



VALVETTE SYSTEMS

June 23, 2011

VIA E-MAIL

**EXECUTIVE SUMMARY OF YEAR-END FINAL RESULTS**  
**ICP Water Conservation Program**

Title: Water Savings Study With LittleValve Sprinkler Parts

FROM: Valvette Systems, dba of Valvette, Inc. [Ted Sirkin: Operations Manager]  
23262 Oxnard St, Woodland Hills, CA 91367  
Tel: (818) 887-1866 Fax: (818) 887-2554 E-Mail: [littlevalve@valvettesystems.com](mailto:littlevalve@valvettesystems.com)

TO: The Metropolitan Water District of Southern California  
**Attn: Timothy Schaadt** - Ref: **AGREEMENT NO. 91692**

**TRIAL PERIOD: MAY 15, 2010 – MAY 15, 2011**

This project was designed and undertaken to quantify the water savings of LittleValve sprinkler products as opposed to other common but popular irrigation products on the market. Sprinklers or sprinkler parts with LittleValves were retrofitted at five separate locations in the western San Fernando Valley/Calabasas areas. The five test sites were set up as pairs of valve systems with one system in each pair being outfitted with LittleValves and the other system staying as is with conventional sprinklers. The sprinklers in the non-LittleValve areas were also renovated and re-nozzled where necessary to insure peak performance. The number of sprinklers in the two valve systems at each site were identical.

Each of the ten valve systems were separately metered in order to precisely quantify the water savings. The conservation specialists from the L.A. DWP accompanied Ted Sirkin to the monthly inspections and meter reads of the three trials in the Winnetka/West Hills areas and the specialist from the Las Virgenes MWD accompanied Sirkin for the two Calabasas trials. The determining factor for setting the watering times on the various controllers at each test site was the soil moisture content within each valve system. With each visit at each site, several soil probes were taken and watering times for each valve system were then determined by Sirkin with the concurrence of the respective conservation specialist.

Four of the sites were typical spray head areas ranging from 18 sprinklers to 41 sprinklers per valve system. **For the full year, the average water savings of the LittleValve sprinklers in these four sites, in opposition to the corresponding non-LittleValve sprinklers, amounted to 30.23%. Average savings in actual water usage between the four spray sites was 24,753 gallons per site.**

One of the sites was a ‘Drip/Micro-Spray’ test. The non-LittleValve area had conventional sprinklers that were re-nozzled and/or upgraded. 16 of the sprinklers in the LittleValve area were relocated in order to operate as a modified ‘Drip’ system whereas 3 remaining sprinklers were converted to ‘Micro-Spray’ operation. **For the year, the LittleValve system in this pair saved 59.3% of the water amounting to 6,997 gallons for the year.**

With the control that LittleValves provide over each sprinkler head, most of the water goes where it’s supposed to go. That feature is then enhanced when one uses the correct nozzles available out in the marketplace. The following four reasons for water savings are the result of that extraordinary control one has over each sprinkler head.

1. Eliminating almost all the over spray generally attributed to ordinary spray sprinklers. When sprinklers overspray, valuable water is being directly applied to streets, sidewalks, walls, buildings and cars and landscaped areas being watered again by another valve. Eliminating overspray not only saves water, it slows down the degradation of public and private property.
2. Because every LittleValve sprinkler part is, for all intents and purposes, pressure-regulating, regardless of the water pressure, wasteful misting/fogging is mostly eliminated with LittleValves and entirely eliminated when the spray distance is under 14–15 feet. Undesirable misting and fogging is further exacerbated when winds and even breezes come along. When that happens, fine water droplets can travel as much as 50 feet or more from the sprinkler head.
3. LittleValves and 15’ nozzles = larger droplets, generally provide higher uniformity with water being applied more evenly. Higher uniformity results in reduced watering times.
4. LittleValve parts have the distinct feature of being able to shut the water down before (or underneath) the nozzle allowing for its removal while the sprinklers are running. Consequently, the work involved with the installation of new sprinklers and maintaining existing ones becomes much easier, less troublesome and saves substantial sums of water and labor compared to conventional methods that ordinary sprinklers require. Remote control is no longer a necessity.

For new installations or replacing broken or worn-out sprinklers that have lost their efficiency, the cost of LittleValve pop-up sprinklers and shrub adapters is comparable to the cost of ordinary sprinklers hence any water savings achieved is a pure cost effective move. On the other hand, should one want to change-out an existing system in order to have the LittleValve benefits, replacing the entire pop-up sprinkler is not necessary because LittleValves are available in replacement pop-up sprinkler riser stems - 3” thru 12”. LittleValve replacement pop-up stems were how they were first introduced to the marketplace and offer great flexibility for the homeowner and contractor. Replacing a pop-up riser stem takes just a few minutes as opposed to digging out and replacing a complete sprinkler head. Replacing ordinary shrub adapters with a LittleValve shrub adapter usually takes less than one minute. When making change-outs, we suggest replacing the nozzles as recommended.

To determine cost effectiveness, we take the figures from the last paragraph of the first page of this Summary: We start with the average number of LittleValve sprinklers in the four spray sites, which amounts to 25 sprinklers per site. Assuming the sprinklers were all 4” pop-ups, (the most common size in residential landscapes,) and properly spaced as they should have been in

the first place, the material cost to change those 25 sprinklers out with 4” LittleValve replacement pop-up riser stems and/or shrub adapters (as was the case with 8 sprinklers in one of the spray trials and all the sprinklers in the ‘Drip/Micro-Spray’ trial,) would cost the retail customer \$50.00 or about \$30.00 to the contractor. If all the sprinklers are shrub adapters, the cost will be 25% less. To ensure a truly efficient system will require an additional investment of approximately \$35.00 for new nozzles. Total for 25 heads: \$85.00.

NOTE: All materials costs quoted herein include 10% CA sales taxes.

Using the figures from above, during the year, the 25 sprinklers saved 24,753 gallons of water amounting to an average of 30% of the water as shown in the trials. Using the water cost figure of .004 cents per gallon (.001 less than charged by the Los Angeles DWP,) the yearly savings will amount to \$99.01. Those savings do NOT include any savings from sewer charges nor utility taxes and any other fees and taxes imposed by some other cities in Southern California. If we include the DWP sewer charges into our example, as we ought to do, the cost of 1<sup>st</sup> Tier water increases to .0082 cents per gallon, (City of L.A. - .0092,) almost one cent per gallon. The yearly savings LittleValves now provide becomes \$220.30. For those consumers who get put into 2<sup>nd</sup> and 3<sup>rd</sup> tiers of usage, their costs, hence their savings per gallon increase substantially.

In the Southern California region, the homeowner who does his own change-outs spending \$85 for replacement stems and new nozzles, recaptures all of his expense in 10 months. In the City of Los Angeles, including sewer charges, the homeowner recaptures his expense in 4.5 months and gets a 167% return on his \$85 investment for the remaining months of the year. If he hires a contractor, who will likely charge in the neighborhood of \$12 – \$15 per sprinkler to do the change-out including parts, the homeowner will recover his costs in a little more than a year, possibly 1½ years.

In Southern California, if the homeowner does the work himself and replaces all 25 of the pop-up sprinklers with brand new ones using Valvette Systems’ Little Tuffy pop-up sprinkler heads, his material costs, including new nozzles, will run in the vicinity of \$118.00. Therefore, he will recover his cost of materials in slightly more than 14 months. In the City of Los Angeles, including sewer fees, he recovers his cost in a little over 6 months.

The table below is water savings for the year for the 5 sites and number of months for return on investment (ROI) for retrofits. Water cost is assumed to be .004 per gallon, all are 1<sup>st</sup> tier prices. New nozzles, which account for 45% of the cost, are included in the Cost of retrofit. Taxes incl/.

**Water and Cost Savings Table**

Trials	Non-LittleValve water usage (gallons)	LittleValve Water usage (gallons)	% savings	Cost of retrofit (\$)	ROI Region-wide (months)	ROI LA city price w/ sewer chgs (months)
1 LA Turf	42,475	32,959	22.7%	71.40	22.5	9.8
2 LA Shrubs	36,616	26,941	27.4%	61.20	19.0	8.3
3 LA Drip	11,960	4,963	59.3%	64.60	27.7	12.0
4 Calabasas Turf	164,052	108,907	33.5%	139.40	7.6	3.3
5 Calabasas Shrub	54,216	29,541	37.3%	54.40	6.6	2.9

The visual results of LittleValves incorporated into one's sprinklers are, in most cases, strikingly different between systems with LittleValves versus systems without them. On the following pages, there are photos taken at the Calabasas test sites while the sprinklers were running. One of the sites is turf (grass) and the other is shrubbery. The non-LittleValve areas of the turf site show much of the sprinkler water traveling way beyond the defined area it is supposed to be watering. Much of the water coming out of the 12' nozzles, which is the proper size nozzle for a 12' wide median strip, is going onto the street on both sides of the strip. But a noticeable amount of water is airborne, traveling north due to the mild prevailing breeze coming from the south. In the opposing area, the heavier droplets that come out of LittleValve sprinklers using 15-foot nozzles, most all fall precisely where it was intended they fall. Further, no misting or fogging is observed. The overall effect of the LittleValve watering is like a gentle rain. The appearance of the turf is similar even though the watering time for the non-LittleValve area is 15 minutes per watering and the LittleValve area set at 12 minutes.

In the pictures of the shrub trial, again the differences are obvious. The soil moisture derived from the soil probes showed the LittleValve area to be slightly more moist than the non-LittleValve area yet the non-LittleValve area with various size nozzles receives 7 minutes of water versus 4 minutes for the LittleValve area using 15' nozzles. Again the appearances of the shrubbery are very similar.

On the retrofit side, LittleValve replacement stems are available for almost all of the major sprinkler manufacturers' sprinkler bodies. They also can be installed into many of the other brands, as well. LittleValve replacement parts can receive both types of plastic nozzles – male and female. Presently, they are installed by cities, school districts and contractors in Florida, California and Hawaii.

Sprinkler systems are installed all over the world. Even areas like the Northeast United States have periods of drought and need sprinkler irrigation, but the sunbelt states can really benefit with this technology. Water conservation is now a national topic and irrigation supply houses and many retail outlets are the likely sources to obtain products such as LittleValves that fulfill and promote a water savings mentality.

## PICTURES

The following 3 pages contain pictures of 3 of the Trial Areas. Page 5 is **Trial No. 4**, one of the two TURF trials. Trial No. 4, the Calabasas Turf trial, is in a 12 feet wide median strip. Station 25, the non-LittleValve area, is using 12-foot nozzles. Station 24 is using 15' nozzles adjusted down to 12 feet with the LittleValve. Page 6 is **Trial No. 5**, one of the two SHRUB trials. Trials 4 and 5 show the difference between LittleValve sprinklers and non-LittleValve sprinklers. Page 7 is **Trial No. 3**, the sole 'Drip' and "Micro-Spray' area. The 'Drip' pictures on page 7 demonstrate LittleValve 'Drip' when watering two shrubs with one sprinkler

**NOTE: If the pictures below do not appear, click on each page and wait a few seconds.**

TRIAL NO. 4 –Calabasas Turf



Station 25: Non LittleValve area  
Excessive misting and overspray



Station 24: LittleValve area  
No misting. No overspray



## TRIAL NO. 5 – Calabasas Shrubs



Station 1: Non LittleValve area  
Excessive misting and overspray



Station 2: LittleValve area  
No misting. No overspray

### TRIAL NO. 3 – Los Angeles ‘Drip’

Please see page 8 for more specifics pertaining to LittleValve ‘Drip’  
And LittleValve ‘Micro-spray’





## **General information pertaining to LittleValve ‘Drip’ and LittleValve ‘Micro-Spray’**

In the two pictures above on page 7, you are seeing LittleValve ‘Drip’ with two plants being watered at the same time. When it is just dirt between the 2 plants, you will want to use Rain Bird’s 5’ center strip nozzle – model number 5 CST-B or Toro’s 5’ center strip as they provide two distinct streams as shown. Do not use the 15’ center strips. However, if there is ground cover or any kind of planting between the two bushes, then use Hunter’s 5 CST-B as its streams break and provide some water between the bushes. Also, with ground cover between the bushes, the 15’ center strips can be helpful.

If you wish to water just one plant, we strongly recommend Rain Bird’s 18’ VAN (adjustable nozzle). When adjusted down to a 6-inch stream, it dispenses water at the rate of 6.5 gallons per hour. Do not spray less than 6 inches. Toro’s 17’ VAN waters efficiently at a distance of about 12” – 15” using under 10 gallons per hour.

For rose gardens and the like, try the 5’ stream bubblers: 5QB, 5HB and 5FB. They can be brought down to about a 9” radius spray distance using about ¼ gallon per minute.

The world’s best ‘Micro-Spray’ is Rain Bird or Toro’s 8-foot flat nozzles with LittleValves. Spray distances are between 2 feet to 6 feet. A spray from 27” to 36” dispenses water at approximately .26 gpm; at a distance of 36” – 48”, it dispenses at approximately .31 gpm.

You can have LittleValve ‘Drip’ and ‘Micro-Spray’ on pop-up sprinklers as easy as shrub adapter-type sprinklers. In many instances, ‘Drip’ and ‘Micro-Spray’ can be mixed into the same system as regular sprays. Trial No. 3 incorporated 16 “Drips”, one ‘Micro-Spray’ and 2 regular sprays.

Please note: LittleValve ‘Drip’ and ‘Micro-Spray’ requires no pressure regulation or pressure compensation of any kind regardless of pressure. All LittleValve parts, whether shrub adapter types or pop-up stem types provide built-in pressure regulation.

## **APPENDIX**

Providing the cumulative year-end information for each of the five trials

### **NOTES:**

- (1) For all trials, figures are in gallons.
- (2) Water used during maintenance and observation is excluded
- (3) All Footnotes are found at the end of the Reports - Pages 14, 15 and 16



## Year-End Final Results of

### TRIAL NO. 1 – Los Angeles - Median Strip with Turf

#### Comparison of Water Usage of Station No. 6 (Little Valves) With Usage of Station No. 5 (Without Little Valves)

Period	Station No. 5 Usage (w/o Little Valves)	Station No. 6 Usage (with Little Valves)	Difference in Gallons	Water Savings Percentage
05/22 - 06/15/10	3,541	2,565	976	27.6%
06/15 - 07/15/10	4,998	3,639	1,359	27.2%
07/15 - 08/15/10	5,582	4,500	1,082	19.4%
08/15 - 09/15/10 (fn 1)	6,551	5,095	1,456	22.2%
09/15 - 10/15/10 (fn 3)	4,444	3,974	470	10.6%
10/15 - 11/15/10	Conflicting information - Test Nullified			
11/15 - 12/15/10 (fn 5)	6,148	4,664	1,484	24.1%
12/15 - 01/15/11	RAIN - NO USAGE; NO READS TAKEN THIS PERIOD			
01/15 - 02/15/11	4,907	4,121	786	16.0%
02/15 - 03/15/11 (fn 6)	832	698	134	16.1%
03/15 - 04/15/11 (fn 9)	2,497	1,895	602	24.1%
04/15 - 05/15/11 (fn 12)	<u>2,975</u>	<u>1,808</u>	<u>1,167</u>	<u>39.2%</u>
TOTALS:	42,475 gallons	32,959 gallons	9,516 gallons	22.7%

**Net Result: Average Monthly Water Savings of 22.7% - 9,516 gallons**

## Year-End Final Results of

### TRIAL NO. 2 – Los Angeles - Median Strip with Shrubs

#### Comparison of Water Usage of Station No. 4 (LittleValves) With Usage of Station No. 2 (Without LittleValves)

Period	Station No. 2 Usage (w/o LittleValves)	Station No. 4 Usage (with LittleValves)	Difference in Gallons	Water Savings Percentage
05/22 - 06/15/10	2,242	1,395	847	37.8%
06/15 - 07/15/10	3,389	2,013	1,376	40.6%
07/15 - 08/15/10	3,166	2,338	828	26.2%
08/15 - 09/15/10	3,991	3,452	539	13.5%
09/15 - 10/15/10	2,744	2,187	557	20.3%
10/15 - 11/15/10 (fn 4)	1,168	747	421	36.0%
11/15 - 12/15/10 (fn 5)	5,275	4,065	1,210	22.9%
12/15 - 01/15/11	RAIN - NO USAGE; NO READS TAKEN THIS PERIOD			
01/15 - 02/15/11	4,445	3,436	1,009	22.7%
02/15 - 03/15/11 (fn 6)	733	563	170	23.2%
03/15 - 04/15/11	4,531	3,022	1,509	33.3%
04/15 - 05/15/11	<u>4,932</u>	<u>3,723</u>	<u>1,209</u>	<u>24.5%</u>
TOTALS:	36,616 gallons	26,941 gallons	9,675 gallons	27.4%

**Net Result: Average Monthly Water Savings of 27.4% - 9,675 gallons**

## Year-End Final Results of

### TRIAL NO. 3 – Los Angeles – Drip/Micro-Spray

#### Comparison of Water Usage of Station No. 5 (LittleValves) With Usage of Station No. 4 (Without LittleValves)

*NOTE: On July 1<sup>st</sup>, system changes made installing LittleValve ‘Drip’*

Period _____	Station No. 4 Usage <u>w/o LittleValves)</u>	Station No. 5 Usage <u>(with LittleValves)</u>	Difference in <u>Gallons</u>	Water Savings <u>Percentage</u>
05/22 - 06/15/10	1,155	741	414	35.9%
06/15 – 07/15/10	1,592	926	666	41.8%
07/15 – 08/15/10	1,148	430	718	62.5%
08/15 – 09/15/10	1,268	411	857	67.6%
09/15 – 10/15/10	1,262	407	855	67.7%
10/15 – 11/15/10	1,096	406	690	63.0%
11/15 – 12/15/10	1,088	398	690	63.4%
12/15 - 01/15/11	RAIN - NO USAGE; NO READS TAKEN THIS PERIOD			
01/15 - 02/15/11	964	353	611	63.4%
02/15 - 03/15/11 (fn 6)	236	92	144	61.0%
03/15 - 04/15/11	1,075	400	675	62.8%
04/15 - 05/15/11	<u>1,076</u>	<u>399</u>	<u>677</u>	<u>62.9%</u>
TOTALS:	11,960 gallons	4,963 gallons	6,997 gallons	59.3%

**Net Result: Average Monthly Water Savings of 59.3% - 6,997 gallons**

## Year-End Final Results of

### TRIAL NO. 4 – Calabasas – Median Strip with Turf

#### Comparison of Water Usage of Station No. 24 (Little Valves) With Usage of Station No. 25 (Without Little Valves)

Period	Station No. 25 Usage (w/o Little Valves)	Station No. 24 Usage (with Little Valves)	Difference in Gallons	Water Savings Percentage
05/22 - 06/15/10	16,268	9,640	6,628	40.8%
06/15 - 07/15/10	18,598	10,852	7,746	41.7%
07/15 - 08/15/10	30,082	17,251	12,831	42.7%
08/15 - 09/15/10	27,836	23,483	4,353	15.7%
09/15 - 10/15/10	21,722	16,892	4,830	22.3%
10/15 - 11/15/10	6,269	4,119	2,150	34.3%
11/15 - 12/15/10 (fn 5)	10,416	7,238	3,178	30.5%
12/15 - 01/15/11	RAIN - NO USAGE; NO READS TAKEN THIS PERIOD			
01/15 - 02/15/11	10,297	6,892	3,405	33.1%
02/15 - 03/15/11 (fn 7)	3,881	3,757	124	3.2%
03/15 - 04/15/11 (fn 10)	6,777	3,556	3,221	47.5%
04/15 - 05/15/11	<u>11,906</u>	<u>5,227</u>	<u>6,679</u>	<u>56.1%</u>
TOTALS:	164,052 gallons	108,907 gallons	55,145 gallons	33.5%

**Net Result: Average Monthly Water Savings of 33.5% - 55,145 gallons**



## Year-End Final Results of

### TRIAL NO. 5– Calabasas – Corner Shrub Areas

#### Comparison of Water Usage of Station No. 22/1 *(fn 8)* (LittleValves) With Usage of Station No. 21/2 (Without LittleValves)

*NOTE: In this trial, 1” meters that read in .10 of a gallon were used.*

Period _____	Station No. 22/1 Usage (w/o LittleValves)	Station No. 21/2 Usage (with LittleValves)	Difference in Gallons	Water Savings Percentage
05/22 - 06/15/10	17,652.2	6,284.6	11,367.6	64.4%
06/15 - 07/15/08	8,164.3	5,177.1	2,987.2	36.6%
07/15 - 08/15/10	7,603.0	3,383.3	4,219.7	55.5%
08/15 - 09/15/10 <i>(fn 2)</i>	6,507.7	4,004.2	2,503.5	38.5%
09/15 - 10/15/10	5,410.6	4,456.9	953.7	17.6%
10/15 - 11/15/10	Controller out of service most of period – Test Nullified			
11/15 - 12/15/10	Station No. 21 out of service due to severed wiring – No Test			
12/15 - 01/15/11	RAIN - NO USAGE, NO READS TAKEN THIS PERIOD			
01/15 - 02/15/11	2,846.5	2,167.8	678.7	23.8%
02/15 - 03/15/11 <i>(fn 8)</i>	1,048.0	763.1	284.9	27.2%
03/15 - 04/15/11 <i>(fn 11)</i>	779.2	469.0	310.2	39.8%
04/15 - 05/15/11 <i>(fn 13)</i>	<u>4,204.6</u>	<u>2,835.3</u>	<u>1,369.3</u>	<u>32.6%</u>
TOTALS:	54,216.1 gallons	29,541.3 gallons	24,674.8 gallons	37.3%

**Net Result: Average Monthly Water Savings of 37.3% - 24,674.8 gallons**

## **Footnotes to Year-End Final Report**

Fn 1 – Re Trial No. 1: It was discovered that Trial No.1's controller needed to be calibrated to take into consideration certain anomalies that arose pertaining to the watering times. Both stations were set for 10 minutes, yet Station No. 5 ran for 12 ½ minutes and Station no. 6 ran for 15 minutes. The watering times were then re-programmed under the corrected guidelines. This controller is a very old mechanical type produced years ago by Superior Controls.

Fn 2 – Re Trial No. 5: During this period, a sprinkler of Station No. 21, the LittleValve area, was broken for approximately two days per the landscape maintenance supervisor. This sprinkler was located along the sidewalk at the curved corner. When we arrived for the monthly read, the sprinkler was repaired but with a standard non-LittleValve sprinkler and a 1/2 circle nozzle installed on it rather than an adjustable nozzle hence, 35% of the water coming out of the sprinkler was watering the sidewalk. The break also caused 3 other sprinklers to become clogged up somewhat with dirt and debris. Valvette Systems immediately restored the system back to normal.

Fn 3 – Re Trial No. 1: Again an employee from the landscape maintenance firm re-set the controller without regard to the testing in progress. The firm was notified, however, they believe the problem is with someone from the City's street median crew that may have changed the times. At that point, we contacted everybody concerned to not touch the stations involved with the Trials. From the beginning, papers have been left inside the clocks to help avoid this problem. We decided to increase our independent visits to all sites to once every other week or more, if possible and read the meters each time to promptly correct problems.

Fn 4 – Re Trial No. 2: For part of the month, the water was off to the entire system between Winnetka Avenue and Corbin Street in which this trial is located due to a main line break. Valvette Systems fixed the break so the testing could proceed.

Fn 5 – Re Trial Nos 1, 2 and 4: The inspection and reads for report No. 7 were performed on the 19<sup>th</sup> due to Sirkin being out of town through the 18<sup>th</sup>. Due to heavy rains prior and during the weekend of the 18<sup>th</sup>/19<sup>th</sup>, with the approval of both Robert Estrada of the L.A.D.W.P. and Scott Harris of the L.V.M.W.D., the reads were taken by Ted Sirkin alone while saturated ground conditions precluded the taking of soil probes.

Fn 6 – Re Trial Nos 1, 2 and 3 and also affecting Nos 4 and 5: Due to significant rain the Los Angeles Trials saw only two days of watering. Watering was also substantially curtailed in Calabasas.

Fn 7 – Re Trial No. 4: As noted in Fn 6, watering times were cut back significantly. However, during the period, Sirkin found that the gardeners had been turning on the water at the controller for various reasons and had to solicit their assistance to avoid touching the two Trial stations. Soil probes showed that moisture levels in the LittleValve area were wetter than the non-LittleValve area.

Additionally, at the Trial No. 4 site, Sirkin encountered a person hired by the City of Calabasas to review the systems and with the help of one of the landscape maintenance crew, was running the water in the median strip including spending extra time with Station No. 24, the LittleValve system in order to observe it. Because the results of Trial No. 4 were so far out of kilter with prior results, it was suggested that something was not right with the Trial during this period.

Fn 8 – Re Trial No. 5: Due to controller problems, no watering took place for five days after taking the February meter reads but finally, on February 21<sup>st</sup>, a new controller was installed and repairs were made to both systems putting them back into good working order. The old controller was replaced with a brand new one and in so doing with deference to the trials, the landscape crew changed the non-LittleValve area Station (21) to No. 1 and the LittleValve area (22) to Station No. 2.

Then with the rain, the areas ultimately saw only 3 or 4 days of watering during the period. The reads below also reflect additional unplanned watering when the gardeners accidentally added 4 waterings of 3 minutes each to both Stations 1 and 2 by inserting them onto Program No. 1, the program used by the gardeners for the non-Trial areas. Meanwhile, Program No. 2, which is dedicated to the two areas used in the Trials, continued its scheduled watering.

Fn 9 – Re Trial No. 1: Upon arrival at the site for the monthly reads, it was noticed that again an employee for the maintenance contractor had re-set all the stations on this clock including Station nos. 5 and 6, which are not supposed to be touched except by Sirkin. In this case – because the clock is an older mechanical one, the calibration for Station Nos. 5 and 6 was then lost. Fortunately, the meters were read prior on April 5<sup>th</sup>. At that time, the clock had not yet been changed, hence only 5 days of watering data was lost, leaving 8 days intact. Sirkin returned on Sunday, the 17<sup>th</sup> to re-calibrate the two stations and in so doing also noticed that a sprinkler in the LittleValve area, Station No. 6, was broken, which was not broken on the 5<sup>th</sup>. Sirkin repaired the problem, which was a broken fitting underneath the pop-up sprinkler head. Evidently, therefore, two problems occurred during the same time period and were then both taken care of on the 17<sup>th</sup>.

Because of the two problems noted above, TWO reads were included in the monthly Report. The first read was the one to be recorded in the Final Report, March 17<sup>th</sup> to April 5<sup>th</sup>, which reflects the 8 days the systems were in proper working order prior to the two problems noted above. The second read reflects the usages during April 5<sup>th</sup> to the 15<sup>th</sup>, the problem time period, which covers 5 watering days during which the clock was out of calibration and Station No. 6 had a broken sprinkler wasting water every time it was on.

Fn 10 – Re Trial No. 4: Only a partial month of watering due to rains in March.

Fn 11 – Re Trial No. 5: Only 4 days of watering in this period due to rains and the maintenance crew not properly turning clock back on.

Fn 12 – Re Trial No. 1: Reduced water usage as system was shut down for last 10 days of period due to a problem with another valve, which was not part of the trial.

Fn 13 – Re Trial No. 5: Broken sprinkler in LittleValve area discovered approximately one week before period ended. Maintenance contractor fixed broken sprinkler with a non-LittleValve sprinkler and installed an incorrect nozzle that threw 30% of the water onto the adjacent sidewalk. Even with the broken sprinkler, the LittleValve area still used 32.6% less water than the non-LittleValve area.