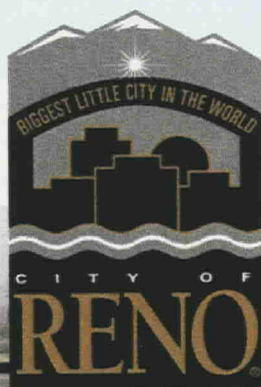


# EFFLUENT MANAGEMENT PLAN

Prepared for:



One East First Street  
8th Floor  
Reno, Nevada 89505

**December 2005**

Prepared by:

**VPOINT**  
Planners - Engineers - Surveyors

A **TRC** Company  
Customer-Focused Solutions

1465 Terminal Way, Suite 5  
Reno, Nevada 89502

## **EFFLUENT MANAGEMENT PLAN**

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City of Reno  
One East First Street  
8<sup>th</sup> Floor  
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## TABLE OF CONTENTS

1.0	REUSE DESCRIPTION .....	1
1.1	Permit Responsibilities .....	1
1.2	Site Irrigation Estimates .....	2
2.0	CONTACT INFORMATION .....	3
2.1	Contact Information .....	3
3.0	REUSE PERMIT .....	3
4.0	EFFLUENT DELIVERY PROTOCOL .....	4
4.1	General Communications .....	4
4.2	Emergency Communications .....	4
5.0	EFFLUENT RELATED HYGIENE .....	4
6.0	EFFLUENT RUN-OFF CONTROL PLAN .....	4
6.1	Notification of Accidental Release .....	4
7.0	CROSS CONNECTION AND BACKFLOW PREVENTION .....	5
8.0	DISCHARGE MONITORING REPORTS (DMR'S) .....	5
9.0	EFFLUENT IRRIGATION .....	5
9.1	Site Maps .....	5
9.2	Sampling and Effluent Quality .....	5
9.3	Water Balance .....	6
9.4	Nitrogen Balance .....	6

## LIST OF APPENDICES

Appendix A	TMWRF Discharge Permit
Appendix B	Reuse Notification
Appendix C	Discharge Monitoring Report
Appendix D	Water/Nitrogen Balance Worksheets
Appendix E	Sod Farm/Tree Farm/Sports Complex Site 1-2
Appendix F	Rosewood Lakes Golf Course (RLGC) Site 2-3
Appendix G	McCarran Boulevard Median Site 2-7
Appendix H	Mira Loma Park Site 2-8
Appendix I	Truck Fill (Site to be Determined)
Appendix J	Future Flood Control Site 3-2
Appendix K	Future Flood Control Site 3-3
Appendix L	Future Flood Control Site 3-4
Appendix M	Future Flood Control Site 3-5
Appendix N	Future Flood Control Site 3-6
Appendix O	Future Flood Control Site 3-7
Appendix P	Avansino Family Site 3-8
Appendix Q	G&J Avansino Site 3-9
Appendix R	Longley Properties Investors Site 4-1
Appendix S	Airport Authority Site 4-2 N
Appendix T	Airport Authority Site 4-2 S
Appendix U	Jamaica Park Site 4-3
Appendix V	Butler Ranch Site 5-1

## CLUSTER EFFLUENT MANAGEMENT PLAN

### 1.0 REUSE DESCRIPTION

All sites will use Truckee Meadows Wastewater Reclamation Facility (TMWRF) water.

There are several potential reuse sites as shown on the attached site map (Figure 1):

Sod Farm/Tree Farm/Sports Complex Site 1-2 (Appendix E)  
Rosewood Lakes Golf Course (RLGC) Site 2-3 (Appendix F)  
McCarran Boulevard Median Site 2-7 (Appendix G)  
Mira Loma Park Site 2-8 (Appendix H)  
Truck Fill (Site to be Determined) (Appendix I)  
Future Flood Control Site 3-2 (Appendix J)  
Future Flood Control Site 3-3 (Appendix K)  
Future Flood Control Site 3-4 (Appendix L)  
Future Flood Control Site 3-5 (Appendix M)  
Future Flood Control Site 3-6 (Appendix N)  
Future Flood Control Site 3-7 (Appendix O)  
Avansino Family Site 3-8 (Appendix P)  
G&J Avansino Site 3-9 (Appendix Q)  
Longley Properties Investors Site 4-1 (Appendix R)  
Airport Authority Site 4-2 N (Appendix S)  
Airport Authority Site 4-2 S (Appendix T)  
Jamaica Park Site 4-3 (Appendix U)  
Butler Ranch Site 5-1 (Appendix V)

These sites are potential reuse sites, and many do not have existing irrigation systems, or identifiable development plans. Effluent demand estimates will be refined for the individual sites as the effluent irrigation system for each site is designed.

#### 1.1 Permit Responsibilities

TMWRF effluent water is monitored by TMWRF to ensure compliance with reuse water quality requirements. Any water quality analysis needed to retain the reuse permit will be handled by TMWRF. Users of effluent will be responsible for compliance with the provisions of the Effluent Management Plan.

## 1.2 Site Irrigation Estimates

Preliminary irrigation estimates for the potential effluent irrigation sites are presented in Table 1.

Table 1: Site Irrigation Estimates

Reuse Site	Owner	Area (acres)	Irrigable Acres (assumed)	Effluent Demand (Ac-ft/yr)	Daytime Effluent Demand (gpm) - pump 16 hrs/day	Nighttime Effluent Demand (gpm) - pump 8 hrs/day
1-2	Sod Farm/Tree Farm/Sport Complex	145.0	145.0	791.8		2,500
2-3	Rosewood Lakes G.C. (COR)	219.3	110.0	534.4	1,688	
2-7	McCarran Blvd Median (15,850 lf)	9.5	9.5	37.2		197
2-8	City of Reno - Mira Loma Park	37.5	18.8	73.5		409
---	Truck Fill (Site to be determined)	---	---	200.0	2,500	
3-2	P.N. Johnson	35.2	28.2	110.3	307	
3-3	F&J Ferrari	22.4	17.9	70.1	195	
3-4	P.N. Johnson	26.1	20.8	81.6	227	
3-5	Corporate Property Associates	8.1	6.4	25.3	70	
3-6	Roman Catholic Bishop of Reno	14.3	11.5	44.9	125	
3-7	UNR Farms expansion	60.0	48.0	188.0	523	
3-8	Avanzino Family	10.0	8.0	31.3	87	
3-9	G&J Avanzino	5.0	4.0	15.7	44	
4-1	Longley Properties Investors	96.8	77.4	303.2	867	
4-2 N	Airport Authority of Washoe Co.	59.3	47.4	185.7		1,062
4-2 S	Airport Authority of Washoe Co.	56.6	45.3	177.3		1,014
4-3	City of Reno - Jamaica Park	7.8	3.9	15.3		85
5-1	R. Butler	358.6	286.9	1,123.7	3,311	
	Cumulative Total	1,026.4	889.0	4,009.4	9,942.7	5,265.7

## 2.0 CONTACT INFORMATION

### 2.1 Contact Information

#### Local Authorities:

Truckee Meadows Water Reclamation Facility (TMWRF)  
Randall Gray  
Operations Manager TMWRF  
P.O. Box 857  
Sparks, Nevada 89432-0857  
Ph (775)861-4102  
Email [rgray@ci.sparks.nv.us](mailto:rgray@ci.sparks.nv.us)

Tom Swan  
Laboratory Services Manager  
P.O. Box 857  
Sparks, Nevada 89432-0857  
Ph (775)861-4147  
Email [tswan@ci.sparks.nv.us](mailto:tswan@ci.sparks.nv.us)

#### City of Reno:

Greg Dennis, P.E.  
Sanitary Engineer  
350 S. Center Street  
P.O. Box 1900  
Reno, Nevada 89505  
Ph (775)334-2165  
Email [dennisg@ci.reno.nv.us](mailto:dennisg@ci.reno.nv.us)

## 3.0 REUSE PERMIT

A complete copy of the reuse permit issued by this Division shall be inserted into the EMP. TMWRF will be responsible for the testing of effluent and supplying sampling information for the Discharge Monitoring Report (DMR). The Laboratory Services Manager of TMWRF, (See Section 2.1 for contact information) completes the DMR and forwards the document to each sites Superintendent for his signature and additional site specific flow information. The DMR is then submitted the Compliance Coordinator at the Bureau of Water Pollution Control, Compliance and Enforcement Branch.

Appendix A has contain the TMWRF Discharge Permit. Discharge permits for each individual site are located in the appendix section for that site.



#### **4.0 EFFLUENT DELIVERY PROTOCOL**

Each reuse site and TMWRF will remain in communication with each other regarding the delivery and application of effluent at the site. The following communication procedure will be followed regarding delivery and use of effluent at the site.

##### **4.1 General Communications**

Each sites personnel will coordinate effluent usage with TMWRF on a regular basis. Effluent delivery will be coordinated with each site and TMWRF personnel in accordance with the terms and conditions of the Discharge Permit. Each site with TMWRF will submit Discharge Monitoring Reports to the Bureau of Water Pollution Control and notify the Bureau of Water Pollution Control of any changes in authorized personnel, transfer of ownership or control, or any anticipated facility expansions or treatment modifications that may result in a new, different, or increased discharge of pollutants.

##### **4.2 Emergency Communications**

In case of an emergency (e.g. accidental release or discharge of effluent), site personnel shall contact the TMWRF operators immediately. The site operators and TMWRF site personnel shall determine and implement methods for limiting and controlling immediate releases/discharges. As soon as the release/discharge is identified and controlled, the NDEP shall be notified by phone, at (775) 687-9485 or (888) 331-6337. Emergency contact numbers for TMWRF and the City of Reno are included in Section 2.1 (Contact Information) of this plan.

#### **5.0 EFFLUENT RELATED HYGIENE**

Each site is responsible for notifying patrons and staff of the hazards related to contact with treated effluent water. Signage shall be posted at each reuse site, and at access points to the effluent water identifying it as non-potable (See Appendix C for example signs).

Signs shall be available in both Spanish and English.

#### **6.0 EFFLUENT RUN-OFF CONTROL PLAN**

The water used to irrigating the chosen sites is highly treated tertiary effluent. Accidental releases of effluent are not anticipated to adversely affect adjacent waterways. The potential for damage from erosion and fertilizer discharge accompanying an accidental release is a concern. The run-off control plan for each site has been prepared to protect adjacent waterways in the case of an accidental release.

##### **6.1 Notification of Accidental Release**

In case of accidental release, the staff of each site should notify, NDEP by phone, at (775) 687-9485 or (888) 331-6337, as soon as the release is identified and controlled

(within 24 hours). Also, a written report on the release (discharge) and the methods used to mitigate the release must be submitted to the NDEP within five days. The report shall list:

- The exact time and date of discharge;
- Exact location and estimated amount of discharge;
- Flow path and bodies of water which the discharge reached;
- The specified cause of the discharge;
- The preventative and/or corrective actions taken.

## **7.0 CROSS CONNECTION AND BACKFLOW PREVENTION**

All backflow devices will be tested annually by the City of Reno with a certified backflow tester. The City of Reno, in conjunction with the Utility personnel will conduct "shut down tests" in the presence of a cross control specialist.

## **8.0 DISCHARGE MONITORING REPORTS (DMR'S)**

As required in the permit, samples and measurements shall be representative of the volume and nature of the TMWRF effluent. Effluent and groundwater at the TMWRF site is sampled by State of Nevada certified technicians and tested at the TMWRF laboratory. Results from the laboratory testing should be reported in the DMR. The TMWRF Laboratory Services Manager completes the DMR form and sends the form to the site superintendent for the water flow measurements and the Superintendent's signature before the DMR is sent to Compliance Coordinator at the Bureau of Water Pollution Control Compliance and Enforcement Branch. A sample copy of a DMR form is included in Appendix D.

## **9.0 EFFLUENT IRRIGATION**

### **9.1 Site Maps**

A detailed site map for the irrigation site, application area, prevailing wind direction, surrounding dwelling units, surrounding water, and storm water controls are located in each separate site Appendix.

### **9.2 Sampling and Effluent Quality**

Sampling and compliance related to effluent quality is the responsibility of TMWRF as the effluent provider. Table 2 shows TMWRF's 2004 performance standards and general effluent data. All measurements are shown as milligrams per liter (mg/L) except for flow which is in million gallons per day (MGD).



Table 2: TMWRF Data

Month	Effluent Flow	Effluent BOD	Effluent SS	Effluent TP	Effluent TDS	Effluent Total NH3	Effluent NO3N	Effluent TN
January	26.78	6	3	0.36	395	0.57	0.31	2.93
February	26.96	4	2	0.31	391	0.51	0.61	2.49
March	26.86	4	1	0.32	398	0.25	0.37	2.27
April	23.9	4	2	0.34	329	0.34	0.21	1.66
May	22	4	2	0.27	376	0.09	0.27	1.78
June	22.13	4	1	0.32	336	0.12	0.34	2.13
July	22.12	5	2	0.32	355	0.3	0.28	2.27
August	23.17	5	2	0.36	340	0.06	0.75	2.07
September	23.26	4	3	0.44	375	0.16	1.63	3.03
October	24.02	6	3	0.3	402	0.15	1.3	2.39
November	26.14	6	3	0.29	391	0.05	0.65	1.7
December	25.83	5	2	0.31	399	0.2	0.08	1.99
Period Avg.	24.42	5	2	0.33	376	0.23	0.56	2.22

BOD = Biological Oxygen Demand, SS = Suspended Solids, TP = Total Phosphorus, TDS = Total Dissolved Solids, NH3 = Ammonia, NO3N = Nitrates Nitrogen, TN = Total Nitrogen

### 9.3 Water Balance

Instructions to complete the water balance have been included in Appendix E. Completed *Plant Consumptive Use Worksheet*, *Worksheet 1-A*, and *Worksheet 1-B* forms are not required per correspondence with Joe Maez at NDEP, but have been included in Appendix E for informational purposes.

### 9.4 Nitrogen Balance

TMWRF effluent is denitrified during treatment and therefore a nitrogen balance will not require per correspondence with Joe Maez at NDEP. For information purposes a sample nitrogen balance form as well as instructions to complete a nitrogen balance titled *Nitrogen Loading Limit Worksheet*, *Worksheet 2-A*, and *Worksheet 2-B* has been included in Appendix E.



***Appendix A      TMWRF DISCHARGE PERMIT***

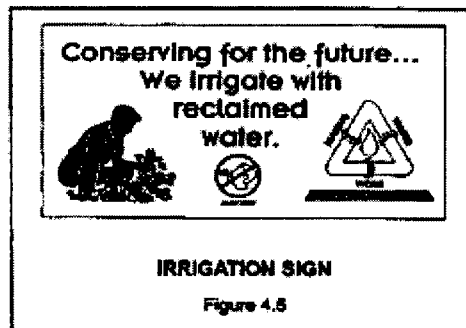
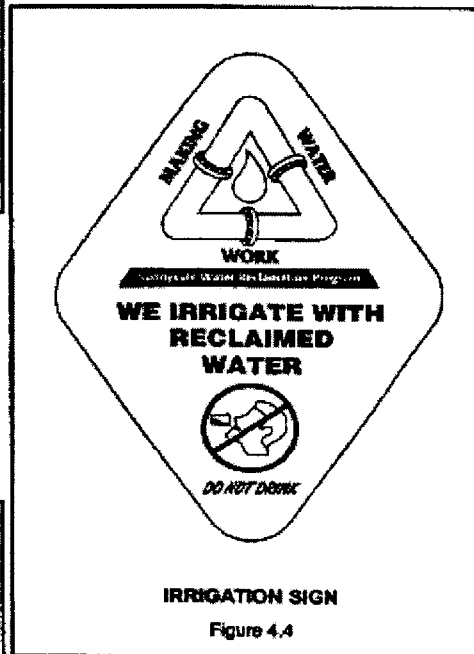
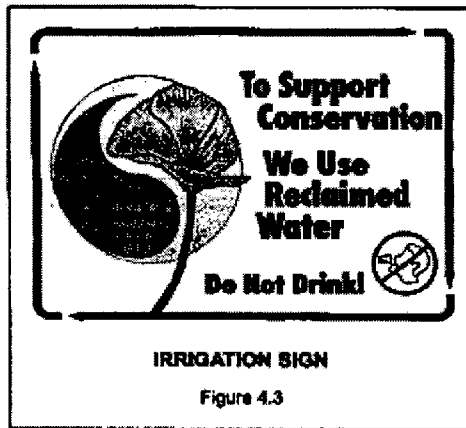
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***Appendix B***

***REUSE NOTIFICATION***

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## NOTIFICATION SIGN EXAMPLES



Signs seen here may not be actual signs used by each site. Signs are available at the following distributors:

*R-Supply*  
1095 South Rock Blvd.  
Sparks NV 89431  
688-5000

*Western Nevada Supply*  
950 South Rock Blvd.  
Sparks NV 89431  
359-5800

## VISITOR HYGIENE FACT SHEET

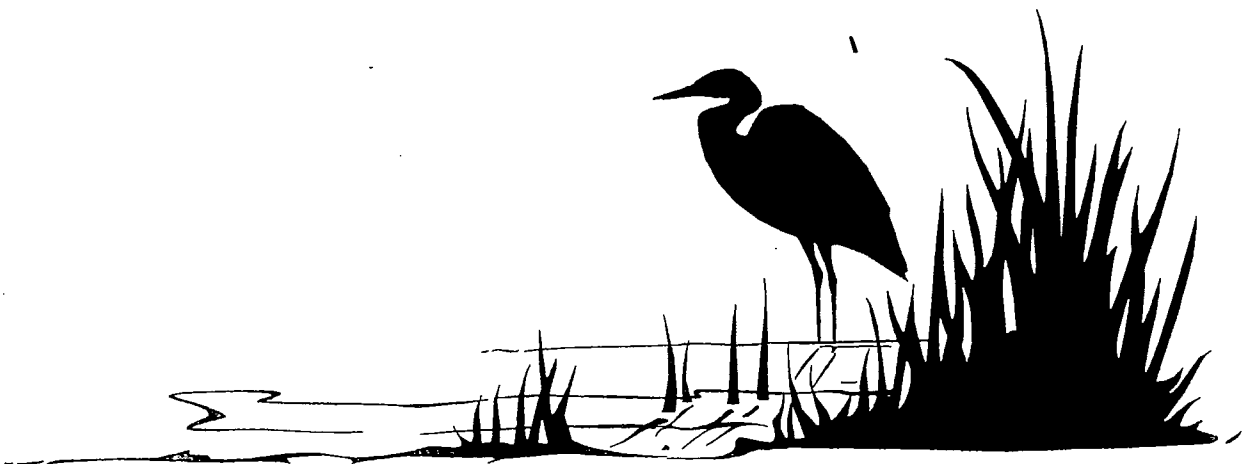
This site uses reclaimed wastewater for irrigation. This reclaimed wastewater comes from the sewage treatment plant and meets the standards required for irrigational reuse. Potential risks of disease transmission from the use of reclaimed water is low, however, some general guidelines (listed below), should be followed to protect you from becoming ill in case of contact with the reuse water.

1. Do not drink or wash in the reclaimed water.
2. Wash hands and face with clean water and soap before eating, smoking, or drinking.
3. If reclaimed water comes in contact with open wounds, clean cut immediately with soap and water, and apply first aid.

## ***WORKER HYGIENE FACT SHEETS***

This project area uses reclaimed wastewater for irrigation. This reclaimed wastewater comes from the sewage treatment plant and meets the standards required for this level of reuse. Potential risks of disease transmission from the use of the reclaimed water is low, however, some general guidelines (listed below), should be followed protect you from becoming ill when working with reclaimed water:

1. Do not drink the reclaimed water or use the reclaimed water for washing.
2. Always wash hands and face with clean water and soap before eating, smoking, or drinking.
3. Wear rubber gloves when working on the irrigation system.
4. Try to keep the irrigation water off your skin and clothes as much as possible.
5. Always treat cuts immediately before continuing with work on the irrigation system.
6. Make sure the area is clear of people that may get sprayed before running the irrigation system.
7. Report any problems to your supervisor that you feel could pose a risk.





*Appendix C*

***DISCHARGE MONITORING  
REPORT***



**GENERAL INSTRUCTIONS FOR COMPLETING THE DISCHARGE MONITORING REPORT \*(OMB NO. 2000- 0015)\***

1. If the Discharge Monitoring Report (DMR) has been partially completed by preprinting, disregard instructions directed at entry or that information already preprinted.
2. Enter "Permittee Name/Mailing Address (and facility name/location, if different)", "Permit Number", and "Discharge Number" where indicated. (A separate form is required for each discharge).
3. Enter dates beginning and ending "Monitoring Period" covered by form where indicated.
4. Enter each "Parameter" as specified in monitoring requirements of permit. (Generally Page 2)
5. Enter "Sample Measurement" data for each parameter under "Quantity" and "Quality" in units specified in permit. "Average" is normally arithmetic average (geometric average for bacterial parameters) of all sample measurements for each parameter obtained during "Monitoring Period"; "Maximum" and "Minimum" are normally extreme high and low measurements obtained during "Monitoring Period". (Note to municipals with secondary treatment requirements: Enter 30-day average of sample measurements under "Average" and enter maximum 7-day average of sample measurements obtained during monitoring period under "Maximum").
6. Enter "Permit Requirement" for each parameter under "Quantity" and "Quality" as specified in permit.
7. Under "No Ex" enter number of sample measurements during monitoring period that exceed maximum (and/or minimum or 7-day average as appropriate) permit requirement for each parameter. If none, enter "0".
8. Enter "Frequency of Analysis" both as "Sample Measurement" (actual frequency of sampling and analysis used during monitoring period) and as "Permit Requirement" specified in permit. (e.g., Enter "Cont", for continuous monitoring, "1/7" for one day per week, "1/30" for one day per month, "1/90" for one day per quarter, etc.).
9. Enter "Sample Type" both as "Sample Measurement" (actual sample type used during monitoring period) and as "Permit Requirement". (e.g., Enter "Grab" for individual sample, "24HC" for 24-hour composite, "Cont" for continuous monitoring, etc.).
10. Where violations of permit requirements are reported, attach a brief explanation to describe cause and corrective actions taken, and reference each violation by date. This is to be submitted with the DMR.

11. If "No Discharge" occurs during monitoring period, write "NO DISCHARGE" across the entire form in place of data entry.
12. Enter "Name/Title of Principal Executive Officer" with "Signature of Principal Executive Officer of Authorized Agent", "Telephone Number", and "Date" at bottom of form.
13. Mail one (1) original signed DMR to the NDEP, one (1) copy to EPA in S.F. (if applicable) and retain one (1) copy for your records. The DMR must be received by the date(s) specified in the permit.
14. More detailed instructions for use of this DMR form may be obtained from the Compliance Coordinator of the Nevada Division of Environmental Protection at (775) 687-4670, Ext. 3152.

#### **PAPERWORK REDUCTION ACT NOTICE**

Public reporting burden for this collection of information is estimated to vary from a range of 10 hours as an average per response for some minor facilities, to 110 hours as an average per response for some major facilities, with a weighted average for major and minor facilities of 18 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

#### **LEGAL NOTICE**

This report is required by law (33 U.S.C. 1318; 40 C.F.R. 125.27). Failure to report or failure to report truthfully can result in civil penalties not to exceed \$10,000 per day of violation; or in criminal penalties not to exceed \$25,000 per day of violation or by imprisonment for not more than one (1) year, or by both.

***Appendix D***      ***WATER/NITROGEN BALANCE***  

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***WORKSHEETS***

## WTS-1B

### *PLANT CONSUMPTIVE USE WORKSHEET*

The consumptive use equation for determining the crop's water requirement takes into account precipitation, evapotranspiration, the efficiency of the irrigation system, and the salt tolerance of the plant species. The salt tolerance of the plant species is used to calculate the leaching requirement (Lr) to remove excess salts from the root zone. Excess salts within the soil cause the plant cells to expend more energy adjusting the salt concentration within the plant tissues, and therefore, less energy is available for vigorous plant growth. The hydraulic loading rate and the TDS to EC<sub>w</sub> conversion equation included below are derived from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991), the equation for the leaching requirement is from the Nevada Irrigation Guide, (USDA, Soil Conservation Service, 1981).

$$Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]} \quad Lr = \frac{EC_w}{[(5 \times EC_e) - EC_w]}$$

where:

Lw<sub>(c)</sub> = Allowable Hydraulic Loading Rate Based on Crop Water Needs (in/yr);

ET = Evapotranspiration Rate (in/yr);

P = Precipitation Rate (in/yr);

Lr = Leaching Requirement (% expressed as a fraction);

E = Efficiency of Irrigation System (% expressed as a fraction)

For example: 75% = 75/100 = 0.75; example efficiencies are included below;

EC<sub>e</sub> = Salinity Tolerance of Plant Crop (mmho/cm or dS/m)<sup>(1)</sup>;

EC<sub>w</sub> = Salinity of Applied Effluent (mmho/cm); If TDS is supplied by the laboratory, see conversion below; and

TDS = Average Total Dissolved Solids in Applied Effluent (mg/l).

#### "ET" - Evapotranspiration

Evapotranspiration is defined as the "loss of water from the soil both by evaporation and by transpiration from the plants growing thereon" (Websters Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (K<sub>c</sub>) can be used to modify the potential ET for a particular area. Values for K<sub>c</sub> vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Five for further crop-specific and regional information.

### "E" - Irrigation Efficiency

The irrigation system efficiency is related to how effective the method is in delivering the irrigation water equally to all parts of the crop. Example values for efficiency are<sup>(4)</sup>:

Sprinkler Irrigation Type	Application Efficiency	Surface Irrigation Type	Application Efficiency
Solid Set	0.70 - 0.80	Narrow Graded Border (< 15' wide)	0.65 - 0.85
Portable Hand Move		Wide Graded Border (<100' wide)	0.65 - 0.85
Wheel Roll		Level Border	0.75 - 0.90
Center Pivot or Traveling Lateral		Straight or Graded Contour Furrows	0.70 - 0.85
Traveling Gun		Drip	0.70 - 0.85

### "ECe" - Salinity Tolerance of Plant Crop

The plant salt tolerance is crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. The low end of the range identifies the ECe value which would result in a 0% reduction of crop yield. The upper end of the range identifies the ECe value which could result in a 25% reduction of crop yield<sup>(4)</sup>.

Example ECe's:

Annual Ryegrass <sup>(2)</sup>	= 3 to 6 mmho/cm or dS/m
Perennial Ryegrass <sup>(2,4)</sup>	= 5.6 to 8.9 mmho/cm or dS/m
Bermudagrass <sup>(2,4)</sup>	= 6.9 to 10.8 mmho/cm or dS/m
Tall Fescue <sup>(2,4)</sup>	= 3.9 to 8.6 mmho/cm or dS/m
Alfalfa <sup>(3,4)</sup>	= 2.0 to 5.4 mmho/cm or dS/m

### "ECw" - Salinity of Applied Effluent

Direct measurement of ECw is typically preferred. However, if the laboratory has supplied the reuser with a concentration of TDS, an approximate conversion<sup>(4)</sup> is  $ECw \approx TDS \div 640$ . This conversion is considered accurate within 10%. The value for ECw or TDS is obtained from the treatment plant supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports should be used.

- (1) For clarity in this document, the unit for electrical conductivity (EC) is expressed as mmho/cm. However, EC can also be expressed in decisiemens per meter, dS/m.  
1 mmho/cm = 1 dS/m
- (2) Wastewater Reuse for Golf Course Irrigation, US Golf Association, 1994.
- (3) Nevada Irrigation Guide, USDA Soil Conservation Service, 1981.
- (4) Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

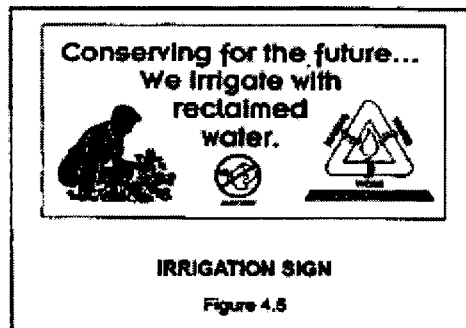
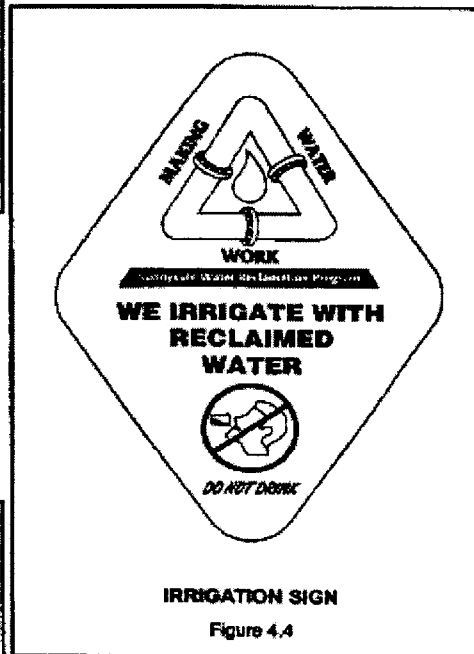
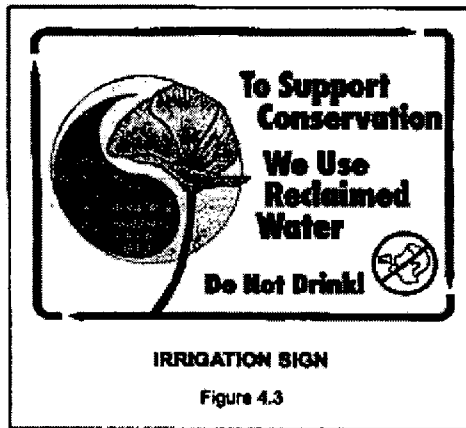


***Appendix B***

***REUSE NOTIFICATION***

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## NOTIFICATION SIGN EXAMPLES



Signs seen here may not be actual signs used by each site. Signs are available at the following distributors:

*R-Supply*  
1095 South Rock Blvd.  
Sparks NV 89431  
688-5000

*Western Nevada Supply*  
950 South Rock Blvd.  
Sparks NV 89431  
359-5800

## VISITOR HYGIENE FACT SHEET

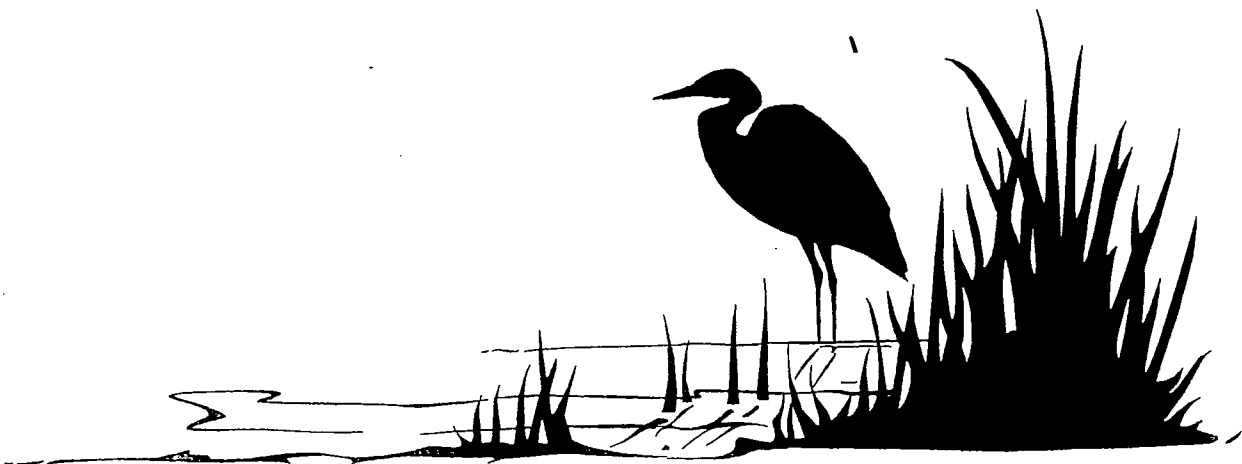
This site uses reclaimed wastewater for irrigation. This reclaimed wastewater comes from the sewage treatment plant and meets the standards required for irrigational reuse. Potential risks of disease transmission from the use of reclaimed water is low, however, some general guidelines (listed below), should be followed to protect you from becoming ill in case of contact with the reuse water.

1. Do not drink or wash in the reclaimed water.
2. Wash hands and face with clean water and soap before eating, smoking, or drinking.
3. If reclaimed water comes in contact with open wounds, clean cut immediately with soap and water, and apply first aid.

## ***WORKER HYGIENE FACT SHEETS***

This project area uses reclaimed wastewater for irrigation. This reclaimed wastewater comes from the sewage treatment plant and meets the standards required for this level of reuse. Potential risks of disease transmission from the use of the reclaimed water is low, however, some general guidelines (listed below), should be followed protect you from becoming ill when working with reclaimed water:

1. Do not drink the reclaimed water or use the reclaimed water for washing.
2. Always wash hands and face with clean water and soap before eating, smoking, or drinking.
3. Wear rubber gloves when working on the irrigation system.
4. Try to keep the irrigation water off your skin and clothes as much as possible.
5. Always treat cuts immediately before continuing with work on the irrigation system.
6. Make sure the area is clear of people that may get sprayed before running the irrigation system.
7. Report any problems to your supervisor that you feel could pose a risk.



*Appendix C*

***DISCHARGE MONITORING  
REPORT***

**Reno, NV 89505**

REUSE SUPPLIER PERMIT NUMBER

**NOTE: Read instructions before completing**

Reno, NV 89505

**LOCATION:** 6800 Pembroke Drive, Reno

100

## REPORTING QUARTER

YEAR	MONTH
------	-------

To				
----	--	--	--	--

Name/Title Principal Executive Officer (Typed or Printed)	I certify under penalty of law that I have personally examined and am familiar with the information submitted herein; and based on my inquiry of those individuals immediately responsible for obtaining the information. I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. See 18 U.S.C. §1001 and 33 U.S.C. §1319. (Penalties under these statutes may include fines up to \$10,000 and/or maximum imprisonment of between 6 months and 5 years.)
TELEPHONE NO.:	
	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT
	DATE: _____ Month _____ Day _____ Year _____

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein; and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. See 18 U.S.C. §1001 and 33 U.S.C. §1319. (Penalties under these statutes may include fines up to \$10,000 and/or maximum imprisonment of between 6 months and 5 years.)

**Signature of Principal Executive Officer or Authorized Agent**

DATE: \_\_\_\_\_

**TELEPHONE NO.:**

TELEPHONE NO.:

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

**GENERAL INSTRUCTIONS FOR COMPLETING THE DISCHARGE MONITORING REPORT \*(OMB NO. 2000- 0015)\***

1. If the Discharge Monitoring Report (DMR) has been partially completed by preprinting, disregard instructions directed at entry or that information already preprinted.
2. Enter "Permittee Name/Mailing Address (and facility name/location, if different)", "Permit Number", and "Discharge Number" where indicated. (A separate form is required for each discharge).
3. Enter dates beginning and ending "Monitoring Period" covered by form where indicated.
4. Enter each "Parameter" as specified in monitoring requirements of permit. (Generally Page 2)
5. Enter "Sample Measurement" data for each parameter under "Quantity" and "Quality" in units specified in permit. "Average" is normally arithmetic average (geometric average for bacterial parameters) of all sample measurements for each parameter obtained during "Monitoring Period"; "Maximum" and "Minimum" are normally extreme high and low measurements obtained during "Monitoring Period". (Note to municipals with secondary treatment requirements: Enter 30-day average of sample measurements under "Average" and enter maximum 7-day average of sample measurements obtained during monitoring period under "Maximum").
6. Enter "Permit Requirement" for each parameter under "Quantity" and "Quality" as specified in permit.
7. Under "No Ex" enter number of sample measurements during monitoring period that exceed maximum (and/or minimum or 7-day average as appropriate) permit requirement for each parameter. If none, enter "0".
8. Enter "Frequency of Analysis" both as "Sample Measurement" (actual frequency of sampling and analysis used during monitoring period) and as "Permit Requirement" specified in permit. (e.g., Enter "Cont", for continuous monitoring, "1/7" for one day per week, "1/30" for one day per month, "1/90" for one day per quarter, etc.).
9. Enter "Sample Type" both as "Sample Measurement" (actual sample type used during monitoring period) and as "Permit Requirement". (e.g., Enter "Grab" for individual sample, "24HC" for 24-hour composite, "Cont" for continuous monitoring, etc.).
10. Where violations of permit requirements are reported, attach a brief explanation to describe cause and corrective actions taken, and reference each violation by date. This is to be submitted with the DMR.



11. If "No Discharge" occurs during monitoring period, write "NO DISCHARGE" across the entire form in place of data entry.
12. Enter "Name/Title of Principal Executive Officer" with "Signature of Principal Executive Officer of Authorized Agent", "Telephone Number", and "Date" at bottom of form.
13. Mail one (1) original signed DMR to the NDEP, one (1) copy to EPA in S.F. (if applicable) and retain one (1) copy for your records. The DMR must be received by the date(s) specified in the permit.
14. More detailed instructions for use of this DMR form may be obtained from the Compliance Coordinator of the Nevada Division of Environmental Protection at (775) 687-4670, Ext. 3152.

#### **PAPERWORK REDUCTION ACT NOTICE**

Public reporting burden for this collection of information is estimated to vary from a range of 10 hours as an average per response for some minor facilities, to 110 hours as an average per response for some major facilities, with a weighted average for major and minor facilities of 18 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

#### **LEGAL NOTICE**

This report is required by law (33 U.S.C. 1318; 40 C.F.R. 125.27). Failure to report or failure to report truthfully can result in civil penalties not to exceed \$10,000 per day of violation; or in criminal penalties not to exceed \$25,000 per day of violation or by imprisonment for not more than one (1) year, or by both.

***Appendix D***      ***WATER/NITROGEN BALANCE***  

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***WORKSHEETS***

## WTS-1B

### *PLANT CONSUMPTIVE USE WORKSHEET*

The consumptive use equation for determining the crop's water requirement takes into account precipitation, evapotranspiration, the efficiency of the irrigation system, and the salt tolerance of the plant species. The salt tolerance of the plant species is used to calculate the leaching requirement (Lr) to remove excess salts from the root zone. Excess salts within the soil cause the plant cells to expend more energy adjusting the salt concentration within the plant tissues, and therefore, less energy is available for vigorous plant growth. The hydraulic loading rate and the TDS to EC<sub>w</sub> conversion equation included below are derived from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991), the equation for the leaching requirement is from the Nevada Irrigation Guide, (USDA, Soil Conservation Service, 1981).

$$Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]} \qquad Lr = \frac{EC_w}{[(5 \times EC_e)-EC_w]}$$

where:

Lw<sub>(c)</sub> = Allowable Hydraulic Loading Rate Based on Crop Water Needs (in/yr);

ET = Evapotranspiration Rate (in/yr);

P = Precipitation Rate (in/yr);

Lr = Leaching Requirement (% , expressed as a fraction);

E = Efficiency of Irrigation System (% , expressed as a fraction)

For example: 75% = 75/100 = 0.75; example efficiencies are included below;

EC<sub>e</sub> = Salinity Tolerance of Plant Crop (mmho/cm or dS/m)<sup>(1)</sup>;

EC<sub>w</sub> = Salinity of Applied Effluent (mmho/cm); If TDS is supplied by the laboratory, see conversion below; and

TDS = Average Total Dissolved Solids in Applied Effluent (mg/l).

#### "ET" - Evapotranspiration

Evapotranspiration is defined as the "loss of water from the soil both by evaporation and by transpiration from the plants growing thereon" (Websters Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (K<sub>c</sub>) can be used to modify the potential ET for a particular area. Values for K<sub>c</sub> vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Five for further crop-specific and regional information.

### "E" - Irrigation Efficiency

The irrigation system efficiency is related to how effective the method is in delivering the irrigation water equally to all parts of the crop. Example values for efficiency are<sup>(4)</sup>:

Sprinkler Irrigation Type	Application Efficiency	Surface Irrigation Type	Application Efficiency
Solid Set	0.70 - 0.80	Narrow Graded Border (< 15' wide)	0.65 - 0.85
Portable Hand Move		Wide Graded Border (<100' wide)	0.65 - 0.85
Wheel Roll		Level Border	0.75 - 0.90
Center Pivot or Traveling Lateral		Straight or Graded Contour Furrows	0.70 - 0.85
Traveling Gun		Drip	0.70 - 0.85

### "ECe" - Salinity Tolerance of Plant Crop

The plant salt tolerance is crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. The low end of the range identifies the ECe value which would result in a 0% reduction of crop yield. The upper end of the range identifies the ECe value which could result in a 25% reduction of crop yield<sup>(4)</sup>.

Example ECe's:

Annual Ryegrass <sup>(2)</sup>	= 3 to 6 mmho/cm or dS/m
Perennial Ryegrass <sup>(2,4)</sup>	= 5.6 to 8.9 mmho/cm or dS/m
Bermudagrass <sup>(2,4)</sup>	= 6.9 to 10.8 mmho/cm or dS/m
Tall Fescue <sup>(2,4)</sup>	= 3.9 to 8.6 mmho/cm or dS/m
Alfalfa <sup>(3,4)</sup>	= 2.0 to 5.4 mmho/cm or dS/m

### "ECw" - Salinity of Applied Effluent

Direct measurement of ECw is typically preferred. However, if the laboratory has supplied the reuser with a concentration of TDS, an approximate conversion<sup>(4)</sup> is  $ECw \approx TDS \div 640$ . This conversion is considered accurate within 10%. The value for ECw or TDS is obtained from the treatment plant supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports should be used.

- (1) For clarity in this document, the unit for electrical conductivity (EC) is expressed as mmho/cm. However, EC can also be expressed in decisiemens per meter, dS/m.  
1 mmho/cm = 1 dS/m
- (2) Wastewater Reuse for Golf Course Irrigation, US Golf Association, 1994.
- (3) Nevada Irrigation Guide, USDA Soil Conservation Service, 1981.
- (4) Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

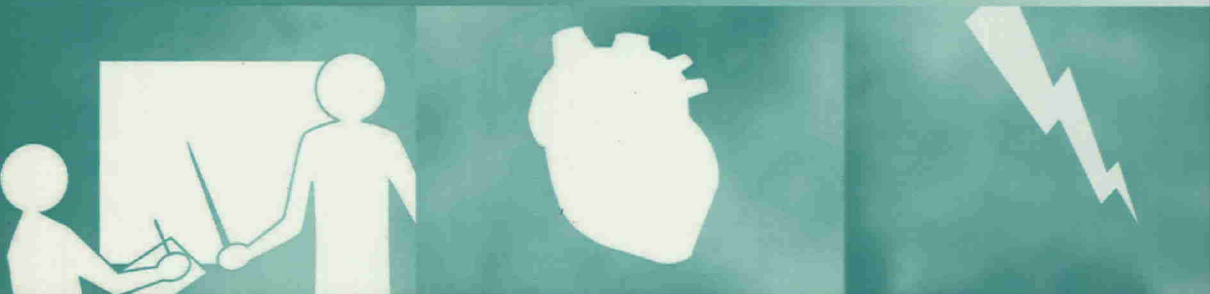


**American  
Red Cross**

# **Adult CPR/AED**

**SKILLS CARD**

**Meets  
ECC 2000  
Guidelines**



## Worksheet 1-A

### CONSUMPTIVE USE REQUIREMENT WORKSHEET: Maximum Loading Rate Based on Plant Water Use Requirements

Page \_\_\_\_\_ of \_\_\_\_\_ Crop Type = \_\_\_\_\_

$$Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]}; \quad Lr = \frac{ECw}{[(5 \times ECe)-ECw]}; \quad ECw \approx TDS \div 640$$

(A) Annual Evapotranspiration (ET, in/yr) = \_\_\_\_\_  
(Multiply by Crop Coefficient (Kc) if value is known)

(B) Annual Precipitation (P, in/yr) = \_\_\_\_\_

(C) (A) - (B) = \_\_\_\_\_ (in/yr)

(D) Salinity of Applied Effluent (ECw, mmho/cm) or  $\approx$  (TDS, mg/l)  $\div$  640 = \_\_\_\_\_  
(Indicate which method was used to determine ECw, Direct Measurement or Approximation by Calculation.)

(E) Salinity Tolerance of Plant Crop (ECe, mmho/cm) = \_\_\_\_\_

(F)  $5 \times (E) =$  \_\_\_\_\_ (mmho/cm)

(G) (F) - (D) = \_\_\_\_\_ (mmho/cm)

(H) Leaching Requirement (Lr, %, expressed as a fraction) = (D)  $\div$  (G) = \_\_\_\_\_

(I)  $1 - (H) =$  \_\_\_\_\_

(J) Efficiency of Irrigation System (E, %, expressed as a fraction) = \_\_\_\_\_

(K) (J)  $\times$  (I) = \_\_\_\_\_

(L) (C)  $\div$  (K) =  $Lw_{(c)} =$  \_\_\_\_\_ (inches/year)

If the water use rate calculated in ("L") above is the lowest application volume calculated between the annual Consumptive Use Limit (This Worksheet) and the Nitrogen Limit (Worksheet 2-A), then fill out Worksheet 1-B to estimate the planned maximum daily flow for the site.

## Worksheet 1-B

### CONSUMPTIVE USE REQUIREMENT WORKSHEET: Maximum Loading Rate Based on Plant Water Use Requirements

Page \_\_\_\_\_ of \_\_\_\_\_ Crop Type = \_\_\_\_\_

$$Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]} ; \quad Lr = \frac{ECw}{[(5 \times ECe)-ECw]} ; \quad ECw \approx TDS \div 640$$

Monthly values for evapotranspiration are dependent on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable source. Please see the explanation in the "WTS-1B: Appendix One" text for further discussion of crop coefficients.

To calculate the monthly value for  $Lw_{(c)}$ , perform the calculation for each month as outlined in Worksheet 1-A, and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

$$\text{Million Gals/Mo} = Lw_{(c)} \text{ in/mo} \times \text{ac} \div 12 \text{ in/ft} \times 43,560 \text{ ft}^2/\text{ac} \times 7.481 \text{ gals/ft}^3 \div 1,000,000$$

(Enter and use the number of acres for the crop type being irrigated)

$$\text{MGD (Million gallons/day)} = \text{M Gallons/mo} \div \text{Days/mo}$$

Month	Days/Mo	ET (in/mo)	P (in/mo)	$Lw_{(c)}$ (in/mo)	M Gals/Mo	MGD
Jan	31					
Feb	28					
Mar	31					
Apr	30					
May	31					
Jun	30					
Jul	31					
Aug	31					
Sep	30					
Oct	31					
Nov	30					
Dec	31					
Totals (in/yr):					Note: These totals should approximate the annual values calculated in Worksheet 1-A	



## WTS-1B

### NITROGEN LOADING LIMIT WORKSHEET

The nitrogen loading equation takes into account precipitation, evapotranspiration, plant nitrogen uptake, nitrogen content of the applied effluent, nitrogen denitrification and volatilization in the soils, and allowable percolate nitrogen concentration. The equation included below is from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

$$Lw_{(n)} = \frac{[(C_p, \text{mg/l}) \times (P-ET, \text{in/yr})] + [(U, \text{lb/acre-yr}) \times (4.4)]}{[(1-f) \times (C_n, \text{mg/l})] - (C_p, \text{mg/l})}$$

where:

$Lw_{(n)}$  = Allowable Hydraulic Loading Rate Based on Nitrogen Loading rate (in/yr);

$C_p$  = Total Nitrogen Concentration in Percolating Water (mg/l);

ET = Evapotranspiration Rate (in/yr);

P = Precipitation Rate (in/yr);

U = Nitrogen Uptake Rate by Crop (lb/acre-yr);

4.4 = Combined Conversion Factor;

$C_n$  = Total Nitrogen Concentration in Applied Wastewater (mg/l); and

f = Fraction of Applied Total Nitrogen Removed by Denitrification and Volatilization.

#### "Cp" - Nitrogen in Percolating Water

A conservative value for Total N in the water that percolates past the root zone ( $C_p$ ) is 7 mg/l, which is the first "red flag" value for Nitrate as N in monitoring well samples. Setting the  $C_p$  limit at a constant value aids in obtaining an hydraulic nitrogen loading rate ( $Lw_{(n)}$ ) which should be protective of groundwater resources. The drinking water standard for Nitrate as N is 10 mg/l, which would be the maximum allowable value for  $C_p$ .

#### "ET" - Evapotranspiration

Evapotranspiration is defined as the "loss of water from the soil both by evaporation and by transpiration from the plants growing thereon" (Websters Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient ( $K_c$ ) can be used to modify the potential ET for a particular area. Values for  $K_c$  vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Five for further crop-specific and regional information.

#### "U" - Crop Nitrogen Uptake

Plant nitrogen uptake rates (U) are crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. Using the accepted value for U in this equation assumes that the harvested portion of the crop is removed from the site. If plant cuttings are not removed from the area, then the amount of nitrogen removed by uptake should be offset by the amount of nitrogen returned to the soil by decomposing cutting materials. If alfalfa, or another legume, is the site's crop, then similar considerations should be made for atmospheric nitrogen which is fixed into the soil by alfalfa. A discussion with the local agricultural extension service is recommended prior to finalizing a "U" value.

"Cn" - Nitrogen in Applied Wastewater

The total nitrogen in the applied effluent water (Cn) can be obtained from the treatment plant that is supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports shall be used.

"f" - Nitrogen lost to Denitrification and Volatilization

The amount of nitrogen lost to denitrification and volatilization varies depending upon the nitrogen characteristics of the applied wastewater and the microbial activity in the soil. Microbial denitrification, in soils with a sufficient carbon source for the biological activity, may account for as much as 15 to 25 percent of the applied nitrogen during warm, biologically active months. Volatilization of ammonia may be as much as 10 percent, depending upon the ammonia fraction in the total nitrogen applied. (Metcalf & Eddy, 1991) For arid climates, such as Nevada, the value typically used for the "f" term is 0.2.

Nitrogen Addition by Chemical Fertilizers

If the allowable reuse water application volume is limited by plant consumptive use (Worksheet 1-A), nitrogen may need to be added by commercial fertilizer. In the design of a reuse site, and preparation of an EMP, this should be estimated to provide the site operator with a guideline for fertilizer application, in addition to the nitrogen being applied via the treated effluent. **The application of fertilizer must then be incorporated into the required annual report to demonstrate that the application of commercial nitrogen and effluent nitrogen did not exceed the plant crop's uptake rate.**

Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage. Reuse permits require that the annual evaluation of the effluent application include, "the total nitrogen in the applied wastewater, nitrogen from fertilizer applications, nitrogen uptake by plant materials, evapotranspiration rate, precipitation rate, and fraction of applied nitrogen removed by denitrification and volatilization." While Worksheet 2-C does not take precipitation and evapotranspiration into account, the permittee should compare each year's P and ET rates to those that were used during the site design and EMP preparation phases to ensure that the original assumptions remain valid.

Worksheet 2-C can also be utilized as a site management tool to *estimate* the amount of commercial fertilizer which may be required in an upcoming month. However, use of the worksheet in this manner does not preclude the responsible use of good irrigation and nutrient management practices.

## Worksheet 2-A

### WATER REQUIREMENT DESIGN WORKSHEET: Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

Page \_\_\_\_\_ of \_\_\_\_\_ Crop Type = \_\_\_\_\_

$$Lw_{(n)} = \frac{[Cp \times (P-ET)] + (U \times 4.4)}{[(1-f) \times Cn] - Cp}$$

(A) Total Nitrogen in Percolating Water (Cp, mg/l) = \_\_\_\_\_

(B) Annual Precipitation (P, in/yr) = \_\_\_\_\_

(C) Annual Evapotranspiration (ET, in/yr) = \_\_\_\_\_  
(Multiply by Crop Coefficient (Kc) if value is known)

(D) (B) - (C) = \_\_\_\_\_ (in/yr) (Note: In Nevada, P is less than ET; therefore a negative number is correct to use in this worksheet.)

(E) (A) x (D) = \_\_\_\_\_

(F) Crop Nitrogen Uptake (U, lb/ac-yr) = \_\_\_\_\_

(G) (F) x 4.4 = \_\_\_\_\_

(H) (E) + (G) = \_\_\_\_\_

(I) Fraction of Applied Total Nitrogen Lost to Denitrification and Volatilization (f) = \_\_\_\_\_

(J) 1 - (I) = \_\_\_\_\_

(K) Total Nitrogen in Applied Effluent (Cn, mg/l) = \_\_\_\_\_

(L) (J) x (K) = \_\_\_\_\_

(M) (L) - (A) = \_\_\_\_\_

(N) (H) ÷ (M) =  $Lw_{(n)}$  (inches/year) = \_\_\_\_\_

If the Water Use Rate calculated in ("N") above is the lowest application volume calculated for the annual Consumptive Use Limit (Worksheet 1-A) or the Nitrogen Limit (This Worksheet), then fill out Worksheet 2-B to estimate the planned maximum daily flow for the site.

## Worksheet 2-B

### WATER REQUIREMENT DESIGN WORKSHEET: Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

Page \_\_\_\_\_ of \_\_\_\_\_ Crop Type = \_\_\_\_\_

$$Lw_{(n)} = \frac{[Cp \times (P-ET)] + (U \times 4.4)}{[(1-f) \times Cn] - Cp}$$

Monthly values for evapotranspiration are dependant on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable sources. Please see the explanation in the "WTS-1B: Appendix Two" text for futher discussion of crop coefficients.

The monthly value of the crop nitrogen uptake (U) can be calculated according to the equation included on the Table. Please see the discussion in the "WTS-1B: Appendix Two" text regarding "U" values for alfalfa crops or sites that do not remove crop cuttings. If a different distribution of monthly "U" is used, due to circumstances such as germination or dormancy periods, then provide documentation explaining the difference.

To calculate the monthly value for  $Lw_{(n)}$ , perform the calculation for each month as outlined in Worksheet 2-A, using the monthly values for "U", "P", "ET", and "Cn", and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

$$\text{Monthly U (lb/ac-mo)} = U \text{ (lb/ac-yr)} \times ET(\text{in/mo}) \div ET \text{ (total in/yr)}$$

$$\text{Million Gallons Per Month} = Lw_{(n)} \text{ in/mo} \times \frac{\text{\# acres}}{\text{(ea. crop type)}} \div 12 \text{ in/ft} \times 43,560 \text{ ft}^2/\text{ac} \times 7.481 \text{ gallons/ft}^3 \div 1,000,000$$

$$\text{MGD (Million gallons/day)} = M \text{ Gallons/mo} \div \text{Days/mo}$$

Month	Days/Mo	P (in/mo)	ET (in/mo)	U (lb/ac-mo)	$Lw_{(n)}$ (in/mo)	M Gals/Mo	MGD of Reclm'd Water
Jan	31						
Feb	28/29						
Mar	31						
Apr	30						
May	31						
Jun	30						
Jul	31						
Aug	31						
Sep	30						
Oct	31						
Nov	30						
Dec	31						
Totals:						Note: The totals for P, ET and $Lw_{(n)}$ should approximate the annual values used or calculated in Worksheet 2-A	

**Worksheet 2-C:** Regardless of the limiting hydraulic loading rate that was defined during the design phase, Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage.

$$\text{Effluent N Applied} = \frac{\text{MGD Applied} \times \text{Effluent N Conc. (mg/l)} \times 8.34}{\text{lb/ac-mo}} \div \frac{\text{\# days/mo}}{\text{\# Acres}} \times (1 - "f") \text{ (i.e. 0.2.)}$$

$$\text{Fertilizer N Applied} = \frac{\text{Monthly Fertilizer used (lbs/mo)} \times \text{\% N in Fertilizer (as a fraction)}}{\text{lb/ac-mo}} \div \text{acres}$$

Crop Name and Nitrogen Uptake Requirement = \_\_\_\_\_ (lbs/ac-yr)

Month	Days/Mo	Million Gallons Applied (mo)	MGD of Irrigation Water Applied	Effluent N Concentration (mg/l)	Effluent N Applied (lb/ac-mo)	Fertilizer N Applied (lb/ac-mo)	Total N Applied (Effl. N + Fert. N) (lb/ac-mo)
Jan	31						
Feb	28/29						
Mar	31						
Apr	30						
May	31						
Jun	30						
Jul	31						
Aug	31						
Sep	30						
Oct	31						
Nov	30						
Dec	31						
Total** =							

\*\* The Total N Applied to the crop should be less than the crop's Nitrogen Uptake Requirement. Please see your permit for directions if it is not.

*Appendix E*

*SOD FARM/TREE FARM/  
SPORTS COMPLEX SITE 1-2*

*Appendix F*

*ROSEWOOD LAKES GOLF*

*COURSE SITE 2-3*

## TABLE OF CONTENTS

1.0	REUSE DESCRIPTION .....	1
1.1	Background .....	1
1.2	Application Site .....	2
1.3	Application Method .....	2
1.4	Distribution System .....	2
2.0	STAFF .....	3
2.1	RLGC Organizational Structure .....	3
2.2	Duties and Responsibilities .....	3
2.3	Contact Information .....	4
3.0	EFFLUENT RELATED HYGIENE .....	5
4.0	EFFLUENT RUN-OFF CONTROL PLAN .....	6
4.1	Potential Sources of Accidental Release .....	6
4.2	Potential Off-Site Accidental Release Areas .....	6
4.3	Detection of Accidental Release .....	6
4.4	Control of Accidental Release .....	6
5.0	CROSS CONNECTION AND BACKFLOW PREVENTION .....	7
6.0	EFFLUENT IRRIGATION .....	8
6.1	Irrigation Plan .....	8
6.2	Site Maps .....	8
6.3	Irrigation System .....	8
6.4	Pond .....	8
6.5	Crop/Turf Management Plan .....	8
6.6	Storm Water .....	8
6.7	Run-Off Containment Berms .....	9
6.8	Freezing Weather Protection .....	9
6.9	Drinking Water Fountain Protection and Food Serving Areas .....	9
6.10	Initial Pond Filling .....	9
6.11	Pond Flushing .....	9

## LIST OF FIGURES

Figure F-1	Vicinity Map
Figure F-2	Phase 2 Reuse System Improvements
Figure F-3	Valve Locations

## LIST OF APPENDICES

Appendix F-1	Job Descriptions
Appendix F-2	Water Balance
Appendix F-3	RLGC Maintenance Manual



## ROSEWOOD LAKES GOLF COURSE EFFLUENT MANAGEMENT PLAN

### 1.0 REUSE DESCRIPTION

#### 1.1 Background

Rosewood Lakes Golf Course (RLGC):

The Rosewood Lakes Golf Course is owned by the City of Reno and is located east of the Reno-Tahoe International Airport and South of Pembroke Drive (see Figure F-1).

Existing Irrigation System:

The RLGC obtains its irrigation water from the Boynton Slough. Water flows by gravity through an underground pipe from the slough to a pond on the RLGC property. From the pond, water is pumped into the RLGC irrigation system. The system has three operating pumps, with a combined capacity of 1,500 gpm. The irrigation system uses a combination of computerized control automatic sprinklers, supplemented by hand watering during the day. Operating pressure at the pump house is limited to 105 psi due to the pipe pressure rating, and frictional losses can result in residual pressures as low as 50 to 60 psi in the south end of the system. Golf course personnel report that the low pressures in the south part of the system contribute to the need to perform hand watering during the day. At the current 1,500 gpm watering rate, the system requires 10-12 hours to irrigate the entire property during the peak temperature months.

The RLGC currently manages the pH of the irrigation water by using a sulfur burner adjacent to the pump house. This device burns elemental sulfur to produce sulfurous acid, which is used to lower the pH of the water in a storage pond. A small pump in the pump house recirculates water from the pond to the sulfur burner and back again.

Effluent Irrigation System:

The RLGC will be using effluent water from Truckee Meadow Reclamation Facility (TMWRF) as a backup source if Boynton slough water is unacceptable or as an emergency source of water for irrigation during droughts. The use of the effluent water would be regulated by a level control placed on the RLGC irrigation pond. When the pond reaches the determined low level, effluent water will be used to fill the pond.

RLGC will tie in the existing 30-inch effluent main located west of the golf course with a 24-inch pipeline. The proposed 24-inch effluent pipeline will discharge to the existing irrigation pond. Irrigation gate valve assemblies will be added to the existing intake pipes between the Boynton Slough and the RLGC irrigation pond to control flow. The RLGC irrigation system would still utilize their computerized control automatic sprinklers and hand watering.

## 1.2 Application Site

Rosewood Lakes Golf Course covers 219 acres of land. The main use of the water is watering the fairways and greens on the course. All land within the RLGC boundary will have the potential to be watered with reuse water. See Figure F-2 for a layout of the application area.

## 1.3 Application Method

The reuse water will be applied through the use of computerized control automatic sprinklers and hand watering done by the grounds staff of RLGC.

## 1.4 Distribution System

The reuse water will be transmitted through a 24-inch ductile iron (DI) reuse main which ties into the existing 30-inch DI reuse main located north of the RLGC. A 12-inch supply pipe will deliver water from the 24-inch transmission main to the RLGC irrigation pond. The 12-inch supply pipe will be equipped with a combination flow-control, back-pressure sustaining, electrical solenoid control valve. Time-of-day and irrigation pond water level will control the solenoid valve.

Once effluent is delivered to the pond, the reuse water will be distributed through the existing automated RLGC irrigation system and through hand watering. When the automatic sprinkler system is not adequate, the grounds staff will distribute the water through the use of portable hoses. See Figure F-2 for exact location of the distribution system.

## 2.0 STAFF

### 2.1 RLGC Organizational Structure

Superintendent:	Tom Janning, CGCS
Assistant Superintendent:	Mike Berry
Irrigation Technician:	Daniel Ludwig
Maintenance Supervisor:	Tom Janning

### 2.2 Duties and Responsibilities

#### Superintendent:

The superintendent oversees and directs the staff, which maintains the golf course. The superintendent patrols the golf course daily and will monitor any irrigation, drainage, or general maintenance issues.

#### Assistant Superintendent:

The assistant superintendent performs tasks to aid the Superintendent. Responsibilities include training, supervising, and scheduling staff which perform maintenance and upkeep on the golf course, monitor golf course for abnormalities, enforce policies, and converse with public on golf course issues; as well as keep up with state and federal health and safety regulations.

#### Irrigation Technician:

The irrigation technician is responsible for the upkeep of the irrigation system, monitor any irregularities, make sure signage for effluent water is posted and maintained.

#### Maintenance Supervisor:

The maintenance supervisor is the direct supervisor over all the golf course maintenance staff, which is responsible for the maintenance and upkeep of the municipal gold course. This includes putting green, tees, fairways, roughs and bunkers. The maintenance supervisor will be responsible for mowing, irrigation, pesticide application, equipment maintenance and repairs.

See Appendix F-1 for comprehensive job descriptions.

### 2.3 Contact Information

Superintendent: Tom Janning, CGCS  
6700 Pembroke Drive  
P.O. Box 1900  
Reno, NV 89505  
Ph (775)857-2890  
Fax (775)857-4488  
Email [janning@ci.reno.nv.us](mailto:janning@ci.reno.nv.us)

Assistant Superintendent: Mike Berry  
6700 Pembroke Drive  
P.O. Box 1900  
Reno, NV 89505  
Ph (775)857-2890  
Cell (608)345-8808  
Email [BerryM@ci.reno.nv.us](mailto:BerryM@ci.reno.nv.us)

Irrigation Technician: Daniel Ludwig  
6700 Pembroke Drive  
P.O. Box 1900  
Reno, NV 89505  
Ph (775)857-2890  
Fax (775)857-4488

Maintenance Supervisor: Tom Janning  
(See Superintendent contact information)

### 3.0 EFFLUENT RELATED HYGIENE

RLGC is responsible for notifying patrons and staff of the hazards related to contact with irrigated effluent water. Signage will be posted at the first and tenth tees (See Appendix B for example signs). Scorecards will contain a notification that the golf course uses effluent water to irrigate and explain the hazards related to contact with effluent water (See Appendix B for example notification language).

#### 4.0 EFFLUENT RUN-OFF CONTROL PLAN

A run-off control plan has been prepared to protect adjacent waterways (Steamboat Creek, Truckee River) in the case of an accidental release and is incorporated into the permit for operation of the golf course.

##### 4.1 Potential Sources of Accidental Release

The most likely sources of effluent release are the irrigation sprinkler lines, or the above ground risers that feed the lines. Additional sources of release include valve boxes and the effluent pumps. The 24-inch effluent transmission main is not anticipated to be a potential source of accidental release because the depth (6-foot minimum to the top of the pipe) is well below the active cultivation depth.

##### 4.2 Potential Off-Site Accidental Release Areas

Accidental release of effluent from the site may occur along any of the site boundaries. However, areas most susceptible to release of effluent are along Steamboat Creek, which flows along the eastern portion of the site.

##### 4.3 Detection of Accidental Release

The Maintenance Supervisor and the Irrigation System Technician shall monitor use of the reclaimed effluent. The Maintenance Supervisor, in his daily patrol of the golf course, should note any malfunctions in the irrigation system and report this to the Irrigation System Technician. The Irrigation System Technician shall take appropriate measures to fix the problem and contain any release following the procedures outlined below.

##### 4.4 Control of Accidental Release

In general, the golf course is located in a lowlands wetland area. The site drains toward Steamboat Creek, which is located south and east of the irrigated area. The site is bound on the north by Pembroke Drive. See Figure F-2 for RLGC boundaries.

The transmission main, supply connection, and on-site irrigation system are all equipped with isolation valves. In the event of an accidental release, the appropriate isolation valve will be closed to stop the release.

## 5.0 CROSS CONNECTION AND BACKFLOW PREVENTION

The RLGC uses potable water in the clubhouse and maintenance shops. The Washoe County Department of Water Resources (the water purveyor) has inspected the backflow prevention system at RLGC. In response to this inspection the meter locations have been retrofitted with reduced pressure principle backflow preventers. The City of Reno staff will test all the assemblies annually. No potable water is used for outdoor irrigation. All irrigation is from the on-site pond. There is no potable water on the golf course and the restrooms on the course are currently porta-restrooms.

## 6.0 EFFLUENT IRRIGATION

### 6.1 Irrigation Plan

The irrigation system is run by a Rainbird system/computer, which determines the needed amount of irrigation based on weather station data. Rainbird typically operates from 8 pm to 6 am. Weather information is downloaded every day at 7 pm and the Rainbird then adjusts the irrigation accordingly. This will prevent over watering of saturated soils and irrigation of frozen soils. The irrigation schedule is 13 minutes on followed by 30 minutes off running a soak and cycle system.

Besides the automated sprinkler system, the RLGC supplements through a hand water program during low flow or high water demand periods. Tee's and greens are subject to hand watering during the months of June, July, and August.

Golf course staff should monitor irrigated areas for oversaturated areas or ponding water. Adjustments should be made to the irrigation system if these conditions exist.

### 6.2 Site Maps

A detailed site map for the irrigation site, application area, prevailing wind direction, surrounding dwelling units, surrounding water, and storm water controls is located on Figure F-2.

### 6.3 Irrigation System

The irrigation system used to transport the reuse water is the existing irrigation system currently in use. Figure F-2 shows the reuse site with the irrigation system and components involved in transport and use of the reclaimed water.

### 6.4 Pond

The existing irrigation pond will be used as a storage pond for the reclaimed water. The pond is monitored for excessive algae growth to avoid odor.

### 6.5 Crop/Turf Management Plan

The putting greens receive 1 pound of fertilizer every 6 weeks from May to September. The tee areas receive 1.25 pounds nitrogen every 7 weeks (See Appendix F-3 for complete Management and Maintenance Plans)

### 6.6 Storm Water

The staff of RLGC monitors the storm water control structures and grading. If there is a significant change in the runoff path or an area of potential washout due to storm water the RLGC Supervisor shall direct the appropriate staff to remedy the problem in order to prevent failure of a control structure. See Figure F-2 for the storm water controls.



## 6.7 Run-Off Containment Berms

The proposed main alignment lies in fairway, therefore if there is a significant line break or failure in the system any run-off will be contained within the site.

## 6.8 Freezing Weather Protection

From November 15 to April 1 the Rainbird system is offline and thus any watering done during this period will be hand watering or through manual operation of the irrigation sprinkler system. All mains on the RLGC property are 4.5 to 6 feet deep and all laterals are 2.5 to 4 feet deep therefore should not propose an issue with annual freeze/thaw.

## 6.9 Drinking Water Fountain Protection and Food Serving Areas

There are no drinking water fountains or food service areas located within the direct irrigation area. There are currently 6 water coolers; in instances of irrigation with effluent water, the coolers will be removed each day before irrigation commences.

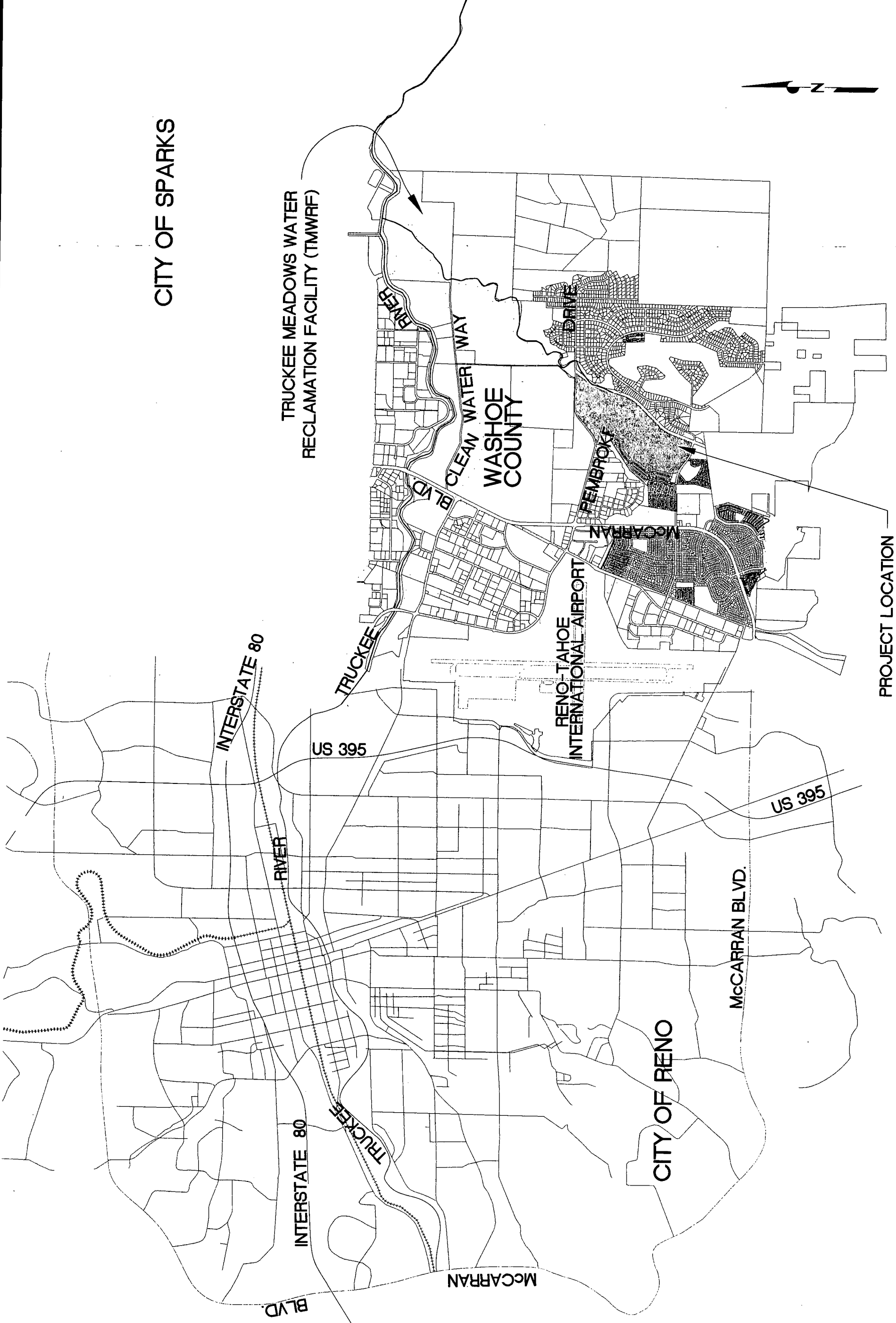
## 6.10 Initial Pond Filling

Before initial pond filling, all four Irrigation Gate Assemblies (Figure F-3) to the Boynton Slough will be closed. Also, the HVGC Irrigation Isolation Valve will be closed. The 12-inch Supply Pipe Isolation Valve will then be opened and the level and time-of-day controls activated.

The pond will be scheduled for daytime filling. Initial water level controls (to be modified based on experience) will be: begin filling :4384.8 feet, off at 4385.3.

## 6.11 Pond Flushing

At the end of effluent use, the RLGC pond will be pumped as dry as practical. The 12-inch Supply Pipe Isolation Valve will be closed, and the irrigation pumps will be used to drain the RLGC irrigation pond to as low a level as practical. The Irrigation Gate Assemblies to Boynton Slough will then be opened. Once the pond is filled with water from the Boynton Slough, the HVGC Irrigation Isolation Valve will be opened.



CITY OF SPARKS

TRUCKEE MEADOWS WATER  
RECLAMATION FACILITY (TMWRP)

CLEAN WATER WAY  
WASHOE  
COUNTY

RENO-TAHOE  
INTERNATIONAL AIRPORT

CITY OF RENO

McCarran Blvd.

US 395

INTERSTATE 80

BLVD

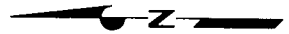
TRUCKEE

US 395

TRUCKEE

McCarran

PROJECT LOCATION



ROSEWOOD LAKES GOLF COURSE EMP  
VICINITY MAP  
FIGURE F-1



ROSEWOOD LAKES GOLF COURSE EMP  
VALVE LOCATIONS  
FIGURE F-3





***Appendix F-1***

***JOB DESCRIPTIONS***

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# **GOLF COURSE SUPERINTENDENT**

## **DEFINITION**

To supervise, assign and review the work of staff responsible for the maintenance and upkeep of the golf course including putting greens, tees, fairways, roughs and bunkers; to develop and implement schedule for mowing, irrigation, pesticide application, equipment maintenance and repairs; and to perform a variety of technical tasks as directed by the Golf Manager.

## **SUPERVISION EXERCISED**

Exercises direct supervision over golf course maintenance staff.

## **ESSENTIAL FUNCTION STATEMENTS**

Essential responsibilities and duties may include, but are not limited to, the following:

### **Essential Functions:**

1. Plan, prioritize, assign, supervise, review and participate in the work of staff responsible for the maintenance and upkeep of the golf courses including putting greens, tees, fairways, roughs and bunkers.
2. Establish schedules and methods for providing golf course maintenance services; identify resource needs; review needs with appropriate management staff; allocate resources accordingly.
3. Participate in the development of policies and procedures; monitor work activities to ensure compliance with established policies and procedures; make recommendations for changes and improvements to existing standards and procedures.
4. Recommend and assist in the implementation of goals and objectives; implement approved policies and procedures.
5. Supervise the use, care and operation of a variety of golf course maintenance and groundskeeping equipment including mowers, weed eaters, chemical sprayers and golf carts.
6. Perform the more technical and complex tasks of the work unit including the safe application of various pesticides, fungicides and related chemicals.
7. Maintain tee boxes, greens and sand traps; rake and edge traps; add materials to sand traps and groom; cut or change cups and move tee markers.
8. Maintain turf; mow fairways, greens, tees and roughs; perform annual aerification and overseedings; apply appropriate chemicals in maintaining greens and turf.
9. Conduct daily patrol of golf course; monitor course for debris, irrigation problems, turf diseases and general maintenance needs; evaluate course wetlands including water flow, drainage and silt build up.

10. Participate in the selection of maintenance staff; provide or coordinate staff training; conduct annual performance evaluations; work with employees to correct deficiencies; implement discipline procedures.
11. Participate in the preparation and administration of department budget for assigned area; submit budget recommendations; estimate time, materials and equipment required for jobs assigned; requisition materials as required; monitor expenditures.
12. Ensure adherence to safe work practices and procedures; stay abreast of State and Federal occupational safety and health requirements.
13. Respond to public inquiries in a courteous manner; provide information within the area of assignment; resolve complaints in an efficient and timely manner.
14. Perform related duties and responsibilities as required.

## **QUALIFICATIONS**

### **Knowledge of:**

Operations, services and activities of a golf course maintenance program.  
Modern and complex principles, practices, tools and materials used in golf course maintenance.  
Acceptable playing standards for a golf course.  
Operational characteristics of various golf course maintenance tools and equipment.  
Safe and appropriate methods of pesticide and chemical application.  
Occupational hazards and standard safety practices.  
Appropriate drainage methods, watering practices and irrigation system operations for a golf course.  
Principles of supervision, training and performance evaluation. Pertinent Federal, State, and local laws, codes and regulations.

### **Ability to:**

Supervise, organize, and review the work of lower level staff.  
Supervise the proper use and application of chemicals and pesticides.  
Interpret and explain golf course maintenance policies and procedures.  
Perform a variety of maintenance, construction and repair work on the golf course.  
Identify needed golf course maintenance or repairs and implement corrective action.  
Ensure adherence to safe work practices and procedures.  
Prepare clear and concise reports.  
Communicate clearly and concisely, both orally and in writing.  
Establish and maintain effective working relationships with those contacted in the course of work.

### **Experience and Training Guidelines:**

Any combination of experience and training that would likely provide the required knowledge and abilities is qualifying. A typical way to obtain the knowledge and abilities would be:

1. **Experience:**  
Three years of increasingly responsible experience in golf course maintenance, landscaping or horticulture including one year of supervisory or lead responsibility.

2. Training:  
Equivalent to the completion of the twelfth grade supplemented by college level course work in maintenance, landscaping, horticulture or a related field.
3. License or Certificate:  
Possession of, or ability to obtain a valid pesticide applicator card.  
Possession of a valid driver's license issued by the State of Nevada.

## **WORKING CONDITIONS**

### **Environmental Conditions:**

Outdoor golf course environment; exposure to noise, dust, potentially hazardous chemicals and inclement weather conditions; work with machinery.

### **Physical Conditions:**

Essential functions may require maintaining physical condition necessary for walking, standing or sitting for prolonged periods of time; moderate to heavy lifting; operating motorized equipment and vehicles.

**ASSISTANT GOLF COURSE SUPERINTENDENT**

Class specifications are intended to present a descriptive list of the range of duties performed by employees in the class. Specifications are not intended to reflect all duties performed within the job.

**DEFINITION**

To supervise, oversee and participate in the more complex and difficult work of staff responsible for the maintenance and grounds keeping function in the upkeep of an assigned golf course and related facilities; assist in the development and implement schedule for mowing, irrigation, pesticide application, equipment maintenance and repairs; and to perform a variety of tasks relative to assigned area of responsibility.

**ESSENTIAL FUNCTION STATEMENTS** - Essential responsibilities and duties may include, but are not limited to the following:

**Essential Functions**

1. Supervise, plan, review and participate in the work of staff responsible for the maintenance and upkeep of an assigned golf course including mowing fairways, greens, tees, and roughs; cut and move tee markers, rake and edge traps and weed abatement.
2. Train assigned employees in their areas of work including maintenance of turf; use care and operation of a variety of golf course maintenance and grounds keeping equipment including mowers, weed eaters, chemical sprayers and golf carts.
3. Conduct daily patrol of golf course; monitor course for debris, irrigation problems, turf diseases and general maintenance needs; evaluate course wetlands including water flow, drainage and silt build up.
4. Establish schedules and methods for providing golf course maintenance services; identify resource needs; review needs with appropriate management staff; allocate resources accordingly.
5. Monitor work activities to ensure compliance with established policies and procedures; make recommendations for changes and improvements to existing standards and procedures.
6. Assist in the implementation of goals and objectives; implement approved policies and procedures.
7. Confer with supervisor to plan and review work projects; determines work priority; assign workers to specific tasks; and performs the more technical and complex tasks of the work unit.



8. Mix, prepare and apply various pesticides, fungicides and related chemicals; and trains employees in their application.
9. Ensure adherence to safe work practices and procedures; stays abreast of State and Federal occupational safety and health requirements.
10. Respond to public inquiries in a courteous manner; provide information; resolve complaints in an efficient and timely manner.
11. Performs related duties and responsibilities as required.

## **QUALIFICATIONS**

### **Knowledge of:**

Operations, services and activities of a golf course maintenance program.  
Modern and complex principles, practices, tools and materials used in golf course maintenance.  
Acceptable playing standards for a golf course.  
Operational characteristics of various golf course maintenance tools and equipment.  
Proper and safe application of chemicals and fertilizers used to maintain a golf course.  
Occupational hazards and standard safety practices.  
Appropriate drainage methods, watering practices and irrigation system operations for a golf course.  
Safe and appropriate methods of pesticide and chemical application.  
Occupational hazards and standard safety practices.  
Appropriate drainage methods, watering practices and irrigation system operations for a municipal golf course.  
Principles of supervision, training and performance evaluation.  
Pertinent Federal, State, and local laws, codes and regulations.

### **Skill to:**

Use golf course maintenance equipment including cup cutters, tractors and mowing equipment.

### **Ability to:**

Supervise, organize, and review the work of lower level staff.  
Supervise the proper use and application of chemicals and pesticides.  
Interpret, explain and enforce golf course maintenance policies and procedures.  
Ensure adherence to safe work practices and procedures.  
Apply herbicides, pesticides and other chemicals in a safe and effective manner.  
Monitor the assigned golf course for needed maintenance and repairs.  
Work independently in the absence of supervision.  
Understand and follow oral and written instructions.  
Communicate clearly and concisely, both orally and in writing.  
Establish and maintain effective working relationships with those contacted in the course of work.

### **Experience and Training Guidelines**

Any combination of experience and training that would likely provide the required knowledge and abilities is qualifying. A typical way to obtain the knowledge and abilities would be:

#### **Experience:**

Two years of increasingly responsible experience in golf course maintenance, landscaping or horticulture including one year of supervisory or lead responsibility.

#### **Training:**

Equivalent to the completion of the twelfth grade supplemented by college level course work in maintenance, landscaping, horticulture or a related field.

### **License or Certificate**

Possession of a valid pesticide applicator card.

Possession of a valid driver's license issued by the State of Nevada.

### **WORKING CONDITIONS**

#### **Environmental Conditions:**

Golf course and field environment; exposure to noise, dust and inclement weather conditions.

#### **Physical Conditions:**

Essential functions may require maintaining physical condition necessary for standing, walking, bending, kneeling, twisting, and crouching for prolonged periods of time; performing heavy manual labor; operating heavy motorized equipment and vehicles.

## IRRIGATION SYSTEM TECHNICIAN

*Class specifications are intended to present a descriptive list of the range of duties performed by employees in the class. Specifications are not intended to reflect all duties performed within the job.*

DEFINITION

To perform a variety of technical tasks in the installation, maintenance and repair of automatic irrigation systems for City owned parks and golf courses; to operate a variety of maintenance and grounds keeping tools and equipment in the performance of assigned duties; and to perform a variety of technical maintenance tasks relative to assigned area of responsibility.

ESSENTIAL FUNCTION STATEMENTS-ffssg/ifi'a/ responsibilities and duties may include, but are not limited to, the following:

Essential Functions:

1. Monitor irrigation system operations at assigned parks or golf courses; determine daily watering needs and check for broken lines, heads, valves and other parts; repair or replace sprinklers, valves, clocks, pipes, backflow prevention devices and wiring.
2. Read and interpret blue prints and specifications of irrigation system pipes, valves, heads and electric, hydraulic or manual control systems.
3. Observe and make corrective adjustments in the operation of pumps and water lines, ensuring proper pressure and coverage.
4. Install, program and maintain computerized irrigation systems and weather stations; modify settings to ensure proper soil and moisture content for the growth of healthy turf.
5. Order necessary parts, tools, equipment or supplies needed for repairs; safely operate and maintain ditch diggers, backhoe, dump truck, front end loader, jack hammer, pipe cutter and sod cutter.
6. Coordinate various irrigation system installation and maintenance projects with outside contractors and other City maintenance staff as needed.
7. Participate in the design and installation of new irrigation systems; maintain and update maps, plans and specifications.
8. Maintain continued education and attend training for new trends in irrigation system installation, maintenance and repair, and the use of backflow prevention devices.
9. Perform related duties and responsibilities as required.

## QUALIFICATIONS

### Knowledge of:

Functions and operations of an automated irrigation system.  
Methods and techniques used in the installation, maintenance and repair of irrigation systems.  
Basic electrical and plumbing procedures.  
Pertinent Federal, State, and local laws, codes and regulations.  
Occupational hazards and standard safety practices.

### Ability to:

Perform a variety of technical tasks in the installation, maintenance and repair of irrigation systems.  
Observe and make corrective adjustments in the operation of pumps and water lines.  
Install, program and maintain computerized irrigation systems.  
Perform a variety of manual tasks for extended periods of time and in unfavorable weather conditions.  
Read and interpret blue prints, schematics and specifications.  
Operate a variety of vehicular and stationary mechanical equipment in a safe and effective manner.  
Understand and follow oral and written instructions.  
Establish and maintain effective working relationships with those contacted in the course of work.  
Communicate clearly and concisely, both orally and in writing.

### Experience and Training Guidelines

*Any combination of experience and training that would likely provide the required knowledge and abilities is qualifying. A typical way to obtain the knowledge and abilities would be:*

#### Experience:

Two years of responsible irrigation maintenance and repair experience.

#### Training:

Equivalent to the completion of the twelfth grade supplemented by specialized training in irrigation, maintenance, plumbing or electrical functions.

### License or Certificate

Possession of a valid commercial driver's license (CDL) with appropriate endorsements.

Possession of, or ability to obtain, an appropriate, valid backflow testing certification issued by the AWWA within one year of hire.

## WORKING CONDITIONS

### Environmental Conditions:

Field environment; travel from site to site; exposure to noise, dust, grease, smoke, fumes, gases, inclement weather conditions; work with water, in confined spaces, underground or on slippery or uneven surfaces.

### Physical Conditions:

Essential functions may require maintaining physical condition necessary for moderate or heavy lifting; walking and standing for prolonged periods of time; operating motorized equipment and vehicles.

**GOLF COURSE MAINTENANCE SUPERVISOR**

*Class specifications are intended to present a descriptive list of the range of duties performed by employees in the class.*

*Specifications are not intended to reflect a/l duties performed within the job.*

**DEFINITION**

To supervise, assign and review the work of staff responsible for the maintenance and upkeep of the municipal golf courses including putting greens, tees, fairways, roughs and bunkers; to develop and implement schedule for mowing, irrigation, pesticide application, equipment maintenance and repairs; and to perform a variety of technical tasks as directed by the Golf Manager.

**SUPERVISION EXERCISED**

Exercises direct supervision over golf course maintenance staff.

**ESSENTIAL FUNCTION STATEMENTS-***responsibilities and duties may include, but are not limited to, the following:*

**Essential Functions:**

1. Plan, prioritize, assign, supervise, review and participate in the work of staff responsible for the maintenance and upkeep of the municipal golf courses including putting greens, tees, fairways, roughs and bunkers.
2. Establish schedules and methods for providing golf course maintenance services; identify resource needs; review needs with appropriate management staff; allocate resources accordingly.
3. Participate in the development of policies and procedures; monitor work activities to ensure compliance with established policies and procedures; make recommendations for changes and improvements to existing standards and procedures.
4. Recommend and assist in the implementation of goals and objectives; implement approved policies and procedures.
5. Supervise the use, care and operation of a variety of golf course maintenance and groundskeeping equipment including mowers, weed eaters, chemical sprayers and golf carts.
6. Perform the more technical and complex tasks of the work unit including the safe application of various pesticides, fungicides and related chemicals.
7. Maintain tee boxes, greens and sand traps; rake and edge traps; add materials to sand traps and groom; cut or change cups and move tee markers.

**Essential Functions: (Continued)**

8. Maintain turf; mow fairways, greens, tees and roughs; perform annual aerification and overseedings; apply appropriate chemicals in maintaining greens and turf.
9. Conduct daily patrol of golf course; monitor course for debris, irrigation problems, turf diseases and general maintenance needs; evaluate course wetlands including water flow, drainage and silt build up.
10. Participate in the selection of maintenance staff; provide or coordinate staff training; conduct annual performance evaluations; work with employees to correct deficiencies; implement discipline procedures.
11. Participate in the preparation and administration of department budget for assigned area; submit budget recommendations; estimate time, materials and equipment required for jobs assigned; requisition materials as required; monitor expenditures.
12. Ensure adherence to safe work practices and procedures; stay abreast of State and Federal occupational safety and health requirements.
13. Respond to public inquiries in a courteous manner; provide information within the area of assignment; resolve complaints in an efficient and timely manner.
14. Perform related duties and responsibilities as required.

#### QUALIFICATIONS

##### Knowledge of:

Operations, services and activities of a golf course maintenance program.  
Modern and complex principles, practices, tools and materials used in golf course maintenance.  
Acceptable playing standards for a golf course.  
Operational characteristics of various golf course maintenance tools and equipment.  
Safe and appropriate methods of pesticide and chemical application.  
Occupational hazards and standard safety practices.  
Appropriate drainage methods, watering practices and irrigation system operations for a municipal golf course.  
Principles of supervision, training and performance evaluation.  
Pertinent Federal, State, and local laws, codes and regulations.

##### Ability to:

Supervise, organize, and review the work of lower level staff.  
Supervise the proper use and application of chemicals and pesticides.  
Interpret and explain golf course maintenance policies and procedures.  
Perform a variety of maintenance, construction and repair work on the golf course.  
Identify needed golf course maintenance or repairs and implement corrective action.  
Ensure adherence to safe work practices and procedures.  
Prepare clear and concise reports.  
Communicate clearly and concisely, both orally and in writing.  
Establish and maintain effective working relationships with those contacted in the course of work.

### Experience and Training Guidelines

*Any combination of experience and training that would likely provide the required knowledge and abilities is qualifying. A typical way to obtain the knowledge and abilities would be:*

#### Experience:

Three years of increasingly responsible experience in golf course maintenance, landscaping or horticulture including one year of supervisory or lead responsibility.

#### Training:

Equivalent to the completion of the twelfth grade supplemented by college level course work in maintenance, landscaping, horticulture or a related field.

### License or Certificate

Possession of, or ability to obtain a valid pesticide applicator card.

Possession of a valid driver's license issued by the State of Nevada.

### WORKING CONDITIONS

#### Environmental Conditions:

Outdoor golf course environment; exposure to noise, dust, potentially hazardous chemicals and inclement weather conditions; work with machinery.

#### Physical Conditions:

Essential functions may require maintaining physical condition necessary for walking, standing or sitting for prolonged periods of time; moderate to heavy lifting; operating motorized equipment and vehicles.





GOLF COURSE IRRIGATION WATER BALANCE  
for  
ROSEWOOD LAKES GOLF COURSE

Irrigated Acreage = 120 Acres\*

Assumed Loss through Irrigation System = 20 %  
Assumed Leaching Fraction = 10 %

Month	Days/ Month	Average Precip (Snow and Rain) (in)	Et (in)	Net (Et- Precip)	Course Irr. (AC-FT)	Total Demand (AF)	Total Demand w/losses (ft <sup>3</sup> )	Adjusted** Total Demand (gal/month)	Total Demand (AF)	Total Demand (gpd)
JANUARY	31	2.14	-0.75	-2.89	-28.90	28.90	1,258,884	12,429,717	38.14	400,959
FEBRUARY	28	2.82	-1.36	-4.18	-41.80	41.80	1,820,808	17,977,930	55.17	642,069
MARCH	31	1.10	-3.45	-4.55	-45.50	45.50	1,981,980	19,569,278	60.05	631,267
APRIL	30	0.54	-4.33	-4.87	-48.70	48.70	2,121,372	20,945,579	64.27	698,186
MAY	31	0.72	-5.54	-6.26	-62.60	62.60	2,726,856	26,923,885	82.62	868,512
JUNE	30	0.45	-7.06	-7.51	-75.10	75.10	3,271,356	32,300,061	99.11	1,076,669
JULY	31	0.25	-8.87	-9.12	-91.20	91.20	3,972,672	39,224,574	120.36	1,265,309
AUGUST	31	0.39	-7.16	-7.55	-75.50	75.50	3,288,780	32,472,098	99.64	1,047,487
SEPTEMBER	30	0.44	-5.49	-5.93	-59.30	59.30	2,583,108	25,504,575	78.26	850,153
OCTOBER	31	0.34	-2.93	-3.27	-32.70	32.70	1,424,412	14,064,074	43.16	453,680
NOVEMBER	30	1.74	-1.39	-3.13	-31.30	31.30	1,363,428	13,461,943	41.31	448,731
DECEMBER	31	1.69	-1.03	-2.72	-27.20	27.20	1,184,832	11,698,557	35.90	377,373
<b>TOTAL</b>	<b>365</b>	<b>12.62</b>	<b>-49.36</b>		<b>-619.80</b>	<b>619.80</b>	<b>26,998,488</b>	<b>266,572,271</b>	<b>817.98</b>	<b>730,335</b>

- Calculation based on assumption that Boynton Slough is dry all year around, therefore all irrigation water is supplied by TMWRF (this is not expected) effluent water is anticipated to be used during the summer months of June through August

- Evapotranspiration (ET) data from Sparks Tree Farm from July 2004 through June 2005

\* Irrigated Acreage estimated from area of fairways and greens (the typical irrigation sites) as shown in aerials,

\*\* Adjusted using a 20% loss through the irrigation system and a 10% loss due to leaching

**Appendix F-3 RLGC MAINTENANCE MANUAL**

**City of Reno Golf Division  
Golf Course Maintenance Standards  
1999**

**Mission Statement:**

**To maintain the City of Reno's golf recreation facilities to ensure longevity of golf course properties and promote customer satisfaction by providing the best playing conditions allowed by nature year around.**

**Document Goal:**

**To set written standards by which the City of Reno's Golf facilities shall be maintained to ensure safe, clean and enjoyable golf outings for the citizens of Reno and their visitors. The City of Reno's Golf Division recognizes that not all golf courses shall be maintained to the same standards and thus sets the standard of maintenance at Rosewood Lakes to be high and the standard of maintenance at Brookside Golf Course to be medium.**

# **City of Reno Golf Course Maintenance Standards**

## **Turf**

**Turf will be healthy, of a uniform green color, and shall be maintained as an adequate playing surface with no bare spots. Realizing that the use of pesticides is restricted to the putting green surfaces with the exception of non-selective target herbicides for edging and fence line maintenance, weed and pest infestations must be kept minimal by the growth of healthy vigorous turf where weeds and pests cannot achieve establishment.**

## **Irrigation Systems**

**Irrigation systems will deliver optimum water to each plant type at the lowest cost and with maximum resource conservation. Bulk of water will be delivered during non-use hours, spot watering of hot spots may be done during use hours by hose or sprinkler but may not disrupt play or negatively effect playing conditions. All systems will comply with legal requirements and will protect safety of the public water system. Accurate records of major system maintenance, water usage and purchasing shall be maintained.**

## **Paved Surfaces**

**Paved pathways, cart paths, parking lots and other paved areas will have smooth surfaces, be properly marked or signed and, where night use is intended, be adequately lighted. Pathways and parking lots will be free of litter and graffiti.**

## **Wetland Areas**

**These areas shall be monitored and maintained to follow the guidelines and restrictions of the Army Corp of Engineers 404 permit which the City of Reno operates Rosewood Lakes Golf Course under. Areas to be monitored will include: Acreage of wetland areas, debris removal, water flows, water levels, overall health of wetlands and non-obstruction of large quantities of water when golf course becomes flood plain. Travel into these areas by man or machine must be limited to those who achieve approval by Golf Maintenance Supervisor or Golf Division Manager. Any major undertakings in the maintenance of these areas must also be approved by the Army Corp of Engineers.**

### **Landscaped Areas**

**Landscape areas will contain healthy, attractive plants that lend variety, color and interest to the landscape. These areas will be litter, weed and pest free. All trees, shrubs and other plants will be trimmed, pruned or otherwise maintained to achieve natural form.**

### **Equipment Maintenance**

**Equipment shall be inventoried, inspected on regular schedule, serviced for preventative maintenance and safety and repaired as necessary for the life of the asset. Accurate records of maintenance procedures and purchasing shall be maintained.**

### **Maintenance Facility**

**Maintain clean, orderly stocked facilities in compliance with OSHA standards. Perform all maintenance required on shop accessories and equipment for proper operation. This would include overhead doors, walk doors, air compressors, lifts, ladders, tools, etc..... to ensure these items are in proper safe working order. Those items needing maintenance which are beyond the knowledge and experience of the employees shall be turned over to building maintenance.**

## Putting Greens Maintenance Standards

Task	Description	Frequency	Season
<b>Mowing</b>	<b>3/16" - Winter Months 9/64 - 11/64" - Summer Months. Change mowing directions daily as per Supervisor's instruction. Mowing to be completed with reel type walking or riding greens mower.</b>	<b>Bi-Weekly Daily - Double Cross cut for Tournaments.</b>	<b>Year Around</b>
<b>Thatch Verticut</b>	<b>Remove thatch mat layer and control graining.</b>	<b>As needed during shoulder seasons. Lighter application for grain control during growing season.</b>	<b>Spring and Fall as needed for thatch control. Summer: Biweekly two directions.</b>
<b>Aerate</b>	<b>Core aeration 3 - 4" depth as standard procedure. Deep tine aerification to 12" as needed.</b>	<b>Two aerifications in spring with an additional aerification would be optimal.</b>	<b>Spring &amp; Fall</b>
<b>Fertilize</b>	<b>Use slow release fertilizer at rate of 1#N/1000 Sq. Ft.. Supplement with Iron, Biological Microbes and Micro-Nutrients as recommended.</b>	<b>Every 4 - 6 wks. During growing season or when color and growth are at minimums.</b>	<b>Spring, summer and Fall</b>
<b>Irrigate</b>	<b>Proper coverage, regular inspections and maintenance. May be done by irrigation system or hand syringing by hose.</b>	<b>As required by E.T. based irrigation software and daily inspections of greens.</b>	<b>Year Around</b>
<b>PUTTING GREENS MAINTENANCE STANDARDS</b>			
Task			

	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Pest Control</b>	<b>Correct identification and proper control methods. Use of Chemical, mechanical, cultural or biological when appropriate determined by supervisor. Chemical applications used according to legal requirements as defined on label.</b>	<b>When pests appear and are causing damage to greens. As determined by Maintenance Supervisor. 404 Permit Restrictions Apply.</b>	<b>Spring, Summer and Fall</b>  <b>Winter: Preventative control applications for Snow Mold disease are made in late November and early to mid February.</b>
<b>Top Dress</b>	<b>Sand applied to greens surfaces for filling of aerification holes and leveling of surface. Sand is then dragged into green to ensure holes are filled and aid leveling.</b>	<b>After each aerification holes should be filled. Once a month for medicinal purposes during growing season.</b>	<b>Spring, Summer and Fall</b>
<b>Over Seeding</b>	<b>Application of bentgrass seed to greens to increase density.</b>	<b>After aerification, but prior to topdressing application.</b>	
<b>Debris Removal</b>	<b>All debris must be removed daily to ensure optimum putting surface. This includes goose droppings during winter months and shoulder seasons.</b>	<b>Daily</b>	<b>Spring, Summer, Fall and Winter</b>

## **TEE SURFACE MAINTENANCE STANDARDS**

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Mowing</b>	<b>Height - 1/2" to 5/8" Change mowing direction each application. To be mowed with triplex reel type mower.</b>	<b>1 - 3 times per week as growth requires.</b>	<b>Spring, Summer, Fall</b>
<b>Thatch</b>	<b>As needed to keep thatch</b>	<b>Annually</b>	<b>Spring, Summer,</b>

	mat below 1" at all times.		Fall
<b>Aerate</b>	Core aeration to 4" depth, remove or grind in cores.	Twice Annually	Spring, Fall
<b>Fertilize</b>	Use slow release fertilizer at rate of 1#N/1000 Sq. Ft.. Supplement with Iron, Biological Microbes and Micro-Nutrients as recommended by supervisor.	Every 4 - 6 wks. During growing season or when color and growth are at minimums.	Spring, Summer, Fall
<b>Irrigate</b>	Proper coverage, regular inspections and maintenance. May be done by irrigation system or hand syringing by hose.	As required by E.T. based irrigation software and daily inspections of tees.	Year Around
<b>Pest Control</b>	404 Permit restricts pesticide usage in these areas. Use of mechanical, cultural and biological methods must be used as determined by supervisor.	When pests or weeds appear.	Spring, Summer, Fall

## **TEE SURFACE MAINTENANCE STANDARDS**

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Trim</b>	Trimming of long grass or weeds around signage and tee distance markers.	Generally bi-weekly or as determined by supervisor during daily rounds.	Year Around
<b>Top Dress</b>	Spreading of sand on tee surface after aerification including dragging in to level tee surface.	After each tee aerification.	Spring, Fall
<b>Debris &amp; Litter Removal</b>	Debris & trash must be removed from tee surface daily to ensure optimum playing surface. Includes	Daily	Year Around



	goose droppings during winter.		
Over seeding	Sand & seed mix is used on tee surfaces in spring to replenish damage to tees in winter. Daily divot filling is done by servicer using same mix.	Heavily in spring. Daily during growing season.	Spring, Summer, Fall
Service	Tee Markers are to be moved. Divots filled with sand & seed. Check hazard stakes to make sure all are unbroken & upright.	3 times weekly while dormant, daily during growing season	Year Around

## FAIRWAY MAINTENANCE STANDARDS

Task	Description	Frequency	Season
Mowing	Height - 1/2" Mow different direction each application. Mowed with a reel type lightweight fairway mower.	3 mowing events per week. Depending on growth & fertility.	Spring, Summer, Fall
Thatch	Removal of portion of thatch mat per application using thatcher/vacuum combination.	Once a growing season.	Summer
Aerate	Core aeration 3 - 4" depth optimum. Deep tine aerification to 12" every third year.	Twice annually during growing season.	Spring, Summer, Fall
Fertilize	Use slow release fertilizer as per 404 permit recommendations at rate of 1#N/1000 Sq. Ft..	Every 4 - 6 weeks during growing season. As per recommendations of supervisor.	Spring, Summer, Fall
Irrigate	Proper coverage, regular system testing and maintenance along with spot watering and hose	As needed per E.T. based application theory.	Year Around

	<b>syringing of hot spots.</b>		
<b>Pest Control</b>	<b>Use of Pesticides is prohibited under 404 permit. Healthy, vigorous turf must be promoted to ward off pests.</b>	<b>Monitor Daily during growing season.</b>	<b>Spring, Summer, Fall</b>
<b>Trim</b>	<b>Accessories (i.e.: ropes &amp; stakes, yardage markers, bridges, etc...) to be trimmed w/line trimmer.</b>	<b>Weekly during growing season.</b>	<b>Spring, Summer, Fall</b>

## **FAIRWAY MAINTENANCE STANDARDS**

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Over Seeding</b>	<b>Areas of turf decline due to excess moisture or alkali burn are seeded. Should be done when germination temperatures are optimum.</b>	<b>When damage affects playing surface.</b>	<b>Spring, Summer, Fall</b>
<b>Debris Removal</b>	<b>Trash &amp; debris are to be removed whenever encountered by maintenance staff. Includes removal of goose droppings.</b>	<b>Daily</b>	<b>Year Around</b>
<b>Sod</b>	<b>When repairs require sodding, sod shall be removed from back of range and repairs made. In case of major sodding necessity, sod grown in sand base should be used.</b>	<b>When repairs are too large for seed or when repair is to primary playing surface.</b>	<b>Spring, Summer, Fall</b>
<b>Servicing</b>	<b>Ropes and stakes are straightened at the beginning of each play day. Any debris removed.</b>	<b>Daily</b>	<b>Year Around.</b>

## **ROUGH MAINTENANCE STANDARDS**

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<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Mowing</b>	<b>Height 1 1/2" - 2"</b> <b>Primary roughs to be mowed with reel type mowers. Secondary roughs to be mowed with rotary type mower.</b>	<b>Once completely through all roughs each week.</b>	<b>Spring, Summer, Fall</b>
<b>Thatch</b>	<b>Removal of thatch recommended when accumulation of mat is at 1 1/2" depth.</b>	<b>Every other year for Primary rough. Every third year for Secondary rough.</b>	<b>Spring, Summer, Fall</b>
<b>Aerate</b>	<b>Core aeration 3 - 4" depth optimum. Deep tine aerification to 12" every fifth year for primary roughs only.</b>	<b>Twice annually during growing season.</b>	<b>Spring, Summer, Fall</b>
<b>Fertilize</b>	<b>Use slow release fertilizer as per 404 permit recommendations at rate of 1#N/1000 Sq. Ft.. 30 Ft. buffer zone must be left unfertilized bordering wetlands.</b>	<b>Every 4 - 6 weeks during growing season. As per recommendations of supervisor.</b>	<b>Spring, Summer, Fall</b>
<b>Irrigate</b>	<b>Proper coverage, regular system testing and maintenance along with spot watering and hose syringing of hot spots.</b>	<b>As needed per E.T. based application theory.</b>	<b>Year Around</b>
<b>Pest Control</b>	<b>Use of Pesticides is prohibited under 404 permit. Healthy, vigorous turf must be promoted to ward off pests.</b>	<b>Monitor Daily during growing season.</b>	<b>Spring, Summer, Fall</b>

### **Rough Maintenance Standards**

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Trim</b>	<b>Accessories (i.e.: ropes &amp; stakes, yardage markers, bridges and trees to be</b>	<b>Weekly during growing season.</b>	<b>Spring, Summer, Fall</b>

	trimmed w/line trimmer.		
<b>Over Seeding</b>	Areas of turf decline due to excess moisture or alkali burn are seeded. Should be done when germination temperatures are optimum.	When damage affects playing surface.	Spring, Summer, Fall
<b>Debris Removal</b>	Trash & debris are to be removed whenever encountered by maintenance staff. Includes removal of goose droppings.	Daily	Year Around
<b>Sod</b>	When repairs require sodding in primary roughs only, sod shall be removed from back of range and repairs made. In case of major sodding necessity, sod grown in sand base should be purchased.	When repairs are too large for seed or when repair is to primary playing surface.	Spring, Summer, Fall
<b>Servicing</b>	Ropes and stakes are straightened at the beginning of each play day. Any debris removed.	Daily	Year Around.
<b>Mounds</b>	Mowed with 4X4 Steiner Specialty mower. Training of proper operation of unit is essential for safe operation.	Biweekly during growing season	Spring, Summer, Fall
<b>Sand Bunker Maintenance Standards</b>			
<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Raking</b>	Machine rake bunkers, hand rake edges and position manual trap rakes around edge of bunker for customer use.	Daily during heavy play periods. 3 times a week during lighter play	Year Around

		periods.	
<b>Sand Depth</b>	<b>Bunkers should be maintained at a depth of 4" of loose sand.</b>	<b>Sand added when inspections warrants need.</b>	<b>Year Around</b>
<b>Bunker Filling</b>	<b>When depth of loose sand is below 4" level sand is added. Plywood sheets should be laid down to protect bunker face as vehicles with sand are driven into bunker and emptied.</b>	<b>When inspections warrant sand needed.</b>	<b>Year Around</b>
<b>Trap Rakes</b>	<b>Should be repositioned around bunker daily during raking. Rakes need to be replaced when broken. Rake operator replaces as is warranted.</b>	<b>During each raking occurrence.</b>	<b>Year Around</b>
<b>Sloped Bunker Face Mowing</b>	<b>Bunker face mowing utilizes FlyMo hover type mower. Mowed area consists of area from edge of sand to top of bunker face where regular rough mower can mow.</b>	<b>Biweekly</b>	<b>Spring, Summer, Fall</b>

### **Sand Bunker Maintenance**

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Drainage</b>	<b>Drainage blow outs should be located and large volumes of water run through pipe for clean out.</b>	<b>Annually</b>	<b>Fall</b>

### **Landscape Area Maintenance Standards**

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Planting</b>	<b>Plant healthy, attractive plants that add color and interest to landscape.</b>	<b>As determined by inspection.</b>	<b>Spring, Summer, Fall</b>

	<b>Plant material must be suitable for environmental and soil conditions.</b>		
<b>Irrigation</b>	<b>Adequate irrigation to sustain healthy, vigorous plant growth.</b>	<b>1 to 3/Week during shoulder seasons. Daily during heat of summer.</b>	<b>Spring, Summer, Fall</b>
<b>Pest Control</b>	<b>Correct identification and proper control methods. Use of Chemical, mechanical, cultural or biological when appropriate, determined by supervisor.</b>	<b>Inspections done weekly during growing season.</b>	<b>Spring, Summer, Fall</b>
<b>Fertilize</b>	<b>Use appropriate fertilizer according to plant needs as determined by supervisor.</b>	<b>2/year for herbaceous perennials and annuals. 1/yr. For woody plants.</b>	<b>Spring, Summer, Fall</b>
<b>Clean-up</b>	<b>Rake leaves, weed, add mulch</b>	<b>Initial spring clean-up and as needed through out the year.</b>	<b>Annually</b>
<b>Litter Removal</b>	<b>Pick-up all debris whenever encountered.</b>	<b>Daily inspections and removal as needed.</b>	<b>Year Round</b>

## **Irrigation System Maintenance Standards**

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Computer Operation</b>	<b>Adjust program according to irrigation needs including individual stations for wet or dry areas. Record then clear data from previous days watering. Check for proper feedback from satellites in field.</b>	<b>Whenever irrigation system is in use.</b>	<b>Year Round</b>
<b>Repairs</b>	<b>Repair main line, lateral</b>	<b>As needed</b>	<b>Year Round</b>

	leaks, satellites, valves and heads with manufacturers suggested materials. From June to September all repairs will be made within 24 hours. Pump house repairs beyond qualifications of Irrigation Technician shall be contracted out to outside source.		
<b>System Maintenance</b>	<b>Valve Boxes, Quick Couplers, Electrical Boxes, Air Relief Valve Boxes and sprinklers shall be edged and leveled.</b>	<b>Annually</b>	<b>Year Round</b>
<b>Pond Aeration</b>	<b>Operation monitoring, installation, removal and preventative maintenance of all pond aerators as per manufacturers recommendations.</b>	<b>Daily</b>	<b>Spring, Summer, Fall</b>
<b>Irrigation System Maintenance Standards</b>			
<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Testing</b>	<b>Observe the system and pump station in operation and make repairs or adjustments as needed. This includes Clubhouse landscape areas.</b>	<b>Weekly</b>	<b>Spring, Summer, Fall</b>
<b>Drainage</b>	<b>Blowout all drainage with blowouts. Add drainage where necessary as per supervisors recommendation. Repair or replace non-working drainage lines.</b>	<b>Annually or as needed</b>	<b>Year Round</b>
<b>Paved Surfaces Standard</b>			

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Clean Walks</b>	<b>Keep free of hazards and debris by sweeping, washing or blowing</b>	<b>Inspect Daily and Clean as Necessary</b>	<b>Year Round</b>
<b>Litter Removal</b>	<b>Pick up all debris</b>	<b>Daily or anytime staff encounters litter.</b>	<b>Year Round</b>
<b>Cleans Gutters</b>	<b>Keep free of hazards and debris by sweeping, washing or blowing</b>	<b>Inspect Monthly and Clean as necessary</b>	<b>Year round</b>
<b>Graffiti Removal</b>	<b>Remove or paint out any visible graffiti.</b>	<b>Inspect daily and treat as needed</b>	<b>Year round</b>
<b>Snow Removal</b>	<b>Remove mechanically, physically or chemically as available, according to location priority set by supervisors.</b>	<b>As Needed</b>	<b>Seasonal</b>
<b>Weed Control</b>	<b>Remove all invasive vegetation chemically, mechanically or manually.</b>	<b>As needed</b>	<b>Seasonal</b>

## **Equipment Maintenance Standards**

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Inventory Equipment</b>	<b>Develop and keep up to date a complete list of all equipment inclusive of fixed assets, to include year, make and model. Track trade-ins, "surveyed" or discarded equipment in conjunction with Bar Code check. Develop standardized numbering system for each piece of equipment.</b>	<b>Once per year with on-going tracking</b>	<b>Year Round</b>
<b>Inspect and service equipment</b>	<b>Visually inspect and service, according to owners/service manual, each piece of equipment</b>	<b>Minimum of once per year, regular intervals as required during</b>	<b>Year Round</b>



	for safety/proper function and per manufacturers interval. Repair as necessary, maintain accurate, up-to-date records/files and MSDS records. Maintain a clean, safe work area.	season.	
<b>Preventative maintenance</b>	In off season, perform complete break-down, inspection, repairs and/or replacement of all wear items according to manufacturers specifications and service manual when available.	Minimum, once per year per piece of equipment, more frequent if its high-use equipment, and whenever equipment is service/repaired.	<b>Year Round</b>

### **Equipment Maintenance Standards**

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Purchasing</b>	Through efficient purchasing maintain adequate stock of necessary parts. Utilize "City" bid system where warranted. Track purchasing to maintain budgetary limitations.	<b>Daily</b>	<b>Year Round</b>

### **Maintenance Facility Standards**

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Clean, organize tools, equipment</b>	Keep tools/tool boxes/equipment organized and stored in safe, accessible locations, free of oil, grease, dirt. Maintain adequate stock for shop use and check-out.	<b>Inspect, clean daily</b>	<b>Year round</b>
<b>Organize stock materials &amp;</b>	<b>Maintain adequate stock of proper materials,</b>	<b>Inspect Weekly</b>	<b>Year round</b>

<b>supplies</b>	<b>supplies, and repair parts, stored and organized in safe, accessible locations properly labled.</b>		
<b>Maintain record, files</b>	<b>Keep accurate and up-to-date tool and equipment check-out lists. Keep files organized, current and accurately labeled. Hazardous Communication program and MSDS book up-to-date, accessible, and accurate.</b>	<b>Inspect weekly</b>	<b>Year round</b>
<b>Clean work areas</b>	<b>Maintain clean, organized work areas, bench and table tops, free of hazards, spills, debris, and in compliance with OSHA standards. Clean wash rack after each use.</b>	<b>Inspect, clean daily</b>	
<b>Equipment and tool use.</b>	<b>Ensure proper and safe use for operator and visitors, use as intended and in compliance with OSHA standards.</b>	<b>Inspect daily</b>	<b>Year round</b>

## **Maintenance Facility Standards**

<b>Task</b>	<b>Description</b>	<b>Frequency</b>	<b>Season</b>
<b>Clean Yard</b>	<b>Vehicles, equipment stored in orderly and safe manner. Scrap any unusable items, properly disposed of. Yard kept free of weeds, hazards, debris. Storage facilities clean and organized.</b>	<b>Inspect monthly, clean as conditions dictate.</b>	<b>Year round</b>
<b>Clean offices, work area</b>	<b>Maintain clean, organized work areas, free of hazards, debris in compliance with OSHA</b>	<b>Inspect daily</b>	<b>Year round</b>

	and ADA standards.		
<b>Office Machines</b>	<b>Stocked, functioning properly, readily accessible.</b>	<b>Inspect daily</b>	<b>Year round</b>
<b>Office Files</b>	<b>Accurately maintained and up-to-date including MSDS records.</b>	<b>Inspect weekly</b>	<b>Year round</b>
<b>Office Inventory</b>	<b>Supplies well stocked, stored properly, labeled clearly.</b>	<b>Inspect weekly</b>	<b>Year Round</b>

## **Task Name: Greens Mowing**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform equipment safety &amp; operational check including fluids and tire pressure.</b>	<b>PPE, Triplex Greens Mower (Reel Type)</b>	<b>Operating speed, vehicle control, PPE</b>

**Transport to first green to be mowed, remove flag, begin mowing across center of green starting and stopping at edge of green, repeat until green is completely mowed. Mow a cleanup lap around inside edge of green completely around green, whip any & all grass clippings left behind. Proceed to next green and repeat until all greens are mowed. Greens are to be mowed daily and should be mowed in nine directions of a clock face to avoid graining. Directions would be: 12-6, 2-8, 3-9, 4-10, 6-12, 8-2, 9-3, 10-4 and returning to 12-6. Different directions are to be mowed daily.**

**Equipment Cleanup:** Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.

**Performance Measure:** Greens will be mowed in under 4½ hours, mowing lines will be straight, cleanup laps shall not encroach the collar, overlap shall be minimal and misses nonexistent.

## **Task Name: Thatching Greens**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform Equipment safety check</b>	<b>PPE, Triplex mower w/Verticut reels</b>	<b>Operating speed, vehicle control, PPE</b>

**Transport to first green to be dethatched, remove flag, begin thatching in straight line across center of green stopping and starting at edge of green. Continue in this**

pattern back & forth until both halves of green are finished. Do not mow cleanup lap with thatching mower. Thatch and clippings left behind will be removed by greensmower following directly behind. If double thatch mow is necessary repeat mowing steps in opposite direction of original mow. Move to next green and continue until all greens are finished.

**Equipment Cleanup:** Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.

**Performance Measure:** Greens will be thatched in under 3½ hours, mowing lines will be straight, overlap shall be minimal and misses nonexistent. If two directional thatching is required thatching time will not exceed 5 hours.

## Task Name: Greens Aeration

Equipment/Parts	Work Procedures	Safety Highlights
Perform equipment safety & operational check including fluids and tire pressure.	PPE, Greens Aerator	Operating speed, vehicle control, PPE

Transport to first green to be aerified, remove flag and cup, begin aeration in front edge of green and proceed to back edge being sure to aerated entirely to the outside edge of green. Repeat back and forth across green until entire green surface is finished, proceed to next green and repeat. Continue until all greens assigned for that day are complete.

**Equipment Cleanup:** Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.

**Performance Measure:** Nine greens shall be aerified in 4½ hours, overlap shall be minimal and misses nonexistent.

## Task Name: Greens Fertilization

Work Procedures	Equipment/Parts	Safety Highlights
Perform equipment safety and operational check including calibration of spreaders.	PPE, Cushman w/Thompson PTO Spreader, Fertilizer	Operating speed, vehicle control, PPE

Open two bags and empty into Thompson tailgate spreader mounted on back of Cushman vehicle. Transport to first green, Load fertilizer (use proper lifting techniques) into bed of Cushman being aware of maximum load limits for vehicle. begin along the straightest edge of green utilizing second gear of low range of

transmission. Begin in approach cut and turn spreader on as vehicle is driven across green, when reaching other edge of green turn off spreader. Make turn and find inside wheel mark of last pass and line up vehicle to throw to that wheel mark but not beyond. Repeat this process until green is completely covered with recommended rate of product. Drive to irrigation controller and water green for the amount of time recommended by maintenance supervisor. Transport to next green and repeat until all greens are fertilized and watered. Note: If greens are to be mowed that day fertilization must be done after green is mowed.

**Equipment Cleanup:** Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.

**Performance Measure:** If not mowing greens should be fertilized within 2 ½ hours, with mowing should be performed in less than 5 hours. Overlap should be minimal, misses should be nonexistent.

## **Task Name: Greens Topdress and Drag**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
Perform equipment safety and operational check including calibration of topdresser setting.	PPE, Cushman/Topdresser Combination, Sand	Operating speed, vehicle control, PPE
Consult with maintenance supervisor about proper settings of topdresser for adequate sand output. Fill topdresser with sand and transport to first green to be topdressed. Starting at outside edge of green begin driving onto green and turn on topdresser as it reaches green surface drive in straight line across green and turn off topdresser as it exits the green surface. Turn and start second pass driving topdresser along edge of first pass with minimal overlap, continue this process until green surface is adequately topdressed with sand. When topdresser is empty return to shop and refill, continue until all greens are finished. When sand is sufficiently dried a drag brush will be pulled over surface by a smooth tired vehicle at moderate rates of speed until sand is dragged into turf and if so desired into aerification holes.		
<b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.		
<b>Performance Measure:</b> Nine greens will be topdressed in under 6 hours. Overlap will be minimal, misses will be nonexistent.		
<b>Task Name: Greens Spray Application</b>		
<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>

Perform equipment safety and operational check including calibration of spray unit.	PPE, Cushman w/Cushman Sprayer	Operating speed, vehicle control, PPE
<p>After correct identification of problem and cause have been identified and decision is made to perform chemical application or in the instance of spraying liquid fertilizers the following method shall be used:</p> <ul style="list-style-type: none"> <li>a.) Select proper fertilizer or pesticide</li> <li>b.) Read label</li> <li>c.) Obtain recommended PPE</li> <li>d.) Mix in accordance with label directions</li> <li>e.) Triple rinse all pesticide containers and pour into spray tank, puncture containers prior to disposal</li> <li>e.) Apply according to label recommendations, legal requirements</li> <li>f.) Dispose of any excess mixed pesticide legally</li> <li>g.) Clean and triple rinse application device (chemically neutralize as recommended).</li> <li>h.) Record application on proper form and turn in to supervisor</li> <li>i.) Adjust water application, etc., to ensure proper pesticide action</li> </ul>		
<p><b>Performance Measure:</b> Spray all course greens in under 5 hours, if greens are mowed that day spraying is secondary to mowing, overlap shall be minimal and misses nonexistent.</p>		
<h2>Task Name: Tee Mowing</h2>		
<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
Perform equipment safety and operational check including engine fluids and tire pressure	PPE, Triples Reel Type Mower	Operating speed, vehicle control, PPE
<p>Transport triplex to first tee to be mowed, remove tee markers, with caution drive mower up slope to level tee surface. Begin by mowing cleanup lap around the inside of the outside edge of tee surface, after making complete circle begin cross mowing at center of tee and mow straight lines across tee surface. To turn lift reels and make 3-point turn remaining on tee surface, when tee surface is completely mowed replace tee markers and proceed to next tee and repeat until all course tees are complete. Tees should be mowed different directions at each mowing. Tees are to be mowed 3 times weekly and should be mowed in three directions of a clock face. Directions would be: 6-12, 8-2 and 4-10.</p>		
<p><b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</p>		
<p><b>Performance Measure:</b> All course tees shall be mowed within 5 ½ hours. Overlap will be minimal, misses will be nonexistent.</p>		

## **Task Name: Tee Surface Thatching**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
Perform equipment safety and operational check including engine fluids and tire pressure	PPE, Ransome 213D w/thatching units	Operating speed, vehicle control, PPE
Transport dethatching machine to first tee to be dethatched, remove tee markers, begin to mow directly across center of tee. Upon reaching other side make a three point turn on tee surface and come back running parallel to last pass, continue this action back & forth until tee surface has been completed. If second mow is requested by supervisor repeat above in a different direction then make cleanup lap around inside edge of tee surface. Thatch and clippings will be removed in next step of process using blowers, rakes and mowers.		
<b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.		
<b>Performance Measure:</b> All course tees shall be thatched within 5 ½ hours. Overlap will be minimal, misses will be nonexistent.		

## **Task Name: Tee Aeration**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
Perform equipment safety and operational check including engine fluids and tire pressure	PPE, GA30 aerifier	Operating speed, vehicle control, PPE
Transport to first tee to be aerified, remove tee markers, carefully drive up slope to level tee surface. Start around outside cleanup lap making passes in circular motion working way into center of tee, when all level surface has been aerified move on the next tee and repeat process. Cleanup of aerification cores will be done by grinding them with core pulverizer and removing debris or shovel off cores and haul them to dumpster. Comply with supervisors recommendation.		
<b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.		
<b>Performance Measure:</b> Nine holes of tees shall be completed in 6 hours, overlap will be minimal, misses will be nonexistent.		

## **Task Name: Tee Fertilization**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
Perform equipment safety and operational check including engine fluids and tire pressure	PPE, Cushman w/Thompson PTO Spreader, Fertilizer	Operating speed, vehicle control, PPE
<p>Open two bags and empty into Thompson tailgate spreader mounted on back of Cushman vehicle. Transport to first tee, Load fertilizer (use proper lifting techniques) into bed of Cushman being aware of maximum load limits for vehicle. begin along the edge of tee surface utilizing second gear of low range of transmission. Turn on spreader and drive down edge of tee, make three point turn at edge and make second pass throwing back to wheel mark of last pass, continue until tee surface is fertilized. Continue until all tees are fertilized. Report amount of fertilizer used to supervisor along with proper setting on spreader for record keeping. Tees should not be mowed with baskets for three days after application.</p>		
<p><b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</p>		
<p><b>Performance Measure:</b> Tee fertilization for 18 holes will be completed in 4 hours.</p>		
<b>Task Name: Fairway Mowing</b>		
<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
Perform equipment safety and operational check including engine fluids and tire pressure	PPE, Fairway Mower	Operating speed, vehicle control, PPE
<p>Transport fairway mower to first fairway to be mowed, beginning at bottom of fairway drive from rough cut onto fairway cut. When inside fairway cut lower reels and begin mowing toward green, when at approach cut in front of green lift reels turn and make next pass, repeat until half of fairway is mowed. Now begin mowing other half of fairway in the approach cut, mowing toward bottom of fairway. (This allows for proper striping of fairway.) Mow second half of fairway then begin cleanup lap from the approach and mow around inside edge of fairway cut. Proceed to next fairway and repeat process until are fairways are mowed. Fairways are to be mowed 3 times weekly and should be mowed in three directions of a clock face. Directions would be: 6-12, 8-2 and 4-10.</p>		
<p><b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</p>		
<p><b>Performance Measure:</b> Fairways will be mowed in under 4½ hours, mowing lines will be straight, cleanup laps shall not encroach the rough, overlap shall be minimal and misses nonexistent.</p>		



## **Task Name: Fairway & Rough Thatch**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
Perform equipment safety and operational check including engine fluids and tire pressure	PPE, Tractor w/Thatching Vacuum	Operating speed, vehicle control, PPE
<p>Transport tractor/vacuum combination to first fairway to be thatched and lower and engage vacuum thatching head. Begin pass along edge of fairway and proceed from bottom toward green, proceed into approach cut, lift head and turn for next pass. Continue until entire fairway is completed. Head must be lifted during pass when encountering irrigation heads, valve boxes and quick couplers as damage to these items will occur. If operator experiences a hard time seeing these items they will be flagged. Operator must monitor level of debris in hopper and dump when necessary.</p>		
<p><b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</p>		
<p><b>Performance Measure:</b> Nine holes of fairways and rough should be completed in 16 - 24 working hours.</p>		

## **Task Name: Fairway & Rough Aerate**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
Perform equipment safety and operational check including engine fluids and tire pressure	PPE, Tractor w/Pull-Behind Aerifier	Operating speed, vehicle control, PPE
<p>Transport tractor w/aerifier to first hole to be aerified, areas to be aerified in this operation will be all areas of each hole except putting, tee surfaces and mounds which are too tall for tractor to safely pass over. Begin process in area around tees including rough, then proceed to fairway, primary roughs and secondary roughs. Finish each hole by aerating areas around greens and bunkers. Moisture levels must be adequate to allow maximum penetration of aerifier tines, cores pulled should be 3 - 5" in length. Core cleanup shall be done by following aerifier with Goosen thatch/vacuum after cores have had time to properly dry.</p>		
<p><b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</p>		
<p><b>Performance Measure:</b> Nine holes of fairways and rough should be completed in 10 - 14 working hours.</p>		

## **Task Name: Fairway & Rough Fertilization**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform equipment safety and operational check including engine fluids and tire pressure</b>	<b>PPE, Cushman w/Vicon Spreader</b>	<b>Operating speed, vehicle control, PPE</b>
<b>Fertilizers used must be of slow release nature to reduce leaching and lateral movements of nutrients in solution. Fill spreader with fertilizer utilizing safe lifting practices and not to exceed 15 bags per Vicon load. Also fill a utility vehicle with bagged fertilizer not to exceed 800# and proceed to first hole of fertilization schedule. All areas of each individual hole will be fertilized except for putting surfaces, tee surfaces and a 25' buffer strip between fertilized turf and wetland areas. Nine holes a day should be completed ahead of play.</b>		
<b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.		
<b>Performance Measure:</b> Nine holes of fairways and roughs will be fertilized ahead of play in 5 - 6 hours.		

## **Task Name: Fairway & Rough Pesticide Application**

### **Work Procedures**

**Perform equipment safety and operational check including engine fluids and tire pressure**

### **Equipment/Parts**

**PPE,**

### **Safety Highlights**

**Operating speed, vehicle control, PPE**

**Use of Pesticides in this area is prohibited under 404 permit.**

**Equipment Cleanup:** Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.

**Performance Measure:**

## **Task Name: Fairway & Rough Trim Work**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform equipment safety and operational check including engine fluids and tire pressure</b>	<b>PPE, Line trimmer</b>	<b>Operating speed, vehicle control, PPE</b>
<b>Load line trimmer, extra line, proper fuel and PPE into utility vehicle and proceed to first hole to be manicured. Areas per hole to be checked on weekly basis are: mouths of bridges, hazard stakes, ballwashers, trash cans, yardage markers, signage and Irrigation controllers. If growth around any of these items is long trim down to adequate height being careful not to scalp the turf. A light touch should be used so as not to damage or remove paint from any of these items. When first hole is complete move onto next hole assigned and continue until all holes assigned are finished.</b>		
<b>Equipment Cleanup: Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</b>		
<b>Performance Measure: Nine holes of trim work should be completed in 4 - 5 hours.</b>		

## **Task Name: Sod & Seed Applications**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform equipment safety and operational check including engine fluids and tire pressure</b>	<b>PPE, Sod cutter, seed spreader.</b>	<b>Operating speed, vehicle control, PPE</b>
<b>If wear, weather or disease cause turf to need to be replaced supervisor shall render decision as to whether to sod or sand and seed areas to be replaced. Generally this will depend on time of year and temperatures. If seed is to be used, soil in area of should be removed to a level of one foot and replaced with sand and top should be seeded and worked into sand to a level of ½ to 1" below surface. Area must be kept moist for a period of 2 weeks and should be roped off to keep carts, machinery and foot traffic out of area. If sod is to be used, the same process should be used but seed should be substituted by a covering of level sod with all edges pressed tightly together.</b>		
<b>Equipment Cleanup: Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</b>		
<b>Performance Measure: Due to differences in size and levelness; neatness and timeliness shall be evaluated per area to be completed.</b>		

## **Task Name: Primary Rough Mowing**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform equipment safety and operational check including engine fluids and tire pressure</b>	<b>PPE, Ransomes 213D Triplex or Rotary Mowers</b>	<b>Operating speed, vehicle control, PPE</b>
<b>Supervisor will recommend to operator whether reel type or rotary type mower is to be used based on height of turf and moisture levels. Take recommended mower out to starting hole and begin mowing roughs inside of carpaths and inside of wetlands on each hole. This would include areas of tee banks, rough directly around fairway proper and around greens. On occasion there is a need to mow these areas two to three times in different directions to knock turf down to appropriate height. Supervisor will advise when this extreme mowing is necessary. After first hole is completed continue onto next hole assigned and so on until all assigned holes are finished.</b>		
<b>Equipment Cleanup: Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</b>		
<b>Performance Measure: Nine holes of rough should be mowed in 5 to 6 hours depending upon rate of play.</b>		

## **Task Name: Secondary Rough Mowing**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform equipment safety and operational check including engine fluids and tire pressure</b>	<b>PPE, Rotary type rough mowers.</b>	<b>Operating speed, vehicle control, PPE</b>
<b>Proceed with rotary type mower to first hole to be mowed. Begin mowing all areas outside primary roughs and inside wetlands. This would include all areas of rough not mowed with Triplex type rough mower. When process is complete on first hole move on to assigned holes in order until task is completed.</b>		
<b>Equipment Cleanup: Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</b>		
<b>Performance Measure: Nine holes should be completed in 12 - 14 hours depending upon rate and pace of play.</b>		

## **Task Name: Mound Mowing (Steiner)**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform equipment safety and operational check including engine fluids and tire pressure</b>	<b>PPE, Steiner 4x4 rotary mower.</b>	<b>Operating speed, vehicle control, PPE</b>
<b>(Note: Steiner 4x4 has two oil reservoirs which must be maintained by venting both tanks at same time at a minimum of 20 minutes every 2 hours.) Proceed with Steiner to first set of mounds to be mowed and begin down one edge from one end of set to the other. Turn around and proceed back in opposite direction up and down mounds, continue with this process until all mounds in set are completed. Proceed to next assigned set of mounds and repeat until all assigned mound areas are mowed. It is imperative that caution be exercised in this task as severe slopes can be dangerous if speed and mower operation are not under control.</b>		
<b>Equipment Cleanup: Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</b>		
<b>Performance Measure: Nine holes of mounds will be mowed in 8 to 10 hours. Supervisor understands that safety is a primary concern in this task.</b>		



## **Task Name: Bunker Raking**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform equipment safety and operational check including engine fluids and tire pressure</b>	<b>PPE, Mechanical Sand Trap Rake</b>	<b>Operating speed, vehicle control, PPE</b>
<b>Transport trap rake to starting point as assigned by supervisor. Drive machine into Sand trap, stop, get off machine and walk around trap and place all manual rakes around outside edge of bunker to make them easily available to our customers. Return to rake and lower cultivator and raking devices and begin to make figure eights throughout bunker, after stirring bunker completely once then start a circular pattern working from the outside in to the center. After making last pass down center of bunker drive out and lift and shake both devices as you exit bunker. Use a manual trap rake and rake the outside edges to trap being sure to work sand into bunker as opposed to out on the bunker face. Make complete pass around edge of green doing so. When complete move onto next trap or hole until all bunkers have been raked as assigned.</b>		
<b>Equipment Cleanup: Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</b>		
<b>Performance Measure: All traps on course should be raked in 4 to 4 ½ hours.</b>		

## **Task Name: Bunker Filling**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform equipment safety and operational check including engine fluids and tire pressure</b>	<b>PPE, Loader, Utility Vehicles, Hand Tools</b>	<b>Operating speed, vehicle control, PPE</b>
<p><b>Supervisor will inspect bunkers weekly to see if levels of loose playable sand are present. Supervisor will assign to simply add sand to bunkers or to empty cavity and replace all sand. If sand is to be removed, it is to be done by hand so as not to destroy subsurface drainage with heavy equipment and hauled out in utility vehicles. Once stripped of sand and drainage inspected, bunker filling will be done in the follow manner which is the same as general bunker filling.</b></p> <p><b>After inspection and supervisor has assigned bunker filling task, use loader to load utility vehicles with sand, being careful to meet and not exceed weight limitations. Haul 4x8' sheets of plywood to use as ramps so bunker face is not destroyed by equipment pulling in and out. Place plywood to cover bunker face and use as ramp for entering and exiting the bunker. Haul sand into bunker and dump, continue this process until sufficient sand is in bunker. Use hand tools and mechanical rake to level and work edges of bunker, finish by grooming bunker for play and move to next assigned bunker. Continue this pattern until all assigned bunkers have been completed.</b></p>		
<p><b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</p>		
<p><b>Performance Measure:</b> If dig out of old sand is necessary then task will take 16 - 20 hrs to complete depending on bunker size. If just adding sand to bunker 1 ½ to 3 hrs.</p>		

## **Task Name: Bunker Face Hover Mowing**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform equipment safety and operational check including engine fluids and tire pressure</b>	<b>PPE, Flymo, Fuel Can, Replacement flymo string</b>	<b>Operating speed, vehicle control, PPE</b>
<b>Load flymo, PPE and extra fuel in utility vehicle and transport to first bunker to be mowed. Unload flymo and put on PPE. Start flymo and begin mowing around sand edge at bottom of bunker face, continue upward until top is reached. Continue this moving around bunker until total bunker face on trap is mowed. Load flymo onto utility vehicle and proceed to next bunker, continue this process until all assigned bunkers have been mowed.</b>		
<b>Equipment Cleanup: Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</b>		
<b>Performance Measure: Nine hole of bunker faces shall be mowed in 6 -8 hours depending upon rate and pace of play and length of turf to be mowed.</b>		

## **Task Name: Drainage Cleanout**

<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
<b>Perform equipment safety and operational check including engine fluids and tire pressure</b>	<b>PPE,</b>	<b>Operating speed, vehicle control, PPE</b>
<b>Blow outs on all green and bunker drainage should be located annually and cleaned out by putting a running hose into pipe and allowing it to run until water coming out of discharge is clean and flowing at an acceptable rate. This is necessary to clean out debris, rodents and impediments in pipe system and allow for maximum flow when necessary.</b>		
<b>Equipment Cleanup: Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.</b>		
<b>Performance Measure: To be completed annually.</b>		

<b>Task Name:</b>		
<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
Perform equipment safety and operational check including engine fluids and tire pressure	PPE,	Operating speed, vehicle control, PPE
<b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.		
<b>Performance Measure:</b>		

<b>Task Name:</b>		
<b>Work Procedures</b>	<b>Equipment/Parts</b>	<b>Safety Highlights</b>
Perform equipment safety and operational check including engine fluids and tire pressure	PPE,	Operating speed, vehicle control, PPE
<b>Equipment Cleanup:</b> Return to maintenance facility, fuel and thoroughly clean equipment in preparation for next use. Report any and all malfunctions or repairs needed to equipment technician.		
<b>Performance Measure:</b>		

***Appendix G***

***MCCARRAN BOULEVARD***

***MEDIAN SITE 2-7***

*Appendix H*

*MIRA LOMA PARK*

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*SITE 2-8*



***Appendix I***

***TRUCK FILL***

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*Appendix J*

*FUTURE FLOOD CONTROL*

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*SITE 3-2*

*Appendix K*

*FUTURE FLOOD CONTROL*

*SITE 3-3*

*Appendix L*

*FUTURE FLOOD CONTROL*

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*SITE 3-4*

*Appendix M*

*FUTURE FLOOD CONTROL*

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*SITE 3-5*

*Appendix N*

*FUTURE FLOOD CONTROL*

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*SITE 3-6*

*Appendix O*

*FUTURE FLOOD CONTROL*

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*SITE 3-7*

*Appendix P*

*AVANSINO FAMILY*

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*SITE 3-8*



*Appendix Q*

*G&J AVANSINO SITE*

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*SITE 3-9*

*Appendix R*

*LONGLEY PROPERTIES*

*INVESTORS SITE 4-1*

*Appendix S*

*AIRPORT AUTHORITY*

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*SITE 4-2N*

*Appendix T*

*AIRPORT AUTHORITY*

*SITE 4-2S*

*Appendix U*

*JAMAICA PARK*

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*SITE 4-3*

*Appendix V*

*BUTLER RANCH*

*SITE 5-1*



