Weston & Sampson Engineers, Inc.
100 Foxborough Blvd. Suite 250
Foxborough, Massachusetts 02035
www.westonandsampson.com
Tel: (508) 698-3034 Fax: (508) 698-0843

Innovative Solutions since 1899

MEMORANDUM

TO: Stephanie Pelkowsky

FROM: Cheri Ruane

DATE: June 16, 2011

SUBJECT: Farlow Park Pond Executive Summary

This memorandum serves to summarize the progress to date on the Farlow Park Pond Restoration Project. Weston & Sampson was hired by the City of Newton to perform a safety and feasibility study on the restoration of the original pond feature at the park. These findings are outlined below. Based on the data gathered in the course of the last year and extensive precedent studies conducted at similar water features in public parks, near schools and playgrounds intended for young children, we have determined that the restoration of the Farlow Park Pond does not pose undue safety concerns. Further, we have established that through use of the existing well, water can be supplied to both the pond and the irrigation system for the adjacent ball field.

- The Safety Matrix (attached herein) shows that in general there were no safety concerns with open water ponds in public landscapes. Maintenance concerns were mostly related to geese and trash collection on the open water surface. Aeration and some water additives will mitigate mosquito concerns.

- An aeration device will be required to ensure movement of water to discourage stagnation, algae growth and mosquito breeding.

- The existing concrete pond shell was investigated through test pits and borings. Given the results, we have made general assumptions about the condition of the concrete and expect to find minimal to moderate repairs necessary to the existing concrete. An applied liner will be required but will not ensure 100% water tightness, which was deemed acceptable by the City.

- The perception of safety, specifically in regards to the abutting day care center, should be addressed with fencing at the property line, not around the pond. Outreach highlighting the educational benefits of the feature was encouraged.

- The existing well appears to have excellent water quality, although no specific water quality testing was performed, per the direction of the City. Yield was confirmed at 21 gpm with some higher levels given seasonal impacts and draw down times. The resulting report is attached herein.

- The existing irrigation system is one zone supported by the city water supply system. By transferring the source of water to the existing well, the system must be removed and reinstalled to include multiple zones that will make more efficient use of the well yield.

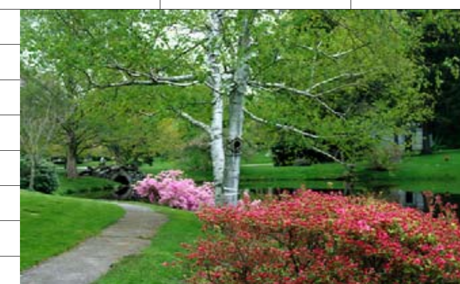
Weston & Sampson Engineers, Inc.
100 Foxborough Blvd. Suite 250
Foxborough, Massachusetts 02035
www.westonandsampson.com
Tel: (508) 698-3034 Fax: (508) 698-0843

- The final design (currently at 85% completion) will include water supply from the existing well, a variable frequency drive pump that will pull water from the well and direct it to source the pond (to refill from leakage or evaporation) or the irrigation system depending on time of day. A water level sensor will be installed in the pond to communicate to the pump when additional water is needed. An aerator will be located under the bridge to provide adequate water turnover and oxygenation to discourage algae growth that impacts water clarity and quality. These systems will be powered either from the mechanical room of the school or the closest pole on the street adjacent to the park. Finally, the pond will have an overflow / drain inlet that will allow the pond to be drained down seasonally and accommodate stormwater run-off from rain and snow melt. This drain will either make use of existing drain lines or require new lines to be installed in place of the existing.

- It has been acknowledged that this proposed feature cannot negatively impact park operations and maintenance staff who are already overtaxed. In response to this, the Friends of Farlow Park have verbally committed to organizing seasonal clean ups to remove leaf build up and debris that falls into the pond. In addition, they will manage any winter skating programming for the pond.

- Total construction costs have been estimated at $265,000 which includes the new irrigation system and a 10% construction contingency.

Comparable Water Feature	Location / Construction	Pond Area	Pond Depth	Circulation / Drainage System	Public Uses / Safety Concerns	Maintenance
NEWTON, MASSACHUSETTS						
Newton Cemetery	791 Walnut Street, Newton, MA	three ponds		All three ponds are connected via culvert and fed / drain via Cold Spring Brook	Used for ornamental viewing only, "DANGER - Thin Ice" signs posted in winter	manually cleaned by dragging rope across water surface to remove algae
	vinyl liner	23,000 sf	7'	Aerator fountain	No reported safety concerns or drownings	
	clay lined	16,000 sf	3-4'	No filtration system		
	clay lined	16,500 sf	3-4'			
		9,150 sf	2-3'			

Comparable Water Feature	Location / Construction	Pond Area	Pond Depth	Circulation / Drainage System	Public Uses / Safety Concerns	Maintenance
City Hall Pond	City Hall, Newton, MA	20,000 sf	2-3'	Hammond + Laundry Brook drain into area nearest to Homer Street	Plantings have obscured views, no programmed recreation	Requires dredging due to siltation, though nothing has been done for 18 years
	clay lined (?) under silt			No filtration system	No reported safety concerns or drownings	Fence was added to deter geese from City Hall lawn


Comparable Water Feature	Location / Construction	Pond Area	Pond Depth	Circulation / Drainage System	Public Uses / Safety Concerns	Maintenance
WORCESTER, MASSACHUSETTS						
General City Observations / Comments	Ornamental ponds are very popular and draw people into the park for viewing / picnicking				No reported safety concerns or drownings, "DANGER - Thin Ice" or "Skating at your own risk" signs posted in	Geese nesting + population control, algae treatment are biggest concerns
						Trash pick up is continuous
Vietnam Veterans Memorial Park	Greenhill Park, Worcester, MA	31,500 sf	4-5'	Spring fed, drain into larger pond		
				Aerator fountain has been used		
				No filtration system		




Crystal Pond	University Park, Worcester, MA	45,000 sf	4-6'	Fed by stormwater run-off		
				No filtration system		



Elm Park Pond	Elm Park, Worcester, MA	74,000 sf	4-6'	Spring fed		
				No filtration system		





Burncoat Park Pond	Burncoat Park, Worcester, MA	103,500 sf total	5-7' (small)	Fed by stormwater run-off		
			6-9' (large)	No filtration system		

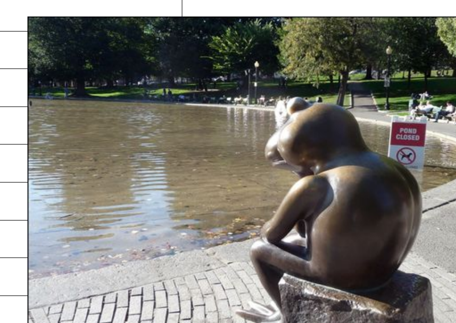


BOSTON, MASSACHUSETTS						
Public Garden Lagoon	Public Garden, Boston, MA	165,000 sf	2.5 - 4.5'	Drain at bottom / low end of pond to storm drainage system	Swan boats, informal ice skating	Swans imported to nest each year
				No filtration	"DANGER - Thin Ice" signs posted in winter	Lagoon must be dredged every Fall, takes four guys and a skid steer a full week to complete
					Minor infractions of drunken disorder reported	



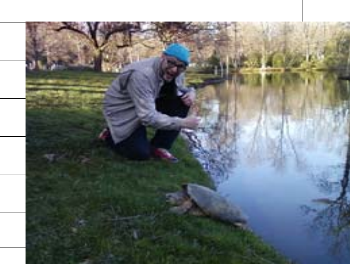

Frog Pond	Boston Common, Boston, MA		12 - 18"	Filled with potable water, drains to sewer system	Wading pool in summer is recirculated and chlorinated, lifeguards are present	Reflecting pool requires skimming and seasonal cleaning of leaves and debris
					Skating rink is refrigerated and ice is groomed.	
					Reflecting Pool in spring and fall	




Forest Hills Cemetery	Jamaica Plain, MA	11,570sf	approx 5' deep	Spring Fed/Rainwater, no recirc. System	Used for Lantern Festival in July, School group field trips	no algae abatement system, no safety complaints, fish eat mosquito larvae, Posted "NO SKATING"

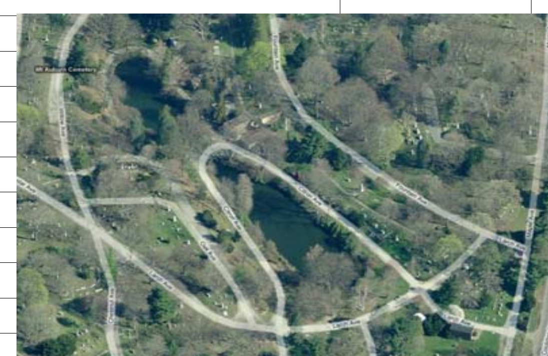


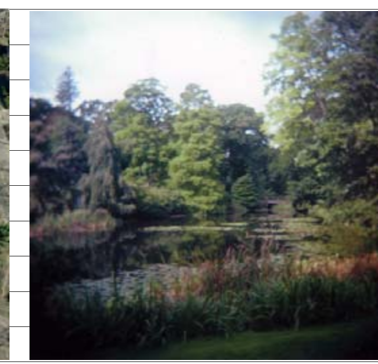



WATERTOWN, MASSACHUSETTS						
Pond @ Perkins School for the Blind	Watertown, MA	<1 acre	10' deep in center	filled with stormwater from roof leaders and rainwater/runoff, large fountain for recirc.	no reported safety concerns, mosquitoes less of a concern with fountain, will be installing paddleboats and dock	Kids get in to vandalize pond, , would like to offer skating, Geese are an issue,

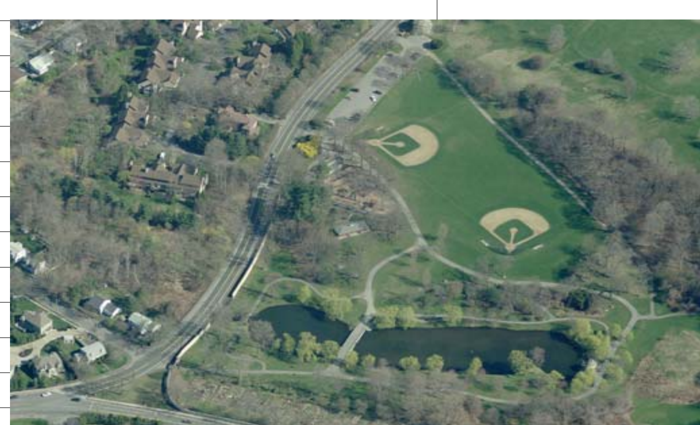



Mount Auburn Cemetery	Watertown, MA	60,165sf-round				




BROOKLINE MASSACHUSETTS						
Lars Anderson	Brookline, MA	70,5000 sf	4' deep	pond is filled with run off and rainwater, is a recirculation system,	no complaints about kids falling in, Don't have any reports of swimming, do allow skating	do use an algaecide, geese control of decoy coyotes, staff to maintain pond 1 person 1 day per week,




Weston & Sampson
Weston & Sampson
Five Centennial Drive
Peabody, Massachusetts 01960-7985
www.westonandsampson.com
Tel: (978)532-1900 Fax: (978)977-0100

Innovative Solutions since 1899

MEMORANDUM

TO: Stephanie Pelkowsky

FROM: Cheri Ruane, RLA, Team Leader

DATE: 3.23.10

SUBJECT: Farlow Park Field Investigation

On March 22, 2010 at 8:30 A.M., field investigation efforts within the confines of the former pond at Farlow Park commenced.. Weston & Sampson retained Sequoia Construction, a Whitman, Massachusetts site construction Company to assist with the excavation of test pits at the former pond. Sequoia Construction furnished an operator, laborer and a backhoe for this purpose. Project representatives agreed to excavate at five locations as illustrated on the diagram to the right.

Area 1 Findings:
Upon initial excavation, gravel and pieces of concrete debris were encountered at 18" depth. The concrete debris was assumed to be broken up pieces of the original pool bottom. Measurements and photographs were taken to record the conditions, a piece of the concrete debris was salvaged for further investigation. Subsequent excavations in other areas revealed that the original pool bottom was actually at a depth of 24" below existing grades. It was then assumed that the concrete debris discovered at the 18" depth was most probably fill that was placed at the time that the pond was removed. To confirm this assumption, Area 1 was re-excavated. Re-excavation confirmed an intact concrete pool bottom 24" below existing grades.

Area 1 debris findings

Area 1 initial excavation depth of 18"

Area 1 second excavation depth of 24" with concrete basin visible

Area 2 Findings:
The goal of the excavation in this location was to determine the interface between the former concrete pond bottom and the existing bridge footings. Excavation revealed a series of joints (one is marked below with a red arrow) between concrete edge segments at the corner of the bridge abutment. The profile of the pond basin at the bridge was an even slope from the top edge / coping (at finished grade) to the bottom of the pond which was 24" total depth.


Area 2 masonry footing and jointed basin material


Area 2 excavation location

Area 3 Findings:
This area is located next to the existing bridge, at the center line of the arch. Old plans show a drain outlet near this general vicinity and it was thought that the pond bottom might be deepest at this location to facilitate the draining of the former pond. However, excavations confirmed a 24" total depth from existing grade to the former pond bottom. The concrete pool bottom was consistent with previous findings and appeared to be completely intact with no cracking or spalling evident.


Area 3: typical fill characteristics of whole pond area

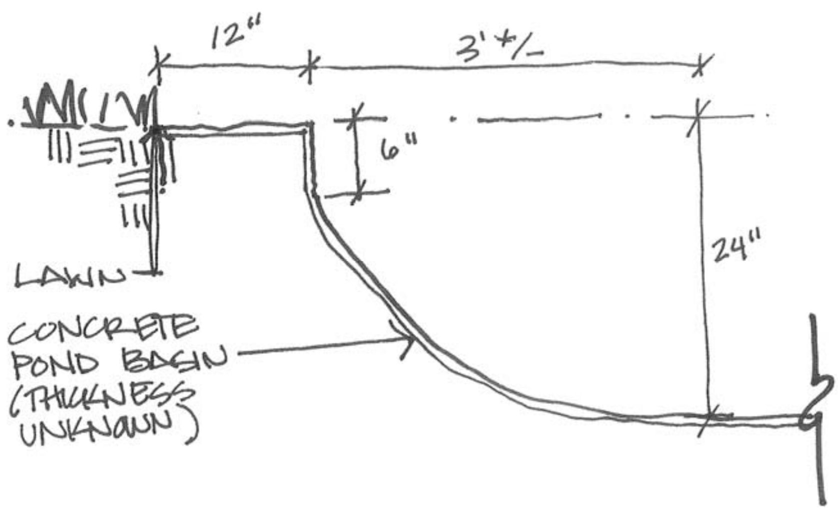

Area 3: intact concrete pond basin, 24" below existing grade

Area 4 Findings:
Area 4 was excavated in hopes of locating the drain outlet structure shown on old plans to confirm existence and condition. While no drain outlet was discovered, the full profile of the pond basin was revealed and measured. The sketch below illustrates the findings of a 6" vertical reveal of the former pond edge / coping, then a rounded sloping edge which transitions to a flat bottom 24" below existing grade.

Area 4: excavation of pond edge

Area 4: 6" vertical reveal of pond edge / coping

Area 4: sloped edge of former pond bottom



Sketch of pond basin profile, not to scale.

Area 5 Findings:
All findings in Area 5 were consistent with the conditions observed at the previous excavations. The bottom of the former concrete bottom was 24" down from finished grade, the characteristics of the fill included 12" of good loam then 12" of gravel and larger pieces of debris, and the pool bottom was concrete and fully intact with no cracking or visible spalling.

Area 5: 24" depth at center of the pond

Area 5: intact concrete pool basin 24" below existing grade

Conclusion

While we cannot be 100% certain that the entire former pond bottom is intact and water tight, it seems reasonable to estimate from our observations that it is likely a large percentage of the former concrete pool bottom is in very good condition. Given these facts, there is probably good potential for reuse of the former pond bottom through a program that might include the completion of limited concrete pond bottom repairs and/or installation of a supportive lining that would ensure water tightness as part of a pond restoration initiative.

Soil borings are recommended to establish thickness of the pond basin, presence of reinforcement (if any), and the characteristics of the soil materials beneath the concrete slab.

Weston & Sampson

Weston & Sampson Engineers, Inc.
100 Foxborough Blvd. Suite 250
Foxborough, Massachusetts 02035
www.westonandsampson.com
Tel: (508) 698-3034 Fax: (508) 698-0843

Innovative Solutions since 1899

MEMORANDUM

TO: Stephanie Pelkowsky

FROM: Cheri Ruane

DATE: May 12, 2010

SUBJECT: Farlow Park Review Meeting

Project members met on Tuesday April 13th in the Newton Parks & Recreation offices to discuss the Restoration of Farlow Park Pond. The following notes are intended to provide a summary of that meeting for project record:

- Cheri Ruane reviewed the Safety Matrix and reported that in general there were no safety concerns with open water ponds in public landscapes. Maintenance concerns were mostly related to geese and trash collection on the open water surface. Alice asked about mosquito concerns and any chemical requirements for management. Aeration and some water additives (varying in chemical make-up from aggressive to organic) will mitigate mosquito concerns.

- Most ponds that were researched used some form of aeration device to ensure movement of water to discourage stagnation, algae growth and mosquito breeding. W&S to research possible alternatives for the Farlow Pond application. Once an aeration approach is determined, mechanical, electrical and plumbing design can begin and construction, maintenance and operation costs will be estimated.

- The test pit results were also positive revealing an intact concrete shell in five locations and 24" of loam with some construction debris used as fill. It was agreed that additional due diligence was warranted to determine the depth of the slab and the quality of the concrete as well as the soil characteristics under the slab. This information will inform the proposed design approach. It was agreed that this work, while out of contract, would be performed in exchange for other scope items that may not longer be required based on these findings.

- The structural integrity of the bridge abutments is not currently known. Current project funding does not allow for a structural evaluation of the bridge at this time. It was noted that should work be required, the renovation of the pond may be an ideal time to address subsurface requirements or abutment improvements to prepare for the anticipated bridge renovation.

- Public acceptance of the project was also discussed. It was agreed by all present that the perception of safety, specifically in regards to the abutting day care center, should be addressed with fencing at the property line, not around the pond. Outreach highlighting the educational benefits of the feature was also discussed.

Weston&Sampson®

Weston & Sampson Engineers, Inc.
100 Foxborough Blvd. Suite 250
Foxborough, Massachusetts 02035
www.westonandsampson.com
Tel: (508) 698-3034 Fax: (508) 698-0843

Innovative Solutions since 1899

M E M O R A N D U M

TO: Cheri Ruane

FROM: Alyssa Rezendes

DATE: May 21, 2010

SUBJECT: Farlow Park Soil Borings

On April 30, 2010, two soil borings were performed by New Hampshire Boring (NHB) within the former pond at Farlow Park in Newton, MA. A representative from Weston & Sampson was onsite to observe the soil borings, as was Stephanie Pelkowsky, of the City of Newton. The picture to the right was taken at the first boring location and shows the equipment used. At both boring locations, no blows were conducted above the concrete pool bottom, so as not to compromise the condition of concrete. The hollow casing used by NHB was lowered to the top of the concrete pool bottom, at which point the stem was changed in order to get through the concrete. Once this was completed, blows were conducted, and samples were retrieved, to determine the soils beneath the concrete pool bottom.

As shown at the picture below, the former pond was bisected by a foot bridge that still remains. The first soil boring was conducted in what is considered "Area 5" in the memorandum dated 3.23.10 by Cheri Ruane, also shown to the right. The pond fill at this location is approximately 24 inches. The depth of the concrete pool bottom is 6 inches. No concrete core was obtained, as the sampler used by NHB crushed the concrete in to small pieces. Underlying the concrete pool bottom, from approximately 3 feet to 5 feet below ground surface, is medium dense gravel. Below this concrete layer, from approximately 5 feet to 7 feet below ground surface, there were two distinct loose soil layers in the 12 inches of soil recovered. The top 8 inches of the 12 inch recovery was fine sand with trace silt and trace coarse sand. The bottom 4 inches was organic silt.

Weston & Sampson Engineers, Inc.
100 Foxborough Blvd. Suite 250
Foxborough, Massachusetts 02035
www.westonandsampson.com
Tel: (508) 698-3034 Fax: (508) 698-0843

Innovative Solutions since 1899

The second soil boring was originally planned to be on the opposite side of the foot bridge - "Area 1" in the aforementioned memorandum. However, due to access issues with the NHB truck, it was decided by Stephanie Pelkowsky that a second boring be done in the same half of the former pond as the first boring. The second boring was centered on the foot bridge, as close as the NHB truck could get to the bridge, approximately "Area 3" in the picture above. Similarly, the pond fill is approximately 24 inches; however, the depth of the concrete pool bottom is approximately 8 inches at this location. A different sampler was used, in the hopes of obtaining a concrete core; however, due to the size of the aggregate, the concrete crumbled anyway. Below the concrete pool bottom, from a depth between 3 and 5 feet below ground surface, is light brown fine sand. From a depth of 5 feet to 7 feet below ground surface, is coarse sand, with trace fine sand and trace silt.

Weston & Sampson
100 Foxborough Blvd. Suite 250
Foxborough, Massachusetts 02035
www.westonandsampson.com
Tel: (508) 698-3034   Fax: (508) 698-0843

Innovative Solutions since 1899

MEMORANDUM

TO: Stephanie Pelkowsky

FROM: Cheri Ruane, RLA
Project Manager

DATE: 10.4.10
UPDATED 6.16.11

SUBJECT: Farlow Park Pond Engineering Summary

As you are all aware, we have been working with our selected group of engineers to design the restoration of Farlow Park Pond. We understand that in order for this project to be feasible, this feature cannot add to the maintenance burden or annual operational costs for the Parks Department. As a result we reviewed the potential of using the pond well to supply water for the irrigation of the playground and field area, currently sourced from the City water supply and funded by the School Department. The premise being that water costs for the School Department would drop from an estimated $5,000 / year to $0 with use of the well. In addition, the School Department would entertain the possibility of covering the costs of the electricity needs for the pump, aerator and irrigation system, which are estimated to be less than the current annual water bill.

The existing irrigation system was assessed. The current system requires 75gpm to operate and the entire system is on one zone. The well yield is estimated at 21-25 gpm per the attached report. In order to utilize the well to supply water for irrigation, a new system must be designed and installed with five or six zones. There is an $35k in construction costs associated with this improvement. Weston & Sampson will include a performance specification in the bid documents for an irrigation system that will meet these requirements.

In addition to Blake's comments below, Here are my findings and concerns as per our conference call and my site visit to Farlow Park on Thursday, September 30, 2010.

- Existing power within the Underwood School and at the utility pole on Church Street is single phase only (this will affect pump selection and specification)- *spec a single phase pump, 5hp was originally spec'd may need bigger size depending on need for irrigation system.*

- Need to confirm location of the new enclosure that will house the panel board (Keith recommended somewhere next to the bridge by the granite columns). Assume enclosure to be approx 36"Wx18"Dx48"H. We'll finalize when we confirm the equipment going in there.

Weston & Sampson
100 Foxborough Blvd. Suite 250
Foxborough, Massachusetts 02035
www.westonandsampson.com
Tel: (508) 698-3034   Fax: (508) 698-0843

Innovative Solutions since 1899

- If we feed electrical from Underwood, we need to confirm how we are getting from the basement electric room in Underwood to the new site enclosure. We'll be crossing the street/walking patch and the playing field you are planning to install the new irrigation system in.

- Need to confirm how the pump will "talk" to the multiple systems being installed (low water at the pond, new irrigation system) also, what will be needed to control each system (2 control panels) plus the raceway from point a to point b.

- Need to confirm routing of all the underground conduits - being sensitive to the existing walking paths, trees, root systems, benches, etc.

50 feet
20 m
© 2010 Microsoft Corporation

Five Centennial Drive
Peabody, MA 01960-7985
tel: 978-532-1900 fax: 978-977-0100
www.westonandsampson.com

planning, permitting, design, construction, operation, maintenance, design/build, & equipment

MEMORANDUM

DATE: June 13, 2011

TO: Ms. Stephanie Lapham
City of Newton

FROM: Blake Martin, Senior Associate

RE: Farlow Park Pond Well Test

This memorandum summarizes the evaluation of the Farlow Park bedrock well. The Park located in Newton, MA has a 400 foot deep bedrock well located next to the former Wading Pond (see site map, attached). The well was drilled in 2009 by Skillings and Sons of Amherst, NH. The well completion report indicates that air lift pumping at the time of the well completion produced a short term yield of 25 gpm.

A controlled pumping test was conducted on May 27th consisting of two different pumping rates. This type of test is considered a step rate pumping test and can provide an indication of well efficiency at varying rates and design requirements related to well yield. The pumping test data is provided in attachment B and graphically depicted in Figure 1. The first test was conducted at a rate of 7 gpm. With a static or non-pumping level of 21.05, final drawdown levels were 47.36 feet. The ratio of the pumping rate per foot of drawdown is known as the specific capacity. Calculated specific capacity at 7 gpm was 0.27 gpm/ft. A second step was conducted at 15 gpm and revealed 103.41 feet of drawdown. As anticipated, specific capacity values dropped with increased pumping rate. Calculated specific capacity at 15 gpm was 0.18 gpm/ft. Thus for every 7-8 gpm increase in pumping rate we would expect an additional 50% decline in specific capacity.

Well Yield

Well Yield is generally dependent on the ability of the fractured bedrock aquifer to pass water into the borehole and the overall recharge that the aquifer/well receives. Limitations in yield from well hydraulics can be developed using the specific capacities calculated from pumping test data. Table 1 indicates that calculated specific capacities range between 0.12 and 0.27 gpm. These values are based on both observed data and the extension of data for pumping rates between 7 and 15 gpm. By multiplying the specific capacity times the available water column estimated well yields range between 20.31 and 21.1 gpm.

Table 1: Well Specifications, Pumping Test Data & Results
Farlow Park, Newton MA

Farlow Park @ 7gpm					
Specifications			*Calculation Variables*		
Well Diameter	6	inches	Specific Capacity	0.27	gpm/ft
Well Depth	400	feet	Projected 180-Day Specific Capacity (S.C.)	0.12	gpm/ft
Pump Intake Depth	300	feet btc	Seasonal Flux*	5	feet
			Required Pumping Level Above Pump Intake	5	feet
			Available Drawdown (Theoretical Yield)	229.17	feet
Pumping Test Data			*Results*		
Static Water Level	21.05	feet	**Safe Yield**	**21.14**	**gpm**
Final Pumping Rate	7	gpm			
Pumping Water Level	47.36	feet			
Maximum Drawdown	26.31	feet			

Farlow Park @ 15gpm					
Specifications			*Calculation Variables*		
Well Diameter	6	inches	Specific Capacity	0.18	gpm/ft
Well Depth	400	feet	Projected 180-Day Specific Capacity (S.C.)	0.16	gpm/ft
Pump Intake Depth	300	feet btc	Seasonal Flux*	5	feet
			Required Pumping Level Above Pump Intake	5	feet
			Available Drawdown (Theoretical Yield)	173.98	feet
Pumping Test Data			*Results*		
Static Water Level	21.92	feet	**Safe Yield**	**20.30**	**gpm**
Final Pumping Rate	15	gpm			
Pumping Water Level	103.41	feet			
Maximum Drawdown	81.49	feet			

Recharge rates to the aquifer and well are much harder to predict in an urban environment due to the presence of impermeable surfaces and storm water conveyance systems. Both limit the ability for precipitation to recharge the aquifer. Recovery rates following each pumping step showed adequate but not robust recovery for the well. Without full recovery, it is prudent to apply a modest safety factor to the final pump design and anticipated long-term production capacity of the well.

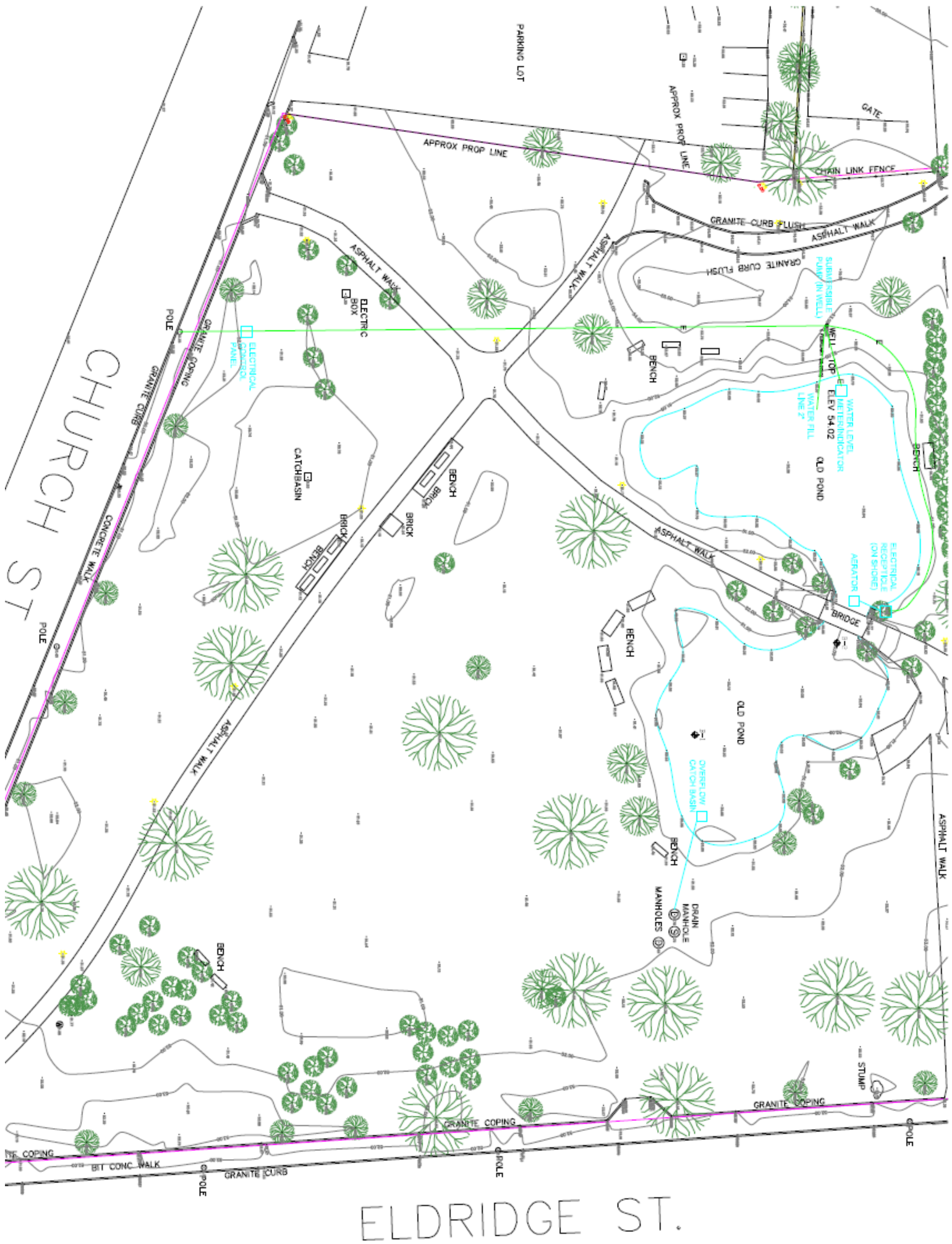
Conclusions

Based on the test data we would suggest the selection of a pump capable of producing a maximum of 25 gpm against the desired system pressures. Although long-term yield may be on the order of 20 gpm, short term yields of 25 gpm may be anticipated. The pump should be set at 350 feet to maximize well yield. At this depth, a motor shroud is recommended in the event that cascading occurs in the bore hole. The well pump should be controlled using a variable frequency drive (VFD) to allow automatic adjustments to the flow rate. This drive should be linked to a pressure transducer set within 5 feet of the pump. Based on water levels sensed by the pressure transducer, set points for the pumping rate can be programmed in the VFD to decrease flow rates as water levels decline. A final setting allowing the pump to shut off should water levels fall within 15 feet of the pump is recommended. This type of system is a common setup for irrigation systems and helps to protect against pump and motor burnout.

The above pumping arrangement can be linked to a pressure tank or placed directly into system use. Power requirements and availability should be evaluated to determine whether single phase or 3 phase power is available. Long-term operating costs are generally lower with 3 phase power and the use of a 240 volt or 480 volt pumping system.

If you have any questions do not hesitate to contact us.

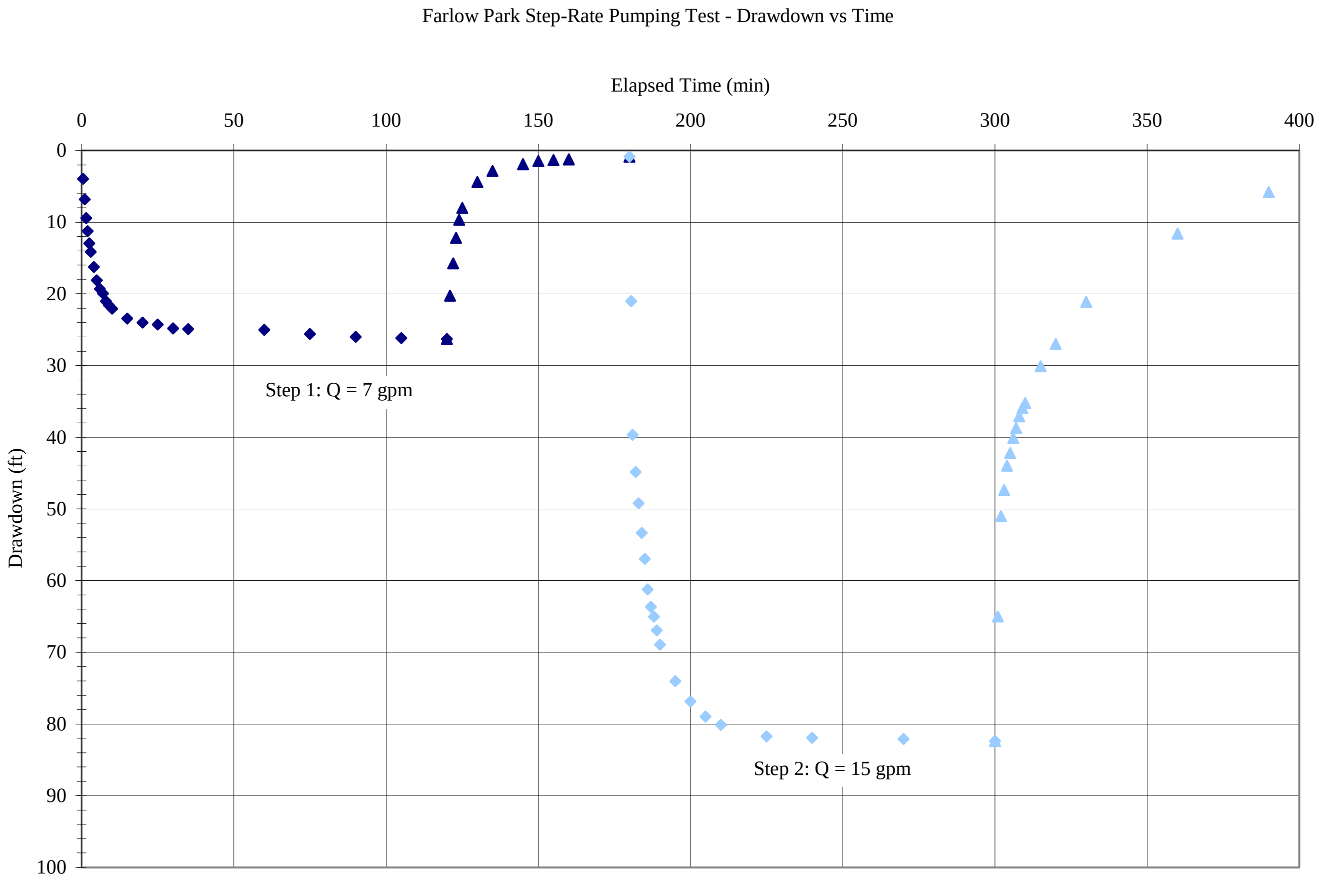
Site Map

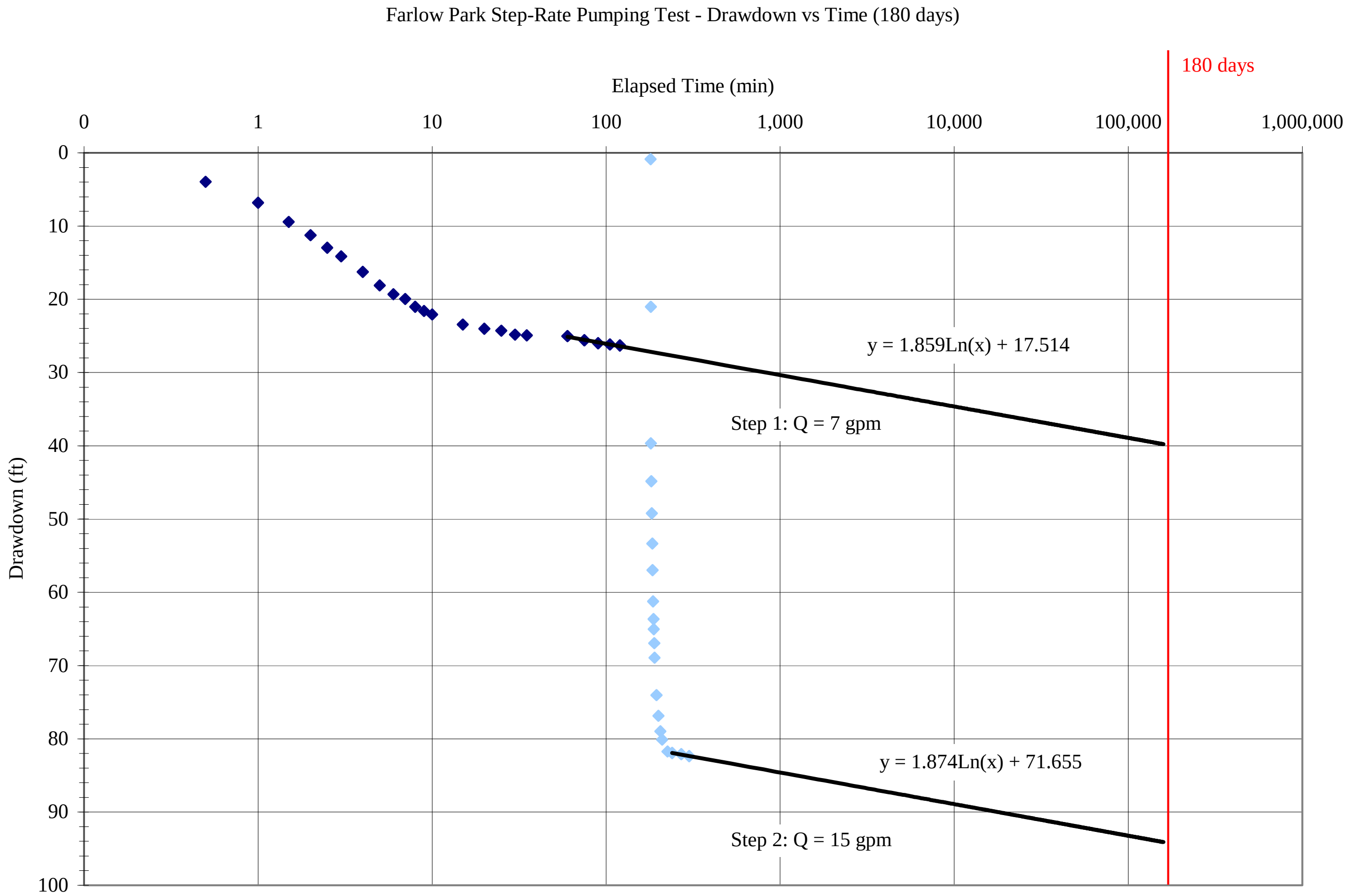

PARKING LOT
APPROX PROP LINE
GATE
CHAIN LINK FENCE
GRANITE CURB FLUSH
ASPHALT WALK
SUBMERSIBLE PUMP IN WELL
WELL TOP ELEV 54.02
WATER LEVEL METER/INDICATOR
WATER FILL LINE 2"
OLD POND
BENCH
ELECTRIC BOX
ELECTRICAL CONTROL PANEL
POLE
GRANITE COPING
GRANITE CURB
CHURCH ST
CONCRETE WALK
CATCHBASIN
BRICK
ELECTRICAL RECEPTACLE (ON SHORE)
AERATOR
BRIDGE
OVERFLOW CATCH BASIN
DRAIN MANHOLE
MANHOLES
STUMP
BIT CONC WALK
ELDRIDGE ST.

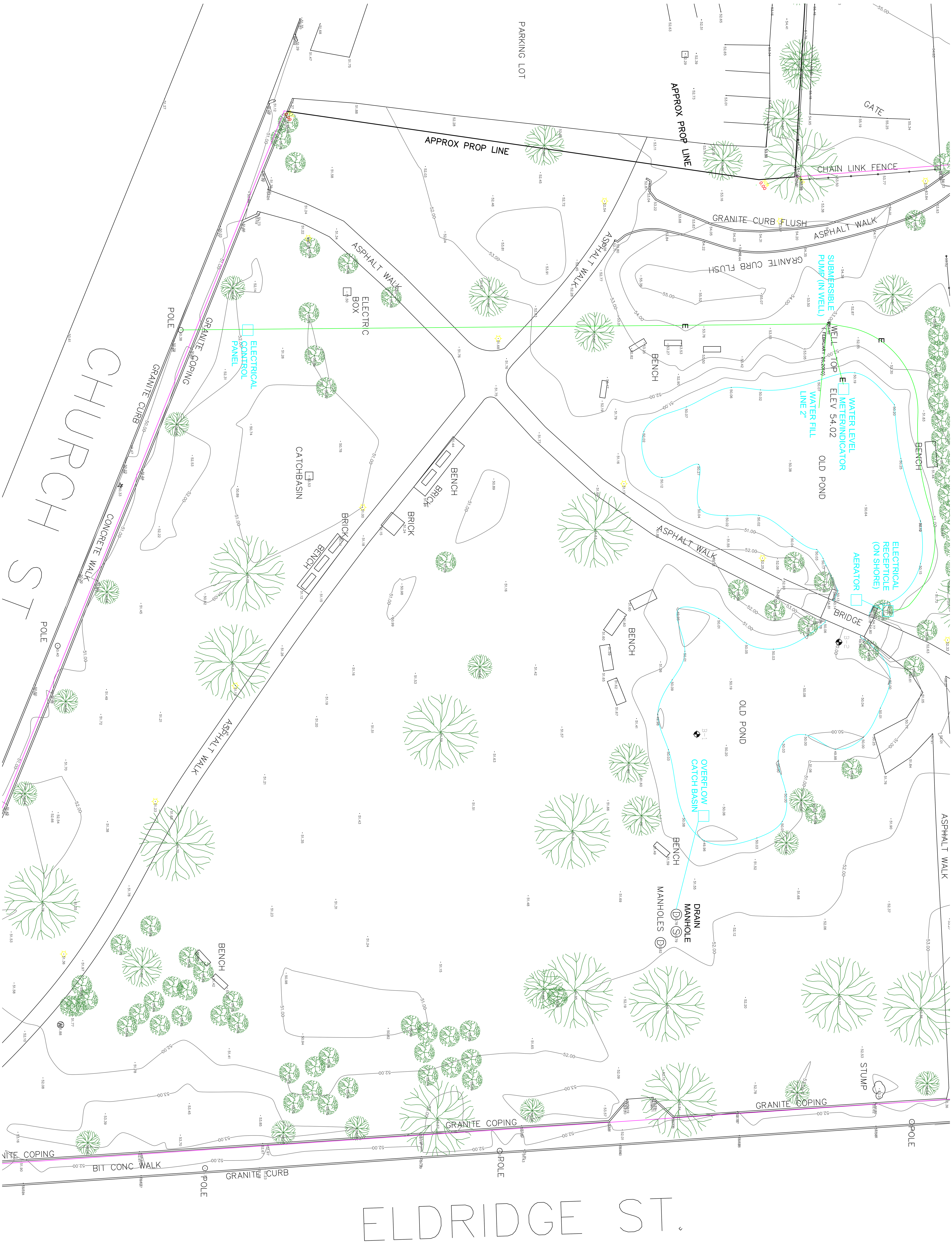
Attachment A

Pumping Rate (gpm)	Time Elapsed (min)	Water Level (feet below TOC)	Drawdown (ft)	Specific Capacity (gpm/ft)
7		21.05		
	0.5	25.00	3.95	1.772
	1	27.88	6.83	1.025
	1.5	30.50	9.45	0.741
	2	32.30	11.25	0.622
	2.5	34.00	12.95	0.541
	3	35.20	14.15	0.495
	4	37.30	16.25	0.431
	5	39.15	18.10	0.387
	6	40.35	19.30	0.363
	7	41.00	19.95	0.351
	8	42.08	21.03	0.333
	9	42.65	21.60	0.324
	10	43.12	22.07	0.317
	15	44.51	23.46	0.298
	20	45.08	24.03	0.291
	25	45.32	24.27	0.288
	30	45.89	24.84	0.282
	35	45.98	24.93	0.281
	60	46.08	25.03	0.280
	75	46.65	25.60	0.273
	90	47.05	26.00	0.269
	105	47.23	26.18	0.267
	120	47.36	26.31	0.266
	121	41.30	20.25	
	122	36.80	15.75	
	123	33.25	12.20	
	124	30.71	9.66	
	125	29.07	8.02	
	130	25.45	4.40	
	135	23.90	2.85	
	145	22.97	1.92	
	150	22.54	1.49	
	155	22.41	1.36	
	160	22.30	1.25	
	180	21.92	0.87	
15	180.5	42.09	21.04	0.713
	181	60.71	39.66	0.378
	182	65.89	44.84	0.335
	183	70.27	49.22	0.305
	184	74.38	53.33	0.281
	185	78.01	56.96	0.263
	186	82.27	61.22	0.245
	187	84.69	63.64	0.236
	188	86.09	65.04	0.231
	189	88.01	66.96	0.224
	190	89.97	68.92	0.218
	195	95.07	74.02	0.203
	200	97.89	76.84	0.195
	205	100.03	78.98	0.190
	210	101.15	80.10	0.187
	225	102.79	81.74	0.184
	240	102.99	81.94	0.183
	270	103.16	82.11	0.183
	300	103.41	82.36	0.182
	301	86.05	65.00	
	302	72.07	51.02	
	303	68.41	47.36	
	304	65.01	43.96	
	305	63.29	42.24	
	306	61.15	40.10	
	307	59.78	38.73	
	308	58.15	37.10	
	309	57.00	35.95	
	310	56.29	35.24	
	315	51.15	30.10	
	320	48.07	27.02	
	330	42.17	21.12	
	360	32.65	11.60	
	390	26.87	5.82	

Attachment B




Farlow Park Step-Rate Pumping Test - Drawdown vs Time (180 days)
Elapsed Time (min)
0
1
10
100
1,000
10,000
100,000
1,000,000
180 days
Drawdown (ft)
0
10
20
30
40
50
60
70
80
90
100
y = 1.859Ln(x) + 17.514
Step 1: Q = 7 gpm
y = 1.874Ln(x) + 71.655
Step 2: Q = 15 gpm



PARKING LOT
APPROX PROP LINE
APPROX PROP LINE
GATE
CHAIN LINK FENCE
GRANITE CURB FLUSH
ASPHALT WALK
GRANITE CURB FLUSH
SUBMERSIBLE PUMP (IN WELL)
WELL TOP
WATER LEVEL METER/INDICATOR
ELEV 54.02
WATER FILL LINE 2"
OLD POND
BENCH
ELECTRICAL RECEPTICLE (ON SHORE)
AERATOR
BRIDGE
ASPHALT WALK
ELECTRIC BOX
ELECTRICAL CONTROL PANEL
POLE
GRANITE COPING
GRANITE CURB
CHURCH ST
CONCRETE WALK
CATCHBASIN
BRICK
BENCH
OLD POND
OVERFLOW CATCH BASIN
DRAIN MANHOLE
MANHOLES
STUMP
GRANITE COPING
BIT CONC WALK
GRANITE CURB
POLE
ELDRIDGE ST.