

REEDY CREEK IMPROVEMENT DISTRICT

CROSS CONNECTION

AND

BACKFLOW PREVENTION

MANUAL

THIS MANUAL SUPERSEDES ALL PREVIOUS MANUALS

PREPARED BY REEDY CREEK ENERGY SERVICES

July 2011

TABLE OF CONTENTS

	Page
Introduction	i
CHAPTER I. DEFINITIONS	
Sec. 101 Definitions for Backflow Prevention and Cross-Connections	1
CHAPTER II. ADMINISTRATION	
Sec. 201 Title and Scope	4
Sec. 202 Organization	4
Sec. 203 Power and Duties of Cross-Connection Official	5
Sec. 204 Application for Authorization to Connect Potable Water Systems	5
Sec. 205 Inspections	6
Sec. 206 New Water Main Connection to Existing Mains	7
Sec. 207 Distribution System	7
Sec. 208 Procedures for Tapping Water Mains	10
Sec. 209 Metering Requirements	12
CHAPTER III. DEGREE OF HAZARD OF CROSS-CONNECTIONS	
Sec. 301 Determination and Fire Systems	14
CHAPTER IV. APPROVED BACKFLOW PREVENTION DEVICES	
Sec. 401 Reduced-Pressure Principle Backflow Preventers	20

Sec. 402	Double Check Valve Assemblies	20
Sec. 403	Pressure-Type Vacuum Breakers	21
Sec. 404	Atmospheric Vacuum Breakers	21
Sec. 405	Air Gaps	23
CHAPTER V.	INSTALLATION AND MAINTENANCE OF BACKFLOW PREVENTION DEVICES	
Sec. 501	Installation and Maintenance of Backflow Prevention Assemblies	24
Sec. 502	Testing and Repairing	25
CHAPTER VI.	REFERENCES	
Sec. 601	References	25
Sec. 602	RCES/WDW UTILITY APPLICATION	27
APPENDIX 1	<i>Guidance Manual For The Use Of Reclaimed Water</i>	

LIST OF CONTACTS

CROSS-CONNECTION CONTROL DEPARTMENT INSPECTOR/OFFICIAL

407-824-4842
Tie-line: 8-273-4842

WATER DEPARTMENT SUPERVISOR

407-824-4841
Tie-line: 8-273-4841

IN EVENT OF AN EMERGENCY, CALL

407-824-4185
or
407-824-1990

INTRODUCTION

The Florida Administrative Code classifies all potable water systems serving more than 25 persons as “Public Water Systems” and includes all parts of the system from the source through the free-flowing outlet serving the consumer. The Code also requires that persons operating such systems be properly licensed.

To ensure complete understanding of the responsibilities for meeting regulatory requirements and protecting the public, the following parties are defined:

REEDY CREEK ENERGY SERVICES (RCES)

Designs, operates, and maintains the Reedy Creek Improvement District (RCID) water utility system utilizing licensed operators. The utility system includes the source through the meter. Additionally, the utility company will monitor and control public water system facilities beyond the meters, reporting deviations from required standards of design and operation to those controlling the specific facility. RCES also provides similar services for reclaimed water supply and wastewater collection, transmission and treatment.

REEDY CREEK IMPROVEMENT DISTRICT (RCID)

Owns the water supply and distribution system from the source to the meter. Reviews, approves, permits, and inspects construction of all water systems downstream of the meter with emphasis on preventing cross-connections, coordinating with Reedy Creek Energy Services (RCES). RCID also owns the reclaimed water distribution system.

WDW ENVIRONMENTAL AFFAIRS

Is the owner’s representative for the water supply and distribution system from the meter to the customer’s or owner’s tap. Reviews, approves and permits, construction of all water systems downstream of the meter with emphasis on preventing cross-connections, coordinating with Reedy Creek Energy Services (RCES).

These “Policies and Standards” are guidelines to be used to bring the highest possible means of assurance that distributed potable water is of the highest quality throughout the Reedy Creek Improvement District.

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CHAPTER I

DEFINITIONS

Section 101.0 – Definitions for Backflow Prevention and Cross-Connections

AWWA - American Water Works Association

Backflow – The flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from any source or sources other than its intended source. Backsiphonage is one type of backflow.

Backflow Preventer – Only the following are considered to be backflow prevention assemblies. They shall be installed in agreement with and under the supervision of the supplier of water or his designated representative (cross connection official) at the consumer's meter, at the property line of the consumer when a meter is not used, or at a location designated by the supplier of water. Types of devices are as follows:

- **Air Gap** – A physical separation between the free-flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. An “approved air gap separation” shall be at least double the diameter of the supply pipe measured vertically above the top of the rim of the vessel. In no case shall it be less than 1 inch.
- **Approved Reduced-Pressure Principle Backflow Preventer** – An assembly of differential valves including an automatically opened spillage port to the atmosphere designed to prevent backflow; including tightly closing shut-off valves at each end of the assembly.
- **Atmospheric Vacuum Breaker** – A backflow prevention device which is operated by atmospheric pressure in combination with the force of gravity. The unit is designed to work on a vertical plane only. The one moving part consists of a poppet valve which must be carefully sized to slide in a guided chamber and effectively shut off the reverse flow of water when a negative pressure exists.
- **Double Check Valve Assembly** – An assembly composed of two single, independently acting, check-valves, including tight closing shut off valves located at each end of the assembly and suitable connections for testing the water tightness of each check valve. A check valve is a valve that is drop-tight in the normal direction of flow when the inlet pressure is one psi and the outlet pressure is zero. The check valve shall permit no leakage in a direction reverse to the normal flow. The closure element (e.g., clapper), shall be internally weighted or otherwise internally loaded to promote rapid and positive closure.

- **Hose Bibb Vacuum Breaker** – A device which is permanently attached to a hose bibb and which acts as an atmospheric vacuum breaker.
- **Pressure Vacuum Breaker** – A pressure vacuum breaker is similar to an atmospheric vacuum breaker except that the checking unit “poppet valve” is activated by a spring. This type of vacuum breaker does not require a negative pressure to react and can be used on the pressure side of a valve
- **Reduced Pressure Backflow Preventer** – A device containing within its structure a minimum of two independently acting approved check valves, together with an automatically operating pressure differential relief valve located between the two check valves. The first check valve reduces the supply pressure a predetermined amount so that during normal flow and at cessation of normal flow the pressure between the checks shall be less than the supply pressure. In case of leakage of either check valve, the differential relief valve, by discharging to the atmosphere, shall operate to maintain the pressure between the checks less than the supply pressure. The unit shall include tightly closing shutoff valves located at each end of the device, and each device shall be fitted with properly located test cocks.

Backsiphonage – The flowing back of used, contaminated or polluted water from a plumbing fixture or vessel or other source into a water supply pipe due to a negative or reduced pressure.

Cross Connection – Any physical connection or arrangement between two otherwise separate piping systems, one of which contains potable water and the other water of unknown or questionable safety, steam, gasses or chemicals whereby there may be a flow from one system to the other (see “Backflow” and “Backsiphonage”).

F.A.C. – Florida Administrative Code

FDEP – Florida Department of Environmental Protection

Flood Level Rim - The edge of the receptacle from which water overflows.

Potable Water – Water which meets the requirements as set forth by the Department of Environmental Protection in Chapter 62-550, F.A.C.

RCES – Reedy Creek Energy Services, through contractual agreement with Reedy Creek Improvement District, is sole authority in the *Cross-Connection and Backflow Prevention Manual*.

RCID – Reedy Creek Improvement District

Vacuum – Any pressure less than that exerted by the atmosphere (less than 14.7 psi at sea level).

WDW – Walt Disney World

CHAPTER II

ADMINISTRATION

Section 201.0 – Title and Scope

201.1 - Title

The provisions embraced within the following chapters and sections shall constitute, be known and cited as “The Policies and Procedures for Metering, Cross-Connection, Backflow Prevention, and Reclaimed Water.”

201.2 - Remedial

This document is remedial and shall be construed to secure the beneficial interests and purposes thereof, which are health, sanitation, general public safety and welfare, by having jurisdiction over installation and maintenance of all RCID facilities and systems providing potable and reclaimed water within Reedy Creek Improvement District.

201.3 – Scope

These provisions shall apply to every point from the source of the water to every plumbing installation, including alterations, repairs, replacement equipment, appliances, fixtures, fittings and/or appurtenances thereto.

Section 202.0 – Organization

202.1 – Cross-Connection Official

A position of “Cross-Connection Official” is hereby established which shall be under the charge of the Director of RCES.

202.2 – Inspectors

The Director will appoint qualified personnel to perform the duties of inspector, who shall perform or cause to be performed any and all actions necessary to meet the requirements of Chapter 62-555, F.A.C., entitled “Permitting, Construction, Operation and Maintenance of Public Water Systems” and all other regulations, as adopted by the RCES Cross-Connection Control Program.

Section 203.0 – Power and Duties of Cross-Connection Official

203.1 – Right to Entry

The cross-connection official shall enforce the provisions of these policies and standards and he or his duly authorized representative may enter any building, structure, or premises to perform any duty imposed upon him by these policies and procedures.

203.2 - Materials and Workmanship

When in the opinion of the cross-connection official, workmanship and/or materials are substandard or contrary to these provisions, he shall give written notice to the supervisor of the facility or area, or to his agent and/or the person performing the work, stating that work will not be approved until corrected.

203.3 – Requirement not Covered by Policies and Standards

Any requirement not specifically covered by these policies and standards shall be determined by the cross-connection official, subject to the administrative authority.

203.4 – Alternate Materials and Methods

Alternate materials and methods of installation shall be allowed only with approval of the cross-connection official.

Section 204.0 – Application for Authorization to Connect Potable Water System

204.1 – When Required

Any person desiring to connect to any water service and/or distribution line shall submit a “RCID/WDW Utility Permit” application for approval to WDW Environmental Affairs. No work shall be performed until authorized by such approval. See page 27 of this Manual for the instructions and form. In the event the proposed work is of a significant nature and exceeds the permitting authority of WDW Environmental Affairs, a permit application will be required from FDEP. WDW Environmental Affairs shall be the judge of when the scope of the work requires a permit from FDEP.

204.2 – Form

Application for authorization shall be made in writing. The applicant shall furnish information as requested on the form provided by WDW Environmental Affairs. Scheduled work will require five working days’ advance notice and an approved permit application.

204.3 – Drawings and Specifications

Drawings and specifications shall be required to clearly depict the nature and character of the work for which the application is made.

The applicant shall furnish such drawings and specifications. Such information shall be clear, of sufficient detail, and conform to the RCID *Utility Specifications and Construction Standards*, latest edition.

204.4 – Review of Applications

WDW Environmental Affairs and RCES (reviewing authorities) shall review all applications, drawings, specifications and supporting documents which may be filed herewith, and shall ascertain by such examination whether the installation and/or modification indicated and described is in accordance with the requirements of these policies and all other applicable regulations.

204.5 – Action on Application

- A. If the reviewing authorities are satisfied that the work described on the application, drawings, and specifications, which may be filed therewith, conforms to the requirements of these policies and standards and all other applicable regulations, they shall sign the application request and return it to the applicant. The applicant may then proceed with the installation.
- B. Disapproval – If the application for authorization does not conform to the requirements of these policies and standards, the reviewing authorities shall not authorize the application, but shall return all papers with reasons for refusal to the applicant.

204.6 – Conditions of Authorization

The reviewing authorities shall act upon an application for authorization with plans as filed, or as amended, within five working days. An authorization issued shall be construed to be a license to proceed with the work and shall not be construed as authority to violate, cancel, alter or set aside any of the provisions of these policies and standards, nor shall the issuance of an authorization prevent the cross-connection official from thereafter requiring correction of errors in plans or in construction, or of violations of these policies and standards.

Section 205.0 – Inspections

All work performed shall be inspected to ensure compliance with these policies and standards and to assure that the installation and construction of the system is in accordance with approved plans.

205.1 – Notification

It shall be the duty of the contractor to give 24 hours notice to the RCES Cross-Connection Control Department when work is ready for inspection, test, and/or chlorination.

Section 206.0 – New Water Main Connection to Existing Mains

206.1 – The Florida Administrative Code requires all Florida-licensed water operators to control all “public water systems” (those serving 25 persons or more). The procedures specified below are in furtherance of this requirement:

No connections shall be made to any potable, irrigation, fire or industrial water lines without written approval from the RCES Cross-Connection Control Department. Approval will be made on the RCID/WDW Utility Application form to be submitted with approved plans. Five working days are required for review. No work shall commence until authorized, and any deviation from the following procedure must be approved in writing by RCES on said request form. When construction water is needed by the contractor, no connection to the existing main will be used until an approved backflow prevention assembly authorized by RCES is installed.

- A. Use of fire hydrants for other than fire-fighting purposes – The operation of fire hydrants by other than authorized personnel is prohibited. The Cross-Connection Department may permit the use of water from a fire hydrant for construction or other purposes provided the applicant shall properly apply for and attach a hydrant meter and an approved backflow prevention assembly. RCES will provide the hydrant meter and may provide a backflow prevention assembly. The installation of this equipment by the applicant will be under the inspection and approval of the Cross-Connection Control Department. Only Water Department employees or other authorized employees may operate the hydrant to provide water to the intended service
- B. The RCES Water Department shall be notified 72 hours in advance for all scheduled water outages.
- C. Valves shall not be operated by any person other than RCES Water Department or RCES Project Management personnel.
- D. The hydrostatic test will be applied to all new installations and to repairs and modifications of 75 feet or more in length, unless otherwise specified in writing by RCES Cross-Connection Control Department and/or RCES Project Management personnel.
- E. All repairs, modifications and installations not requiring a hydrostatic test shall have critical joints (typically those requiring restraint) exposed when line pressure is applied.

- F. No connection will be allowed from new to existing water mains except through a reduced pressure principle backflow prevention assembly for the purpose of flushing, chlorination or construction water. RCES will monitor all such connections to insure compliance with this requirement.
- G. The prescribed test of completed work on the main shall be hydrostatic and shall be two times the normal line working pressure but in no case less than 200 PSI for a period of four hours with no pressure loss. Hydrostatic test cannot be made against permanent valves unless approved by RCES. All hydrostatic tests shall be made with water; air testing is not acceptable.
- H. Fire mains shall be tested as per fire code specifications. Test pressure will be 200 PSI for a period of four hours with no pressure loss.
- I. RCES will observe the test and inspect the quality of material and workmanship and monitor the charging of new mains.
- J. Chlorination and Sampling
 - 1. All potable water and/or fire systems servicing and/or in new buildings or structures shall be chlorinated and flushed by the contractor installing the system, and witnessed by the Cross Connection Official.
 - 2. RCES is the sole authority to determine if chlorination is required on additions and modifications of water systems in buildings or structures.
 - 3. RCES will, upon receipt of satisfactory results of the water samples (bacteriological samples and chlorine residuals), turn on the water in the presence of the installing agency. The above will only be conducted upon receipt/proof of an approved final plumbing inspection by the RCID Building and Safety Department.
- K. A $\frac{3}{4}$ " corporation cock with suitable extension shall be provided by the contractor for the purpose of disinfecting the system, and such opening will be located at a distance of 24" or less from the tap. When requested, the contractor will furnish a $\frac{3}{4}$ " corporation cock on the existing main at a point no greater than 36" from the tap. Upon completion of the disinfecting procedure, the installer will remove the extension.
- L. Adequate flush points shall be provided by the contractor for flushing and chlorinating.
- M. The new main or piping system shall be thoroughly flushed before chlorinating. Pipe line velocities of at least 3.0 feet/second shall be attained in the largest line size to be flushed. If velocities of at least 3.0 feet/second cannot be obtained, then the line shall be cleaned via the insertion of a "pig" or similar device to ensure adequate cleansing has occurred.

- N. RCES will monitor the chlorinating and flushing process and will draw samples for bacteriologic analysis. Should samples prove unsatisfactory, steps M and N will be repeated at no cost to RCES/RCID. The contractor shall pay for all retesting and analyses.
- O. The installing agency, after receiving approval from FDEP to place the system in service (for FDEP permitted projects), will remove the temporary backflow preventer and make the final connection to the existing water main in the presence of RCES. Proof of FDEP approval must be provided to RCES.
- P. The installer shall provide all equipment and materials needed to accomplish the required test.
- Q. Potable water shall be used in all tests.
- R. Pipeline Identification. Pipeline identification shall be in accordance with the RCID *Utility Specifications and Construction Standards*, latest edition, Standard Specification 02505 and referenced details. A summary of those specifications follows:

A 12 gauge copper wire shall be attached to the pipe at the 12 o'clock position. The copper wire shall be coated with THHN (plastic coating). The wire shall be extended to the surface at air release and vacuum valves, valve boxes, pumps, etc., so a current can be induced through the wire to detect the location of the pipe line. Underground utility tape shall be placed on the pipe at the 12 o'clock position and shall be continuous for the entire length of the pipe line. The color shall extend the full width of the tape and be imprinted with the following "Caution Potable Water Main Buried Below". Lettering shall be black on a pantone "safety precaution blue" background.

Please refer to the RCID *Utility Specifications and Construction Standards* for the exact means, methods and materials of pipeline identification.

- S. Pipeline Separation. Potable water lines shall be located to be in full compliance with the requirements of Chapter 62.555.314, F.A.C. entitled "Location of Public Water System Mains".
- T. Additional requirements with respect to cross-connection for reclaimed water distribution systems shall be in accordance with the Reedy Creek Improvement District's *Guidance Manual for Use of Reclaimed Water* (see Appendix I). All facilities served with reclaimed water must employ reduced pressure type backflow prevention device(s) on the potable water supply system. Systems without appropriate backflow devices will not be served with reclaimed water.

Section 207.0 – Distribution System

The following lists of valves, fire hydrants, tapping saddles and sleeves are recognized by RCID for installation on potable water systems. For a complete list of acceptable products, refer to the *RCID Utility Specifications and Construction Standards*.

207.1 – Tapping Saddles and Sleeves

Approval for use must be obtained from RCES prior to installation. No taps less than 2 inch diameter will be allowed and no size-on-size taps will be allowed.

- A. No taps smaller than 2” will be allowed, unless granted specifically in writing by RCES/RCID.
- B. For all 5/8” to 2-1/2” taps, use a double strap service saddle Smith-Blair 323 or 317; JCM 406; Ford FC202 or approved equal.
- C. Tapping sleeves shall be used for taps 4” and larger; use tapping sleeves by Smith-Blair 622 or 662 or 663; JCM Models 422 or 432; Ford style FAST or FTSC or approved equal.
- D. For tap size on size outlets, a tee shall be installed in lieu of a tapping saddle or sleeve.
- E. Tapping saddles and sleeves will be permitted only on lines at least one nominal pipe size or diameter larger than the saddle and sleeve size.
- F. RCES reserves the right to require fittings in lieu of tapping saddles and sleeves where conditions dictate.

207.2 – Valves

Refer to the *RCID Utility Specifications and Construction Standards* for a complete list of approved valves, operator types and applications. In general, valves shall be AWWA compliant; gate valves shall be resilient wedge type and comply with AWWA C509. Butterfly valves shall not be allowed for new construction, and may only be used in replacement circumstances upon approval of RCES. If approved for use, butterfly valves shall comply with AWWA C504.

207.3 – Valve Box

Valve boxes shall be polyethylene or cast iron, buffalo type, two piece, 5-1/4” shaft, screw type, with lid marked “Water” and include a pick hole. Valve boxes shall be Tyler Model #6850/6860, U.S. Foundry Model 7500 or approved equal.

207.4 – Fire Hydrant

Fire hydrant shall be Clow/Rich #92-3-way low silhouette with two 2-1/2” hose outlets and one 4-1/2” steamer outlet, or American Darling B-84B type, Mueller Centurion type approved equal.. All hydrants shall be equipped with breakaway risers, equal to Clow #30C breakaway risers. Use of hollow bolts or reduced cross section bolts in lieu of risers is prohibited unless the bolts are approved by RCID/RCES.

Section 208.0 – Procedures for Tapping Water Mains

- A. The main line to be tapped shall be rinsed clean with potable water before installing the tapping saddle and shall be disinfected with a 5-6% solution of household bleach. The tapping bit shall likewise be cleaned and disinfected.
- B. Tapping saddles with a test plug shall be pressure tested to 200 PSI for 10 minutes with no pressure loss. This test shall be witnessed by the Cross Connection Inspector or RCES Project Management or the RCID Building and Safety Department Inspectors.
- C. The tapping machine and saddle shall be disinfected by tapping contractor in the presence of RCES inspector before installing machine on tapping valve.

Section 209.0 – Metering Requirements

- A. All potable and non-potable uses of water are to be metered and all meters will be furnished by RCID.
- B. All non-potable uses of potable water shall be isolated from system with the use of approved backflow preventer assemblies.
- C. Connection of irrigation systems to the fire protection system is prohibited, unless written approval by RCES is obtained.
- D. Meters and backflow preventers shall be installed above ground as indicated in the *RCID Utility Specifications and Construction Standards, latest edition.*
- E. Requests for below grade meter vaults will require written approval from RCES Cross-Connection Control Department and the RCES Engineering Department, and shall not normally be allowed.

CHAPTER III

DEGREE OF HAZARD OF CROSS-CONNECTIONS

Section 301.0 – Determination and Fire Systems

301.1 – Evaluation

Whenever possible, a cross-connection should be eliminated. When it is not possible to eliminate a cross-connection, the cross-connection shall be controlled against backflow, by use of an approved backflow preventer based on the degree of hazard. Tables 3-1 and 3-2 provide guidance on the applications of various assemblies for internal and external protection purposes.

301.2 – Authority

Under the rules of the State of Florida, Department of Environmental Protection, Chapter 62-555.360 F.A.C., relating to cross-connection, the water purveyor has the primary responsibility of insuring that water from an unsuitable source or any other harmful substance does not enter the potable water system.

The RCES Cross-Connection Control Department shall have the sole authority to determine the degree of hazard and the type of device to be used in correction of a cross-connection.

The RCES Cross-Connection Control Department has the authority to require the customer to install and maintain an approved backflow preventer to protect the water system from any existing or new cross-connections.

301.3 – Customer Responsibilities

The customer has the primary responsibility of preventing contaminants and pollution from entering the potable water system. This responsibility begins at the meter and includes all of the customer's distribution system.

In addition, the customer shall, at his own expense, install, operate, and maintain approved backflow preventers as required by the RCES Cross-Connection Control Department.

Only personnel who are certified by AWWA, the University of Florida Center for Training, Research and Evaluation for Environmental Operations (TREEO) or the Florida Water and Pollution Control Operators Association (FW&PCOA) for testing and repair can perform maintenance and repair of a backflow device.

All backflow assembly test equipment must be calibrated annually by certified personnel. A current copy of all personnel and equipment certifications must be on file with the

Cross-Connection Control Department before any work is performed. The testing lab must provide the Cross Connection Official with a copy of the lab test certification and the model and make of test equipment manufacturer.

TABLE 3-1
Guide to the Assessment of Hazard and Selection of Assemblies for Internal Protection

<u>Description of Cross-Connection</u>	<u>Assessment of Hazard</u>	<u>Recommended Assembly at Fixture</u>
Aspirator (medical)	Health	AB or PVB
Bedpan washers	Health	AVB or PVB
Autoclaves	Health	RPBA
Specimen tanks	Health	AVB or PVB
Sterilizers	Health	RPBA
Cuspidors	Health	AVB or PVB
Lab bench equipment	Health	AVB or PVB
Autopsy and mortuary equipment	Health	AVB or PVB
Sewage pump	Health	AG
Sewage ejectors	Health	AG
Fire fighting system (toxic liquid foam concentrates)	Health	RPBA
Connection to sewer pipe	Health	AG
Connection to plating tanks	Health	RPBA
Irrigation systems with chemical additives or agents	Health	RPBA
Connection to salt-water cooling system	Health	RPBA
Tanks, vats, or other vessels containing toxic substances	Health	RPBA
Connection to industrial fluid system	Health	RPBA
Dye vats or machines	Health	RPBA
Cooling towers	Health	RPBA
Trap primer	Health	AG
Steam generators	Non health**	RPBA
Heating equipment:		
Commercial	Non health**	RPBA
Domestic	Non health**	DCVA
Irrigation systems	Non health**	DCVA, AVB, PVB
Swimming pools:		
Public	Non health**	RPBA or AG
Private	Non health**	RPBA or AG
Vending machines	Non health**	RPBA
Ornamental fountains	Non health**	RPBA
Degreasing equipment	Non health**	DCVA
Lab bench equipment	Non health**	AVB or PVB
Hose bibs	Non health**	AVB
Trap primers	Non health**	AG
Flexible shower heads	Non health**	AVB or PVB
Steam tables	Non health**	AVB
Washing equipment	Non health**	AVB
Shampoo basins	Non health**	AVB
Kitchen Equipment	Non health**	AVB
Aspirators	Non health**	AVB
Domestic space-heating boiler	Non health**	AVB
Kitchen Equipment	Health	RPBA
Kitchen Hood Washdown Systems	Health	RPBA
Ice Machines (w/o internal air gap)	Health	RPBA

Note: AG= air gap; AVB = atmospheric vacuum breaker; DCVA = double check valve backflow-prevention assembly; PVB = pressure-vacuum breaker; RPBA = reduced-pressure principle backflow-prevention assembly.

*AVBs and PVBs may be used to isolate health hazards under certain condition, that is, backsiphonage situations. Additional area or premises isolation may be required.

**Where a greater hazard exists (due to toxicity or other potential health impact) additional area protection with RPBA is required.

TABLE 3-2
Guide to the Assessment of Hazard and Selection of Assemblies for Premises Isolation

<u>Description of Premises</u>	<u>Assessment of Hazard</u>	<u>Recommended Assembly on Water Service Pipe</u>
Hospitals, mortuaries, clinics, laboratories	Health	RPBA
Plants using radioactive material	Health	RPBA
Processing of storage facilities petroleum	Health	RPBA
Premises where inspection is restricted	Health	RPBA
Sewage treatment plant	Health	RPBA
Sewage lift stations	Health	RPBA
Commercial laundry	Health	RPBA
Plating or chemical plants	Health	RPBA
Docks and beverage processing plants	Health	RPBA
Pleasure-boat marina	Health	RPBA
Tall buildings >3 stories (protection against excessive head of water)	Non health	RPBA
Steam plants	Non health	RPBA
Reclaimed water systems	Health	RPBA

Note: AG= air gap; AVB = atmospheric vacuum breaker, DCVA = double check valve backflow-prevention assembly; PVB = pressure vacuum breaker; RPBA = reduced-pressure principle backflow-prevention assembly.

301.4 – Determination of Corrective Device

Guidelines for the type of device or method to be used for correction of cross-connections will be in accordance with this manual.

301.5 – Typical Areas that Specific Devices Shall be Used

Table 3-3 below shows typical applications of backflow assemblies and the type of device to be used.

TABLE 3-3
Typical Applications of Backflow Assemblies

<u>Installation</u>	<u>Type of Device</u>
Swimming Pools	RPBA
Make-up Water Lines	RPBA
Auxiliary Water System	RPBA
RV and Camping Trailer Sites	RPBA
Ice Machines (w/o air gap)	RPBA
Vending Machines	RPBA
Fire Systems	RPBA or DCVA*
Car Wash Facilities	RPBA
Film Laboratories	RPBA
Hospital Medical Facilities	RPBA
Irrigation Systems	RPBA
Laundries	RPBA
Multi-Storied Buildings	RPBA
Power Plants	RPBA
Solar Heating Systems	RPBA
Waterfront Facilities	RPBA
Display Fountains	RPBA
Fish Ponds	RPBA
Equipment Cooling	RPBA
Carbonation Systems (soda fountains)	RPBA
Water Softeners	RPBA
Construction Water	RPBA
All Sites with Reclaimed Water	RPBA
Kitchen Hood Washdown Systems	RPBA
Any Premises Requiring Isolation	RPBA

Note: AG = air gap, AVB = atmospheric vacuum breaker, DCVA = double check valve assembly, PVB = pressure vacuum breaker, RPBA = reduced-pressure principle backflow-prevention assembly

*See 301.6 "Fire System Classification"

301.6 – Fire Systems

Industrial fire protection systems consist of sprinklers, hose connections, and hydrants. Sprinkler systems may be dry or wet, open or closed. Systems of fixed-spray nozzles may be used indoors or outdoors for protection of flammable liquid and other hazardous processes. It is standard practice, especially in cities, to equip automatic sprinkler systems with fire department pumper connections.

For cross-connection control, fire protection systems may be classified on the basis of water source and arrangement of supplies as follows:

- Class 1 – Direct connections from public water mains only; no pumps, tanks, or reservoirs, no physical connection from other water supplies, no antifreeze or other additives of any kind; all sprinkler drains discharging to atmosphere, dry wells, or other safe outlets.
- Class 2 – Same as Class 1, except that booster pumps may be installed in the connections from the street mains. Booster pumps shall not adversely impact the potable supply system. It is necessary, however, to avoid drafting so much water that pressure in the water main is reduced below 20 PSI.
- Class 3 – Direct connection from public water supply main plus one or more of the following: Elevated storage tanks; fire pumps taking suction from above-ground covered reservoirs or tanks; and pressure tanks (all storage facilities are filled or connected to public water only, the water in the tanks to be maintained in a potable condition). Otherwise, Class 3 systems are the same as Class 1.
- Class 4 – Direct supplied from public mains similar to Classes 1 and 2, and with an auxiliary water supply on or available to the premises; or an auxiliary supply may be located within 1,700 feet of the pumper connection.
- Class 5 – Directly supplied from public mains, and interconnected with auxiliary supplies, such as: pumps taking suction from reservoirs exposed to contamination, or rivers and ponds; driver wells; mills of other industrial water systems; or where antifreeze or other additives are used.
- Class 6 – Combined industrial and fire protection systems supplied from the public water mains only, with or without gravity storage or pump suction tanks.

Fire Protection systems of classes 1, 2 and 3, as defined by this manual, will require minimum protection of a Double Check Valve Assembly (DCVA) to prevent stagnant waters from back- flowing into the public potable water system.

Class 4 systems will normally require backflow protection at the service connection. The type (air gap, reduced-pressure principle backflow-prevention assembly, or double check valve assembly) will generally depend on the quality of the auxiliary water supply and can only be determined by a survey of the premises.

Class 5 systems would need maximum protection (air gap or reduced-pressure principle backflow-prevention assembly) to protect the potable water system.

Class 6 system protection would depend on the requirements of both industry and fire protection and can only be determined by a survey of the premises.

Any alteration, modification, or addition to any existing fire system will require that system to meet the above standards.

A meter (compound, detector check) should not normally be permitted as part of a backflow prevention device. An exception may be made, however, if the meter and backflow prevention device are specifically designed for that purpose.

301.7 – Premises Isolation

When isolation of a premises is required and the site has only one source of water, a dual backflow assembly will be required in order to allow proper testing and repair of backflow devices without interruption of service. Typical examples of facilities requiring dual backflow assemblies are hospitals, power plants, hotels, motels, and theme parks. A review of the sites intended operation will be the deciding factor. Refer to Table 3-2 for a list of typical applications.

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CHAPTER IV

APPROVED BACKFLOW PREVENTION DEVICES

Section 401.0 – Reduced-Pressure Principle Backflow Preventers

401.1 – The following reduced-pressure principle backflow preventers are recognized by the RCID for installation on potable water systems. **NOTE: This list is based on the makes and model numbers provided by the listed manufacturers at the time of publication of this document and may change over time as the manufacturers update their devices and/or nomenclature. Deviation from this list may therefore be allowed but must obtain email or written approval from RCES Cross-Connection Control Department.**

<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SIZES</u>
Ames	4000SS	2-1/2" through 6"
Wilkins/Zurn	975XL	1/2" through 2"
Wilkins/Zurn	975	2-1/2" through 10"
Wilkins/Zurn	375	2-1/2" through 8"
Febco	825YR	3/4" through 2"
Febco	825 YD	2-1/2" through 10"
Febco	860	1/2" through 10"
Febco	880 & N&V Patterns	2-1/2" through 10"
Watts	909	3/4" through 10"
Watts	009- M series	1-1/4" through 2"
Watts	994	4" through 10"
Watts	995	1/2" through 1-1/2"
Watts	009	1/2" through 3"
Conbraco	40-200	1/2" through 10"

Section 402.0 – Double Check Valve Assembly Backflow Preventers

402.1 - The following double check valve assemblies are recognized by the RCID for installation on potable water systems. **NOTE: This list is based on the makes and model numbers provided by the listed manufacturers at the time of publication of this document and may change over time as the manufacturers update their devices and/or nomenclature. Deviation from this list may therefore be allowed but must obtain email or written approval from RCES Cross-Connection Control Department.**

<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SIZES</u>
Ames	2000SS	2-1/2" through 8"
Febco	850	1/2" through 8"
Febco	850U	1/2" through 2"
Febco	805Y	3/4" through 2"
Febco	870 & 870V	2-1/2" through 10"
Conbraco	40-100	1/2" through 10"
Watts	007	1/2" through 3"
Watts	709	2 1/2" through 10"
Watts	774	4" through 10"
Wilkins/Zurn	950XL	3/4" through 2"
Wilkins/Zurn	950	2 1/2" through 10"
Wilkins/Zurn	350	2 1/2" through 8"

Section 403.0 – Pressure Type Vacuum Breakers

403.1 – The following pressure type vacuum breakers are recognized by the RCID for installation on potable water systems:

NOTE: This list is based on the makes and model numbers provided by the listed manufacturers at the time of publication of this document and may change over time as the manufacturers update their devices and/or nomenclature. Deviation from this list may therefore be allowed but must obtain email or written approval from the RCES Cross-Connection Control Department.

<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SIZES</u>
Febco	765	½” through 2”
Watts	800M4 QT	½” through 2”
Watts	008 QT	¼” through ½”
Wilkins	720A	½” through 2”

Section 404.0 – Atmospheric Vacuum Breakers

404.1 – The following atmospheric vacuum breakers are recognized by the RCID for installation on potable water systems:

NOTE: This list is based on the makes and model numbers provided by the listed manufacturers at the time of publication of this document and may change over time as the manufacturers update their devices and/or nomenclature. Deviation from this list may therefore be allowed but must obtain email or written approval from the RCES Cross-Connection Control Department.

<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SIZES</u>
Cash	VBA	¼” through 2”
Champion Brass	162	¾” through 2”
Champion Brass	262	¾” through 2”
Chicago Faucet	892	½”
Chicago Faucet	893	3/8”
Conbraco	38-103	½”
Conbraco	38-104	¾”
Conbraco	38-105	1”
Febco	710-A	¼”, 3/8”, 1”, 1-¼”, 1-½”
Febco	710-G	1” through 2”
Febco	715-A	½”, ¾”
Febco	715-G	½”, ¾”
Modern Faucet	957	½”
Rainbird	AV	¾” through 2-½”
Sloan Valve	V-350-A	½”, ¾”
Sloan Valve	V-360-A	¼”, 3/8”, ½”, ¾”
Sloan Valve	V-370-A	¼”, 3/8”, ½”, ¾”

<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SIZES</u>
SMR	H-400	1/2"
SMR	H-403	3/4"
Tempstat	VB-10	1/2" . 3/4"
Water Saver	L100	3/8"
Water Save	L101	1/2"
Watts	8*	3/4"
Watts	8A*	3/4"
Watts	NLF9	3/8"
Watts	288A	1/4", 3/8", 1/2", 3/4", 1-1/4", 1-1/2", 2-1/2"
L.R. Nelson	71075	3/4"
L.R. Nelson	71100	3/4"
L.R. Nelson	73075	1"
L.R. Nelson	73100	1"
Richdel	R706	3/4"
Richdel	R711	3/4"
Richdel	R711 Hdy	3/4"
Richdel	R734	3/4"
Richdel	R709	1"
Richdel	R713	1"
Richdel	R713 Hdy	1"
Richdel	R734	

*This device to be used on existing hose bibbs only, with approval by the RCES Water Department.

404.3 – Flush valves shall be provided with vacuum breakers.

404.4 – Hose Bibbs

- A. On existing systems, replacement of existing hose bibbs shall be with hose bibb equipped with integral vacuum breaker.
- B. New hose bibb installations shall be equipped with integral vacuum breakers.
- C. Hose bibbs installed on industrial or non-potable systems are not required by RCES to have vacuum breakers.
- D. The following list of hose bibbs are recognized by the RCES Water Department for installation on potable water systems.

<u>MANUFACTURER</u>	<u>MODEL</u>
Chicago Faucet	952
Chicago Faucet	998
Woodford	24
Nibco	63 VB or 74 VB

Section 405.0 – Air Gaps

An air gap shall have two times the diameter of the supply pipe or faucet through the free atmosphere from the lowest opening to the flood level of the receptacle with a minimum distance of 1”.

CHAPTER V

INSTALLATION AND MAINTENANCE OF BACKFLOW PREVENTION DEVICES

Section 501.0 – Installation of Reduced-Pressure Principle Backflow Preventers

501.1 – All backflow prevention assemblies will be installed in accordance with the manufacturer's instructions and the following RCID requirements:

- A. Pipelines should be thoroughly flushed to remove foreign material and debris before installing the device.
- B. Vendor shall furnish shut-off valves with test cocks at each end of the device for testing and servicing purposes.

The assembly shall be placed in the horizontal position unless required otherwise by the manufacturer's instructions and approved by RCES.

- C. The assembly shall be installed a minimum of 18" plus the nominal size of the device aboveground or maximum flood level, whichever is highest, in order to prevent any part of the device from becoming submerged.
- D. The assembly should always be installed in an accessible location to facilitate testing and servicing; never in the ceiling and with a maximum height of 48 inches above the floor or flood level, or as approved by RCES.
- E. The relief valve should never be plugged or solidly piped into the drainage ditch, sewer or sump. The relief valve discharge pipe should be terminated a minimum of 18" above finish grade or maximum flood level. No further extensions or connections shall be made.
- F. The device should be adequately supported to prevent the assembly from sagging and from placing undue stress on the piping.

501.2 – All reduced-pressure principle backflow prevention assemblies shall be in a horizontal position with the relief valve opening down in accordance with the details in the *RCID Utility Specifications and Construction Standards*.

Section 502.0 – Testing and Repairing

502.1 – Reduced pressure, double check, and pressure type backflow preventers shall be tested annually by the RCES Cross-Connection Control Department. Should such testing determine that a customer's backflow prevention device does not operate satisfactorily; the customer shall be notified in writing. Upon receipt of notification, the customer shall immediately make the necessary repairs. If the customer fails to make the repairs within

thirty (30) calendar days upon receipt of notification, the RCID shall sever the potable water service to the customer. Service shall not be restored until the repairs have been satisfactorily completed. All repairs shall be made by a certified Cross Connection Control Technician, under the approval of the Cross Connection Inspector.

502.2 – Atmospheric type vacuum breakers installed on water distribution systems shall be tested and repaired annually by the maintenance department having jurisdiction of the building or area (i.e., flushometers, hose bibs, kitchen equipment, and similar installations).

CHAPTER VI

REFERENCES

Section 601.0 – References (including all Amendments, Editions, and/or Revisions)

601.1 – Manuals

“Recommended Practice for Backflow Prevention and Cross-Connection Control,” AWWA Manual M14.

“Accepted Procedure and Practice in Cross-Connection Control,” Pacific Northwest Section, AWWA.

“Manual of Cross-Connections Control,” Foundation for Cross-Connection and Hydraulic Research, University of Southern California.

“Cross-Connections and Backflow Prevention,” AWWA.

“Cross-Connection Control Manual,” U.S. Environmental Protection Agency

601.2 – Device Standards

University of Southern California, Foundation for Cross-Connection Control and Hydraulic Research, “Specifications of Backflow Prevention Devices.”

AWWA C506.78, “AWWA Standard for Backflow Prevention Devices.”

Florida Department of Environmental Protection, Permitting and Construction of Public Water Systems Chapter 62-555.360, F.A.C., “Cross-Connection Control for Public Water Systems”.

601.3 – Regulations, Laws, and Codes

Public Law 93-523, “Safe Drinking Water Act,” December 16, 1974.

Florida Department of Environmental Protection “Permitting and Construction of Public Water Systems (Chapters 62-550; 62-555, 62-610; F.A.C.).

Rules of the Department of Health and Rehabilitative Services, Division of Health, Chapter 10D-9, F.A.C., “Plumbing,” and Chapter 10D-4, F.A.C., “Water Systems.”

The National Fire Protection Association, Installation of Sprinkler System, NFPA No. 13.

Reedy Creek Improvement District, “EPCOT Plumbing Code.”

Section 602.0 – Procedures for RCES/WDW Utility Applications

The following instructions outline the procedure for obtaining a determination as to whether a project requires a Florida Department of Environmental Protection (FDEP) water or wastewater permit:

1. Fill out the “RCES/Walt Disney World Co. Utility Permit” application form (see attached).
 - A. It is very important to list both the Project Manager, or appropriate contact, and a telephone number where they can be reached in the event additional information is required or there are questions regarding the application.
2. Attach a sketch or drawing highlighting the existing utility line(s) and the proposed line(s). Please label and/or use contrasting colors to delineate between the two. Current as-builts are preferable. Give pipe diameter and length (in feet) for all pertinent utility lines, both existing and proposed. This information is necessary for both the permit determination procedure and for approval from RCES. Reedy Creek Improvement District (RCID) Building and Safety will not issue a building permit without a **COMPLETED, SIGNED** in-house utility application.
3.
 - A. Deliver the in-house utility application to Manager of Environmental Permitting, WDW Environmental Affairs, at Disney University, 2nd Floor, C-146D; telephone 407-824-7279. Office hours are 8:00 am to 5:00 pm, Monday through Friday. A meeting may be set up, if necessary, to identify all project plans with proposed utilities.
 - B. The Project Manager listed on the application will be notified within 48 hours if a FDEP permit is required. Obtaining a FDEP permit will take 30-60 days, and allowances should be made in project schedules for submittal and acquisition. The Project Manager must be in receipt of the final FDEP permit prior to the construction of any proposed utilities. Upon completion of the project, RCID will only issue a Certificate of Occupancy when a Certificate of Completion has been submitted to FDEP and the subsequent Letter of Release has been received from FDEP.
 - C. If a FDEP permit is not required, Environmental Permitting will forward the application to Reedy Creek Energy Services (RCES) for comment and approval. Once RCES has approved and signed the utility application, it will be sent to RCID Building and Safety for a building permit to be issued. Appropriate drawings and specifications must be submitted to Building and Safety and RCES, as required.

If you have any questions or feel that a meeting is necessary, please do not hesitate to call.

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APPENDIX I

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**GUIDANCE MANUAL
FOR THE USE OF
RECLAIMED WATER**

ISSUED BY THE

**REEDY CREEK IMPROVEMENT DISTRICT
LAKE BUENA VISTA, FLORIDA**

July 2011

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CONTENTS

	Page
Introduction	2
Regulatory Requirements	6
Health and Safety	9
Application for Reclaimed Water Use	13
Design and Construction	14
Operations	18

List of Contacts for RCES

Reuse/Cross Connection Inspector	407-824-4842
Water Department Supervisor	407-824-4841
In Event of Emergency, call	407-824-4185
	or 407-824-1990

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Introduction

Conservation of drinking water supplies has become a critical need in Florida as the population grows and demands on the traditional sources increase. A practical method for conservation is to substitute highly treated wastewater, or reclaimed water, for potable water when the supply is not intended for human consumption or contact. Suitable non-potable uses for reclaimed water include turf and landscape irrigation, washdown of streets and sidewalks, dust control, construction, cooling water for utility systems, fire suppression and prevention, toilet flushing and vehicle washing. Reclaimed water is prohibited from use in swimming pools and bathing areas or in applications where direct human contact is possible.

The Reedy Creek Improvement District (RCID) recognizes the importance of conserving Florida's limited natural water resources so that they will be available to serve future potable needs. In fact, RCID is meeting one of the state's water conservation measures as identified in Chapter 403.064 Florida Statutes, Reuse of Reclaimed Water:

- (1) The encouragement and promotion of water conservation, and reuse of reclaimed water, as defined by the department, are state objectives and are considered to be in the public interest. The Legislature finds that the reuse of reclaimed water is a critical component of meeting the state's existing and future water supply needs while sustaining natural systems. The Legislature further finds that for those wastewater treatment plants permitted and operated under an approved reuse program by the department, the reclaimed water shall be considered environmentally acceptable and not a threat to public health and safety.

To this end, RCID has implemented a reuse system to supply reclaimed water from the Reedy Creek Wastewater Treatment Plant (WWTP) to meet non-potable demands, which account for a significant portion of the water consumed within RCID. As part of the planning process for the reuse system, users were identified among existing and future developments within RCID and are listed in Table 1. (Users that have been converted to reclaimed water are shown in bold face type in Table 1; those that are planned to be converted are in plain type.) The predominant use is irrigation of landscaped areas, including golf courses, ornamental plantings, and roadway medians. Figure 2 shows the current irrigated areas within the District, color coded to indicate reclaimed water (in purple) and potable water (in blue). Approximately 80% of the landscape irrigation uses reclaimed water. Reclaimed water consumption has averaged over 6 million gallons per day since 2000 and currently meets almost 30% of the District's water resource requirements. Eventually, reclaimed water could potentially replace over 10 million gallons per day of potable water

Table 1
Existing and Potential Users of the Onsite Reuse System
 [Note: ID Numbers correspond to areas identified in Figure 1]

<u>ID No.</u>	<u>Development Name</u>	<u>Development Category</u>
1	Typhoon Lagoon	Attraction
2	Hollywood Studios	Attraction
3	EPCOT	Attraction
4	Casting Center	Commercial
5	WDW Village/Downtown Disney	Commercial
6	AMC Theatres	Commercial
7	Pleasure Island	Commercial
8	SunTrust Office	Commercial
9	WDW Office Building	Commercial
10	Disney Boardwalk	Commercial
11	Great American Restaurant	Commercial
12	Lake Buena Vista Golf Course	Golf Course
13	Magnolia Golf Course	Golf Course
14	Palm Golf Course	Golf Course
15	Osprey Ridge Golf Course	Golf Course
16	Executive Golf Course (9 holes)	Golf Course
17	Buena Vista Palace	Hotel/Resort/Villa
18	Caribbean Beach Resort	Hotel/Resort/Villa
19	Shades of Green	Hotel/Resort/Villa
20	Polynesian Village Resort	Hotel/Resort/Villa
21	Hilton	Hotel/Resort/Villa
22	Saratoga Springs (Phase I)	Hotel/Resort/Villa
23	Saratoga Springs (Phase II)	Hotel/Resort/Villa
24	Saratoga Springs (Phase III)	Hotel/Resort/Villa
25	Club Hotels (Beach and Yacht)	Hotel/Resort/Villa
26	Dolphin Hotel	Hotel/Resort/Villa
27	Swan Hotel	Hotel/Resort/Villa
28	Old Key West Vacation Club Resort	Hotel/Resort/Villa
29	Port Orleans	Hotel/Resort/Villa
30	Animal Kingdom Park	Attraction
31	Animal Kingdom Lodge	Hotel/Resort/Villa
32	Sports Complex	Attraction
33	Boardwalk Resort	Hotel/Resort/Villa
34	Administration Area	Mixed Use
35	Team Disney	Office/Commercial
36	Contemporary Hotel	Hotel/Resort/Villa
37	North Service Area	Support
38	STOLport	Hotel/Resort/Villa
39	Tree Farm	Mixed Use
40	Coronado Springs	Hotel/Resort/Villa
41	EPCOT Perimeter Canal	Mixed Use

<u>ID No.</u>	<u>Development Name</u>	<u>Development Category</u>
42	Bus Wash	Mixed Use
43	NSA Central Energy Plant (Cooling towers)	Mixed Use
44	EPCOT Central Energy Plant (Cooling towers)	Mixed Use
45	Hollywood Studios Chiller Plant	Mixed Use
46	Buena Vista Drive	Primary Road
47	Lake Buena Vista Drive	Primary Road
48	Vacation Club Way Entrance	Secondary Road
49	EPCOT Resorts Blvd.	Secondary Road
50	Bonnet Creek Drive	Secondary Road
51	Magic Kingdom	Attraction
52	Grand Floridian Resort	Hotel/Resort/Villa
53	Fort Wilderness	Hotel/Resort/Villa
54	Wyndham Resort	Hotel/Resort/Villa
55	Holiday Inn	Hotel/Resort/Villa
56	Best Western	Hotel/Resort/Villa
57	Doubletree Suites	Hotel/Resort/Villa
58	Royal Plaza	Hotel/Resort/Villa
59	Wilderness Lodge	Hotel/Resort/Villa
60	WDW Office Building Chiller Plant	Mixed Use
61	Contemporary Resort Chiller Plant	Mixed Use
62	Dolphin Hotel Chiller Plant	Mixed Use
63	Swan Hotel Chiller Plant	Mixed Use
64	Wyndham Hotel Chiller Plant	Mixed Use
65	Hilton Chiller Plant	Mixed Use
66	Buena Vista Palace Chiller Plant	Mixed Use
67	Best Western Chiller Plant	Mixed Use
68	Royal Plaza Chiller Plant	Mixed Use
69	Doubletree Suites Chiller Plant	Mixed Use
70	Holiday Inn Chiller Plant	Mixed Use
71	Mediterranean Resort Chiller Plant	Mixed Use
72	Port Orleans Chiller Plant	Mixed Use
73	Boardwalk Resort Chiller Plant	Mixed Use
74	Wilderness Lodge Chiller Plant	Mixed Use
75	All-Star Resorts (all phases)	Hotel/Resort/Villa
76	Pop Century Resort	Hotel/Resort/Villa
77	Victory Way (north)	Secondary Road
78	Buena Vista Drive (west)	Primary Road
79	Osceola Parkway	Primary Road
80	Osceola Parkway (east)	Primary Road
<u>ID No.</u>	<u>Development Name</u>	<u>Development Category</u>
81	Victory Way (south)	Secondary Road
82	Osceola Parkway (west)	Primary Road

83	Flamingo Crossing	Mixed Use
84	Four Seasons Resort	Hotel/Resort/Villa
85	Golden Oak (Orange County via wholesale service)	Residential
86	Disney's Art of Animation Resort	Hotel/Resort/Villa

See Figure 2 on page 10 for a depiction of those areas within RCID that are currently irrigated, and a distinction of those using reclaimed water and potable water.

Because of the strong need to conserve limited drinking water supplies, RCID's policy is to use reclaimed water to meet non-potable water demands to the maximum extent possible, within economic and technical reason. Accordingly, unless exempted in writing by RCID, new development will be required to provide facilities for connection to the reuse system to obtain water for irrigation, washdown, and other non-potable uses. RCID also expects that facilities at existing developments will be converted whenever it is economically and technically feasible to do so. All uses will be reviewed by RCID before connection to the reuse system is approved. The goal of the District is to have all major landscape irrigation needs met with reclaimed water.

RCID has issued this *Guidance Manual for the Use of Reclaimed Water* to provide potential users with requirements and guidelines for design, construction, and operation of the facilities that will serve their developments. The manual outlines regulatory requirements, discusses health and safety, and summarizes user responsibilities in several areas required to successfully implement an individual site system. As a supplement to the manual, RCID has also produced a standard specification for reclaimed water, which provides materials and workmanship specifications and standard details that should be followed by designers and contractors for reclaimed water facilities (refer to Section 02515 of the *RCID Utility Specifications and Construction Standards*).

Regulatory Requirements

Within the state of Florida, the use of reclaimed water for any purpose is regulated by the Florida Department of Environmental Protection (FDEP). The enforcing regulations are presented in Chapter 62-610, F.A.C., entitled "Reuse of Reclaimed Water and Land Application". Some of the general requirements of the regulations are discussed in this section, but each user should be aware of all specific requirements and should have access to the most recent version of the chapter.

FDEP encourages beneficial use of reclaimed water as long as adequate treatment is provided. The level of treatment necessary depends on the intended use of the reclaimed water and the degree of potential public contact. The reuse system at RCID will serve public access areas, which are defined by Chapter 62-610.450, F.A.C. as follows:

“...areas that are intended to be accessible to the public, such as residential lawns, golf courses, cemeteries, parks, landscape areas, and highway medians. Public access areas may include private property that is not open to the public at large, but is intended for frequent use by many persons. Reclaimed water may also be made available for fire protection, aesthetic purposes (such as decorative ponds or fountains), irrigation of edible crops, dust control on construction sites, or other reuse activities.”

Accordingly the reclaimed water must receive a minimum of secondary treatment followed by filtration and high level disinfection and must meet the following limits before distribution to users:

<u>Parameter</u>	<u>Limit per Chapter 62-610, F.A.C.</u>	<u>RCID Permit Limit (Annual Average)</u>
Biochemical Oxygen Demand	20 mg/l	5 mg/l
Total Suspended Solids	5 mg/l	5 mg./l
Total Nitrogen	10 mg/l	6 mg/l
pH	6.0-8.5	6.0-8.5
Fecal Coliform	below detectable limit	Same
Chlorine Residual	1.0 mg/l after 15 minutes	Same at maximum month flow or 30 minutes at average daily flow
Total Phosphorus	N/A	1 mg/l

The Reedy Creek WWTP is designed to produce reclaimed water that meets this level of treatment. Reclaimed water from the RCID facility has historically met or exceeded all of the primary and secondary drinking water standards.

Chapter 62-610 also cites the following requirements, in addition to others, for reuse systems operating in public access areas:

- Cross connections between reclaimed water and potable water facilities are not allowed.
- A setback distance of 75 feet must be provided from the edge of the wetted application area to any public potable water supply wells. A separation of 75 feet must be maintained between public potable water supply wells and a reclaimed water transmission main.
- Low trajectory irrigation spray nozzles or other methods that minimize aerosol formation shall be used when the irrigation system is within 100 feet of outdoor public eating, drinking, and bathing facilities.
- The public must be notified that reclaimed water is being used in the area, with signs, notes on golf course scorecards, or other suitable methods.

- Hose bibbs or other hand operated connections to the system must be located in below-ground vaults, and either the vaults must be locked or the hose bibbs must be operable only with a special tool. Additionally, the hose bibbs must be marked with a tag bearing the words “Do Not Drink” in English and Spanish.
- Reclaimed water facilities must clearly identify that the water is not intended for consumption and include the words “Do Not Drink” in English and Spanish, together with the international symbol.

Refer to Chapter 62-610.468, F.A.C. for a complete description of the advisory requirements.

Guidelines for meeting these requirements are presented in subsequent sections of this manual and in the RCID *Utility Specifications and Construction Standards* (Section 02515).

Chapter 62-610, F.A.C. requirements for permitting and monitoring a reuse system are and will continue to be met by RCID. RCID has obtained a master permit for the reuse system that includes all of the known future and current sites that could use reclaimed water (see Figure 2). RCID also conducts a monitoring program consisting of sampling and analysis of reclaimed water after treatment and disinfection and of local groundwater at selected sites approved by FDEP. Users are required to allow RCID access to all monitoring facilities and potable and non potable water lines and to provide such information and participation as may be needed by RCID to comply with all regulatory requirements.

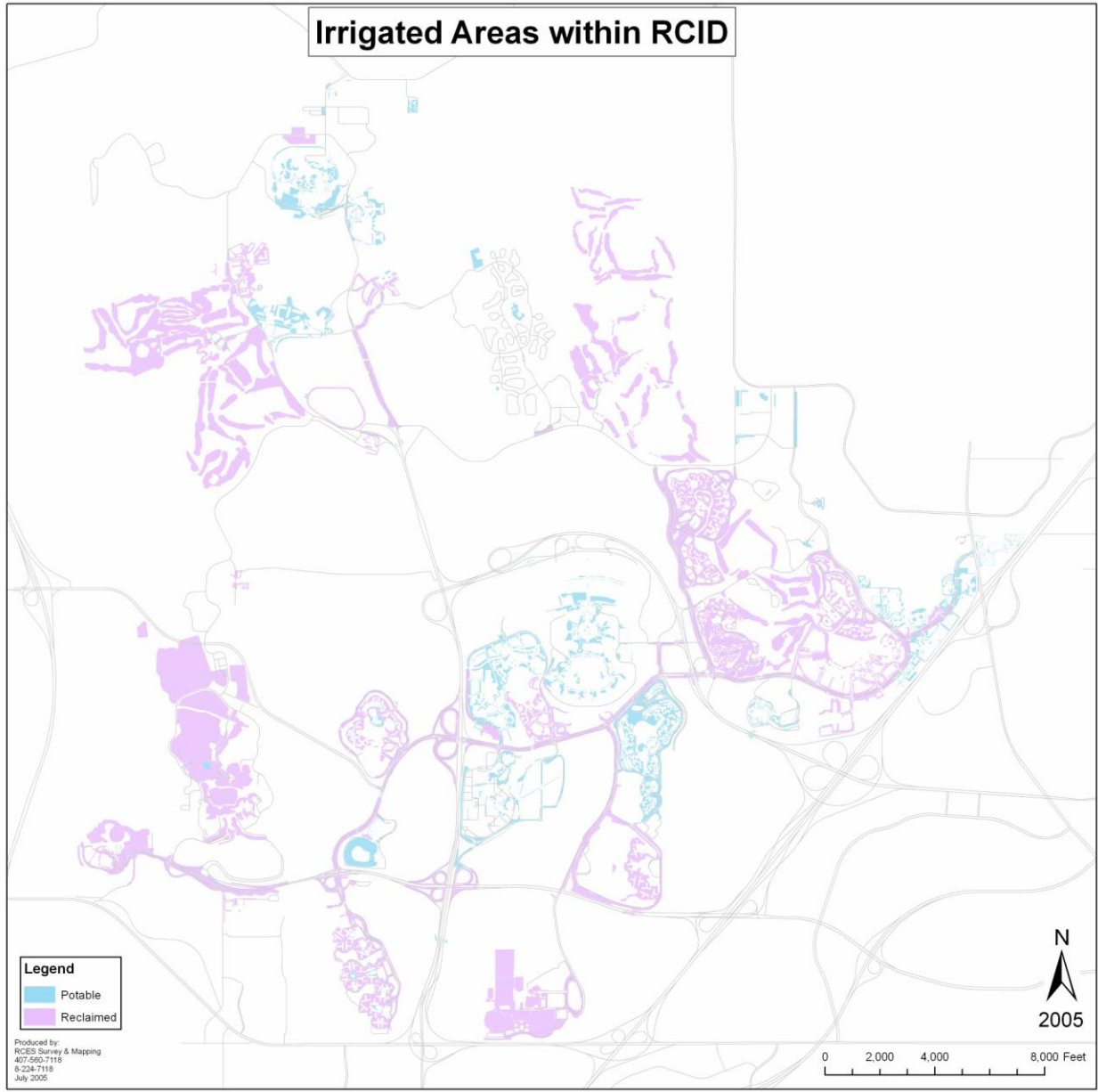


Figure 2
Irrigated Areas within RCID

Health and Safety

Reclaimed water has been shown through extensive studies and in actual practice to be safe for non-potable purposes. Health risks associated with use of reclaimed water are extremely low if the water is properly treated and ingestion is avoided. RCES will operate the Reedy Creek WWTP and the reuse distribution system to provide users with reclaimed water that meets all regulatory standards for the intended purposes. Users are expected to operate their systems to serve those purposes in a safe manner that minimizes the potential for direct ingestion and incidental contact by employees and the general public.

Because people are sometimes reluctant to accept new ideas such as reuse, care must be taken to avoid dissemination of inadequate, inaccurate or misleading information about the safety of reclaimed water. The success of the reuse system depends on education and demonstration of a significant benefit to the environment and the water resources of the local area. To help users better understand reclaimed water, this section briefly describes the types of potentially harmful constituents found in wastewater and the effectiveness of the Reedy Creek WWTP in removing them. The methods used to minimize human contact are also discussed, with a summary list of associated guidelines.

More detailed information on health and safety issues associated with use of reclaimed water can be obtained from the publications of the Water Environment Federation, American Water Works Association, WaterReuse Association, Environmental Protection Agency and the Florida Department of Environmental Protection, most of which are available and found on-line.

Wastewater Constituents and Treatment

The sources contributing to municipal wastewater are typically domestic, industrial, and commercial development and infiltration and inflow from groundwater and stormwater. At RCID, the major sources are domestic and commercial; wastes are generated from restrooms, showers, laundry facilities, food processing, and restaurants. Infiltration and inflow are limited by separated storm and sanitary sewer systems, a relatively young wastewater collection system (less than 40 years), and the amount of pumping used to convey wastewater. Industrial contributions are essentially nonexistent, as the WWTP serves only customers within RCID. However, there are some generators classified as industrial, such as the co-generation facility and the major laundries. These facilities are regulated by the RCID Industrial Waste Pretreatment Program, which protects the treatment plant and the reclaimed water from harmful constituents.

The two major categories of municipal wastewater constituents with health significance are microbial pathogens and chemicals, neither of which can be entirely eliminated by any treatment process. Pathogens are generally considered to provide a greater risk than chemicals when reclaimed water will not be used for potable purposes, because chemicals must typically be ingested orally to have an effect. Pathogens, on the other hand, can have an effect from a single

exposure and are transmitted by ingestion, inhalation, direct skin contact, or contact with a previously contaminated object.

The microbial pathogens of concern can be broadly classified into four groups of organisms: viruses, bacteria, protozoans, and helminths. The presence and concentration of these organisms in reclaimed water are influenced by population size and health, collection system sources, treatment levels and types, and organism survival rates; while public health risk depends on the degree and type of exposure, infective dose, the organism's ability to cause disease (pathogenicity), and host susceptibility. Thus, many interrelated factors play a role in determining the extent to which pathogens are present and their ability to cause potential harm.

The processes employed to remove pathogens at the Reedy Creek WWTP include biological treatment with secondary clarification, filtration, and disinfection with chlorine. These processes are designed to reduce coliforms, which are the indicators for pathogens, to below detectable levels as required by state regulations. The protozoan cysts, oocysts and helminths (mainly intestinal parasites) that may occur in wastewater have also been shown to be reduced to acceptable risk levels by clarification and filtration processes. (Recent samples of reclaimed water from the RCID facility showed *cryptosporidium* levels at 2 per 100 liters and *giardia* at less than 2 (none detected) per 100 liters, both below the action threshold recommended by FDEP.) Therefore, conscientious operation of the Reedy Creek WWTP as designed and permitted by the state will produce reclaimed water that is safe for reuse. Some studies have also shown that chlorination is effective in the inactivation of giardia cysts.

The reliability of the Reedy Creek WWTP is determined by meeting requirements established by the U.S. Environmental Agency and the Florida Department of Environmental Protection. Multiple sources of power supply the plant, and each major process is sized to provide treatment with one of the largest units out of service. In addition, if a process upset or failure was to occur and affect the quality of the reclaimed water, distribution to the reuse system would cease and reclaimed water would be diverted to the Rapid Infiltration Basin facilities.

Minimizing Contact

The Reedy Creek WWTP is provided with treatment processes that will significantly reduce the level of potential contaminants in reclaimed water, and RCID is committed to operating the plant in a manner that will optimize treatment process performance. Removal of all pathogens cannot be ensured, however, so it is important to minimize the potential for direct human ingestion of reclaimed water and incidental contact. Many of the requirements of Chapter 62-610, F.A.C., are focused on this goal, including prevention of cross connections to potable water systems, restricted access to and clear identification of reuse system facilities, use of application devices that minimize aerosol formation, and public notification. By meeting these requirements, RCID and system users will substantially reduce the possibility of direct human ingestion of the reclaimed water and, correspondingly, associated health risks.

Standard operating procedures for use of reclaimed water at individual sites will also minimize health risks. Irrigation will generally be performed at night, when few untrained people will be in or near the areas being irrigated. In addition, except for the golf courses, many of the

landscaped areas within RCID are not readily accessible to foot traffic, as they are designed for viewing rather than direct use. Washdown will be performed at night when facilities are closed or restricted to public access, and areas such as public eating and drinking facilities should be washed and dried before the public comes into contact with them. Washdown for areas around swimming pools should be performed with potable water.

Proper training of employees will be a critical factor in reducing the chance that they or the public will directly ingest reclaimed water. Before employees are allowed to work in the vicinity of reclaimed water, either directly with the reuse system or on other tasks that bring them into the area, they should be properly instructed about the potential health risks involved and the precautions they should take. In fact, everyone involved in the management or operation of user systems should maintain a high level of awareness, as the potential always exists for equipment failure and human error.

Employees who may be questioned by the public about the reuse system, such as those who work in information or first-aid stations, should also be knowledgeable about its purpose, benefits, and degree of health risk. Calm, well informed, and direct answers to the concerns expressed can correct misconceptions, allay fears, and prevent negative reactions. Emphasis should always be placed on the high level of treatment provided and the beneficial nature of reuse in conserving the scarce water resources of the state.

The following general guidance should be followed by those working directly with reclaimed water:

- Employees using reclaimed water should maintain standard personal hygiene, such as washing their hands after such use and before eating.
- Drinking fountains and outdoor eating areas contacted by overspray or direct application of reclaimed water from irrigation or washdown activities should be wiped with a disinfectant before they are made available for public use.
- Sprinklers should be adjusted to minimize or, if possible, eliminate overspray onto surface water, swimming areas, fountains, or outdoor eating areas.
- Cross connections of potable and reclaimed water systems are never permitted, and systems at risk are to be checked periodically for confirmation.
- Reclaimed water should not be used to wash kitchen mats or other items that may be used in kitchens or food preparation areas.
- Hoses and other items used for reclaimed water should not be connected to the potable water system unless they have been disinfected in accordance with current rules and regulations.
- Reclaimed water is not to be used to fill swimming pools or interactive fountains where body contact could occur. Reclaimed water may not be used in or discharged to ponds or other surface water areas without prior approval of RCID.

Application for Reclaimed Water Use

Application to connect to the reuse system, as well as to the potable water system, is achieved by progressing through the steps outlined below. These steps provide RCID with the opportunity to review the proposed plans for reclaimed water use and to verify that the system will meet the objectives of safe use of reclaimed water and conservation of potable water.

Each development owner or operator must request service by obtaining and completing a Utility Service Request (USR) form (see form and instructions on pages 26 and 27 of the *RCID Cross Connection and Backflow Prevention Manual*). These are also available by calling 407-824-4123 or can be found on the RCID website: www.rcid.org. The potential user must provide information on the form about the type and location of the development to be served, the uses planned for the reclaimed water, the desired date for reclaimed water service to begin, the presence of potable water service at the development and the average and maximum flow rates required. If the planned use is irrigation, the form must also include irrigated area, irrigation water requirements, and a brief description of the irrigation system.

In addition to the USR form, the user must provide RCID with construction drawings and specifications prepared by a registered professional engineer for the reuse system facilities at the proposed use area (the engineer must be identified on the form). Drawings should be prepared to scale and will include plans and details showing proposed reuse areas and system facilities. Existing utilities, including potable water lines, point(s) of connection, facilities, buildings, and other existing and future improvements will be indicated on the drawings. The specifications will define the materials and procedures to be used for constructing the reuse system facilities in conformance with regulatory requirements and *RCID Utility Specifications and Construction Standards* and the *RCID Cross Connection and Backflow Prevention Manual, latest editions*.

After reviewing the submittal, a representative of RCID may visit the proposed reuse area with the user to verify the facilities layout as shown on the drawings and to determine the general suitability of the area for the proposed use. If an existing irrigation system connected to potable water service is to be converted to a reclaimed water supply, the RCID representative may request that the system be operated to confirm the absence of cross connections and the absence of ponding and/or overspray. A similar check would be made for a new system after construction.

If the above steps are not followed, service will not be initiated.

Design and Construction

Users will be responsible for obtaining any and all permits required for design or construction of their systems from appropriate RCID, county, state, or federal agencies. Individual user reuse system facilities will be designed and constructed in accordance with the materials and workmanship specifications and standard details provided in the *Reclaimed Water Distribution System Specifications*; the *RCID Policies and Procedures for Metering, Cross Connection, and Backflow Prevention Manual*; and the RCID EPCOT Plumbing Code. Requirements for selected items of particular importance for regulatory compliance are briefly summarized below.

Service Connections

Service connections between the user's system and the RCID reuse distribution system will be made **only** under the supervision/inspection of RCES personnel and as described in the *RCID Cross Connection and Backflow Prevention Manual*.

Each service connection will include a valve to isolate the user's system from the reuse distribution system and a flowmeter to monitor the flow to the user. The valve will be provided by the user and installed at the user's expense at a location downstream of the service connection and upstream of the flow meter. All service connections shall be metered. The flow meter will be provided by RCID and will be installed by the user downstream of the isolation valve in accordance with RCID standards and details. Where reclaimed water is critical to daily operations (e.g., chillers), the user is also required to install a bypass for the flowmeter so that reclaimed water delivery can be maintained if the flowmeter is out of service for maintenance or repair. Operation of the bypass will be controlled by RCID. All bypass lines shall be equipped with an isolation valve.

Where reclaimed water is provided to irrigation systems or for other public access uses, the potable water service shall be provided with a backflow preventer approved by RCES.

Reclaimed water is prohibited from entering a dwelling unit or building. Exceptions are for chillers, fire protection, and toilet flushing provided the following conditions are met:

- Where reclaimed water is provided for fire system sprinkler systems, the piping to the sprinkler system shall be color coded per section "System Identification" of this manual. The reclaimed water fire sprinkler shall be constructed so as to preclude connection to a potable water system and to preclude access by guests or visitors for operation, repair, or modification.
- Generally, fire protection systems shall be fed from the potable water system, and preference shall be given to this system for fire protection. In circumstances where the potable water system is inadequate or does not exist, then the reclaimed water system may be used for fire protection, provided it is available and of adequate capacity for the intended purpose.

- Reclaimed water shall not be provided for toilet flushing unless approved by RCES and the piping is color coded per section “System Identification” of this manual. The plumbing system shall be constructed so as to preclude connection to a potable water system and to preclude access by guests or visitors for repair or modification.
- Reclaimed water shall not be used for toilet flushing in any residential property or dwelling unit where the residents have access to the plumbing system for repairs or modifications.

RCES will evaluate each service for the requirement of any backflow preventer. The installation of a backflow prevention device is to be in accordance with the RCID *Cross Connection and Backflow Prevention Manual*. Generally, there will not be a requirement for a backflow preventer on the reclaimed water system, but if there is a discernable degree of risk associated with the application, that could result in contamination of the reclaimed water, RCES/RCID reserves the right to require such devices/assemblies as the circumstances warrant.

As required by FDEP regulations, any area served with both potable and reclaimed water, must provide a backflow prevention device on the potable service.

Cross Connection Control

No cross connection between reclaimed water and potable water lines will be permitted. Users will not connect to the reuse distribution system until testing supervised and inspected by RCES has confirmed that cross connections do not exist. RCES will also make annual inspections, at the user’s expense, to verify that cross connection has not occurred.

For new developments, reuse systems will be completely separate from potable water systems. Vertical and horizontal separations shall be in full compliance with the requirements of 62-555.314, F.A.C. RCES will verify separation by review of the construction drawings and inspection of the construction.

For existing developments converting from potable water to reclaimed water, all potable water lines that will be connected to the reuse system must be located and positively severed from the potable water system.

Where surface or ground water resources are used to supplement the reclaimed water system, an air gap separation or other backflow prevention device approved by RCES shall be required.

Whenever a reclaimed water user also has potable water service, a reduced pressure principle backflow prevention assembly shall be installed on the potable water system service.

Hose Bibbs

Hose bibbs or other hand operated connections to the system will be used in accordance with Chapter 62-610.469, F.A.C; above ground hose bibbs (spigots or other hand operated connections) shall not be present. Hose bibbs shall be located in locked vaults, service boxes, or compartments which shall be clearly labeled as being of non-potable quality (bearing the words in English and Spanish: “Do not drink” together with the equivalent standard international symbol). Hose bibbs which can be only operated by a special tool may be placed in non-lockable vaults, service boxes, or compartments clearly labeled as non-potable water (bearing the words in English and Spanish: “Do not drink” together with the equivalent standard international symbol). Vaults, service boxes, and compartments meeting the requirements of this rule may be located above or below grade.

Fire Hydrants

Fire hydrants supplied by reclaimed water shall be provided with tamper-proof caps and shall require a special wrench for operation. Reclaimed water fire hydrants shall not have provisions for connection or be connected to the potable water system. All such hydrants shall be painted purple (Pantone 522C) for identification. Generally and preferably, fire hydrants shall be supplied from the potable water system unless it is inadequate or does not exist, in which case the reclaimed water system may be used, provided it is of adequate size and capacity.

System Identification

All new reuse system facilities including the user’s on-site facilities will be identified by the color code and marking system specified in the *RCID Utility Specifications and Construction Standards* and as required by 62-610 F.A.C, briefly summarized as follows:

- All new buried reclaimed water piping shall be marked with a continuous 6-inch wide purple colored (Pantone color number 522C) underground marking tape, placed approximately 1 ft above the top of the pipe. The tape will be printed with the following message in black or yellow (Pantone color number 395C):

CAUTION RECLAIMED WATER MAIN BURIED BELOW

- All new buried and all new and existing above-ground reclaimed water piping shall have a continuous 6-inch wide purple color (Pantone color number 522C) stripe or adhesive tape (or, in the case of plastic pipe (HDPE, PVC, CPVC, etc.) shall be purple impregnated pipe). The stripe/tape shall be printed or stenciled with the following message in black or yellow:

RECLAIMED WATER

- All new reclaimed water valve boxes and manholes shall have covers imprinted with the words “RECLAIMED WATER.” Valve boxes and covers shall be square. Existing

facilities, unless exempted, shall be painted with a purple stripe (Pantone color number 522C).

- All new irrigation piping up to the last control valve (that is, that portion of the system that is always pressurized) will meet the above requirements; however, instead of using adhesive tape, PVC pipe with a purple color pigment with the words “Reclaimed Water” stenciled thereon in black or yellow shall be utilized.
- Fire hydrants supplied by reclaimed water shall be painted purple (Pantone color number 522C).

Existing buried potable water piping and appurtenances converted to reclaimed water use will be exempted from the identification requirements, but any exposed parts of the user reuse system will be identified and labeled, including valves, valve boxes and covers, controllers, piping, and hose bibbs or other outlets. However, any existing potable water mains converted to reclaimed water use (those pipelines owned by RCID) upstream of the customer’s meter and not under pavement shall be provided with a pipe location tape or other marking devices approved by RCES. Location tape will be in accordance with the RCID *Utility Specifications and Construction Standards*.

Any conversion of existing potable water or sewer mains to reclaimed water use shall require written approval from RCID and FDEP.

Public Notification

RCID has developed property-wide standards for signs and wording to meet the public notification requirement. When a user applies for reclaimed water service, RCID and the user will develop methods for placement of notification. Such methods could include notes on admission tickets, score cards, or guest receipts. At a minimum, the following guidance will apply:

- Golf courses will provide signs on the first and tenth holes and/or on scorecards.
- Resorts, attractions, and theme parks should provide signs near their entrances indicating that the landscaping within are irrigated with reclaimed water in the interest of water conservation.
- Ponds containing reclaimed water shall be posted with advisory signs that contain the language in Spanish and English “Do not Drink” and “Do not Swim”.
- RCID will be responsible for the placement of advisory signs on all public roadways.

Inspections During Construction

The use area must be open to representatives of RCID and any other affected agency for inspection during installation of reuse system facilities. The user must notify RCID and other affected agencies at least 48 hours before installation of major elements of the reuse system as defined and requested by RCID.

Operations

Startup

After a user's reuse system has been installed but before reclaimed water is delivered to it, RCES will supervise and inspect cross connection control testing conducted at the user premises at the user's expense. One testing method is dye testing, which involves filling the reuse system with potable water and injecting it with a traceable, non-staining, non-toxic dye. Potable water outlets on the premises are then turned on and monitored for the appearance of the dye over several hours. If dye appears, the user will need to locate and sever the cross connection. Potable water service to the user will be discontinued by RCID until the cross connection is eliminated. RCES will then supervise and inspect another round of cross connection testing conducted at the user's expense. Another possible method is to compare chloride levels. Reclaimed water typically has chloride levels about 10-20 times the levels of potable water, and therefore serves as an indicator of the presence of reclaimed water. However, this method of testing should only be used if dye testing or other means are not possible, since it requires the piping systems to be filled with reclaimed water, and thereby introduces an unnecessary degree of risk.

If the user system has been designed for irrigation, pre-operation testing is also required for ponding, runoff, and overspray effects. The user must notify RCES at least 48 hours prior to the testing so that RCES representatives can attend. For the testing, the irrigation system will be activated during daylight hours and observers (including the user's engineer and RCES representatives) will check for potential ponding, runoff, or overspraying on non-irrigated areas.

If excessive ponding or runoff occurs, the user system schedule will have to be adjusted to allow for shorter and/or more frequent irrigation periods. The adjustments would require either changing the controllers or making more frequent manual setting changes. A change in the application rate by reducing sprinkler nozzle size or altering the operating pressure may also be required.

Normal Operations

User system operation will follow procedures similar to those that would be employed if potable water were the supply source but with additional precautions taken as necessary to minimize the potential for contact. Unless otherwise directed or approved by RCID, irrigation will be performed at night and on a schedule that will allow maximum opportunity for use areas to dry before normal periods of public access. Washdown will also be performed at night when

facilities are closed or restricted to public access, and areas such as public eating and drinking facilities will be disinfected before the public comes into contact with them. Washdown in areas around swimming pools should be performed with potable water.

System operations should be regularly observed by responsible user management to check that reclaimed water is being used safely and as intended. Users will also accommodate RCES requests to periodically visit their areas and observe operations. Irrigations systems shall be equipped with PLC or computer controlled sensors that monitor ambient conditions and adjust irrigation duration and frequency to deliver the optimum volume of water for the vegetation.

Violations and Emergency Situations

Users will immediately notify RCES, by phone if necessary, and in writing of any problems, violations of regulatory or code requirements, or emergency situations during the ongoing operations of their reuse systems. Upon notification, RCES will cease reclaimed water delivery to the user until normal operations can be resumed.

Examples of emergency situations include pipe or line failures, rupture or malfunction of system facilities or discovery of a cross connection. These examples are not all-inclusive, and the user should inform RCES of any situation that may adversely affect normal system operations.

New Connections

New connections to a user's reuse system will require testing for cross connections. In addition RCES should be notified of any new connections or other changes planned for the reuse system so that RCES can update its records and review the activities for conformance with applicable rules and regulations.

Maintenance

Users will be responsible for normal maintenance of their reuse system facilities, including the valves, pipes and fittings, and sprinklers. RCES will be responsible for maintenance of backflow prevention devices, flow meters, treatment, storage, pumping, and distribution facilities associated with the reuse system up to the user service connections.

Tank Trucks

Tank trucks, buffalos, tanker wagons and other vehicular means may be used to transport reclaimed water for washdown and landscape irrigation and other non-potable uses provided the following requirements are met:

- The vehicle is not used to transport potable water;

- The vehicle is not used to transport waters or other fluids that do not meet the requirements of Part III of FAC 62-610 unless the tank has been evacuated and properly cleaned prior to the addition of reclaimed water;
- All applicable requirements of Part III of Chapter 62-610, F.A.C. are met.

