May 28, 2008

WATER SAVINGS PROGRESS REPORT DUE TO MODIFICATION OF SPRINKLER HEADS WITH "LITTLE VALVES" IN MEDIAN STRIP AGOURA HILLS, CALIFORNIA

The subject median strip is located on Thousand Oaks Boulevard running easterly from Kanan Road, the main north-south street in the City of Agoura Hills. Thousand Oaks Boulevard runs parallel to the 101 Freeway and is located less than one mile north of the freeway.

The median island would normally be characterized as having a length of one city block. It is 10 feet wide and irrigated by four remote control valves (RCV) with approximately 27 heads per RCV. Starting from the intersection of Kanan Road and Thousand Oak Boulevard and heading east on Thousand Oak Boulevard the first and third landscape areas are each planted with 1,320 sq ft of turf (RCV #3 & #4). The second and fourth landscape areas are each 1,250 sq ft and planted with shrubs and trees (RCV #1 & #2). All four landscape areas contain trees.

The existing median irrigation system is controlled and monitored by a central irrigation control system with a master flow control meter, operates with a static water pressure of 80 psi, and irrigated with 6" Rain Bird pop-up sprinklers that are in excess of 12-15 years old. The heads are triangularly spaced and carry 8' and 10' Rain Bird nozzles. The City Agoura Hill has maintained water usage records for at least four years. The initial programmed irrigation frequency was four times per week with a runtimes of 12 minutes for both RCV #3 & #4.

RCV #3 was chosen for the trial. Although the 8' and 10' nozzles are the normally recommended size nozzles for a 10' wide median strip, the overspray and excessive misting from the sprinklers constantly saturated the street on both sides of the median strip each time the irrigation system turned on.

The proposal was to replace the existing Rain Bird 6" pop-up riser stems with the Valvette Systems 6" replacement pop-up stems for the existing 27 Rain Bird 6" pop-up sprinklers. The Valvette System's 6" pop-up is designed to be interchangeable with the Rain Bird's model 1806 pop-up bodies. However, it was found that the existing Rain Bird 6" pop-up heads were too old, hence the City of Agoura Hills was required to swap out the old Rain Bird sprinklers for Valvette System's new 6" pop-up sprinklers known as "Little Tuffy" (Model No. TUF6).

The change-out was performed on Friday, March 7, 2008 by the Landscape Maintenance Contractor, Quality Landscape Co. The new "Little Tuffy" sprinkler heads were equipped with Rain Bird 15 foot nozzles.

Within days of the irrigation retro-fit on RCV #3, the following was observed and confirmed:

1) Almost all misting and over spraying was reduced, thereby minimizing one major potential cause for roadway deterioration.

2) Due to increased water uniformity, the overall water usage was reduced by 50.7% without any noticeable effect on the viability of the turf.

Schedule #1

Valve	date	# of days irrigated	runtime	aver. water usage/day	% of water saved/day	gal/min used
#4	3/10-19	05	12 min	624 gal		52.9 gal
#3	3/10-19	05	12 min	308 gal		25.6 gal
Difference ----------				**316 gal**	**50.7%**	**27.3 gal**

After the initial observations, it was decided to reduce the runtime on RCV #3 and continue to monitor the appearance of the turf and the water usage.

In order to determined if a higher uniformity of the water application occurred due to the presence of the "Little Valve" in the pop-up riser stems of the "Little Tuffy" sprinkler heads, the runtime on RCV #3 was reduced on March 21 from 12 minutes to 9 minutes. RCV #4 was to be left unchanged with the original 12 minute runtime. Over a six week period no visual sign of stress was observed nor was the viability of the turf jeopardized. The most substantial data collected validated an appreciable water savings of 58.9% along with a reduction of misting and overspray onto Thousand Oaks Boulevard.

More substantial testing was previously conducted on the "Little Tuffy" sprinkler in 2004 by Joe Kissinger, water auditor, in collaboration with the eminent Dr. Joseph Hung, professor emeritus at Cal-Poly, Pomona that validated higher water uniformity when this product was used (see Hung & Kissinger, 2004).

This first change in the runtime for RCV #3 from 12 minutes to 9 minutes was to remain programmed until warmer weather arrived in order to determine how long the 25% decrease in runtime for RCV # 3 could remain without causing a noticeable stressing of the turf. The goal was to determine if the higher uniformity of the water application created by the "Little Valve" compensates for the lesser runtime. The collected data indicates that a 25% reduction in watering time achieved an appreciable water savings of 58.9% during the six week observation period without any noticeable negative affects on the turf.

Schedule #2

Valve	date	# of days irrigated	runtime	aver. water usage/day	% of water saved/day	gal/min
#4	3/21-5/2	14	12 min	619 gal		51.6 gal
#3	3/21-5/2	14	09 min	255 gal		25.0 gal
Difference ----------				**364 gal**	**58.9%**	**26.6 gal**

Warmer weather came on in the last week of April with temperatures well into the 90's. The turf irrigated by RCV #3 started to exhibit signs of stress when compared to the turf irrigation by RCV #4.

On Friday, May 3, 2008, the runtime for RCV #3 was increased to 16 minutes while the runtime for RCV #4 remained at 12 minutes. Both RCV #3 & #4 were reprogrammed to irrigate for three days in order to revive the turf irrigated by RCV #3 and restart the comparison between the two turf areas. The collected data indicates that RCV #3 used 21.7% less water than RCV #4 while having a 25 % longer runtime.

Schedule #3

Valve	**date**	**# of days irrigated**	**runtime**	**aver. water usage/day**	**% of water saved/day**	**gal/min**
#4	5/3-6	03	12 min	609 gal		50.7 gal
#3	5/3-6	03	16 min	477 gal		29.8 gal
Difference	**----------**			**132 gal**	**21.7%**	**20.9 gal**

On Thursday, May 8, 2008, both RCV #3 & #4 had their irrigation frequencies programmed to irrigate four (4) days per week and their runtimes programmed to 12 minutes.

Schedule #4

Valve	**date**	**# of days irrigated**	**runtime**	**aver. water usage/day**	**% of water saved/day**	**gal/min**
#4	5/8-14	05	12 min	658.9 gal		54.8 gal
#3	5/8-14	05	12 min	384.8 gal		32.0 gal
Difference	**----------**			**274.1 gal**	**41.6%**	**22.8 gal**

On Tuesday, May 19, 2008, both RCV #3 & #4 had their irrigation frequencies increased from four (4) days per week to five (5) days per week and their runtimes programmed to 12 minutes.

Schedule #5

Valve	**date**	**# of days irrigated**	**runtime**	**aver. water usage/day**	**%of water saved/day**	**gal/min**
#4	5/19-6/03	07	12 min	632.3 gal		52.7 gal
#3	5/19-6/03	07	12 min	344.8 gal		28.7 gal
Difference	**----------**			**287.5 gal**	**45.4%**	**24.0 gal**

Beginning Tuesday, June 04, 2008 the runtime on RCV #3 will be reduced by two minutes in order to establish a sufficient runtime to insure that an adequate amount of water is applied to allow healthy turf development and growth as the seasonal temperatures increase. The irrigation frequency shall remain at five (5) days per week.

Schedule #5

valve	**date**	**# of days irrigated**	**runtime**	**aver. water usage/day**	**% of water saved/day**	**gal/min**
#4	6/04	02	12	592		49.3 gal
#3	6/04	02	10	278		27.8 gal
Difference	**----------**			**314**	**53.0**	**21.5 gal**

Based on the above information, after July 1st the City of Agoura Hills intends to initiate a change-out of 1,610 sprinkler heads in all city street medians as well as the sprinklers at City Hall and City parks

This Report was prepared and reviewed with the concurrence and approval of Mr. Gonzalez.