

## **Monterey Pines Network**

### **Introduction**

Military life takes people all over the world for various reasons. Coupled with extended work hours and highly technical specialties, stress is not uncommon to military personnel and their families. The Morale Welfare and Recreation (MWR) program was established to help families cope with military life and provide services for stress relief. It is an organization that provides many good entertainment services throughout the world. One such service you will most likely see is a golf course. Golf is something that is normally expensive venture, which may not appeal to the wannabe military golfer with specks of free time. CONUS and OCONUS military courses provide an opportunity to enjoy the game of golf without the high cost.

With the changing times in the country today, everyone is trying to save money by cutting cost. As shown by budget cuts and sequestration, the military is not beyond this cut back. A big hit is being taken by MWR in the midst of these cutbacks. Some programs are being scaled back due to funding and other programs being cut completely. Monterey Pines, the local course in Monterey, is overseen by the MWR and run by the General Manager who is always finding ways to not only improve the day to day operational costs, but improve the overall experience of everyone who visits the facility. The goal of this project is to analyze the costs associated with running a golf course, from an employee standpoint, for a weeks duration.

### **Problem**

Using Monterey Pines as the model, we want to map the costs of operating a military golf course to provide useful information on the best way to cut costs or the best, most cost effective way to make improvements. The goal is to not only to provide a project for class, but hopefully produce valuable, quantifiable results that could be applied to Monterey Pines, and possibly other military courses, in order to help their operation. The idea is to create a network and examine the costs associated with employees performing the required weekly tasks that ensure smooth operation. The first step is to take the current number of employees and a list of required jobs they must complete. Next, the identified network must be adjusted to see if the jobs can be completed with less people without going into the overtime level of a 40 hour work week. The hope is to find out if any cuts can be made and if so, to which set of workers. From there, the focus will turn to the most cost efficient ways to improve the course. This will be accomplished by adding certain jobs or adjusting the hours on jobs already in the network.

## Network Design

The network chosen for this model is a bipartite min-cost flow. On one side are the employees and the other side are the jobs, 32 and 29 respectively, to be completed. From the start node will be edges with the hourly cost per worker and the upper bound of a 40 hour work week for the managers and 30 hours for everyone else. The edges in the middle of the network connect the workers with the jobs that they can be assigned to. From job nodes, the edges go to the sink with lower bounds of hours needed to complete that specific job. That is what it used to push the flow across the network.

## Model Output/Analysis

The Monterey Pines model is run with a min-cost flow program using the data provided in Figure 1 below. It's implementation provides us with the most cost efficient method to utilize the employees that work the day to day operations at the course. Program output, based on the constraints, identifies specific employees performing certain jobs.

Monterey Pines Golf Course Operation					
Functional Dept	Employees	Hrly Wage (\$/Hr)	Max Hours/Week	Required Jobs to Complete	Hours/Week/Job
Golf Shop	Golf Course Manager	30	40	Cashier	40
	Teaching Golf Pro 1	20	25	Sales	40
	Teaching Golf Pro 2	20	25	Starter	40
	Starter/Marshall 1	15	40	Marshall	40
	Starter/Marshall 2	15	40	Driving Range Ball Recovery	25
	Outside Services Employee 1	13	40	Driving Range Clean Up	25
	Outside Services Employee 2	13	40	Golf Cart Maintenance	15
	Outside Services Employee 3	13	40	Golf Cart Clean Up	40
				Professional Lessons	30
Grill	Grill Manager	18	40	Cashier	40
	Grill Employee 1	13	35	Food Preparation	14
	Grill Employee 2	13	35	Cook	40
				Bar	21
				Clean	14
Maintenance	Maintenance Manager	18	40	Fairway 1	14
	Maintenance Assistant Manager	16	40	Green 1	14
	Maintenance Employee 1	13	40	Fairway 2	14
	Maintenance Employee 2	13	40	Green 2	14
	Maintenance Employee 3	13	40	Fairway 3	14
	Maintenance Employee 4	13	40	Green 3	14
	Maintenance Employee 5	13	40	Fairway 4	14
	Maintenance Employee 6	13	40	Green 4	14
	Maintenance Employee 7	13	40	Fairway 5	14
	Maintenance Employee 8	13	40	Green 5	14
	Maintenance Employee 9	13	40	Fairway 6	14
		13	40	Green 6	14
				Fairway 7	14
				Green 7	14
				Fairway 8	14
				Green 8	14
				Fairway 9	14
				Green 9	14

				Fairway 10	14
				Green 10	14
				Fairway 11	14
				Green 11	14
				Fairway 12	14
				Green 12	14
				Fairway 13	14
				Green 13	14
				Fairway 14	14
				Green 14	14
				Fairway 15	14
				Green 15	14
				Fairway 16	14
				Green 16	14
				Fairway 17	14
				Green 17	14
				Fairway 18	14
				Green 18	14
				General Trash Pick up	14
				Tool Maintenance	10
RV Park/ Storage Lot	RV Manager			RV Oversight	40
	RV Camp Host			RV Clean Up	25

Figure 1: Data set used in analysis

### Summary

The Monterey Pines Network Model simulates the minimum cost possible of operating the golf course from an employee standpoint. The model is based on the number of jobs that have to get completed, the number of workers available to complete those jobs, and the associated hourly wage per worker. Follow on parts to this problem could be to add more nodes with additional costs to include more aspects of the things that keep a golf course in operation. They include, but are not limited to; water, fertilizer, grass seed, vehicles, upkeep, and maintenance. This would make for a much more granular model that could be adjusted to fit any of the military golf courses worldwide.