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CARSON CITY PUBLIC WORKS
WATER DIVISION

WATER CONSERVATION PLAN
September 2018

OWNER:
CARSON CITY
3505 Butti Way
Carson City, NV 89701
(775) 887-2355

Prepared by:
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The Carson City Public Works Water Department (PWWD) provides potable water to customers within an overall service area that extends north to the Goni Canyon Area, south to the Douglas County border, east to the Lyon County border and west to the Sierra foothills. Production facilities include the Quill Water Treatment Plant and 32 groundwater wells. Water is obtained from both surface and groundwater sources. Currently, Carson City has completed a regional water system project which will result in the interconnection of the Minden water system, the North Douglas County water system, the Indian Hills General Improvement water system, the Carson City water system and the Lyon County (Dayton) water system. Carson City has purchased an additional 1,250 acre feet of water rights from the Town of Minden. Minden will supply up to 12,000 gallons per minute of water to the regional system. Ultimately, this will add an additional 4,500 gpm to Carson City's production capability.

At the time this plan was prepared, the distribution system includes approximately 235 miles of water mains, 14,000 fire hydrants, 32 wells, 16 storage tanks, and 16 pressure zones. All customer connections are metered (*NRS 540.141 (1)(f)*).

There has been a 3 percent per year decrease in overall water use since a peak occurred in 2007. The likely reason for the decrease is the economic downturn that has affected housing and standard of living in Nevada for the past three years. Most of the decrease in water use has occurred during June through September; the months of highest anticipated water use.

One highlight of the Carson City conservation effort includes conjunctive use. Conjunctive use is the coordinated management of surface water and groundwater supplies to maximize the yield of the overall water resource. Carson City's approach is to rely on surface water in wet years and to use groundwater in dry years. Conjunctive use is becoming a key part of the City's overall water management strategy in terms of coping with its water demands.

The City continues the three-day-a-week watering schedule from June 1st to October 1st, requiring that odd-numbered addresses water on Tuesday, Thursday, and Saturday and even-numbered addresses water on Sunday, Wednesday, and Friday with no watering between the hours of 10:00 a.m. and 6:00 p.m. Outdoor irrigation is not allowed on Mondays. (*NRS 540.141 (1)(i)*)

The Public Works Water Division is constantly seeking new uses for reclaimed wastewater. Currently all of the treated effluent that is produced is put to use. Uses include irrigation of the cemetery, Edmonds Sports Complex, Prison Farm, golf courses and the Governors Field Complex. Potential future uses of treated effluent include Mills Park and the Anderson Ranch. (*NRS 540.141 (1)(c)(2)*)

Regarding efforts to reduce the amount of unaccounted for water, the Water Utility has an ongoing leak detection program that includes the survey of approximately 25 miles of pipe annually. (*NRS 540.141 (1)(c)(1)*)

The purpose of this plan is to document current conservation efforts and provide a strategy for future water saving measures and incentives.

This plan is mandated by Nevada Revised Statute (NRS) 540.131 and is compliant with NRS 540.121 through 540.151. This plan has also been updated to comply with the additions as a

result of the 2017 Nevada Legislative Session. Per NRS 540.131.4(a) this plan is available for public inspection at the following location:

3505 Butti Way
Carson City, Nevada 89701
Ph: 775-887-2355
Fax: 775-887-2112

Public comments about this plan are encouraged. Written comments may be sent to the address above.

Nevada is considered the driest State in the nation. Because of this, the proper management of water rights is an important aspect of water conservation. This section provides a profile of water production, usage, and a quantitative description of the Carson City water system that will include the following:

- Water rights information
- Existing supply sources and their production
- System water use profile with customer classifications and unaccounted for water
- Water use forecast using projected population growth

The purpose of this section is to analyze water sources and demand and establish a basis for conservation measures.

1.1 Water Rights

Total current usable water rights (ground + surface) equal 17,602 acre-ft annually (AFA) per year in the name of Carson City. Carson City's average water demand from 2014 to 2017 is 11,124 AFA. Carson City has access to surface water from Marlette Hobart Water System (MHWS). These state owned rights are not added in to the total usable rights due to water quality issues, but the City has access to them for purchase. The only useable right from the MHWS comes from springs on the East Slope spring collection system that is diverted to Carson City and to Virginia City and that number is shown in the useable section.

1.1.1 Ground Water Rights.

Table 1.1 is a summary of current ground water rights currently held by Carson City. The Eagle Valley is a total combined duty amount for 6,716.30 AFA, or supplementally adjusted, and does not include the drought permits (Permit 61505, 61507, 61508) which allows Carson City to pump a maximum of 11,700 AF for a one year period provided that the average groundwater pumped from Eagle Valley over a period of five consecutive drought years will not exceed 9,900 AFA, as set forth under State Engineer Order 1140. (See Permit Terms for Drought Permits) The Carson Valley groundwater totals include the Carson – Douglas Intertie Pipeline.

TABLE 1.1

Summary of Carson City Ground Water Rights

GROUNDWATER	ANNUAL PERMITTED (AF)	USABLE (AF)
Eagle Valley (Basin 104)	6,716	6,716
Dayton Valley (Basin 103)	3,206	2,330
Carson Valley (Basin 105)	3,553	3,553
Totals	**13,475**	**12,599**

1.1.2 Surface Water Rights.

Table 1.2 is a summary of current surface water rights currently held by Carson City. The Quill Water Treatment Plant production has been significantly reduced in recent years due to water quality issues from both the Marlette Hobart and Ash Creek sources.

TABLE 1.2

Summary of Carson City Surface Water Rights

SURFACE WATER	ANNUAL PERMITTED (AF)	USABLE (AF)
Carson River (Basin 103)	2,295	2,095
Kings Canyon (Basin 104)	939	939
Ash Canyon (Basin 104)	1,666	0
Clear Creek (Basin 105))	273	0
State Owned Franktown Creek Decree and Marlette Water (Basins 89 and 90 respectively)	3,000 from Marlette State Owned (7,240 from Franktown Creek State Owned (Not included in total))	1,969
Totals	**8,173**	**5003**

1.2 Supply Sources, Production and Storage

1.2.1 Supply Sources

Table 1.3 shows 2017 yearly average production for the Quill water treatment plant and wells in the Carson City system.

TABLE 1.3

Daily Average Production Capabilities by Source (2017)

Source or Well Number	Production (gpm)
3	1,231
4	0
5	289
6	430
7	250
8	358
9	350
10B	870
11	556
16B	0
24B	985
25B	830
33	96
34	330
38	331
40	1,240
41	1,595
43	504
44	335
45	511
46	227
47	0
48	280
49	0
50	750
51	866
53	100
54	0
55	797
Town of Minden Intertie	3,500
Quill WTP	1,600
Total Daily Average Production (gpm)	**19,211**

1.2.2 Storage

Table 1.4 shows existing Carson City storage facilities and their capacities.

TABLE 1.4

Storage Facilities

Storage Facility	Capacity (gal)
Quill Tank	4,000,000
Quill Reservoirs	3,200,000
Chlorine Contact Tank	500,000
Ash Canyon Tanks	6,000,000
Ash Canyon Reservoir	1,000,000
Timberline Tank	600,000
Lakeview Tank	508,000
Tanstaafl Tanks	500,000
Goni Tank	3,000,000
East Carson Tank	2,600,000
Prison Hill Tank	3,000,000
Goni Canyon Tank	400,000
Voltaire Tank	2,000,000
Highway 50 East Water Tank	3,000,000
Total Storage Capacity	**30,308,000**

1.3 Water Use Profile

1.3.1 Use by Customer Class

Water use categories in the Carson City system include residential, commercial, and institutional users. The institutional users include Federal, State (including the Nevada State Prisons), and City connections. Percentages in Figure 1.1 are averages derived from the Water Division's Fiscal Year Water Consumption reports from 2006 to 2017. The Figure includes non-revenue water; the 10 percent average being considered standard for the water industry.

The system unaccounted-for water is the difference between the amount produced and the amount used by metered customers. Using average values for total production, including surface water sources, and total revenues per class, the Carson City system has approximately 7 percent gross unaccounted-for water which is below the industry average. This number is taken from an average of the last 4 years of production data, which best represents how the system is operating. Potential causes for unaccounted-for water include leaking mains, fire flow testing, system flushing, dead meters, under-registering meters, record keeping practices, un-metered uses, and unauthorized use. Carson City does a system flush every year and that amount is not accounted for in this number. The actual water loss would be much lower if that was accounted for.

FIGURE 1.1

Customer Use by Class

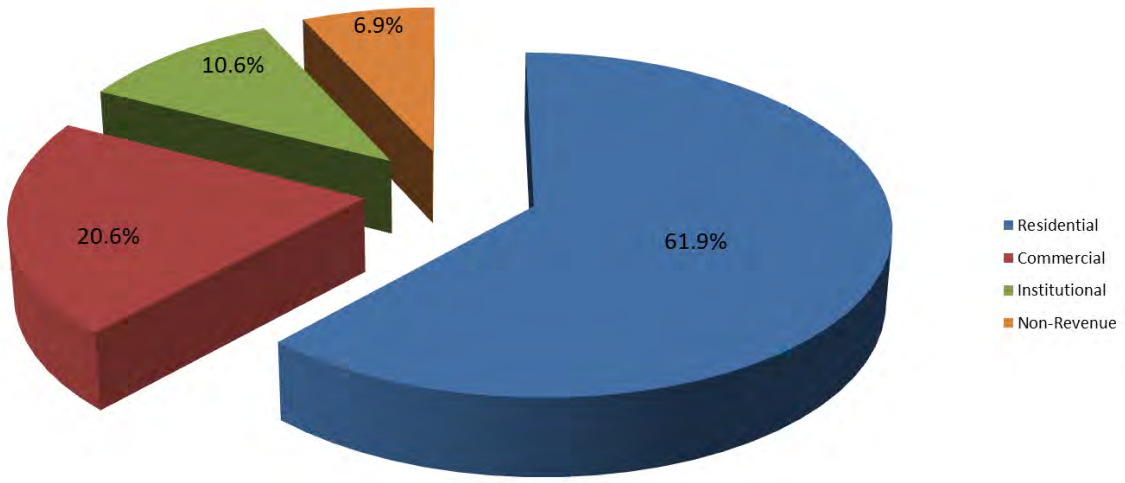


FIGURE 1.2

Overall Monthly Use

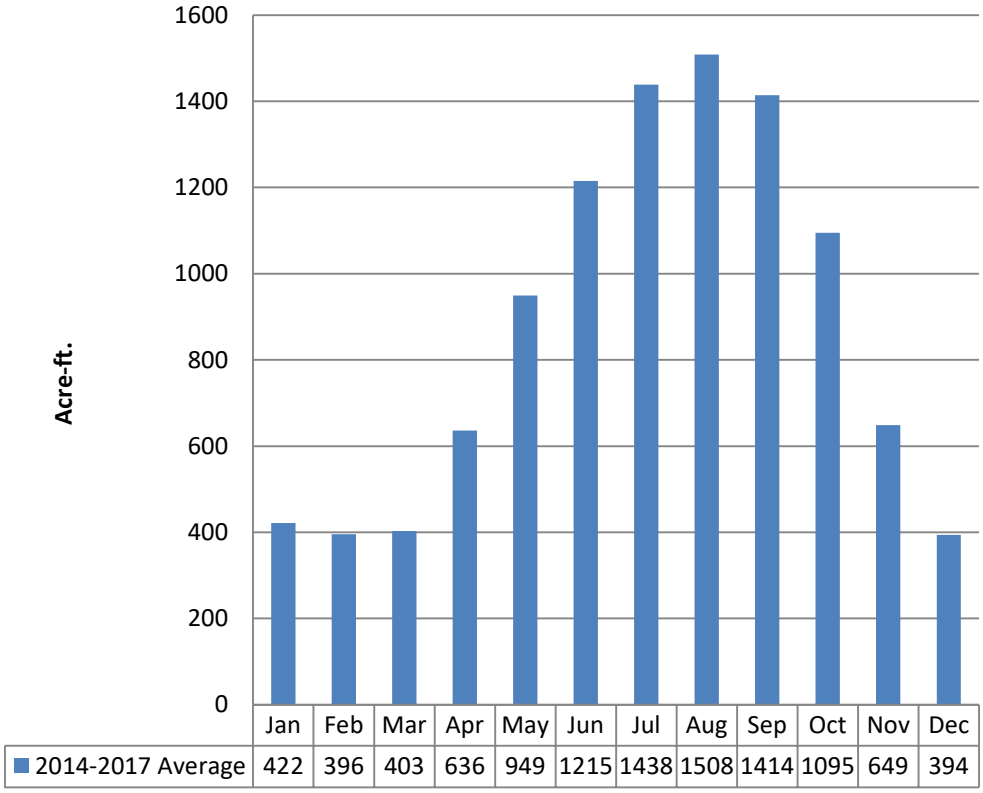


Figure 1.2 shows the monthly water use for 2014 through 2017. In the Carson City system the highest use occurs from July through September and the lowest from December through February. August (highest month) use is approximately 400 percent higher than December (lowest month) use.

Total Carson City metered use (including commercial, residential and institutional) was approximately 173 gallons per capita per day (gpcd). This number is the result of the average usage from 2008 to 2018. The gpcd is based on the Nevada State Demographers population estimate for Carson City of 55,885 for 2018.

The average residential-only gpcd for this same 10 year period was 113 gpcd. This amount is less than the State average residential use supplied by a public entity of 122 gpcd (United State Geological Survey for year 2015).

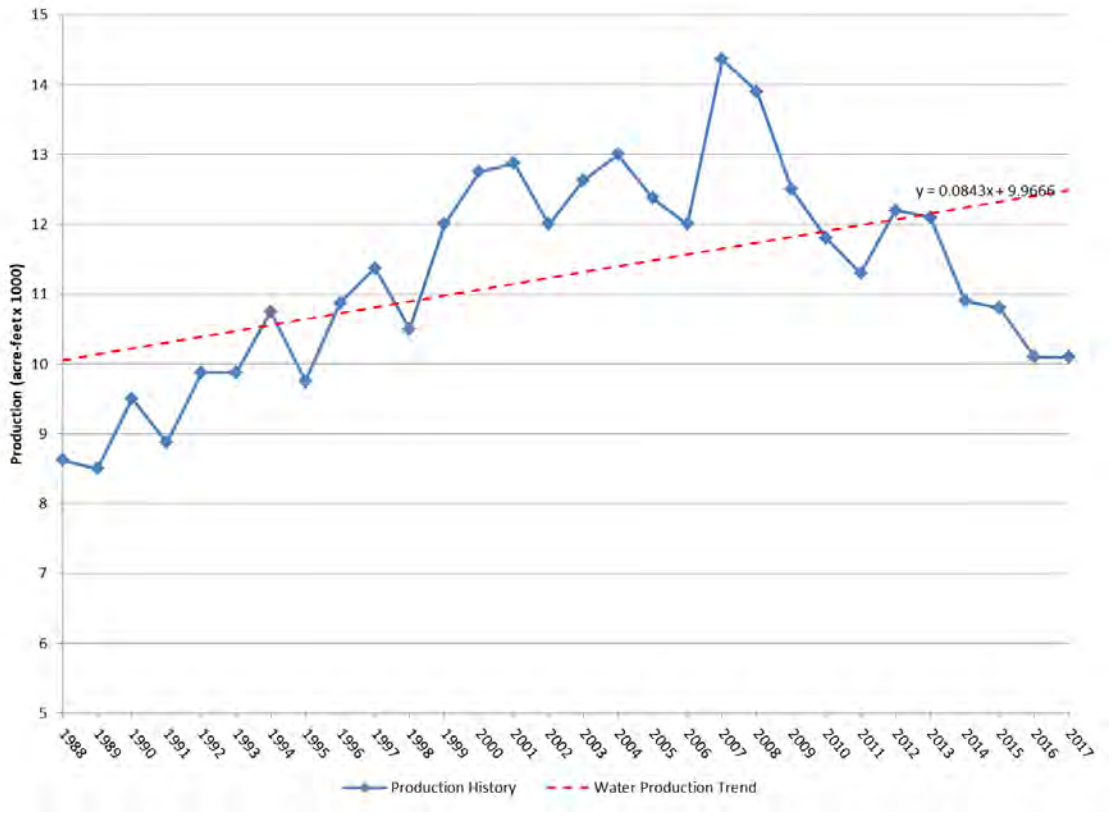
1.4 Water Use Forecast

From 1988 to 2009, demand has increased at an average rate of 262 acre-feet per year as shown in Figure 1.3. However, from 2007 through 2016, overall usage in the Carson City area decreased at a rate of about 3 percent per year. This was also during the great recession where population decreased significantly. Another very important factor that shows up in this chart is

that Carson City raised its rates in the fall of 2013 which greatly affected the consumption and decreased the gpcpd, especially in the residential use. Because of this, the production forecast in this plan is based on the 20 year period rather than the short-term. Also, often times water consumption will return back to "normal" a few years after conservation takes place if the conservation is due to a change in water rates, also known as "rate shock". This is important to track in future updates to this plan.

FIGURE 1.3

Water Production 1988 through 2017



Using the 26-year trend line shown in Figure 1.3, approximately 0.5% increase per year to predict future demand, projected production through 2036 is as shown in Table 1.5.

TABLE 1.5

Projected production for 2018 to 2036 based on Figure 1.3 trend line

Year	Production (AF)
2018	10,121
2019	10,136
2020	10,221
2021	10,306
2022	10,391
2023	10,476
2024	10,561
2025	10,645
2026	10,730
2027	10,815
2028	10,900
2029	10,985
2030	11,070
2031	11,155
2032	11,240
2033	11,325

2034	11,410
2035	11,495
2036	11,580

Table 1.6 shows population estimates from the ”2017 Population Projections for Nevada counties 2017 to 2036” report created by the Nevada Department of Taxation, factoring in additional factors such as Tesla and Housing Costs.

TABLE 1.6

Population estimate 2017 to 2036

Year	Population
2018	55,885
2019	56,128
2020	56,322
2021	56,523
2022	56,744
2023	57,002
2024	57,276
2025	57,503
2026	57,713
2027	57,904
2028	58,074
2029	58,226
2030	58,374
2031	58,520
2032	58,665
2033	58,793
2034	58,911
2035	59,006
2036	59,088

Assuming that the demand continues to be 173 gpcd, projected metered water use is shown in Table 1.7.

TABLE 1.7

Projected metered use for 2018 through 2036 based on State Demographers population estimates

Year	Metered Use (AF)
2019	10,877
2020	10,914
2021	10,953
2022	10,996
2023	11,046
2024	11,099
2025	11,143
2026	11,184
2027	11,221
2028	11,254
2029	11,283
2030	11,312
2031	11,340
2032	11,368
2033	11,393
2034	11,416
2035	11,434

2036	11,450

The production estimate from the trend line (Table 1.5) and the production estimate derived from the October 2017 State Demographers population estimates and current estimated gpcd (Table 1.7) provide a range for estimating future water needs. However, the estimate based on the latest demographer's report and gpcd may be more accurate due to the fact that much of the trend line data predates conservation efforts.

Conservation incentives by definition are those things that increase awareness and encourage conservation. There are three general categories of conservation incentives: Educational, Financial, and Regulatory.

A conservation measure is a device or practice that reduces water consumption. Conservation measures are divided into two fundamental categories: (1) hardware or equipment, and (2) behavior or management practices. Examples of hardware measures include low-volume toilets and irrigation rain sensors. Examples of behavioral measures include not using the toilet as a trash can and watering lawns less frequently. Examples of management measures include the reuse of treated effluent and rebate programs. Some conservation measures are mandated by state and/or federal laws and others are voluntarily implemented by local water purveyors and/or customers.

This section discusses the incentives and measures currently in place or planned for future implementation in the Carson City service area. Incentives and measures discussed include:

- Water Rates (existing incentive)
- Ordinances (existing incentive)
- Educational materials (existing incentive)
- Plumbing standards (existing incentive)
- Landscape code (existing incentive)
- Plumbing Retrofits
- Watering schedule (existing measure)
- Leak detection, Meter Accuracy, and Pressure Management (existing measure)
- Effluent reuse (existing and proposed measure)
- Drought plan (existing measure)

2.1 Water Rates

Carson City uses an inclining block rate structure that could be considered a financial conservation incentive. With inclining block rate structures the unit price for water increases as the volume consumed increases. The service charge rate schedules and block rate charges for the Carson City service area are shown in Tables 2.1 and 2.2

TABLE 2.1

Monthly residential and commercial service charges

Meter Size	Residential/Commercial	Multifamily
5/8”	$27.39	$9.70 per unit
1”	$41.68	
1-1/2”	$62.22	
2”	$77.41	
3”	$113.14	
4”	$148.87	
6”	$220.33	
10”	$547.84	

TABLE 2.2

Monthly residential and commercial commodity charges (per 1000 gallons)

Residential Usage	Charge		
First 5,000 gallons per month	$1.76	Commercial	$3.53 per 1000 gallons
Next 25,000 gallons per month	$3.07	Multifamily	$1.99 per 1000 gallons
Over 30,000 gallons per month	$4.91	Industrial Manufacturing	$3.71 per 1000 gallons

2.1.1 Analysis of Rate Structure (NRS 540.141.2)

Although marginal prices (see Figure 2.1) are important, the average price for water is what water customers see reflected in their bills. Because consumers respond to what they see on their monthly bill, the most effective inclining block rate structures are those that send a strong price signal to customers as consumption increases.

Average prices are most effective when they increase at higher levels of consumption. The average price curves shown in Figure 2.2 compare the curve for Carson City with those of the Las Vegas Valley Water District (LVVWD), City of Tucson Arizona, and Truckee Meadows Water Authority (TMWA). The comparison shows that in Carson City, the average price per unit of water decreases until users exceed 30,000 gallons. Above 30,000 gallons the average price of water increases sharply. In Tuscon, the average price begins to increase gradually after 11,000 gallons, much earlier than Carson City. The point at which the average price begins to increase sends a signal to water users that water use beyond that point will be more expensive.

FIGURE 2.1

Carson City Marginal Price Curve Comparison as of August 2018

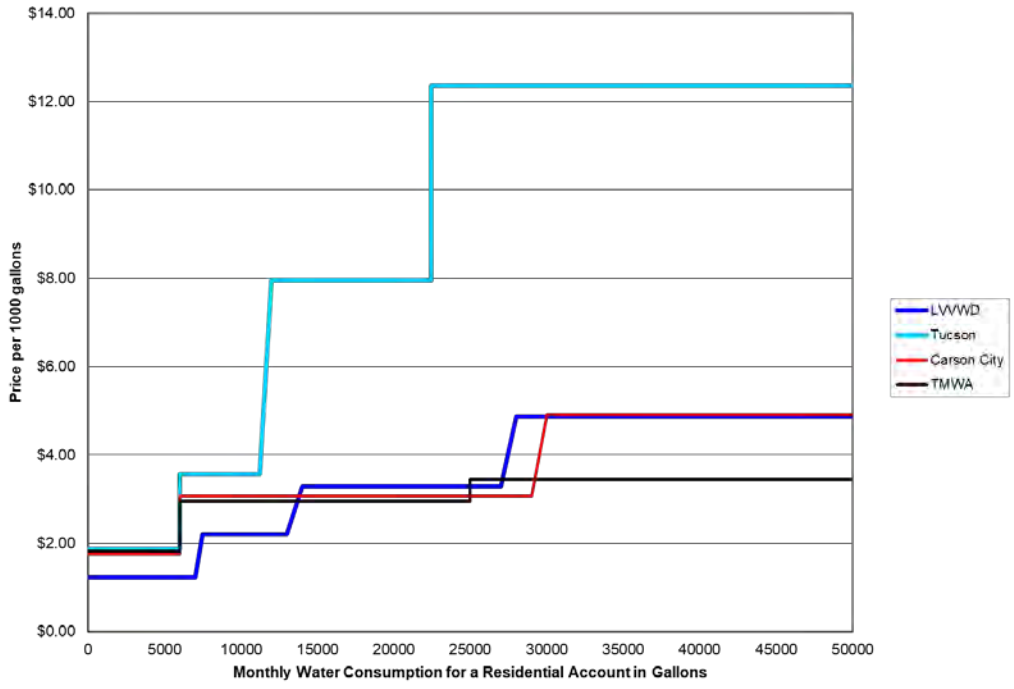
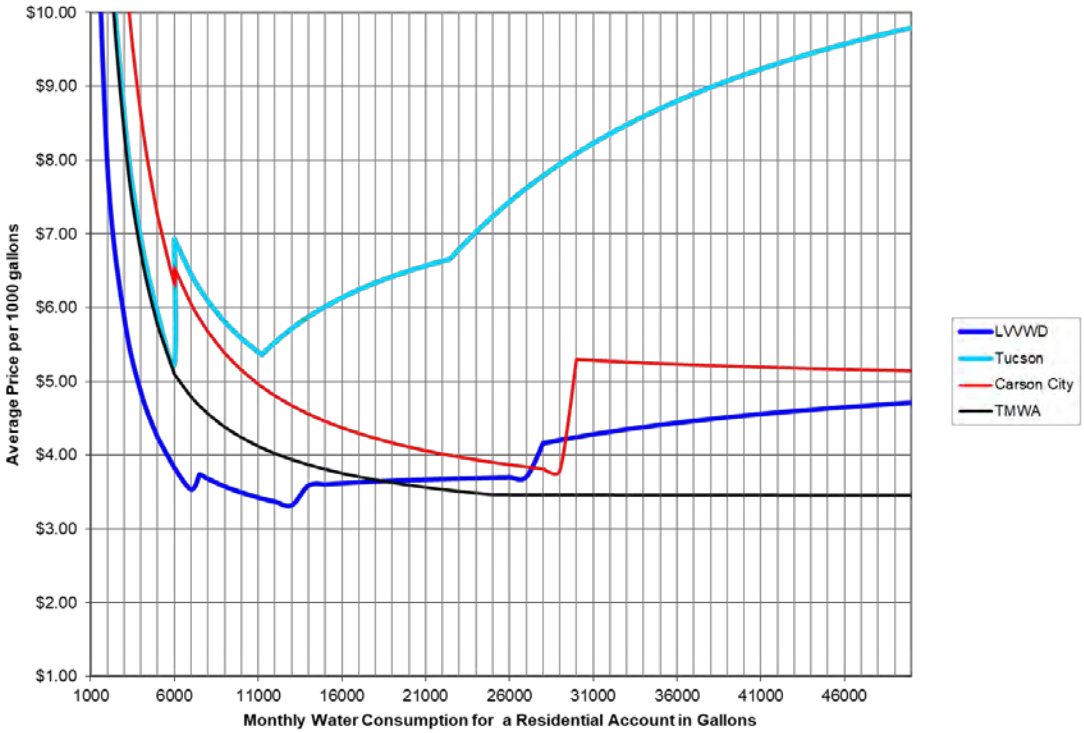


FIGURE 2.2

Carson City Average Price Curve Comparison as of August 2018



Not all systems can structure their rates to achieve the same sharp increase in average price for high water usage like Tucson. Each system has to implement rates that balance conservation with revenue and demographic needs. The Carson City rate schedule accounts for system needs while sending a price signal to customers who exceed average use levels.

It is difficult at this time to estimate the amount of water that will be conserved as a result of the inclining block rates. This is due to the fact that the rates are new and the highest "conservation" tier did not become effective until November 2017.

2.2 Ordinances and Enforcement

Carson City has enacted ordinances prohibiting water waste and limiting irrigation. The ordinances are included in Appendix F.

2.3 Educational Materials and Programs

Carson City has developed conservation objectives that include public education. Educational materials in the form of pamphlets that encourage reduction in lawn size and provide general conservation measures are available at the public works office, on the Carson City website http://carson.org/government/departments-g-z/public-works/water, and through periodic mail distribution. These pamphlets are shown in Appendix A.

Landscape guides are useful to water customers who need information regarding water friendly landscapes. There are two excellent landscape guides available online that are well suited to the Carson City area. One is the guide created by Truckee Meadows Water Authority (TMWA). It can be found at: http://www.tmwalandscapeguide.com/landscape_guide/interactive/index.php.

Another excellent guide created by the University of Nevada Cooperative Extension is the Home Landscaping Guide for the Tahoe Basin. The guide was designed specifically to help homeowners landscape their property in the most environmentally sensitive way. The guide can be found at: http://www.unce.unr.edu/publications/files/nr/2006/eb0601.pdf.

Educational materials encourage changes in water use habits. Table 2.3 shows U.S. Environmental Protection Agency (EPA) estimates for residential water use by fixtures and appliances. The average Carson City residential gpcd of 113 is less than mid-range according to the EPA estimates. With the current population of 55,188, a minor reduction in the use of each fixture and appliance could save a substantial amount of water.

TABLE 2.3

Range of Residential Water Use in Gallons per Day (EPA National Estimates)

Use	Per Person (Low)	Per Person (High)
Toilets	6.4	48.00
Showers	7.50	75.00
Baths	6.00	10.00
Washing Machine	9.00	25.00
Dish Washer	1.00	4.50
Kitchen Faucet	1.00	15.00
Bathroom Faucet	1.00	9.00
Landscape	12.2	162.6
Total	**44.1**	**349.1**

If water customers were to reduce use by just 10 gallons per day, millions of gallons of water per year could be saved. Table 2.4 shows a range of potential savings depending on different customer participation levels.

TABLE 2.4

Potential Residential Conservation Resulting from Education

% of Users Consuming 190 gallons/day	New gpcd Average (gal)	Amount Conserved Annually (AF)
25	217.5	157
50	205.0	313
75	192.5	470

*Table assumes current population of 55,188

2.4 Plumbing Standards (NRS 540.151.1(b))

The most recent Federal plumbing standards in Table 2.5 apply to the Carson City service area. California's standards are also included in the table. In the event Carson City implements a fixture retrofit program, the City could choose to use the California standards since they meet or exceed the Federal standards. The use of California standards could potentially allow for greater water savings.

In 2006, the U.S. Environmental Protection Agency (EPA) created the WaterSense Program. This voluntary national program certifies products that use 20 percent less water than the federal minimum without sacrificing performance. WaterSense certified fixtures include dual-flush toilets and 1.28 gpf toilets, which are lower than the federal maximum flow rate of 1.6 gpf. Since then, California, Georgia, Texas, and most recently Colorado have matched the EPA WaterSense flow rate criteria in creating their state efficiency standards.

TABLE 2.5

Federal and California Plumbing Standards

Device	FEDERAL ENERGY POLICY ACT (FEPA) AND NEVADA'S CURRENT STANDARDS		CALIFORNIA	
	Manufacture	Effective Date	Sale and Installation	Effective Date
Shower Heads	2.5 gpm*	1/1/94	2.5 gpm	1/1/2014
Lavatory Faucets	2.5 gpm	1/1/94	2.2 gpm	1/1/2014
Sink Faucets	2.5 gpm	1/1/94	2.2 gpm	1/1/2014
Metering Faucets	*	1/1/94	†	7/1/92
Tub Spout Diverters	Not included in FEPA		0.1 to 0.3‡	3/20/92
Residential Toilets	1.6 gpf§	1/1/94	1.28gpf	1/1/2014
Urinals	1.0 gpf§	1/1/94	1.0 gpf	1/1/92

http://www.ncsl.org/research/environment-and-natural-resources/water-efficient-plumbing-fixtures635433474.aspx#standards

* Gallons per minute.

† Hot water maximum flow rate range from 0.25 to 0.75 gal/cycle and/or from 0.5 gpm to 2.5 gpm, depending on controls and hot water system.

‡ 0.1 (new), to0.3 gpm (after 15,000 cycles of diverting).

§ Gallons per flush.

2.5 Landscape Code (NRS 540.151.(c))

The Carson City landscape code applies to the following new development:

- Multi-family residential with 3 or more units
- Institutional uses
- Commercial uses
- Industrial uses
- Public uses

The code includes provisions for irrigation, tree and plant types, mulches, turf, and maintenance. The following summarizes code requirements specifically related to conservation:

1. Well planned irrigation systems with separate irrigation zones based on water needs.
2. Automatic irrigation components that conserve water.
3. Turf standards that minimize the need for irrigation and reduce runoff. This includes slope limitations, buffer zones, and limitations on turf size. Turf size limitations are the following:

Development Area	Permitted Turf Area
Less than 5 acres	50%
5 acres to less than 10 acres	40%
10 acres to less than 15 acres	30%
15 acres or larger	25%

4. Approved lists of plants and trees that are indigenous to arid regions.
5. Mulch requirements that will keep the soil cool and prevent or limit evaporation.
6. Maintenance requirements that will ensure that the landscape will continue to function as originally planned.

A copy of the code is included in Appendix I.

2.6 Plumbing Retrofits (NRS 540.151.1(b))

Literature distributed by Carson City PWWD encourages the retrofit of plumbing fixtures. Even though the Federal Energy Policy Act (FEPA) has mandated the manufacture and installation of efficient plumbing fixtures since 1994, there are still inefficient fixtures and appliances in use.

Table 2.6 includes physical housing characteristics for occupied housing units from the 2012-2016 American Community Survey for Carson City. The table shows the number and percentage of the total of houses built per decade from pre-1939 to present. The table can be used to estimate the number of homes that could benefit from plumbing retrofits.

TABLE 2.6

Housing Data for the estimated 23,459 existing houses in Carson City

Year Structure Built	Occupied Housing Units	Number of Houses
2014 or later	0.0%	0
2010 to 2013	1.0%	244
2000 to 2009	11.3%	2,657
1990 to 1999	20.9%	4,893
1980 to 1989	19.7%	4,616
1970 to 1979	29.8%	7,000
1960 to 1969	12.4%	2,919
1950 to 1959	2.8%	660
1940 to 1949	1.0%	231
1939 or earlier	1.0%	239

Source: U.S. Census Bureau

Table 2.7 shows the capacity of older plumbing fixtures and the potential water savings that could result from the retrofit of these fixtures. The assumed average household size for the table is 2.43 persons per U.S. Census household data for Carson City.

TABLE 2.7

Potential Plumbing Retrofit Water Savings

		WATER USE (gpd)		WATER SAVINGS (gpd)	
Fixture*	**Fixture Capacity**	**Per Capita**	**Per Household****	**Per Capita**	**Per Household****
Toilets***					
Efficient	1.5 gal/flush	6.0	14.6	N/A	N/A
Low-Flow	3.5 gal/flush	14.0	34.0	8.0	19.4
Conventional	5.5 gal/flush	22.0	53.5	16.0	38.9
Conventional	7.0 gal/flush	28.0	68.0	22.0	53.5
Showerheads†§					
Efficient	2.5 [1.7] gal/min	8.2	19.9	N/A	N/A
Low-Flow	3.0 to 5.0 [2.6) gal/min	12.5	30.4	4.3	10.5
Conventional	5.0 to 8.0 gal/min	16.3	39.6	8.1	19.7
Faucets†§					
Efficient	2.5 [1.7] gal/min	6.8	16.5	N/A	N/A
Low-Flow	3.0 [2.0] gal/min	8.0	19.4	1.2	2.9
Conventional	3.0 to 7.0 gal/min	13.2	32.1	6.4	15.6
Fixtures Combined					
Efficient	N/A	21.0	51.0	N/A	N/A
Low-Flow	N/A	34.5	83.8	13.4	32.6
Conventional	N/A	54.5	132.4	33.5	81.4

Source: Amy Vickers, "Water Use Efficiency Standards for Plumbing Fixtures: Benefits of National Legislation", *American Water Works Association Journal*. Vol 82 (May 1990): 53

*Efficient = post-1994, Low-Flow = post-1980, Conventional = pre-1980;

**Assumes 2.43 persons per household.

***Assumes four flushes per person per day. Does not include losses through leakage.

†For showerheads and faucets: maximum rated fixture capacity [measured fixture capacity]. Measured capacity equals about 2/3 the maximum.

§Assumes 4.8 shower-use-minutes per person per day and 4.0 faucet-use-minutes per person per day.

Table 2.8 provides an estimate of potential water savings by combining information from both tables 2.6 and 2.7. Table 2.8 also assumes the following:

- 2.43 persons per household
- All fixtures in the homes will be retrofitted
- The 2012-2016 American Community Survey is accurate

The estimate shown is likely high since many homes may have already been retrofitted and the savings from those retrofits has already occurred. However, the table demonstrates that a substantial amount of water can be saved by retrofitting older homes with more efficient fixtures.

TABLE 2.8

Estimates of Potential Retrofit Water Savings for Carson City

		WATER SAVINGS (gpd)				
Year Structure Built	**Number of Houses**	**Toilets**	**Shower heads**	**Faucets**	**Per Household**	**Total for all Homes**
1980 to 1989	4,616	19.4	11.0	3.1	34.5	159,252
1979 or earlier	11,049	48.45	20.7	16.4	85.6	945,794
					Grand Total	**1,105,046**

Total estimated potential savings from Table 2.8 is 1,238 AF annually.

2.7 Watering Schedule

Per Carson City Municipal Code Ordinance 12.01.130, water regulations are in effect from June 1st to September 30th. During this period, no watering is allowed between 10 a.m. and 6 p.m. daily and no watering is allowed on Mondays.

The schedule is based on the odd/even address system. Odd addresses water on Tuesday, Thursday, and Saturday; even addresses on Sunday, Wednesday, and Friday.

Studies have shown that watering restrictions can reduce summertime water use by 20 to 30 percent depending upon climate and soils. The Carson City watering schedule is shown in Appendix B.

2.8 Leak Detection, Meter Accuracy, and Pressure Management

2.8.1 Leak Detection

Carson City Public Works has an ongoing leak detection program that includes the survey of approximately 25 miles of pipe per year (NRS 540.141.1(c)(1)). The amount of water savings from this measure can vary substantially from year to year due to the varying condition of the pipes surveyed. For example, a detailed water audit and leak detection program of 47 California water utilities found an average loss of 10 percent and a range of 30 percent to less than 5 percent of the total water supplied by the utilities. The July 1997 American Water Works Association Journal cites examples of more than 45 percent leakage.

Between 2015 and 2019, the average amount of unaccounted-for water in Carson City was approximately 6.9 percent. It is probable that some of the unaccounted-for water can be attributed to causes other than leaks. Water losses can also occur due to illegal connections, accounting procedure errors, reservoir seepage and leakage, reservoir overflow, theft, etc. Other losses can be due to beneficial uses such as main flushing and/or firefighting.

2.8.2 Meter Accuracy

Carson City has an ongoing meter testing program. Typically, the utility uses its own bench testing equipment to test meters when they are changed out from customer services or inaccuracies are suspected.

2.8.3 Pressure Management

The Uniform plumbing code requires pressure regulating valves be installed on all water services. Carson City has installed and maintains over 45 prv's throughout the city to regulate pressure in 22 different pressure zones. The city maintains between 25 and 150 psi., the average being approx. 60-110 lbs.

2.9 Effluent Reuse (NRS 540.141.1(c)(2))

Carson City has developed objectives aimed at maximizing effluent reuse. The objectives include the following:

1. Development of a land use application priority list for excess effluent, to be evaluated on an annual basis.
2. To continue to meet with existing effluent users on an annual basis to assess their current needs.
3. To continue to work jointly with the Nevada Division of Environmental Protection on Carson City's reuse system, ensuring continued compliance with reuse regulations and discharge limits.
4. To continue to meet the City's existing contractual agreements with current effluent users.

Currently, Carson City supplies treated effluent to 16 locations including:

- Eagle Valley Golf Course
- Empire Ranch Golf Course
- Silver Oak Golf Course
- Pet Cemetery
- Governors Field
- Upper Centennial Park
- Saliman Landscape
- Lone Mountain Cemetery
- Prison Farm Irrigation
- WWRP Landscape
- Butti Way Reuse Overhead
- College Parkway
- Edmonds Park

The current total reuse program saves more than 1 billion gallons of potable water per year. There are also plans to convert Mills Park and Anderson Ranch to reclaimed water within the next few years. Reclaimed water use at the additional locations will add millions of gallons more in potable water savings. Table 2.9 below shows a breakdown of the recent re-use usage.

TABLE 2.9

Reclaimed Wastewater Re-Use Summary 2010 - 2017

	Reclaimed Wastewater Use Summary 2010 - 2017									
Year	2010	2011	2012	2013	2014	2015	2016	2017	Total	Average
	AF	AF	AF	AF	AF	AF	AF	AF		AF
Eagle Valley Golf Course	792	778	920	828	778	801	857	727	6,481	810
Empire Ranch Golf Course	536	531	680	765	938	832	837	602	5,721	715
Silver Oak Golf Course	428	420	486	465	425	451	504	300	3,479	435
Prison Farm Usage	1,397	1,510	968	780	1,103	753	1,208	1,188	8,907	1,113
Subtotal	3,153	3,239	3,054	2,838	3,244	2,837	3,406	2,817	24,588	3,074
Pet Cemetary	3	3	0	0	0	0	0	0	6	1
Governors Field	23	21	25	21	0	0	0	0	90	11
Upper Centenial Field	23	19	25	17	0	0	0	0	84	11
Saliman Landscape	0	0	0	0	0	0	0	0	0	0
Edmonds Park	70	73	85	85	0	0	0	0	313	39
Lone Mtn. Cemetary	22	21	27	20	4	0	0	0	94	12
WWRP Landscape	0	0	0	0	0	0	0	0	0	0
Butti Way Reuse Overheads	0	1	0	0	10	1	0	0	12	2
Butti Way Hyd S.	0	3	1	0	4	1	0	0	9	1
Overhead	11	8	4	0	0	0	0	0	23	3
College Parkway	51	33	29	18	0	0	0	0	131	16
Subtotal Parks, other	203	182	196	161	17	2	0	0	761	95
Total AF Reuse	3,356	3,421	3,250	2,999	3,261	2,839	3,406	2,817	25,349	3,169
Potable Water Supplementation to Prison Farm					327	159	185	0		168

2.10 Drought Plan

The Carson City Drought Plan is included in Appendix D (NRS 540.141.1(d)).

2.11 Additional Incentives and Measures

The following incentives and measures may be considered for future implementation.

2.11.1 School Visits.

Local school children can be taught about conservation by local public works experts. There are a number of water models available that can be used to do this.

2.11.2 Education for Large Water Consumers.

Some water customers consume large amounts of water as a matter of necessity. Examples of these customers include hotels, golf courses, manufacturing companies and even large homes. Schools and parks may also use large amounts of water. Carson City Public Works can encourage these entities to use water more efficiently by offering conservation training or performing audits that help pinpoint sources of potential waste. The City can also sponsor courses offered by the Irrigation Association. These courses provide information on irrigation techniques including audits, design, installation and maintenance. Information for the Irrigation Association may be found at www.irrigation.org.

2.11.3 Submetering.

Submeters are meters installed in the main water lines that enter the individual units of multi-family properties (apartments, condominiums, duplexes, etc...) and/or subdivided areas of commercial, industrial, or institutional (ICI) facilities. Traditionally such properties and facilities were built with one master meter that served the entire complex or facility. Submeters can be used as a measure that property or company owners can use to conserve water and cut costs. Submetering has the following basic advantages:

- Decrease in overall water consumption of 18% to 39%[1].
- Fair allocation of water costs to residents.
- Potential increase in property owners net operating income.
- Increase in water use efficiency.
- Proper allocation of water costs within ICI operations.

[1] *Submetering, RUBS, and Water Conservation,* prepared for the National Apartment Association and the National Multi Housing Council by Industrial Economics Incorporated, June 1999.

In residential applications, submeters can reduce consumption by making the individual users responsible for their own water bill. When water use by multi-family units is measured by a single meter, leaks in individual units often go undetected. Measuring the consumption of each unit may also discourage waste.

In ICI applications separate meters can be used for individual processes thereby encouraging use efficiency. Landscape irrigation can be monitored separately from facility use. In institutions such as universities, water costs can be directed to the departments that use the water. Manufactures can cut costs and determine which processes or equipment needs to be improved or replaced.

There are some disadvantages to submetering. Retrofits may be expensive and may prove to be economically unfeasible. Also, some of the financial incentive for landlords to install conservation devices (low-volume toilets and low-flow fixtures) is removed. These shortcomings, however, are not present in new construction. Whether new construction or retrofit, consideration should be given to both conservation and cost.

2.11.4 Conservation Committee.

A conservation committee made up of public works representatives, landscape specialists, and community leaders could be created. This committee is important because some conservation measures can have a broad affect on the utility as well as the community. The committee could discuss proposed measures and incentives prior to implementation to be certain all contingencies have been considered.

2.11.5 Monitoring.

Monitoring water use helps the City focus on customers that consume the greatest amount. By establishing the sources of greatest use, specific customers could receive conservation training specifically related to their needs. High use customers could benefit from audits, leak detection, and technology upgrades. Also, commercial and industrial connections could be audited/inspected to determine if their consumption could be reduced. For all water customers there is financial incentive to cut waste. Currently, the Utility Billing Technicians monitor unusual consumption reports and contact the affected customer to advise them of potential leaks.

Table 3.1 shows the estimated schedule for the implementation of measures and incentives in the Carson City area (NRS 540.141.1(e)).

TABLE 3.1
Plan Implementation Schedule

Incentives and Measures	**2010**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Water Rates	Implemented		New Rates Implemented	New Rates Implemented	New Rates Implemented	New Rates Implemented	New Rates Implemented
Effluent reuse	Implemented		Additional effluent use at Mills Park and Anderson Ranch				
Educational Materials	Implemented						
Landscape code	Implemented						
Leak Detection	Implemented						
Waste ordinance	Implemented						

Additional incentives and/or measures may be added as the success of those that are currently in place or proposed are evaluated. Also, existing programs may be expanded according to their effectiveness and need.

This Section shows the estimated savings due to implementation of the conservation measures explained in Section 2.

4.1 Savings due to Rates

Carson City residents use approximately 113 gpcd and the average number of persons per home is 2.43. Based on these statistics, the average use per home per month is estimated to be 8,223 gallons. Prior to July, 2010, the cost for this amount of water was $21.24.

Carson City residential rates increased starting in 2013 and ending in 2017. Based on the new rates, the average 8,223 gallons per month would cost $42.33. The $21.09 equals a 50 percent price increase. Since the rates were raised beyond an inflationary response, use would be expected to decline (AWWA Manual M52). This anticipated decrease in use is due to price elasticity. Price elasticity is used to express the effectiveness of pricing in reducing water use. It is defined as the ratio of percentage change in consumption per the percentage change in price. For example, in one study (Hanke, S.H. *Demand for Water Under Dynamic Conditions*. Jour. Water Resources, 6:5 (Oct. 1970)) the price elasticity of indoor water use was estimated to be -.26 and of outdoor use -.40 (these elasticity's are approximately near the center of a broad range). If the 50 percent Carson City rate increase were applied to these elasticity's, they would result in a 13 percent reduction in indoor use and a 20 percent decrease in outdoor use. In general, studies have shown that outdoor use is more elastic than indoor use.

Despite the value of price elasticity, it is difficult to estimate the amount that use will decrease in Carson City due to a rate increase without more data. For this reason, a 5 percent decrease in consumption after a rate increase is a reasonable assumption (Green, Deborah. *Water Conservation for Small-and Medium-Sized Utilities*, AWWA, 2010). It should be kept in mind, however, that the effects of an increase eventually wear off and the long-term savings end up being lower than the initial savings.

Assuming the 5 percent savings, Carson City residential consumption should be reduced from 113 gpcd to 107 gpcd, a savings of 6 gallons.

4.2 Savings due to Effluent Reuse

Carson City Public Works currently saves over 1 billion gallons of potable water per year by using treated effluent for landscape irrigation. The City is planning to use effluent at Mills Park and Anderson Ranch in the near future. Mills Park is slightly larger than Governors Field where approximately 52 million gallons of effluent is currently used per year. This would be a gpcd reduction of 2.5 gallons.

4.3 Savings due to Educational Materials

It is difficult to estimate the effect of educational materials on water conservation. However, studies have shown that when public information is the only conservation measure offered by a utility, water savings range from 2 to 5 percent during non-crisis periods (American Water Works "*Water Conservation for Small and Medium-Sized Utilities").* If this estimate of savings is accurate, the amount saved in 2010 would be somewhere between 285 and 713 acre-ft. Table 2.4 shows the approximate mid-range (470 AF) at 75% participation. Water savings of 2 to 5 percent would result in a gpcd reduction of 3.7 to 9.3 gallons.

4.4 Savings due to Watering Schedules

An odd/even watering schedule is currently in place in the Carson City system. Large cities, including Los Angeles, California and Austin, Texas have reported savings between 20 and 30 percent due to odd/even schedules and the associated restrictions (watering hours, etc…).

4.5 Savings due to Plumbing Standards/Retrofits

Carson City does not have a plumbing retrofit program in place but educational material distributed by the public works department encourages water customers to retrofit fixtures. Table 2.8 shows the potential conservation that could come from retrofits. It is difficult, however, to estimate additional savings since fixtures in many of the older homes in the service area may have already been retrofitted with newer more efficient fixtures. Table 2.8 provides an estimate of potential water savings based on the participation shown. The Table suggests that as much as 18.4 gpcd could be saved from a plumbing retrofit program.

4.6 Savings due to the Landscape Code

The landscape code applies only to new construction but it limits the amount of turf that can be installed on projects as specified in Section 2.7. The code states the following: "*The following standards for the use of turf in landscaping are intended to conserve water by minimizing the need for water for irrigation and minimizing irrigation water wasting."*

Because the amount and type of new construction in Carson City cannot be predicted, it is difficult, if not impossible, to estimate the amount of water saved due to the code. However, demonstration garden experiments done by the East Bay Municipal Utility District (EBMUD) showed a 45 to 55 percent difference in water use between traditional landscapes and low-water-use landscapes. The main difference between the landscape types was a reduction in the use of turf.

4.7 Savings due to Turf Rebates

Lawn rebates have been shown to be very effective in Las Vegas. According to the Southern Nevada Water Authority (SNWA) the average savings has been 55 gallons per square foot of turf per year. The savings in Carson City would be approximately 25 gallons per square foot, an estimate based on current evapotranspiration rates from May through September. For this reason, Carson City is currently considering implementing a turf rebate program.

4.8 Savings due to Leak Detection

Carson City has a leak detection program that surveys approximately 25 miles of pipe per year. The system currently has 7 percent unaccounted-for water. It should be noted, however, that all unaccounted-for water may not be attributed to leaks.

4.9 Savings due to Waste Ordinances

The existing waste ordinance has been in place for several years and no studies were done to compare current waste with that experienced in the past. Nevertheless, the ordinance acts as deterrence to unnecessary waste.

The implementation of conservation measures and incentives can provide benefits to both water customers and the City. For water customers the benefits are as follows:

- Reduced energy use (lower hot water use)
- Reduced maintenance costs (due to low-water-use landscaping)
- Lower water bills

The City benefits from lower water use as well. The potential benefits include:

- Reduced water purchases
- Reduced pumping costs
- Lower chemical use
- Reduced or deferred facility capital expansion costs
- Reduced storage costs
- Reduced wastewater processing costs

There are also costs associated with conservation measures and incentives. Some potential costs include:

- Administration including managing programs and keeping records
- Field labor costs
- Material costs
- Marketing costs

Water savings must be realized in order to justify the cost of measures and incentives. An estimate of potential water savings based on a 20 percent reduction in overall use by 2020 is shown in Figure 5.1.

FIGURE 5.1

Projected water savings based on a 2 percent per year decrease in use

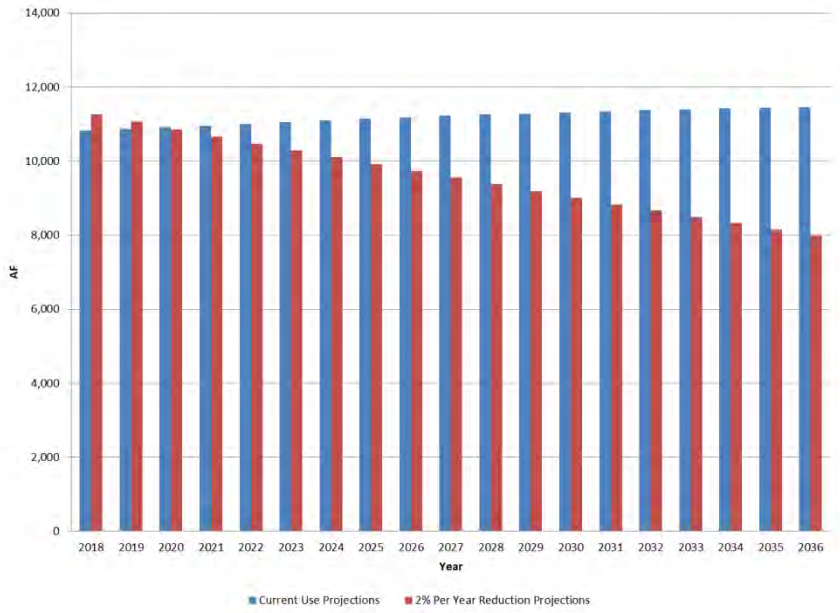
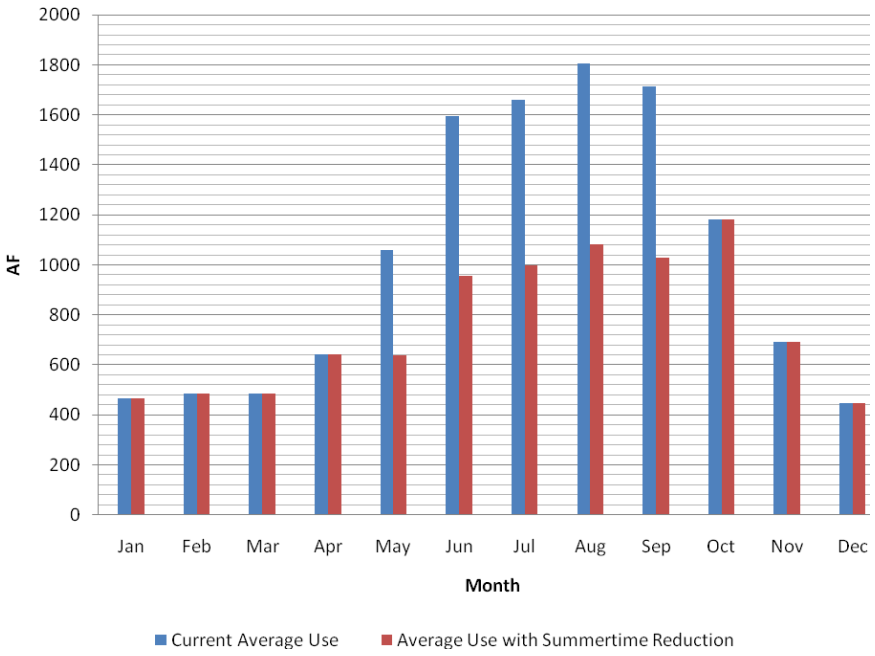


Figure 5.2 shows savings resulting from converting to low-water-use landscaping. A 40 percent decrease in summertime use (May through September) is assumed based on the experience of EBMUD. The figure shows the average monthly use shown in Figure 1.2 as well as the same data with a 40 percent reduction in summertime use. The reduction would result in an approximate 25 percent annual decrease in water use.

FIGURE 5.2

Projected water savings from Low-Water-Use Landscape Conversion



NRS 540.141.1(f) requires that this plan include a provision relating to measures to evaluate the effectiveness of this plan. The plan metrics are described below.

The American Water Works Association Water Conservation Division January 2010 Subcommittee Report *"Water Conservation Measurement Metrics"* defines a metric as follows:

> *"A metric is a unit of measure (or a parameter being measured) that can be used to assess the rate of water use during a given period of time and at a given level of data aggregation (e.g., system-wide, sector-wide, customer level, or end-use level). Another term for a metric is performance indicator.*
>
> *Basically, a metric is a formula. In the context of measuring water use, there are very many possible metrics that can be formulated. Some examples of water usage metrics include: total water use per capita per day; residential indoor water use per dwelling unit per day; or average volume of water being used for flushing toilets."*

The same report defines benchmarks:

> *"A benchmark is a particular (numerical) value of a metric that denotes a specific level of performance, such as a water efficiency target. Sometimes a distinction is made between a benchmark (which indicates a current state of achievement) and a target which indicates a state of achievement expected at some time in the future.*
>
> *Basically, benchmarks or targets are numerical values of the metric to which the calculated metric values are intended to be compared. Metrics and benchmarks can be defined in either absolute or relative terms. For example, some broadly defined benchmarks may reflect conservation goals of water utility, which are often expressed in relative terms, such as a 15 percent reduction of average annual per capita water use in 10 years.*
>
> *Examples of specific absolute-value benchmarks include: Energy Policy Act of 1992 requirement that all residential toilets had to flush using no more than 1.6 gallons per flush; or*
> *Energy Star residential clothes washer standard water factor WF ≤ 8.0 gallons per cycle per cubic foot. Here, the values of 1.6 gallons and 8.0 gallons are benchmarks, which are expressed in absolute terms (i.e., quantity of water being used)."*

Regarding metrics, the most commonly used scaling variable is population served. The metric of aggregate use is the "per capita use" in gallons per capita per day (gpcd). This metric is obtained by dividing average daily production (in gallons) by total population served. This, along with the benchmarks shown in Tables 2.3, 2.5 and 2.7 and Appendix H, provide a means to measure the success of the measures and incentives discussed in this plan.

This plan will be reviewed and updated a minimum of every 5 years in accordance with NRS 540.131.4(c). When the plan is reviewed, the plan metrics and benchmarks can be used to determine the effectiveness or appropriateness (due to economics) of the measures and incentives included in this plan. The current residential use is 113 gpcd, which is already on the low end, which can be used as the basis for future reviews.

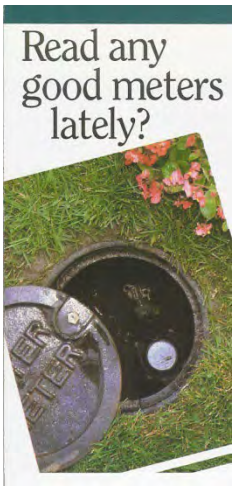
The Carson City PWWD recommends the following conservation objectives:

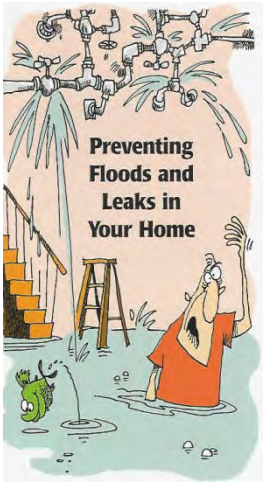
- Continue to implement through existing ordinance, an ultra-low-flow plumbing fixture program, thus gaining additional wastewater treatment capacity and water rights through their installation.
- To continue to review existing City ordinances and develop new ordinances to ensure that state-of-the-art water conservation fixtures are maintained.
- To encourage reduction in the size of lawns and the use of plants that are adapted to arid and semi-arid climates.
- To increase public awareness through public education, of the limited water supply in the State of Nevada and the need to conserve water.
- To continue to utilize a tiered rate structure that encourages and rewards conservation efforts.

Of the objectives listed, those expected to have the greatest effect on conservation are lawn size reduction and the plumbing program. PWWD has considered the possibility of implementing a lawn rebate program and found that a rate increase would be required to fund such a program, therefore making it not feasible at this time. Therefore PWWD will continue to encourage lawn size reduction through programs currently in place.

FIGURES A.1, A.2, and A.3

AWWA Conservation Pamphlets





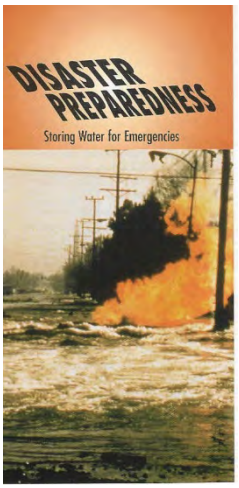
Read any good meters lately? Guide provides instruction for reading and interpreting meter information. It also teaches water customers how to measure the amount of water they use in different applications (see figure A.1).

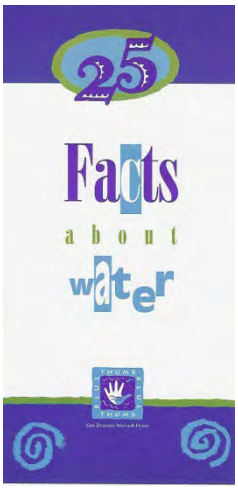
Yes, you can...fix a leaky faucet by yourself pamphlet gives step-by-step instructions on how to fix a leaking faucet. It includes a list of tools necessary to perform the repairs (see figure A.2).

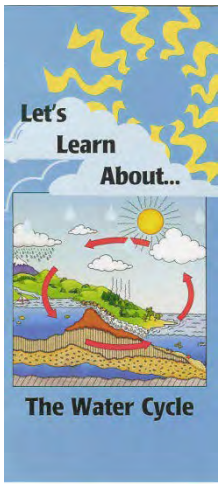
Preventing Floods and Leaks in Your Home emphasizes the importance of locating a master valve and discusses where it might be. It also deals with faucet, toilet, and hose leaks (see figure A.3).

FIGURES A.4, A.5 and A.6

AWWA Conservation Pamphlets







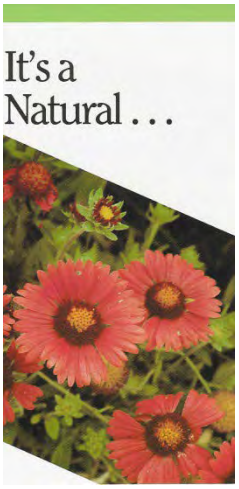
Disaster Preparedness, Storing Water for Emergencies addresses four important emergency questions; How much water should be stored, How long can tap water be stored safely, What is a boil water order, and How will I know when the water is safe again (see figure A.4).

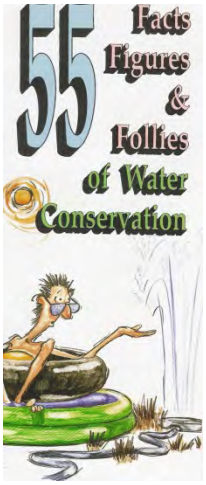
25 Facts About Water is a list of 25 water facts that encourage conservation (see figure A.5).

Lets Learn About the Water Cycle diagrams the seven stages of the water cycle (see figure A.6).

FIGURES A.7, A.8, and A.9

AWWA Conservation Pamphlets





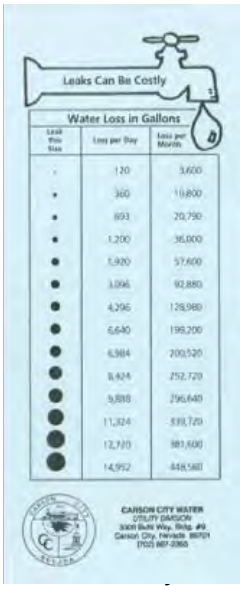
It's a Natural makes suggestions regarding landscape including planning, design, soils, and irrigation (see figure A.7).

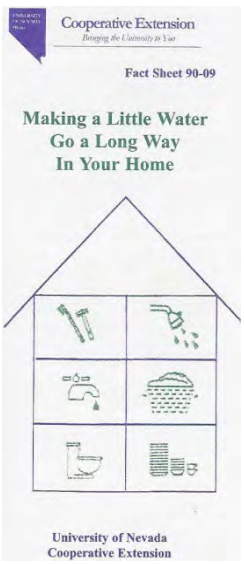
Water Conservation at Home discusses in-home conservation practices for bathroom, kitchen, and outdoor water use (see figure A.8).

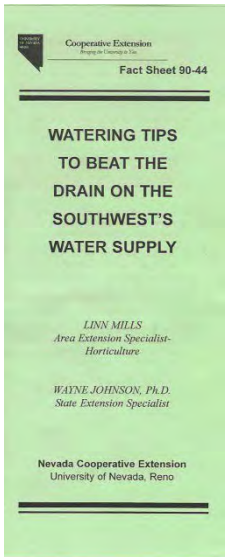
55 Facts Figures & Follies of Water Conservation is similar to "25 Facts about Water" but it provides a bit more conservation information (see figure A.9).

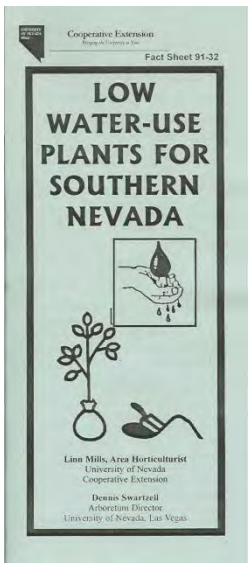
FIGURES A.10, A.11, A.12, and A.13

University of Nevada Cooperative Extension Fact Sheets and Leaks Can be Costly Chart









Nevada Cooperative Extension publishes Fact Sheets that encourage conservation. Fact Sheet 90-09 "Making a Little Water Go a Long Way in Your Home" contains residential conservation tips (see figure A.11), Fact Sheet 90-40 "Watering Tips to Beat the Drain on the Southwest's Water Supply" provides tips

to make landscapes more water efficient (see figure A.12) and Fact Sheet 91-32 is a list of low water-use plants for southern Nevada (see figure A.13).

Carson City also distributes a chart that emphasizes the importance of repairing leaks (Figure A.10). The chart provides an excellent visual example of the water that can be wasted through unrepaired leaks.

When to Water

Carson City Public Works asks that you be water smart.

Per Carson City Municipal Code Ordinance #12.01.130 water regulations are in effect from **June 1st to September 30th**. During this time frame there is no watering between **10 a.m.** and **6 p.m.** daily and no watering on Mondays. Make sure you water on your assigned days and hours.

Odd addresses water on **Tuesday**, **Thursday** and **Saturday**

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
	✗	💧		💧		💧

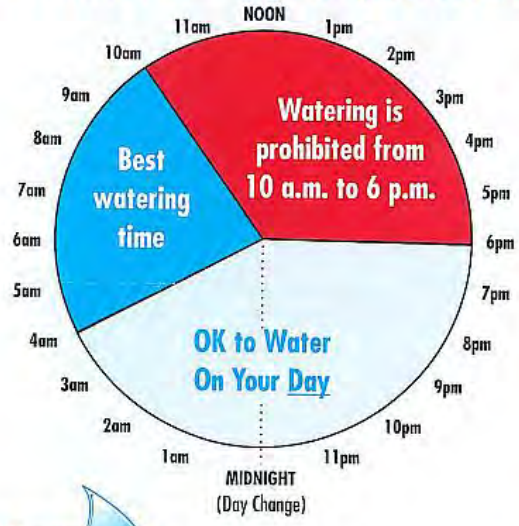
Even addresses water on **Sunday**, **Wednesday** and **Friday**

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
💧	✗		💧		💧	

Last number of your address determines odd or even status.

NO WATERING ON MONDAYS

Please don't water when temperatures are too high or conditions are windy.



Excessive watering can cause waste. City ordinance #12.01.120 prohibits waste of water running along the street, gutter or storm drain. Hand watering is allowed when flowers, shrubs and vegetables need a little extra. Remember there is **NO watering on Mondays**; make sure you make every drop count!

EVERY DROP COUNTS
Be Water Smart

For information please call
775 887-2355

CARSON CITY
PUBLIC WORKS

BE WATER SMART

Conservation measures are divided into two types: (1) Hardware/Equipment and (2) Behavioral/Managerial. Each of these is subdivided into five categories of application: (1) Residential, (2) Landscape, (3) Industrial, Commercial, and Institutional (ICI) (4) Agricultural, and (5) Purveyor. The following conservation measures will be classified first by application and then by type.

C.1 RESIDENTIAL CONSERVATION MEASURES

C.1.1 Behavioral Measures

C.1.1.1 Residential Water Audits. Water audits could target high use customers first and then be offered to all customers. The following elements should be part of an effective audit.

- Purpose for the audit.
- Estimation of use for all fixtures and appliances.
- Check for and repair leaks.
- Evaluation of Landscape (See "Landscape Conservation Measures).
- Evaluation of outdoor water use.
- Evaluate efficiency measures.
- Educate customers using available flyers.

An audit should take no more than 30 to 45 minutes.

C.1.1.2 Additional Measures. The sample pamphlets in Appendix A include additional behavioral conservation measures.

C.1.2 Hardware/Equipment Measures

The following is a list of devices/practices that will reduce water consumption in the home.

Measure	Description
Bathroom/Kitchen Fixtures	
Low-flow toilets	1.6 gallons per flush
Toilet retrofit devices	Bladders (bags), dams, early close flappers, other hardware and adjustments
Toilet leak repairs	Includes detection (dye tabs) and replacement of worn parts.
Low-volume shower heads	2.5 gallons per minute @ 80 psi
Showerhead retrofit devices	Includes temporary cutoff valves and restrictors.
Low-volume faucets	2.5 gallons per minute @ 80 psi
Faucet retrofit devices	Includes aerators, activation sensors, self closing and metered valves
Faucet maintenance	Includes washer replacement, repacking, tightening, and cleaning aerators
Water pressure reduction	Only needed if house pressure exceeds what's required
High Efficiency Appliances	
Clothes washers	27 gallons per load
Dish washers	4.5 gallons per load

C.2 LANDSCAPE CONSERVATION MEASURES

C.2.1 Behavioral Measures

C.2.1.1 Landscape Water Audits. Landscape water audits should be conducted on park and golf course irrigation systems and could be considered an option on residential irrigation systems, targeting high-volume users. The following should be included as part of a landscape audit:

- Purpose for the audit.
- Estimation of outdoor use based on meter records.
- Check for and repair leaks.
- Evaluation of Landscape (size, soil, amount of turf, types of plants)
- Evaluation of irrigation system (Timers, Use of drip, Precipitation amounts).
- Efficiency recommendations.
- Educate customers using available flyers

A residential landscape audit should take no more than an hour. Parks and golf courses could take substantially longer.

C.2.1.2 Xeriscape™. Xeriscape is a method of landscaping that employs low-water use plants, turf, ground covers, shrubs and trees. It includes careful planning, soil analysis, and irrigation system design.

C.1.1.3 Additional Measures. The sample pamphlets in Appendix A include additional behavioral conservation measures.

C.2.2 Hardware/Equipment Measures

Landscape hardware measures consist of two basic groups: (1) Landscape materials and (2) Irrigation equipment.

Measure	Description
Landscape Materials	
Trees, plants, and grass	Should be well suited to climate and altitude and be drought tolerant
Organic mulch	Grass clippings, leaves, wood chips, bark, and pine needles. Organic mulches help to retain soil moisture and keep ground cool around plants.
Inorganic mulch	Boulders, gravel, pavers, decomposed granite, and stepping stones. Inorganic mulches are generally more for decorative purposes but they reduce the amount of trees, plants, and turf thereby conserving water.
Compost	Made of manure or biosolids and wood, straw, grass, and leaves. Helps plants stay healthy and retains moisture in the soil.
Irrigation Equipment	
Valves	Should be sized to meet requirements and checked periodically for leaks
Sprinkler Heads	Should match water volume requirements of area being irrigated.
Sprinkler Nozzles	Should have proper arc of coverage and proper trajectory.
Irrigation Controllers	Should have required number of stations, programs, and starts. Also rain delays and sensor terminals.
Drip irrigation	Insures water is directed to where it's needed.

C.3 INDUSTRIAL, COMMERCIAL, AND INSTITUTIONAL (ICI) CONSERVATION MEASURES

C.3.1 Behavioral and Hardware/Equipment Measures

C.3.1.1 ICI Water Audits. Since ICI water audits can require a substantial amount of time (4 hours or more), it may be necessary to have a private engineering firm hired by the water user conduct the audit. There is incentive for ICI customers to pay for audits since the results of an audit could translate into substantial savings. An ICI water audit should include the following elements:

- Support from ICI owners, managers, and employees
- Survey/Estimation of facility use based on meter records.
- Calculation of water-related costs.
- Evaluation of efficiency measures.
- Evaluation of payback periods for measures.
- Efficiency recommendations and implementation.
- Tracking and reporting system.

C.3.1.2 Manual Washing. Manual washing is cleaning done on surfaces with hoses and cloths.

MANUAL WASHING

Behavioral Measures	Hardware/Equipment Measures
• Surfaces should be swept or brushed off before using water to clean.	• High pressure low-volume hoses with automatic shut-off nozzles • High-pressure pumps, steam cleaners.

C.3.1.3 Vehicle Washing. Vehicle washing includes manual washing and automated car washes or a combination of both.

VEHICLE WASHING

Behavioral Measures	Hardware/Equipment Measures
• Limit number of spray nozzles and set flow rates at lowest volume and pressure required. • Adjust nozzles in automated systems so that they take full advantage of gravity and position. Also make sure water shuts off after vehicles have passed. • Increase conveyor speeds or reduce rinse cycle time. • Sweep wash area before using water to clean. • Establish a regular maintenance schedule that includes checking for leaks and making repairs.	• Recycling systems. These would include filters and storage tanks. • High pressure pumping systems.

C.3.1.4 Kitchens and Restaurants. Kitchen and restaurant conservation is divided into four areas of application: (1) Food and drink preparation, (2) Dishwashing, (3) Garbage disposal and scraping trough, and (4) Ice making.

FOOD AND DRINK PREPARATION

Behavioral Measures	Hardware/Equipment Measures
• Presoak and wash food service articles in basins instead of running water. • Reduce thawing of food with hot water unless required by law. If required use lower flow. • Avoid running water to melt ice in sinks. • Use full loads in dishwashers and other automated equipment. • Serve water only when requested by customers.	• Low-volume faucets • Hands-free foot pedal valves for faucets • On demand hot water dispensers

DISHWASHING

Behavioral Measures	Hardware/Equipment Measures
• Presoak utensils, dishes, and pots and pans in basins of water instead of using running water prior to loading dishwashing machines. • Scrape food off of plates rather than use running water. • Operate scraping troughs only while dishes are actually being washed. • Assess the water efficiency of the current dishwashing system to determine where improvements might be made. • Always wash full loads in automated machines. • Operate conveyor type dishwashers only when dishes are actually passing through the machine. • Verify that the dishwashing equipment is using the minimum amount of flow recommended by the manufacturer. • Since many older automated dishwashing systems are neither energy nor water efficient, evaluate the cost of retrofitting or replacing existing equipment. • Turn dishwashers off when not in use. • Routinely check all dishwashing equipment to ensure there are no leaks. • Post signs requesting that personnel minimize their use of utensils, dishes, and pots and pans to save water.	• Manual pre-wash sprayers with “dead man” shut off controls. • Low-flow spray heads on all sprayers. • New water efficient dishwashing equipment. • Electronic eye sensors that shut off conveyer type systems when dishes are not passing through the machine.

GARBAGE DISPOSER AND SCRAPING TROUGH

Behavioral Measures	Hardware/Equipment Measures
• Eliminate disposers and troughs. • Use the minimum acceptable flow rate on all machines. • Reuse wastewater in the mixing chamber of the disposer.	• Garbage strainers (instead of disposers) • Sensors that detect the amount of flow in a disposer and regulate flow accordingly. • Solenoid valves that turn water off when the disposer is off. • Flow regulators for disposer supply lines.

ICE MAKERS

Behavioral Measures	Hardware/Equipment Measures
• Use the minimum flow rate recommended by the manufacturer on water cooled icemakers. • Adjust machines to produce ice only when it's needed. • Collect spent cooling water and reuse it for non-potable purposes.	• Air-cooled icemakers. • Re-circulating systems for water-cooled icemakers. • Ice flake machines that use less bleed off than cube machines.

C.3.1.5 Laundries and Laundromats. This section includes measures that are applicable in hotels, motels, hospitals, nursing homes, diaper services, restaurants, and coin operated Laundromats.

LAUNDRIES AND LAUNDROMATS

Behavioral Measures	Hardware/Equipment Measures
• Operate equipment with full loads only. • Reduce water levels for partial loads. • Back flush filters or softeners only when necessary.	• Computer controlled rinse water reclamation systems. • Wash and rinse water treatment and reclamation systems. • Continuous batch washers. • Ozone laundry systems. Horizontal axis washers.

C.3.1.6 Swimming Pools. The measures in this section can be applied to commercial and residential swimming pools.

SWIMMING POOLS

Behavioral Measures	Hardware/Equipment Measures
• Limit the frequency of pool refilling. • Cover the pool with an insulated cover when not in use to reduce losses due to heat and evaporation. • Reduce the level of the pool to avoid losses due to splashing. • Lower the pool temperature. • Back wash filters only when necessary. If backwash is timed, verify that frequency is efficient. • Regularly check pool for leaks and cracks. Keep pool and filter clean to avoid unnecessary backwashing.	There are no special equipment measures that would help conserve water in pools. It is important however that available equipment is efficient and used properly.

C.3.1.7 Cooling Systems. This section includes measures for three types of cooling systems: (1) Single-pass, (2) Evaporative, and (3) Equipment. Single-pass cooling uses fresh water to cool without re-circulating any of the water used in the first pass. Evaporative coolers are used for cooling in commercial and residential applications and are commonly known as swamp coolers. Equipment cooling includes both single-pass and re-circulating systems that are used to cool equipment and machinery.

SINGLE-PASS COOLING

Behavioral Measures	Hardware/Equipment Measures
• Reuse water for landscaping, vehicle washing, or another cooling application that allows for water to be at a higher temperature. • Eliminate single-pass systems.	• Air-cooled equipment (i.e. compressors, pumps, icemakers, etc...) • Automatic controls that insure coolers only operate when needed.

EVAPORATIVE COOLING

Behavioral Measures	Hardware/Equipment Measures
• Regularly check for leaks in hoses and pan. • Replace pads at least annually. • Shut cooler off when building is unoccupied. • Annually service the equipment by oiling moving parts and cleaning off accumulated scale or corrosion.	There are currently no equipment measures for evaporative coolers. The design of the coolers is relatively simple.

EQUIPMENT COOLING

Behavioral Measures	Hardware/Equipment Measures
• Reuse water in single pass systems for other cooling purposes. Examples of reuse include cooling molten materials, landscape, of boiler make-up water. • Replace al single pass cooling systems with closed-loop systems or replace water-cooled equipment with air-cooled.	Equipment varies depending on application.

C.3.1.8 Heating Systems. This section deals with conservation measures for boilers and steam generators which are used to heat large buildings and multiple-building facilities.

HEATING SYSTEMS

Behavioral Measures	Hardware/Equipment Measures
• Regularly inspect systems for leaks and make repairs. • Insulate all piping. • Limit boiler bleed-off to a level that satisfies water quality requirements. • Discharge blow-down into an expansion tank instead of using cold water to cool it.	• Flow meters for make-up and blow-down valves. • Automatic controls to discharge blow-down.

C.3.1.9 Leaks and Water Losses. This section covers water conservation measures relating to leaks and losses.

LEAKS AND WATER LOSSES

Behavioral Measures	Hardware/Equipment Measures
• Regularly check for leaks at all water connections. Keep in mind that higher pressure applications have more incidence of leakage. • Regularly check all vessels that contain water for cracks or bad seals. • Regularly check all heating and cooling systems. • Repair any leaks that are discovered.	• Leak detection equipment. This could include sonic or probe type equipment. • Any equipment used to stop a leak. This would depend on the material of the pipe or vessel that has a leak.

C.3.1.10 ICI Maintenance Practices. This section reemphasizes maintenance conservation measures for ICI facilities that have been mentioned in previous sections. These measures should become standard procedure at all ICI facilities.

- Create a maintenance schedule that includes schedules for leak detection inspections and meter reading, and repair procedures.
- Monitor water-use records keeping track of any increases or decreases in use.
- Conduct water audits every one to three years.
- Shut off supply lines to areas that are not being used.
- Install pressure reducers where feasible.
- Keep a maintenance schedule to clean cooling and heating equipment regularly.
- Recycle and reuse water when feasible.
- Insulate all hot water pipes.
- Replace old equipment with water saving equipment.
- Install timers wherever possible.
- Educate employees on water saving techniques.

C.4 GENERAL CONSERVATION MEASURES

This list of conservation behaviors is divided into four parts: (1) Home, (2) Landscaping, (3) Community, and (4) Miscellaneous.

HOME BEHAVIORS

1. When washing dishes by hand, don't let the water run while rinsing. Fill one sink with wash water and the other with rinse water.

2. Evaporative coolers require a seasonal maintenance checkup. For more efficient cooling, check your evaporative cooler annually.

3. Run your washing machine and dishwasher only when they are full and you could save 1000 gallons a month.

4. Use the garbage disposal sparingly. Compost instead and save gallons every time.

5. Keep a pitcher of water in the refrigerator instead of running the tap for cold drinks, so that every drop goes down you not the drain.

6. Check your water meter and bill to track your water usage.

7. Wash your produce in the sink or a pan that is partially filled with water instead of running water from the tap.

8. Use a broom instead of a hose to clean your driveway or sidewalk and save 80 gallons of water every time.

9. If your shower can fill a one-gallon bucket in less than 20 seconds, replace it with a water efficient showerhead.

10. Collect the water you use for rinsing produce and reuse it to water houseplants.

11. We're more likely to notice leaky faucets indoors, but don't forget to check outdoor faucets, pipes, and hoses for leaks.

12. When you shop for a new appliance, consider one offering cycle and load size adjustments. They are more water and energy-efficient than older appliances.

13. Time your shower to keep it under 5 minutes. You'll save up to 1000 gallons a month.

14. Install low-volume toilets.

15. When you clean your fish tank, use the water you've drained on your plants. The water is rich in nitrogen and phosphorus, providing you with a free and effective fertilizer.

16. Put food coloring in your toilet tank. If it seeps into the toilet bowl, you have a leak. It's easy to fix, and you can save more than 600 gallons a month.

17. Plug the bathtub before turning the water on, and then adjust the temperature as the tub fills up.

18. Designate one glass for your drinking water each day. This will cut down on the number of times you run your dishwasher.

19. Don't use running water to thaw food.

20. Grab a wrench and fix that leaky faucet. It's simple, inexpensive, and can save 140 gallons a week.

21. When doing laundry, match the water level to the size of the load.

22. Teach your children to turn the faucets off tightly after each use.

23. Before you lather up, install a low-flow showerhead. They're inexpensive, easy to install, and can save your family more than 500 gallons a week.

24. Soak your pots and pans instead of letting the water run while you scrape them clean.

25. Make sure you know where your master water shut-off valve is located. This could save gallons of water and damage to your home if a pipe were to burst.

26. Turn off the water while you brush your teeth and save 4 gallons a minute. That's 200 gallons a week for a family of four.

27. Make sure your toilet flapper doesn't stick open after flushing.

28. Make sure there are aerators on all of your faucets.

29. Install an instant water heater on your kitchen sink so you don't have to let the water run while it heats up. This will also reduce heating costs for your household.

30. Cut back on rinsing if your dishwasher is new. Newer models clean more thoroughly than older ones.

31. Bathe your young children together.

32. Winterize outdoor spigots when temps dip to 20 degrees F to prevent pipes from bursting or freezing.

33. Insulate hot water pipes so you don't have to run as much water to get hot water to the faucet.

34. Drop that tissue in the trash instead of flushing it and save gallons every time.

35. If your toilet was installed prior to 1980, place a toilet dam or bottle filled with water in your toilet tank to cut down on the amount of water used for each flush. Be sure these devices do not interfere with operating parts.

36. Install water softening systems only when necessary. Save water and salt by running the minimum number of regenerations necessary to maintain water softness.

37. Wash clothes only when you have a full load and save up to 600 gallons each month.

38. Listen for dripping faucets and toilets that flush themselves. Fixing a leak can save 500 gallons each month.

39. Cook food in as little water as possible. This will also retain more of the nutrients.

40. Turn the water off while you shampoo and condition your hair and you can save more than 50 gallons a week.

41. Choose new water-saving appliances, like washing machines that save up to 20 gallons per load.

42. Select the proper size pans for cooking. Large pans require more cooking water than may be necessary.

43. Turn off the water while you shave and you can save more than 100 gallons a week.

44. To save water and time, consider washing your face or brushing your teeth while in the shower.

45. For hanging baskets, planters and pots, place ice cubes under the moss or dirt to give your plants a cool drink of water and help eliminate water overflow.

46. Throw trimmings and peelings from fruits and vegetables into your yard compost to prevent from using the garbage disposal.

47. Keep a bucket in the shower to catch water as it warms up or runs. Use this water to flush toilets or water plants.

48. When you are washing your hands, don't let the water run while you lather.

49. Pre-treat stains before washing clothes to avoid re-washing.

50. Use the shortest wash cycle for lightly soiled clothes.

51. Check washing machine hoses regularly for leaks.

52. Do not pre-rinse dishes except in cases of sticky or burnt-on food.

53. Scrape off food with a utensil or used paper napkin when pre-cleaning for dishwasher.

LANDSCAPE BEHAVIORS

1. Check your sprinkler system frequently and adjust sprinklers so only your lawn is watered and not the house, sidewalk, or street.

2. Avoid planting turf in areas that are hard to water such as steep inclines and isolated strips along sidewalks and driveways.

3. Plant during the spring or fall when the watering requirements are lower.

4. Minimize evaporation by watering during the early morning hours, when temperatures are cooler and winds are lighter.

5. Use a layer of organic mulch around plants to reduce evaporation and save hundreds of gallons of water a year.

6. Divide your watering cycle into shorter periods to reduce runoff and allow for better absorption every time you water.

7. Only water your lawn when needed. You can tell this by simply walking across your lawn. If you leave footprints, it's time to water.

8. Adjust your lawn mower to a higher setting. Longer grass shades root systems and holds soil moisture better than a closely clipped lawn.

9. Use the sprinkler for larger areas of grass. Water small patches by hand to avoid waste.

10. Use porous materials for walkways and patios to keep water in your yard and prevent wasteful runoff.

11. Direct downspouts and other runoff towards shrubs and trees, or collect and use for your garden.

12. Install a rain shut-off device on your automatic sprinklers to eliminate unnecessary watering.

13. Choose a water-efficient drip irrigation system for trees, shrubs and flowers. Watering at the roots is very effective, be careful not to over water.

14. Reduce the amount of grass in your yard by planting shrubs and ground cover with rock and granite mulching.

15. Remember to check your sprinkler system valves periodically for leaks and keep the heads in good shape.

16. Don't water your lawn on windy days. After all, sidewalks and driveways don't need water.

17. Water your plants deeply but less frequently to create healthier and stronger landscapes.

18. When watering grass on steep slopes, use a soaker hose to prevent wasteful runoff.

19. Group plants with the same watering needs together to get the most out of your watering time.

20. Remember to weed your lawn and garden regularly. Weeds compete with other plants for nutrients, light, and water.

21. While fertilizers promote plant growth, they also increase water consumption. Apply the minimum amount of fertilizer needed.

22. Avoid installing ornamental water features and fountains that spray water into the air. Trickling or cascading fountains lose less water to evaporation.

23. Buy a rain gauge to track how much rain or irrigation your yard receives. Check with your local water agency to see how much rain is needed to skip an irrigation cycle.

24. Teach your family how to shut off your automatic watering systems. Turn sprinklers off if the system is malfunctioning or when a storm is approaching.

25. Set a kitchen timer when watering your lawn or garden with a hose.

26. Next time you add or replace a flower or shrub, choose a low water use plant for year-round landscape color and save up to 550 gallons each year.

27. Use a screwdriver as a soil probe to test soil moisture. If it goes in easily, don't water. Proper lawn watering can save thousands of gallons of water annually.

28. Avoid over-seeding your lawn with winter grass. Once established, ryegrass needs water every three to five days, whereas dormant Bermuda grass needs water only once a month.

29. Landscape with Xeriscape trees, plants and groundcovers. Call your local conservation office for more information about these water thrifty plants.

30. If you have an evaporative cooler, direct the water drain to a flowerbed, tree, or your lawn.

31. Leave lower branches on trees and shrubs and allow leaf litter to accumulate on top of the soil. This keeps the soil cooler and reduces evaporation.

32. Start a compost pile. Using compost when you plant adds water-holding organic matter to the soil.

33. Use sprinklers that throw big drops of water close to the ground. Smaller drops of water and mist often evaporate before they hit the ground.

34. More plants die from over-watering than from under-watering. Be sure only to water plants when necessary.

35. Water only as rapidly as the soil can absorb the water.

36. Aerate your lawn. Punch holes in your lawn about six inches apart so water will reach the roots rather than run off the surface.

COMMUNITY BEHAVIORS

1. Encourage your school system and local government to help develop and promote a water conservation ethic among children and adults.

2. Make suggestions to your employer to save water (and dollars) at work.

3. Support projects that use reclaimed wastewater for irrigation and other uses.

4. Encourage your friends and neighbors to be part of a water-conscious community.

5. Pick-up the phone and report significant water losses from broken pipes, open hydrants and errant sprinklers to the property owner or your water management district.

MISCELLANEOUS BEHAVIORS

1. Install covers on pools and spas and check for leaks around your pumps.

2. Periodically check your pool for leaks if you have an automatic refilling device.

3. Use a commercial car wash that recycles water.

4. Don't buy recreational water toys that require a constant flow of water.

5. Use a grease pencil to mark the water level of your pool at the skimmer. Check the mark 24 hours later. Your pool should lose no more than ¼ inch each day.

6. When the kids want to cool off, use the sprinkler in an area where your lawn needs it the most.

7. Make sure your swimming pools, fountains, and ponds are equipped with re-circulating pumps.

8. Bathe your pets outdoors in an area in need of water.

9. While staying in a hotel or even at home, consider reusing your towels.

10. When backwashing your pool, consider using the water on your landscaping.

	CARSON CITY PUBLIC WORKS PROCEDURE	**Ken Arnold, Public Works Operations Manager** **Revised: 02-06-07** Lack of Water Plan

CARSON CITY UTILITIES
CONTINGENCY PLAN
(For dealing with Water Demand that exceeds Supply capabilities)

This plan may be put into action upon authorization from the City Manager and /or designee in-order to avoid a city wide water emergency. It is anticipated that most instances of implementation of the plan would be for very short time frames.

- City Manager or designee notified by Utilities Operations Manager or designee when it is determined that water demand is exceeding production capability in one or more pressure zones and/or storage levels are at the critical level (see attached Standard Operating Procedures for Storage Reservoirs). And that standard operating procedures such as adjusting pressure zones, increasing patrols to ensure compliance with restrictions, all production facilities are in operation and that all surface water that can be obtained from other users has been diverted to the treatment plant have yielded no effect.
- City Manager or designee notified by Utilities Operations Manager or designee that the following plan should be implemented.
- City Manager or designee approves and directs that Plan be implemented.

Voluntary cut backs

STAGE 1

- Contact the Carson City Parks Department and request that they voluntarily cut back outdoor irrigation of City parks, planters and City buildings as much as possible until further notice.
- Contact the Carson City School District and request that they voluntarily cut back outdoor irrigation as much as possible until further notice.
- Contact State Buildings and Grounds and request that they voluntarily cut back outdoor irrigation as much as possible until further notice.
- Contact Legislative Counsel Bureau Grounds Division and request that they voluntarily cut back outdoor irrigation as much as possible until further notice.

- Request that the Fire Department suspend all certification testing of Fire trucks and pumping equipment and suspend all drills with live water flow until further notice.

- Request that all residents in the affected areas voluntarily cut back outdoor irrigation as much as possible until further notice.

Required reduction of potable water use

STAGE 2

- Direct the Carson City Parks Department to **stop all** potable water irrigation of City parks, planters and City buildings until further notice.

- Contact the Carson City School District and direct them to **stop all** outdoor irrigation until further notice.

- Contact State Buildings and Grounds and direct them to **stop all** outdoor irrigation until further notice.

- Contact the Legislative Counsel Bureau Grounds Division and direct them to **stop all** outdoor irrigation until further notice.

- Direct the Carson City Fire Department to **stop all** certification testing of Fire trucks and pumping equipment and **stop all** drills with live water flow until further notice.

- Require all residents in the affected areas to **stop all** outdoor irrigation until further notice.

- Notify the media of additional watering restrictions in the affected areas and ask for everyone's assistance in conserving as much water as possible.

STAGE 3

- **Citywide ban on all outside irrigation until further notice!!!**

WATER

- www.amsa-cleanwater.org
- www.energystar.gov

DROUGHT

- DroughtMonitor@ndmc.unl.edu

LANDSCAPE

- www.usda.gov/news/garden.htm
- www.tmwalandscapeguide.com/landscape_guide/interactive/index.php
- http://www.unce.unr.edu/publications/files/nr/2006/eb0601.pdf .

EDUCATION

- www.wateruseitwisely.com
- www.washoeet.dri.edu/

INSTITUTIONAL

- www.douglascountynv.gov/sites/main/index.cfm
- www.lvvwd.com
- www.snwa.com
- www.co.washoe.nv.us/water_dept/rwpc/regionalplm
- www.tmh20.com
- www.cabq.gov
- www.ci.phoenix.az.us/WATER/wtrteach.html
- www.owue.water.ca.gov/leak/faq/faq.cfm

LEAK DETECTION

- www.who.int/docstore/water_sanitation_health/leakage/begin.html

Findings.

The Carson City board of supervisors finds that a severe water shortage exists within Carson City due to the fact of population growth and the fact that only a specified amount of water can be withdrawn from Eagle Valley. Therefore, pursuant to the police power vested in Carson City, the following sections are hereby enacted: 12.01.120 and 12.01.130.

(Ord. 1982-8 § 2 (part), 1982).

12.01.120 - Waste of water prohibited.

It is unlawful for anyone connected to the city water system to waste water. For the purpose of this section, "waste" means any excessive usage which causes water to run into or along any street, alley, storm drainage system, or into or upon another's property; provided nothing in this section shall be construed as to apply to the accidental breaking of any hose, water pipe, or other irrigation device unless same is not abated within 2 hours after personal notice of such break is given the person owning, controlling or maintaining the same or having any pecuniary interest therein. If such breaks are not repaired or the water turned off within the specified time, it shall be the duty of the utilities director or his/her designee to cause the water to be shut off, and it is unlawful for any person to again turn on such water until proper repairs have been made. If personal notice is unable to be given, the water shall be immediately shut off by the public works director or his/her designee and a notice shall be placed on the front door stating the reason(s) for said shutoff. Each and every request for the water to be turned on will require the payment of $25.00 which the city will add to the monthly bill.

Exception: Car washing by civic or philanthropic groups may receive written approval from the public works director or his/her designee when it is determined that said usage will not be detrimental to the city's water situation.

(Ord. 2008-8 § 7, 2008: Ord. 1999-14 § 5, 1999: Ord. 1991-12 § 8, 1991: Ord. 1987-18 § 1, 1987: Ord. 1982-8 § 2 (part), 1982).

12.01.130 - Limitations on irrigation.

1.

From June 1st to October 1st of each year it is unlawful for any person to use water from public mains for the purpose of irrigating, regardless of method, lawns, gardens, trees, grass, shrubbery or other vegetation from ten a.m. to six p.m. or on any Monday. The board of supervisors may, by resolution, set a different length of limitation period and hours for restricted watering should circumstances so dictate. For the purposes of this section, a calendar day is defined as a 24 hour period, beginning at 12:01 a.m. and ending at midnight. Additionally, the following restrictions apply:

A.

The irrigation of lawns, gardens, trees, grass, shrubbery or other vegetation located on premises having an odd-numbered address shall be limited to Tuesday, Thursday and Saturday effective June 1, 2005;

B.

The irrigation of lawns, gardens, trees, grass, shrubbery or other vegetation located on premises having an even-numbered address shall be limited to Sunday, Wednesday and Friday effective June 1, 2005;

C.

If unlawful irrigation is observed as noted under this section, and personal notification cannot be made, the utilities director or his/her designee may cause the water to be shut off and a notice shall be placed on the front door stating the reason for said shutoff.

2.

Exempted from this section are the following:

A.

Carson City licensed commercial gardeners or caretakers who are on the premises at the time watering is taking place;

B.

Vegetable gardens, flower beds, trees within 2 months of planting;

C.

New lawns, for 21 days from planting or installation date, that have been planted or sodded prior to June 15th or after August 15th;

D.

Complexes that file for and receive approval of an irrigation plan.

E.

Residential customers adjusting and repairing their irrigation system during the non-watering times for a not to exceed time frame of 1 hour.

3.

Special exemptions from this section may be granted by the public works director or his/her designee subject to filing an appropriate application and the determination that the special request shall not be detrimental to the city's water situation.

(Ord. 2008-8 § 8, 2008: Ord. 2004-16 § 1, 2004: Ord. 1999-14 § 6, 1999: Ord. 1993-44 § 8, 1993: Ord. 1991-12 § 9, 1991: Ord. 1990-9 § 1, 1990: Ord. 1988-8 § 1, 1988: Ord. 1987-18 § 2, 1987: Ord. 1982-8 § 2 (part), 1982).

Locate Your Meter

Most water meters will be located outside in front of your house next to the curb on the street under a steel or concrete lid.

Reading Your Meter

There are two basic types of meters; a dial with a needle that measures in tenths of a cubic foot and a digital meter that measures from 100,000 down to 1 cubic foot. Most meters also have a small triangle on the face called a flow indicator. It will move when there is water passing through it. Read your meter from left to right.

Measuring Water Use Activities

It is possible to measure the water use of certain activities. These activities include but are not limited to the following:

- Shower or bath use.
- Watering the lawn.
- Washing clothes or dishes.
- Flushing a toilet
- Washing a car

To measure the water use of an activity, do the following (in order):

1. Make sure all water off. This includes all faucets (inside and out), appliances, swamp coolers, or icemakers.

2. Write down the meter reading to two decimal places.

3. Perform the activity. Be sure to measure the amount of time in minutes that the activity required.

4. At the end of the activity read the meter again. Subtract the first meter reading from the second one. The result is the amount of water used for the activity in cubic feet. To convert to gallons multiply the result by 7.48. To determine how many gallons per minute were used divide the gallon amount by the number of minutes the activity required. You should now have the water used amount in *gallons per minute.*

Detecting Leaks

1. Make sure all water off. This includes all faucets (inside and out), appliances, swamp coolers, or icemakers.

2. Write down the meter reading and time of day to the minute.

3. Wait at least an hour before reading the meter a second time. Make sure no water is used during the test. Read the meter at the end of the test and record the time to the minute. If the flow indicator is moving during the test you either have a leak or a meter malfunction.

4. Subtract the first meter reading from the second. Multiply the remainder by 7.48. The result is the amount of water in gallons that passed through the meter during the test period. Also record the time duration of the test.

5. Divide the amount of water by the number of minutes in the test. The result is the amount of water that went through the meter in *gallons per minute.*

6. To measure amount lost over time multiply the gallons per minute by the following:

    - 1,440 for gallons per day.
    - 43,920 for gallons per month.
    - 527,040 for gallons per year.

7. Locating a leak is a process of elimination. Shut off one toilet at a time at the wall. Go to the meter and check to see if the flow indicator (triangle) is still moving. If the triangle has stopped you have discovered the leak. If not go on to the next one and repeat the above steps.

8. Check your sprinkler system. Shut off the system at the anti siphon valve and check the meter.

9. Check your main service line. You will need to shut off the valve between your house and the meter. If the meter stops the leak is between the meter and the valve.

10. These steps can be repeated for every fixture and fitting in your home. In the event you cannot locate the leak, you should call a professional plumber to find and fix it.

Type of Use	Likely Range of Values
INDOOR USES	
Average household size	2.0 – 3.0 persons
Frequency of toilet flushing	4.0 – 6.0 flushes per person per day
Flushing volumes	1.6 – 8.0 gallons per flush
Fraction of leaking toilets	0 – 30 percent
Showering frequency	0 – 1.0 showers per person per day
Duration of average shower	5 – 15 minutes
Shower flow rates	1.5 – 5.0 gallons per minute
Bathing frequency	0 – 0.2 baths per person per day
Volume of water	30 – 50 gallons per cycle
Washing machine use	0.2 – 0.5 loads per person per day
Volume of water	45 – 50 Gallons per cycle
Dishwasher use	0.1 – 0.3 Loads per person per day
Volume of water	10 – 15 gallons per cycle
Kitchen faucet use	0.5 – 5.0 Minutes per person per day
Faucet flow rates	2.0 – 3.0 gallons per minute
OUTDOOR USES	
Average lot size	5000 – 8000 square feet
Average house size	1200 – 2500 square feet
Landscape area	4000 – 5000 square feet
Fraction of lot size in turf	30 – 50 percent
Water application rates	1 – 5 feet per year
Homes with pools	10 – 25 percent
Pools evaporation losses	3 – 7 feet per year
Frequency of refilling pool	1 – 2 times per year

Division 3 - LANDSCAPING

Sections:

3.1 - Purpose.

The purpose of this section is to set forth standards for new and expanded development within the city, enhance the aesthetic appearance of the community, including the visual appearance of streets, complement the visual effect of buildings, aid in the enhancement of property values, provide buffers between various land uses, provide protection from intense land use activities, insulate from the effects of weather conditions, including the provision shading for parking lots, and aid in conserving water by encouraging the use of varieties of plants indigenous to arid regions. These standards shall be the minimum requirements necessary for the promotion of the foregoing purposes. Text and diagrams describing landscaping and irrigation requirements, planting details, approved tree and shrub lists and other examples for the requirements of this division are in the appendix to this section, and available on the Carson City website and on CD at the planning division office.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

3.2 - Applicability.

These landscape standards shall apply to new construction of the following projects:

Multi-family Residential with 3 or more units;

Institutional Uses;

Office Uses;

Commercial Uses;

Industrial Uses;

Public Uses.

The director may approve variations to the standards set out in this division if they respond more appropriately to a particular site and provide equivalent means of achieving the intent of the landscape standards.

Any expansion of a building not in compliance with the landscape requirements in this division and Title 18 of the Carson City Municipal Code must comply with landscape standards by twice the proportion to the expansion pursuant to Table 3.1 (Expansion Compliance).

Table 3.1
Expansion Compliance

≤ 5% Building Expansion	No Requirements
≤ 10% Building Expansion	20% of Landscape Requirements for entire site
≤ 20% Building Expansion	40% of Landscape Requirements for entire site
≤ 30% Building Expansion	60% of Landscape Requirements for entire site
≤ 40% Building Expansion	80% of Landscape Requirements for entire site

≥ 40% Building Expansion	100% of Landscape Requirements for entire site

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

3.3 - Landscape and irrigation plans.

A landscape and irrigation plan shall be filed with the city and approved by the director prior to the approval of a site plan or issuance of a building permit. The plan shall be prepared by a landscape architect registered in the state of Nevada, or other person permitted to prepare landscape plans pursuant to Chapter 623A of the Nevada Revised Statutes (NRS). Landscaping on all commercial/industrial projects must be installed or supervised by an individual at the job location with at least one of the following credentials: Certified Landscape Technician, Licensed Landscape Contractor, Certified Landscape Professional, ISA Certified Arborist, Registered Landscape Architect, a C10 Qualified Employee as recognized by the State Contractor's Board, or an equivalent certification, approved by the parks and recreation department.

3.3.1 The landscape and irrigation plan shall be clearly and neatly drawn in a commonly used scale such as engineer or architect (i.e., 1 inch equals 20 feet or ¼ inch equals 1 foot) and shall include a north arrow, owner/developer name, project location, location of adjacent streets, property lines, easements, sidewalks, drives, paved areas, sign and light standard locations, building outlines, eaves, topography and grading, existing trees or other natural features influencing the use of the site, utilities either overhead or underground and ground-mounted equipment such as vaults, transformers and air conditioning units.

3.3.2 The plans shall include landscape calculations relevant to the application of the standards of this section and shall include a plant list in a legend format giving the common and botanical names of each plant with a key number or identifying symbol assigned to each plant, the size of the plant, its spacing and the quantity to be used.

3.3.3 The landscape plans shall include construction details for planting, staking, soil amendments and any special requirements for the project and may be an attachment to the plans.

3.3.4 Irrigation plans shall be drawn at the same scale as the landscape plans and include specifications which comply with the most current Uniform Plumbing Code as adopted by the city. On all submitted plans, provide detail showing number of emitters/bubblers and rate or gallons per hour (gph) or gallons per minute (gpm) for all plants and trees. See emitter detail in appendix for example.

3.3.5 Identification and description of automatic irrigation components to insure that vegetation is adequately serviced through water conserving features. Overhead sprinkler irrigation is only allowed on turf areas or other areas requiring overhead sprinkler irrigation.

3.3.6 All drip and bubbler irrigation systems for trees and shrubs must be on a separate irrigation zone from turf irrigation zones. The utilization of water savings irrigation design is encouraged, and incorporation of separation of irrigation zones based on water needs.

3.3.7 Indication of the irrigation system point of connection to the water supply and size, water pressure available, and maximum demand of the system in gallons per hour/minute shall be provided.

3.3.8 Irrigation equipment specified must be identified by manufacturer's name and equipment identification number.

3.3.9 All equipment locations shall be indicated for irrigation valves, controllers, hydrants, quick coupler valves, sprinkler heads, backflow preventors and pipe sizing.

3.3.10 Additional irrigation details may be needed to clarify particular situations as shown in typical irrigation legend in the Appendix.

3.3.11 Typical details shall include backflow prevention devices, backflow enclosure valves, irrigation heads and irrigation controllers. Note that pressure vacuum breakers are allowed for residential applications, and reduced pressure principle backflow prevention devices are required in all other applications.

3.3.12 All below ground equipment must be located within boxes of adequate size to protect the components.

3.3.13 Schedule 40 PVC pipe is required for all pressure lines and under all paved areas.

3.3.14 Piping must be installed a minimum of 18 inches underground for non-pressure irrigation lines and 24 inches underground for constant pressure irrigation lines.

3.3.15 Freeze protection and/or winterization for the irrigation system shall be provided.

3.3.16 Schedule 40 PVC pipe or equivalent sleeving under sidewalks or driveways is required.

3.3.17 Landscape irrigation water use shall be separately metered or sewer changes shall apply for other than residential uses.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

3.4 - Preservation and protection of existing trees and shrubs.

Trees and significant shrubs shall be preserved whenever possible and shall be considered part of the required landscape area. Preservation of existing 4-inch caliper (6-8 foot for evergreens) healthy trees will be eligible for a 2:1 credit toward the total tree requirement if approved by the director, up to a maximum of 25 percent of the requirement for trees on the site. Provide an overlay on all submitted plans of all existing trees with caliper (deciduous) or height (evergreen) and significant shrubs on the site and clearly mark which will be retained on the site and which are proposed to be removed.

3.4.1 Deciduous trees with a trunk diameter of 4 inch or greater at a point four and ½ foot above ground level or evergreen trees 6 foot or greater in height or significant shrubs, shall not be removed unless authorized by prior written approval from the director. The applicant is encouraged to submit a report to the director prepared by a certified arborist, or licensed design professional detailing a reason for a request to authorize removal of trees and significant shrubs. After consultation with other applicable city divisions, the director may authorize the removal of existing trees and shrubs if any of the following criteria exist:

1. The health or condition of the tree presents a clear danger to people or property or it constitutes a nuisance.
2. When the tree or shrub is located within the footprint of the building, or when a tree trunk or shrub is so close to the building area that construction would result in irreparable damage or death to the plant.
3. Access is so restricted to the site that removal is necessary and unavoidable.
4. The elevation will be severely changed by grading/building/development. The tree or shrub cannot remain on the site as a result of the change in elevation.
5. Any other instances deemed appropriate by the director shall be considered.

3.4.1.1 All trees removed from a site, which were not previously approved under the criteria outlined in subsection 3.4.1 above, require replacement by 1 of the methods listed below. As an example, removal of a 6-inch diameter tree would require replacement of the tree with 4, 3-inch caliper trees or the equivalent.

a. Deciduous trees require replacement with a 2:1 caliper ratio tree, with a minimum caliper of 2 inch and a maximum of 3 inch per tree.

b. Evergreen trees require replacement with a 2:1 height ratio, with a height minimum of 6 foot and maximum of 8 foot per replacement tree.

c. Tree replacement may require off-site mitigation, including planting of trees on public property. Off-site mitigation shall require approval by the parks and recreation director. Payment of fees to purchase and plant trees, as well as associated costs are required, rather than actual planting of trees on public property. Appropriate fees which are based on the placement of trees in the right-of-way program as periodically updated shall be paid to the parks and recreation department. Provide the planning department with a copy of receipt for payment of required tree replacement/mitigation fees. Payment is required prior to the building permit being issued.

3.4.2 Tree Protection. All deviations from the tree protection code must be approved by the planning division. Construction activities can severely damage or kill trees. See tree retention/protection, root pruning detail, and excavation adjacent to retained trees in appendix for additional requirements and information. The following practices must be followed during all construction activities:

1. Pruning of live branches from trees identified for preservation is prohibited except in conjunction with subsection 3.4.3 Pruning Standards. See pruning details in appendix for more requirements and details.

2. Tree protection fencing and protection is required around all trees identified for preservation. See detail in appendix. Construct protection fencing which complies with the following:

   a. Protective fencing must be constructed of 4 foot wide minimum orange netting or chain link. Fencing must be a minimum of 5 feet outside the tree drip line. Fences must be mounted on above ground concrete footings, which shall not be driven into the ground. Spacing shall be no more than 10 foot. This detail shall be placed on all grading, demolition and improvement plans.

   b. Protective fencing shall enclose the entire area under the canopy drip line of the tree protection zone throughout the life of the project, or until work within the tree protection zone is completed. The fence shall not be moved during construction phase without prior approval of the qualified site professional utilizing the best management practices. The protective fence may be removed at final grading inspection or at the time final landscaping is installed. Refer to detail in appendix for sample drawing.

   c. A sign describing the fence as protective tree fencing shall be prominently displayed on each fence. The sign must be a minimum of 8.5 by 11 inches and clearly state: "Tree Protection Zone. This fence shall not be removed and is subject to penalty per Carson City Municipal Code." Refer to detail in appendix for sample drawing.

3. If protective fencing cannot be placed around the entire tree protection zone, then protective fencing shall be placed around the trunk of the tree(s) but only after prior approval of the proposal by the planning division. 2 by 4 lumber shall be secured with banding around the trunk of tree(s) to be preserved. Do not attach boards or banding directly into the bark or trunk of the tree.

4. There should be no activity in the tree protection zone without prior approval by the planning division. The following are prohibited activities within the tree protection zone:

   a. Soil disturbance, including excavation, trenching or grade change without prior approval of the planning division.

   b. Spoils, non-spoils, storage of any equipment, materials or parking.

   c. Placement of non-spoil material or equipment.

5. Apply 6 inches of wood chips or bark over the root zone of trees within the protective barriers. Mulching areas outside of protective barriers will help to minimize compaction from construction traffic adjacent to sensitive root zones.

6. Hand digging shall be required to determine if lateral roots are present on trees in the direction of proposed foundation location. If support roots are found, it is recommended that correct root pruning is performed, so as to not compromise the stability of the tree(s).

7. Correctly and cleanly prune exposed roots that are not to be saved back to the soil horizon in compliance with detail in subsection 3.4.3. Pruning should be supervised by a qualified licensed professional and should be performed to ISA standards (see details in appendix).

8. Promptly cover exposed roots with damp tarp(s) which are kept moist, or material that will keep roots from drying.

9. Irrigate within the dripline of trees once a week if natural precipitation does not occur during spring, summer and fall.

10. See detail for tree retention, root pruning and excavation adjacent to retained trees in appendix.

3.4.3 Pruning Standards. No trees on commercial or industrial land which is part of required landscaping shall be pruned in a manner that impairs the health of the tree. All pruning performed on required trees shall be in accordance with pruning standards published by the American National Standards Institute (ANSI), per ANSI A300 Part 1 Pruning, and International Society of Arboriculture, Western Chapter. See appendix regarding pruning detail.

1. ANSI pruning standards require in part, the use of certain tools, cutting techniques, and pruning methods to be followed, including not leaving branch stubs, few or no heading cuts, not cutting off the branch collar (not making a cut flush with the trunk), not topping or lion's tailing ("gutting-out" a tree by removing a large number of the inner branches), not removing more than 25 percent of the foliage of a single branch, not removing more than 25 percent of the total tree foliage in a single year, not damaging other parts of the tree during pruning and not using wound paint. 50 percent of the foliage should remain evenly distributed in the lower 66 percent of the tree canopy after pruning.

2. All pruned material shall be controlled and removed in a manner to prevent damage to the surrounding plant material and property. Tree topping, tipping and heading back are all terms used to describe severe cutting back of a tree's crown and is prohibited on any tree which is part of required landscaping and strenuously discouraged on any other trees on the site.

3. Trees severely damaged by storms or other causes, or trees under utility wire or other obstructions, where other pruning practices are impractical, may be exempted from the prohibition of topping, tipping and heading back, at the discretion of the director. A letter of request must be submitted to the director and approved prior to such severe pruning.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

3.5 - Landscape design standards.

3.5.1 All landscaping shall aesthetically enhance and be compatible with the site area. Landscaping shall be installed to enhance the view of the site from public street(s) and adjacent properties.

3.5.2 A minimum of 20 percent of the site's impervious surfaces excluding the building coverage must be pervious areas of landscape material. The area within the public right-of-way adjacent to a site must be landscaped and may be counted for 25 percent of the total required landscaped area. In areas with right-of-ways over 20 feet in depth, the director may modify or waive the requirement for landscaping of the right-of-way. The requirement may also be waived by the director if the public agency denies permission for an encroachment permit or lease of the area to be landscaped.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

3.6 - Turf.

The following standards for the use of turf in landscaping are intended to conserve water by minimizing the need for water for irrigation and minimizing irrigation water wasting.

3.6.1 Turf areas shall not constitute more than the percentage of the total landscape area as established by the table below unless approved by special use permit.

Table - Permitted percentage of turf area. Turf area is shown as a percentage of the total landscaped area:

Development Area	Permitted Turf Area
Less than 5 acres (ac.)	50%
5 ac. to less than 10 ac.	40%
10 ac. to less than 15 ac.	30%
15 ac. or larger	25%

3.6.2 Turf shall not be used on slopes greater than 4:1 or in areas less than 8 feet in width or length.

3.6.3 Where landscape areas abut sidewalks, drive-aisles, parking areas or other hardscape surfaces, a minimum 3-foot wide landscape buffer area must be provided between any turf areas and the hardscape to capture irrigation overspray and runoff. The buffer area may be drip-irrigated plant materials or non-living landscape materials.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

3.7 - Trees.

3.7.1 The minimum number of trees shall be one (1) tree per four hundred (400) square feet of landscape area. Additional trees are required if the number of trees for parking areas and along right-of-way areas as described in subsections 3.7.1.1 and 3.7.1.2 exceed this minimum. The Director may modify this standard for public uses such as parks.

1. Included in the minimum required number of trees, a minimum of one (1) shade tree must be planted for every ten (10) parking spaces or fraction thereof, and distributed throughout the parking area surface to provide even shading within the parking lot. For example, eighteen (18) parking spaces shall require two (2) trees. A minimum of one (1) deciduous tree shall be placed in each standard sized parking island.
2. Included in the minimum required number of trees, at least one (1) tree shall be placed along the right-of-way frontage for every thirty (30) lineal feet of right-of-way at a point not more than

twenty (20) feet from the right-of-way. The Director may allow for different spacing or locations of trees for projects with outdoor display such as automobile sales lots.

3.7.2 Where more than ten (10) deciduous trees are provided as a part of the landscape plan, a minimum of fifty percent (50%) of the trees shall be of a different species to ensure diversity. Additional species may be required on larger projects.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

(Ord. No. 2008-33, § XVI, 9-4-2008)

3.8 - Groundcover (including shrubs).

3.8.1 Groundcover shall be used to prevent erosion, inhibit weed growth, and present an aesthetically pleasing appearance when mature. Groundcover may include living plants such as turf, shrubs, vines, meadow grasses, flowers or other living covers. Ground cover and shrubs shall be incorporated into all landscape plans in a balanced manner.

3.8.2 Non-planted, non-living materials such as wood chips, bark, decorative rock, mulch, stone or other non-living materials may be used as groundcover, and shall be distributed throughout the site. All landscape areas shall be covered with materials suitable for reducing dust and evaporation and shall be designed to improve the aesthetic appearance of the area. An attractive mix of organic and non-organic materials is encouraged. Products which appear to be dirt shall not be used.

3.8.3 A ratio of at least 6 shrubs is required for each tree placed or retained on the site. If a large quantity of turf is proposed for the site, the required shrub count may be reduced after review and approval of the submitted landscaping plans by the planning division.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

3.9 - Streetscape.

On arterial streets, minimum 10 foot wide landscape areas shall be provided along the frontage of the site adjacent to the street. On all other streets, a minimum of 6 foot wide landscape area shall be provided along the frontage of the site adjacent to the street. On sites with unique constraints, the director may approve an alternative dimension if the alternative does not compromise the integrity of the landscape plan.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

3.10 - Plant materials.

3.10.1 The latest edition of the American Standard for Nursery Stock by the American Association of Nurserymen shall be the criteria for sizes and grades of plant materials. No artificial plants are allowed unless approved by the director.

All trees to be number 1 grade nursery stock and meet current industry quality standards adopted by the American Association of Nurserymen, American National Standards Institute (ANSI) Z60 and NRS 555 (Regulations of Nursery and Nursery Stock). All trees must comply with the following:

No girdling, kinked, circling or "J" roots;

No trees that have been topped;

No wounds in the trunk, bark or on limbs;

Insect and disease free, rodent and mechanical damage free;

No trees that have large nursery stakes through rootball or have been grown on a nursery stake;

Rootball to be appropriate to caliper and crown size;

Trunk/crown structure and trunk taper to be appropriate for the species;

All graft unions to be healthy with trunk diameter below union larger than above union;

All trees to stand upright without stakes;

Roots, bark and shoot growth to give evidence of good tree vigor;

Any replacement of plant stock to be equal to original specification and approved by the owner's representative;

Any substitution of plant material must be submitted in writing for approval by the landscape architect or design professional and the planning division;

3.10.2 Container grown shrubs shall be minimum 5 gallon size at the time of planting excluding trees and those plants grown in flats. Perennials shall be a minimum 1 gallon size at the time of planting.

3.10.3 Required evergreen trees shall be a minimum of 6 feet in height at the time of planting and shall not comprise more than 40 percent of the total number of trees or as dictated by the site and approved by the director.

3.10.4 Required deciduous trees shall be a minimum caliper of 2 inches at the time of planting. Using 3 inch maximum caliper new trees shall reduce the number of required trees by 10 percent or as approved by the director. This does not refer to required replacement trees as shown in subsection 3.4.1.1, for trees removed without permission.

3.10.5 If additional trees beyond the minimum requirement are proposed, they may be smaller in size. The required number of trees in each category and total for the project must be clearly marked on the plan, with additional trees noted as supplemental.

3.10.6 Trees which overhang sidewalks, parking lots or streets shall be free of thorns or fruit types that litter the ground. Evergreen trees are not permitted in standard sized parking islands.

3.10.7 Within an urban setting, the following types of trees shall not be installed because of undesirable characteristics: 'Populus genus' (aspens, poplars and cottonwoods), 'Salix genus' (willows), and 'Ulmus genus' (elms). New species which do not exhibit undesirable characteristics are acceptable. Requests for waiver of this requirement may be considered by the director in appropriate instances. Developers are encouraged to protect and preserve existing healthy trees on site.

3.10.8 Tree selection for projects will be guided by the approved Carson City tree list for commercial projects. Trees planted in the city will be installed according to the city's tree planting standards. The approved tree list and standard planting details are located in the appendix.

3.10.9 Riparian Areas. Areas along established riparian corridors may utilize native riparian trees and shrubs which are identified on the Carson City riparian area list. These materials may be planted along river/stream corridors within Carson City after approval of the intended choices and locations by the director. Request for use of riparian trees and shrubs outside of a riparian or wetland zone within the urban setting may be considered by the director in appropriate instances. The approved riparian area tree and shrub lists are located in the appendix.

3.10.10 Historic District Properties. Areas within the historic district are encouraged to utilize trees and shrubs shown as noted on the Carson City tree list for commercial projects, further noted as Carson City historic district preferred trees. The approved tree list with historic district preferred trees noted is located in the appendix.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

3.11 - Details.

3.11.1 Parking and driveway areas shall include concrete curbs or similar improvements as approved by the director for protection of landscaping. Vehicle overhangs into landscaped areas shall not exceed 2 feet. Planter areas shall not be less than 72 square feet in size and shall have a minimum width of 6 feet.

3.11.2 Drainage basins, when required, shall be incorporated into the landscape design, utilize non-buoyant landscape materials, and shall be irrigated if landscaped. Access shall be provided for maintenance. The landscaped basin area may count as 10 percent of the total landscape requirement if the basin is not fenced with sight-obscuring materials and is landscaped along the perimeter to enhance the appearance.

3.11.3 Snow storage should be incorporated within the design of projects and should be oriented for maximum sun exposure for acceleration of melting. Driveways, drive aisles, sidewalks and landscape areas, cannot be used for snow storage. Drainage and run-off from snow storage areas shall be considered in the design.

3.11.4 Soil in planted areas should be mechanically loosened to a minimum depth of 12 inches and/or to the depth of the root ball and 3 times the diameter for trees and shrubs. Tests of soils, based upon one test per site (sites over 25,000 square feet in landscape area may require additional tests as required by the director), shall be conducted and appropriate soil amendments recommended. Soils should be improved by incorporating the recommended soil amendments into the loosened soil prior to planting.

3.11.5 All non-planted landscape areas shall be covered with materials such as mulch. Products which appear to be dirt shall not be used. A weed barrier fabric is required under all rock and cobble mulches and pre-emergent herbicide is recommended.

a. Planted areas should be mulched to a minimum depth of 3 inches for organic mulches. No fabric shall be used under wood mulch.

b. Sufficient quantity of rock mulch shall be installed to completely cover all weed control fabric. Fabric shall be trimmed back in compliance with landscaping details to allow for future growth of plants. All rock mulch must be washed and cleaned prior to installation. Large cobble mulch should include top dressing of smaller matching cobble or similar material. Nonporous material such as plastic sheeting shall not be placed under the mulch.

3.11.6 All debris, including concrete, asphalt, wire, wood, steel and other foreign matter, must be removed from a planting area prior to soil preparation or planting and prior to request for a final inspection of the site.

3.11.7 Conflicts shall be avoided in design of landscape improvements by considering the size and breadth of mature landscaping. Show existing and proposed overhead and underground power lines, utility poles, light standards and utility easements on submitted landscape plans. Fire hydrants, fire connections, water boxes (3 feet clearance required), water and sewer service lines 10 feet clearance required for trees), overhead utilities, signs, roof overhangs, light standards etc., shall be taken into consideration in design of landscaping. Show all proposed and existing signage for the site.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

3.12 - Inspection, certifications and security.

3.12.1 Upon installation of landscaping and irrigation systems, the registered design professional, licensed design professional, general contractor, certified landscape contractor, registered landscape architect, or others as allowed per Nevada Revised Statutes (NRS) who created, stamped and signed the landscaping and irrigation plans, or who has been authorized by that person, shall certify that the installation was completed per the approved plans, including review of installation of correct plant materials, planting was according to diagrams and instructions included in the plan, emitter location and detail, etc. A letter attesting to this inspection and compliance shall be submitted to the

planning division. Plant tags are to be left on plants until after approval of the landscaping plan by the authorized professional and shall be removed upon approval. The planning division retains the right to inspect projects, and if not in compliance with submitted plans, require compliance prior to issuance of a final certificate of occupancy.

3.12.2 It is understood that minor deviations and/or plant substitutions may be necessary during the course of the project. These deviations may be done if approved by the registered design professional or others as allowed per NRS, and if consistent with the original approved design and plants selected are similar to the original plan and intended purpose. Notification in writing to the director is required for these instances. Approval is required from the director prior to installation. Upon completion, as-built landscape plans shall be submitted. Major design revisions require a new fee and additional staff resources.

3.12.3 If, due to weather constraints, all landscaping is not completed prior to the final inspection, financial security in a form acceptable to the city in the amount of 150 percent of the estimated cost of installation of remaining landscape improvements shall be filed with the city guaranteeing installation within 9 months of final inspection. The estimated cost of the landscaping improvements not completed must be verified by the city. Installation of plant materials during times when the ground is likely to be frozen is discouraged due to high mortality of plants. Delay of planting, and providing financial security in a form acceptable to the city, as described in subsection 3.13.1, is recommended during these times.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2001-23).

3.13 - Maintenance.

3.13.1 All landscape areas must be maintained by the property owners, including using the most current pruning standards accepted by the ANSI International Society of Arboriculture and/or the National Arborist Association. Any damaged or dead plant(s) must be replaced or repaired by the property owners within 30 days following notification by the director. If the season of the year makes this repair or replacement within a 30 day period impractical, the person responsible for landscaping shall schedule an appropriate time for the completion of the accomplishment of this work as required and approved by the director. Property owner shall provide a financial security in a form acceptable to the city, in the amount of 150 percent of the estimated cost of installation of remaining landscape improvements, which shall be filed with the city guaranteeing installation. The estimated cost of the landscaping improvements not yet completed must be verified by the city.

3.13.2 Maintenance must include the checking of the sprinkler pattern and drip systems, plant condition, weeding, fertilization, pest control, replacement of mulches, weed barrier and dead material, or other debris, proper pruning and use of proper mowing heights. Radical pruning or trimming such as topping shall require replacement of the plant material.

The required maintenance schedule for both the planting and the irrigation system shall be shown on the landscape plan provided to the owner by the registered design professional or others as allowed by NRS.

3.13.3 An acknowledgment by the property owner of the required maintenance for a project must be submitted to the city as a part of landscape and irrigation plan submittals.

(Ord. 2007-26 § 1 (part), 2007: Ord. 2004-13 § 7, 2004; Ord. 2001-23).

3.14 - Revisions to landscape plans.

3.14.1 If a revision to a landscape plan results in a change to the approved plans of more than 25 percent, a new landscape plan and review fee are required. Variations to the plan include, but are not limited to, change in species, type (e.g. rock, mulch, turf, etc.), and change in location.

(Amended by Ord. 2007-26 § 1 (part), 2007).

3.15 - Design standards.

Diagrams, text and examples are located in the appendix, including, but not limited to, general landscape and irrigation notes, irrigation legend detail, typical plant list legend example, tree and shrub planting details, emitter layout and staking, bubbler, tree protection, flushing end cap, drip, spray and coupling valves, rotor/pop-up head, irrigation trench wall section, rock wall, wood and pipe bollards, approved tree, shrub, riparian and historic district lists, pruning, tree retention/protection, root pruning and excavation adjacent to retained tree details.

(Ord. 2007-26 § 1 (part), 2007).

Appendix.

GENERAL LANDSCAPE NOTES: 02/2007

ALL LAWN AREAS SHALL BE CONTOURED AND ROLLED WITH A WEIGHTED HAND ROLLER PRIOR TO SODDING OPERATIONS.

CONTRACTOR MAY PROVIDE PHOTOGRAPHS OR SAMPLES OF ALL TREE PLANT MATERIAL FOR APPROVAL BY THE DESIGN PROFESSIONAL OR OWNER'S REPRESENTATIVE TO SEE IF SPECIFICATIONS ARE MET. THIS DOES NOT GUARANTEE ACCEPTANCE OF ALL TREES UPON DELIVERY TO PROJECT SITE.

THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES PRIOR TO ANY DIGGING OR CONSTRUCTION. THE ACQUISITION OF ALL NECESSARY PERMITS ASSOCIATED WITH CONSTRUCTION SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR READING ALL NOTES, CHECKING PLANT NAMES AND CONFIRMING ALL NUMBERS, SIZES, AND PLANT AVAILABILITY PRIOR TO SUBMITTING BID.

IF QUANTITIES LISTED IN THE PLANTING SCHEDULES DO NOT CORRELATE WITH THE QUANTITIES INDICATED ON THE PLANS, THEN PLAN QUANTITIES SHALL GOVERN.

THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY TO INSTALL ALL MATERIALS COMPLETE AND IN PLACE AS SHOWN AND/OR SPECIFIED.

FINISH GRADES IN ALL LAWN AREAS SHALL BE ESTABLISHED BEFORE INSPECTION BY THE DESIGN PROFESSIONAL OR OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION OF SOD.

ROUGH GRADE, FINISH GRADE AND ALL BERM LOCATION/SHAPES SHALL BE ESTABLISHED BY THE CONTRACTOR AND APPROVED BY THE LANDSCAPE ARCHITECT, DESIGN PROFESSIONAL OR OWNER'S REPRESENTATIVE BEFORE INSTALLATION OF THE IRRIGATION SYSTEM, SITE ELEMENTS OR ANY SOD.

SOIL AMENDMENTS IN COMPLIANCE WITH DEVELOPMENT STANDARDS 3.11 SHALL BE INCORPORATED INTO THE TOP 6" TO 10" (MIN) OF THE ROUGH GRADE OF ALL LAWN AREAS PRIOR TO SODDING.

ROUGH GRADE IN ALL LAWN AND PLANTING BED AREAS SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 8"-10" (MIN.) PRIOR TO INSTALLATION OF PLANT MATERIAL, BERMS AND SOD.

ALL SOD AND PLANT MATERIALS SHALL BE #1 GRADE NURSERY STOCK AND WARRANTED FOR ONE YEAR AFTER FINAL PROJECT ACCEPTANCE. REPLACE ANY PLANT WHICH DIES WITHIN 30 DAYS AFTER NOTIFICATION, EXCEPT DURING WINTER, WHEN REPLANTING MAY BE DELAYED, WITH PLANTS EQUAL TO ORIGINAL MATERIALS.

THE CONTRACTOR SHALL BE REQUIRED TO EXCAVATE ALL LAWN & PLANTING BED AREAS TO ESTABLISH ROUGH GRADE AND INSTALL REQUIRED SOIL AMENDMENTS. (4 1/2" BELOW TOP OF CURBS IN PLANTING AREAS & 1 1/2" BELOW SIDEWALKS IN LAWN AREAS.)

ANY IMPORTED TOPSOIL REQUIRED FOR INSTALLATION OF THE BERMS OR ESTABLISHMENT OF ROUGH GRADE OR FINISH GRADE SHALL BE TOPSOIL MIX APPROVED BY THE LANDSCAPE ARCHITECT OR DESIGN PROFESSIONAL PRIOR TO INSTALLATION.

TREE STAKING SHALL BE DONE ON ALL TREES. CONTRACTOR SHALL STAKE AS PER DETAIL. ORIGINAL NURSERY STAKES ON TREES SHALL BE REMOVED BEFORE INSTALLATION. TREES MUST STAND UPRIGHT WITHOUT SUPPORT TO BE ACCEPTABLE.

INSTALL A PROFESSIONAL GRADE LANDSCAPE FABRIC UNDER ALL ROCK MULCH AREAS. SECURE TO ROUGH GRADE. DO NOT LEAVE EXPOSED. (SEE DEV ST 3.11) NO PLASTIC SHEETING CAN BE PLACED UNDER ROCK MULCH.

ROCK MULCH SHALL BE WASHED AND CLEANED. MULCH DEPTH TO BE 4"-6" MIN. AND BE INSTALLED IN ALL PLANTING AREAS AND OVER ALL BERMS AS SHOWN ON APPROVED LANDSCAPE PLANS. WEED FABRIC SHOULD BE COVERED BY MULCH AND NOT VISIBLE.

ALL PLANTING PITS SHALL BE EITHER HAND OR BACKHOE DUG (NO AUGER). THE BOTTOM AND SIDES OF THE PLANTING PITS SHALL BE SCARIFIED BEFORE INSTALLATION OF THE PLANT MATERIAL. HOLES SHALL BE THREE TIMES AS WIDE AS THE ROOTBALL DIAMETER, THE SAME DEPTH AS THE ROOTBALL AND BACKFILLED WITH AN APPROVED SOIL MIX.

ALL PLANTING BEDS AND SOD AREAS SHALL BE STRIPPED AND CLEARED OF ALL LAWN, ROOTS, WEEDS, AND DEBRIS AND SHALL BE RAKED TO A SMOOTH AND EVEN GRADE PRIOR TO PLANT MATERIAL OR SOD INSTALLATION.

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INSTALL IBDU WATER SOLUBLE STARTER PLANT FERTILIZER BAGS/TABLETS OR AN APPROVED EQUAL IN ALL PLANTING PITS. USE 1 PER 1-GALLON CONTAINER, 3 PER 5-GALLON CONTAINER, AND 5 PER 15-GALLON CONTAINER/ 2" CAL OR LARGER TREE.

CONTRACTOR TO APPLY A PRE-EMERGENT HERBICIDE AND PERMEABLE LANDSCAPE FABRIC THROUGHOUT ALL ROCK MULCH AREAS PRIOR TO PLACING MULCH. NO PRE-EMERGENT HERBICIDE SHALL BE APPLIED IN PERENNIAL, GROUNDCOVER, BULB AND ANNUAL AREAS. ADD GRANULAR PRE-EMERGENT HERBICIDE PER MANUFACTURER'S WRITTEN RECOMENDATIONS PRIOR TO INSTALLING LANDSCAPE FABRIC AND ROCK MULCH.

FINAL LOCATION OF ALL LANDSCAPE PLANT MATERIAL SHALL BE SET BY THE CONTRACTOR ACCORDING TO THE PLANS AND APPROVED BY THE LANDSCAPE ARCHITECT, DESIGN PROFESSIONAL OR OWNER'S REP BEFORE INSTALLATION.

NO PLANTS SHALL BE PLACED TO CONFLICT OR CREATE CONFLICT W/ SIGNS, LIGHTS, UTILITIES, ETC. IF PLANT LOCATION WILL CAUSE A CONFLICT, CONTACT THE LANDSCAPE ARCHITECT.

ALL PERENNIAL & GROUNDCOVER AREAS SHALL BE HAND SET BY THE CONTRACTOR IN AREAS SHOWN ON DRAWINGS AND APPROVED BY THE LANDSCAPE ARCHITECT, DESIGN PROFESSIONAL OR OWNER'S REP BEFORE INSTALLATION.

THE CONTRACTOR SHALL REMOVE ALL BURLAP, TWINE, TIES, CONTAINERS AND WIRE BASKETS FROM ALL PLANT MATERIAL. DO NOT DISTURB ROOTBALLS. REMOVE ANY EXCESS SOIL ON TREES OR SHRUBS THAT HAS ACCUMULATED DURING THE PACKAGING & SHIPPING PROCESS, (B&B STOCK – ESPECIALLY) IN ORDER TO DETERMINE PROPER PLANTING DEPTH IN ORDER TO PLACE ROOTBALL AT 1" ABOVE GRADE. CLEAN DOWN TO THE TOP OF STRUCTURAL (FLARED) ROOT SYSTEM.

THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROVIDE EFFECTIVE DUST CONTROL OF ALL PREPARED SOIL AREAS.

ALL TREES TO BE #1 GRADE NURSERY STOCK AND MEET CURRENT INDUSTRY QUALITY STANDARDS ADOPTED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) Z60 AND NEVADA REVISED STATES (NRS) 555 (REGULATIONS OF NURSERY AND NURSERY STOCK). ALL TREES MUST COMPLY WITH:

- NO GIRDLING, KINKED, CIRCLING OR "J" ROOTS.
- NO TREES THAT HAVE BEEN TOPPED.
- NO WOUNDS IN THE TRUNK BARK OR ON LIMBS.
- INSECT AND DISEASE FREE, RODENT AND MECHANICAL DAMAGE FREE.
- NO TREES THAT HAVE LARGE NURSERY STAKES THROUGH ROOTBALL OR HAVE BEEN GROWN ON A NURSERY STAKE.
- ROOTBALL TO BE APPROPRIATE TO CALIPER AND CROWN SIZE.
- TRUNK/ CROWN STRUCTURE AND TRUNK TAPER TO BE APPROPRIATE FOR THE SPECIES.
- ALL GRAFT UNIONS TO BE HEALTHY WITH TRUNK DIAMETER BELOW UNION LARGER THAN ABOVE UNION.
- ALL TREES TO STAND UPRIGHT WITHOUT STAKES.
- ROOTS, BARK AND SHOOT GROWTH TO GIVE EVIDENCE OF GOOD TREE VIGOR.
- ANY REPLACEMENT OF PLANT STOCK TO BE EQUAL TO ORIGINAL SPECIFICATION AND APPROVED BY THE OWNER'S REPRESENTATIVE OR DESIGN PROFESSIONAL AND THE COMMUNITY DEVELOPMENT PLANNING DEPARTMENT.

ALL PLANTING BEDS AND SOD AREAS SHALL HAVE POSITIVE DRAINAGE AWAY FROM ALL BUILDINGS.

ALL BOX TREES TO BE STAKE FREE NURSERY STOCK, NO LARGE STAKES THROUGH ROOTBALL.

THE CONTRACTOR SHALL SPACE PLANT MATERIALS TO ACCOMMODATE EVERGREEN TREE GROWTH. SPACE ALL SHRUBS/ GROUND COVERS/ PERENNIALS A MINIMUM OF 8' AWAY FROM ANY EVERGREEN TREE TRUNK.

ANY SUBSTITUTION OF PLANT MATERIAL MUST BE SUBMITTED IN WRITING FOR APPROVAL BY THE LANDSCAPE ARCHITECT OR DESIGN PROFESSIONAL AND THE COMMUNITY DEVELOPMENT DEPARTMENT.

THE CONTRACTOR SHALL INSPECT THE SITE REGULARLY TO REVIEW THE CONDITION OF ALL PLANTINGS. IF ANY CHANGES IN THE OVERALL MAINTENANCE PROGRAM ARE REQUIRED TO IMPROVE THE CONDITIONS TO AN ACCEPTABLE STANDARD, THE CONTRACTOR SHALL NOTIFY THE OWNER IN WRITING. OTHERWISE THE CONTRACTOR ACCEPTS FULL RESPONSIBILITY FOR THE CONDITION OF THE PLANTINGS AND MUST HONOR THE GUARANTEE. ANY PLANTS REPLACED UNDER THIS GUARANTEE SHALL BE GUARANTEED FOR ONE FULL YEAR FROM THE DATE OF REPLACEMENT.

THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE MAINTENANCE OF THE ENTIRE IRRIGATION SYSTEM & ALL LANDSCAPING UNTIL FINAL PROJECT ACCEPTANCE. AFTER FINAL PROJECT ACCEPTANCE ALL PROJECT MAINTENANCE SHALL BE THE RESPONSIBILITY OF THE OWNER.

THE CONTRACTOR SHALL TOP DRESS ROUGH GRADE OF ALL LAWN AREAS WITH 2" OF PROFESSIONAL GRADE TOP SOIL MIX, APPROVED BY THE LANDSCAPE ARCHITECT OR DESIGN PROFESSIONAL. SCARIFY ALL LAWN AREAS INCORPORATING TOPSOIL INTO ROUGH GRADE.

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UPON INSTALLATION OF LANDSCAPING AND THE IRRIGATION SYSTEM, THE REGISTERED DESIGN PROFESSIONAL OR LANDSCAPE ARCHITECT OR OTHERS AS ALLOWED PER NRS SHALL CERTIFY THAT THE INSTALLATION WAS COMPLETED PER THE APPROVED PLANS. THE REGISTERED DESIGN PROFESSIONAL SHALL CHECK THE INSTALLATION TO VERIFY COMPLIANCE WITH APPROVED PLANS. THEN THE PLANNING DEPARTMENT SHALL INSPECT FOR FINAL APPROVAL. PLANT SPECIES IDENTIFICATION TAGS ARE TO BE LEFT ON PLANTS UNTIL AFTER APPROVAL OF THE LANDSCAPING AND THEN REMOVED.

IT IS UNDERSTOOD THAT MINOR DEVIATION AND/OR PLANT SUBSTITUTIONS MAY BE NECESSARY DURING THE COURSE OF THE PROJECT. THESE DEVIATIONS MAY BE DONE IF APPROVED BY THE LANDSCAPE ARCHITECT OR DESIGN PROFESSIONAL OR OTHERS AS ALLOWED PER NRS, AND IF CONSISTENT WITH THE ORIGINAL APPROVED DESIGN AND PLANTS SELECTED ARE SIMILAR TO THE ORIGINAL PLAN AND INTENDED PURPOSE. NOTIFICATION IN WRITING TO THE COMMUNITY DEVELOPMENT PLANNING DEPARTMENT IS REQUIRED FOR THESE INSTANCES. APPROVAL IS REQUIRED FROM THE DIRECTOR PRIOR TO INSTALLATION. UPON COMPLETION, AS-BUILT LANDSCAPE PLANS SHALL BE SUBMITTED TO COMMUNITY DEVELOPMENT PLANNING DEPARTMENT. MAJOR DESIGN REVISIONS MAY REQUIRE NEW FEES AND ADDITIONAL STAFF RESOURCES.

ALL LANDSCAPE AREAS MUST BE MAINTAINED BY THE PROPERTY OWNERS, INCLUDING USING THE MOST CURRENT PRUNING STANDARDS ACCEPTED BY THE INTERNATIONAL SOCIETY OF ARBORICULTURE AND/OR THE NATIONAL ARBORIST ASSOCIATION. ANY DAMAGED OR DEAD PLANT MUST BE REPLACED OR REPAIRED BY THE PROPERTY OWNERS WITHIN 30 DAYS FOLLOWING NOTIFICATION BY THE DIRECTOR. IF THE SEASON OF THE YEAR MAKES THIS REPAIR OR REPLACEMENT WITHIN A 30 DAY PERIOD IMPRACTICAL, THE PERSON RESPONSIBLE FOR LANDSCAPING SHALL SCHEDULE AN APPROPRIATE TIME FOR THE COMPLETION OF THE ACCOMPLISHMENT OF THIS WORK AS REQUIRED BY THE DIRECTOR.

MAINTENANCE MUST INCLUDE THE CHECKING OF THE SPRINKLER PATTERN AND DRIP SYSTEMS, PLANT CONDITION, WEEDING, FERTILIZATION, PEST CONTROL, REPLACEMENT OF MULCHES, WEED BARRIER AND CLEAR AWAY DEBRIS, PROPER PRUNING AND USE OF PROPER MOWING HEIGHTS. RADICAL PRUNING OR TRIMMING SUCH AS AS TOPPING SHALL REQUIRE REPLACEMENT OF THE PLANT MATERIAL.

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GENERAL IRRIGATION NOTES: 2/2007

ALL PLUMBING AND ELECTRICAL WORK SHALL BE COMPLETED AS PER ALL LOCAL CODES.

INSTALLATION OF MATERIALS SHALL BE PER MANUFACTURERS RECOMMENDATIONS OR AS SPECIFIED. SPRINKLER HEADS ARE EXACT. NO EXTRA PAYMENT WILL BE MADE WHERE PIPING MUST BE OFFSET TO AVOID EXISTING CONDITIONS, OTHER WORK OR WHERE CHANGES ARE NECESSARY TO FACILITATE INSTALLATION.

THE IRRIGATION SYSTEM SHALL BE CONSTRUCTED FOR WINTERIZATION BY THE CONTRACTOR.

ALL MATERIALS SHALL BE NEW, WITHOUT FLAWS AND CONSIDERED THE BEST AVAILABLE IN STOCK. THE COMPLETE SYSTEM SHALL HAVE A ONE-YEAR WARRANTY AFTER FINAL PROJECT ACCEPTANCE ON ALL PARTS AND LABOR.

PRIOR TO FINAL PROJECT ACCEPTANCE, THE CONTRACTOR SHALL INSTRUCT THE OWNER, OR HIS REPRESENTATIVE, IN THE PROPER OPERATION, MAINTENANCE, AND WINTERIZATION OF THE ENTIRE IRRIGATION SYSTEM.

THE CONTRACTOR SHALL PROVIDE AND KEEP CURRENT A COMPLETE SET OF RECORD DRAWINGS WHICH SHALL BE CORRECTED DAILY TO SHOW CHANGES IN THE ORIGINAL DRAWINGS. ALL MAINLINE PIPING AND VALVE LOCATIONS SHALL BE SHOWN WITH ACTUAL MEASUREMENTS TO REFERENCE POINTS.

WHEN THE SYSTEM IS COMPLETE, THE CONTRACTOR SHALL PERFORM A COVERAGE TEST. THE IRRIGATION SYSTEM SHALL PROVIDE 100% COVERAGE OF ALL LAWN & LANDSCAPE PLANTING AREAS.

ALL IRRIGATION MAINLINE PIPING & LATERAL PIPING SHALL BE SCHEDULE 40 PVC PIPE.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY SETTLING IN THE IRRIGATION TRENCHES OR ASSOCIATED IRRIGATION WORK AS A WARRANTY ITEM.

ALL IRRIGATION VALVES SHALL BE LOCATED IN PROFESSIONAL GRADE VALVE BOXES. SIZE OF VALVE BOXES SHALL VARY WITH NUMBER OF VALVES LOCATED IN BOX. ALL VALVE BOX LID ELEVATIONS SHALL BE SET FLUSH WITH FINISHED GRADE. PROVIDE BOX SIZE THAT WILL ALLOW 6" CLEARANCE AROUND ALL SIDES OF VALVES. PROVIDE BOLTS PER MANUFACTURER'S RECOMMENDATIONS AND SECURE EACH VALVE BOX.

ON ALL THREADED JOINTS WITHIN THE IRRIGATION SYSTEM, THE CONTRACTOR SHALL USE 2-3 FULL TURNS OF TEFLON TAPE AT EACH CONNECTION.

WIRE CONNECTORS SHALL BE USED ON ALL FIELD WIRE SPLICES AND CONNECTIONS.

ALL CONTROL WIRE SHALL BEAR A U/L APPROVED LABEL FOR DIRECT UNDERGROUND BURIAL IN NATIONAL ELECTRIC CODE CLASS II CIRCUITS. AWG SIZES. ALL CONTROL WIRE RUNS LESS THAN 1000' SHALL HAVE NO SPLICES. IF A SPLICE OCCURS ON A FIELD CONTROL WIRE, THE CONTRACTOR SHALL INSTALL THE SPLICE IN A 6" ROUND VALVE BOX USING APPROVED WATERTIGHT CONNECTORS. IF APPROVED BY THE LANDSCAPE ARCHITECT OR DESIGN PROFESSIONAL. OTHERWISE THE ENTIRE FIELD CONTROL WIRE SHALL BE REMOVED & REPLACED.

TAPE AND BUNDLE ALL CONTROL WIRE TO BOTTOM OF MAINLINE PIPE AT 10' O.C.

THE IRRIGATION CONTROLLER SHALL BE INSTALLED IN A LOCATION AS SHOWN ON THE PLANS. THE LANDSCAPE ARCHITECT, DESIGN PROFESSIONAL, OR THE OWNER'S REPRESENTATIVE WILL APPROVE FINAL CONTROLLER LOCATION.

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IRRIGATION VALVE BOXES ARE TO BE INSTALLED IN LANDSCAPE PLANTING AREAS OR OTHER PROTECTED SPACES. VALVE BOXES SHALL NOT BE INSTALLED IN LAWN AREAS.

THE CONTRACTOR SHALL INSTALL SCHEDULE 40 GALVANIZED PIPING 5' ON EITHER SIDE OF THE BACK FLOW PREVENTER, AS DEPICTED IN THE STANDARD CITY'S DETAIL.

FILTER FABRIC FOR ABOVE ALL ROCK SUMPS SHALL BE PROFESSIONAL GRADE WEED BARRIER OR AN APPROVED EQUAL.

IRRIGATION MAINLINE TO BE BURIED 24" BELOW FINISHED GRADE AND ALL SPRAY SYSTEM LATERAL LINE PIPING TO BE BURIED 18" BELOW FINISH GRADE. ALL 3/4" DRIP IRRIGATION TUBING TO BE BURIED 4" – 6" BELOW FINISH GRADE.

THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION. THE ACQUISITION OF ALL NECESSARY PERMITS ASSOCIATED WITH CONSTRUCTION SHALL BE THE CONTRACTORS RESPONSIBILITY.

ALL GALVANIZED PIPE IN CONTACT WITH SOIL SHALL BE COVERED WITH PVC TAPE TO PREVENT PIPE CORROSION (PER UNIFORM PLUMBING CODE).

THE CONTRACTOR SHALL INSTALL A CURB STOP AND WASTE VALVE AT THE BACKFLOW PREVENTER (SIZE TO MATCH MAINLINE) (AS PER CITY'S PUBLIC WORKS DEPARTMENT DETAIL.).

PIPE DOPE SHALL NOT BE USED ANYWHERE ON THE IRRIGATION SYSTEM.

NO 3/4" PIPE SHALL BE USED ANYWHERE ON THE SPRAY IRRIGATION SYSTEM. (EXCEPT FOR 3/4" SWING JOINT ASSEMBLIES FOR ROTOR OR POP-UP SPRAY HEADS).

THE CONTRACTOR SHALL EXPOSE ENDS OF ALL IRRIGATION SLEEVES. ANY BROKEN OR SHATTERED ENDS OF THE IRRIGATION SLEEVES SHALL BE CUT TO A CLEAN END BEFORE INSTALLATION OF EITHER MAINLINE PIPE, LATERAL LINES OR DRIP IRRIGATION TUBING. ALL SLEEVE ENDS SHALL BE INSPECTED BY THE LA/DESIGN PROFESSIONAL BEFORE BURYING.

FINAL CONNECTION OF THE VALVE WIRES TO THE CONTROLLER SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

THE CONTRACTOR SHALL AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND UTILITIES WHICH MAY EFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO THE SAME.

THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD OR UNDERGROUND POWER AND/OR TELEPHONE, WATER, GAS AND SEWER FACILITIES SO AS TO SAFELY PROTECT ALL UTILITIES, PERSONNEL, AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COSTS AND LIABILITY IN CONNECTION THEREWITH.

THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR RECONSTRUCTED TO THE OWNER'S SATISFACTION AT THE CONTRACTOR'S EXPENSE.

ALL MAINLINES SHALL BE PRESSURE TESTED AT 1.5 TIMES THE STATIC PRESSURE FOR A MINIMUM 2 HOUR PERIOD PRIOR TO BACKFILLING OF TRENCHES. TEST WILL BE CONSIDERED SUCCESSFUL IF NO PRESSURE LOSS OCCURS DURING THE TWO HOURS. IF ANY LEAKS ARE PRESENT THEY SHALL BE CORRECTED AND LINES SHALL BE RE-TESTED PRIOR TO BACKFILLING TRENCHES.

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PIPE SIZES SHALL CONFORM TO THOSE SHOWN ON THE DRAWINGS. NO SUBSTITUTIONS OF SMALLER PIPE SIZES SHALL BE PERMITTED, BUT SUBSTITUTIONS OF LARGER SIZES MAY BE APPROVED. ALL DAMAGED AND REJECTED PIPE SHALL BE REMOVED FROM THE SITE AT THE TIME OF SAID REJECTION.

THE CONTRACTOR SHALL FLUSH ALL LATERALS AND EMITTER LINES PRIOR TO INSTALLING EMITTERS.

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FAMILIARIZE HIMSELF WITH ALL GRADE DIFFERENCES, LOCATION OF WALLS, STRUCTURES AND UTILITIES. THE IRRIGATION CONTRACTOR SHALL REPAIR OR REPLACE ALL ITEMS DAMAGED BY HIS WORK. HE SHALL COORDINATE HIS WORK WITH OTHER CONTRACTORS, FOR THE LOCATION AND INSTALLATION OF PIPE SLEEVES AND LATERALS UNDER SIDEWALKS AND PAVING.

SHOULD DISCREPANCIES ARISE BETWEEN THESE PLANS AND ACTUAL FIELD CONDITIONS WHICH REQUIRE FIELD MODIFICATIONS OR PLAN REVISIONS, THE LANDSCAPE ARCHITECT, DESIGN PROFESSIONAL, OR OWNER'S REPRESENTATIVE SHALL BE CONTACTED PRIOR TO CONSTRUCTION FOR RESOLUTION OR PLAN REVISION.

DO NOT WILLFULLY INSTALL THE IRRIGATION SYSTEM AS SHOWN ON THE DRAWINGS WHEN IT IS OBVIOUS IN THE FIELD THAT UNKNOWN OBSTRUCTIONS, GRADE DIFFERENCES OR DIFFERENCES IN THE AREA DIMENSIONS EXIST THAT MIGHT NOT HAVE BEEN CONSIDERED IN THE DESIGN. SUCH OBSTRUCTIONS OR DIFFERENCES SHOULD BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT, DESIGN PROFESSIONAL, OR THE OWNERS REPRESENTATIVE. IN THE EVENT THIS NOTIFICATION IS NOT PERFORMED, THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ANY REVISIONS NECESSARY.

THE IRRIGATION CONTROLLER SHALL BE WIRED DIRECTLY TO A 110 VOLT POWER SOURCE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE IRRIGATION CONTROLLER WIRING TO THE POWER SOURCE. CONNECTING THE CONTROLLER TO THE POWER SOURCE SHALL BE THE RESPONSIBILITY OF A LICENSED ELECTRICAL CONTRACTOR. THE INSTALLATION SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND ANY LOCAL CODES OR ORDINANCES THAT APPLY. IT SHALL BE THE ELECTRICAL CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE POWER SOURCE AND EXACT LOCATION OF THE CONTROLLER WITH OWNER'S REPRESENTATIVE.

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TYPICAL PLANT LIST EXAMPLE

5/2006

TREE LEGEND

QUANTITY	SYMBOL	COMMON/ BOTANICAL NAME	SIZE	SPACING
9	A	CHANTICLEER FLOWERING PEAR Pyrus calleryana 'Chanticleer'	2" CAL.	40 FEET ON CENTER
4	B	BLOODGOOD JAPANESE MAPLE Acer palmatum 'Bloodgood'	2" CAL.	AS PER PLANS
15	C	NORTHERN RED OAK Quercus rubra	2" CAL.	40 FEET ON CENTER
5	D	BLUE ASH Fraxinus quadrangulata	2" CAL.	40 FEET ON CENTER
3	E	BACHERI BLUE SPRUCE Picea pungens 'Bacheri'	6' TALL (MIN.)	15 FEET ON CENTER
1	F	BLUE HAVEN JUNIPER Juniperus scopulorum	6' TALL (MIN.)	8 FEET ON CENTER

TYPICAL PLANT LIST EXAMPLE

5/2006

SHRUB/ PERENNIAL LEGEND

QUANTITY	SYMBOL	COMMON/ BOTANICAL NAME	SIZE	SPACING
120	AA	JAPANESE REDLEAF BARBERRY Berberis thunbergii 'Atropurpurea'	5 GAL.	6 FEET ON CENTER
15	BB	ROCK COTONEASTER Cotoneaster horizontalis	5 GAL.	6 FEET ON CENTER
207	CC	DWARF OREGON GRAPE Mahonia aquifolium 'Compacta'	5 GAL.	4 FEET ON CENTER
109	DD	SUTTER'S GOLD POTENTILLA Potentilla fruticosa 'Sutter's Gold'	5 GAL.	4 FEET ON CENTER
11	EE	VANHOUTTE SPIREA Spiraea vanhouttei	5 GAL.	6 FEET ON CENTER
3	FF	DWARF MUGHO PINE Pinus mugo mugo	5 GAL.	5 FEET ON CENTER
55	GG	RED-HOT POKER Kniphofia uvaria	1 GAL.	3 FEET ON CENTER
30	HH	MOONBEAM COREOPSIS Coreopsis lanceolata 'Moonbeam'	1 GAL.	2 FEET ON CENTER
27	II	DAY LILIES (MIXED COLORS) Hemerocallis spp.	1 GAL.	3 FEET ON CENTER
24	JJ	BALTIC IVY Hedera helix 'Baltica'	1 GAL.	18 INCHES ON CENTER

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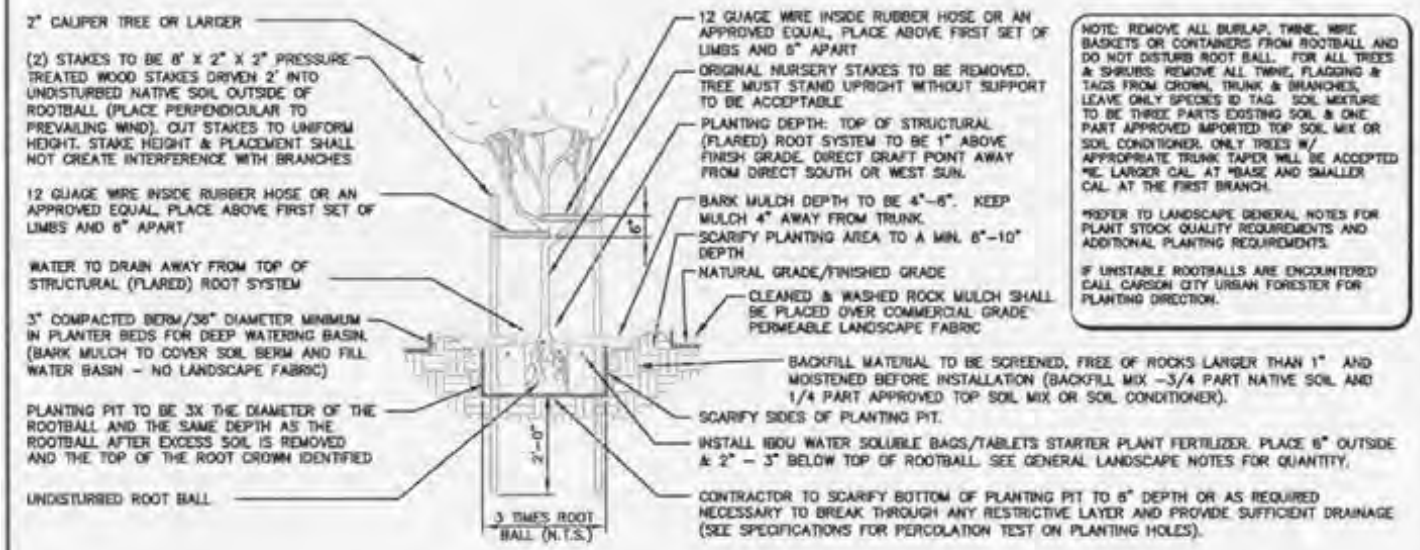


NOTE: REMOVE ALL BURLAP, TWINE, WIRE BASKETS OR CONTAINERS FROM ROOTBALL AND DO NOT DISTURB ROOT BALL. FOR ALL TREES & SHRUBS: REMOVE ALL TWINE, FLAGGING & TAGS FROM CROWN, TRUNK & BRANCHES, LEAVE ONLY SPECIES ID TAG. SOIL MIXTURE TO BE THREE PARTS EXISTING SOIL & ONE PART APPROVED IMPORTED TOP SOIL MIX OR SOIL CONDITIONER. ONLY TREES W/ APPROPRIATE TRUNK TAPER WILL BE ACCEPTED *IE. LARGER CAL. AT *BASE AND SMALLER CAL. AT THE FIRST BRANCH.

*REFER TO LANDSCAPE GENERAL NOTES FOR PLANT STOCK QUALITY REQUIREMENTS AND ADDITIONAL PLANTING REQUIREMENTS.

IF UNSTABLE ROOTBALLS ARE ENCOUNTERED CALL CARSON CITY URBAN FORESTER FOR PLANTING DIRECTION.

DECIDUOUS TREE

TYPICAL PLANTING DETAIL IN LANDSCAPE AREAS

Standard Landscape Detail

File Name: [N:\Landscape details\L2100.dwg]

Landscape Detail Number: L-XX

Date: 2/2007

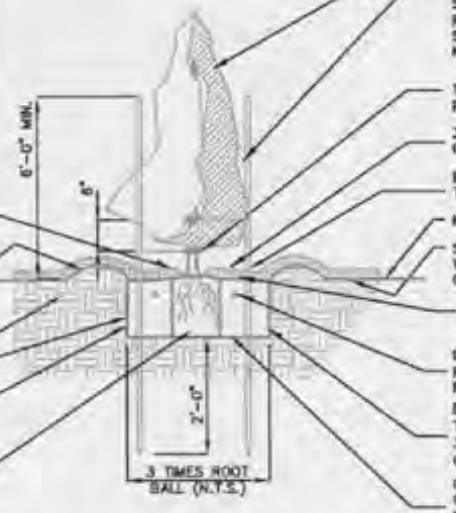
NO.	REVISION	DATE

SCALE: NTS

NOTE: REMOVE ALL BURLAP, TWINE, WIRE BASKETS OR CONTAINERS FROM ROOTBALL AND DO NOT DISTURB ROOT BALL. FOR ALL TREES & SHRUBS: REMOVE ALL TWINE, FLAGGING & TAGS FROM CROWN, TRUNK & BRANCHES. LEAVE ONLY SPECIES ID TAG. SOIL MIXTURE TO BE THREE PARTS EXISTING SOIL AND ONE PART APPROVED IMPORTED TOP SOIL MIX OR SOIL CONDITIONER.

REFER TO LANDSCAPE GENERAL NOTES FOR PLANT STOCK QUALITY REQUIREMENTS AND ADDITIONAL PLANTING REQUIREMENTS.

IF UNSTABLE ROOTBALLS ARE ENCOUNTERED CALL CARSON CITY URBAN FORESTER FOR PLANTING DIRECTION.



- PLANTING DEPTH: TOP OF STRUCTURAL (FLARED) ROOT SYSTEM TO BE 1" ABOVE FINISH GRADE. WATER TO DRAIN AWAY FROM TOP OF STRUCTURAL (FLARED) ROOT SYSTEM.
- 3" COMPACTED BERM/36" DIAMETER MINIMUM IN PLANTER BEDS FOR DEEP WATERING BASIN. MULCH TO COVER SOIL BERM AND FILL WATER BASIN – NO LANDSCAPE FABRIC.
- SCARIFY PLANTING AREA TO A MIN. 12" DEPTH
- SCARIFY SIDES OF PLANTING PIT
- PLANTING PIT TO BE 3X THE DIAMETER OF THE ROOTBALL AND THE SAME DEPTH AS THE ROOTBALL AFTER EXCESS SOIL IS REMOVED AND THE TOP OF THE ROOT CROWN IS IDENTIFIED.
- UNDISTURBED ROOT BALL

- 6' TALL EVERGREEN TREE OR LARGER
- (2) STAKES TO BE 8' X 2" X 2" PRESSURE TREATED WOOD STAKES DRIVEN 2' INTO UNDISTURBED NATIVE SOIL OUTSIDE OF ROOTBALL (PLACE PERPENDICULAR TO PREVAILING WIND). CUT STAKES TO UNIFORM HEIGHT. STAKE HEIGHT & PLACEMENT SHALL NOT CREATE INTERFERENCE WITH BRANCHES
- 12 GUAGE WIRE INSIDE RUBBER HOSE OR AN APPROVED EQUAL. PLACE ABOVE FIRST SET OF LIMBS AND 6" APART
- 3" DEEP WATERING BASIN – FILL WITH BARK MULCH AS SPECIFIED ON PLANS.
- BARK MULCH DEPTH TO BE 4"–6". KEEP MULCH 4" AWAY FROM TRUNK.
- NATURAL GRADE/FINISHED GRADE
- SCARIFY PLANTING AREA TO A MIN. 8"–10" DEPTH. CLEANED AND WASHED ROCK MULCH SHALL BE PLACED OVER COMMERCIAL GRADE PERMEABLE LANDSCAPE FABRIC.
- CLEANED AND WASHED ROCK MULCH SHALL BE PLACED OVER COMMERCIAL GRADE PERMEABLE LANDSCAPE FABRIC.
- INSTALL @DU WATER SOLUBLE BAGS/TABLETS STARTER PLANT FERTILIZER. PLACE 6" OUTSIDE & 2"–3" BELOW TOP OF ROOTBALL. SEE GENERAL LANDSCAPE NOTES FOR QUANTITY.
- BACKFILL MATERIAL TO BE SCREENED, FREE OF ROCKS LARGER THAN 1" AND MOISTENED BEFORE INSTALLATION (BACKFILL MIX – 3/4 PART NATIVE SOIL AND 1/4 PART APPROVED TOP SOIL MIX OR SOIL CONDITIONER).
- CONTRACTOR TO SCARIFY BOTTOM OF PLANTING PIT TO 6" DEPTH OR AS REQUIRED NECESSARY TO BREAK THROUGH ANY RESTRICTIVE LAYER AND PROVIDE SUFFICIENT DRAINAGE (SEE SPECIFICATIONS FOR PERCOLATION TEST ON PLANTING HOLES).

SCALE: NTS

NO.	REVISION	DATE

Standard Landscape Detail

File Name: [H:\landscape details\L-XXX.dwg]

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EVERGREEN TREE

TYPICAL PLANTING DETAIL IN LANDSCAPING AREA

(2) STAKES TO BE 8' X 2" X 2" PRESSURE TREATED WOOD STAKES DRIVEN 2' INTO UNDISTURBED NATIVE SOIL OUTSIDE OF ROOTBALL (PLACE PERPENDICULAR TO PREVAILING WIND). CUT STAKES TO UNIFORM HEIGHT. STAKE HEIGHT & PLACEMENT SHALL NOT CREATE INTERFERENCE WITH BRANCHES

PLANTING DEPTH: TOP OF STRUCTURAL (FLARED) ROOT SYSTEM TO BE 1" ABOVE FINISH GRADE. DIRECT GRAFT POINT AWAY FROM DIRECT SOUTH OR WEST SUN. WATER TO DRAIN AWAY FROM TOP OF STRUCTURAL (FLARED) ROOT SYSTEM.

PROFESSIONAL GRADE BLACK POLYHEADER

FINISH GRADE

NO LANDSCAPE FABRIC TO BE INSTALLED UNDER BARK MULCH.

PLANTING PIT TO BE 3X THE DIAMETER OF THE ROOTBALL AND THE SAME DEPTH AS THE ROOTBALL AFTER EXCESS SOIL IS REMOVED AND THE TOP OF THE ROOT CROWN IDENTIFIED.

UNDISTURBED ROOT BALL

2" CALIPER TREE OR LARGER

12 GUAGE WIRE INSIDE RUBBER HOSE OR AN APPROVED EQUAL – PLACE ABOVE FIRST SET OF LIMBS AND 6" APART.

ORIGINAL NURSERY STAKES TO BE REMOVED. TREE MUST STAND UPRIGHT WITHOUT SUPPORT TO BE ACCEPTABLE

3' DIA. AROUND TREE TRUNK FILL W/ 4"-6" DEPTH BARK MULCH – KEEP MULCH 4" AWAY FROM TRUNK

INSTALL I.B.D.U WATER SOLUBLE BAGS/TABLETS STARTER PLANT FERTILIZER. PLACE 6" OUTSIDE & 2"-3" BELOW TOP OF ROOTBALL. SEE GENERAL LANDSCAPE NOTES FOR QUANTITY.

SCARIFY SIDES OF PLANTING PIT

BACKFILL MATERIAL TO BE SCREENED FREE OF ROCKS LARGER THAN 1" AND MOISTENED BEFORE INSTALLATION. (BACKFILL MIX – 3/4 PART NATIVE SOIL, AND 1/4 PART APPROVED TOP SOIL MIX OR SOIL CONDITIONER).

CONTRACTOR TO SCARIFY BOTTOM OF PLANTING PIT TO 6" DEPTH OR AS REQUIRED NECESSARY TO BREAK THROUGH ANY RESTRICTIVE LAYER AND PROVIDE SUFFICIENT DRAINAGE (SEE SPECIFICATIONS FOR PERCOLATION TEST ON PLANTING HOLES).

NOTE: REMOVE ALL BURLAP, TWINE, WIRE BASKETS OR CONTAINERS FROM ROOTBALL AND DO NOT DISTURB ROOT BALL. FOR ALL TREES AND SHRUBS: REMOVE ALL TWINE, FLAGGING AND TAGS FROM CROWN, TRUNK AND BRANCHES, LEAVE ONLY SPECIES ID TAG. SOIL MIXTURE TO BE THREE PARTS EXISTING SOIL AND ONE PART APPROVED IMPORTED TOP SOIL MIX OR SOIL CONDITIONER. ONLY TREES WITH APPROPRIATE TRUNK TAPER WILL BE ACCEPTED IE. LARGER CAL. AT BASE AND SMALLER CAL. AT THE FIRST BRANCH.

REFER TO LANDSCAPE GENERAL NOTES FOR PLANT STOCK QUALITY REQUIREMENTS AND ADDITIONAL PLANTING REQUIREMENTS.

IF UNSTABLE ROOTBALLS ARE ENCOUNTERED CALL CARSON CITY URBAN FORESTER FOR PLANTING DIRECTION.

ONLY BARK MULCH SHALL BE INSTALLED INSIDE THE 3' DIAM. BLACK POLYHEADER.

SCALE: NTS

NO.	REVISION	DATE

Standard Landscape Detail

DECIDUOUS TREE

TYPICAL PLANTING DETAIL IN LAWN AREA

File Name: [H:\landdev\dwg\Landscape details\L2907.dwg]

Landscape Detail Number: L-XX

Date: 2/2007

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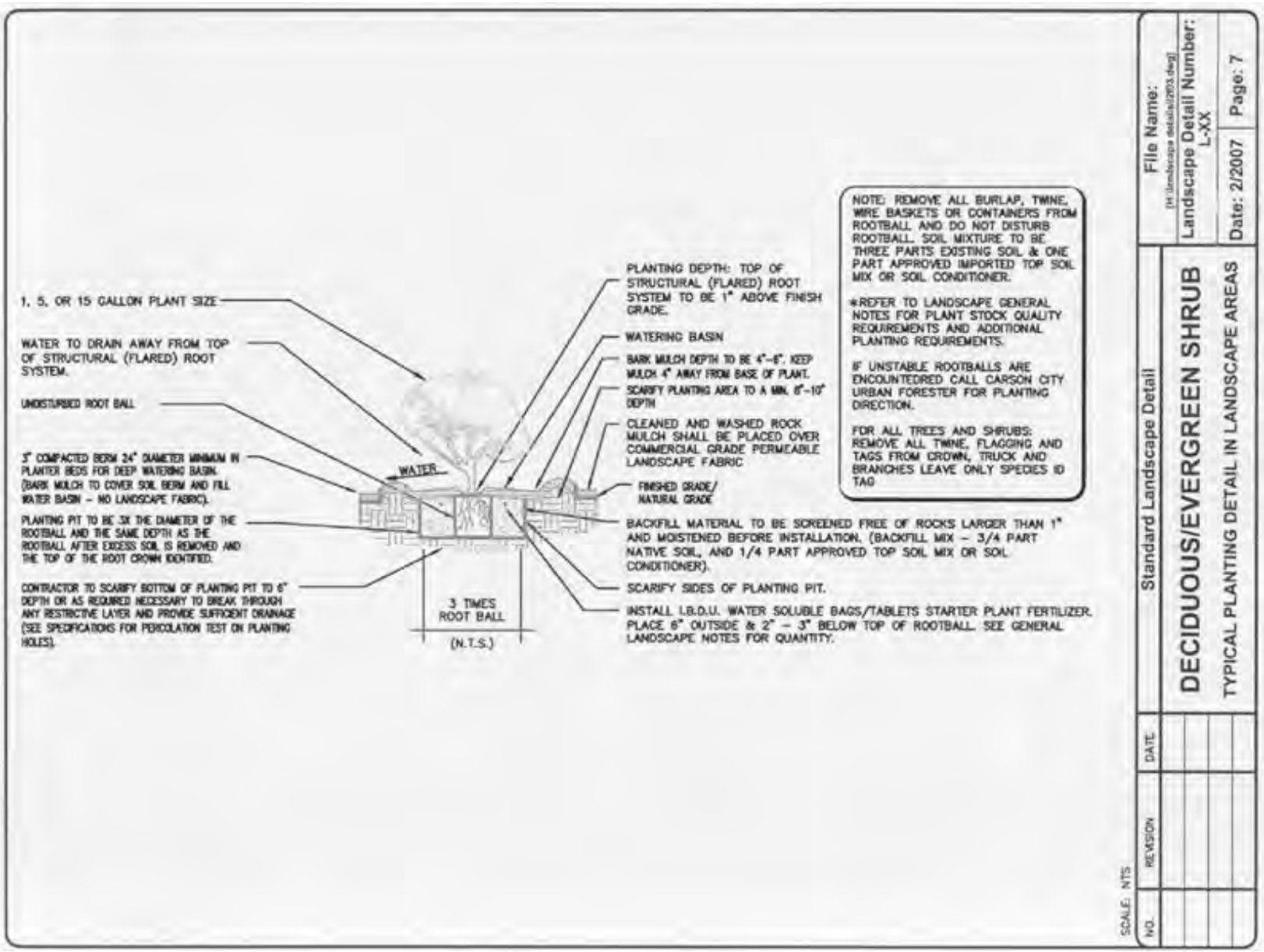
1, 5, OR 15 GALLON PLANT SIZE
WATER TO DRAIN AWAY FROM TOP OF STRUCTURAL (FLARED) ROOT SYSTEM.
UNDISTURBED ROOT BALL
3" COMPACTED BERM 24" DIAMETER MINIMUM IN PLANTER BEDS FOR DEEP WATERING BASIN. (BARK MULCH TO COVER SOIL BERM AND FILL WATER BASIN – NO LANDSCAPE FABRIC).
PLANTING PIT TO BE 3X THE DIAMETER OF THE ROOTBALL AND THE SAME DEPTH AS THE ROOTBALL AFTER EXCESS SOIL IS REMOVED AND THE TOP OF THE ROOT CROWN IDENTIFIED.
CONTRACTOR TO SCARIFY BOTTOM OF PLANTING PIT TO 6" DEPTH OR AS REQUIRED NECESSARY TO BREAK THROUGH ANY RESTRICTIVE LAYER AND PROVIDE SUFFICIENT DRAINAGE (SEE SPECIFICATIONS FOR PERCOLATION TEST ON PLANTING HOLES).
WATER
3 TIMES ROOT BALL
(N.T.S.)
PLANTING DEPTH: TOP OF STRUCTURAL (FLARED) ROOT SYSTEM TO BE 1" ABOVE FINISH GRADE.
WATERING BASIN
BARK MULCH DEPTH TO BE 4"–6". KEEP MULCH 4" AWAY FROM BASE OF PLANT.
SCARIFY PLANTING AREA TO A MIN. 6"–10" DEPTH
CLEANED AND WASHED ROCK MULCH SHALL BE PLACED OVER COMMERCIAL GRADE PERMEABLE LANDSCAPE FABRIC
FINISHED GRADE/ NATURAL GRADE
BACKFILL MATERIAL TO BE SCREENED FREE OF ROCKS LARGER THAN 1" AND MOISTENED BEFORE INSTALLATION. (BACKFILL MIX – 3/4 PART NATIVE SOIL, AND 1/4 PART APPROVED TOP SOIL MIX OR SOIL CONDITIONER).
SCARIFY SIDES OF PLANTING PIT.
INSTALL I.B.D.U. WATER SOLUBLE BAGS/TABLETS STARTER PLANT FERTILIZER. PLACE 6" OUTSIDE & 2" – 3" BELOW TOP OF ROOTBALL. SEE GENERAL LANDSCAPE NOTES FOR QUANTITY.
NOTE: REMOVE ALL BURLAP, TWINE, WIRE BASKETS OR CONTAINERS FROM ROOTBALL AND DO NOT DISTURB ROOTBALL. SOIL MIXTURE TO BE THREE PARTS EXISTING SOIL & ONE PART APPROVED IMPORTED TOP SOIL MIX OR SOIL CONDITIONER.
*REFER TO LANDSCAPE GENERAL NOTES FOR PLANT STOCK QUALITY REQUIREMENTS AND ADDITIONAL PLANTING REQUIREMENTS.
IF UNSTABLE ROOTBALLS ARE ENCOUNTEDRED CALL CARSON CITY URBAN FORESTER FOR PLANTING DIRECTION.
FOR ALL TREES AND SHRUBS: REMOVE ALL TWINE, FLAGGING AND TAGS FROM CROWN, TRUCK AND BRANCHES LEAVE ONLY SPECIES ID TAG
SCALE: NTS
NO.
REVISION
DATE
Standard Landscape Detail
DECIDUOUS/EVERGREEN SHRUB
TYPICAL PLANTING DETAIL IN LANDSCAPE AREAS
File Name:
[H:\landscape details\lt2f03.dwg]
Landscape Detail Number: L-XX
Date: 2/2007
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IRRIGATION LEGEND**

2/2007

SYMBOL	BRAND	MODEL NUMBER	P.S.I.	G.P.M.	RADIUS	COMMENTS
	RAINBIRD	1804-8Q-FLT	30	.39	8'	4" POP-UP SPRAY HEAD
	RAINBIRD	1804-8H-FLT	30	.79	8'	4" POP-UP SPRAY HEAD
	RAINBIRD	1804-10Q-LA	30	.39	10'	4" POP-UP SPRAY HEAD
	RAINBIRD	1804-10H-LA	30	.79	10'	4" POP-UP SPRAY HEAD
	RAINBIRD	1804-10F-LA	30	.57	10'	4" POP-UP SPRAY HEAD
	WILKINS	BACKFLOW PREVENTER				BACKFLOW PREVENTER (INSTALL IN STRONG BOX INSULATED BACKFLOW COVER)
	STRONG BOX	SBBC-45 ALI				45" LONG, 29.5" HIGH, 18" WIDE, (ALUMINUM INSULATED COVER, LOW PROFILE).
	WATDURS	ISOLATION VALVE/GATE VALVE				1 1/2" OR 2" GATE VALVE (MATCH TO MAINLINE SIZE)
	MUELLER	CURB AND STOP WASTE VALVE				1" VALVE (MATCH TO MAINLINE SIZE)
	WILKINS	500 SERIES				2" PRESSURE REDUCING VALVE
	RAINBIRD	150-PEB				1 1/2" ELECTRIC PLASTIC VALVE (SPRAY SYSTEM)
	RAINBIRD	44RC				1" QUICK COUPLING VALVE
	--	PVC MAINLINE - SIZE INDICATED ON DRAWINGS				SCHEDULE 40 PIPE
	--	1" - 2" DIAM. PVC LATERAL LINES - SIZE INDICATED ON DRAWINGS				SCHEDULE 40 PIPE
	--	EXISTING PVC IRR. SLEEVES (NEW SLEEVES INDICATED ON DRAWINGS)				
	--	VALVE NUMBER GALLONS				
DRIP IRRIGATION SYSTEM **						
	RAINBIRD	XCZ-100				CONTROL ZONE KIT W/ 1" DV ELECTRIC PLASTIC VALVE (DRIP SYSTEM) (USE CARSON INDUSTRIES, INC. VALVE BOX OR AN APPROVED EQUAL - SIZE 13 3/4" x 23 1/4")
	PEPCO	3/4" DRIP TUBING				
	PEPCO	FLUSHING END CAP				
	RAINBIRD	XB-10 OR XB-10-6 EMITTERS				SINGLE OR MULTI OUTLET PRESSURE COMPENSATING - INSTALL DRIP TO ALL PLANTS

** IDENTIFIED BRANDS ARE FOR ILLUSTRATION PURPOSES ONLY. THE LANDSCAPE ARCHITECT OR DESIGN PROFESSIONAL IS RESPONSIBLE FOR SPECIFYING THE PROPER EQUIPMENT FOR THE IRRIGATION SYSTEM.

SCALE: NTS

NO.	REVISION	DATE

Standard Irrigation Detail

TYPICAL IRRIGATION LEGEND

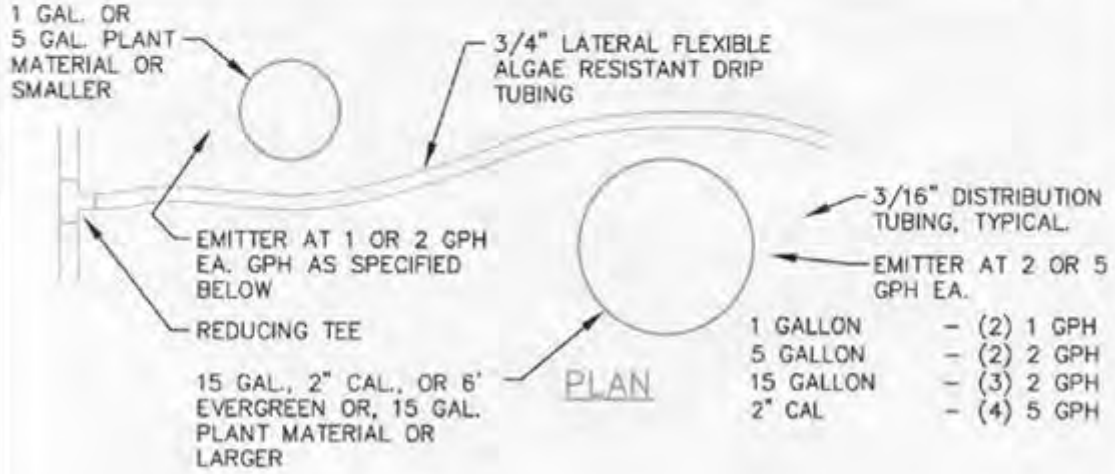
File Name:
[N:\landscape details\IRR-LEGEND.dwg]

Landscape Detail Number: L-XX

Date: 2/2007 | Page: 8

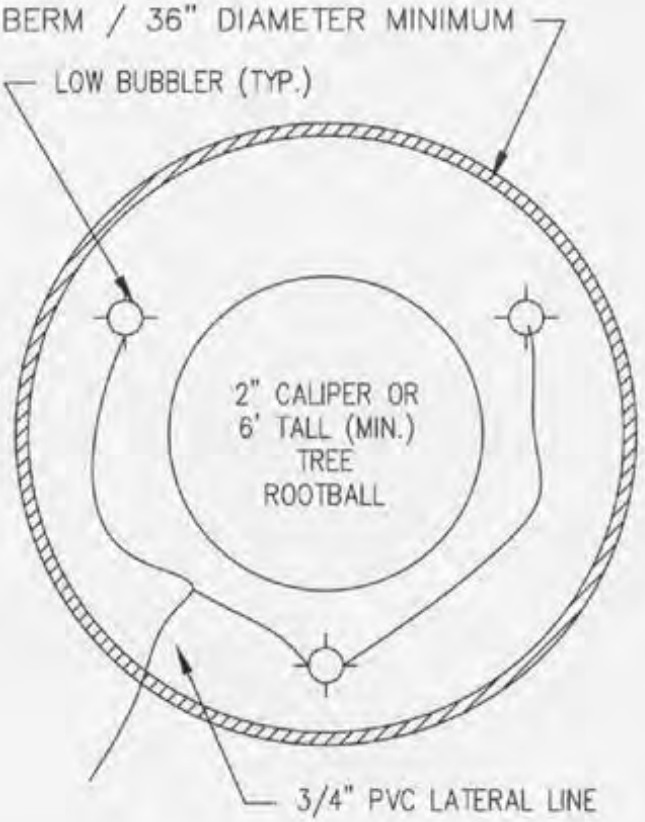
NOTES:

1. STAKE DISTRIBUTION TUBING IN PLACE AT SURFACE OF EACH EMITTER.
2. ALL PLANTS LOCATED ON SLOPES SHALL HAVE EMITTERS PLACED UP HILL FROM PLANT.
3. DO NOT WRAP DISTRIBUTION TUBING AROUND PLANT STEM OR TREE TRUNK.
4. DO NOT PLACE EMITTERS AGAINST PLANT STEM OR TREE TRUNK.
5. PLACE EMITTERS AROUND PLANT FOR EQUAL DISTRIBUTION OF WATER.
6. CONTRACTOR IS RESPONSIBLE TO ESTABLISH WATERING TIMES AND DURATIONS.
7. EMITTER (GPH) WATER RATE MAY BE ALTERED DUE TO SOIL TYPE AND SOIL DRAINAGE CHARACTERISTICS.



SCALE: NTS

NO.	REVISION	DATE	Standard Irrigation Detail	File Name:
			TYPICAL DRIP EMITTER DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 9



PLAN VIEW

REFER TO DECIDUOUS OR EVERGREEN TREE/TYPICAL PLANTING DETAIL IN LANDSCAPE AREA

NOTES:

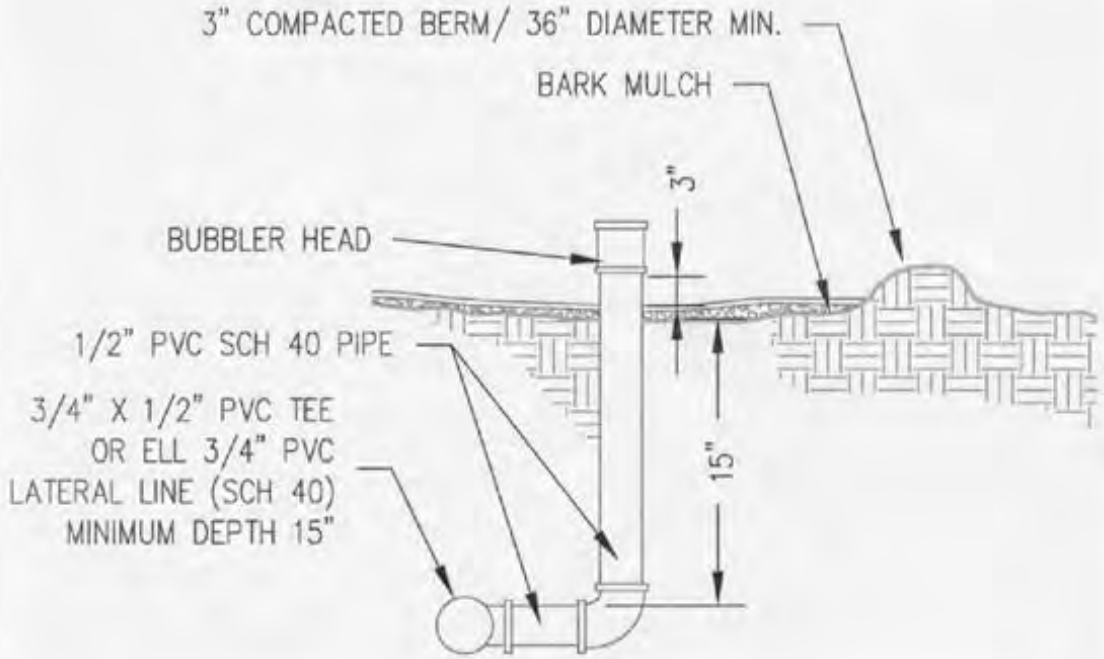
1. TREES SHALL HAVE 3 BUBBLERS PER TREE, EQUALLY DISTRIBUTED AROUND ROOTBALL.
2. DRAWING IS DIAGRAMMATIC ONLY.
3. REFER TO IRRIGATION PLAN FOR BUBBLER ZONES.
4. 3 BUBBLER PER TREE, BUT QUANTITY MAY BE ALTERED (2 MINIMIM – 4 MAXIMUM) DUE TO SOIL TYPE AND SOIL DRAINAGE CHARACTERISTICS.

SCALE: NTS

NO.	REVISION	DATE	Standard Irrigation Detail	File Name: [H:\landscape detail\BUBBLER2.dwg]
			TYPICAL TREE BUBBLER LAYOUT DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 10

SCALE: NTS

NO.	REVISION	DATE	Standard Site Amenity Detail	File Name: [H:\landscape details\TPZ.dwg]
			TYPICAL TREE PROTECTION FENCE DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 11



NOTES

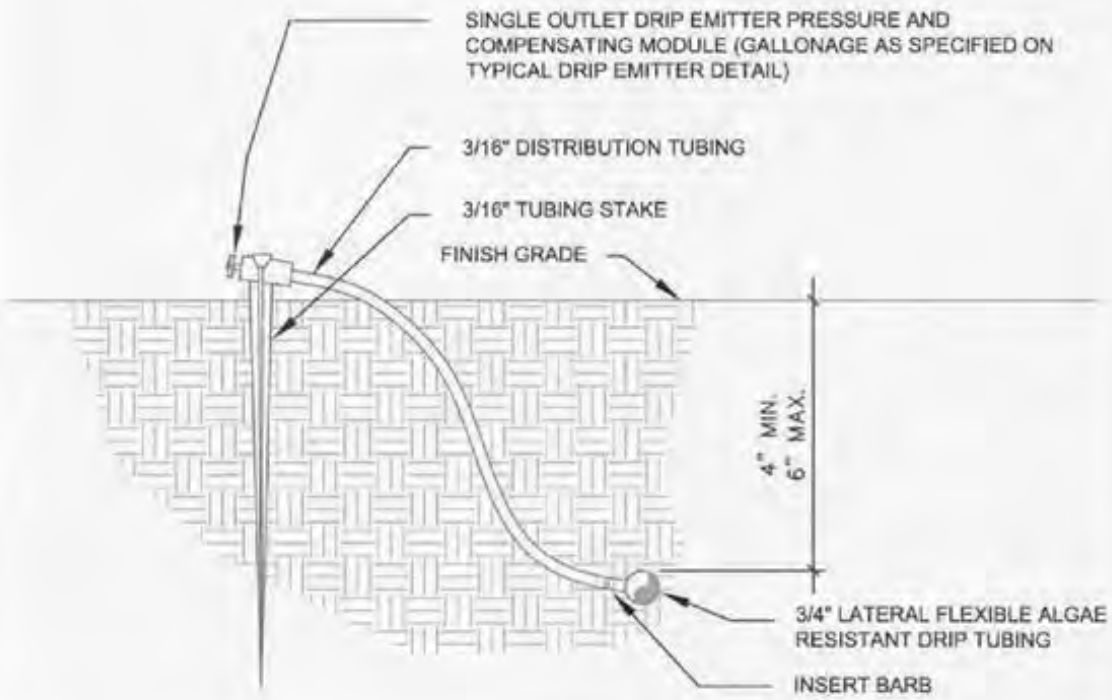
1. TREES SHALL HAVE 3 BUBBLERS PER TREE, EQUALLY DISTRIBUTED AROUND ROOTBALL.

2. IN LANDSCAPE PLANTING AREA BUBBLER HEADS NEED TO BE 3" ABOVE BARK MULCH

3. 3 BUBBLER PER TREE QUANTITY MAY BE ALTERED (2 MIN. / 4 MAX.) DUE TO SOIL TYPE AND SOIL DRAINAGE CHARACTERISTICS.

SCALE: NTS

NO.	REVISION	DATE	Standard Irrigation Detail	File Name: [H:\landscape details\BUBBLER1.dwg]
			TYPICAL TREE BUBBLER DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 12



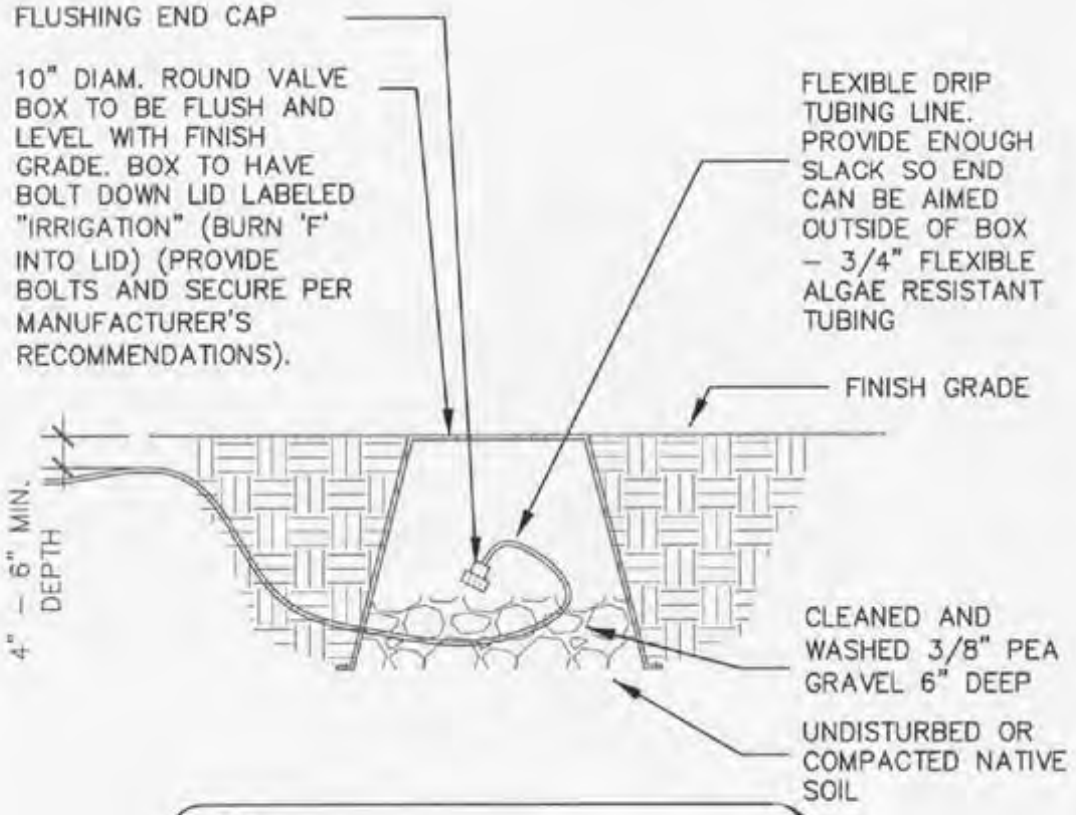
NOTES:

1. INSERT BARB DIRECTLY INTO FLEXIBLE DRIP TUBING FOR INSTALLATION OF DISTRIBUTION TUBING.

2. PLACE EMITTERS ON OUTER EDGE OF ROOT BALL AND SOIL OUTSIDE OF ROOT BALL SO PLANT MATERIAL WILL RECEIVE WATER. DO NOT PLACE EMITTER AT BASE OF TRUNK OR STEM PLANTS.

SCALE: NTS

NO.	REVISION	DATE	Standard Irrigation Detail	File Name: [H:\landscape details\drippers.dwg]
			TYPICAL DRIP EMITTER STAKING DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 13

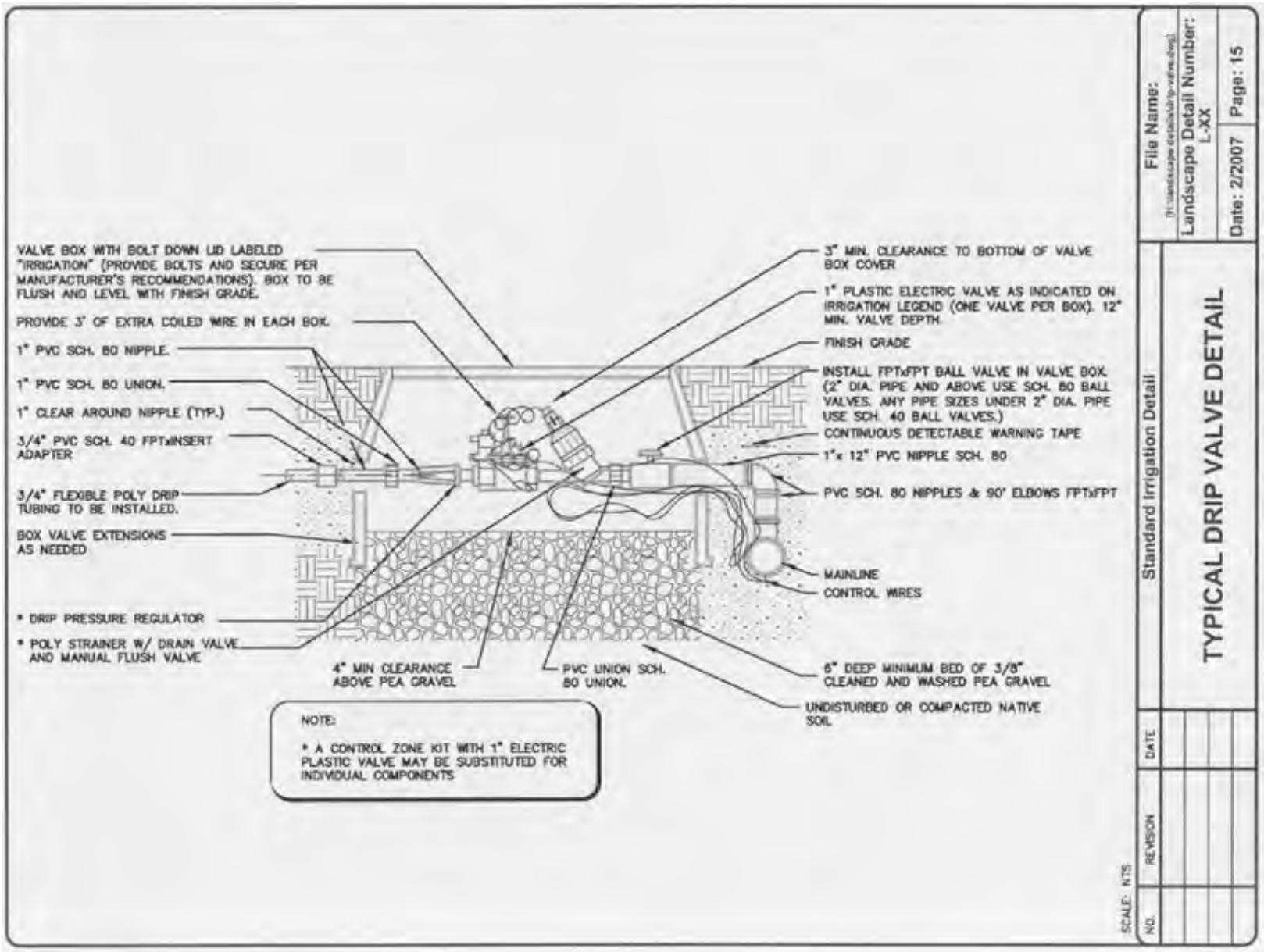


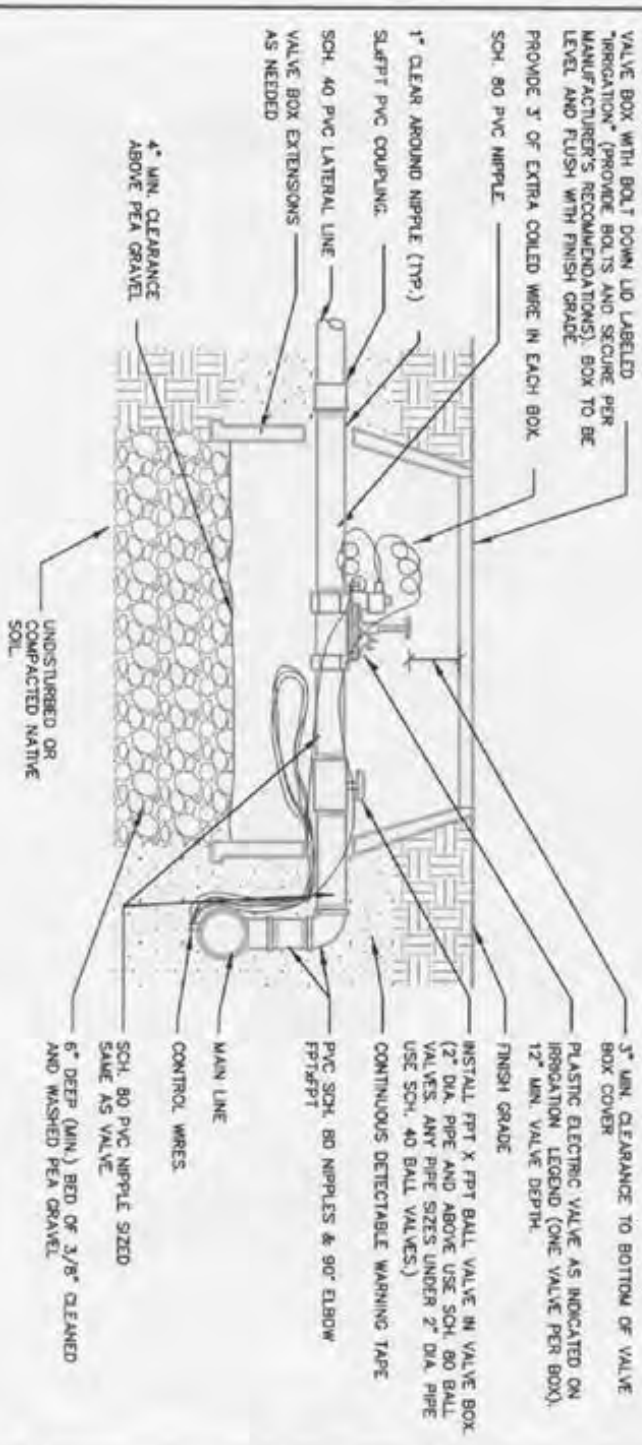
NOTE:

1. ALL DRAIN ROCK IN VALVE BOXES TO BE 3/8" CLEANED AND WASHED PEA GRAVEL

SCALE: NTS

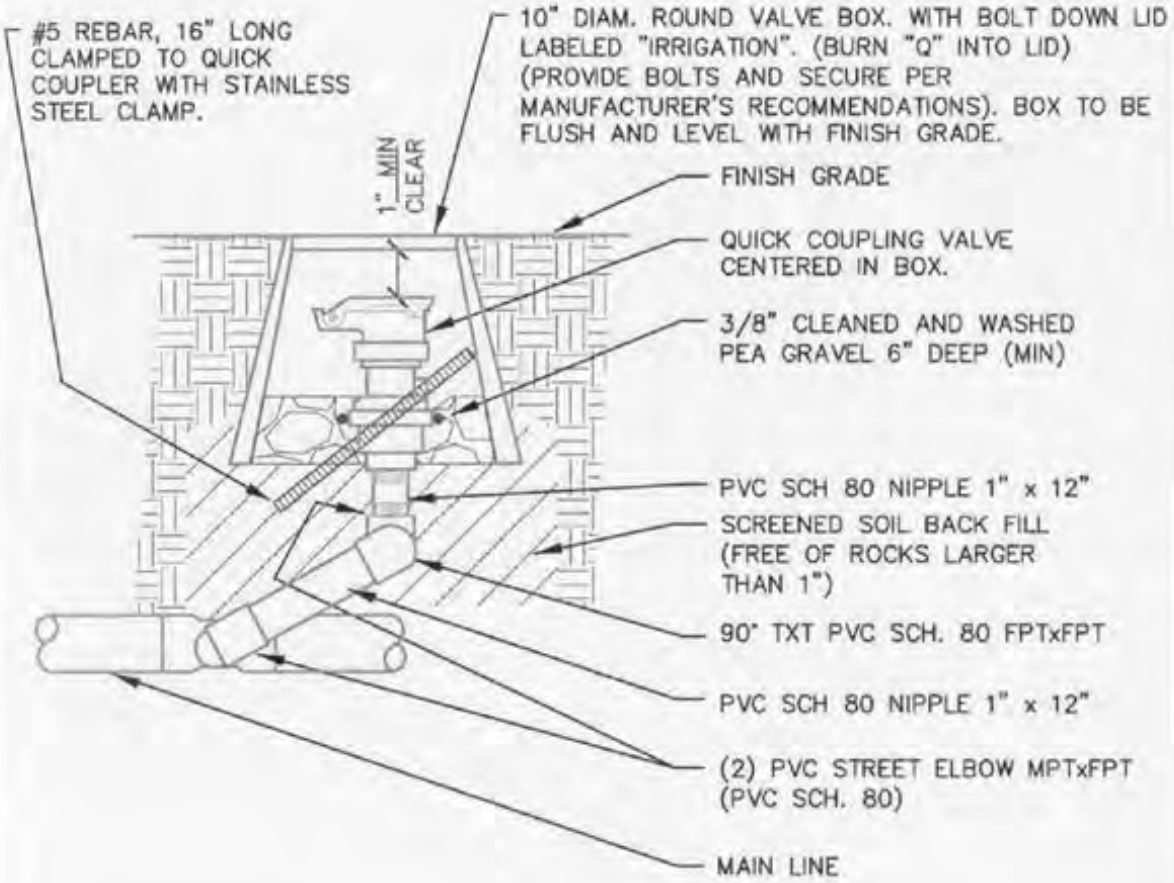
NO.	REVISION	DATE	Standard Irrigation Detail	File Name: [H:\landscape details\FLUSHING.dwg]
			TYPICAL FLUSHING END CAP DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 14


VALVE BOX WITH BOLT DOWN LID LABELED "IRRIGATION" (PROVIDE BOLTS AND SECURE PER MANUFACTURER'S RECOMMENDATIONS). BOX TO BE FLUSH AND LEVEL WITH FINISH GRADE.
PROVIDE 3' OF EXTRA COILED WIRE IN EACH BOX.
1" PVC SCH. 80 NIPPLE.
1" PVC SCH. 80 UNION.
1" CLEAR AROUND NIPPLE (TYP.)
3/4" PVC SCH. 40 FPTxINSERT ADAPTER
3/4" FLEXIBLE POLY DRIP TUBING TO BE INSTALLED.
BOX VALVE EXTENSIONS AS NEEDED
* DRIP PRESSURE REGULATOR
* POLY STRAINER W/ DRAIN VALVE AND MANUAL FLUSH VALVE
4" MIN CLEARANCE ABOVE PEA GRAVEL
PVC UNION SCH. 80 UNION.
3" MIN. CLEARANCE TO BOTTOM OF VALVE BOX COVER
1" PLASTIC ELECTRIC VALVE AS INDICATED ON IRRIGATION LEGEND (ONE VALVE PER BOX). 12" MIN. VALVE DEPTH.
FINISH GRADE
INSTALL FPTxFPT BALL VALVE IN VALVE BOX. (2" DIA. PIPE AND ABOVE USE SCH. 80 BALL VALVES. ANY PIPE SIZES UNDER 2" DIA. PIPE USE SCH. 40 BALL VALVES.)
CONTINUOUS DETECTABLE WARNING TAPE
1"x 12" PVC NIPPLE SCH. 80
PVC SCH. 80 NIPPLES & 90° ELBOWS FPTxFPT
MAINLINE
CONTROL WIRES
6" DEEP MINIMUM BED OF 3/8" CLEANED AND WASHED PEA GRAVEL
UNDISTURBED OR COMPACTED NATIVE SOIL
NOTE:
* A CONTROL ZONE KIT WITH 1" ELECTRIC PLASTIC VALVE MAY BE SUBSTITUTED FOR INDIVIDUAL COMPONENTS
SCALE: NTS
NO.
REVISION
DATE
Standard Irrigation Detail
TYPICAL DRIP VALVE DETAIL
File Name:
Landscape Detail Number: L-XX
Date: 2/2007
Page: 15



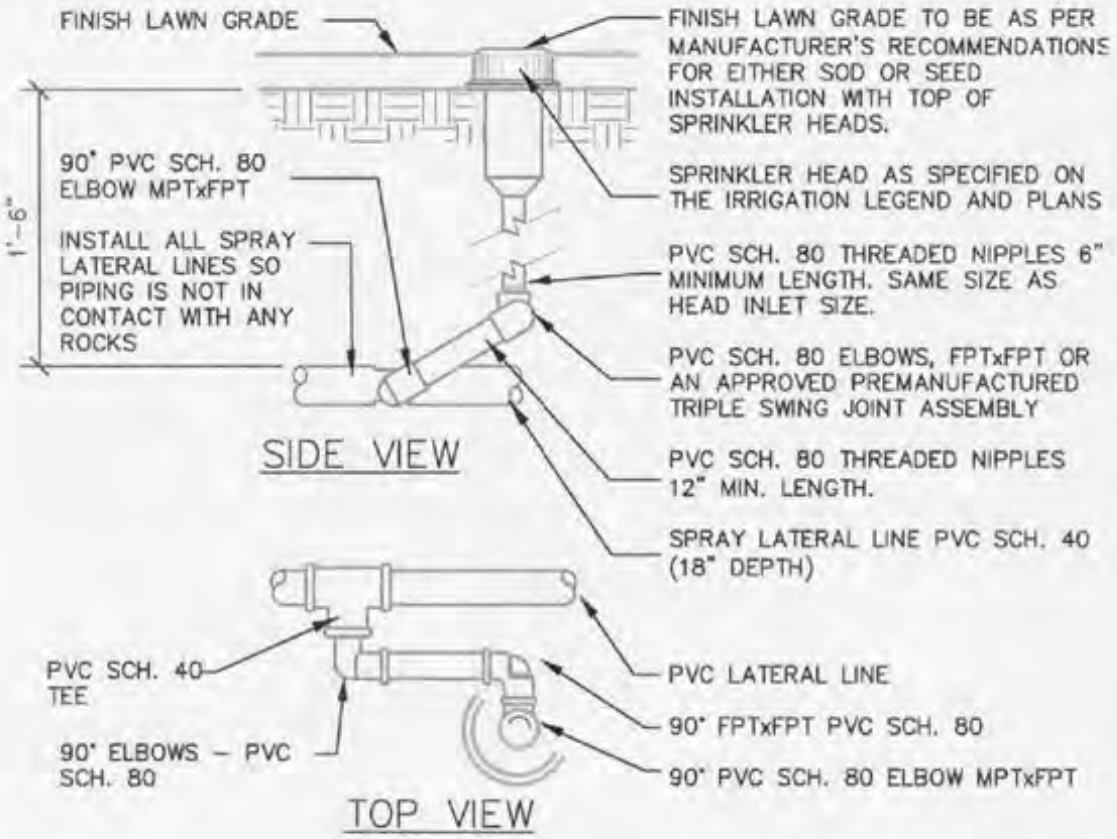
SCALE: NTS

NO.	REVISION	DATE	Standard Irrigation Detail	File Name: [H:\landscape details\spray-valve.dwg]
			TYPICAL SPRAY VALVE DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 16



SCALE: NTS

NO.	REVISION	DATE	Standard Irrigation Detail	File Name: [I:\landscape details\QUICKVALVE.dwg]
			TYPICAL QUICK COUPLING VALVE DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 17

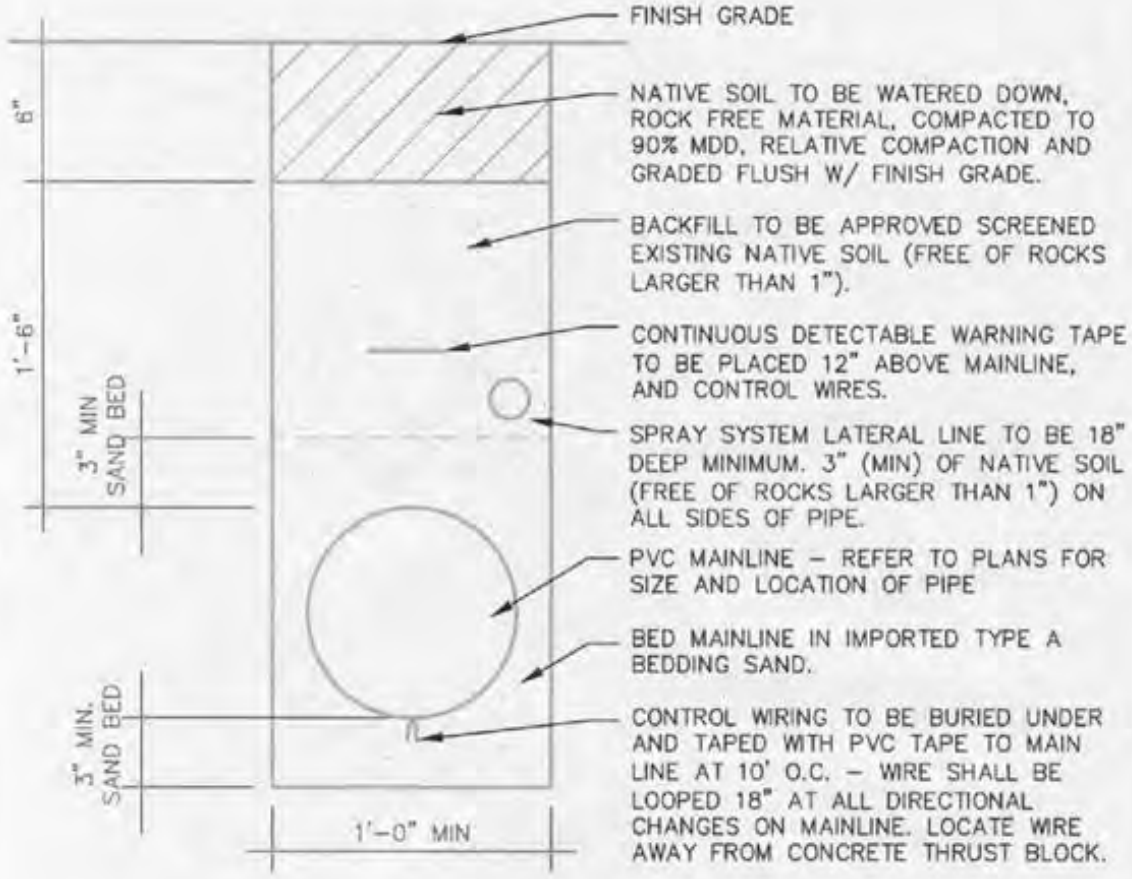


NOTE:

1. MARLEX STREET ELBOWS MAY BE SUBSTITUED FOR 90° PVC SCH. 80 ELBOWS.

SCALE: NTS

NO.	REVISION	DATE	Standard Irrigation Detail	File Name: [H:\Landscape details\RDTOR.dwg]
			TYPICAL ROTOR/POP-UP HEAD DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 18



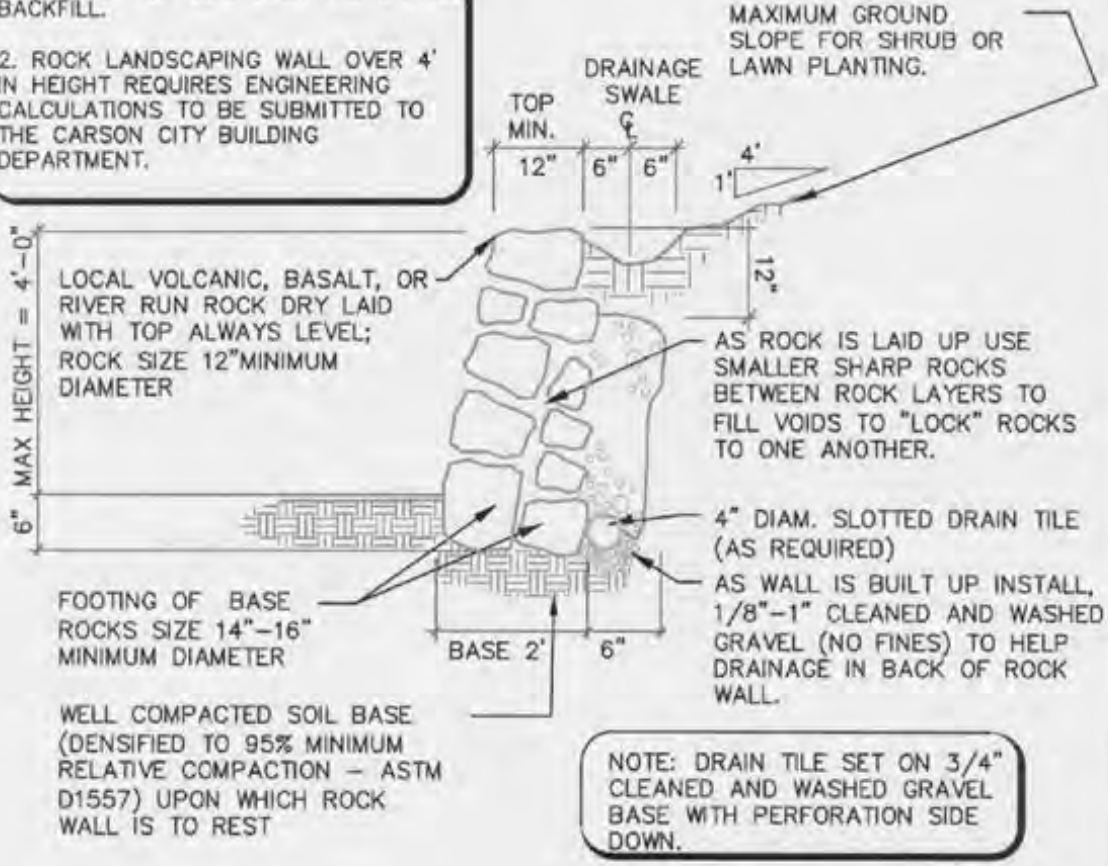
SCALE: NTS

NO.	REVISION	DATE	Standard Irrigation Detail	File Name: [R:\Landscape details\TRENCH1.dwg]
			TYPICAL IRRIGATION TRENCH WALL SECTION DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 19

NOTES:

1. THERE MUST ALWAYS BE A MINIMUM OF 10" OF TOP SOIL OVER THE GRAVEL BACKFILL.

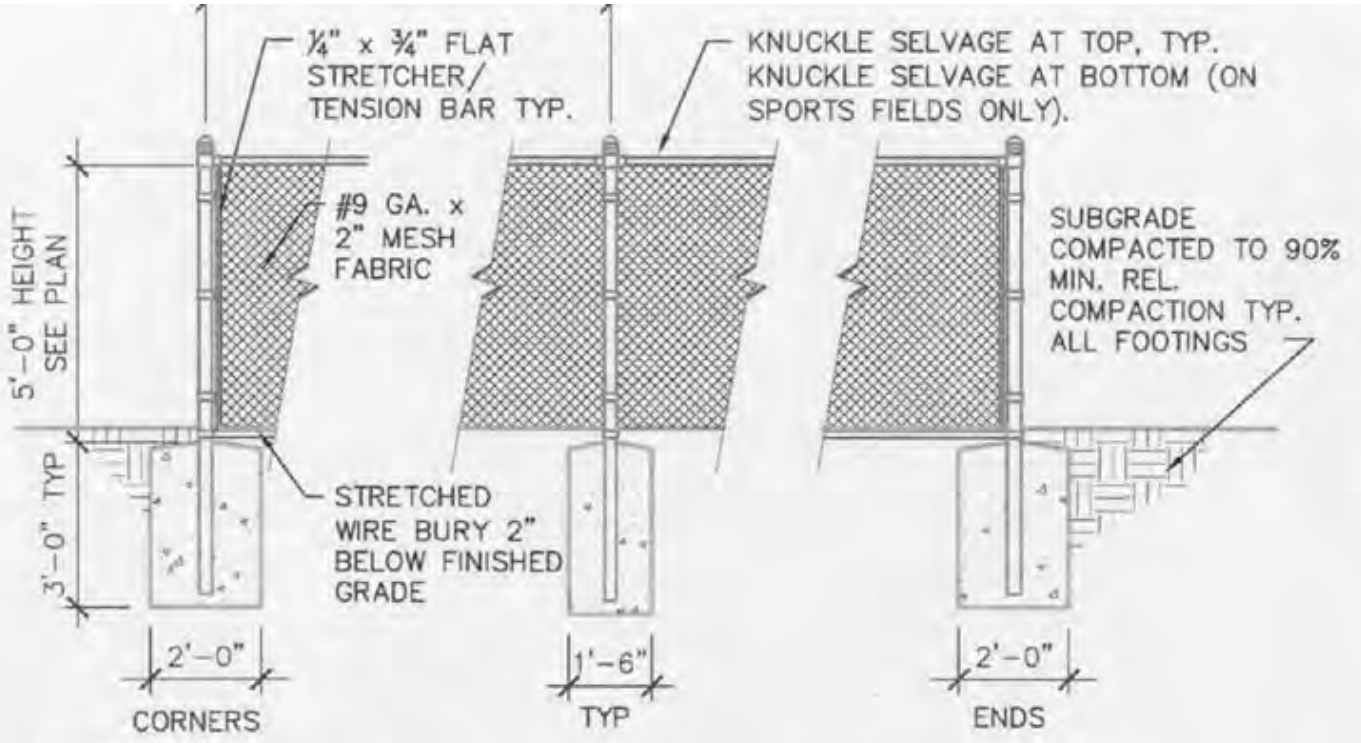
2. ROCK LANDSCAPING WALL OVER 4' IN HEIGHT REQUIRES ENGINEERING CALCULATIONS TO BE SUBMITTED TO THE CARSON CITY BUILDING DEPARTMENT.



NOTE: DRAIN TILE SET ON 3/4" CLEANED AND WASHED GRAVEL BASE WITH PERFORATION SIDE DOWN.

SCALE: NTS

NO.	REVISION	DATE	Standard Site Amenity Detail	File Name: [N:\landscaping details\L2G02.dwg]
			TYPICAL DRY-LAID ROCK LANDSCAPING WALL DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 20



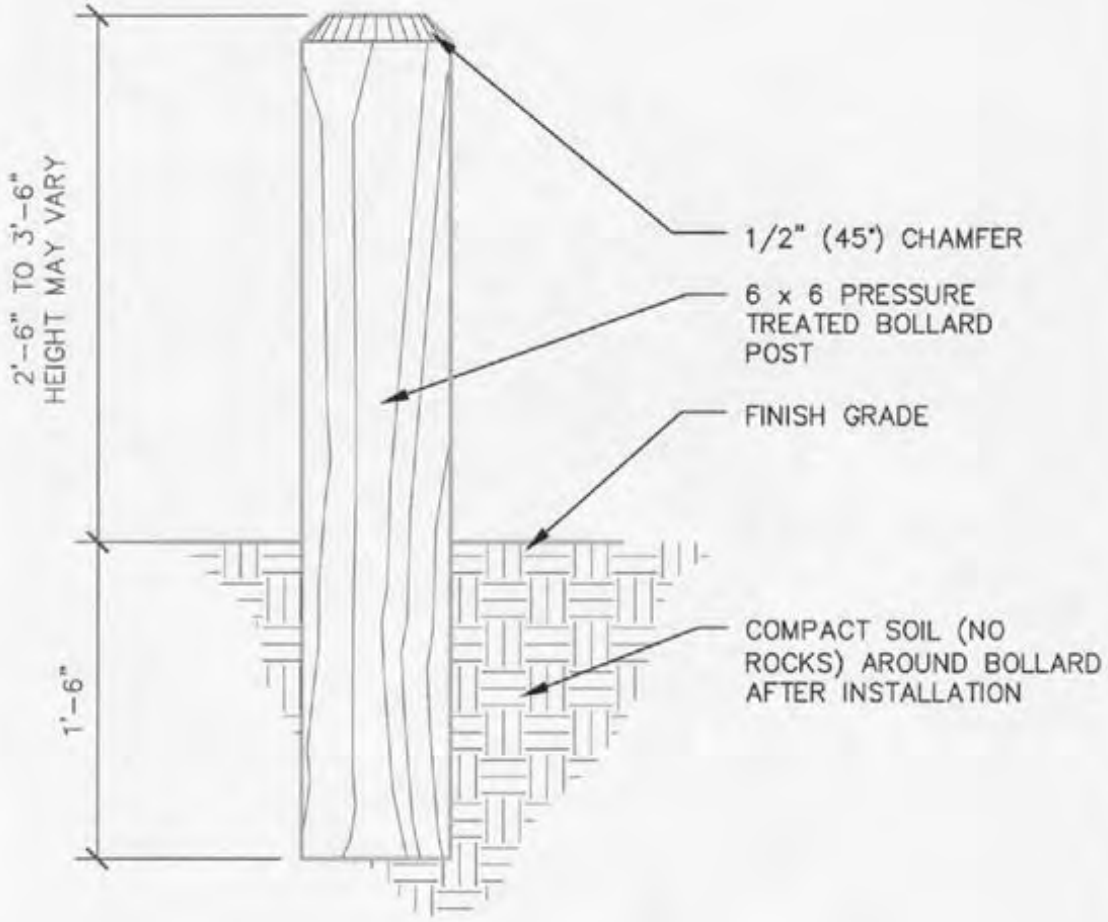
NOTES:

1. TOP RAIL SHALL BE 1 ⅝" O.D. SCH 40 STEEL.
2. FENCES 8' OR HIGHER SHALL HAVE 1 ⅝" O.D. MID RAIL.
3. CORNER AND END POSTS SHALL BE 3" O.D. AT 6' AND 4' HIGH FENCE.
4. INTERMEDIATE POSTS SHALL BE 2 ½" O.D. AT 6' AND 4' HIGH FENCE, 3" O.D. AT 8' OR HIGHER FENCE.
5. FENCING FABRIC, POSTS, RAILS AND HARDWARE SHALL BE GALVANIZED.

CHAIN LINK FENCE

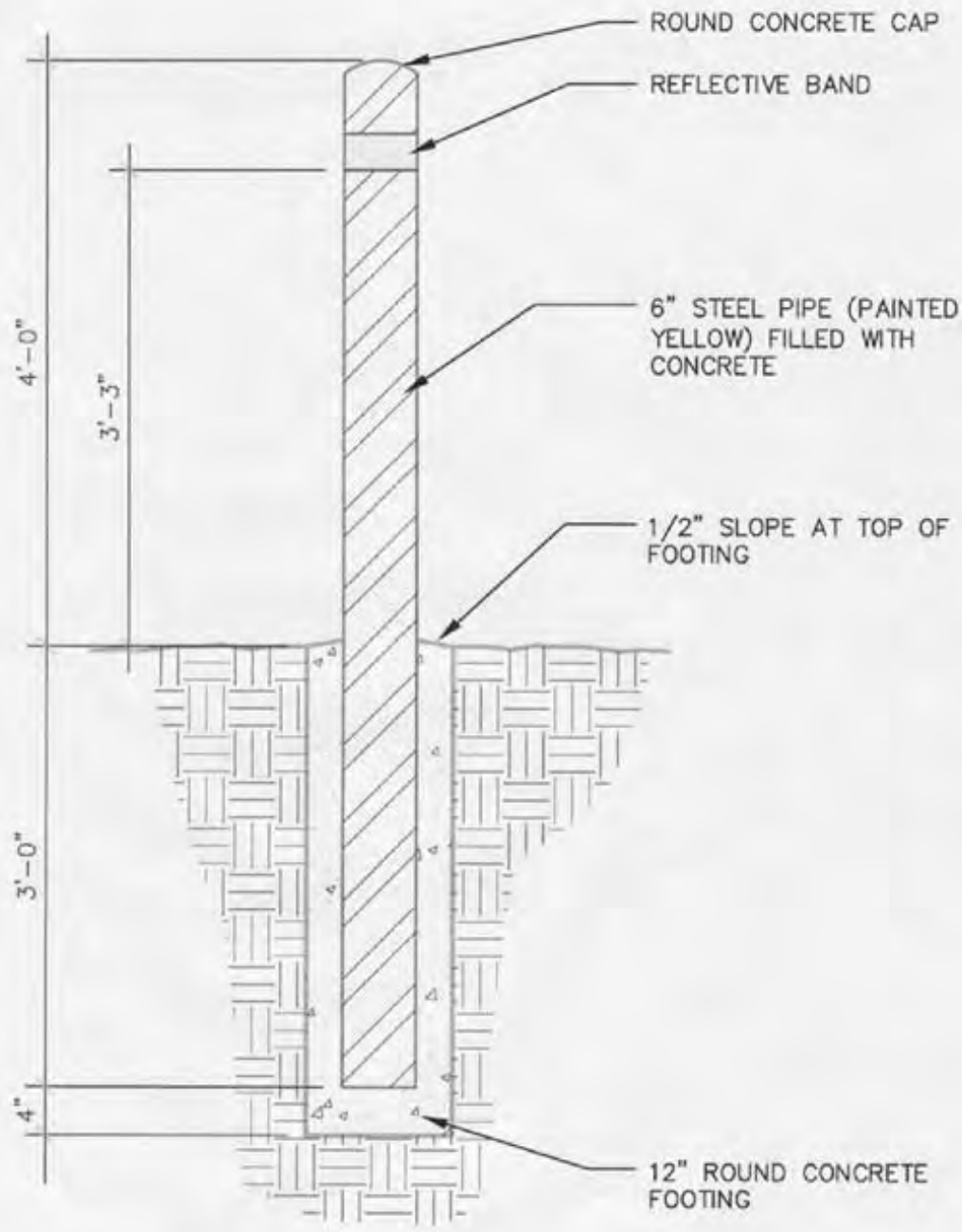
CHAINLINKFENCE

1/4" = 1'-0"



SCALE: NTS

NO.	REVISION	DATE	Standard Landscape Site Amenity Detail	File Name: [H:\landscape details\L2B01.dwg]
			TYPICAL WOOD BOLLARD DETAIL	Landscape Detail Number: L-XX
				Date: 2/2007 | Page: 22



SCALE: NTS

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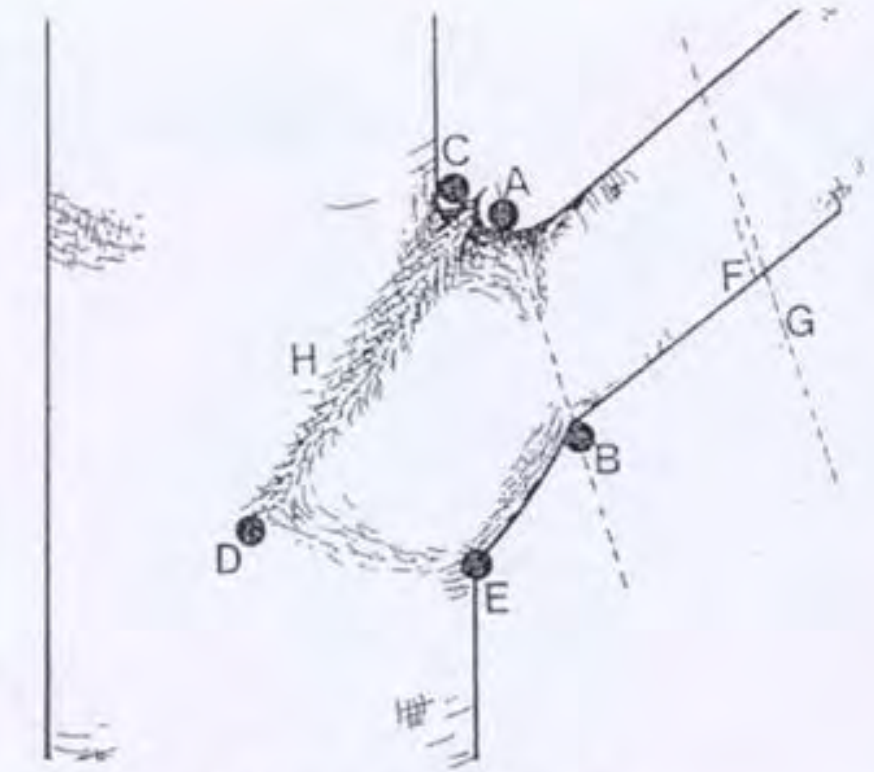
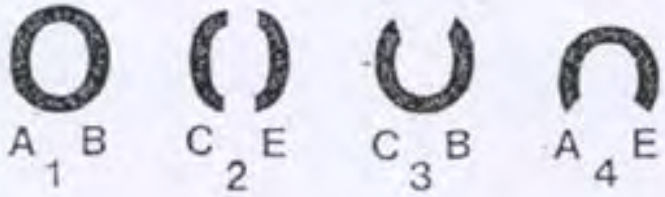
			PIPE BOLLARD DETAIL	Landscape Detail Number: L-XX
				Date: 5/2006 | Page: 23





NATURAL TARGET PRUNING

Locate the branch bark ridge (H) and the branch collar (E to B).
Stub cut the branch (up F, down G).
Locate points A and B where the branch meets the branch collar.
Cut from A to B, or from B to A with care.
If position of B is uncertain, draw a line in your mind from A to E.
Angle EAD is approximately the same as angle EAB.
Point D is the beginning of the branch bark ridge (H).
A proper cut will result in woundwood pattern 1.
Improper cuts will result in patterns 2, 3, and 4.
Do not leave stubs.
Do not make flush cuts.
Do not paint the wounds.

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Horticulture Assistant
Master Gardener Program Coordinator

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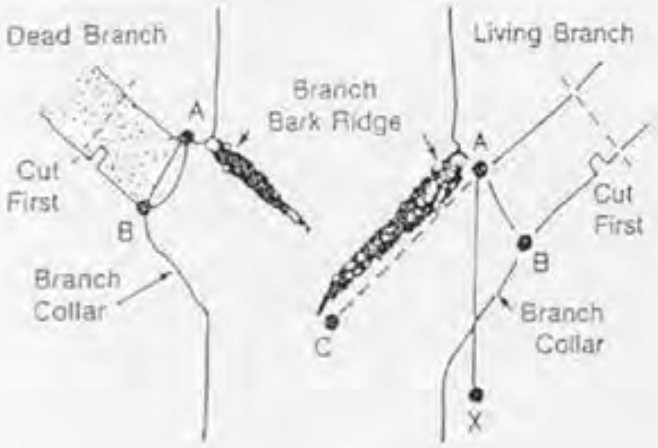
Web site: www.unce.unr.edu

Natural Target Pruning

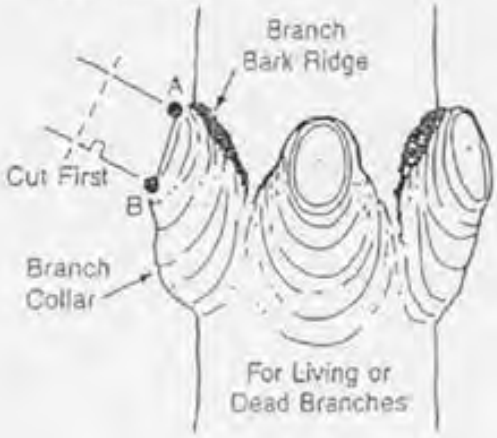
Hardwoods



Natural Pruning Steps

1. Locate the branch bark ridge
2. Find TARGET A—outside of branch bark ridge
3. Find TARGET B—swelling where branch meets branch collar
4. If B is hard to find—drop a line at AX. Angle XAC=to angle XAB
5. Stub branch to be pruned
6. Make cut at line AB

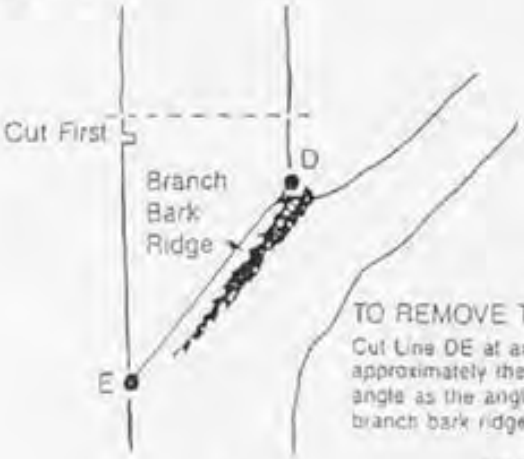
Conifers



Do Not

- Cut behind the branch bark ridge
- Leave stubs
- Cut branch collar
- Paint cuts—except for cosmetics
- Leave flat top when topping

Topping



TO REMOVE TOP:
Cut Line DE at an angle approximately the same angle as the angle of the branch bark ridge

BEST TIME TO PRUNE

Late dormant season or EARLY spring before leaves form

FOR MORE INFORMATION WRITE:

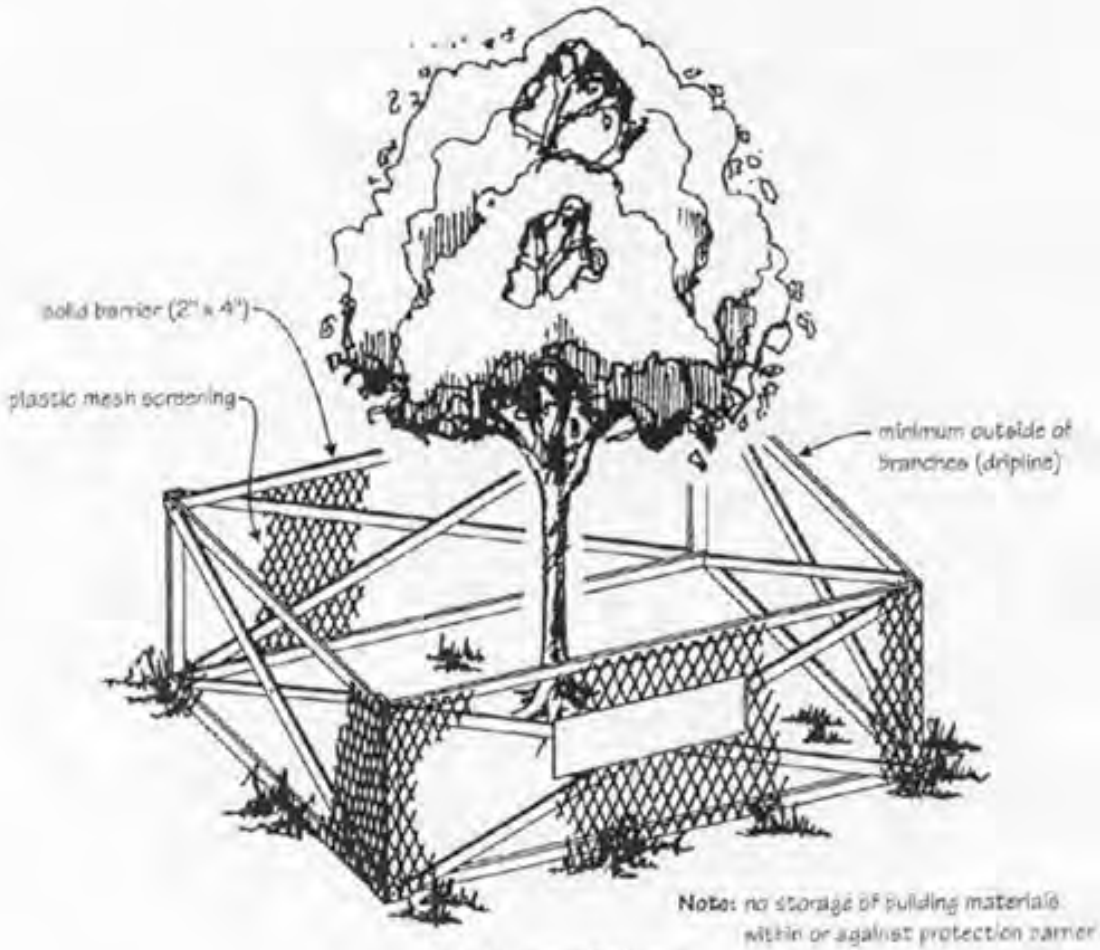
Northeastern Forest
Experiment Station
P.O. Box 640
Durham NH 03824

or

your local State Forestry or
USDA Forest Service Office

TREE RETENTION/PROTECTION

1) Where trees are to be retained on a site, protection barriers must be installed as specified in 3.4.2.
2) Any required excavation in or around the protection barrier to accommodate underground services, footing, etc. should be indicated on the plan and completed by hand.
3) Trees inside the protection zone should be cared for throughout the construction process, i.e., they must be watered sufficiently if a portion of the tree's root system has been disturbed by excavation.
4) Root and branch pruning, where necessary, must be done in accordance with 3.4.2.



Tree Retention Guideline

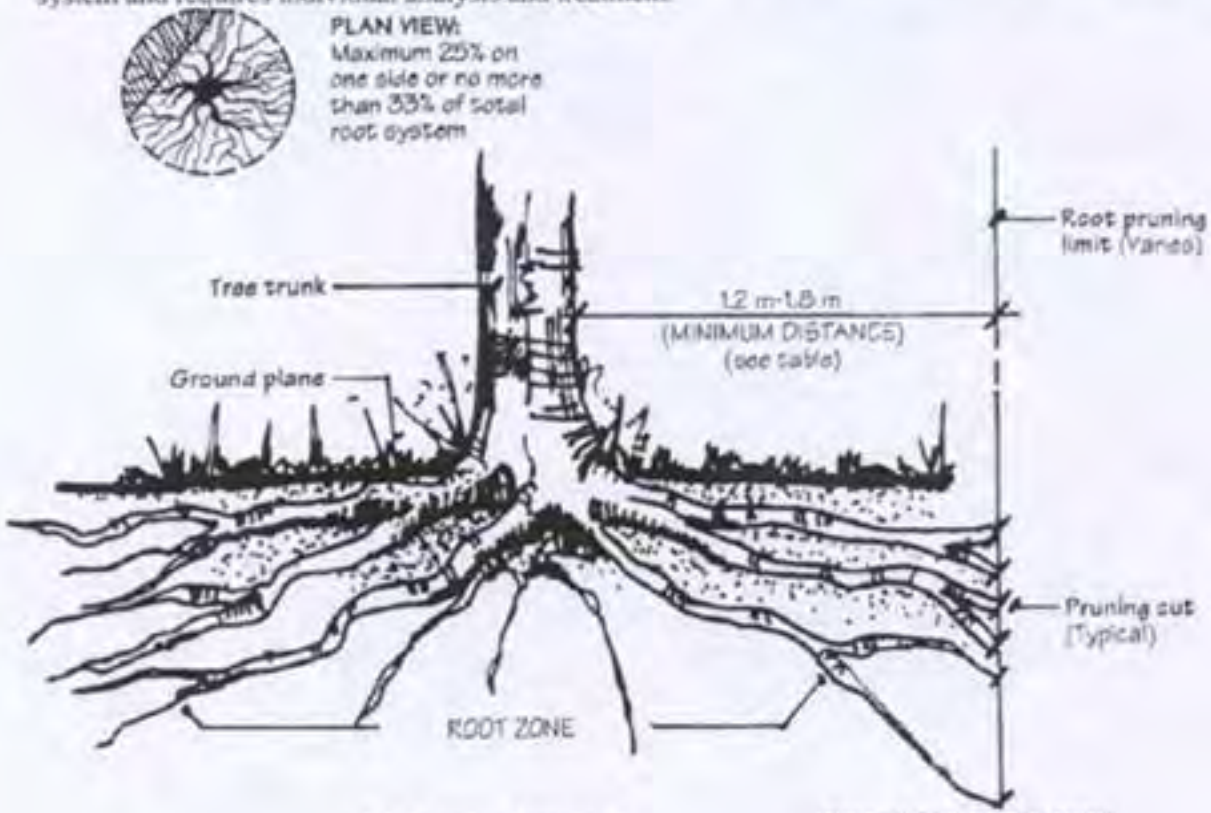
Root Pruning

Root pruning is the practice of removing a portion of a tree's root system. As a first alternative, adding soil and reseeding is recommended to prevent the removal of key structural roots. However, root pruning sometimes becomes necessary in order to accommodate landscape features such as walks, retaining walls, drains or utilities. Root pruning may also be necessary when existing roots begin to interfere with the routine maintenance of surrounding lawns and shrub beds. For example, it would be better to remove a surface root which is continually wounded by a lawn mower blade rather than to increase potential for disease through open wounds in the root. Other reasons for root pruning may include transplanting and undesirable growth patterns.

The circumstances necessitating root pruning vary, but the objective of tree root pruning is always to ensure the health, stability and longevity of the tree. Therefore, major root pruning should only be done by, or in consultation with, an Arborist or other qualified landscape professional.

The following general guidelines for root pruning are provided for your convenience:

a) A tree should be root pruned only if the problem can be solved by removing less than 33 percent of the tree's roots, with no more than 25 percent from one side.
b) For trees 30 cm in diameter and less, roots should not be removed within 1.2 m of the outer edge of the tree base. Trees with diameters over 30 cm should be allowed an additional 30 cm for every extra 7.5 cm of trunk diameter measured at a point 1.4 m above ground. For example, a tree with a 37.5 cm diameter trunk measured 1.4 m above the ground would require a minimum 1.55 m allowance around it.
c) Cut roots cleanly after excavation with clean, sharp tools, to promote callous formation and wound closure. Wounds may be dressed with a tree rooting hormone compound that is available at garden centres.
d) Backfill the excavation as soon as possible and water the soil around roots to avoid leaving air pockets.
e) Mix soil improvements (e.g. peat moss) with fill soil to promote new root growth, especially if the existing soil is of poor quality. The soil quality can be easily determined by using a basic soil testing kit which is readily available at most nursery supply stores. Do not add fertilizers until improved tree growth is noticed, generally after 6 to 8 weeks during a growing season. Soil testing will better determine soil deficiencies and additional amendment requirements.
f) Surface roots which interfere with other elements in the landscape can be removed under the supervision of an Arborist or other qualified landscape professional. Each tree has a different root system and requires individual analysis and treatment.



Excavation Adjacent to Retained Trees

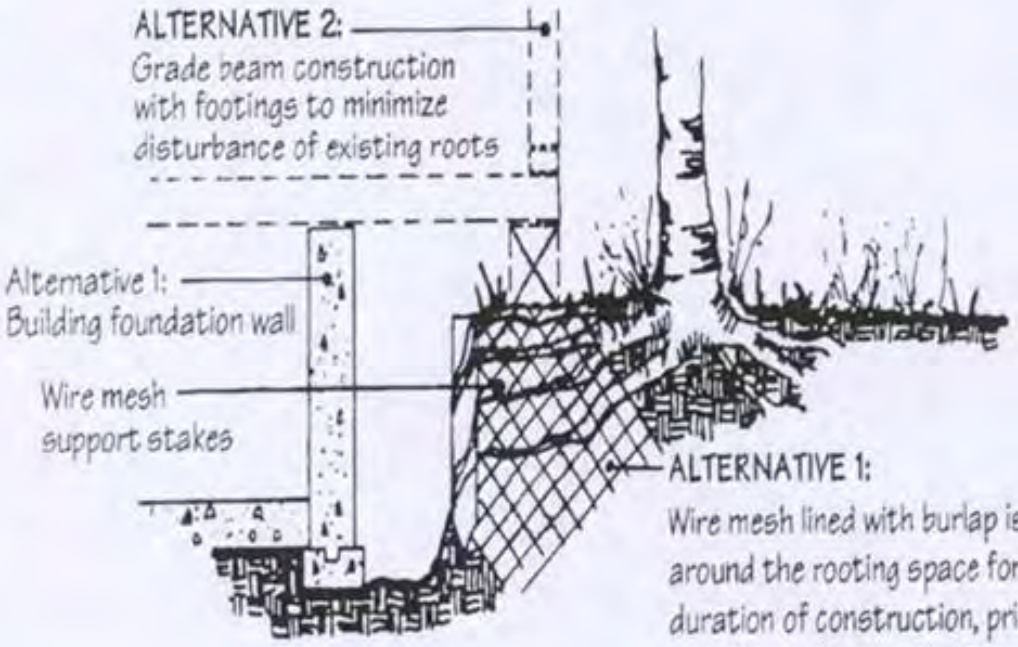
In cases where proposed building excavation will affect existing trees to be retained, special attention should be given to proper root pruning and care for the remaining root system. Alternatively, a post and beam structure for the building may be considered to retain the rooting space (see diagram, Alternative 2). It is important to note that most roots are located in the top 60 cm of soil, with the major roots for water and nutrients absorption in the top 20 to 30 cm.

a) In order to minimize root damage, soil erosion and tree disturbance, a temporary root curtain[2] should be wrapped around the root zone to retain and protect the exposed area. The root curtain should consist of heavy wire mesh or similar material lined with burlap (to retain moisture) and supported by posts. Backfill should be used as required to ensure that none of the roots are left exposed. Only hand excavation should be used in the root zone area.

b) It is critical that the root zone system (or roots of the tree) be kept moist by watering as required throughout the construction process.

c) Once the foundation is ready to be backfilled, the root curtain can be carefully removed. It is of utmost importance that the area surrounding the tree be kept free of building materials, as well as pedestrian and vehicular traffic, to avoid soil compaction.

d) Tunnelling rather than trenching should be considered when installing underground utilities and drainage lines to minimize damage to existing trees. This technique entails boring a hole under or through the root system with minimum disturbance. To ensure that the work is undertaken in the appropriate manner, a certified Arborist or similarly qualified landscape professional should be consulted if the applicant decides to use this technique.



ALTERNATIVE 1:
Wire mesh lined with burlap is placed around the rooting space for the duration of construction, prior to backfilling, after area adjacent to the foundation wall is cleared by hand.
(also see: Root Pruning)

Owner Maintenance Agreement

All landscaping, irrigation and screening shall be maintained at all times to conform to the regulations of Development Standards Division 3 Landscaping. Landscaping and related equipment including, but not limited to, trees, shrubs, plants, screens, walkways, benches, fountains and irrigation systems shall be maintained by the present or subsequent owner of the property. The owner of the property is responsible for maintaining or assuring the ongoing maintenance of installed landscaping so that the landscaping continues to thrive. Each owner shall be required at all times to keep all landscaping materials in good health, repair and maintenance.

The City may require the immediate replacement of any and all dead or damaged plant materials at any time. If any portion of the landscaping material or irrigation equipment is dead, dying, damaged, destroyed or otherwise affected, the owner of the development project shall replace or repair the damaged or affected material within thirty days following notification from the Director. If the season of the year makes this repair or replacement impractical within the thirty-day period, the person responsible for the landscaping shall submit a letter of request to the Director asking for a delay to replace materials and shall submit a time frame for the accomplishment of this work. If the repair or replacement is not accomplished in a timely fashion the Director may initiate proceedings to revoke the special use permit or business license for the subject use.

_____ _____

Signature of Owner Date

Carson City Tree List for Commercial Projects

USDA Zone: 5 (Plant Material) Sunset Zone: 3

Species and Varieties Appropriate for Proposed Site That Are Not on This List Are Subject to Approval, Not Including Accent Trees

Deciduous

Small Tree - Less than 30 feet (single stem)

	ACER ginnala 'Flame'	Amur Maple
*	AMELANCHIER species varieties	Serviceberry
	CARPINUS caroliniana	American Hornbeam
	CATALPA bignonioides 'Nana'	Umbrella Catalpa
*	CRATAEGUS species thornless varieties	Hawthorn
	FRAXINUS pennsylvanica 'Johnson'	Leprechaun Green Ash
	KOELREUTERIA paniculata	Goldenrain Tree
*	MALUS species varieties	Flowering Crabapple (<1" size fruit)
*	PRUNUS maackii	Amur Chokecherry
*	PRUNUS padus	European Bird Cherry
*	PRUNUS virginiana 'Canada Red'	Canada Red Chokecherry
	SORBUS americana 'Dwarfcrown'	Red Cascade Mountain Ash

Medium Tree - 30 feet to less than 50 feet tall

	ACER fremanii 'Jeffersred'	Autumn Blaze Maple
*	ACER negundo 'Sensation'	Sensation Box Elder
	ACER nigrum 'Greencolumn'	Greencolumn Maple
*	ACER platanoides varieties	Norway Maple
	ACER pseudoplatanus varieties	Sycamore Maple
*	ACER rubrum varieties	Red Maple
	ACER saccharum 'Green Mountain'	Sugar Maple
	CARPINUS betulus varieties	European Hornbeam
	CATALPA speciosa	Northern Catalpa
	CELTIS occidentalis	Common Hackberry
	CELTIS reticulata	Western Hackberry
*	FRAXINUS americana varieties	White Ash
	FRAXINUS excelsior	European Ash
	FRAXINUS ornus	Flowering Ash
*	FRAXINUS pennsylvanica varieties	Green Ash
	FRAXINUS quadrangulata	Blue Ash
*	GLEDITSIA triacanthos inermis varieties	Thornless Honeylocust
	GYMNOCLADUS dioicus	Kentucky Coffeetree
*	PYRUS calleryana varieties	Callery Pear

* - Carson City Historic District Preferred Tree

QUERCUS lobata	Valley Oak
QUERCUS robur 'Fastigiata'	Skyrocket English Oak
* ROBINIA x ambigua 'Idaho'	Idaho Locust
* SORBUS aucuparia varieties	Mountain Ash
* TILIA cordata varieties	Littleleaf Linden
TILIA tomentosa varieties	Silver Linden

Large Tree - 50 feet or greater

* PLATANUS occidentalis	American Sycamore
* PLATANUS x acerifolia 'Bloodgood'	London Planetree
* QUERCUS coccinea	Scarlet Oak
QUERCUS douglasii	Blue Oak
QUERCUS macrocarpa	Bur Oak
QUERCUS robur 'Fastigiata'	Columnar English Oak
* QUERCUS rubra	Red Oak
TILIA americana varieties	American Linden
ZELKOVA serrata	Sawleaf Zelkova

Evergreen

Small Tree - Less than 30 feet (single stem)

* PINUS mugo	Swiss Mountain Pine
PINUS thumbergiana	Japanese Black Pine

Medium Tree - 30 feet to less than 50 feet tall

* JUNIPERUS species varieties	Juniper tree
* PICEA pungens varieties	Spruce
PINUS aristata	Bristlecone Pine
PINUS edulis	Two-Needle Pinyon Pine
PINUS monophylla	Single-Leaf Pinyon Pine
PINUS nigra	Austrian Pine
PINUS sylverstris	Scotch Pine

Large Tree - 50 feet or greater

* ABIES concolor	White Fir
* CALOCEDRUS decurrens	Incense Cedar
CEDRUS atlantica	Atlas Cedar
* PICEA pungens	Colorado Spruce
PINUS contorta latifolia	Lodgepole Pine
* PINUS jeffreyi	Jeffrey Pine
* PINUS ponderosa	Ponderosa Pine
SEQUOIADENDRON giganteum	Giant Sequoia

* - Carson City Historic District Preferred Tree

Carson City Riparian Area List

Tree

Scientific Name	Common Name
ACER negundo	Boxelder
ALNUS incana spp. tenuifolia	Thinleaf Alder
ALNUS rubra	Red Alder
ALNUS sinuata	Sitka Alder
BETULA occidentalis	Water (Black) Birch
CRATAEGUS douglasii	Black/Douglas Hawthorn
POPULOUS fremontii	Cottonwood
POPULUS angustifolia	Narrowleaf Cottonwood
POPULUS balsamifera spp. Trichocarpa	Black Cottonwood
POPULUS tremulides	Quaking Aspen
PRUNUS virginiana 'Canada Red'	Canada Red Chokecherry
SALIX alba	White Willow
SALIX amygdaolodes	Peachleaf Willow
SALIX nigra	Black Willow
SALIX prolixa	Mackenzie Willow
SAMBUCUS coerulea	Blue Elderberry

Carson City Riparian Area List

Scientific Name	Common Name
Shrub	
CORNUS sericea	Redosier Dogwood
ELAEGNUS commutata	Silverberry
PENTAPHYLLOIDES floribunda	Shrubby Cinquefoil
PHILADELPHUS lewisii	(Mockorange) Syringa
RHUS tribobata	Skunkbush Sumac
RIBES aureum	Golden Current
RIBES cereum	Wax (Squaw) Current
ROSA woodsii	Wood's Rose
SALIX bebbiana	Bebb Willow
SALIX boothii	Booth Willow
SALIX drummondiana	Drummond Willow
SALIX exigua ssp. Exigua	Coyote Willow
SALIX exigua ssp. Melanopsis	Coyote Willow
SALIX geyeriana	Geyer Willow
SALIX lemmonii	Lemmon Willow
SALIX lutea	Yellow Willow
SALIX lutia spp. Lasiandra	Pacific (Whiplash) Willow
SALIX planifolia var. planifolia	Planeleaf Willow
SALIX scouleriana	Scouler Willow
SALIX sitchensis	Sitka Willow
SAMBUCUS racemosa spp. Pubens	Red Elderberry
SHEPHERDIA argentea	Silver Buffaloberry
SYMPHORICARPOS albus	Common Snowberry