THE PEKAREK GROUP *** IRRIGATION SYSTEM OPERATING TIME SCHEDULE ***

PROJECT: WOODGLEN VISTA PARK DATE: 09/07/89
PROJECT NO: 85-080 #3 prep. by: RM

CLIMATE TYPE: D
- D warm/dry
- M moderate
- H humid

CONTROLLER LABEL: W
WATERING DAYS/WEEK: 2
START TIMES/DAY: 4

PLANT TYPES:
- N arid natives & ice plants
- L cool season turfgrass
- T warm season turfgrass
- R riparian shrubs & trees
- P trees, shrubs, & vines
- A apple & cherry trees
- F other fruit trees

'ET' = EvapoTranspiration rate (inches of water)

ZONE #	CLOCK STA.#	PROGRAM #	PLANT TYPE	SPRINKLER MFR.	SPRINKLER HEAD	SPRINKLER NOZZLE	GPM of full head	SPACING (RADIUS)	PRECIP RATE	OPERATING TIME BASED ON ACTUAL AVE. DAILY 'ET' RATE (min.) 0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40
1		1	L	TORO	S600C	6.0	10.4	46	0.46	3	6	9	13	16	19	22	25	28	32
2		1	L	TORO	S610	12	9.3	57	0.27	5	11	16	22	27	33	38	43	49	54
3		1	L	TORO	S610	12	9.3	57	0.27	5	11	16	22	27	33	38	43	49	54
4		1	L	TORO	S600C	6.0	10.4	46	0.46	3	6	9	13	16	19	22	25	28	32
5		1	L	TORO	S610	12	9.3	57	0.27	5	11	16	22	27	33	38	43	49	54
6		2	L	TORO	S610	12	9.3	57	0.27	5	11	16	22	27	33	38	43	49	54
7		2	L	TORO	S610	12	9.3	57	0.27	5	11	16	22	27	33	38	43	49	54
8		2	L	TORO	S610	12	9.3	57	0.27	5	11	16	22	27	33	38	43	49	54
9		2	L	TORO	S600C	6.0	10.4	46	0.46	3	6	9	13	16	19	22	25	28	32
10		3	L	TORO	S600C	6.0	5.2	46	0.23	6	13	19	25	32	38	44	51	57	63
11		3	L	TORO	570C-3P	15	4.0	15	1.68	1	2	3	3	4	5	6	7	8	9
12		3	L	TORO	S600C	6.0	5.2	46	0.23	6	13	19	25	32	38	44	51	57	63
13		3	L	TORO	570C-3P	15	4.0	15	1.68	1	2	3	3	4	5	6	7	8	9
14		3	L	TORO	S600C	6.0	10.4	46	0.46	3	6	9	13	16	19	22	25	28	32
15		3	L	TORO	S600C	6.0	10.4	46	0.46	3	6	9	13	16	19	22	25	28	32
16																			
17																			
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22																			
23																			
24																			
TOTAL SYSTEM RUN TIME, PER START (minutes) =										59	126	185	253	314	379	438	499	564	628
TOTAL SYSTEM RUN TIME, PER START (hours) =										1.0	2.1	3.1	4.2	5.2	6.3	7.3	8.3	9.4	10.5
TOTAL SYSTEM RUN TIME, PER DAY (hours) =										3.9	8.4	12.3	16.9	20.9	25.3	29.2	33.3	37.6	41.9

IMPORTANT! This time schedule is based on watering 2 days per week, with 4 start times per watering day.

HOW TO USE THIS OPERATING TIME SCHEDULE:

1) Set the irrigation controller for the # of watering days/week & start times/day shown.
2) Call the California Irrigation Management Information System (CIMIS) at 1-800-336-3023 and note the AVE. DAILY 'ET' RATE for your vicinity given on the recorded message.
3) Set each irrigation zone to run the number of minutes shown in the chart under the column which corresponds to the nearest AVE. DAILY 'ET' RATE noted from calling CIMIS.
4) Adjust zone run times and/or # of starts per day based on your own observations and experience to compensate for rainfall, on-site conditions (sunny vs. shady areas), etc
5) Call CIMIS weekly and, if needed, reset the irrigation controller as per #3 & #4 above

*** THE PEKAREK GROUP may be reached at 619-239-0811 for assistance or further information. ***

DRIP IRRIGATION SYSTEM OPERATING TIME SCHEDULE

PROJECT: RINCON RESERVOIRS JOB NO: 87-088, 87-089 DATE: 01/30/89

SYSTEM INFORMATION:

canopy dia. (ft.)	8	PLANT FACTORS:		SYSTEM EFFICIENCY:	
plant factor	0.35	mature tree	0.80	(climate)	
system efficiency	0.85	shrub > 4'dia. (& vines)	0.70	warm/dry	0.85
waterings/week	3	shrub < 4'dia.	1.00	moderate	0.90
gph of emitters	9.4	all arid climate natives	0.35	humid	0.95

OPERATING TIME BASED ON 30 YEAR AVERAGES:

	days	ave. ET	ET/day	GPD	gal/wk	hrs/wk	hr/start	min/start	min/start@ ave. Pr	ave. Pr
JAN	31	0.97	0.03	0.40	2.82	0.30	0.10	6	0	3.25
FEB	28	1.19	0.04	0.55	3.84	0.41	0.14	8	0	3.55
MAR	31	2.12	0.07	0.88	6.17	0.66	0.22	13	0	2.63
APR	30	3.01	0.10	1.29	9.06	0.96	0.32	19	10	1.47
MAY	31	4.13	0.13	1.72	12.02	1.28	0.43	26	24	0.32
JUN	30	4.94	0.16	2.12	14.86	1.58	0.53	32	31	0.08
JUL	31	6.13	0.20	2.55	17.85	1.90	0.63	38	38	0.07
AUG	31	5.71	0.18	2.37	16.62	1.77	0.59	35	34	0.15
SEP	30	4.56	0.15	1.96	13.72	1.46	0.49	29	28	0.25
OCT	31	3.16	0.10	1.31	9.20	0.98	0.33	20	15	0.69
NOV	30	1.84	0.06	0.79	5.54	0.59	0.20	12	4	1.27
DEC	31	1.20	0.04	0.50	3.49	0.37	0.12	7	0	3.17

OPERATING TIME BASED ON ACTUAL DAILY ET (phone 1-800-336-3023):

ET/day	GPD	gal/wk	hrs/wk	hr/start	min/start
0.01	0.13	0.90	0.10	0.03	2
0.05	0.64	4.51	0.48	0.16	10
0.10	1.29	9.03	0.96	0.32	19
0.15	1.93	13.54	1.44	0.48	29
0.20	2.58	18.05	1.92	0.64	38

VARIANCE TO OPERATING TIME BASED ON ACTUAL MONTHLY Pr:

	days	Pr	ET/day	GPD	gal/wk	hrs/wk	hr/start	min/start
(any)	30	0.10	-0.00	-0.04	-0.30	-0.03	-0.01	-1
(any)	30	0.50	-0.02	-0.21	-1.50	-0.16	-0.05	-3
(any)	30	1.00	-0.03	-0.43	-3.01	-0.32	-0.11	-6

days	# of days in example
ave. ET	ave. monthly EvapoTranspiration rate (inches)
ET/day	EvapoTranspiration rate per day
GPD	Gallons Per Day required by each plant
gal/wk	gallons per week required by each plant
hrs/wk	hours per week emitters must run to provide gallons per week
hr/start	hours per each watering start
min/start	minutes per each watering start, with no precipitation
min/start@ ave. Pr	minutes per each watering start, with ave. precipitation & ave. ET
ave. Pr	ave. monthly Precipitation Rate (inches)
Pr	actual Precipitation rate (inches)

[ave. ET & ave. Pr from TORO "Rainfall - Evapotranspiration Data", 1966;
data for CALIFORNIA - South Coast Drainage (Los Angeles).]

THE PEKAREK GROUP

*** IRRIGATION SYSTEM OPERATING TIME SCHEDULE ***

INFORMATION SHEET

The irrigation system operating time schedules which we are furnishing to you are based on the most up-to-date scientific information and irrigation management practices currently in use for the irrigation industry.

This sheet explains in greater detail the information on the schedule:

CLIMATE TYPE is selected for the project area.

CONTROLLER LABEL is for multiple controller projects, and indicates the particular irrigation controller which the schedule is for. "N/A" is entered for projects with a single controller.

WATERING DAYS/WEEK is selected to best suit your project's landscaping.

START TIMES/DAY is normally the maximum number which your controller will allow.

One of the best methods of irrigating is called "cycling". It works this way: A portion of the amount of water needed is applied to the soil during the first start time. This water then has time to percolate down and move through the soil. With each successive start time, the water will percolate further down and move farther through the wetted soil. Cycling of irrigation start times accomplishes deeper watering with less runoff, than does irrigating an area all at once.

Most everyone has heard the phrase "Water deeply, less often". What is actually meant by this phrase is: "Water deeply (by cycling) when you water, and water less frequently throughout the week." This results in more deeply rooted plants, which are also able to better withstand periods of drought stress. We have chosen the number of watering days per week and start times per watering day to best accomplish this goal, within the time available to irrigate at your project.

ZONE # corresponds to the irrigation plans.

CLOCK STATION # is to be inserted by the irrigation system installer, if he varies from connecting the valves in the sequence as shown on the plans (ZONE #'s).

PROGRAM # is for multiple-program controllers, and is the program within which the zone should be set to run. See "TOTAL SYSTEM RUN TIME, PER DAY (in hours)" for further explanation.

PLANT TYPE is the predominant type of plant material in the irrigation zone.

SPRINKLER HEAD MANUFACTURER, MODEL, NOZZLE, Gallons-Per-Minute (GPM) of a 360-degree head, and HEAD SPACING are all entered so that the program can calculate the irrigation zone's PRECIPITATION RATE.

PRECIPITATION RATE for a given sprinkler head may differ from values listed in catalogues due to differences in head spacing and/or the fact that our program utilizes a factor for irrigation system efficiency based on CLIMATE TYPE.

HOW LONG DO I WATER?

This question is the crux of the success of the irrigation of the project. Unfortunately, the answer is not an easy one. The answer is totally dependent on two variables which are constantly changing: the evapotranspiration (ET) rate, and the precipitation rate (PR).

In simple terms, the ET rate is a measure of how much soil moisture is lost by plants through evaporation and transpiration to the atmosphere in a given time period. The PR is the amount of moisture received as rainfall. The ET minus the PR equals the amount of moisture needed to be supplied by the irrigation system.

The California Department of Water Resources has a program called "California Irrigation Management Information System" (CIMIS) which provides the actual ET information on a day-to-day basis. By calling 1-800-336-3023, one can listen to a recorded message which lists the average daily ET for Escondido, San Diego, and Oceanside. The message is updated each Wednesday.

OPERATING TIME BASED ON ACTUAL AVERAGE DAILY 'ET' RATES (in minutes) is calculated for each irrigation zone, based on the actual daily ET rate found through calling CIMIS. The operating time formula includes coefficients which adjust for the amount of ET required by different PLANT TYPES. Any value of ET and corresponding operating times can by interpolated between the columns of values shown.

These CIMIS ET values do not take into account any precipitation (PR) which is received, due to the possible variability in rainfall from one area to the next. If the amount of PR can be determined, reductions in corresponding operating time can also be made.

Use of the actual values from CIMIS is definitely the most accurate measure of "How Long Do I Water?", particularly for the months of May through October when our area historically receives very little rainfall.

TOTAL SYSTEM RUN TIME, PER START is listed as both minutes or hours, to facilitate programming successive start times in the controller.

TOTAL SYSTEM RUN TIME, PER DAY (in hours) is also shown, to facilitate controller programming.

A note is in order here regarding multiple-program irrigation controllers. Many of today's controllers allow two or more independent programs to be entered into them. This feature can be utilized to further divide the TOTAL SYSTEM RUN TIME's into smaller increments.

Your schedule may show our initial recommendations for the programs under which the irrigation zones should be set to run. If so, all TOTAL SYSTEM RUN TIME's listed (PER START in minutes and hours, and PER DAY in hours) for any given watering day will approximate the total times shown divided by the number of programs. For this to be correct, do not set more than one program to run on any single watering day.

For example, we'll assume you have a dual program controller. Your IRRIGATION SYSTEM OPERATING TIME SCHEDULE is based on watering 3 days per week, and shows a total system run time per day of 6 hours based on an average daily 'ET' rate of .20. You then program 3 hours worth of zones in Program 1 to water Monday, Wednesday, and Friday; and program the remaining 3 hours worth of zones in Program 2 to water Tuesday, Thursday, and Saturday. Therefore, every zone waters only 3 days per week and on any day, the total system run time will only be 3 hours.

An infinite number of possibilities can exist with today's solid-state irrigation controllers. Try the recommended programming, or set up the programs yourself. A pocket calculator is handy for adding up each programs' actual TOTAL SYSTEM RUN TIME, PER START and PER DAY, as an aid in setting successive start times in the controller (cycling of start times). Just be sure to adhere to the number of days per week shown for watering any irrigation zone, and set the programs up to best suit your project.

GOOD IRRIGATION MANAGEMENT requires that you adjust zone run times and/or number of starts per day based on your own observations and experience to compensate for rainfall received, on-site conditions such as sunny and shady areas, differing soil types, etc.

In conclusion, "How Long Do I Water?" can best be determined by the individual manager of the irrigation system. Utilizing the mathematical aids provided here as a starting point, and combining them with observations and experience regarding plants, plant water requirements, and the influence of local weather conditions, will result in the best irrigation management achievable given the variability of the natural systems involved.

We'd like to hear back from you! If you find that any of your actual operating times are consistently different from those shown, we'd like to know it. In a matter of minutes, we can change plant type coefficients, climate type factors, number of watering days per week or start times per day, (or even change the schedule for different irrigation heads), and print you a new schedule.

We want to make this schedule work for your project, and have it be a tool which makes your management of the irrigation system easy as well as accurate.

Please call THE PEKAREK GROUP at 619-239-0811 for assistance, further information, or to let us know how our IRRIGATION SYSTEM OPERATING TIME SCHEDULE works for your project.

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September 7, 1989