5. Sample #5A	24500
6. Sample #6A	>30,000
7. Sample #8A	24,200

Detection Limit: 100
Method of Analysis: SM9222D

Massachusetts State Certified
Testing Laboratory #MA048


Michael P. Carlson, for
Thorstensen Laboratory, Inc.

RECEIVED,

AUG 31 '06

F.S.&T.

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: A102868
Client:
Attn: Justin Gould
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

Report Date: 9/15/06
Sample Taken At:

Belmont MA

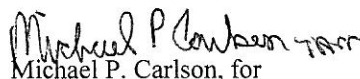
Date Received: 8/14/06

CERTIFICATE OF ANALYSIS

Sample ID	Results
	Fecal Coliform per 100 ml
1. Sample 9A	100
2. Sample 11A	1300
3. Sample 17	>30,000
4. Sample 10A	8900
5. Sample 12A	24,400
6. Sample 13A	17,800
7. Sample 3A	5100
8. Sample 18	>30,000
9. Sample 15A	200
10. Sample 15A, DUP	200

Method of Analysis: SM9222D

Massachusetts State Certified
Testing Laboratory #MA048


Michael P. Carlson, for
Thorstensen Laboratory, Inc.

RECEIVED,

SEP 18 '06

F.S.&T.

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: A103207
Client:
Attn: Justin Gould
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

Report Date: 9/29/06
Sample Taken At:

Belmont MA

Date Received: 8/14/06

CERTIFICATE OF ANALYSIS

Sample ID	Results Fecal Coliform per 100 ml
1. Sample 14A	5800
2. Sample 16A	200
3. Sample 2A	600
4. Sample 17A	1900
5. Sample 17A DUP	2000
Detection Limit	100

Method of Analysis: SM9222D

Massachusetts State Certified
Testing Laboratory #MA048


Michael P. Carlson, for
Thorstensen Laboratory, Inc.

RECEIVED

OCT 03 '06

F.S.&T.

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: 104701
Client:

Report Date: 12/26/06
Sample Taken At:

Attn: Justin Gould
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

Sample Taken By: Client

On: 12/21/06

CERTIFICATE OF ANALYSIS

<u>Test Parameter</u>	<u>Results</u>
	Fecal Coliform per100ml
14C	100
14B	4600
14E	1300
14D	2900
4B	<100
5B	1100
6B	500
6C	23800
6D	>30000
6E	>30000
6E Dup	>30000

Detection limit : 100 per 100ml

Method of Analysis: SM 9222D

Massachusetts State Certified
Testing Laboratory #MA048


Michael P. Carlson, for
Thorstensen Laboratory, Inc.

RECEIVED, AM

DEC 29 '06

F.S.&T.

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: 104999

Report Date: 1/16/07

Client:

Sample Taken At:

Attn: Justin Gould
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

JB209
Belmont MA

Sample Taken By: Client

On: 1/12/07

CERTIFICATE OF ANALYSIS

Test Parameter

Results

Fecal Coliform
per100ml

19	<20
18B	620
8B	<20
17B	80
10B	340
10C	320
10D	1700
10D Dup	1760
Blank	0

Detection limit : 100 per 100ml

Method of Analysis: SM 9222D

Massachusetts State Certified
Testing Laboratory #MA048



Michael P. Carlson, for
Thorstensen Laboratory, Inc.

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: 106461
Client:

Report Date: 4/26/07
Sample Taken At:

Attn: Justin Gould
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

Belmont MA

Sample Taken By: Client

On: 4/25/07

RECEIVED,

APR 30 '07

FBI

CERTIFICATE OF ANALYSIS

Test Parameter

Results

Fecal Coliform
per 100ml

20	<100
10C2	900
10D2	400
6F	1,400
6G	4,600
6E2	10,400
21	100
22	1,100
22 DUP	1,000
Blank	0

Detection limit : 100 per 100ml

Method of Analysis: SM 9222D

Massachusetts State Certified
Testing Laboratory #MA048



Michael P. Carlson, for
Thorstensen Laboratory, Inc.

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: 106615
Client:

Report Date: 5/15/07
Sample Taken At:

Attn: Justin Gould
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

Belmont MA

Sample Taken By: Client

On: 5/07/07

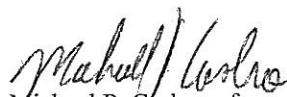
CERTIFICATE OF ANALYSIS

<u>Test Parameter</u>	<u>Results</u>
	Fecal Coliform per100ml
22B	100
21B	<100
22C	<100
22D	1,200
18B2	<100
19B	<100
5B2	<100
8B2	<100
4B2	<100
4C	800
4C DUP	900
17B2	<100
6G2	11,400
6F2	24,100
6F2 DUP	25,300
Blank	0

Detection limit : 100 per 100ml

Method of Analysis: SM 9222D

Massachusetts State Certified
Testing Laboratory #MA048


Michael P. Carlson, for
Thorstensen Laboratory, Inc.

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: 106663
Client:

Report Date: 5/11/07
Sample Taken At:

Attn: Justin Gould
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

Belmont MA

Sample Taken By: Client

On: 5/09/07

CERTIFICATE OF ANALYSIS

Test Parameter

Results

Fecal Coliform
per 100ml

14D2	2,500
1400 14E2	300
14B2	5,700
14C2	1,300
6D2	26,500
6B2	100
6C2	21,000
22C2	100
10B2	400
4C2	<100
4C2 DUP	<100
2B	100
23	<100
Blank	0

Detection limit : 100 per 100ml

Method of Analysis: SM 9222D

Massachusetts State Certified
Testing Laboratory #MA048


Michael P. Carlson, for
Thorstensen Laboratory, Inc.

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: 106950
Client:

Report Date: 5/25/07
Sample Taken At:

Attn: Justin Gould
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

JB-199A
Belmont MA

Sample Taken By: Client

On: 5/24/07

CERTIFICATE OF ANALYSIS

Test Parameter

Results

Fecal Coliform
per 100ml

6I	27,600
6H	5,900
23B	<100
2B2	<100
11B	12,500
11B DUP	12,900

RECEIVED, AMF

MAY 30 '07

F.S.&T.

Blank

0

Detection limit : 100 per 100ml

Method of Analysis: SM 9222D

Massachusetts State Certified
Testing Laboratory #MA048



Michael P. Carlson, for
Thorstensen Laboratory, Inc.

Thorstensen Laboratory, Inc.

66 LITTLETON ROAD, WESTFORD, MA 01886

(978) 692-8395 FAX (978) 692-0023 1-800-649-TEST

Report Number: 107626
Client:

Report Date: 6/29/07
Sample Taken At:

Attn: Justin Gould
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

JB-209
Belmont MA

JUL 02 '07

F.A.T.

Sample Taken By: Client

On: 6/27/07

CERTIFICATE OF ANALYSIS

Test Parameter

Results

Fecal Coliform
per100ml

6H2	13,900
6I2	1,820
6I2 DUP	1,780

Blank 0

Detection limit : 100 per 100ml

Method of Analysis: SM 9222D

Massachusetts State Certified
Testing Laboratory #MA048



Michael P. Carlson, for
Thorstensen Laboratory, Inc.