VALVES, FIRE HYDRANTS, AND APPURTENANCES

PART 1 – GENERAL

1.01 SECTION INCLUDES
   A. Butterfly Valves
   B. Gate Valves
   C. Tapping Valve Assemblies
   D. Fire Hydrant Assemblies
   E. Flushing Devices (Air Releases and Blowoffs)
   F. Valve Boxes

1.02 DESCRIPTION OF WORK
   Install valves, fire hydrants and appurtenances for water mains.

1.03 SUBMITTALS
   Comply with Division 1- General Provisions and Covenants of SUDAS Specifications.

1.04 SUBSTITUTIONS
   Comply with Division 1-General Provisions and Covenants of SUDAS Specifications.

1.05 DELIVERY, STORAGE, AND HANDLING
   Comply with Division 1- General Provisions and Covenants of SUDAS Specifications as well as the following:
   A. Remove valves, fire hydrants, and appurtenances contaminated with mud and surface water from the site. Do not use in construction unless thoroughly cleaned, inspected, and approved by the Engineer
   B. Store material in accordance with the manufacturers’ recommendations and in locations that will minimize the interference with operations, minimize environmental damage and protect adjacent areas from flooding, runoff and sediment deposition.

1.06 SCHEDULING AND CONFLICTS
   Comply with Division 1- General Provisions and Covenants of SUDAS Specifications.
1.07 SPECIAL REQUIREMENTS

A. City Contracts: For all projects in which the City enters into a Contract with the Contractor, the Water Division will furnish the following materials unless otherwise noted in the contract documents:
   1. Fire hydrant assemblies including:
      a. Mainline tee, tapping sleeve, or tapping saddle.
      b. Fittings and accessories.
      c. Hydrant isolation valve, tapping or MJ, and valve box.
      d. Fire hydrant.
   2. Main valves and valve boxes including:
      a. Gate valves.
      b. Butterfly valves.
      c. Tapping valves.
      d. Tapping sleeves.
      e. Dead-end plug and blow-off assembly.

B. Developments: For water mains constructed by a developer and which shall be accepted by the City as part of the City's public distribution system, the Contractor may purchase from the Water Division at its direct cost, the following materials:
   1. Fire Hydrant and isolation valve.
   2. Main line valves.

C. Private Mains and Fire Lines: The Water Division will not furnish any materials for private water mains, fire protection lines, or service lines. All material installed in private systems shall meet the same specifications as for public systems, including polyethylene wrap and tracer wire.

D. The Water Division will furnish all labor and equipment to operate water system valves and fire hydrants in conjunction with the work.

1.08 MEASUREMENT AND PAYMENT

A. Valve (Butterfly or Gate):
   1. Measurement: Each type and size will be counted.
   2. Payment: Payment will be at the unit price for each type and size of valve.
   3. Includes: Unit price includes, but is not limited to, installation of valve and box, all components attached to the valve or required for its complete installation, including underground or above ground operators, extensions, joint restraints, valve box, and adjustment of valve box to final grade.

B. Installation of Valve (Butterfly or Gate) - Owner Supplied:
   1. Measurement: Each type and size of valve and box supplied by the Owner will be counted.
   2. Payment: Payment will be at the unit price for each supplied valve and box installed.
   3. Includes: Unit price includes, but is not limited to, pick-up and delivery of
material to the jobsite, installation of valve and box, all components attached to
the valve or required for its complete installation, including underground or
above ground operators, extensions, joint restraints, valve box, and adjustment
of valve box to final grade.

C. Tapping Valve Assembly:
1. **Measurement:** Each size of tapping valve assembly will be counted.
2. **Payment:** Payment will be at the unit price for each tapping assembly.
3. **Includes:** Unit price includes, but is not limited to, installation of assembly,
tapping sleeve, tapping valve, the tap, valve box and valve extensions, and
adjustment of valve box to final grade.

D. Tapping Valve Assembly- Owner Supplied:
1. **Measurement:** Each size of tapping valve assembly supplied by the Owner will
be counted.
2. **Payment:** Payment will be at the unit price for each supplied tapping assembly
installed.
3. **Includes:** Unit price includes, but is not limited to, pickup and delivery of material
to jobsite, installation of assembly and supplied material, and adjustment of
valve box to final grade.

E. Fire Hydrant Assembly:
1. **Measurement:** Each fire hydrant assembly will be counted.
2. **Payment:** Payment will be at the unit price for each fire hydrant assembly.
3. **Includes:** Unit price includes, but not limited to, installation of the assembly, the
fire hydrant, barrel, and components to connect the fire hydrant to the water
main, including anchoring pipe, fittings, thrust blocks, cast in-place thrust blocks,
mechanical joint restraint, pea gravel or porous backfill material, isolation valve
and appurtenances including tapping valve assembly if used, and adjustment of
valve box to final grade.

F. Fire Hydrant Assembly- Owner Supplied:
1. **Measurement:** Each fire hydrant supplied by the Owner will be counted.
2. **Payment:** Payment will be at the unit price for each supplied fire hydrant
installed.
3. **Includes:** Unit price includes, but is not limited to, installation of assembly and all
supplied materials, pea gravel or porous backfill material, and other materials
necessary for installation and adjustment of assembly to final grade.

G. Flushing Devices (Air Releases and Blow-offs):
1. **Measurement:** Each type and size of flushing device will be counted.
2. **Payment:** Payment will be at the unit price for each flushing device.
3. **Includes**: Unit price includes but is not limited to tapping saddle, installation of assembly, pipe, valve, curb box, support blocking, thrust block, mechanical joint restraint, pipe fittings, and adjustment of valve box to final grade.

**H. Installation of Flushing Device (Air Releases and Blowoffs) - Owner Supplied:**
1. **Measurement**: Each type and size of assembly supplied by the Owner will be counted.

2. **Payment**: Payment will be at the unit price for each supplied assembly permanently installed.

3. **Includes**: Unit price includes, but is not limited to, pick-up and delivery of material to the jobsite, installation of assembly and all supplied materials and those necessary for installation, and adjustment of valve box to final grade.

**I. Valve Box Adjustment:**
1. **Measurement**: Each existing adjustable valve box raised or lowered to finished grade will be counted.

2. **Payment**: Payment will be at the unit price for each valve box adjustment.

**J. Valve Box Extension:**
1. **Measurement**: Each existing valve box adjusted to finished grade by adding a valve box extension will be counted.

2. **Payment**: Payment will be at the unit price for each valve box extension.

3. **Includes**: Unit price includes, but is not limited to, valve box base, valve box extension, valve nut extension, slip type adjustable riser, and PVC pipe as needed.

**K. Valve Box Replacement:**
1. **Measurement**: Each existing valve box replaced with a new valve box will be counted.

2. **Payment**: Payment will be at the unit price for each valve box replacement.

3. **Includes**: The unit price for each valve box replacement includes, but is not limited to, removal of existing valve box, excavation, furnishing and installing new valve box, backfill, compaction, and all other necessary appurtenances.

**L. Valve Box Removal:**
1. **Measurement**: Each valve box removed will be counted.

2. **Payment**: Payment will be at the unit price for each valve box removed.

3. **Includes**: The unit price includes, but is not limited to, excavation, removal of each valve box, backfill, compaction and surface restoration to match the surrounding area.

**M. Relocation of Existing Fire Hydrant:**
1. **Measurement**: Each fire hydrant to be relocated will be counted.
2. **Payment:** Payment will be at the unit price for each fire hydrant relocated.

3. **Includes:** Unit price includes, but is not limited to, removal and reinstallation of the existing fire hydrant, short term on-site storage of fire hydrant assembly, adjustment of fire hydrant and valve box to final grade, and all materials necessary for reinstallation.

**N. Removal of Flushing Device (Air Releases and Blow-off):**

1. **Measurement:** Each flushing device removed will be counted.

2. **Payment:** Payment will be at the unit price for each permanent flushing device removed.

3. **Includes:** Unit price includes, but is not limited to, removal and disposal or delivery to Water Division, disposal of miscellaneous fittings, capping or plugging the water main, repairs to the polyethylene wrap and/or tracer wire, and backfill.

**O. Fire Hydrant Adjustment**

1. **Measurement:** Each existing fire hydrant adjusted to finished grade by removal and reinstallation or the addition of an extension barrel section and stem will be counted.

2. **Payment:** Payment will be at the unit price for each adjustment of an existing fire hydrant.

3. **Includes:** The unit price includes, but is not limited to, removal and reinstallation of the existing fire hydrant, adjustment of fire hydrant and valve box to final grade, disinfection, necessary appurtenances, and furnishing and installing the extension barrel section and stem as specified.

**P. Removal of Fire Hydrant Assembly:**

1. **Measurement:** Each fire hydrant assembly removed will be counted.

2. **Payment:** Payment will be made at the unit price for each fire hydrant assembly removed.

3. **Includes:** Unit price includes, but is not limited to, excavation and removal of couplings and auxiliary valves, replacing the removed valve with pipe and connections if required, or capping the former valve connection, disposal or delivery of the assembly to the Water Division (as specified), backfill, compaction, and surface restoration to match the surrounding area.

**PART 2 – PRODUCTS**

2.01 VALVES

**A. General**

1. Valve must be same size as pipeline on which it is installed, unless otherwise noted on drawings.
2. Must be approved for buried service.
3. All valves must be factory tested to twice the rated working pressure.
4. Gaskets: unless otherwise specified match watermain gasket material.
5. **Valve Body:** Manufacturer’s name and pressure rating cast on valve body.

6. **Direction of Opening:**
   a. Open when turned clockwise as viewed from the top. Opening direction arrow shall be cast on the operating nut.
   b. All valve operators to be supplied by valve supplier.

7. **Joints:**
   a. For buried service: mechanical joints per AWWA 111. Comply with Section CR-5010 of Cedar Rapids Supplementary Specifications to SUDAS for joint nuts and bolts.
   b. For service within structures: flanged joints with dimensions and drillings according to AWWA C110 or ANSI B16.1 Class 125, unless noted otherwise. All valve operators to be supplied by valve supplier.

B. **Gate Valves:**
Gate valves are to be used on water main 12 inches in diameter and less, unless otherwise approved by the Engineer

1. **Standards:**
   a. Comply with AWWA C509 (grey or ductile iron) or AWWA C515 (ductile iron) and NSF 61.
   b. Pressure rating of 200 psi working pressure up to and including 12-inch and 150 psi over 12-inch.
   c. Body, Bonnet and Gate: Cast iron per ASTM A 126 Class B or ductile iron per ASTM A536.
   e. Interior Finish: In accordance with AWWA C550.
   f. Type: Resilient seat.

2. **Stem:**
   a. Comply with ANSI/AWWA C509.
   b. 2-inch square operator nut.
   c. Non-Rising Stem.
   d. Stem and spindle: solid bronze bearing against bronze surface. Lead content must comply with current regulations and standards.

3. **Shaft Seals:**

4. **Approved Manufacturers:**
   a. Mueller (Decatur, IL)
   b. Clow (Oskaloosa, IA)
   c. Kennedy (Elmira, NY)
   d. M&H (Anniston, AL)
   e. American Flow Control (Birmingham, AL)
5. **External Bolts and Hex Nuts**: Stainless steel according to ASTM A 240, Type 304.

C. **Butterfly Valves**:

Butterfly Valves are to be used on 16-inch and greater diameter water main, unless otherwise approved by the Engineer.

1. **Standards**:
   a. Comply with: ANSI/AWWA C504 Class 150B
   b. Pressure rating: 150 psi working pressure.
   c. Body: Cast iron per ASTM A126 Class B; Two trunnions for shaft bearings.
   e. Interior finish: In accordance with AWWA C550.
   f. Type: Rubber seat.

2. **Ends**:
   a. Mechanical joint, except as otherwise shown in the plans.

3. **Bearings**:
   a. Corrosion resistant and self-lubricating, sleeve type. Bearing load not greater than 1/5 the compressive strength of the bearing or shaft material.

4. **Stem**: Type 304 stainless steel; turned, ground and polished.

5. **Disc**: Cast iron ASTM A126 Class B, with plasma-applied nickel-chromium edge; connected to shaft by mechanically fixed stainless steel pins.

6. **Seat**:
   a. Type: Rubber; Synthetic rubber compound; simultaneously molded in, vulcanized and bonded to body.
   b. Bubble-tight at rated pressures with flow in either direction.

7. **Shaft Seal**:
   a. Shall be of O-ring type and replaceable.
   b. Seal lubricant.

8. **Actuator**:
   a. Type: Designated for buried service.
   b. 2-inch square nut.
   c. Three bolt minimum mounting to valve.
   d. Hold valve in any intermediate position between fully open and fully closed without any movement or fluttering.
   e. Mechanical stop-limiting device preventing devices to over-travel of the disc in the open and closed positions.
   f. Designed to operate the valve under full rated pressure with a maximum of 80 foot-pounds of torque at extreme operator position without damage to valve.
   g. Fully enclosed, gasketed, and grease packed.

9. **External Bolts and Hex Nuts**: stainless steel according to ASTM A 240, Type 304.
10. Approved Manufacturers:
   a. DeZurik
   b. Mueller
   c. M & H
   d. Pratt
   e. VAG/GA Industries

D. Tapping Valve Assemblies:

1. Tapping Valve complying with AWWA C509 or AWWA C515.

2. Tapping sleeves for tapping water mains up to and including 12 inch: only sleeves with mechanical followers or full circle gaskets may be used for full sized taps.
   a. Minimum 14 gauge.
   b. Sleeves shall be carbon steel ASTM A283, Grade C with fusion bonded epoxy coating per AWWA C213, interior and exterior; or Type 304 SS.
   c. Working pressure 150 psi.
   d. Flanged with dimensions and drilling according to AWWA C110 of ANSI B16.1, Class 125.
   e. Gasket to completely surround pipe. Minimum thickness 0.125 inch, nitrile rubber.
   f. Install according manufacturer’s specifications.
   g. Fabricated steel and stainless steel tapping sleeve.
   h. Approved manufacturers:
      1) Total Piping Solutions (TPS)
      2) Triple Tap
      3) Romac
      4) SST III
      5) Smith Blair

3. Tapping sleeves for tapping water mains greater than 12-inch:
   a. Tap size: one-half pipe size or less:
      1) Sleeves shall be carbon steel ASTM A283, Grade C with fusion bonded epoxy coating per AWWA C213, interior and exterior; or Type 304 SS.
      2) Sleeves shall be furnished with Type 304 stainless steel bolts and accessories.
      3) Manufacturers
         a) Smith Blair Tapping Sleeve 622
         b) Romac FTS 420
         c) TPS Triple Tap
         d) Approved equal

   b. Tap size: larger than one-half pipe size:
      1) Sleeves shall be carbon steel ASTM A283, Grade C with fusion bonded epoxy coating per AWWA C213, interior and exterior; or Type 304 SS or cast or ductile iron, full body, split construction.
      2) Fully surround pipe.
      3) Mechanical joints ends: branch flanged to match tapping valve.
      4) Outlet flange: Ductile iron, cast iron, or Type 304 SS: ANSI B16.1, Class 125
5) Approved sleeves:
   a) American Flow Control
   b) TPS Triple Tap
   c) Mueller Company
   d) Approved equal.

c. On 16 inch or larger water mains, use cast or ductile full body tapping sleeve.

4. **Bolts and Hex Nuts**: Stainless steel according to ASTM A 240, Type 304.

### 2.02 FIRE HYDRANT ASSEMBLY

**A. Material:** Comply with ANSI/AWWA C502 as modified

**B. Manufacturers:**
1. Clow Medallion
2. Kennedy Guardian
3. Kennedy K-810
4. Mueller Super Centurion 200
5. Waterous Pacer

**C. Features:**
1. Main Valve Size: 5 ¼ inch.
2. Inlet Connection Type 6 inch MJ.
3. Direction of Opening: Right (clockwise).
4. Pumper Nozzle Size: 5 inch Storz Connection.
   a. Storz connection shall have brass metal face and hard anodized aluminum Storz ramps and lugs.
   b. Cap shall have hard anodized Storz ramps and lugs and be connected to the fire hydrant with 0.125 inch vinyl coated aircraft cable.
   c. Text “OPEN” and arrow cast on top.
   d. Bronze drain ring, valve seat ring, and upper and lower valve plates.
5. Pumper Nozzle Thread 5.562 inch OD with 6 tpi.
6. Hose Nozzle Number/Size: Two, each 2 1/2 inches in diameter.
8. Operating Nut: 1 inch square.

D. Painting:
1. Shop coating according to ANSI/AWWA C502.
2. Exterior below grade: Asphalthic coating.

E. External Bolts and Hex Nuts: Stainless steel according to ASTM A 193, Grade B8.

F. Auxiliary Gate Valve: Comply with Section CR-5020 2.01 of this specification.

G. Pipe and Fittings: Comply with Section CR-5010 of Cedar Rapids Supplementary Specifications to SUDAS.

2.03 APPURTENANCES

A. Flushing Device (Air Releases and Blow-offs): As specified in the contract documents. All pipe fittings shall have National Pipe Thread pattern.
1. Nominal size:
   a. 2 inch blow-off assemblies.
   b. Minimum 1 inch air release assemblies.

B. Valve Box:
1. Applicability: For all buried gate or butterfly valves.

2. Manufacturer:
   a. East Jordan Iron Works
   b. Tyler
   c. Approved equal

3. Type:
   a. In paved areas, for water main less than 12 inch diameter, use a slide type.
   b. In paved areas, for water main 12 inch diameter or larger, use slide type with locking lid.
   c. In all other areas, use a screw extension type.


5. Cover: Gray iron, labeled "WATER".

6. Wall Thickness: 3/16 inch, minimum.

7. Inside Diameter: 5 inches, minimum.

8. Length: Adequate to bring top to finished grade, including valve box extensions, if necessary.
9. **Factory Finish:** Asphalt coating.

10. **Valve Box Centering Ring:** Include in installation.

C. **Valve Stem Extension:** For buried valves over 7 feet deep, provide extension as necessary to raise 2 inch operating nut to within 4 to 6 feet of the finished grade.

### PART 3 – EXECUTION

#### 3.01 GENERAL

A. Install according to the contract documents.

B. Apply polyethylene wrap to all iron pipe, valves, fire hydrants, and fittings.

C. Set tops of valve boxes to finished grade in paved areas and 2 inches below finished grade in non-paved areas unless otherwise directed by the Engineer. Valve boxes shall be plumb and free from debris.

D. Check the working order of all valves by opening and closing through entire range. Operate valves only under direction of Water Division personnel.

E. Test and disinfect all valves, fire hydrants, and appurtenances as components of the completed water main according to Section CR-5030 of Cedar Rapids Supplementary Specifications to SUDAS.

#### 3.02 FLUSHING DEVICES (Air Releases and Blow-offs)

A. Install and construct as specified in the contract documents. If not specified, install flushing devices as directed by the Engineer.

B. Install gravel backfill.

C. Install thrust block, bearing on perpendicular excavation face of undisturbed earth.

D. Drain-back holes are not allowed.

#### 3.03 FIRE HYDRANT

A. Install according to Figure CR 5020.993.

B. If the fire hydrant valve is positioned adjacent to the water main, attach it to an anchor tee.

C. If the fire hydrant valve is positioned away from the water main, restrain all joints between the valve and water main.

D. **Fire Hydrant Depth Setting:**
   1. Use adjacent finished grade to determine setting depth.
   2. Set bottom of breakaway flange between 2 and 5 inches above finished grade.
3. If finished grade is not to be completed during the current project, consult with the Engineer for proper setting depth.

E. Coordinate installation with tracer wire installation.

F. Orient fire hydrant nozzles as directed by the Engineer.

G. Tee, isolation valve, and associated piping (but not barrel shall be wrapped with polyethylene wrap.

H. When determined by the Engineer, scratches, chips, cracks, pits or mars to the finish will require the entire exposed portion of the fire hydrant to be re-painted as follows:
   1. Prepare surface per paint manufacturer’s directions for surface preparation, primer, temperature and humidity and application.
   2. Remove all debris on hydrant, including but not limited to, hydroseed, spray mulch, mud and dirt with sand paper, an abrasive pad or wire brush.
   3. Surface shall be clean, dry and free from oil, grease or other contaminants.
   4. Paint all base metal with one coat of recommended primer.
   5. Paint: A mineral spirits based 200 Series Silicone Alkyd Enamel containing no lead or chromium compounds and having superior UV resistance for brush, roller or spray application. Color to match RAL 6005.

3.04 ADJUSTMENT OF EXISTING VALVE BOX OR FIRE HYDRANT

A. Valve Box Adjustment: For existing adjustable boxes that have sufficient adjustment range to bring to finished grade, raise or lower valve box to finished grade.

B. Valve Box Extension: For existing valve boxes that cannot be adjusted to finished grade, install valve box extensions as required.

C. Fire Hydrant Adjustment:
   1. Fire hydrant extensions will be allowed only with approval of the Engineer. If possible, adjust height by deflection of joints. If necessary, adjust height by use of fittings.
   2. Paint exterior of new barrel section to match existing fire hydrant unless otherwise specified.

3.05 ABANDONMENT OF EXISTING VALVES

A. Removal of valve box includes removal of the top 2 sections of a 3-piece valve box or removal to a minimum of 5 foot below top of grade.

B. Fill void after removal with sand, crushed stone or flowable mortar.
FIGURES

CR 5020.991  Temporary Dead End Water Mains
CR 5020.992  Concrete Blocking for Fixtures
CR 5020.993  Hydrant Set Detail
CR 5020.994  Round way Connection Main
CR 5020.995  Valve Box Installation > 10 ft. Deep
CR 5020.996  Air Release Detail
CR 5020.997  Blow Off Detail
CR 5020.998  Typical Residential Service Line

END OF SECTION