

SECTION 06500
RECLAIMED WATER DISTRIBUTION SYSTEM
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06510 GENERAL

1. All aspects of the design and construction of any portion of the reclaimed water distribution system shall, at a minimum, meet the requirements of the North Carolina Department of Environment and Natural Resource (DENR) Division of Water Quality (DWQ) and the North Carolina Administrative Code Section 15A NCAC 02T 0909. Requirements presented in the Town of Cary Standard Specifications hereunder that are more restrictive or go above and beyond the state regulated requirements are required by the Town of Cary.
2. There shall be no direct cross connections between the reclaimed water and potable water systems. In all cases where reclaimed and municipal potable water are supplied to the same structure and/or other same facility, a reduced pressure principle backflow preventer shall be provided on the municipal potable water service. The privately owned and maintained reclaimed water service piping and other appurtenances shall be identified in conformance with the North Carolina Plumbing Code.
3. Extensions of the existing reclaimed water distribution system including locations and sizing shall adhere to any and all Policy Statements and/or Master Plans pertaining to the reclaimed water distribution system, or other requirements as initiated by the Director of Engineering.
4. All relocations of existing or permitted reclaimed water infrastructure including service piping and meter boxes shall be permitted and inspected in conformance with Town policies and procedures.
5. Any reclaimed water that leaves the reclaimed water distribution system other than by means of a properly permitted use must be disposed of into the Town of Cary sanitary sewer system. This includes any reclaimed water from blowoffs, testing, line flushing, and/or line breaks. In no case shall reclaimed water from blowoffs, testing, flushing, line breaks or other unpermitted uses be discharged onto the ground surface or drainage systems, stormwater ponds, streams or other non-treated systems. Any unpermitted discharge of reclaimed water shall be reported to the Town of Cary immediately and treated as a wastewater spill in accordance with established policies by the Town of Cary and NCDENR.
6. In all cases where potable water is used to temporarily charge a reclaimed water system, there shall be an approved above-ground reduced pressure principle backflow preventer or air gap separation between the potable water system and the reclaimed water system.

06520 RECLAIMED WATER DISTRIBUTION PIPE

A. DESIGN

1. Location: In accordance with Policy Statement Number 23, reclaimed water lines shall be extended along the roadway to the adjacent property line. All

reclaimed water mains shall be provided within dedicated street rights-of-way or within dedicated Town of Cary utility and pipeline easements. The minimum width of reclaimed water easements shall be 20-ft. Greater easement widths shall apply in cases where depth and/or diameter require more than 20-ft for construction, operations and maintenance as directed by the Director of Engineering. No permanent structures, equipment, retaining walls, embankments, impoundments, or other elements that would inhibit maintenance operations shall be constructed within a reclaimed water main easement unless a written request for waiver is approved by the Director of Engineering. The request for waiver shall describe all special conditions and include all appropriate measures to assure protection of the water main and access for maintenance. Fences may be allowed across easements provided that appropriate access gates have been installed to allow utility maintenance. Fill or cut slopes are not allowed to extend into reclaimed water main easements except by specific approval of the Director of Engineering. See Section 02000 for allowable landscape plantings within a Town easement.

2. Sizing: Reclaimed water mains shall be sized in accordance with good design procedures to provide adequate pressures throughout the system or as directed by the Director of Engineering. The minimum pipe size for reclaimed water mains shall be 4 inches.
3. Installation: All utility extension permits must be obtained prior to construction. All reclaimed water mains shall have a minimum cover of 4 feet measured from the top of the pipe to the finished grade. When reclaimed water mains are installed along a roadway, which does not have curb and gutter, the reclaimed water main shall be installed at sufficient depth to prevent conflict with future road improvements or vertical alignment changes.
4. Relation to Potable Water Mains and Other Utilities
 - a) Reclaimed water mains shall be laid with at least 10 feet of horizontal separation from existing potable water mains, measured laterally edge to edge, unless the elevation of the top of the reclaimed water main is at least 18 inches below the bottom of the potable water main, with a horizontal separation of at least 3 feet. Where a reclaimed water main and potable water main cross, the crossing shall be constructed at a 90-degree angle and the reclaimed water main shall cross at least 18-inches below the potable water main and the reclaimed water main shall be constructed of ductile iron pipe to water main standards at least 20-ft on both sides of the crossing and wrapped with purple polyethylene wrap as specified herein.
 - b) Reclaimed water mains shall be laid with at least 10 feet of horizontal separation from existing sanitary sewer lines, measured laterally edge to edge unless the elevation of the bottom of the reclaimed water main is at least 18 inches above the top edge of the sanitary sewer, with a horizontal separation of at least 3 feet. Where a reclaimed water main and a sanitary sewer main cross, the crossing shall be constructed at a 90-degree angle and the reclaimed water main shall cross at least 18-inches above the sanitary sewer line.

- c) Reclaimed water mains shall be laid below storm sewer mains with a minimum vertical separation of 12 inches when horizontal separation is less than 3 feet, unless otherwise approved by the Director of Engineering. Where a reclaimed water main and a storm sewer cross, the crossing shall be constructed at a 90-degree angle and the reclaimed water main shall cross at least 18-inches below the storm sewer.
- d) The following minimum horizontal separations shall be maintained:
- i. 100 feet from any private or public water supply source, including wells, WS-1 waters or Class I or Class II impounded reservoirs used as a source of drinking water (except as noted below)
 - ii. 50 feet from any waters (from normal high water) classified WS-II, WS-III, B, SA, ORW, HQW or SB (except as noted below)
 - iii. 10 feet from any other stream, lake, or impoundment (except as noted below)
 - iv. 25 feet from private wells (with no exceptions)
 - v. 50 feet from sources of public water supply (with no exceptions)

Where the required minimum separations cannot be obtained, ductile iron sanitary sewer pipe with joints equivalent to potable water main standards shall be used.

5. Identification of Reclaimed Piping

a) General:

All new distribution piping in the reclaimed water system, including service lines, valves and other appurtenances shall either be colored purple and embossed or be integrally stamped/marked with the words "CAUTION: RECLAIMED WATER – DO NOT DRINK," or be installed with a purple identification tape, and a purple polyethylene vinyl wrap. The warning shall be stamped on opposite sides of the pipe and repeated every 3-feet or less.

Existing potable or nonpotable water lines that are being converted to reclaimed water use should first be accurately located and tested in accordance with regulatory requirements. If required, the necessary actions to bring the line and appurtenances into compliance with regulatory standards should be taken. If the existing lines meet approval of the reclaimed water supplier and NCDENR, the lines can be approved for

reclaimed water distribution. If verification of the existing lines is not possible, the lines should be uncovered, inspected, and identified prior to use.

- b) Polyethylene Wrap: Buried ductile iron fittings, gate valves and other appurtenances shall either be painted Pantone 522 purple and/or wrapped with a Pantone 522 purple polyethylene membrane conforming to ANSI A21.5, and installed in accordance with AWWA C105. The polyethylene sheets shall be 8 mils thick, minimum.
- c) Tracer Wire: Tracer wire shall be installed along all PVC reclaimed water mains and polyethylene service piping. At a minimum, tracer wire shall be provided as a single copper strand of #12 AWG attached to the main line in at least 5-ft intervals. The copper tracer wire shall be jacketed with a purple polyethylene film. All tracer wire for main lines shall be connected to valve boxes to allow reading equipment to follow the main line location from the valve box.
- d) Identification Tape: Identification tape shall be required for all instances in which the reclaimed water piping for main lines is not labeled, embossed or integrally stamped/marked with the words "CAUTION: RECLAIMED WATER – DO NOT DRINK," repeated on opposite sides of the pipe every 3-feet or less. Identification tape shall be prepared with white or black printing on a purple field (Pantone 522) having the words "CAUTION: RECLAIMED WATER – DO NOT DRINK." The overall width of the tape should be at least 3 inches.

Identification tape shall be installed on the top of the distribution piping longitudinally and should be centered over the pipe. The identification shall be continuous in its coverage on the pipe and should be fastened to each pipe length in at least 10-ft intervals. Tape attached to sections of pipe before they are placed in the trench should have flaps sufficient for continuous coverage. Other satisfactory means of securing the tape during backfill of the trench may be used if suitable for the work, as determined by the Director of Engineering.

The identification tape differentiating the reclaimed water piping from other utility lines should be consistent throughout the service area.

B. PIPE MATERIALS

1. Material: All reclaimed water main distribution pipe shall be C900 or C905 PVC pipe. The Engineering Department will maintain a list of approved manufacturers for all reclaimed water distribution products. New manufacturers must submit requests for approval to the Engineering Department in accordance with Standard Procedure 120, Manufacturer Approval Guidelines.

2. C900, PVC Pipe, 4 through 12 inches in diameter:

- a) All PVC pipe in the range of 4 through 12 inches in diameter shall be designed and manufactured in accordance with AWWA C900. The PVC pipe shall be made of virgin PVC resin that provides chemical and physical properties that meet or exceed cell class 12454 as defined in ASTM D1784. All PVC pipe shall be supplied with a minimum pressure rating of 200-psi corresponding to a diameter ratio of 14. All PVC pipe shall be supplied in standard laying lengths of 20-ft. PVC pipe shall have integral wall, bell and spigot joints fabricated with elastomeric gaskets in conformance with ASTM F477 with joints that meet or exceed the performance requirements of ASTM D3139. All PVC pipe joints shall be provided with an approved method of restraint. All PVC pipe supplied for reclaimed water applications shall be color coded purple, Pantone 522 as required by the North Carolina Administrative Code, 15A, NCAC, 02T 0909. Pipe identification for reclaimed water by the manufacturer with the words "CAUTION – RECLAIMED WATER DO NOT DRINK" repeated on opposite sides of the pipe every 3-feet or less shall be a preferred alternative to identification tape.

C-900 PVC Pipe Sizes

Nominal Pipe Diameter	Pressure Rating	Diameter Ratio	Wall Thickness (inches)	Outside Diameter
4-inch	200	14	0.343	4.80
6-inch	200	14	0.493	6.90
8-inch	200	14	0.646	9.05
12-inch	200	14	0.943	13.20

b) C-905, PVC Pipe, 16 through 24 inches in diameter:

All PVC pipe in the range of 16 through 24 inches in diameter shall be designed and manufactured in conformance with AWWA C905. The PVC pipe shall be made of virgin PVC resin that provides chemical and physical properties that meet or exceed cell class 12454 as defined in ASTM D1784. All PVC pipe shall be supplied with a pressure rating of 200-psi corresponding to a diameter ratio of 21. All PVC pipe shall be supplied in standard laying lengths of 20-ft. PVC pipe shall have integral wall, bell and spigot joints fabricated with elastomeric gaskets in conformance with ASTM F477 with joints that meet or exceed the performance requirements of ASTM D3139. All PVC pipe joints shall be provided with an approved method of restraint. All PVC pipe supplied for reclaimed water applications shall be color coded purple, Pantone 522 as required by the North Carolina Administrative Code, 15A, NCAC, 02T 0909. Pipe identification for reclaimed water by the manufacturer with the words "CAUTION – RECLAIMED WATER DO NOT DRINK" repeated on opposite sides of the pipe every 3-feet or less shall be a preferred alternative to identification tape.

C-905 PVC Pipe Sizes

Nominal Pipe Diameter	Pressure Rating	Diameter Ratio	Wall Thickness (inches)	Outside Diameter
16-inch	200	21	0.829	17.40
18-inch	200	21	0.929	19.50
20-inch	200	21	1.029	21.60
24-inch	200	21	1.229	25.80

c) PVC Bell Joint Restraint

All PVC bell joints shall be restrained for both C900 and C905 PVC pipe. The bell joint restraint shall consist of either an approved restrained PVC joint provided by the same manufacturer of the PVC pipe or an approved bell joint restraint harness. All bell joint restraint harness assemblies shall be made of DIP, coated with a manufacturer applied epoxy coating or polyester powder coating, including stainless steel bolts, nuts and rods. The bell joint restraint harness shall be manufacturer approved for use with PVC pipe and rated for at least 200-psi with a 3:1 safety factor.

C. PIPE INSTALLATION

1. PVC pipe shall be installed in accordance with AWWA C605. At a minimum, all PVC pipe shall be installed at a Type 3 laying condition as specified by AWWA C605 for depth of installation from 4-ft to 10-ft measured from the top of the pipe. The Type 3 laying condition requires the pipe to be bedded on a minimum of 4-inches of select granular material that will conform to the bottom of the pipe. Select granular material shall consist of well-graded sand, gravel, crushed gravel, crushed stone or crushed slag composed of hard, tough and durable particles, and shall contain not more than 10 percent by weight of material passing a 0.075 mm (No. 200) mesh sieve and no less than 95 percent by weight passing the 25 mm (1 inch) sieve. Pipe laying on a flat bottom trench is unacceptable.

Embedment material shall be compacted to the top of the pipe. When using mechanical compactors, avoid contact with the pipe. When compacting over the pipe crown, a minimum cover of at least 8-inches or more in conformance with the manufacturer's requirements shall be maintained over the top of the pipe prior to compacting. The maximum embedment sizing shall be limited to materials passing a 3/4-inch sieve for angular materials or 1-1/2-inches for rounded rock. Embedment materials consisting of select material or native soils shall be well drained, granular, free of rocks and other foreign materials and shall be selected and placed to prevent gouges, crimping, or puncture of pipe, joints or appurtenances.

2. Materials at all times shall be handled with mechanical equipment or in such a manner to protect them from damage. At no time shall pipe and fittings be dropped or pushed into ditches.

3. Pipe and fitting interiors shall be protected from foreign matter and shall be inspected for damage and defects prior to installation. In the event foreign matter is present in pipe and fittings, it shall be removed before installation. Open ends of pipe shall be plugged or capped when pipe laying is not in progress.
4. All pipe shall be in nominal lengths of (20) twenty feet and shall be installed with at least 48 inches of cover below the finished subgrade. Pipe shall be laid on true lines as directed by the Engineer. Trenches shall be sufficiently wide to adjust the alignment. Bell holes shall be dug at each joint to permit proper joint assembly. The pipe shall be laid and adjusted so that the alignment with the next succeeding joint will be centered in the joint and the entire pipeline will be in continuous alignment both horizontally and vertically. Pipe joints shall be fitted so that a thoroughly watertight joint will result. All joints will be made in conformance with the manufacturer's recommendations for the type of joint selected. All transition joints between different types of pipe shall be made with transition couplings approved on shop drawings showing the complete assembly to scale.
5. Prior to beginning construction, the Contractor shall contact local utility companies and verify the location of existing utilities. The Contractor shall be completely and solely responsible for locating all existing buried utilities inside the construction zone before beginning excavation. The Contractor shall be solely responsible for scheduling and coordinating the utility location work. When an existing utility is in conflict with construction, it shall be exposed prior to beginning construction to prevent damage to the existing utility.
6. Valves in the existing Town of Cary reclaimed water system shall not be operated without a minimum notice of 24 hours to the Engineer and the Public Works and Utilities Department. All valves that are under the ownership of the Town of Cary reclaimed water system shall be operated only by trained personnel of the Town of Cary. Contractor's personnel shall only be responsible for operating valves within new construction areas that are not directly connected with the existing reclaimed water supply. At such time when the valves in new construction areas are connected with the reclaimed water supply, the valves shall only be operated by Town of Cary personnel or in limited circumstances by contractor's personnel after receiving authorization from the Operator in Responsible Charge of the reclaimed water distribution system. For all other cases, the Contractor shall operate valves only in accordance with Town of Cary Policy Statement No. 49, Control and Operation of Valves and Fire Hydrants.

06530 VALVES AND APPURTENANCES

A. VALVES

1. General

- a) Valves shall be installed on all branches from feeder reclaimed water mains according to the following schedule: 3 valves at crosses; 2 valves at tees. When a loop section of reclaimed water line is connected back into the feeder reclaimed water main within a distance of 200 feet or less, only one valve will be required in the feeder reclaimed main.
- b) Where no reclaimed water line intersections are existing, a main line valve shall be installed at every 100 feet per 1 inch diameter main up to a distance of 2000 feet between valves.

- c) Gate Valves, 12-inches and Smaller in Diameter:

All valves for reclaimed water applications, 12-inches in diameter and smaller shall be resilient seated wedge gate valves in conformance with the requirements of AWWA C509, (grey or ductile iron body) or AWWA C515, (reduced wall ductile iron body) and provided with a full circumferential pipe opening. All gate valves shall be designed for a working pressure of 250-psi with a minimum ULFM rating of 200-psi. Gate valves shall be fusion bonded epoxy, (FBE) coated both interior and exterior at a minimum of 10mils and the FBE coating shall be provided in conformance with AWWA C550.

All gate valves 12-inches in diameter and smaller shall be installed in the vertical position and shall be provided with mechanical joint fittings. Gate valves shall be restrained by wedge action retainer glands or other approved manufacturer provided restraining systems. In all cases, the valve and piping shall be restrained on both sides to sufficiently allow the valve to function as a dead end.

All gate valves shall open left with a non-rising stem and be provided with a 2-inch square operating nut. All gate valves shall be constructed with triple o-ring seals in which 2 o-rings are located above the thrust collar and 1 o-ring is located below the thrust collar. The two upper o-rings shall be replaceable with the valve fully open and subjected to full rated working pressure.

The gate valve wedge shall be fully encapsulated in molder rubber and fully retractable. All valves shall be rated for bi-directional flow. All sealing gaskets shall be made of EPDM rubber materials.

- d) Gate Valves, 16-inches through 24-inches:

Gate valves 16-inches through 24-inches shall comply with all specifications outlined for gate valves 12-inches and smaller in the previous section including the 250-psi pressure rating. Gate valves 16-inches through 24-inches shall be fabricated exclusively with ductile iron construction in conformance with AWWA C515.

As additional requirement, gate valves 16-inches through 24-inches if installed vertically, shall be provided with a minimum of 2-ft of overhead clearance between the top of the operator nut and the finished subgrade.

- e) Gate valves, sixteen (16) inches and larger, installed in a horizontal position, shall only be provided, as permitted by the Director of Engineering for special circumstances where vertical alignment is not possible. All horizontal gate valves shall meet or exceed the specifications outlined herein for vertical gate valves including the 250-psi pressure rating. All horizontal gate valves shall be equipped with bevel gears resulting in 4:1 turn ratios through 24-inches in diameter,
- f) All gate valves for reclaimed water applications shall be painted purple, Pantone 522 with an approved field application paint by the contractor prior to installation or otherwise wrapped in purple polyethylene wrap for required identification as a reclaimed water valve.
- g) Valves shall be properly located, operable and at the correct elevation. All valves and reducers shall be rodded to the tee or cross if one is located within 10 feet as shown in the Details. If reducers cannot be rodded, concrete blocking or other restraining methods will be required. The maximum depth of the valve nut shall be 5 feet. When valve extension kits are used, they must be manufactured by the same company which manufactured the valve.

2. Combination Air Valves

- a) Combination air valves approved for use in reclaimed water installations shall be installed at all high points of reclaimed water lines 8 inches in diameter or larger and at other locations, such as major changes in slope, as directed by the Town. A high point shall be determined as any high location where the difference between the high elevation and adjacent low elevation exceeds 10-ft unless otherwise determined by the Director of Engineering based on special circumstances. The combination air valve shall automatically exhaust large volumes of air from the system when it is being filled and allow air to re-enter the pipe when the system is being drained. The reclaimed water main shall be installed at a grade which will allow the air to migrate to a high point where the air can be released through an air valve. A minimum pipe slope of 1 foot in 500 feet should be maintained. The valve shall have a minimum two (2) inch NPT inlet and 200-PSIG working pressure. Combination air valves shall be sized by the Engineer and approved by the Town.
- b) Combination air valves shall be of the single housing style that combines the operation of both an air/vacuum and air release valve. The valve must meet the requirements of AWWA C512 and be installed in accordance with the Details.
- c) Manholes installed for the combination air valves shall meet all

requirements of Section 07000. The contractor shall paint the inside of all manholes housing ARV's with Pantone 522 purple paint and stencil the words "CAUTION: RECLAIMED WATER - DO NOT DRINK" on the inside of the manhole in at least 2 locations on both sides of the ARV. The lettering shall be at least 3-inches in height and be painted in black visible paint that can be easily noticed from ground level.

3. Valve Boxes

- a) Valve boxes shall be cast iron, screw or telescopic type, with a 5 inch opening. Valve box ring adjustments will not be allowed.
- b) Valve box covers shall be square in shape (NOT round) and shall be designed for AASHTO H-20 truck loadings. All valve box covers shall be of non-interchangeable shape with potable water covers, and cast on the top surface with a recognizable inscription indicating "Reclaimed Water". All valve box covers shall be painted purple, Pantone 522.
- c) The valve box shall be centered over the wrench nut and seated on compacted backfill without touching the valve assembly. All valve boxes shall be encased in a trowel finished 2' x 2' x 6" pad of 3000-psi concrete beneath the asphalt with the cover flush with the top of the pavement or flush with the finished grade. Precast concrete valve box encasements may not be used for valve box encasement outside of paved areas. The maximum depth of the valve nut shall be 5 feet. When valve extension kits are used, they must be manufactured by the same company that manufactured the valve.

B. APPURTENANCES

1. Pipe Fittings: Pipe fittings shall be cast or ductile iron designed and manufactured as per AWWA C110. Sizes of fittings up to and including 24 inches shall be designed for an internal pressure of 350 psi, and larger size fittings shall be designed for an internal pressure of 250 psi. Compact ductile iron mechanical joint fittings designed and manufactured as per AWWA C111 are also acceptable. Gaskets shall be provided in conformance with AWWA C111 with EPDM rubber preferred over SBR. Joints for fittings shall be mechanical and lined with cement mortar with a seal coat of bituminous material, all in accordance with AWWA C104. All fittings shall be restrained to C900 or C905 pipe with an approved wedge action retainer gland or other approved restraining method. All DIP fittings for reclaimed water use shall be identified by painting or wrapping with polyethylene wrap in Pantone 522 purple.
2. Blowoffs
 - a) Blowoffs installed on reclaimed water mains at the end of cul-de-sacs shall be a minimum of 2 inches. Where there is not sufficient pressure to thoroughly flush the system, a larger blowoff will be required.

- b) Blowoff Assemblies shall be constructed as shown in the Details. Blowoff assembly sizing for distribution mains, 4-inches through 8-inches in diameter, shall be the typical 2-inch assembly as shown in the details. The 2-inch valves shall be gate type provided with threaded connections with a non-rising stem and a 2 inch operating nut, O-ring seals and screwed ends. A full size valve is required on mains that are planned to be extended. Typical 2-inch blowoff assemblies shall be provided with SDR 21 purple PVC pipe rated at 200-psi and labeled for use with reclaimed water systems. The SDR 21 PVC pipe shall be joined with bell and spigot joints restrained by solvent weld. The PVC pipe shall be joined to the threaded connections of the 2-inch gate valve with PVC transition couplings with metal threads. The metal inserts of the transition couplings shall be made of stainless steel, brass or bronze. The transition couplings shall be connected to the gate valve with threaded brass nipples. Threaded PVC pipe and joints with connections threaded in PVC shall not be allowed. All threaded connections shall be provided with metal threads to maintain the pressure rating of the blowoff assembly.
 - c) For blowoff assemblies on main lines larger than 8-inches in diameter, a blowoff assembly design including calculations for sizing shall be provided by the design engineer of record and approved by the Engineering Department.
 - d) All blowoffs shall drain to the nearest sanitary sewer manhole when there is a sewer manhole within 200-ft. In cases where a sewer manhole is not within 200-ft, the blowoff assembly may be omitted at the discretion of the Director of Engineering in cases where another blowoff assembly is in close proximity.
 - e) All blowoff assemblies for reclaimed water installations in which the system will be initially charged with potable water, shall be required to maintain an air gap separation from the blowoff discharge pipe to the sanitary sewer manhole.
3. Paint: An approved Pantone 522 purple is required to meet color identification requirements under NC ACAC 02T .0909 and referenced herein as the color code identification for reclaimed water piping, valves and other appurtenances. Field application of Pantone 522 purple to valves, fittings, manholes and other appurtenances shall be implemented in conformance with manufacturer specifications including surface preparation. In all cases a minimum film thickness of 10-mils shall be applied. For applications open to daylight, the paint shall have UV protection. The paint shall consist of a two coat system consisting of a part high solids cured epoxy as the primer with a polyurethane top coat. For applications not exposed to sunlight, the paint shall be a two coat application of a high solids cured epoxy.
4. Wedge Action Retainer Glands
All fittings, valves, blowoffs and appurtenances other than pipeline joints shall be restrained with approved wedge action retainer glands. All wedge action

retainer glands shall be manufactured as a one piece retainer gland for use with typical DIP mechanical joint fittings, gate valves and PVC C900 or C905 pipe. The wedge action retainer glands shall be rated to provide restraint up to a 200-psi pressure rating for sizes through 24-inches with a safety factor of 3:1. Approved wedge action retainer glands shall be made of DIP, coated with a manufacturer applied epoxy coating or polyester powder coating, including stainless steel bolts and nuts.

06540 RECLAIMED WATER SERVICE TAPS

A. DESIGN

1. Individual reclaimed water services and multiple branch services shall be provided from the reclaimed water main to each reclaimed water meter in accordance with the Details. Multiple branch services for reclaimed water shall not exceed 2 branch lines unless otherwise approved by the Director of Engineering. All connections shall be made by wet taps. Service connections shall be made perpendicular to the reclaimed water main and shall run straight to the reclaimed water meter.
2. All reclaimed water meter boxes and vaults shall be located at the edge of the serviced lot's right of way or easement. Reclaimed water meter boxes shall not be placed in streets, sidewalks, parking areas or obstructed by fencing or buildings. Exceptions to these conditions will be at the direction of the Director of Engineering.
3. Provisions for backflow prevention shall be in accordance with the NC Plumbing Code for plumbing. Normally no backflow provisions will be necessary on reclaimed water systems. Approved backflow prevention devices shall be required on the potable water system for all customers with reclaimed water service. See appropriate requirements in Section 06000.
4. The reclaimed water meter shall be sized based on applicant water budget calculations using the approved method. The minimum size of reclaimed water meters and services shall be 1-inch diameter. Multiple branch service sizing shall be determined by the designer.
5. Service taps to existing reclaimed water mains shall be made by the Town. Service taps to new reclaimed water mains shall be made by the Contractor in accordance with the Specifications.
6. Service taps greater than 2 inches shall be made by a Contractor of the Developer.

B. MATERIALS

1. Taps: Direct taps shall not be allowed with C900 or C905 PVC pipe for reclaimed water mains. The maximum size for saddle taps is 2-inches in diameter.

All taps larger than 2-inches shall be installed by inline fittings or tapping sleeves. All tapping of C900 or C905 PVC reclaimed water mains shall be implemented with shell type cutting tools classified for use with PVC pipe that retains the coupon cut while penetrating the pipe wall. Twist drill bits and auger bits shall be prohibited.

2. Service Saddles: All service saddles shall be fabricated with an 85-5-5-5 waterworks brass and fabricated in a controlled diameter configuration to prevent over tightening the bolts and distorting or stressing the PVC pipe. Service saddles shall provide full support around the entire circumference of the pipe. All service saddles shall be manufacturer approved for use with C900 PVC pipe in conformance with AWWA C800. Service saddles shall be provided in a 2-piece bolted design for 4-inch through 8-inch pipe diameters and in a 3-piece assembly for 10-inch and 12-inch diameters. All service saddles shall be provided with an EPDM rubber gasket o-ring design in conformance with ASTM D2000. Service saddle outlets shall be provided with AWWA tapered threads.
3. Mechanical Joint Tapping Sleeves: MJ tapping sleeves shall be fabricated of cast iron or ductile iron construction in a two-piece assembly with mechanical joint connections to the main line and flanged connection to the tapping valve. All MJ tapping sleeves shall be rated for a working pressure of 200-psi or greater and provided with a ¾-inch test plug for testing. All tapping sleeves shall be hydrostatically tested up to 200-psi before a tap is made. Tapping sleeves shall NOT be air tested.

All mechanical joint tapping sleeves shall be manufacturer fabricated and approved for installation on the specific main line pipe material, whether C900 or C905 PVC pipe. In all MJ tapping sleeve applications, the tapping sleeve and tapping valve shall be provided by the same manufacturer.

Stainless Steel Tapping Sleeves, 6-inch through 12-inch main lines:

Stainless steel tapping sleeves may be used in lieu of mechanical joint tapping sleeves for C900 PVC reclaimed water mains through 12-inches in diameter where the branch line is 50% or less in diameter than the main line. All stainless steel tapping sleeves shall be manufactured in conformance with AWWA C223 and made of 100% stainless steel including the flange. All SS tapping sleeves shall be provided in a two piece assembly with a full circumferential gasket and a ¾-inch test plug. All SS tapping sleeves shall be manufacturer rated for a working pressure of 200-psi or greater and hydrostatically tested to 200-psi before a tap is made. Tapping sleeves shall NOT be air tested.

4. Tapping Saddles: Tapping saddles shall not be used with PVC pipe.
5. Corporation Stops: Corporation Stops shall be ball type, fabricated with an 85-5-5-5 waterworks brass and complete inlet AWWA Standard threads as per AWWA C800. Taps shall be located at 10:00 or 2:00 o'clock on the

circumference of the pipe. The outlet connection of the corporation stop shall be sized for IPS, Iron Pipe Size polyethylene piping and provided with a solid stainless steel insert stiffener manufactured by the same manufacturer of the corporation stop ball valve. The outlet connection to the polyethylene service piping shall be by compression connections provided with the corporation stop ball valve. Service taps shall be staggered alternating from one side of the reclaimed water main to the other and at least 12 inches apart. The taps must be a minimum of 24 inches apart if they are on the same side of the pipe. No tapping shall be made within 3-ft of the end of the reclaimed water main.

6. Polyethylene Service Piping: Polyethylene service piping shall be provided as minimum 1-inch to maximum 2-inch, IPS, (iron pipe size), inside diameter controlled, piping in conformance with ASTM D2239 and rated for 200-psi. All polyethylene service piping shall comply with NSF14, AWWA C901 and meet all requirements of PE 3710 code designation. The piping shall be provided with no breaks or fittings in service installation lengths of 100-ft or less. All polyethylene service piping shall be provided in purple color, Pantone 522, for reclaimed water applications with the words, "CAUTION – RECLAIMED WATER DO NOT DRINK" labeling the piping as reclaimed water service piping. All PE piping shall be provided with tracer wire. Tracer wire shall be a 12 AWG, UL listed solid copper conductor wire. The wire shall have a polyethylene coating and be securely attached to the piping so that the wire and piping are one combined package. The tracer wire shall be connected visibly inside the meter box for use by Town of Cary utility locating staff. All connections to PE piping shall be provided with stainless steel insert stiffeners provided by the same manufacturer of the corporation stops and/or the meter setters and approved by the manufacturer for use with PE piping.
7. Coppersettlers for 1-inch Reclaimed Water Services: The minimum service size for reclaimed water coppersettlers is 1-inch in diameter. Coppersettlers shall be installed in reclaimed water applications as shown in the details and provided with a lockable, full port ball valve on the inlet side of the meter and a second full port ball valve on the outlet side of the meter. Coppersettlers shall be provided in a 15-inch vertical rise at the shape and configuration shown in the details. Coppersettlers shall be installed in the center of the meter box such that the top of the inlet and outlet piping is visible for inspection. Coppersettlers shall be anchored by the contractor to prevent movement and to maintain the meter in the center of the box directly under the cover. Coppersettlers shall be provided with compression connections sized for polyethylene piping as specified herein for both inlet and outlet connections. Typical saddle nuts shall be provided with reverse or left hand threads for connecting reclaimed water meters with reverse or left hand threads. The top of the ball valve shall be text identified for use with reclaimed water by a manufacturer installed metal tag.
8. Reclaimed Water Meters for 1-inch Services: Reclaimed water meters for 1-inch services will be provided by the Town of Cary with reverse or left hand threads. Reclaimed water meters shall be color identified by purple Pantone 522 cover and casing.

9. Meter Boxes for 1-inch Services: Meter boxes for 1-inch reclaimed water services shall be high density polyethylene construction with a wall thickness of no less than 0.550 inches or heavy duty fiberglass reinforced polymer. The box shall be molded as one piece and provided in a circular shape with a diameter of 20-inches and a depth of 24-inches. The box shall be provided with pre-cut entry areas approximately 3-inches wide by 4-inches high for the service pipe entrance and exit. The plastic box shall be provided with a black exterior and a reflective white on the interior. The meter box cover shall be made of light weight polymer concrete dyed purple, Pantone 522 with the words, "CAUTION RECLAIMED WATER – DO NOT DRINK", embossed in the cover. The meter box cover shall be provided as a solid polymer cement cover with no reader door. The meter box cover shall be provided with 1 stainless steel locking bolt. The stainless steel locking bolt shall be provided in a penta head configuration. The box and cover shall be load rated for a vertical load of 20,000-lbs. The inside of the meter box shall be painted Pantone 522 purple and text shall be stenciled on the inside of the interior indicating, "CAUTION RECLAIMED WATER – DO NOT DRINK" in lettering at least 1-1/2 inches in height that is clearly legible when opening the cover.
10. Meter Box Assembly and Setters for 1-½ and 2 inch services: Meter Boxes for 1-½" and 2" services shall be made of fiberglass reinforced polymer and provided with heavy duty rated polymer concrete covers as indicated in the Standard Details. All meter box covers shall be consistently color-coded purple (Pantone 522 C) and marked on the top surface with a recognizable inscription indicating "RECLAIMED WATER – DO NOT DRINK". Meter box covers shall be provided as a solid polymer cement cover with no reader doors and provided with 2 stainless steel bolt locks on opposite ends of the meter box cover. The stainless steel bolts for locking the cover shall be provided in a penta head configuration. Piping for 1-1/2 and 2 inch reclaimed water meter setters shall be constructed from brass and copper tubing and shall be equipped with angled check valve outlets and by-pass flanged valve or by-pass flanged ball valve inlets. The box shall have an open bottom to allow drainage through stone. The inside of the meter box shall be painted Pantone 522 purple and text shall be stenciled on both sides of the interior indicating, "CAUTION RECLAIMED WATER – DO NOT DRINK" in lettering at least 1-1/2 inches in height that is clearly legible when opening the cover. The setter and meter shall also be painted or provided in Pantone 522 purple.
11. Meter Vaults for Services Larger than 2-inches in Diameter: Please contact the Engineering Dept. to determine design criteria for reclaimed water services larger than 2-inches in diameter.

06550 RECLAIMED WATER IRRIGATION SYSTEMS

- A. All reclaimed water irrigation systems within public street right of way require an encroachment agreement from the Town or NCDOT prior to installation. Plans designating the location, size, material, and depth shall be submitted with the agreement application to the Inspection & Permits Department.

- B. Pipe material for the irrigation mainline proposed to be used within the public right of way shall be Schedule 40 PVC or greater provided in Pantone 522 purple. A minimum depth of 2 feet of cover shall be provided.
- C. The reclaimed water irrigation mainline pipe system shall be hydrostatically tested per Section 06560 with a minimum pressure of 200 psi or 50 psi above working pressure, whichever is greater.
- D. All street crossings of reclaimed water irrigation systems shall be encased in ductile iron or steel conduit.
- E. Hose bibs will be installed and maintained on private property by private property owners in accordance with NCDENR rules and the plumbing code. Above ground hose bibs are not allowed. Hose bibs can be located in locked, below grade vaults. As an alternative, hose bibs can be located in non-lockable below ground vaults if special tools are required to operate them. All below grade vaults for hose bibs shall be consistently color-coded purple (Pantone 522) and marked on the top surface with a recognizable inscription indicating "CAUTION RECLAIMED WATER – DO NOT DRINK". The hose bib shall consist of a ¾ inch gate valve and ¾ inch cam lock type hose connection as indicated in the Standard Details.

06560 TESTING AND INSPECTION

A. GENERAL

1. All reclaimed water used in testing and inspection must be disposed of properly as described in Section 06510.
2. All materials must be approved by the Inspector prior to installation. Materials rejected by the Town's Inspector shall be immediately removed from the job site.
3. The Contractor shall furnish all materials, labor, and equipment to perform all testing and inspections to the satisfaction of the Town's Inspector. The Town shall provide reclaimed water for testing purposes on reclaimed water mains in accordance with Town Standard Procedure 4, Control and Monitoring of Water System Flow Activity.

B. TESTING

1. Hydrostatic Testing
 - a) No valve in the Town reclaimed water system shall be operated without authorization in accordance with the Town Standard Procedure 4 Control and Monitoring of Water System Flow Activity. A section of reclaimed water main which is to be hydrostatically tested shall be slowly filled with reclaimed water at a rate which will allow complete evacuation of air from the line. Hand pumps shall not be used for the pressure testing of

reclaimed water mains. Taps used for testing purposes shall be removed after testing and repaired using a stainless steel full circle repair clamp.

- b) After all air has been expelled from the water main, the line shall be tested to a pressure of 150 psi as measured at the lowest elevation of the line for a duration of 2 hours. The pressure gauge used in the hydrostatic test shall be calibrated in increments of 10 psi or less. The pressure gauge shall be liquid-filled and indexed for an operating range of 300-psi or less with a minimum dial size of 3-1/2 inches. At the end of the test period, the leakage shall be measured with an accurate water meter.
- c) Any measured leakage not within the allowable limits as specified in the following table shall require repair of the reclaimed water main and additional testing until the standards are met. For pipe sizes other than those shown, the Contractor shall test within the allowable leakage amounts as specified by AWWA C605-94. All visible leaks shall be repaired regardless of the amount of leakage.

Maximum Leakage Allowed per AWWA C605-94

Pipe Size inches	Allowable Leakage at 150-psi (Gal/Hour per 1000-ft of Pipe)
4	0.33
6	0.50
8	0.66
12	0.99
16	1.32
18	1.49
20	1.66
24	1.99

2. Chlorination

- a) All additions or replacements to the reclaimed water system shall be chlorinated before being placed in service under the supervision of the Town's Inspector in the following manner:
 - i. Taps shall be made at the control valve at the upstream end of the reclaimed water main and at all extremities of the line including valves.
 - ii. A solution of water containing 70% HTH available chlorine shall be introduced into the reclaimed water main by regulated pumping at the control-valve tap. The solution shall be of such a concentration that the reclaimed water main shall have a uniform concentration of 100 ppm total chlorine immediately after chlorination. The chart below shows the required quantity of 70% HTH compound to be contained in solution in each 1000 feet section of line to produce the desired concentration of 100 ppm.

Pipe Size (inches)	Pounds High Test Hypochlorite (70%) per 1000 feet of line
6	1.76
8	3.12
10	4.84
12	7.00
14	9.52
16	12.44
20	19.52
24	28.00

- iii. The HTH Solution shall be circulated in the reclaimed water main by opening the control valve and systematically manipulating blowoffs and taps at the reclaimed water main extremities. All reclaimed water leaving the system during this test must be disposed of through either an approved use or sent to the sanitary sewer. The HTH solution must be pumped in at a constant rate for each discharge rate so a uniform concentration will be produced in reclaimed water mains.
- iv. HTH solution shall remain in reclaimed water mains for no less than 24 hours or as directed by the Town's Inspector.
- v. Extreme care shall be exercised at all times to prevent the HTH solution from entering existing reclaimed water mains.

3. Bacteriological Sampling

- a) Free residual chlorine after 24 hours shall be at least 10 ppm or the Town's Inspector will require that the lines be rechlorinated.
- b) Flushing of reclaimed water mains may proceed after 24 hours, provided the free residual chlorine analysis is satisfactory. Reclaimed water leaving the system because of line flushing must be returned to a sanitary sewer. Flushing shall be continued until an orthotolidine check shows that the reclaimed water mains contain only the normal chlorine residual. Samples for bacteriological analysis shall be collected by the Town's Inspector 24 hours after flushing is completed. The Contractor shall furnish the sample bottles, the testing agency and such help as may be required to secure these samples. The Contractor shall also submit the test results to the Town's inspector.
- c) If test results are unsatisfactory, the Contractor shall immediately rechlorinate reclaimed water mains and proceed with such measures as are necessary to properly sterilize those reclaimed water mains.
- d) The new reclaimed water system shall be valved off from the existing reclaimed water system until a satisfactory bacteriological sample has

been obtained and the Town's Inspector has authorized the use of the new reclaimed water system.

06570 REPAIR OF RECLAIMED WATER SYSTEM

- A. Reclaimed water that leaves the system due to a leak or break in the system must be reported and handled as if it were a wastewater spill.
- B. Joint leaks of Cast Iron Pipe, Ductile Iron Pipe, and PVC pipe shall be repaired by use an approved bell joint leak repair clamp.
- C. Line Breaks or Punctures shall be repaired by a full circle repair clamp as manufactured by Mueller, or other approved material.
- D. Line Splits or Blow Outs shall be repaired by replacing the damaged section with a new section of C-900 or C905 PVC pipe with a restrained mechanical joint sleeve made of ductile iron used at both ends to reconnect with existing pipe. All sleeves shall be restrained by wedge action retainer glands on both sides.
- E. Reclaimed Water Service Line Repairs
 - 1. A reclaimed water service line severed between the reclaimed water main and the reclaimed water meter shall be repaired using new polyethylene service piping.
 - 2. All repairs to existing copper service tubing shall be provided in conformance with the repair specification under section Section 6000.
 - 3. A corporation stop pulled out of a reclaimed pipe water main shall have a new service saddle and a new corporation stop installed on the reclaimed water main.

END OF SECTION 06500