Town of Apex
Standard Specifications & Standard Details
Summary of Revisions
June 11, 2024

❖ Standard Specifications

➢ OVERALL UPDATES

- Department names and staff titles have been updated to accurately reflect the current organizational structure (e.g. Public Works and Transportation to Transportation and Infrastructure Development)

- Rearranging of specifications to more appropriate sections or subsections, noted below for better organization and ease of reading. Most comprehensively, all easement requirements have been consolidated to Section 200. Sections noted as removed in their entirety may have been moved/added in another section.

- Revise *"Water Resources Director"* to *"Water Resources Department"*

- Revise all variations of "*Water Pipe", "Water Main", and "Water Line"* to "*Water Main"*

- Revise *"Storm Sewer"* to *"Storm Drain"*

- Remove all Approved Products scattered within Section 600, 620, 700, and 800. A separate Approved Products list has been created.

- Revise *"Fire Code"* to *"NC Fire Code"*

➢ SECTION 100 – PRELIMINARY CONSIDERATIONS & INSTRUCTIONS

<u>102 Submittal Requirements</u>
A. Initial Submittal
5) Soil Erosion and Sedimentation Control Plan
REMOVE: *"and 1 electronic copy of the "Financial Responsibility / Ownership Form"*

REMOVE ENTIRELY B. Second Submittal, 7) Soil Erosion and Sedimentation Control Plan

REVISE: the end of third paragraph to read: *"After construction drawings have been signed by the Town, and a preconstruction meeting has been scheduled, submit 1 electronic copy of the "Financial Responsibility / Ownership Form". After the Town issues the "Letter of Plan Approval", a NPDES Storm Water Notice of Intent for all sites greater than 1 acre is also required."*

➢ SECTION 200 – GENERAL PROVISIONS

Table of Contents
Rename Section 215 from *"Utility Easements – Special Provisions"* to *"Public Utility Easements"*
Add a subsection A and B to Section 215: "*A. General, B. Encroachments"*

201 General
ADD: *Any deviations, or sections noting "as required by" a department, or department director shall require submittal of an Exception Review Request for consideration by appropriate staff."*

202 Abbreviations & Definitions
A. Abbreviations
ADD: *"NCDEQ – North Carolina Department of Environmental Quality"*

B. Definitions,
REVISE: *"Director of Public Works and Transportation"* to *"Transportation and Infrastructure Director"* and *"Director of Water Resources"* to *Water Resources Director."*

REVISE the second paragraph to remove "*Water Resources Department"* to *Transportation and Infrastructure Development Department."*

REVISE the third paragraph to read: *"Where the word "TOWN" or "Apex" is used in these Specifications…*

215 Public Utility Easements
A. General
ADD: *"All utility easements shall be clearly identified as PUBLIC or PRIVATE and labeled as per the requirements in Section 600, 700, or 800, as applicable."*

ADD: *"Only one utility shall be installed per easement, unless as approved by exception request to the Water Resources Department."*

ADD: *"Easement shall be acquired by the Developer (unless utility is designed as part of a Capital Improvement Project) prior to construction plan approval."*

ADD: *"Fill or cut slopes greater than 6:1 shall not extend into utility easements. Easements shall be graded to provide positive drainage in all directions, with a minimum grade of 0.5%. Easements shall be fully accessible by rubber-tired vehicles in their entirety and graded smooth, free from rocks, boulders, roots, stumps, and other debris to provide a maximum 6:1 grade parallel to the utility centerline and a maximum of 4% cross-slope and seeded and mulched upon completion of construction. Utility easements shall be accessible from a public right-of-way. If the easement is not accessible perpendicular from the right-of-way due to steep slope, environmental feature, or other obstacle, additional easement may be necessary, as deemed by the Water Resources Department."*

ADD: *"All pre-existing or planned conditions as noted herein which may impact operations and maintenance within the utility easement shall be noted and disclosed during the site plan and construction drawing approval process. Pre-existing conditions not disclosed during the site plan and construction drawing approval process may nullify the approval and require relocating the utility easement, and underlying infrastructure, where no conflicts exist."*

ADD: *"Where concentrated sources of runoff (e.g. SCM discharge, FES discharge outlets, natural drainage ways, etc.) convey across an existing or proposed utility easement, the applicant must design a rip rap lined channel across the full width of the easement, graded at a 4:1 slope, or a closed drainage*

system to move all runoff across the easement. In locations where the crossing of a natural drainage way is not-feasible, or not approved by the applicable regulatory agency, a turn-around shall be provided prior to the termination."

ADD: *"All retaining walls shall have a separation from the utility easement boundary of at least 1:1 horizontal to vertical. For example, if the retaining wall is 10 feet tall, it shall be placed no closer than 10 feet from the adjacent easement boundary. In no instance shall any footer or component of a retaining wall be within 5 feet of an easement boundary."*

B. Encroachments

ADD: *No part of any structure, including substructures and overhangs, equipment, private utility line (including water, irrigation, and/or sewer lines), retaining walls, embankments, impoundments, privately maintained greenways and paths, landscaping, or other elements, both temporary or permanent, which may inhibit maintenance operations shall be constructed within a utility easement and no grading may occur within any Apex utility easement prior to obtaining final construction plan approval, a building permit, or an encroachment agreement or prior approval from the Water Resources and/or Electric Utilities.*

ADD: *Any application for an encroachment agreement must include plans to facilitate access and maintenance of the utility and must include supporting documentation to confirm no damage will occur to the utility.*

ADD: *Proposed utility easement encroachments reviewed through construction plan review will not require a separate encroachment agreement application, but will require an approved exception request from the Water Resources Director.*

ADD: *Fences may be allowed to cross utility easements provided appropriate access gates have been installed to allow maintenance. Fences shall not be installed parallel to the utility within the utility easement. Town of Apex staff shall have 24-hour access to secured access gates.*

ADD: *Any improvements encroaching within an Apex utility easement are subject to disturbance, damage, or removal during Apex's use of the easement. The Town of Apex will not repair or replace any improvements within a utility easement. Apex will not be held liable for damage to any improvement encroaching during the maintenance of the Apex facility or structure.*

➢ SECTION 400 – SOIL EROSION & SEDIMENTATION CONTROL

401 General Requirements

REVISE the second paragraph to read: *"For areas of single-family development within a project, all logging…"*

405 Inlet Protection

REVISE *"Environmental Engineering Manager"* to *"Stormwater Engineering Manager"*

ADD: "*For stub streets and street phasing lines draining away from the site, and other areas as directed by the TOWN, rolled asphalt diversions, or other TOWN approved alternative, shall be installed to direct runoff into inlets until the final lift of asphalt is installed. Cold patch asphalt shall not be used."*

ADD: "*Unless inlets are located at the street stub, erosion control measures shall be installed at the edge of stub streets draining away from the site to prevent erosion."*

➢ SECTION 450 – UTILITY TRENCHES

451 Excavation and Preparation

A. Preparation, 1. General Requirements

REVISE c) to *"In all cases where trenchless methods are planned to cross an existing utility corridor with water, sewer, force main, and/or other Town maintained pipelines, an SUE (subsurface utility exploration) services firm shall be contracted to verify the depths of existing utilities prior to submittal of Construction Drawings for review."*

452 Pipe Laying and Backfilling

A. General Requirements 6. Pipe Identification and Marking

a) Marking Tape

1) **ADD:** *"Marking tape shall be installed directly above the center of the pipe at a depth of 24-inches to 36-inches below final grade."*

REVISE 2) to *"2)Specifications: The marking tape shall be made of an approved material in Apex's Approved Products List, 6-inches wide and a minimum of 6 millimeters thick. The tape color shall be in accordance with the utility being installed:"*

REMOVE ENTIRELY b) Tracer Wire

ADD: *"b) Marker Balls*

1)Installation: Non-programmable marker balls are required at the ends of all casing pipe, fittings and reducers. Marker balls shall be used in addition to marking tape within thoroughfares and within 100-feet of a signalized intersection. Through signalized intersections, marker balls shall be spaced at 25-foot intervals. They shall also be installed along and directly above all water mains in conditions where marking tape cannot be installed due to restrictions or conflicts. In these conditions, non-programmable marker balls shall be placed at all vertical and horizontal deflection points, at all tees and crosses and at a spacing along the main no greater than 100 feet apart. Each marker ball shall be installed directly above the center of the pipe and at a depth of 24-inches to 36-inches below final grade. At any sections where tape cannot be accurately placed at time of backfilling, sufficient survey data shall be collected to reestablish location for tape installation. A table of marker ball locations, with description, must be submitted as part of the record drawing.

2) Specifications: The Marker Ball is a non-programmable ball and shall be an approved product identified in the Approved Products List. The marker ball shall be blue in color for potable water and conform to APWA standards. It shall have a minimum detectable depth of 5 feet."

REVISE c) to *"Marker Tape and Marker Ball Testing"*

REVISE 1) to *"Testing of the marker tape and marker balls shall be performed by the Contractor at the completion of the project to assure they are all working properly. It is the Contractor's responsibility to provide the necessary equipment to perform all testing. Any defective, missing, or otherwise non-locatable units shall be replaced."*

453 Pavement Repairs
A. Open Trench Pavement Repair, 1. General Requirements
REVISE a) to: *"All pavement cuts shall be repaired within a maximum of three (3) calendar days from the date the cut is made. If conditions do not permit a permanent repair within the given time limit, permission to make a temporary repair must be obtained from the Transportation and Infrastructure Development Department."*

ADD: *"c) No pavement repair joints shall be installed within the wheel path of the travel lane."*

REVISE e) to *"All pavement patches shall be provided in such a manner that a uniform and smooth driving surface free of depressions and/or bumps is obtained. Pavement patches not meeting this standard shall be milled and replaced, as directed by the Transportation and Infrastructure Development Department."*

454 Trenchless Pipe Installation
A. Design
1. General Requirements
REVISE a) to: *"All utility crossings within the Town of Apex, or State maintained streets, shall be made by trenchless methods. In cases where utility conflicts, rock, or other obstructions prevent trenchless crossings, other methods may be considered at the discretion of the Water Resources Department."*

REVISE c) to: *"In addition to meeting or exceeding all Town requirements, all trenchless crossings shall be approved by and meet the requirements of all controlling legal authorities, such as NCDOT, Norfolk Southern Railway, CSX Corporation, Colonial Pipeline, Cardinal Pipeline, and Dixie Pipeline. At a minimum, encasement pipe shall be installed at least 10 feet on either side of the easement crossing and appurtenant equipment and accessories located outside of the easement boundaries."*

➢ SECTION 500 – STORM DRAINAGE

501 Design

A. General

REVISE 6) to: *"A Hydraulic Grade Line (HGL) study shall be performed for all public storm drainage systems. Where the public storm drainage system conveys stormwater into a private SCM, the Q_{10} staging elevation shall be used as the starting point for the study. The study or plans shall include storm pipe profiles that show inverts, slopes, proposed finished grade and HGL. The HGL shall be required to stay within the pipe to ensure no surcharge on the system. ASTM Standard C443 (O Ring or Single Groove) water tight sealed pipe shall be used in cases where it is not practicable."*

502 Materials

REVISE nomenclature to:

" C. Polypropylene Pipe (PP)
D. Corrugated Steel Pipe - Type 2 (CSP)
E. Corrugated Aluminum Alloy Pipe (CAAP)"

506 Stormwater Control Measures (SCMs) within the Primary and Secondary Watershed Protection Overlay Districts

REVISE "All vegetated side slopes and tops of dams shall be sodded with non-clumping turf grass." to *"All vegetated side slopes (interior & exterior) and tops of dams shall be sodded with non-clumping turf grass."*

REMOVE: *"See Section 106 of this document for additional "as built" submittal requirements."*

ADD to the end of the fourth paragraph**:** *"Dam compaction geotechnical reports, and photographic evidence of the outlet pipe cradle and anti-seep device installation shall be included with the SCM as-builts. See Section 106 of this document for additional "as-built" submittal requirements."*

➢ SECTION 600 – WATER DISTRIBUTION SYSTEM

Table of Contents

ADD subsection *"A. General"* to 601 Water Distribution Pipe

601 Water Distribution Pipe

A. General

ADD: *"All water system extensions shall be designed by a Professional Engineer. The following Standard Specifications and associated Standard Detail Drawings shall apply to all water system extensions and development of the Apex municipal water system. The Standard Specifications included herein shall apply to all aspects of the Apex water system that is owned, operated and maintained by the Town of Apex. Any deviations from this specification, or sections noting approval required by the Water Resources Department, shall require submittal of an Exception Review Request for consideration."*

ADD: *"All private water mains that connect to the Town's water system shall also be designed in accordance with these specifications, including those under a private system permit by NCDEQ. Any private commercial water connection shall be metered and protected by a reduced pressure assembly listed on the most current Manual of Cross-Connection Control issued by the USC Foundation for Cross-Connection Control and Hydraulic Research. See Section 620."*

ADD: *"All utility extension permits must be obtained prior to construction. Refer to General Provisions in Section 200 for further requirements."*

ADD: *"The Water Resources Department maintains a list of approved products and manufacturers for all water distribution products. All DIP, DIP fittings, and RJDIP that are allowable for installation within the Town's system are found in the list of approved products and manufacturers. The use of alternative products or manufacturers may be considered with the submittal of an exception request and supporting documentation with the Construction Plan submittal."*

B. Design
REMOVE first two paragraphs entirely.

REVISE *"greenway paths"* to *"public greenway paths."*

REVISE the third paragraph in section 1) Location to**:** *"Dedicated easements for water mains and appurtenances shall be recorded as "Town of Apex Public Waterline Easement." Town of Apex utility and pipeline easements shall contain only Town of Apex utilities unless otherwise approved by an approved site plan or encroachment agreement. Easements that are shared by water mains and public greenway paths shall have a minimum width of 30 feet. See Section 215 for utility easement requirements."*

REMOVE: *"All private water mains that connect to the Town's water system shall also be designed in accordance with these specifications. Any private commercial water connection shall be metered and protected by a reduce pressure assembly listed on the most current Manual of Cross-Connection Control issued by the USC Foundation for Cross-Connection Control and Hydraulic Research. See Section 620."*

REVISE the fifth paragraph in section 1) Location to**:** *"All water main extensions and distribution facilities which connect to the water distribution system of the Town shall be considered as public facilities up to the metering point. Therefore, all such facilities must be installed in public street right-of-way (not alleys) or centered within a public utility easement. Extensions shall terminate at the furthermost property line fronting the property or as required by this section."*

REVISE *the seventh paragraph of 1) Location* to: *"If there is a gap in existing public water main along an existing road frontage or right-of-way of a proposed development, regardless of the location of the existing main within the right-of-way or along the road frontage, the development shall extend the water main along the road frontage to eliminate the gap in water service (property line to property line), unless otherwise approved by the Water Resources Department. Water mains shall be located and sized as required in this section."*

ADD: *"Where water mains dead end, or are terminated for future extension, at least one full length section of ductile iron pipe shall be installed with a thrust collar, main line valve, and blow-off assembly. This dead end shall terminate within a right-of-way or dedicated public utility easement, and shall extend to the property line. Connections to existing dead end mains in adjacent streets may be required, as directed by the Water Resources Department, in order to enhance flow, water quality, and/or pressure in the affected area."*

REMOVE the thirteenth paragraph "Easement Areas" entirely.

REMOVE: *"Easements shall be accessible from public rights-of-ways. If easement is not accessible perpendicular from right-of-way due to steep slope, environmental feature, or other obstacles, additional easement may be necessary."*

REMOVE: *"Only one utility can be installed per easement, unless prior approval from the Water Resources Director is obtained."*

REMOVE: *"All retaining walls shall have a separation from the easement boundary of at least a 1:1 ratio. For example, if the retaining wall is 10 feet tall, it shall be placed no closer than 10 feet from the adjacent easement boundary."*

Revise *"2. Sizing"* to *"Major transmission lines shall be sized in accordance with the "Water System Master Plan" or as directed by the Town, and shall be extended to the adjacent properties to provide an adequate pipe network.*

Water mains shall be sized as required by this section and to meet minimum fire flow conditions according to the type and classification of the proposed development, whichever is greater.

In residential zoning districts, water mains shall have a standard minimum diameter of eight (8) inches. Six (6) inch mains may be used on a case by case basis when the Town has determined that a sufficient hydraulic grid exists and the existing network supports using six (6) inch mains. The total maximum length of a run of 6-inch and 8-inch lines within that grid, without connecting to a larger main, is 1200 feet and 2000 feet, respectively. Water distribution facilities for multi-family units, apartments and condominiums shall comply with the provisions for non-residential zoning districts indicated below.

In non-residential and multi-family zoning districts, water mains shall have a standard minimum diameter of 12-inches. Eight (8) inch shall be used only when it completes a good hydraulic grid and the maximum length of a run of 8-inch lines within that grid without connection to a larger feeder main is 1,200 feet unless special approval for deviation from this requirement is granted by the Water Resources Department.

Where the existing network is lacking connectivity, lines shall be upsized to provide adequate fire flow as directed by the Department of Water Resources. All lines shall be designed to maintain a minimum of 20 psi at maximum daily demand with applicable fire flow conditions.

New transmission mains 12-inches in diameter and larger shall be designed to deliver maximum daily design flow with a head loss not to exceed 5' per 1000'. Lower head loss criteria may be established based on length of main and available system head. Distribution mains 8-inches in diameter and smaller shall meet the same criteria for maximum daily domestic demand, but head losses up to 10' per 100' are acceptable for fire flow design provided volume and residual pressure requirements are met. Design shall be based on a Hazen-William "C" value of 130 for ductile iron."

REVISE last row of restraint table to: *"Valves, Caps, and Plugs (Dead Ends)*

4. Depth of Installation
ADD Subsections for Depth of Installation: Public Utility Easements and Right-of-Way

REVISE *"When water lines are installed along a roadway they shall be installed at sufficient depth to maintain three (3) feet of cover to the subgrade of any future road improvements including potential vertical alignment changes."* to *"Right-of-Way: When water mains are installed along an existing right-of way, future right-of-way, or under the roadway they shall be installed at sufficient depth to maintain three (3) feet of cover to the subgrade, including any future road widening/improvements and potential vertical alignment changes based on the Comprehensive Transportation Plan, Capital Improvement Plan, and/or at the discretion of Water Resources Department. Water mains shall have a maximum cover of 8 feet measured from the top of the pipe to the subgrade."*

REVISE 5. Relation to Sanitary and Storm Drain to: *"Separation between Potable Water Mains and Sanitary Sewer Mains or Storm Drains.*

a) Parallel Installations: 10-feet lateral separation (pipe edge to pipe edge) or minimum 5-feet lateral separation and water main at least 18-inches above sanitary sewer/storm drain line measured vertically from top of sewer pipeline to bottom edge of water main.

Added Table for Clarity

b) Crossings (Water Main Over Sanitary Sewer or Storm Drain): All water main crossings of sanitary sewer lines shall be constructed over the sewer line in conformance with Town of Apex Specifications. At a minimum, 18-inches of clearance shall be maintained between the bottom edge of the water main and the top edge of the sanitary sewer main or storm drain. If 18-inches of clearance is not maintained the water main and sanitary sewer main shall both be constructed of ductile iron pipe with joints in conformance with water main construction standards. The sanitary sewer pipe shall be ductile iron the entire run from manhole to manhole. When the separation between pipelines is less than 18-inches, the void space between the pipes shall be filled with minimum 500-psi, quick setting, non-excavatable flowable fill extending 3-ft on both sides of the crossing. Regardless of pipe material, at least 12-inches of vertical separation is required for both sanitary and/or storm drain crossings of potable water mains.

c) Crossings (Water Main Under Sanitary or Storm Drain): Allowed only as approved by Town of Apex, when it is not possible to cross the water main above the sanitary or storm drain line. At a minimum, 18-inches of separation shall be maintained, (measured from pipe edge to pipe edge) and both the water main and sanitary sewer shall be constructed of ductile iron in conformance with water main construction standards. The sanitary sewer pipe shall be ductile iron the entire run from manhole to manhole. If local conditions prevent providing 18-inches of clearance, then at least 12-inches of clearance shall be provided and the void space between the pipes shall be filled with minimum 500-psi, quick setting, non-excavatable flowable fill extending at least 3-ft on both sides of the crossing."

ADD: *"6. A secondary connection to the distribution system is required for any development proposing 100 or more service connections, or at the discretion of the Water Resources Department."*

"7. Construction activities involving existing Water Mains:
a) The existing water main must remain active and protected during all phases of construction. The contractor must provide a plan for the structural protection of the existing water main.
b) A proposed construction sequence must be submitted for any demolition of a portion of existing water main. The plan must be reviewed and approved by the Water Resources Department.
c) Any approved disruption to water service requires advance notice and coordination. Coordination with Water Resources staff is required no later than 14-business days prior to any disruption to allow adequate time for planning and public notification."

B. Materials

REMOVE all approved materials, see note above.

ADD: clarification of all pipe materials and associated appurtenances to be DIP (No change in requirement)

602 Fire Protection
Remove sizing of mains in its entirely (relocated to design)

Revise *"Residential Districts"* to *"Residential Zoning Districts"*

Under Residential Zoning Districts, **REVISE** *"*For single-family residential projects, a hydrant shall be located at the end of all cul-de-sacs" to *"For single-family residential projects, a hydrant shall be located*

at the end of all cul-de-sacs, or other terminus not planned to be extended, and shall not include any bends within the radius of the cul-de-sac.
For residential developments which do not meet minimum fire flow requirements, water main extensions and improvements shall be installed to meet minimum fire flow requirements. If additional improvements are not an option due to proximity to existing utilities, at the approval of the Water Resources Department and Fire Marshal, all residential units shall have individual fire protection systems designed and installed at each residence. Residential fire systems must comply with the required backflow prevention based on the hazard as provided in Section 620."

REVISE *"Business, office, and institutional zoning"* to *"non-residential and multi-family zoning districts"*

REMOVE: *"Residential developments which do not meet minimum fire flow requirements shall have individual fire protection systems designed and installed at each residence. Residential fire systems must be current Town Backflow Prevention Protection, listed under Section 620."* (Relocated)

REVISE: *"Fire hydrant legs shall not be tapped from water service connections, they shall be tapped directly from the main line."* to *"Fire hydrant legs shall not be tapped from domestic water service connections, they shall be tapped directly from the main line, or dedicated fire line."*

ADD: "No domestic water service connection shall be made from a fire hydrant leg, or dedicated fire line."

REVISE 2. Specifications to read: "Hydrants shall conform to AWWA C502 with a minimum valve opening of 4 1/2 inches. Hydrants shall be furnished with a 5-inch Storz connection coupling on the steamer outlet. The Storz connection shall be manufactured by the hydrant manufacturer and only come as part of the hydrant assembly. No adaptors for the Storz connection are allowed.
Hydrants shall be also be furnished with: caps with chains for all connections, National Standard Threads, mechanical joint, 1 1/2-inch pentagon operating nut, open left, painted fire hydrant red, bronze to bronze seating, a minimum 4 feet bury depth with a break away ground line flange and break away rod coupling."

REVISE 3. Installation, 3rd paragraph to: *"A clear level space within the right-of way or public utility easement of at least 10 feet shall be provided and maintained on all sides of a fire hydrant for immediate access. Clearance from the ground surface to the center of the 5-inch Storz cap shall be between eighteen (18) inches and twenty-four (24) inches and shall be installed with positive drainage."*

REVISE 5. Hydrant Relocations to**: "***For installations where hydrants will be relocated, all hydrants with greater than 20-years of operational service, as indicated by the date of manufacture provided on the hydrant, shall be replaced with new fire hydrants. The existing fire hydrant shall be returned to the Town of Apex Water Resources Department.*
For installations where the hydrant to be relocated has less than 20-years of operational service, the existing hydrant may be relocated at the discretion of the Water Resources Department. The existing hydrant shall still be disinfected, flushed and pressure tested.
All fire hydrants shall be initially tagged and/or bagged "NOT IN SERVICE". This tag or bag shall not be removed until approved by the Inspector."

ADD subsection C. Fire Flow Requirements.

ADD: *"All water main extensions shall provide water pressures and fire flows at a standard acceptable value for the applicable zoning district requirements.*
1. One- and two-family dwellings:
The minimum fire-flow and flow duration of one- and two-family dwellings having a fire-flow calculation area, as defined by the NC Fire Code, not exceeding 3,600 square feet shall be 1,000 gpm at 20 psi for 1 hour.

For fire-flow calculation areas greater than 3,600 square feet, the minimum fire-flow and flow duration shall be specified by the NC Fire Code, but no less than 1,500 gpm at 20 psi.
2. Non-Residential, Multi-Family, and all other buildings:
The minimum fire-flow and flow duration for non-residential, multi family, and buildings other than one- and two-family dwellings shall be specified by the NC Fire Code, but no less than 1,500 gpm at 20 psi."

REVISE 3. Hydraulic Design, d) Backflow Protection to: *"When a fire protection system is proposed, with a Fire Department. connection or as otherwise required by the Cross Connection Ordinance a reduced pressure principle detector assembly (RPDA), two and one half inch or greater, shall be installed on the supply side of the sprinkler fire protection line inside the riser room. A two inch or less reduced pressure principle assembly may be allowed if the site is designed for that size. At no time shall any fire backflow preventer outlet be smaller than the water pipe inlet. These backflow prevention devices must be UL listed and/or listed by Factory Mutual Research Corporation. Reduced pressure principle detector assemblies shall not be arranged vertically. For indoor installations of RPDA's, follow Section 620.O. Relief Valve Piping."*

REVISE 4. Fire Department Connection to: "Where automatic fire sprinkler systems or standpipe systems are used, a fire department connection with National Standard threads shall be provided within 50-ft of a fire hydrant, except for town homes, apartment buildings, and within urban settings where greater lengths may be permitted. When a sprinkler system serves only part of a large structure, the fire department connection shall be labeled, with minimum 2-inch letters on a permanent sign, as to which section of the structure that sprinkler riser serves." to *"Fire Department Connection: Where automatic fire sprinkler systems or standpipe systems are used, a fire department connection with National Standard threads shall be provided at distances specified within the NC Fire Code. When a sprinkler system serves only part of a large structure, the fire department connection shall be labeled, with minimum 2-inch letters on a permanent sign, as to which section of the structure that sprinkler riser serves."*

<u>603 Valves and Appurtenances</u>

A. Valves
REMOVE: *"Valve requirements are not enforced unless the branch line serves more than one parcel or has more than one connected service."*

ADD: *"Valves shall not be installed within the curb and/or gutter*

REMOVE: *"ARV's must be located at high points with positive slope on the line to the ARV in both directions"*

REVISE: Combination air valve elevation from 10-feet to 25-feet on either side

ADD: *"6. Insertion Valves, 12-inches and under: Insertion valves shall only be used as permitted by the Water Resources Department. Insertion valves shall meet the requirements of AWWAC515, seat on the valve body and be rated for a working pressure of 250-psi or greater. All insertion valves shall be made of ductile iron in conformance with ASTM A-536 Grade 65-45-12 and epoxy coated at a minimum of 10-mils. Insertion valves may be required, as directed by the Water Resources Department to minimize disruption to water service required to perform a cut-in-tee.*

Insertion valves under this section are available for pipe sizes through 12-inches in diameter. Larger insertion valves shall meet requirements for Insertion Valves, 16-inches through 24-inches, below. In cases where insertion valves are being installed to shut down water to a work zone area, the insertion valve shall be located a minimum of 100-ft from the work zone or greater as determined by the Engineer of Record to

assure the insertion valve can safely operate as a dead end without dislodging from the pipeline or otherwise causing the existing pipeline to shift.

Disinfection – During installation of any insertion valve, positive pressure in the distribution system shall be maintained at all times. Once the water main is exposed and the trench is adequately dewatered, the exterior of the main and all insertion valves and equipment, including the cutter head and valve gate shall be cleaned and disinfected pursuant to AWWA C651-14 by spraying or swabbing with a minimum 1% chlorine solution.

Insertion Valves shall be Resilient Wedge Gate Valves, designed for use in potable water systems and be listed on Apex's Approved Products List. The body, bonnet and wedge shall be ductile iron meeting or exceeding AWWA C515. Insertion Valves shall be ductile iron construction meeting ASTM A536 Grade 65-45-12. The pressure rating markings must be cast into the body of the insert valve.

Chemical and modularity tests shall be performed as recommended by the Ductile Iron Society, on a per ladle basis. Testing for tensile, yield and elongation shall be done in accordance with ASTM E8.

Sizes 12" and smaller must be capable of working on Cast/Grey Iron or Ductile Iron Class A, B, C and D, IPS PVC, C900 and C909 PVC, Steel, AC pipe diameters without changing either top or bottom portion of split valve body.

After the installation of the insertion valve body on to the existing pipe a pressure test of 1.1 times that of the contents shall sustained for 15 minutes. Once the pressure test is effectively achieved the insert valve body must not be moved in accordance with AWWA Standards. If the insertion valve is moved the pressure test must be completed again. The insertion valve must not be moved or repositioned once the pressure test is achieved.

The construction of the Resilient Wedge shall comply with AWWA C509 requirements. The ductile iron wedge shall be fully encapsulated with EPDM rubber by a high pressure and high temperature compression or injection mold process. The ductile gate shall be fully coated with molded rubber with no exposed iron.

The resilient wedge shall seat on the valve body and not the pipe to obtain the optimum seating and flow control results. The resilient wedge shall be totally independent of the carrier pipe. The resilient wedge shall not meet the carrier pipe or depend on the carrier pipe to create a seal. Pressure equalization on the down or upstream side of the closed wedge shall not be necessary to open the valve. The wedge shall be symmetrical and seal equally well with flow in either direction.

The Resilient wedge must ride inside the body channels to maintain wedge alignment throughout its travel to achieve maximum fluid control regardless of high or low flow pressure or velocity. Insertion valve shall provide an unobstructed flow way.

The insertion valve shall be fully epoxy coated with minimum of 8 mils of epoxy on the interior and the exterior, including bolt holes and body-to-bonnet flange surfaces, prior to assembly, in compliance with AWWA C550 and certified to ANSI/NSF-61.

The insertion valve shall include triple O-Ring stem seals with two O-Rings located above, and one O-Ring below the thrust collar. Side flange seals shall be of the O-Ring type of either round, oval, or rectangular cross-sectional shape.

The gate valve stem and wedge nut shall be copper alloy in accordance with Section 4.4.5.1 of the AWWA C515 Standard. The stem shall be NRS with AWWA standard turns and must have an integral thrust collar in accordance with Section 4.4.5.3 of AWWA C515 Standard. Two-piece stem collars are not acceptable. Operated by 2" square wrench nut according to ASTM A126 CL.B and open left.

The wedge nut shall be independent of the wedge and held in place on three sides by the wedge to prevent possible misalignment. Two thrust washers are required. One shall be located above, and one located below the stem thrust collar.

All parts and components to be exclusively and completely assembled, manufactured, machined, and coated in the United States. All physical and chemical test results shall be recorded such that they can be accessed via the identification number on the casting. These Material Traceability Records (MTR's) are to be made available to the purchaser that requests such documentation. All components shall be

manufactured and assembled in the United States. The purchaser shall, with reasonable notice, have the right to plant visitation at his/her expense.

Bolting materials shall meet the requirements of ASTM A307 with dimensions conforming to ANSI B18.2.1.

The stuffing box, operating stem, and resilient wedge (complete bonnet and all moving parts) shall be removable, repairable and or replaceable under pressure without additional pipe penetration taps or foreign methods. While the valve is fully pressurized in the system all moving components shall be fully removable under pressure. In the event the valve stem is broken or damaged the bonnet shall be removable under pressure.

Restraint devices shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C110/A21.10 Restraint devices shall have a working water pressure rating of 350 psi for 4-12 inch and must include a minimum safety factor of 2 to 1 in all sizes and be approved by the Town. Gland body wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536. Mechanical joint restraint shall require conventional tools and installation procedures per AWWA C600, while retaining full mechanical joint deflection during assembly as well as allowing joint deflection after assembly. Proper actuation of the gripping wedges shall be ensured with torque limiting twist off nuts. Set screw pressure point type hardware shall not be used. Restraint devices shall be listed by Underwriters Laboratories and Approved by Factory Mutual (3-inch through 12-inch size).

Manufacturer's installation procedures shall be strictly adhered to, including the installation of vacuum flange, checking, removing and confirmation of removal of shavings in the valve body. Installation procedures shall be approved by the Town prior to installation of insertion valve.

Prior to installation, the operating pressure shall be confirmed with the Water Resources Department. Valve pressure testing procedures shall be approved by Water Resources Department and Manufacturer prior to installing.

Contractor shall confirm existing pipe outside diameter prior to purchasing insertion valve."

ADD: "*7. Insertion Valves, 16-inches through 24-inches: Insertion valves shall only be used as permitted by the Water Resources Department. Disinfection procedure listed in item 6 above shall be required."*

REMOVE: *"Insertion Valves: Insertion valves shall only be used as permitted by the Water Resources Department. Insertion valves shall meet the requirements of AWWA C515, seat on the valve body and be rated for a working pressure of 250-psi or greater. All insertion valves shall be made of ductile iron in conformance with ASTM A-536 Grade 65-45-12 and epoxy coated at a minimum of 10-mils. Insertion valves are available for pipe sizes through 12-inches in diameter. In cases where insertion valves are being installed to shut down water to a work zone area, the insertion valve shall be located a minimum of 100-ft from the work zone or greater as determined by the Engineer of Record to assure the insertion valve can safely operate as a dead end without dislodging from the pipeline or otherwise causing the existing pipeline to shift."*

B. Appurtenances

2. Reaction Blocking

ADD: *"Reaction blocking for all fittings and components subject to hydrostatic thrust shall be securely anchored by the use of thrust restraints."*

REVISE sampling stations to read: *"Sampling Stations shall be provided at all new development projects at the following rates:*

a) One (1) for every 200 residential units

b) One (1) for every 10 acres of non-residential

c) One (1) per institutional facility with more than 100,000 square feet

d) One (1) for every 100 residential units and 5 acres of non-residential in projects with multiple uses.

e) As otherwise required by the Water Resources Department.

For phased development projects, sampling stations are calculated based on the total number of units, acreage, or square footage (as applicable) at total build-out. At least one sampling station shall be installed within the first phase of a phased development, with subsequent stations installed with the phase of which the next sampling station is warranted based on the rates listed above.

Padlocks for sampling stations shall be provided by the Town of Apex Water Resources Department. The sampling station requirement may be waived in cases where area sampling is already deemed sufficient by the Town.

Sampling stations shall be installed per the standard detail and provided as a self-contained manufactured assembly with locking aluminum housing, stainless steel tube and unthreaded spigot. Sampling stations shall not be connected to a service line."

<u>604 Water Main Taps and Services</u>

A. Design

REVISE *"A 5-foot clear zone easement shall be maintained around meter boxes and vaults."* to *"A 5-foot clear zone shall be maintained around meter boxes and vaults, measured from the outer edge. If a 5-foot clear zone is not feasible, a public utility easement shall be required."*

REVISE 10. Meter Installation to: *"The Town of Apex shall provide and install (¾" – 2") water meters subject to the following conditions (if applicable):*
- The Town has received a copy of the waterline purity test results and the Engineer's water and sewer certification of completion
- The Developer (or property owner) has paid all Capital Reimbursement Fees.
- The Developer (or property owner) has paid any pending fee-in-lieu of construction fees.
- The Developer (or property owner) has paid prescribed meter fee.
- The backflow preventer(s) are installed.
- Applicable Building Inspections have passed.
- The Developer has installed all specified improvements or guaranteed their installation as prescribed in the Town Code."

B. Materials

ADD: *"The Water Resources Department maintains a list of approved products and manufacturers for all water distribution products. Requests to use alternative products or manufacturers shall submit an exception request with supporting documentation for the request with Construction Plan submittal."*

REVISE strap requirements table to add a 4" saddle outlet.

REVISE #8 to read: *"Meter boxes for ¾ and 1-inch services: ¾ and 1-inch meter boxes shall be high density polyethylene (black). Meter boxes shall provide a cover opening of at least 7.5 X 13 inches and boxes shall measure at least 18 inches in depth. Lids shall be provided with a recessed 4-1/8-inch diameter hole to accommodate a transmitter. All meter boxes and lids shall be installed as shown in the Details and shall meet AASHTO HS20 load bearing capacity.*

There shall be a lockable ball valve inside the box on the inlet side. Meter boxes shall also be provided with an ASSE 1024 approved inline, dual check valve located behind the meter. All fittings and connections shall be "no lead" brass conforming to UNS C89833 as per ASTM B584.

A "no lead" brass curb stop with compression connections shall be installed within 2 feet of the inlet connection. The curb stop may be buried without a box above it.

One 2-inch or 6-inch grade adjuster may be used when needed to meet final grade, however, no grade adjusters are permitted on new construction projects. Grade adjusters shall be cast iron. Grade adjuster and box shall be by the same manufacturer."

REVISE #9 to read: *"1 ½ and 2 inch Water Services: 1 1/2" and 2" meter boxes shall be concrete or light weight polymer concrete as indicated on the Standard Detail 600.02. Meter boxes for 1 ½ and 2 inch water services shall provide a cover opening of 24 X 36 inches and boxes shall measure at least 30-inches in depth and provide a straight wall arrangement. Standard meter box covers shall bolt down to the box, and all polymer cement covers shall be provided in solid configuration with a recessed 4-1/8 inch diameter transmitter hole, and with the words, "Water Meter" cast into the lid. The meter box covers shall be provided with 2 stainless steel bolts in penta-head configuration for security. To ensure positive discharge, the box should be tied into the existing storm drain system, or shall have an open bottom to allow drainage through a 6-inch stone base. All meter box covers for potable water service shall be provided in standard concrete gray or black color.*

Meter setters shall be installed per Standard Detail 600.02 meeting UNS C89833 as per ASTMB584. Copper setter shall be no lead with a high by-pass and a lockable flanged angle meter ball valve on the inlet and bypass. All applications shall have a separate above ground backflow preventer."

<u>607 Repair and Abandonment</u>

Abandonment of Existing Water Mains
ADD: *"a) Water distribution pipe abandonment involves removing the pipe and any related appurtenances from service and leaving them in such a manner that no risk is posed to public health and safety."*

ADD: *"d) Pipe and appurtenances that are to be removed due to a conflict with the proposed work shall be drained of all contents, removed, and disposed as part of the excavation process."*

ADD: *"e) Water distribution pipe shall be physically disconnected and the active water distribution pipe capped and thrust restrained. Once separated from the active pipe, the pipe specified for abandonment shall be drained and pumped entirely full with cement grout. The cement grout shall have a compressive strength of 500-psi and shall be of an appropriate consistency to completely fill the water distribution pipe."*

ADD: *"f) Gate valves shall be completely closed, the valve box removed and disposed of, the resultant void space backfilled with a minimum 500-psi compressive strength, quick setting, non-excavatable flowable fill, and a standard asphalt repair patch installed."*

ADD: *"Fire Hydrant Assembly Abandonment*
The fire hydrant assembly specified for abandonment shall have the associated gate valve completely closed, the valve box removed and disposed of, the resultant void space backfilled with a minimum 500-psi compressive strength, quick setting, non-excavatable flowable fill, and a standard asphalt repair patch installed. The hydrant shall then be removed, salvaged and returned to the Water Resources Department and the existing water main capped and thrust blocked. The void space shall be backfilled with flowable fill and the final 2 feet below ground level backfilled with topsoil and restored."

ADD: *"Blowoff Assembly Abandonment*
The blowoff assembly specified for abandonment shall have the associated gate valve completely closed, the blowoff assembly removed and disposed of, the resultant void space backfilled with a minimum 500-

psi compressive strength, quick setting, non-excavatable flowable fill, and a standard asphalt repair patch installed."

ADD: *"Combination Air Valve Abandonment*
Paved Area: The air valve specified for abandonment in a paved area or within 5-feet of a roadway shall have the valve completely closed and the associated manhole ring, cover, and chimney removed and disposed of. The barrel of the manhole shall then be filled with non-excavatable flowable fill from the bottom of the manhole to within 8-inches of the surface of the roadway. The pavement shall be replaced as specified elsewhere in the Contract Documents.

Unpaved Area: The air valve specified for abandonment in an unpaved area more than 5 feet from a roadway shall have the valve completely closed and the associated manhole ring, cover, and chimney removed and disposed of. The uppermost barrel sections of the manhole shall be removed up to a depth of at least 6 feet from the ground surface. The manhole barrel shall be filled with aggregate base course to within 12 inches of the ground surface. The manhole barrel shall be filled and tamped in 8 inch lifts with aggregate base course and compacted to a minimum of ninety percent (90%) Standard Proctor density. The upper 12 inches shall be filled with screened topsoil and graded uniformly with the surrounding area. The area shall be seeded and mulched as specified elsewhere in the Standards."

➢ SECTION 620 – CROSS CONNECTION CONTROL

Table of Contents
ADD subsection *"B. Location" to 623 Backflow Prevention Assembly Installation Requirements*

622 General Installation Requirements

A. Permits
REVISE the last sentence to *"A current list of Town approved certified backflow testers is available on the Water Resources Cross Connection Control webpage."*

B. Inspections
REVISE 1) to *"Any backflow preventer assembly that is installed, removed, or relocated shall be inspected by a Town of Apex Code Enforcement Officer. It is the responsibility of the installer of a backflow preventer assembly to secure the inspection or re-inspection by the Code Enforcement Officer. Certified test reports must be completed and submitted by the approved certified backflow tester via the Town's designated electronic reporting system AquaResourse, before the system is approved or put into use and within 10 days of the completed test."*

REVISE the last sentence of 2) to *"All other connections not related to irrigation shall meet the current North Carolina State Plumbing Code and Town of Apex Standard Specifications."*

C. Testing Backflow Prevention Assemblies
REVISE *"Double Check Detector Assemblies (DCDA)"* to *"Double Check Detector Type I and Type II Assemblies (DCDA I and II)"*

REVISE *"Reduced Pressure Detector Assemblies RPDA)"* to *"Reduced Pressure Detector Type I and Type II Assemblies (RPDA I and II)"*

REVISE *"The Town of Apex requires that a registered certified tester perform all testing. A registered certified tester is a person who has proven their competency to test, repair, overhaul and make reports on backflow prevention assemblies as evidenced by the successful completion of an approved Cross-*

Connection Control School. The registered certified tester is responsible for submitting all test forms to the Town's Water Resources Department." to *"The Town of Apex requires that an approved certified backflow tester perform testing of backflow preventer assemblies. Certified backflow tester means a person who has proven their competency to the satisfaction of the Town by successful completion of an approved Cross-Connection Control (CCC) ORC or Backflow Tester Certification school.*
Town of Apex accepts CCC ORC and Backflow Tester Certifications from the following approved schools:

- *Charlotte Mecklenburg Utilities Department*
- *Greenville Utilities Commission*
- *City of Durham*
- *City of Raleigh*
- *NC Rural Water*
- *Training Research and Education for Environmental Occupations (TREEO)*
- *University of Southern California (US FCCCHR)*
- *NC American Water Works Association (AWWA)"*

REMOVE: *"Registered certified testers in good standing with any of the following training schools in the State of North Carolina (American Water Works Association – State (NC) Sponsored, City of Charlotte-CMUD, City of Fayetteville-PWC, City of Raleigh, City of Wilmington, City of Durham, INFO-Tech, LLC Carthage, NC, Cape Fear Public Utility Authority (CFPUA) and Greenville Utilities Commission (GUC)) or Town approved may test backflow preventers on the Apex water system provided they satisfactorily completed required courses offered by the above mentioned schools and have submitted the required background information to the Town of Apex Water Resources Department. Testers not successfully completing these requirements will not be allowed to test on the Apex system. Testing schools identified above in bold are recognized as an approved Cross-Connection Control School."*

ADD: *"Certified Backflow Testers must register on the Town's designated electronic reporting system, AquaResource. The tester must upload the school certificate and pressure gauge calibration certificate to their profile on AquaResource for review and approval by the Town's CCC ORC. Certified Backflow Testers that do not complete these steps will be prohibited to test in the Town and access to the electronic reporting system will not be approved.*

Only passing backflow preventer tests may be submitted to the Town's designated electronic reporting system. The tester is responsible for notifying the consumer regarding any failed test and a quote to make the repair shall be provided to the consumer for approval.

Backflow preventer test reports must be submitted to the Town's designated electronic reporting system within 10 days of the completed report."

F. Facilities and Applications Requiring Backflow Prevention
REVISE Facilities and Applications Requiring Backflow Prevention
Public/Private Water Supply - RPA
Bakeries - RPA
Bulk Water – AG/RPA
Swimming Pools – Pools Connected to Town Water System – RPA

G. Definitions
REVISE *"Double Check Detector Assembly – (DCDA) (ASSE Approval #1048)" to "Double Check Detector Assembly Type I – (DCDA I) (ASSE Approval #1048)"*

ADD *"Double Check Detector Assembly Type II (DCDA II) (ASSE Approval #1048) - This assembly may be used singly or in parallel with any flow requirements. It shall not include contact with toxic chemicals or liquids that may be a health hazard. This assembly will have a water meter and an in-line single check valve bypass."*

REVISE "Reduced Pressure Detector Assembly (RPDA) (ASSE Approval #1047)" to "Reduced Pressure Detector Assembly (RPDA Type I) (ASSE Approval #1047)"

ADD *"Reduced Pressure Detector Assembly (RPDA Type II) (ASSE Approval #1047) – This assembly may be used singly or in parallel with any flow requirements. It shall have a water meter and an in-line single check valve bypass."*

623 Backflow Prevention Assembly Installation Requirements

ADD: *"B. Location*

Backflow preventer installations are not allowed in public rights-of-way (Town or NCDOT), under structures or within foundations.

Backflow preventers cannot exceed 50-feet from the potable water main.

Backflow preventers for irrigation must be within 25-feet of the meter and not exceed 10-feet past the front corner of the permanent structure.

All backflow preventers are considered private and shall be located outside of the Town's utility easements.

C. Materials

REVISE to *"All materials used in conjunction with a backflow preventer installation shall conform to the specifications of the North Carolina State Plumbing Code, section 605.3 and ASSE 1013, and AWWA C511."*

D. Accessibility

REVISE to *"All backflow preventers must be installed where the Water Resources staff, Inspector, or Code Enforcement Officer deems them to be ready-accessible. All RPA, RPDA, DCVA and DCDA backflow preventers are required to be installed at least 12 inches and no more than 60 inches above the floor (the vertical distance measured from the lowest point of the backflow preventer to the floor or grade). Approved minimum clearance above and around the backflow preventer must also be provided (refer to Town Standard Details for minimum installation clearance). Lawn irrigation backflow preventers must be installed outside any building, structures, or foundation crawl space and must meet clearance requirements as shown in the Town Standard Details."*

E. Orientation

REMOVE *"unless preapproved in writing by the Water Resources Department."*

F. Freeze Protection

REVISE to read as *"The NC Plumbing Code prohibits the installation of RPAs where they may be exposed "to freezing except where they can be removed by means of unions or are protected from freezing by heat, insulation, or both." Backflow preventers installed outside, require an ASSE 1060 insulated enclosure. The enclosures are rated to maintain 40 ^{o}F in as low as -30 ^{o}F weather, (a minimum R value of 8.0 (unless the backflow preventer is designed to be removed each winter and the enclosure is understood to be for decorative purposes only). For fire protection installed outside, the NFPA requires the ASSE 1060 enclosure to include permanent, hard piped electrical service, and a thermostatically controlled heater or heat trace. Freeze protection is not required for lawn irrigation where RPAs are installed outside and can be removed with unions and an upstream SOV not subject to freezing. All underground piping must be installed a minimum of 12 inches below grade and must meet the requirements of underground water service piping."*

G. Alterations

REMOVE *"Rain Sensor installation is required for all automatically controlled irrigation installations. They must be set to ¼ inch or less per Town Ordinance and specifications. Property addresses shall be displayed on the outside of the approved enclosure or inside on the backflow preventer with 6 mm or ¼ inch lettering. The properties / sites affected are townhomes, multifamily, commercial, and industrial uses / applications."*

I. Wye Strainers

REVISE to read as *"Wye Strainers shall not be allowed on fire protection systems. Wye strainers are required on all other backflow preventer assemblies (RPA, DCVA, PVB). Wye strainers specified by the manufacturer are required to be installed immediately upstream of the backflow preventer's number one shut-off valve (SOV) and after the isolation SOV. All internal or confinement (isolation) backflow preventer assemblies will have a wye strainer upstream of the assembly with the exception of fire protection systems."*

L. Identification Tag

ADD: *"Property addresses shall be displayed on the outside of the approved enclosure or inside on the backflow preventer with 6 mm or ¼ inch lettering. The properties / sites affected are townhomes, multifamily, commercial, and industrial uses / applications."*

M. Labeling of Non-Potable Piping

ADD: *"Where non-potable water systems are installed, the piping conveying the non-potable water shall be identified either by color marking, metal tags or tape. Non-potable water outlets, such as hose connections, open ended pipes and faucets, shall be identified with signage in accordance with NC Plumbing Code 608.8.1 through 608.8.2.3. that reads*

Non-potable distribution piping shall be purple in color and shall be embossed, or integrally stamped or marked, with the words: "CAUTION NONPOTABLE WATER – DO NOT DRINK" or the piping shall be installed with a purple identification tape or wrap. Pipe identification shall include the contents of the piping system and an arrow indicating the direction of flow in accordance with Plumbing Code 608.8.1 through 608.8.2"

REMOVE: *"All non-potable piping downstream of isolation backflow preventers installed on the domestic water system shall be identified with the words "NON-POTABLE" using a durable yellow paint at intervals of not more than 10 feet and at all branches as specified by the State of North Carolina Plumbing Code."*

O. Relief Outlet Piping

REVISE to read as *"When RPA and RPDA assemblies are installed inside buildings they shall be in accordance with NC Plumbing code. RPAs and RPDAs capable of experiencing a full port discharge that are installed inside shall flow by gravity to a sanitary waste floor drain designed to handle a full port discharge from these assemblies or be routed outside so long as the discharge does not create a hazard or nuisance in accordance with NC Plumbing Code. When drains from the relief valve outlets are utilized they must include the following:*

1. *An approved, prefabricated, appropriately sized Air Gap drain (factory Air Gap adapters are generally available from the manufacturer).*
2. *Drain lines to direct flow towards indirect waste floor drains.*
3. *All relief port drain lines shall be piped, full size, to their point of termination.*
4. *When run horizontally, install the drain line with a slope conforming with the NC Plumbing code 704.1."*

R. Culinary Use

REVISE to *"Backflow preventers and wye strainers used for culinary purposes such as canned food preparation or in dairies shall have an FDA (Food and Drug Administration) approved coating and shall be stamped with the appropriate seal."*

624 Drainage Requirements for Backflow Prevention Assemblies
A. Reduced Pressure and Reduced Pressure Detector

REVISE 2) Building Installation to "*An approved, prefabricated, appropriately sized Air Gap drain (factory Air Gap adapter generally available from the manufacturer). Drain lines to direct flow towards indirect waste floor drains. All relief port drain lines shall be piped, full size, to their point of termination. When run horizontally, install the drain line with a slope conforming with the NC Plumbing code 704.1."*

REVISE *"3) Below Installation: All existing assemblies shall be raised above ground to meet Town of Apex Cross Connection Standards."* To *"3) Below Ground Installation:*
All existing assemblies shall be raised above ground at the time the assembly can no longer be repaired and requires replacement to meet Town of Apex Cross- Connection Standards and Ordinance."

625 Backflow Prevention Assembly Enclosures
A. Above Ground Enclosures
ADD after the last sentence: *"For fire protection assemblies installed outside, the NFPA requires the ASSE 1060 enclosure to include permanent, hard piped electrical service, and a thermostatically control heater or heat trace."*

626 Fire Protection Backflow Preventer Requirements
REVISE the first paragraph to read: *"There shall not be any unprotected interconnection between potable water and fire lines. All backflow prevention assemblies installed on fire suppression systems shall be either a Double Check Detector Assembly Type I or Type II (DCDA I or II) for low hazard installations or a Reduced Pressure Detector Assembly Type I or Type II (RPDA I or II) for high hazard installations. All meters on the detector by-pass must read in gallons per minute. Backflow prevention assemblies on fire lines shall be installed as received from the manufacturer with no modifications. All assemblies used in fire protection systems must have USCFCCCHR, ASSE, and FM approvals."*

REVISE B. Low Hazard Systems requiring DCDA to read as *"1) Systems that do not have a fire department connection (FDC), 2) Dry pipe systems, 3) Less than 5 stories above ground level, 4) Without booster pumps, 5) Without chemical additives, 6) Line extension less than 50 feet from a potable water line for the purpose of serving a fire hydrant."*

627 Lawn Irrigation Backflow Preventer Requirements
REMOVE section in its entirety

ADD: *"A. Irrigation Meter Fed Systems*
Lawn irrigation systems have the potential to allow contaminated water to backflow into the potable water system. The Town of Apex requires the installation of an approved RPA (ASSE 1013). On properties platted after July 1, 2009, all new lawn irrigation systems are required to install a separate water meter per NCAC §143-355.4. All backflow preventers shall be installed per Town of Apex Standard Details. To obtain information for purchasing an "irrigation only" meter, contact the Building Inspections & Permitting Department.
B.Irrigation Systems Tied to Outside Hose Bibbs
Irrigation systems, piping, fittings, sprinklers, drip tubing, valve, timers, and all associated components installed for the delivery and application of water for the purpose of irrigation that are connected to outside hose bibbs shall be prohibited and are in violation of the CCC Ordinance.
The only approved method for watering from an outside hose bibb with an approved AVB or hose bibb vacuum breaker (HBVB) is an open-ended water source above grade, without valves.
C.Location and Accessibility
The location of the installed RPA shall meet the following criteria:

RPA shall be installed between the meter and the first sprinkler head (or yard hydrant).
Distance from the water main to the RPA shall not exceed 50 feet
Distance from the water meter to the RPA shall not exceed 25 feet
RPA shall not be located more than 10 feet from the front corner of the home.
RPA shall not be installed behind a fence, under a deck, crawl space, or other structure accessory.
Installation within Town right-of-way or Town easement is prohibited. The RPA must be located outside the 5-foot utility easement.
RPA must be located with a minimum clearance of 12 inches from lowest part of the assembly above final grade.

D. Backflow Preventer Orientation
All reduced pressure assemblies shall be installed in the horizontal position or per the current USCFCCHR manual.

E. Freeze Protection
All underground piping must be installed a minimum of 12 inches below grade and must meet the requirements of underground water service piping.
All enclosures must meet ASSE 1060 "Freeze Retardant" with a minimum R value of 8.0, unless the backflow preventer is designed to be removed each winter (lawn irrigation installed with unions and an upstream shut off valve not subject to freezing) and the enclosure is understood to be for decorative purposes only.

F. Inspections
Water Tap Inspection is required for contractor installed taps.
The Irrigation Rough-in Inspection is an open trench inspection from the water meter to the RPA. The trench must remain open until the inspection has passed.
Final Irrigation Inspection verifies that the concrete pad, rain sensor (if applicable), and backflow enclosure is installed and meets the requirement based on installation of the system.

G. Accessories
Rain sensor installation is required for all automatically controlled irrigation installations. The device must be set to ¼ inch or less per Town of Apex Ordinance."

<u>629 Certified Backflow Prevention Assembly Tester</u>

REVISE the second paragraph to read *"When employed by the consumer to test, repair, overhaul, or maintain backflow prevention assemblies, a tester will have the following responsibilities:*

1)Each person wishing to test, repair, overhaul, or maintain backflow prevention assemblies shall provide a certificate to the Town which sets forth that he/she has met the minimum qualification standards established by the Town for certification as a backflow preventer assembly tester.
The tester will be responsible for making competent inspections, repairing or overhauling backflow prevention assemblies, and making reports of such repair to the consumer and the Town via the designated electronic reporting system. The tester shall include the list of materials or replacement parts used. The tester shall be equipped with and be competent to use all the necessary tools, gauges, manometers, and other equipment necessary to properly test, repair, and maintain backflow preventer assemblies. It will be the tester's responsibility to ensure that original manufactured parts are used in the repair of or replacement of parts in a backflow prevention assembly. It will be the tester's further responsibility not to change the design, material, or operational characteristics of an assembly during repair or maintenance without prior approval of the Town. A tester shall perform the work and be responsible for the competency and accuracy of all tests and reports. The tester shall provide a copy of all test and repair reports to the

consumer and to the Town within 10 business days of any completed test or repair work. Testers shall maintain such records for a minimum period of 3 years.

2) All certified backflow prevention assembly testers must obtain and employ backflow prevention assembly test equipment that has been evaluated and/or approved by the Town. All test equipment shall be registered with the Town. All test equipment shall be checked for accuracy annually (at a minimum), calibrated, if necessary, and certified to the Town as to such calibration, employing an accuracy/calibration method acceptable to the Town."

➢ SECTION 700 – WASTEWATER COLLECTION SYSTEMS

701 Gravity Sewer

A. Design

ADD after the last sentence of c) *"A magnetic flow meter and manhole shall be required prior to connection to the Town's System."*

REVISE: Sewer installation depth and easement width table to the following:

Pipe Size (D)	Pipe Depth*	Easement Width	Town Road R/W
≤ 12-inches	≤ 8-ft	20-ft	Allowed
≤ 12-inches	8-ft – 15-ft	30-ft	Exception Required
≤ 12-inches	15-ft – 20-ft	40-ft	Not Allowed
>12-inches to ≤ 24-inches	≤ 15-ft	30-ft	Exception Required
>12-inches to ≤ 24-inches	15-ft to 20-ft	40-ft	Not Allowed
≥ 24-inches	Any Depth	As Specified by the WR Department	Not Allowed
Any Size	Deeper than 20 ft		

*Depth of the sewer main shall be measured from the top of the pipe to the final grade or road subgrade at the deepest point between manholes.

REVISE the second paragraph to read *"Dedicated easements for sewer mains and appurtenances shall be recorded as "Town of Apex Public Sanitary Sewer Easement". Town of Apex sewer easements shall contain only Town of Apex utilities unless otherwise approved by the site plan or an encroachment agreement. Sewer mains shall be centered in the easement. Easements shall be acquired by the Developer (unless utility is designed as part of a Capital Improvement Project) prior to construction plan approval. See Section 215 for utility easement requirements."*

REVISE e) to *"the minimum width of a permanent easement that contains sanitary sewer and storm drain shall be at least 10 feet in addition to the easement width required in the table above. There must be a separation of 10 feet between the outside of each pipe and 10 feet from the centerline of the pipe to the easement line. Additional easement width may be required based on the depth and combination of utility and/or storm drain within the shared easement."*

REMOVE: *"h) No structures, equipment, retaining walls, embankments, impoundments, pavement, landscaping, fill, or other elements that would inhibit maintenance operations shall be constructed within a sewer main easement as outlined in Section 200. Fences may be allowed across easements provided that appropriate access gates or removable panels have been installed to allow utility maintenance. Fences shall not be installed parallel within utility easements. In all cases, Town of Apex Operations Staff shall have access to secured access gates. Fill or cut slopes are not allowed to extend into easements without full development plan approval or an approved encroachment agreement from the Town of Apex, see Section 200 for further information. All such pre-existing or planned conditions as noted herein that would impact operations and maintenance within the noted sewer main easement shall be noted and*

disclosed during the site plan approval process. Pre-existing conditions that are not disclosed during the site plan review may nullify the approval and require relocating the sewer easement where there are no existing conflicts. If sewer main is located within road right-of-way or on Town owned property there shall be no permanent structures, equipment, retaining walls, embankments, impoundments, landscaping, or other elements that would inhibit maintenance operations unless approved by the Water Resources Director."

REMOVE: *"Easements shall be accessible from public rights-of-ways. If easement is not accessible perpendicular from right-of-way due to steep slope, environmental feature, or other obstacle, additional easement may be necessary."*

REMOVE: *"Sewer line easements shall be graded smooth, free from rocks, boulders, roots, stumps, and other debris, and seeded and mulched upon the completion of construction. Easements across sloped areas shall be graded uniformly across the slope to no steeper than a 4 to 1 ratio."*

REVISE k) to read *"k) The following minimum horizontal separations shall be maintained:*
1. 100 feet from any private or public water supply source, including wells, WS-1 waters or Class I, Class II, or Class III impounded reservoirs used as a source of drinking water (except as noted below)
2. 50 feet from wetlands and any waters (from normal high water) classified WS-II, WS-III, WS-IV, B, SA, ORW, HQW or SB (except as noted below)
3. 20 feet from waters classified as C, any other stream, lake, or impoundment (except as noted below)
4. The following separations may be acceptable when water main standards are implemented:
a. All appurtenances shall be outside the 100 foot radius of wells.
b. 50 feet from private wells (with no exceptions)
c. 50 feet from public water wells (with no exceptions)
d. Where the required minimum separations cannot be obtained, ductile iron pipe shall be used with joints constructed and tested to water main standards."

REVISE l) to "*Sanitary Sewer mains shall be extended to adjacent upstream property lines in order to serve all upstream properties. Additionally, Sanitary Sewer shall always be extended along any and all-natural drainage courses/draws that are located within the property line boundaries of the proposed development, based on the original topography.*
1) Sewer design shall account for future upstream development based on the current land use plan, or approved developments (whichever results in larger flow).
2) The most upstream manhole shall be designed and located so that all upstream properties will have access to connect with future sewer mains without the need for a pump station. Depths shall be evaluated so that streams, roads, culverts, and any other features that must be crossed by future upstream sewer mains can do so and still achieve the required minimum cover on top of the sewer main."

REVISE m) to *"The most upstream manhole shall be designed and located so that all upstream properties will have access to connect with future sewer mains without the need for a pump station."*

REVISE n) to *"Sewer mains that do not meet minimum cover stated are required to be ductile iron for the entire run between manholes. Steel casing and/or concrete may also be required for protection, at the direction of the Water Resources Department."*

REVISE r) to include the following table:

Separation Requirements Summary*					
	Vertical**				
Utility Type	*Water Main (Over)*	*Water Main (Under)*	*Sanitary Sewer*	*Force Main*	*Storm Drain*
Water Main (Over)			18"	18"	18"
Water Main (Under)			18" (DIP)	18" (DIP)	18"
Sanitary Sewer	18"	18" (DIP)			24"
Force Main	18"	18" (DIP)			18"
Storm Drain	18"	18"	24"	18"	

*Minimum Requirements. Additional requirements may be required when vertical separation is not met.
**When horizontal separation requirement is not met
(DIP) - Material Requirement for Utility Crossing Over Water Main

REMOVE: *"Where concentrated sources of runoff (e.g., SCM discharge, FES discharge outlets, natural drainage ways, etc.) convey across existing or proposed Town of Apex Sanitary Sewer Easements, the applicant must design a rip rap lined channel across the full width of the easement."*

REMOVE: *"All retaining walls shall have a separation from the easement boundary of at least 1:1, vertical to horizontal. For example, if the retaining wall is 10 feet tall, it shall be placed no closer than 10 feet from the adjacent easement boundary."*

ADD: *"Downstream Sewer Analysis: All projects shall perform evaluation of existing downstream sewer capacity to demonstrate there are no negative impacts on the existing sewer system. The limits of the downstream sewer capacity study will be determined by the Water Resources Department. The sewer capacity analysis shall be stamped and signed by the Professional Civil Engineer in the State of North Carolina. This evaluation shall address the capacity of all sewer collection and trunk sewer systems that will be impacted downstream of the new development and/or redevelopment.*

If any downstream segments of the sewer system have previously been identified as critical, or sub-critical in a monitoring report or previous analysis, additional field monitoring or data collection may be required, as determined by the Water Resources Department.

The sewer capacity analysis shall incorporate the potential sewage generated within the entire natural drainage basin in which the development is located based on the Comprehensive Plan Land Use Map, or previous development approvals, whichever is higher. Topographic maps of the entire drainage basin and any and all adjacent previously approved developments and any subsequent improvements shall be included in the analysis. The maps shall also incorporate sewage routes included in the Town's Sewer Master Plan and demonstrate no adjacent development, including existing pumped lands outside of the drainage basin, will be precluded from obtaining sewer service. The sewer capacity analysis shall include all proposed sanitary sewer alignments and potential points of entry of sewage from surrounding lands, not included in the sewer master plan.

The sewer capacity analysis shall assume standard minimum depth for all upstream sewer mains and clearly identify any proposed facilities which will exclude standard depths. Anticipated flows for undeveloped land shall be determined using the 2T rules at the rates for zoning classification as determined by the Comprehensive Plan Land Use Map.

If any downstream sewer segments exceed 50 percent full, but are less than 65% full, the Water Resources Department will evaluate and determine if upsizing is required. If any downstream sewer segments exceed 65 percent full, the sewer main must be upsized or re-installed at a greater slope to allow for greater flow through the pipe. All improvements must be made the full length, from manhole to manhole."

REVISE: Minimum grade requirements for public sewer table to the following:

Main Size *(diameter in inches)*	Minimum Slope V=2.5ft/s, depth 1/2 full *(feet per 100 feet)* *{standard required velocity}*
8	0.61
10	0.46
12	0.36
14	0.29
15	0.27
16	0.25
18	0.21
21	0.17
24	0.14
27	0.13
30	0.11
36	0.09
42	0.06
48	0.05

ADD: *"p) Construction Involving Existing Mains:*
i. The existing sewer main must remain active and protected during all phases of construction. The contractor must provide a plan for the structural protection of the existing sewer main.
ii. A proposed construction sequence and bypass pumping plan must be submitted for any demolition of any portion of existing sewer main. The plan must be reviewed and approved by the Water Resources Department.

B. Materials
ADD: *"The Water Resources Department maintains a list of approved products and manufacturers for all waste water collection system products. Requests to use alternative products or manufacturers shall submit an exception request with supporting documentation for the request with the Construction Plan submittal."*

REMOVE: Table of approved manufacturers.

<u>703 Service Connections</u>
A. Design
ADD: *"a) Direct sewer service taps shall not be allowed on sewer interceptor or outfall mains 15-inches in diameter or larger, except by manhole connection."*

REVISE b) to *"b)All residential subdivision lots shall be served by gravity unless otherwise approved. If a pump is approved, it shall be privately maintained and must pump into either a service connection placed on the lot. The private pump and force main (if needed) must have a note on the recorded plat indicating the following: "Privately maintained sewer pump and force main is required to serve this lot"."*

ADD: *"c) All non-residential development projects shall be serviced by gravity sewer and/or a public pump station, if permitted. The Town will not consider a private pump station serving more than one lot, regardless of ownership. If a private pump station and/or force main is recommended by the Water Resources Department, it must be formally approved by Town Council prior to final approval of construction documents. All private infrastructure must be located outside of the public right-of-way or utility easement and must be converted into gravity prior to entering the public sanitary sewer system. As*

directed by the Water Resources Department, a magnetic flow meter may be required prior to entering the public sanitary sewer system.

REVISE g) to *"Only if approved by the Water Resources Department, sewer cleanouts located in paved areas, which bear vehicle loading, must have ductile iron risers, ductile iron fittings and a traffic rated cast iron cover assembly."*

REVISE h) *"All 4-inch services shall connect directly into a public sewer main or manhole, in the fronting street or into an easement within the property. All services 6 inches or larger shall be into a manhole."*

B. Materials
ADD: *"The Water Resources Department maintains a list of approved products and manufacturers for all waste water collection system products. Requests to use alternative products or manufacturers shall submit an exception request with supporting documentation for the request."*

C. Installation
ADD: *"h) Buoyancy shall be considered, and floatation of the manholes shall be prevented with appropriate construction where high groundwater conditions are anticipated."*

<u>706 Repairs, Modifications, and Abandonment</u>

A. Sewer Main Repairs
REVISE to read *"1. Vitrified Clay Pipe - replace damaged section with PVC C900 and install a coupling at each end encased in concrete.*
2. PVC Pipe - replace damaged section with PVC Pipe and install a coupling at each end encased in concrete.
3. ABS/PVC Truss Pipe - replace damaged section with DIP and install a coupling at each end encased in concrete.
4. Asbestos Cement Pipe - Replace damaged section with DIP and couplings encased in concrete.

D. Abandonment of Existing Sewer Mains
REMOVE: Section in its entirety.

ADD: *"1. Existing sewer mains and casings located outside of road sections shall be removed, unless otherwise directed by the Town. All materials and labor shall be provided by the contractor.*
2. Existing sewer mains and casings located within a road section shall be grout filled and abandoned in place.
3. In other locations, grout filling and abandonment in place may be allowed with prior approval from the Water Resources Department.
4.Sewer service laterals shall be abandoned by removing and replacing the saddle with a 360-degree stainless steel sleeve. At in-line wyes the service lateral shall be cut within 12" of the wye and a mechanical cap installed on DIP/cast services or glued to PVC services and the abandoned wye encased with 1 cubic foot of concrete."

➢ SECTION 800 – WASTEWATER PUMPING SYSTEMS & FORCE MAINS

801 General

A. Design Requirements

REVISE: Multiple material changes to stainless steel throughout the entire section.

ADD: *"10. Antenna may not be installed directly on the sun shade. The antenna should be at least 10 feet higher than the sun shade, fencing, walls and any other nearby metallic objects that may cause signal interference."*

ADD: "11. *The signal for the pump station's standard low gain antenna shall be tested over a period of time to verify that it is acceptable strength and consistency for the location. If the signal strength is found unacceptable by operations, the antenna will be upgraded to a high gain antenna or directional antenna. If signal issues continue, a pole extender will be added as well as any needed extra cable."*

ADD: "12. *Pump station control design shall include a signal strength survey of the site. The design of the pump station shall incorporate any upgrades indicated necessary by the survey and approved by Water Resource Department."*

ADD: *"13. Pump station control design shall include a signal strength survey of the site. The design of the pump station shall incorporate any upgrades indicated necessary by the survey and approved by Water Resource Department."*

802 Pump Station Site and Structures

A. General

REVISE 4., second sentence to *" The pumps shall be solids handling, grinder type, submersible, centrifugal pumps each capable of pumping flows equal to the expected peak hourly flow."*

B. Site Work, 5.

ADD *"The access road concrete or pavement shall not cover any piping between the wet well, valve vault, or bypass connection."*

C. Structures

2. Wet Well

REVISE e) first sentence to "At a minimum, wet wells shall have a vent made from stainless steel with flanged or welded joint pipe fittings."

REVISE f) first sentence to *"Interior of wet wells, including the top, and wet well piping shall be coated with at least 80-mils of an approved monolithic epoxy coating system consisting of 100% solids, solvent-free, two-component epoxy resin for up to 100 mils of coating with a manufacturer approved set time of 6-hours or less."*

REMOVE: *"Each we well shall be equipped with a removable extension ladder as specified to enable access. The Town shall designate the location during the review process."*

REVISE i) first sentence to *"Pre-cast structures shall have a Raven Lining Systems, or equivalent applied to the outside of all tongue and groove joints."*

REVISE k) first sentence to *"A removable aluminum handrail shall be provided around the wet well opening of all submersible pumping stations."*

REVISE l) first sentence to *"A fall-through prevention system, with appropriate tie-off, shall be provided with the wet well hatch doors."*

D. Piping and Valves
REVISE 1. Piping first sentence to "Suction and discharge piping shall be SCH 10 304 Stainless Steel in accordance with AWWA C 115."

REVISE 5. Plug Valve second paragraph, second sentence to *"A restrained sleeve coupling shall be installed on each discharge main between the wet well and the valve vault." Add "A minimum 12-inch spool shall be installed between the check valve and plug valve to facilitate valve replacement."*

REVISE 7. to *"Air Release Valve: Each pump shall have an air release valve, installed on the discharge prior to combining with other pumps and leaving the valve vault. There shall be one additional air release valve installed in a manhole on the force main, prior to the main leaving the pump station site."*

REVISE 8. to *"Surge Valve: There shall be one surge valve installed within the valve vault, if deemed required by analysis."*

803 Pump Station Equipment
REMOVE: *"a) Pumps, motors, and major accessories shall be supplied by a single manufacturer and must be Fairbanks Morse, ABS, Hydromatic, or HOMA.*

REVISE b) to *"Each pumping unit shall be complete with a close-coupled, submersible electric motor, and all other appurtenances specified, or otherwise required for proper operation. Self-priming or vacuum primed pumps are not permitted."*

807 Wastewater Force Mains
A. Design, 3.
REVISE: Standard Easement Width for Sewer Force Mains Table:

Pipe Size (D)	Pipe Depth*	Easement Width	Town Road R/W
≤ 12-inches	≤ 8-ft	20-ft	Allowed
≤ 12-inches	8-ft – 15-ft	30-ft	Exception Required
≤ 12-inches	15-ft – 20-ft	40-ft	Not Allowed
>12-inches to ≤ 24-inches	≤ 15-ft	30-ft	Exception Required
>12-inches to ≤ 24-inches	15-ft to 20-ft	40-ft	Not Allowed
≥ 24-inches	Any Depth	As Specified by the WR Department	Not Allowed
Any Size	Deeper than 20 ft		

*Depth of the sewer main shall be measured from the top of the pipe to the final grade or road subgrade at the deepest point between manholes.

REVISE the third paragraph of 14. f) to *"The following minimum horizontal separations shall be maintained:*

1) 100 feet from any private or public water supply source, including wells, WS-1 waters or Class I, or Class II, or Class III impounded reservoirs used as a source of drinking water (except as noted below).

2) 50 feet from any waters (from normal high water) classified WS-II, WS-III, WS-IV, B, SA, ORW, HQW or SB (except as noted below).

3) 10 feet from any other stream, lake, or impoundment (except as noted below).

4) 50 feet from private wells (with no exceptions).

5) 50 feet from sources of public water supply (with no exceptions)"

❖ Standard Details

400.01 (TEMPORARY SILT FENCE) – Added required maintenance notes. Renamed alternative option to "Super Silt Fence" to be in-line with the NCDEQ design guidelines.

400.02 (TEMPORARY SILT FENCE OUTLET) – Added required maintenance notes.

400.03 (CATCH BASIN RISER/FILTER) – Added required maintenance notes.

400.04 (CATCH BASIN & YARD INLET PROTECTION) - Added required maintenance notes.

400.05 (CHECK DAM) - Added required maintenance notes. Added dimension labels to the step sequence diagram.

400.06 (CONSTRUCTION ENTRANCE) - Added required maintenance notes.

400.07 (DIVERSION DITCH) - Added required maintenance notes.

400.07 (BLOCK & GRAVEL DROP INLET PROTECTION) - Added required maintenance notes.

400.09 (GRAVEL & RIP RAP HORSESHOE INLET BASIN FOR EXISTING PIPE INVERTS) - Added required maintenance notes.

400.10 (PIPE INLET PROTECTION) - Added required maintenance notes.

400.11 (TEMPORARY STREAM CROSSING) - Added required maintenance notes.

400.12 (RISER BARREL SEDIMENT BASIN) - Added required maintenance notes. Separated into two sheets.

400.14 (SKIMMER DETAIL) - Added required general and maintenance notes.

400.15 (RIP RAP LINED CHANNELS) – Updated slopes to reflect updated specifications.

400.16 (TEMPORARY SILT DITCH) - Added required maintenance notes.

400.17 (TEMPORARY SLOPE DRAIN) - Added required general and maintenance notes.

400.18 (PIPE OUTLET) - Added required maintenance notes.

400.19 (INLET SEDIMENT CONTROL DEVICE) - Added required maintenance notes.

400.21 (WATTLE) - Added required maintenance notes.

400.22 (FILTER BAG WITH GRAVEL PAD) - Added required maintenance notes.

400.23 (TEMPORARY PUMP AROUND) - Added required maintenance notes.

400.25 (TEMPORARY ASPHALT DIVERSION) – New detail.

500.09 (STORM DRAIN PIPE BEDDING & BACKFILLING) – Updated pipe material nomenclature.

600.01 (3/4" & 1" WATER SERVICE & METER BOX) – Updated to reflect updated specifications.

600.02 (1-1/2" & 2" METER INSTALLATION & VAULT) – Modified vault dimensions.

600.03 (3" & LARGER METER INSTALLATION & VAULT) – Modified vault dimensions.

620.01 (TYPICAL SERVICE & IRRIGATION CONNECTIONS) – Updated to current standards.

620.02 (TYPICAL FIRE CONNECTIONS) – Updated to current standards.

620.03 (3/4" - 2" RESIDENTIAL & COMMERCIAL IRRIGATION BACKFLOW ASSEMBLY) – Updated to current standards.

620.04 (3/4" - 2" COMMERCIAL OUTDOOR BACKFLOW ASSEMBLY) – Updated to current standards.

620.05 (3/4" - 2" COMMERCIAL INDOOR BACKFLOW ASSEMBLY) – Updated to current standards.

620.06 (≥3” COMMERCIAL OUTDOOR BACKFLOW ASSEMBLY) – Updated to current standards.

620.07 (≥3" COMMERCIAL INDOOR BACKFLOW ASSEMBLY) – Updated to current standards.