# STANDARD SPECIFICATIONS

For construction of public water and sewer improvements in the City of Rogers and areas under the jurisdiction of the Rogers Waterworks and Sewer Commission

Revised September 2022


ADH # 115198 D1 A1
ROGERS Standard Specs
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Rogers Water Utilities

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# Table of Contents

# PART I - GENERAL REQUIREMENTS

## *Section 1 - General*

### 1.1 Description

This part of the specifications stipulates general requirements for the preparation of reports, plans, specifications, methods of construction, inspection, testing, and final approval of any proposed water and/or sanitary sewer lines, appurtenances, or other structures that are within the jurisdiction of Rogers Water Utilities (also referred to as “RWU”). Any deviations from the requirements set forth herein these specifications will be approved only by written authorization from Rogers Water Utilities. Special conditions may arise on any project that are not covered in these Specifications or that may require special handling. In case of such special conditions, complete detail as to materials, method of construction, or other procedures shall be submitted to Rogers Water Utilities for review and approval.

Standard construction details are incorporated and made a part of these Specifications and shall become a part of the standard requirements for water and sewer line construction. The Standard Details are included in the appendices at the back of these Specifications. Any omissions from these Specifications or construction details are to be referred to the Recommended Standard for Sewage Works and Recommended Standards for Water Works referred to as the "10-State Standards". The Standards shall apply as a minimum standard in all cases.

Where reference is made to a particular industry specification (ASTM, etc.) it is hereby understood that reference is made to the latest specification revision in effect.

### 1.2 Disclaimer

These specifications are intended to set forth minimum standards of quality for the construction of water and sewer facilities which can be accepted by Rogers Water Utilities. These specifications do not replace the Engineer's specifications and contract documents; however, construction of all water and sewer facilities must meet these standards of quality as a minimum.

Rogers Water Utilities shall not be responsible, nor shall it bear any liability, for the Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto; nor, shall Rogers Water Utilities be responsible for any actions resulting from direction of the project by the Engineer.

Rogers Water Utilities shall not be responsible for the acts or omissions of the Contractor or any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work. Nothing contained in these specifications shall be construed as an endorsement or warranty of any product, material, or workmanship. Rogers Water Utilities shall not be responsible, nor shall it bear any liability, for the failure of any material or method of construction.

## 1.3 Definitions

Rogers Water Utilities (“RWU”) - the municipal water and sewer utility of the City of Rogers, Arkansas, consisting of the water department and the sewer department, operated under common management, and being supervised by the Rogers Waterworks and Sewer Commission of the City of Rogers, Arkansas ("the Commission"), a combined waterworks and sewer commission established by City of Rogers Ordinance No. 86-10, codified at Section 54-1 et seq. of the Code of Ordinances of the City of Rogers, Arkansas.

**Superintendent**-The Superintendent of Rogers Water Utilities (“RWU”), the chief administrator and manager of RWU appointed by the Commission.

**Developer** - Individual, partnership, corporation, or other legal entity such as an improvement district desiring to construct water and/or sanitary sewer facilities for immediate or contemplated future inclusion in Rogers Water Utilities’ systems.

**Engineer** - Individual licensed to practice engineering in the State of Arkansas who is responsible for the preparation of reports, plans, specifications and inspection of the work.

**Contractor** - The person, firm, or corporation with whom the Developer has entered into an agreement to construct the water and/or sewer facilities.

**Resident Inspector** - An authorized representative of the Engineer responsible for the inspection of construction for compliance with approved plans and contract documents.

**Mainline** - Those parts of the sewer collection pipe system and/or water distribution pipe system that are maintained by RWU and provide service to individual private connections. The minimum diameter of all new main line construction is eight inches.

The term **"as specified"** shall mean as specified by the Rogers Water Utilities in plans, proposals, other specifications, and written or oral instructions.

The term **"or equal"** shall mean that the proposed material or item shall perform adequately the duties intended by the general design and is of same or equal design, substance, and junction to that specified by using the name of a product, manufacturer, or vendor. Use of the term "or equal" shall mean any party proposing to substitute an "equal" shall obtain an approval of RWU. RWU shall make final approval of such items or materials judged to be "equal".

The term **"these specifications"** shall refer to the "Specification Requirements for the Construction of Water and Sewer Facilities", latest revision.

Abbreviations used throughout these specifications have meanings as follows:

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| AASHTO | American Association of State Highway and Transportation Officials |
| ARDOT | Arkansas Department of Transportation |
| ANSI | American National Standard Institute |
| AWWA | American Water Works Association |
| CI | Gray Cast Iron |
| CS or CC | AWWA (Mueller Corporation Stop) Thread |
| DI | Ductile Iron |
| FIP | Female Iron Pipe |
| IP | Iron Pipe |

| | |
|---|---|
| MIP | Male Iron Pipe |
| PE | Polyethylene |
| PSI | pounds per square inch (gauge) |
| SSPC | Steel Structures Painting Council |

# *Section 2 - Jurisdiction*

## 2.1 Description

This section defines the areas where these specifications apply. These specifications apply to all areas presently being served or proposed to be served with potable water and/or sanitary sewer service by RWU.

## 2.2 Area of Jurisdiction

These specifications shall be adhered to for all extensions or expansions of potable water and sanitary sewer including the following:

a. All extensions of public water mains
b. All extensions of sanitary sewer mains
c. Fire protection systems (from the public main to the discharge side of the backflow prevention device)
d. Backflow prevention systems
e. Irrigation systems (from the public main to the discharge side of the backflow prevention device)
f. Private sanitary sewer systems
g. Private sanitary sewer pretreatment systems

These specifications govern all areas now served or to be served by RWU. These areas include the entirety of the corporate limits of the City of Rogers, as may be changed from time to time, and any area outside of the City approved for service. Except for areas within the City of Lowell, a request for a main line extension outside of the City must be submitted for approval to the Commission and may require approval of the Rogers City Council. A request for a main line extension outside of the City of Rogers but within the planning jurisdiction of the City of Rogers must also be submitted for approval to the Rogers Planning Commission.

All plans for private commercial plumbing (commercial & industrial building plumbing, process plumbing, fire protection, irrigation, etc.) must be submitted to RWU for determination of the adequacy of proposed backflow prevention. Plumbing permits will not be issued by the City of Rogers Building Inspection Department until RWU has approved proposed backflow prevention devices.

# *Section 3 – Plans & Specifications*

## 3.1 Description

This section covers the requirements for submission of plans and specifications to RWU in order to obtain approval.

## 3.2 Pre-Design Meeting

To prevent waste of valuable resources and unnecessary redesigns, the consulting engineer and/or developer may be required to meet with the RWU staff to discuss proposed utility extensions before detailed plans are prepared. Those representing the development are encouraged to bring site location maps, layout drawings, sketches, preliminary plans or any other document that will provide adequate understanding of what is proposed. RWU will provide input as to what is required from the development for water or sewer extensions and/or service connections.

## 3.3 Preliminary Report

When requested by RWU, the Engineer shall prepare and submit a preliminary engineering report prior to approval of construction plans. The report shall conform to accepted engineering criteria including the requirements of the Arkansas Department of Health and the Arkansas Department of Pollution Control and Ecology and shall contain data and facts as may be required by the Superintendent. The size, scope, and contemplated land use of the proposed development will determine the need for a preliminary report.

## 3.4 Construction Plans and Specifications

No water or sewer main extension may be approved for connection to RWU's system which was constructed prior to approval of construction plans by RWU or which was not constructed in accordance with approved plans. Construction plans shall conform to the requirements herein. Specifications shall be in accordance with Parts "I" and "II" of these requirements as a minimum. The submission of construction plans for approval shall be accompanied by a letter from the Engineer stating that materials and workmanship will be in accordance with these specifications and standard details.

All plans shall be drawn to a scale suitable for adequately showing the facilities proposed except as stipulated herein. All plans and profiles of sewer lines shall be at sufficient scale such that all components, text, notes and dimensions are clearly legible. All elevations shall be based on NAVD-88. An overall project map shall accompany the construction plans. It shall depict the entire project and show all proposed water and/or sewer lines properly labeled as to size and pipe material. All other utilities shall be shown along with the proposed road profile if applicable. A vicinity map shall be furnished indicating the location of the project in relation to arterial streets and major highways. All plans not prepared in accordance with this paragraph, without prior waiver of requirements, will not be reviewed or approved.

A detailed plan review checklist is provided in *APPENDIX C – ENGINEERING GUIDELINES*.

## 3.5 Changes from Approved Plans

Any changes from the approved construction plans and specifications must be authorized by the Superintendent or authorized representative of RWU prior to the start of construction.

## 3.6 Design Considerations

The following principals shall be adhered to:

Sanitary Sewer Mains:

a. No gravity sewer main conveying raw sewage shall be less than eight inches in diameter unless written permission is obtained from the Superintendent or other authorized RWU personnel
b. Where the difference in invert elevation between any two pipes entering a manhole is 2.0 feet or more, an outside drop connection shall be utilized as shown on the standard detail sheets. Inside drop connections (when necessary) shall be secured to the interior wall of the manhole and shall provide access for cleaning. Drop connections are permitted on a case by case basis, only.
c. The minimum earth cover for sanitary sewer mains shall not be less than 36 inches, unless an exception is granted in writing by Rogers Water Utilities.
d. Where the earth cover over the pipe bells cannot be maintained at least 2.5 feet (30 inches) the pipe material shall be ductile iron pipe as specified in *PART II-MATERIALS* of these specifications.
e. Sewer pipe material shall be of the types listed in *PART II-MATERIALS* of these specifications. Materials not specifically authorized in these specifications are forbidden for use in the system unless approved in writing by RWU.
f. Location and depth of main extensions to serve parcels of property shall be planned so as to facilitate operation, maintenance, and extension.
g. All sewer main extensions without regard to length shall terminate in a standard manhole.

Water Distribution Mains:

h. The minimum inside diameter (I.D.) for public water mains shall be eight (8) inches. unless hydraulic analysis determines that adequate fire flow may be obtained through a six inch line. Generally, six inch diameter mains must be constructed in closed loop configurations.
i. Fire hydrants shall be installed at a maximum spacing of 800 feet along proposed water main extensions. In planned additions or developments, fire hydrants shall be configured to provide adequate fire protection to all planned structures.
j. All main extensions without regard to length shall terminate in a fire hydrant unless otherwise approved by the Superintendent or other authorized RWU personnel.
k. The minimum earth cover shall not be less than 36 inches for mains and 30 inches for services.

l. A hydraulic analysis of the water distribution system may be required. The analysis shall depict design flows and residual pressures in the mains. Additional design data may be required, if in the opinion of RWU, it is necessary for review and approval of the plans.

m. Sufficient valves shall be provided on water mains to minimize inconvenience, facilitate expansion and minimize sanitary hazards during repairs, as determined by RWU.

n. Valves should be located at not more than 500 foot intervals in commercial districts or 800 foot intervals in other districts. Also, if possible, valves shall be provided so that no more than 20 residential water services shall be affected by main line shut downs.

o. All taps on existing mains for main extension shall be performed by RWU at the Contractor's expense.

p. Water pipe materials shall be of types listed in Part II of these specifications. Materials not specifically authorized in these specifications are forbidden for use in the system unless approved in writing by RWU.

## 3.7 Approval

Four (4) sets of complete construction plans shall be furnished to RWU. A statement by the Engineer, that work will conform to these specifications and that professional construction inspection will be provided, must accompany the plans. A Construction Progress Schedule and Engineer inspection schedule may be required prior to commencing construction. Design data for all sewer extensions shall be furnished for RWU's review.

All plans must be submitted to and receive approval for construction from the Arkansas Department of Health (ADH) (or, as applicable, from RWU as a delegate of ADH) before any utility work is started.

## 3.8 Conformity

All plans, specifications, and construction procedures shall conform to the standards as established by RWU. All plans and specifications shall be prepared under the supervision of a Professional Engineer licensed in the State of Arkansas. The Engineer's seal and signature shall be placed on all plans and specifications. Plans will not be reviewed unless the engineer's seal and signature are in place.

## 3.9 Plan Review Fees

RWU may charge plan review fees when multiple reviews are required. The plan review fee policy is provided in Appendix A.

## 3.10 Record Plans

### Description

This specification governs the record plans (as-built) requirements that must be submitted to RWU upon the completion of the water and sanitary sewer facilities. The record plans must show the exact location of all water and sanitary sewer facilities as constructed.
Deliverables shall include the following Electronic Media:

a. PDF (.pdf) of Record Plans
b. Autocad Drawing (.dwg)
c. Point file (in .txt or .csv format) of all critical water & sewer point coordinates

PDF Record Plan Requirements

### General

a. The construction plans shall be used in the preparation of the record plans.
b. Record plans shall consist of the cover sheet, utility plan sheet(s), water and sanitary sewer main plan/profile sheet(s). If the construction project includes a sanitary sewer lift station, record plans shall also include the force main plan/profile sheet(s) and all lift station sheet(s).
c. A table of all critical point coordinates shall be shown on each sheet. The table shall contain the Item ID, Northing, Easting, Elevation, and Description. Drawing callouts shall be shown corresponding to the point number.

Example:

| Coordinate Table | | | | |
|---|---|---|---|---|
| Point No. | Northing | Easting | Elevation | Description |
| 1 | 123456.78 | 123456.78 | 1234.56 | 8” Gate Valve |
| 2 | 123456.78 | 123456.78 | 1234.56 | Sewer Manhole 4’ dia |
| 3 | 123456.78 | 123456.78 | 1234.56 | Sewer Service Capped |

d. Utility easements and rights-of-way shown on the utility plan sheet(s) must be shown on the recorded plat and/or easement dedication plat. Utility easement dedicated by separate document shall be shown and noted on record drawings.
e. On phased projects, the phase lines must be clearly shown on the utility plan sheet(s) and the plan view of affected water and sanitary sewer main plan/profile sheet(s).
f. All street names, subdivision names, lot numbers and property addresses must be clearly shown on record plans.
g. Utilize detail blow-ups where several utility features are close together, such as valve clusters and manholes/services.

h. All changes to the construction plans must be shown clearly on the record plans by boldly striking through the item changed and placing the record plan information next to or as near as possible to it. All record plan annotation changes must be larger and bolder than the original and free from background obscuring.
i. When there is a change in the alignment of the proposed sanitary sewer main, force main or water main, the record plan must reflect this change accurately. The old alignment should be deleted from the record plans.
j. All elevations reflected on the record plans shall be based upon NGVD88.
k. All record plans must be labeled and signed and sealed by a registered Arkansas professional engineer.

### Water Main Facilities Requirements

a. Utilize detail blow-ups where several valves/meter boxes are close together and provide directional dimensions for valves/meter boxes.
b. When there is a change in the proposed depth and/or length of the water pipe, the profile view shall reflect this change accurately.
c. The demarcation (separation) valve from public to private fire lines must be labeled. The fire lines and FDC lines must be labeled.
d. Clearly show all abandoned water mains, valves and cut & caps on the record plans.
e. Water system valves shall be identifiable with the overall layout.
f. Critical point coordinates shall include all fittings, valves, meters, hydrants, ARVs, and pipe bells.

### Sanitary Sewer Facilities Requirements

a. Determining record slope of sanitary sewer mains may be accomplished by one of two methods. Record slope may be calculated by determining the horizontal length of pipe between the invert in elevation and the invert out elevation of the manholes (edge of manhole to edge of manhole) or by determining the horizontal length to the center of the two manholes (length being the pipe and half of the diameter of two manholes) with the center invert elevation of both manholes.
b. The demarcation (separation) sewer manhole from public to private sewer mains (diameters greater than 6 in.) must be labeled. Private sanitary sewer mains must be labeled.
c. When there is a change in the proposed slope and/or length of the sewer pipe, the profile view shall reflect this change accurately. The rim elevation, invert elevations, slope percent and pipe length shall be revised as needed.
d. Two directional dimensions are not required for an end of sewer service if sewer service is connected to building.
e. Record force main plans shall be prepared as outlined for the water main facilities requirements.
f. Record lift station plans shall reflect all changes accurately. The site grading, paving, power/cable routing, fencing and yard piping shall be revised as needed. Record elevations are required for the wet well structure, valve vault structure and the piping penetrating structure walls.

g. Clearly show all abandoned sewer mains and manholes.

### AUTOCAD (.DWG) Drawing Requirements

a. All pertinent drawing elements must reside in the primary drawing file. All x-reference drawings shall be bound (insert method).
b. All line work shall be in the form of flattened polylines.
c. All AutoCAD data shall be removed from the drawing except the following features:
d. Water (mains, services, hydrants, valves, fire lines, air release, etc.)
e. Sewer (mains, services, manholes, cleanouts, force main, valves, etc)
f. Property (Lot lines, ROW lines, easements, lot numbers, addresses)
g. Structures (buildings, canopies, masonry walls, etc.)
h. Streets, sidewalks, and parking areas

### Text (.txt) File Requirements

a. The text files shall include all critical point coordinates matching the coordinate table shown in the PDF submittal.
b. The GPS points included in the text file shall be ASCII coma delimited format (numbers shall be without commas).
c. Global Positioning System (GPS) data points (field measured) must be provided on all visible above-ground components, including but not limited to:
    1. Water: valves, air release valves, water meter boxes, fire hydrants
    2. Sewer: Manholes, end of sewer service lines with record plan stationing.
d. GPS data points must be provided in state plane coordinates, NAD 83 Arkansas North Zone, survey feet.
e. All elevations shall be based upon NGVD88.
f. The GPS position accuracy shall be survey grade with differential correction.

## *Section 4 - Inspection and Layout*

### 4.1 Description

This section covers the requirements of inspection and layout for the construction of water and/or sanitary sewerage facilities.

### 4.2 Responsible Engineer

The Engineer who prepared and submitted the construction plans and specifications shall be responsible for construction layout, general direction, and resident inspection as described in more detail in the following sections. Continuous project responsibility shall be an express condition of plan approval. The Engineer's responsibility shall extend through submittal of "as-built" plans and full acceptance of the project by RWU for maintenance.

### 4.3 General Direction

All water and/or sanitary sewerage facilities proposed shall be constructed under the general direction of the Engineer. General direction shall consist of, but not be limited to, periodic visits

to the construction site to observe the progress and quality of the executed work to determine if the work is proceeding in accordance with the approved plans and specifications and with the standards set forth by RWU.
Any defects, deficiencies or irregularities in the work found by the Engineer or reported by the resident inspector shall be reported to RWU. Such action, as deemed appropriate, and as approved by RWU, shall be taken to correct such deficiencies.
All work performed subject to these requirements shall at all times be subject to the general inspection of RWU. The frequency of visits and the number of hours required for RWU personnel will be depend on the quality of inspection being performed by the Engineer and resident inspector.

### 4.4 Resident Inspection

To insure conformance with the approved plans and specifications, full time resident inspection is required and shall be performed by qualified personnel under the direct supervision of the Engineer. The name of the resident inspector shall be furnished to RWU prior to start of construction. It shall be the responsibility of the resident inspector to safeguard RWU's interests by checking the construction work for compliance with the approved plans, specifications, and other standards. Any defects, deficiencies, or irregularities shall be reported to the Engineer. A job diary shall be kept outlining all aspects of the construction project and shall be made available to RWU on a weekly basis.

### 4.5 Construction Layout

The layout and staking of the construction work shall be completed by trained and qualified survey personnel. The Engineer shall be responsible for verification of the Job Layout. Such layout and staking shall consist of alignment and grade stakes as required to construct the proposed extensions as approved for construction. The use of construction lasers is required for gravity sewer construction.

Where mains and service lines are adjacent to or under proposed streets, or which are located in areas where the final grade of the site has not been established before installation, the main or service line shall be staked for grade to ensure compliance with approved plan and profile, and to ensure a minimum cover of 36 inches for water mains and 36 inches for sewer mains after completion of all dirt work.

### 4.6 Preconstruction Conference

RWU requires a preconstruction conference for all water and/or sewer projects. The conference will be held to discuss the scope of the project and other aspects such as scheduling, insurance, work hours, contractual commitment between developer and contractor, or other project aspects as RWU may deem necessary. It is the engineer's responsibility to contact RWU to schedule said meeting.

### 4.7 Contract Requirements

Before any construction starts, the developer or owner of the proposed project, or his designated agent, will be required to enter into a "RWU Special Contract for the Facilities Extensions". A contract template is provided in *APPENDIX B – Standard Forms*.

### 4.8 New Connection Fees

The Rogers Waterworks and Sewer Commission may, from time to time, set fees for the connection of water or sewer service. The Developer/Owner shall pay all such fees as required prior to the establishment of service.

### 4.9 Plan Review Fees

The Rogers Waterworks and Sewer Commission may, from time to time, establish fees to cover the review of plans and inspection of construction. All such fees are payable in advance of plan review.

## *Section 5 - Rules and Regulations*

### 5.1 Description

This section covers such rules and regulations as required by law for the completion of plans, specifications, and construction work on any and all proposed water and/or sanitary sewerage facilities.

### 5.2 Laws, Regulations, and Ordinances

All Federal, State, County, and City Laws, Regulations, or Ordinances shall be complied with on all projects. This shall include, but not be limited to the obtaining of approval from the Arkansas Department of Health and the Arkansas Department of Pollution Control and Ecology. Responsibility for submission to, and approval by, the Arkansas Department of Health and the Arkansas Department of Pollution Control and Ecology shall be the engineer's, including payment of any applicable fees.

### 5.3 Permits and Licenses

All permits and licenses required by any Federal, State, County, or Local Governing Body shall be obtained in strict accordance with the requirements of the governing agency. When required by the licensing agency, RWU will assist in application for permits and licenses, but the cost of any permit, fee, or bond required will be borne by the Developer.

### 5.4 Bonds Required

For all contracts exceeding a sum of $50,000, the Contractor shall post a performance and payment bond, in a form acceptable to RWU for the amount of the contract to guarantee performance of the job in accordance with the plans and specifications within the time prescribed for such completion and for a period of one year after acceptance and becoming a part of the municipal system, and to ensure payment to those providing labor, materials, and supplies. Additional bond requirements may be found in the Appendix.

### 5.5 Contractor Qualifications Required

All corporations, firms or individuals laying or installing water and/or sewer lines, except when being laid by Utility personnel, shall have a contractor's license specific to municipal work or underground cabling & trenching, and specific water and/or sewer utility construction experience.

## *Section 6 - Existing Utilities*

### 6.1 Description

This section covers the requirements with respect to existing public or private utilities.

### 6.2 Proximity

All plans shall be drawn in such manner that all known utilities are shown using the best available information including utility maps, field surveys, or other sources of information. Water and sewer lines shall be kept, where possible, a minimum horizontal distance of 5' from all underground utilities with the following exception. A minimum horizontal distance of 10 feet shall be maintained between water and sanitary sewer lines and appurtenances. Exceptions shall be only as authorized by the Arkansas Department of Health, Division of Engineering.

### 6.3 Crossings of Water and Sewer Lines

Water mains necessarily in close proximity to sewers must be placed so that the bottom of the water line will be at least 18 inches above the top of the sewer line at its highest point. If this distance must unavoidably be reduced, the water line or the sewer line must be encased in watertight pipe with sealed watertight ends extending to points where at least ten feet of horizontal separation between un-encased pipes is provided. Any joint in the encasement pipe is to be mechanically restrained. Where a water line must unavoidably pass beneath the sewer line, at least 18 inches of separation must be maintained between the outside of the two pipes in addition to the preceding encasement requirement. All joints shall be located equidistant and as far as possible from the point of crossing. Special structural support for the water and sewer lines may be required by RWU.

Water and sewer services must also be constructed to maintain minimum separations. All such crossings must be shown on the plans.

## *Section 7 – Easements*

### 7.1 Description

This section covers the requirements of easements for the purpose of maintaining water and/or sanitary sewer lines where the proposed lines will be on private property or where the lines would not be within public rights-of-way.

### 7.2 Width of Easement

Where water and/or sanitary sewer lines are not placed in public rights-of-way, a permanent easement shall be acquired for RWU and dedicated for all purposes necessary to operate and maintain main lines. The easement shall have a minimum width of 15' or two times the maximum depth to pipe flowline, whichever is greater. Common utility easements will be accepted provided that the easement is wide enough to accommodate the above requirements. Where practicable, easements of maximum width possible will be provided to allow access to all manholes, fire hydrants, valves, and other appurtenances. Temporary construction easements of adequate width must be provided for off-site extensions.

### 7.3 Filing of Easements

An example of a typical easement is provided in *APPENDIX B – Standard Forms*. Easements shall be prepared in the same manner as the typical and submitted to RWU for approval before being filed for record. Any proposed easement not approved by RWU will not be accepted. Easements shall be properly executed and recorded by the developer. It is the responsibility of the developer and engineer to discover the necessity of any easements and to obtain same. One copy of the approved recorded easement or dedicated plat must be submitted to RWU before construction will be accepted. All easements shall be in favor of the City of Rogers. Easements as shown on a recorded plat shall be considered as public easements and adequate for this purpose.

### 7.4 Plans

Construction plans should reflect the type, location, and dimensions of all proposed easements. As-built plans should reflect the type, location, and dimensions of all dedicated easements. Existing easements, as they relate to new construction, shall also be shown.

### 7.5 Engineer's Statement

The engineer must provide a statement that all utility construction was performed within the easements provided by the development.

## *Section 8 - Final Inspection and Acceptance*

### 8.1 Description

This section covers the requirements for final inspection and acceptance of the water and/or sanitary sewerage facilities upon completion of the project.

### 8.2 Acceptance Testing

Methods of acceptance testing are outlined in Part IV-Testing, of these standard specifications. All tests shall be conducted in the presence of the Engineer, the Contractor, and a representative of RWU. The Engineer shall schedule said tests with RWU at least twenty-four hours in advance of proposed testing times. All water and/or sewer services shall be in place before the mainline is tested. All tests shall be conducted during the normal working hours of RWU.

## 8.3 Final Inspection

Before water and/or sanitary sewer extensions are accepted for maintenance and service connections to these extensions approved, a final inspection will be made by RWU personnel in the presence of the Engineer. The final inspection will not be conducted until "as-built" plans are submitted.

Final inspection will be made at the request of the Engineer. A list of material and workmanship defects, if any, will be forwarded to the Engineer. Defects noted must be corrected before acceptance. Improvements found not as depicted on the submitted "as-built" plans shall be rejected.

## 8.4 Maintenance Bond

Upon completion of the project and after all defects have been corrected in accordance with the final inspection, a maintenance bond in a form acceptable to RWU or his representative for an amount equal to 50% of the construction cost shall be submitted to RWU (see *APPENDIX D – CONSTRUCTION FORMS AND CHECKLISTS* for cost certification form template). The bond shall be for a period of one year and shall cover all defects in materials and workmanship. The bond shall be binding on the owner, developer, or the contractor. If, in the judgment of RWU, construction of extensions, which total less than $50,000 in construction costs, meet the applicable specifications stated herein, the maintenance bond may be waived.

## 8.5 Acceptance

No connection of customer facilities or other utilization of main extensions will be permitted by RWU until a letter of acceptance is issued. The acceptance letter will not be issued until the following requirements are met:

a. Receipt of a digital copy of approved "as-built" plans and profiles of main extensions.
b. Satisfactory correction of all defects noted in final inspection.
c. Receipt of maintenance bond if applicable.
d. Receipt of all required easements.
e. Receipt of Engineer’s certification that all improvements have been constructed in accordance with the approved plans and specifications.
f. Receipt of an affidavit from the owner or developer that all materials, supplies and labor bills have been paid.
g. Receipt of Engineer's report outlining the total capital cost for water and/or sewer facilities, including all engineering fees.
h. Testing requirements, including bacteriological samples, have been certified as acceptable.
i. Payment of all applicable fees.
j. Engineer's certification that all main extensions are located in dedicated easements.

## 8.6 Inspection before Expiration of Maintenance Bond

An inspection will be made by RWU before the expiration of the maintenance bond. A list of any defects in material or workmanship found during this inspection will be forwarded to the

Developer's Engineer. If corrections are not made within a reasonable period of time, a claim will be filed with the bonding company. Once defects found during this inspection are corrected, RWU will issue full acceptance of the project for maintenance.

### 8.7 Use of Completed Portions

Portions of the project completed will not be allowed to be put into service without written approval from RWU. Approval of the use of completed portions of the project will be granted only in the best interest of RWU. Use of completed portions of an incomplete project does not constitute acceptance of the project by RWU.

## *Section 9 - Service Connections*

### 9.1 Description

This section describes certain requirements with respect to service line locations.

### 9.2 Adjacency Required

A water or sewer main must lie in an easement or right-of-way immediately adjacent to the property to be served, so that the service line to the property to be served shall not cross any other platted lot line. Private service lines must intersect the easement at a right angle. Otherwise, a main line extension is required.

### 9.3 Minimum Size and Location of Services:

### Sewer Services

All service stubs shall be installed on the sewer main to facilitate connection of anticipated services to the sewer. All service stubs shall terminate in suitable manner for insertion of a watertight plug or watertight cap. Unless anticipated service requires a larger line, all service stubs shall be 4" nominal diameter. Service stubs shall terminate at least 2 feet inside the property line but in no case shall the service stub terminate at a distance less than 8 feet from the sanitary sewer main, with sufficient vertical and horizontal clearances from other utilities. Coordinates of all service stubout termination points shall be measured and recorded on the record plans.

The exact location of all sanitary sewer stubs shall be accurately identified in the field at the property line in order that the exact location can be easily found by a metal detector when the connection is made. This shall be done by burying a 6 Ft. steel tee post over the end of the service stub and buried to the finish grade of the lot.

### Water Services

All water services shall be installed on the water main to facilitate connection of anticipated services. All water service meter boxes shall be within the dedicated easement or right-of-way. Unless anticipated service requires a larger line, all service lines shall be 1" nominal diameter. The meter box shall be field adjusted to final grade. Failure to do this may be sufficient reason to refuse utility service. All meter box adjustments or service repairs or replacements, due to lot development shall be the responsibility of the developer or owner.

## *Section 10 - Facility Extension*

### 10.1 General

### Fees

Any person (APPLICANT) who requests the installation of facilities must pay all costs connected with the installation, including applicable Connection fees, except under certain circumstances where the installation includes facilities in excess of those required to serve the APPLICANT'S property, as determined by RWU (see *Section 11 - Participation*)

### Changeability

The information furnished herein is subject to change, may not apply under certain circumstances and is not binding upon RWU. ROGERS WATER UTILITIES IS NOT BOUND EXCEPT BY WRITTEN CONTRACT.

### Construction Permission

No facilities may be constructed prior to applicant entering into a written contract with the RWU. See *APPENDIX B – Standard Forms* for a typical contract form.

### 10.2 Requirements

### Adjacency of Service

Should a water or sewer main be adjacent to property which requires service but a main is not available or adequate in size, in the judgment of RWU to provide the service required for the project, the main extension policy will be applied as if no main exists.

### Cost of Extension

Unless the Commission participates in the cost of installation (see Section 11), it will be necessary for the APPLICANT to pay the cost of the extension of an adequately sized water main or sewer main to the property from a main on the existing system, where adequate capacity is available. Where the property requiring service cannot be reached, as described in Section 10.2, it is considered that no main exists and a main extension must be made before service can be provided.

### Installation of Domestic Services Adjacent to Main

APPLICANT will be required to install domestic (and sometimes sprinkler and irrigation, if applicable) services to serve APPLICANT'S property adjacent to the main being installed.

### Exceptional Requirements

It may be necessary for the applicant to install additional facilities other than water or sewer mains (i.e., tanks, pumps, lift stations, etc.) if hydraulic conditions warrant such, or such as required by RWU.

## 10.3 Approvals

### Subject to Approval of the City

All plans for installation of water or sewer utilities are subject to the approval of the Rogers Water Utilities Until approval is given by the Rogers Water Utilities, no water or sewer main extensions, either inside or outside the city, will be allowed.

### Plans Affecting Major Streets and Drainage

Plans which affect major streets and drainage must be approved by Rogers Planning Department.

### Fire Hydrant Spacing

Fire hydrant spacing, within the city limits, shall be in conformance with Chapter 20 of the Code of Ordinances of the City of Rogers and requires approval from the Rogers Fire Department.

### County

Work within County or within road right-of-way requires County Planning approval.

### Cut Permits

Cut permits are required for work within county right-of-way.

### Arkansas State Health Department

All plans for the installation of water facilities are subject to prior approval of the Arkansas Health Department (ADH), or, as applicable by RWU as a delegate of ADH.

### Arkansas Department of Transportation

All plans for the installation of water facilities within state right-of-way are subject to prior approval and permitting.

### Right-of-way Requirements

If not installed in public right-of-way, the APPLICANT must furnish an easement acceptable to RWU.

# *Section 11 - Participation*

## 11.1 General

Under certain circumstances, RWU may determine that it is in the public interest that distribution/collection facilities be installed which have a capacity greater than that required for a particular tract or development. In such case:

- RWU may pay a portion of the additional installation cost; or,
- The APPLICANT may pay the additional installation cost; or,
- The APPLICANT andRWU may share in the additional installation cost.

### Cost Participation

Cost participation in an amount greater than $20,000 for any individual project is subject to approval by the Commission and commitments to participate shall not be made prior to such approval and prior to execution of a main extension contract.

### Limiting Participation

In the event budgetary constraints require limiting participation, priority shall be granted to those extensions located within the city limits of Rogers. **APPLICANT will be notified of options available.**

## 11.2 Requirements for Participation

### Considerations

The following will be carefully considered in deciding when facilities are installed which merit participation:

a. Minimum criteria for water facilities established by RWU;
b. Type of development proposed or anticipated within the general service area;
c. Anticipated rate of development;
d. Projected total demand (both fire and domestic);
e. Hydraulic gradient and characteristics of system;
f. Department's Master Plan for distribution/transmission facilities and collection and treatment facilities;
g. Budgetary constraints.

These considerations shall be applied to the general service area rather than a specific development or tract within the general service area.

### Size of Mains

If, after determining the size of mains required for a tract of development in accordance with the above criteria, RWU desires to have larger mains installed, RWU may participate in an

amount represented by the cost differential between the main sizes required and those installed subject to the following limitations.

- Limited to mains which are intended to "pass through" the development to provide transmission capacity to another area.
- Single-Family and Low Density Multi-Family Residential limited to mains larger than 8 inches in diameter.
- High Density Multi-Family, Commercial and Industrial-limited to mains larger than 12 inches in diameter.

**RWU may pay the cost for:**

- Last Lot Installing main necessary to extend from the point of termination of mains required to provide service to all lots or tracts within a development, if other improvements such as streets, storm sewers, sidewalks, etc. are extended (on both sides of the street) to the development boundary. In the case of phased development by a common development entity, the development entity will be required to make such extensions without cost to RWU.
- Cost of installing mains across "gaps" which exist as a result of mains being extended to adjacent properties from opposite directions.
- Other locations as may be determined by RWU.
- **The amount of participation will be determined by the RWU whichever method described below yields the lesser amounts.**
- Application of unit prices received by the APPLICANT in the case of facilities installed under a "Special Contract for Distribution or Collection System Facilities".
- Application of unit prices received by RWU for constructing facilities of a similar nature.

### 11.3 Utility Master Plan

In some cases there may be a need for a water or sewer main as a part of the Utility Master Plan. If this pipe line exceeds a reasonable cost to the APPLICANT, as determined by the Commission, and if funds are available, RWU may, on Commission approval, move up the construction date if the APPLICANT makes an acceptable "contribution in aid of construction". An extension made under these conditions will require a contract.

## *Section 12 - Tap Fees and Connections*

### 12.1 Tap Fees in General

Tap Fees are required to be paid to RWU before the taps are made. Applicant shall complete a "request for service" application. Upon approval of the application and receipt of required fees, the work will be scheduled by RWU.

**Tap Fees**

Taps fees refer to latest fees established by the Commission. Fees are charged only when it is necessary to complete a water service or tap an existing water or sewer main.

**Water**

Fee schedules may be obtained from Rogers Water Utilities. Some services may cost more than the published rate, due to local conditions. All services 1 1/2" and larger will be charged on a "cost plus" basis, as determined by Rogers Water Utilities. Applicant may be required to pay a deposit before work starts.

**Sewer**

Sewer connection fees schedules may be obtained from the Rogers Water Utilities office. Some services may cost more than the published rates due to local condition, as determined by Rogers Water Utilities. This cost does not include excavation. Builder or owner is responsible for excavation of sewer line.

**Tap Fees do not include the Building Service Lines**

Large tap fees must be paid for prior to the tap being made. A rate schedule for large tap fees is available on request from Rogers Water Utilities.

## 12.2 Connection Fees

Connection fees help defray costs of water and sewer system improvements. Connection fees are collected by RWU prior to the establishment of service. All connection fees are set aside in a separate fund to help pay for water and sewer main extensions, transmission mains, tanks, pumping stations, treatment works, or any other legal purpose. Connection fees may be included in the "contract for extension of water and /or sewer facilities", if the connection to the existing facilities includes such extensions. If water or sewer service only is required, the connection fee will be collected at the time the "application for service" is submitted to RWU. Connection fees are separate and in addition to tap fees.

**Water Connection Fees**

The current rate schedule may be obtained at the Rogers Water Utilities business office or online at www.rwu.org .

**Sewer Connection fees**

A current Sewer connection fee rate schedule is available at the Rogers Water Utilities business office or online at www.rwu.org .

**Multiple Unit Housing Will be assessed on a Per Unit Basis**

**Water and Sewer Connection Fees are Subject to Change without Notice**

The Rogers Water Utilities is not bound except by written contract. Failure to collect connection fees at the time service is made does not constitute a waiver of such fees.

# PART II-MATERIALS

## *Section 1 - Description*

### 1.1 Description

These specifications are intended to set a standard of quality and design for all material used in the construction of water and/or sewer mains and appurtenances. Projects that would necessarily involve materials other than those included in this specification shall be subject to the approval of the Rogers Water Utilities.

### 1.2 Domestic Manufacture

All materials must be of DOMESTIC manufacture and approved by RWU.

### 1.3 Lead Free

All materials in contact with potable water must conform to the no lead requirements in the Safe Drinking Water Act.

### 1.4 References

Any reference to specifications published by other agencies shall refer to the latest edition or revision of such specifications.

## *Section 2 - Ductile Iron Pipe*

### 2.1 Description

This specification covers 4 in., 6 in, 8 in., 12in., 18 in., 24 in. and 30 in. through 54 in. in diameter ductile-iron pipe, centrifugally cast, for water or other liquids, with push-on, mechanical or flanged joints. All pipe furnished shall be in conformance with ANSI/AWWA Standard C151/A21.51 latest edition.

### 2.2 General Requirements

a. All buried pipe shall conform to the following classes, based upon Type 5 bedding conditions and a working pressure of 150 pounds per square inch:

| Pipe Diameter | Minimum Pressure Class | ANSI Thickness Class |
|---|---|---|
| 4”, 6”, 8”, 12” | 350 psi | 50 or greater |
| 18” | 350 psi | 51 or greater |
| 24” | 350 psi | 52 or greater |
| 30” through 54” | 250 psi | 51 or greater |

b. Flanged end pipe shall conform to ANSI A21.51/AWWA C115.

c. All pipes shall have an interior cement motor lining with seal coat applied in accordance with ANSI A21.4/AWWA C104, latest revision. No asphaltic coating will be required on the interior cement mortar lining.
d. Exterior coating shall consist of a nominal one-mil thick asphaltic material applied to the outside of the pipe as described in section 4.4 of AWWA C151.
e. All rubber joint gaskets utilized on ductile-iron pipe shall be in conformance with ANSI A21.11/AWWA C111, latest revision.
f. Each length of pipe furnished shall bear identification markings in conformance with Sec. 4.7 of AWWA Standard C151.
g. Lubricant furnished for lubricant joints shall be non-toxic and shall conform to ANSI 21.11. The lubricant container must be labeled with the manufacturer's name.
h. The Rogers Water Utilities may, at no cost to the manufacturer, subject random lengths of pipe for testing by an independent laboratory for compliance with this specification. Any visible defects or failure to meet quality standards herein will be grounds for rejecting the entire order.

The following manufacturers are approved for push-on, mechanical joint and flanged ductile iron pipe.

**APPROVED MANUFACTURERS LIST**

American Cast Iron Pipe Company
U.S. Pipe Company
McWane Cast Iron Company

## *Section 3 - Ductile Iron Fittings and Couplings*

### 3.1 Description

This specification covers 4" through 64" in size designed and manufactured for use with gray-iron, standard/compact fittings, anchor fittings and couplings.

### 3.2 General Requirements for Fittings

a. Except as otherwise modified or supplemented herein, the latest revision of ANSI A21.10/AWWA C110 (full body) for Gray-iron and Ductile-Iron Fittings, 4 inch through 64 inch for Water and other Liquids and ANSI A21.53/AWWA C153 (compact body) for Ductile-Iron Compact Fittings, shall govern the design, manufacture, and testing for all fittings under this specification.
b. For 4" through 24-inch size range, the pressure rating of all fittings shall be a minimum of 350 psi. The working pressure for all fittings of size greater than 24 inches shall be a minimum of 250 psi.
c. Fittings shall be furnished with the types of end combination specified.
d. Anchor fittings shall be furnished in size and type or length as specified, and shall conform to ANSI A21.53/AWWA C153.

e. Flanged fittings have 150 lb. flanges and shall be faced and drilled in accordance with ANSI Specification B16.1, Class 125.
f. The exterior of all fittings shall be provided with a petroleum asphaltic coating in accordance with the latest revision of AWWA C110. The interior of flanged fittings supplied under this specification shall be cement-mortor lined with seal coat in accordance with the latest revision of AWWA Standard as specified. The interior of all other fitting supplied under this specification shall be cement-mortar lined in accordance with the latest revision of ANSI A21.04/AWWA C104.
g. All fittings shall be domestically manufactured.

## 3.3 General Requirements for Couplings

a. Couplings shall be made of ductile iron (full body) with mechanical joint (MJ) ends. Coupling shall conform to ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11.
b. The minimum length of a coupling is 8 inch.
c. Standard mechanical joint tee-bolts and nuts shall be high strength steel conforming to AWWA C111/A21.11 and C153/A21.53.
d. Coating of the coupling shall be provided with a petroleum asphaltic coating in accordance with the latest revision of ANSI/AWWA C151/A21.51.
e. Where specifications state a cast transition or reducing coupling in place of a straight coupling, the sleeve and follower flange shall be of the same manufacturer and compatible for the specific used intended.
f. The coupling shall be designed for a minimum working pressure as follows:

| Pipe Diameter | Minimum Working Pressure |
|---|---|
| 12” and smaller | 200 psi |
| 18” | 175 psi |
| 24” and larger | 150 psi |

g. All ductile iron couplings shall be domestically manufactured.

## 3.4 General Requirements for Direct Restraint Fittings

a. Mechanical joint (MJ) and/or flange joint valves, fittings and hydrants shall be restrained using a positive restraint mechanism manufactured of ductile iron conforming to ASTM A536, Grade 65-45-12.
b. Both MJ glands shall have the capability of rotating 360-degrees and deflecting the full deflection amount of a mechanical joint.
c. Glands shall bolt to integrally cast barrel ribs without the use of lug bolts, and shall be interchangeable to allow either MJ glands or flange glands to be attached in the field. The MJ glands shall be attachable with standard bolts and gaskets conforming to ANSI/AWWA C111/A21.11. The flange glands shall be attachable with standard bolts and gaskets conforming to ANSI/AWWA C110/ A21.10 and flange drilling conforming to ANSI Class 125 B16.1.
d. The device shall be supplied with an NSF 61 approved fusion bonded epoxy conforming to AWWA C116/A21.16 as well as the coating, surface preparation and application requirements of ANSI/AWWA C550.

e. All direct restraint fittings shall be domestically manufactured.

The following manufactures are approved for fittings, and couplings, and direct-restraint fittings.

**APPROVED MANUFACTURERS LIST**

| | |
|---|---|
| American Cast Iron Pipe Company | U.S. Pipe Company |
| Tyler Pipe Company | McWane Ductile |
| JCM Industries | Mueller Company |
| Infact Corporation | Romac Industries |

## *Section 4 - Resilient-Seated Gate Valves*

### 4.1 Description

This product specification covers resilient-seated gate valves, with nominal diameters of 2 in., 3 in., 4 in., 6 in. and 8 in. in size, refer to the nominal diameter in inches, of the waterway through the inlet and outlet connections and the closure area.

### 4.2 General Requirements

a. Except as otherwise modified or supplemented herein, AWWA Standard C515(latest revision) shall govern the design, component materials, construction; manufacture and testing of all resilient seated gate valves.
b. 2 in. and 3 in. resilient seated gate valves meeting the applicable design and construction requirements of the latest revision of ANSI/AWWA C509 shall be acceptable.
c. The minimum design working water pressure for gate valves with nominal diameter of 2 in., 3 in., 4 in., 6 in. and 8 in. shall be 200 psig unless otherwise specified.
d. Valves shall be resilient-seated types, bronze mounted with non-rising stems with 2-inch by 2-inch square operating nut. The closure member shall be fully encapsulated by an elastomer without thin spots or voids. When open the valve shall have a clear, full-port, un-obstructed waterway.
e. The gate valves shall be designed and constructed for installation in a horizontal orientation. Valves shall be designed for buried installation with stem in vertical position and shall be furnished for mounting in a horizontal pipeline, unless otherwise specified.
f. Valve ends shall be either flanged, screwed, mechanical joint or as specified. All mechanical joint valves shall be supplied with glands, bolts, and gaskets. Valve body bolts and nuts shall meet the strength requirements of ASTM A307 with dimensions conforming to ANSI B18.2.1. The size of the bolts head shall be equal to the size of the nut and shall be stainless steel in accordance with ASTM 276.

g. The following parts of the valve shall be made of either gray or ductile iron: bonnet, body, yoke, wrench nut, O-ring packing plate or seal plate, and gland follower. The gate may be made of gray or ductile iron.
h. Resilient seats shall be applied to the gate and shall seat against a corrosion resistant surface. The non-metallic seating surface shall be applied in a manner to withstand the action of line fluids and the operation of the sealing gate under long-term service. A metallic surface shall have a corrosion resistance equivalent to or better than bronze. A non-metallic surface shall be in compliance with ANSI/AWWA C550. The gate must be fully encapsulated by an elastomer without thin spots or voids.
i. All gate valves shall open left (counter clockwise), unless otherwise specified.
j. Screw Ends: Screw ends (2 in. and 3 in. service valves) shall be national pipe thread (NPT).
k. Flanged ends: Flanged fittings have 150 lb. flanges and shall be faced and drilled in accordance with ANSI Specification B16.1, Class 125.
l. Mechanical Joint Ends: Mechanical joint bell dimensions shall conform to ANSI A21.11/AWWA C111.

### 4.3 Painting

All exterior and interior surfaces of the valves shall be coated with epoxy, NSF certified. The epoxy shall have a minimal dry film thickness of 8 mils, and shall be in accordance with AWWA C550, latest revision.

### 4.4 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random valves to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All valves shall be domestically manufactured.

The following manufactures are approved for resilient-seated gate valves.

**APPROVED MANUFACTURERS LIST**

American Flow Control
Clow Valve Company
Kennedy Valve
Mueller Company

## *Section 5 - Rubber-Seated Butterfly Valves*
### *12 In., 18 In., 24 In. and 36 In. Through 54 Inches*

### 5.1 Description

This product specification covers class 150 rubber-seated butterfly valves, 12 in., 18 in., 24 in. and 36 in. through 54 in. All products furnished shall be in conformance with the American National Standards Institute and American Water Works Association C504 (ANSI/AWWA C504)

latest edition thereof. All coatings in contact with potable water shall be certified to NSF 61. A proof of design certification shall be provided upon request.

## 5.2 General Requirement

a. Except as otherwise modified or supplemented herein, AWWA C504 shall govern the design, component material construction, manufacture and testing of all butterfly valves.
b. Valves shall be Class 150 of the short-body type with a 150 psig bi-directional shut-off rating, a 300 psig hydrostatic body shell test and a maximum upstream line velocity rating according to the table listed below unless specified otherwise.
c. Valve shall be in the same alignment as a horizontal pipe and shall be for buried service, unless otherwise specified. Valve shall be configured with a horizontal valve shaft and a vertical actuator shaft with standard 2" AWWA operating nut. The actuator shall be side mounted with a counter clockwise rotation of the operating nut.
d. Valve body shall be of cast iron conforming to ASTM Specification A126, Class B, or Ductile Iron ASTM A536, grade 65-45-12.
e. Valve shall be of such design that the disc will seat at 90 degrees with the pipe axis.
f. Valves disc shall be of Cast Iron A-48, class 40 Cast Iron A126, class B or Ductile Iron ASTM A536, grade 65-45-12 and shall be of disc design to provide 360 degree uninterrupted seating.
g. The valve seat shall be natural or synthetic rubber applied integrally to the body or disc. For valves 24 inches or larger, the rubber seat shall be capable of mechanical adjustment in the field and shall be field replaceable. The mating seat surface shall be type 304 or type 316 stainless steel, ni-chrome or model. Sprayed or plate mating seat surfaces are not acceptable.
h. Valve shafts shall be type 630 stainless steel conforming to ASTM A-564 condition H-1100 and shall have a diameter equal to or greater than that shown for Class 150B in Table 3 of AWWA C504.
i. The valve assembly shall be furnished with a factory-set, non-adjustable disc shaft thrust bearing that insures the valve disc is centered within the valve body seat at all times.
j. Valve shaft bearings shall be permanent, self-lubricated, bearings with continuous, low-friction maintenance-free operation. Shaft bearing shall be contained in integral hubs of the valve body.
k. Valve shaft seal shall consist of O-ring or V-type type packing where the shaft projects through the valve body for the actuator connection.
l. The valves shall be provided with a fully enclosed, permanently lubricated actuator of the traveling nut or worm gear design. The actuator shall be connected to the valve shaft by means of a key and keyway connection.

m. Valves for non-buried installations shall be provided with a handwheel. The handwheel shall have an arrow thereon, indicating the direction of the opening. The handwheel shall be suitably fastened to the actuator input shaft. Actuators equipped with handwheels shall be designed to produce the specified torque with a maximum pull of 80 pounds of the handwheel rim.
n. Flanged ends (non-buried installation): Flanged fittings have 150 lb. flanges and shall be faced and drilled in accordance with ANSI Specification B16.1., Class 125.
o. Mechanical Joint Ends (buried installation): Mechanical joint bell dimensions shall conform to ANSI A21.11/AWWA C111.

### 5.3 Painting

All interior and exterior ferrous surfaces of the valve, including the disc, shall be coated with epoxy, NSF 61 certified. The epoxy shall have a nominal thickness of 8 mils, and shall be in accordance with AWWA C550, latest revision.

### 5.4 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random butterfly valves to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All butterfly valves shall be domestically manufactured.

The following manufactures are approved for butterfly valves.

**APPROVED MANUFACTURERS LIST**

| | |
|---|---|
| Mueller Company | Lineseal III |
| Henry Pratt Co. | Groundhog |
| Val-Matic Mfg. Co. | Series 2000 |
| M&H Valve | CL150 |
| DeZurik | 43.00-1 |

## *Section 6 - Air Release Valves*

### 6.1 Description

This specification covers automatic valves installed on water mains to vent accumulated air under system pressure, and to provide air exhaust during initial fill or to prevent a vacuum during draining of the system.

## 6.2 General Requirements

a. Valve body and cover shall be cast iron fabricated in accordance with ASTM A48-35 or ASTM A126 Class B or Ductile Iron in accordance with ASTM A-536. Inlet sizes through 3 inch shall be screwed (NPT). Pipe sizes above 18 inches shall have flanged inlets (125# ANSI B 16.1). A protective hood or cowl shall be installed on the outlet of flange-bodied valves.
b. Internal seat trim float arm and pivot pin shall be stainless steel type 303 or 304. Floats shall be stainless steel ASTM A240. Other internal parts shall be stainless steel ASTM A240 or ASTM A276.
c. Internal seat or orifice button shall be of Buna-N rubber compounded for water service. Cover gasket shall be composition-type, equal to Armstrong CS-231, Garlock 3000, or Lexide NK-511. Cover bolts shall be alloy steel.
d. Valve body shall have a test pressure rating of 300 psi and working pressure rating of 200 psi or greater.
e. Outlet shall be equipped with an an inflow preventer conforming to AWWA C514, latest edition.

## 6.3 General Operation Requirements

Combination valves shall provide for both automatic air release under system pressure and to allow air movement during filling or draining operations. The combination valve may be housed in a single casting. The housing shall be designed to incorporate conventional or kinetic flow principles to properly vent the air without premature closure. Flanged sized (4 inch) may be furnished in a dual housing. When dual casings are used a bronze manual isolation valve shall be installed. This will allow the air release valve to be serviced when the system is under pressure.

## 6.4 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random air release valves to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All air release valves shall be domestically manufactured unless specifically excepted in the approved manufacturers list.

The following manufactures are approved for combination air release valves.

**APPROVED MANUFACTURERS LIST**

| Manufacturer | 6”-12” PIPE | 18” PIPE | 24” and Larger Pipe |
|---|---|---|---|
| Apco Valve Company | 143C | 145C | 149C |
| G.A. Industries, Inc. (Empire) | 945H(1”NPT) | 945H(2”NPT) | 960C |
| Val-Matic Mfg. Co. | 201C | 202C | 204C |
| ARI (non-domestic) | D-040-C (1”) | D-040-C (2”) | D-060-C-HF |

# *Section 7 - Fire Hydrants*

## 7.1 Description

This product specification covers post-type, dry-barrel fire hydrants with compression shutoff (opening against pressure) or gate shutoff for use in water supply service in all climates. All products furnished shall conform to the American National Standards Institute and ANSI /AWWA C502, latest edition.

## 7.2 General Requirements

a. Fire hydrant shall be designed for a minimum working pressure of 200 psi.
b. The length of bury of the fire hydrant shall be as specified on project construction plans. The minimum depth of bury of the fire hydrant is 3½ feet.
c. The fire hydrant shall have two (2½ inch) hose nozzles and one (4½ inch) pumper nozzle and all nozzles shall be arranged in the same plain.
d. The fire hydrant outlet-nozzle threads are to conform to the National Fire Protection Association (NFPA) 1963, Standard for Fire Hose Connections.
e. The nominal diameter of the main fire hydrant valve opening shall be 5¼ inches.
f. The fire hydrant seat shall be removable, using a short lightweight wrench that will fit all depths of bury of a fire hydrant.
g. The fire hydrant shoe shall be provided with a mechanical flange (ANSI 125) connection to fit the water supply connecting pipe from the water main. Shoe mechanical flange shall be a non-rotating bolt design.
h. The fire hydrant shall open left (counter clockwise).
i. The fire hydrant shall have a non-rising stem.
j. No more than one extension shall be provided if required to raise breakaway flange of the fire hydrant grade level.
k. The fire hydrant shall have a breakaway flange (safety flange) at the ground line as stipulated in AWWA C502 in the barrel and operating mechanism and shall be designed so that in the event of accident, damage or breaking of the hydrant above or near the ground line, the main valve will remain closed and reasonably tight against leakage in accordance with AWWA C502.
l. The fire hydrant nozzle cap chains shall be required and shall be attached permanently to the fire hydrant as stipulated in the General Design section of AWWA C502.
m. Parts of the fire hydrant that require lubrication and come within contact with water shall be lubricated with non-toxic lubricant that does not pose a health hazard to the public if consumed.

## 7.3 Paint

a. All coatings shall be factory-applied, except as otherwise noted herein.

b. The exterior surface of the public fire hydrant shall be coated with a coating that shall meet or exceed the requirements of Federal Specifications TT-C-494b. A second coat of oil based enamel paint, SW7664 "Steely Grey", will then be applied from the top of the hydrant to the traffic breakaway flange connection at the ground. Private fire hydrants shall be coated in oil based enamel paint, red in color.
c. If damage to the exterior surface coating of the public fire hydrant occurs during the handling and/or installation of the hydrant, the material supplier and/or contractor shall be responsible for the minor touch-up/repair of said exterior surface to its original factory condition.

### 7.4 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random fire hydrants to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All fire hydrants shall be domestically manufactured.

The following manufactures are approved for fire hydrants.

**APPROVED MANUFACTURERS LIST**

| | |
|---|---|
| Mueller Company | Centurion A-423, Traffic Model |
| Clow Valve Company | Medallion F-2545, Traffic Model |

## *Section 8 - Tapping Sleeves and Valves, Insert Valves & Cut-in Valves*

### 8.1 Description

This specification covers tapping sleeves and valves, insert valves & cut-in valves. The diameter of the tap may be as large as the pipe for 12 inch and smaller water mains. The maximum diameter of the tap on an 18 inch water main is 12 inch, the maximum diameter of the tap on a 24 inch water main is 18 inch and the maximum diameter of a tap on a 30 inch water main is 24 inch.

### 8.2 General Requirements for Ductile Iron Tapping Sleeves and Valves

a. Ductile iron sleeves shall be mechanical, split-type (full body) with flanged outlet. Sleeves shall conform to ANSI/NSF 61 and Manufacture's Standardization Society standard practice SP-60.
b. Sleeves shall be designed for a minimum working pressure of 225 psi or greater.
c. Outlet flange of sleeve shall be a 150 lb. and shall be faced and drilled in accordance with ANSI Specification B16.1, Class 125.
d. A test port with plug shall be furnished through the sleeve body for hydrostatic testing on sleeves 4 inch and larger.
e. All tapping valves shall be resilient-seated gate valves and conform to the requirements of *PART II-MATERIALS*.

f. All tapping valves shall open left (counter clockwise), unless otherwise specified.
g. Valves used in tapping applications (2" – 12") shall be resilient seated gate valves (MJ x Flange) conforming to all applicable requirements of Section 4 of this specification.
h. Tapping valves 16 inch and larger shall meet all applicable requirements of ANSI/AWWA C515, shall be designed for horizontal installation and geared. Gears shall be cut-tooth steel and gear cases shall be totally-enclosed, weather type to enclose the gears, the stuffing box and the valve stem, attached to the valve bonnet. The number of turns to open or close the valve shall be consistent for each valve size for the manufacturer.
i. All exterior and interior surfaces of the tapping valves shall be coated with epoxy, NSF certified. The epoxy shall have a minimal dry film thickness of 8 mils, and shall be in accordance with AWWA C550, latest edition.
j. Installation shall be per the manufacterer's recommendations, and testing shall be in accordance with *PART IV - TESTING* of these specifications.

## 8.3 General Requirements for Stainless Steel Tapping Sleeves and Valves

a. Stainless steel sleeves shall be mechanical, split-type (full body) with flanged outlet. Sleeves shall conform to ANSI/NSF 61 and Manufacturers Standardization Society standard practice SP-60.
b. All sleeves shall utilize a Nitrile Butadiene Rubber gasket per ASTM D2000.
c. Sleeves shall be designed for a minimum working pressure of 225 psi or greater.
d. Outlet flange of sleeve shall be a 150 lb. and shall be faced and drilled in accordance with ANSI Specification B16.1, Class 125.
e. A test port with plug shall be furnished through the sleeve body for hydrostatic testing on sleeves 4 inch and larger.
f. All tapping valves shall be resilient-seated gate valves and conform to the requirements of *PART II-MATERIALS* of this specification.
g. All tapping valves shall open left (counter clockwise), unless otherwise specified.
h. Tapping valves shall be mechanical joint with tapping flange on the other end. The tapping valves shall be furnished complete with glands, bolts and gaskets.
i. The tapping valve shall have a clear, unobstructed waterway. The seat ring shall be of larger diameter to permit entry of full diameter tapping machine cutters. The valve end which mates with the tapping sleeve shall have an alignment lip to fit the recess in the tapping sleeve flange for proper alignment. The lip will be dimension in accordance with MSS SP 60 for valves 12 inch nominal sized and smaller.
j. Tapping valves 18 inch and larger shall be designed for horizontal installation and geared. Gears shall be cut-tooth steel and gear cases shall be totally-enclosed, weather type to enclose the gears, the stuffing box and the valve stem, attached to the valve bonnet. The number of turns to open or close the valve shall be consistent for each valve size for the manufacturer.
k. All exterior and interior surfaces of the tapping valves shall be coated with epoxy, NSF certified. The epoxy shall have a minimal dry film thickness of 8 mils, and shall be in accordance with AWWA C550, latest edition.

l. Installation shall be per the manufacterer's recommendations, and testing shall be in accordance with *PART IV - TESTING* of these specifications.

### 8.4 General Requirements for Insert Valves

The use of insert valves is not allowed unless authorized by the Superintendent of the Rogers Water Utilities.

### 8.5 General Requirements for Cut-In Valves

The use of cut-in valves is not allowed unless authorized by the Superintendent of the Rogers Water Utilities.

### 8.6 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random tapping sleeves or tapping valves to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All tapping sleeves and valves shall be domestically manufactured.

The following manufacturers are approved for tapping sleeves and valves.

**APPROVED TAPPING SLEEVE MANUFACTURERS LIST**

American Cast Iron Pipe Company (Ductile)
Tyler Pipe Company (Ductile)
Clow Valve Company (Ductile)
U.S. Pipe Company (Ductile)
Mueller Company (Ductile)
Romac Industries (Stainless Model SST III)
JCM Industries (Stainless Model 432)
Ford Meter Company (Stainless Model FTSS)

**APPROVED TAPPING VALVE MANUFACTURERS LIST**

American Flow Control
Clow Valve Company
Kennedy Valve
Mueller Company

## *Section 9 - Joint Restraint Systems*

### 9.1 Description

This product specification covers pipe joint restraint systems to be used on water mains for nominal pipe sizes of 6 inch, 8 inch, 12 inch, 18 inch, 24 inch and 30 inch through 64 inch.

## 9.2 General Requirements for Mechanical Joint (MJ) Restraint Devices

a. Radial type bolt retainer gland system shall be made of ductile iron and shall be in conjunction with mechanical joint (MJ) fittings or pipe. Split-ring retainer glands are not allowed on new construction. The retainer gland system shall conform to ANSI/AWWA C110/A21.10 and C111/A21.
b. The MJ Restraint Device shall utilize a standard mechanical joint gasket with a ductile iron replacement gland conforming to ASTM A 536 (latest edition). The gland dimension shall conform to standard mechanical joint bolt circle criteria.
c. The gripping wedges shall be compressed to the outside wall of the pipe using bolt and/or twist-off nuts to insure proper actuating of the retainer gland system.
d. Standard mechanical joint tee-bolts and nuts shall be high strength steel conforming to AWWA C111/A21.11 and C153/A21.53.
e. Coating of the retainer gland system shall be provided with a petroleum asphaltic coating in accordance with the latest revision of ANSI/AWWA C151/A21.51 or shall be provided with epoxy coating. The epoxy shall have a minimal dry film thickness of 8 mils, and shall be in accordance with AWWA C550, latest edition.
f. The retainer gland system shall be designed for a minimum working pressure of 350 psi for nominal pipe sizes of 6 inch through 12 inch and a minimum working pressure of 250 psi for nominal pipe sizes of 18 inch through 54 inch.

## 9.3 General Requirements for Lock Gasket Joints

a. Lock gasket joints shall conform to ANSI/AWWA C111/A21.11.
b. Lock gasket joints are required for carrier pipe installation in casings/tunnels and water mains for nominal pipe sizes of 18 inch, 24 inch and 30 inch through 64 inch (away from the ductile iron MJ fitting).

## 9.4 General Requirements for Tie Rods

a. Tie rods shall be ¾ inch diameter (all thread) ASTM grade 304 (18-8) stainless steel rods.
b. Eye Bolts shall be ¾ inch national coarse roll thread, high strength low alloy steel conforming AWWA C111. The installation of tie rods through the MJ flange bolt holes is not allowed.

## 9.5 General Requirements for Fitting Adapters

a. Mechanical joint (MJ) valves and fittings shall be connected using a bolt-through positive restrain system (adaptor) with a working pressure of 350 psi.
b. The adapters shall be ductile iron conforming to ASTM A 80-55-06 and provided for nominal pipe sizes of 6 inch, 8 inch and 12 inch.
c. The adapters shall be asphaltic coating in accordance with ANSI/AWWA C153/A21.53 and ANSI/AWWA C104/A21.4.

### 9.6 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random restraint systems to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All restraint systems shall be domestic manufactured.

The following manufactures are approved for restraint systems.

**APPROVED RETAINER GLAND MANUFACTURERS LIST**

EBBA, Inc.
Ford Meter Company
Tyler Pipe Company
Mueller Company
Romac Industries, Inc.

**APPROVED LOCK GASKET JOINTS MANUFACTURERS LIST**

McWane Ductile
US Pipe Company
American Cast Iron Pipe Company

**APPROVED TIE RODS MANUFACTURERS LIST**

| | |
|---|---|
| Star National Products | ¾" Stainless Steel, all thread, Rods |
| Romac Industries, Inc. | ¾" Eye Bolts |
| All-Pro Fasteners | ¾" Stainless Steel, all thread, Rods |
| All-Pro Fasteners | ¾" Eye Bolts |

**APPROVED FITTING ADAPTERS MANUFACTURERS LIST**

Infact (Foster) Corporation

## *Section 10 - Valve Boxes and Valve Stem Extensions*

### 10.1 Description

This product specification covers valve boxes and valve stem extensions for gate and butterfly valves.

### 10.2 General Requirements for Valve Boxes

a. Valve boxes shall be cast iron with iron lid suitable for heavy traffic and conform to ASTM A48, Class 20 Specifications.
b. Valve boxes shall be screw type and have 5¼ inch inside shaft diameter.
c. Cast iron drop lids shall have the word "Water" cast into the lid.

d. Valve boxes shall be provided with a petroleum asphaltic coating in accordance with the latest revision of AWWA/ANSI C151/A21.51.
e. At bury depths greater than 80 inch (6'-8"), the use of six inch PVC, SDR 26 sewer pipe as an extension is allowed between the base and the bottom piece of a two piece valve box assembly.

## 10.3 General Requirements for Valve Stem Extensions

a. Valve stem extensions shall be required only in limited circumstances, as noted on design plans and at the direction of RWU.
b. Provide operating extension stems to bring the operating nut to a point within 24 inches to 12 inches below the surface of the ground and/or box lid. Extension stems shall be steel and shall be complete with 2 inch square operating nut.
c. A round center guide made from 3/16 inch or ¼ inch steel plate shall be placed on the valve stem extension approximately 6 inches from the upper end. The diameter of the guide shall be slightly less than the inside diameter of the valve box. The guide shall be affixed to the stem extension in such a way that it can rotate freely on the stem.
d. Valve stem extensions shall be of a solid design (no pinned couplings allowed) with guides.

## 10.4 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random valve boxes or valve stem extensions to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All valve boxes and valve stem extensions shall be domestically manufactured.

The following manufactures are approved for valve boxes and valve stem extensions.

**APPROVED VALVE BOX MANUFACTURERS LIST**

| Manufacturer | Model Number | Depth of Bury |
|---|---|---|
| Tyler Pipe Company | 6850 series, two piece #160 base | 27" to 39" |
| East Jordan Iron Works, Inc. | 8850 series, two piece #160 base | 27" to 39" |
| Tyler Pipe Company | 6860 series, three piece #160 base | 44" to 80" |
| East Jordan Iron Works, Inc. | 8860 series, three piece #160 base | 44" to 80" |

**APPROVED VALVE STEM EXTENSION MANUFACTURERS LIST**

R & B Pipe Manufacture, Inc. Trumbell Manufacturing

# *Section 11 – Meter Boxes*

## 11.1 Description

This product specification covers meter boxes for 5/8 inch and 1 inch meters. All meter boxes are to be installed in non-vehicular traffic areas (green area).

## 11.2 General Requirements for Meter Boxes for 5/8 Inch and 1 Inch Meters

a. Meter box for 5/8 inch meters shall be a round one-piece molded constructed for durability and impact strength out of high-density polypropylene material.
b. Meter box for 1 inch meter shall be a rectangle one-piece molded constructed for durability and impact strength out of high-density polypropylene material.
c. Meter box cover for the 5/8 inch meters shall be made of cast iron and conform to ASTM A48-03, class 25. The meter box cover shall also be provided with a petroleum asphaltic coating in accordance with the latest revision of AWWA/ANSI C151/A21.51.
d. Meter box cover for the 5/8 inch meters shall have, plainly marked, the word "WATER".
e. Meter box cover for the 1 inch meters shall be made of high density polypropylene material with a 4 5/8"x 7 5/8" cast iron reader lid.
f. Meter box cover for the 1 inch meter shall have, plainly marked, the word "WATER".

## 11.3 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random meter boxes to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.

The following manufactures are approved for meter boxes.

**APPROVED METER BOX MANUFACTURERS LIST**

| Manufacturer | Model Number | Meter Setter |
|---|---|---|
| Oldcastle (Carson) | 2200-18<br>Lid-AP2200 | 5/8 inch single, double and water 1 inch air release valves |
| East Jordan Iron Works, Inc. | 32197200 | Option lid for 2200-18 box |
| Oldcastle (Carson) | 1220-18<br>Lid-1220 w/ Reader | 1 inch single |

*Note: Approved meter boxes are for non-traffic, greenspace applications. RWU may consider approval of submittals for traffic and/or sidewalk applications on an individual basis.*

# *Section 12 – Meter Service Hardware*

## 12.1 Description

This product specification covers waterworks service hardware, such as corporation stops, meter yokes, angle ball valves and dual check valves.

## 12.2 General Requirements

a. The brass composition shall conform to ASTM B-62-63, or latest revision and the threads shall conform to AWWA/ANSI C800, latest edition.
b. Ball type valves and corporation stops shall be rated for a working pressure of 300 psi.
c. Copper tubing to brass hardware connection shall be a pack joint.
d. All corporation stops shall be direct tapped to ductile iron pipe.

## 12.3 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random meter service hardware to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All meter service hardware shall be domestically manufactured.

The following manufacturers are approved for meter service hardware

**APPROVED CORPORATION STOP MANUFACTURERS LIST**

| **Manufacturer** | **1" Corp Stop** |
|---|---|
| Ford Meter Company | B1000-4-NL |
| Mueller Company | P25008N |
| AY McDonald | 74701B-22 NL |

**APPROVED SINGLE 5/8 INCH METER SETTER MANUFACTURERS LIST**

| **Manufacturer** | **Angle Valve** | **Meter Yoke** | **Angle Dual Check** |
|---|---|---|---|
| Ford Meter Company | BA94-214W-NL | Y501 | HHCA94-313-NL |
| Mueller Company | P-14273N | 5010-200 | P-14245N |
| AY McDonald | 74642BY-22 (1x5/8x01) NL | 14-1 | 712-3Y2 23 NL |

**APPROVED DOUBLE 5/8 INCH METER SETTER MANUFACTURERS LIST**

| **Manufacturer** | **Angle Valve** | **U-Branch** | **Meter Yoke** | **Angle Dual Check** |
|---|---|---|---|---|
| Ford Meter Company | BA91-213W-NL | U48-43-65 | Y501 | HHCA94-313-NL |
| Mueller Company | P-14278N | P15363N | H-5010 | P-14245N |
| AY McDonald | 74644BY (3/4x5/8x01) NL | 708U2M (1x3/4x6.5) NL | 14-1 | 712-3Y2 23 NL |

**APPROVED SINGLE 1 INCH METER SETTER MANUFACTURERS LIST**

| Manufacturer | Angle Valve | Meter Yoke | Angle Dual Check |
|---|---|---|---|
| Ford Meter Company | BA94-444W-NL | Y504 | HHCA94-444-NL |
| Mueller Company | P-14273N | H-5040 | P14466-AN |
| AY McDonald | 74602BY-22 (1x1x04) NL | 14-4 | 712-4Y2 44 NL |

# *Section 13 - Copper Tubing*

## 13.1 Description

This product specification covers copper tubing in nominal sizes of 3/4 inch, 1 inch, 2 inch and 3 inch.

## 13.2 General Requirements

a. Copper tubing shall be of domestic manufacture, commercially known as type "K" soft tempered, and conform to ASTM Specifications B-88-49, Federal Specification WW-T-799 and AWWA C800, latest edition.
b. Copper tubing shall be made from alloy C12200 (Phosphorus deoxidized, high residual phosphorus) and conform to NSF/ANSI standard 61.
c. Copper tubing coils shall be annealed (soft) tempered and copper tubing straight lengths shall be hard tempered.
d. 3/4 inch copper tubing shall be furnished in twenty-foot lengths, forty-foot coils or sixty-foot coils as specified. 1 inch copper tubing shall be furnished in sixty-foot coils or one hundred-foot coils as specified. 2 inch and 3 inch copper tubing shall be furnished in twenty-foot lengths (hard tempered).

## 13.3 Quality Assurance

The Rogers Water Utilities may, at no cost to the manufacturer, subject random copper tubing to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
The following manufactures are approved for copper tubing.

**APPROVED MANUFACTURERS LIST**

Cambridge Lee Industries Inc.
Cerro Flow Products, Inc.
Halstead Industries, Inc.
Mueller Industries, Inc.
Wolverine Tube, Inc.

# *Section 14 - 1½ and 2 Inch Meter Service Hardware and Meter Boxes*

## 14.1 Description

This product specification covers waterworks service hardware and meter boxes for 1½ and 2 inch water meter installations.

## 14.2 General Requirements for 1½ and 2 Inch Meter Service Hardware

a. The brass composition shall conform to ASTM B62-02 and ASTM B63-90(2001), or latest revision and the threads shall conform to AWWA/ANSI C800, latest edition.
b. Ball type valves shall be rated for a working pressure of 300 psi.
c. Copper tubing to brass hardware and 2 inch threaded gate valve on water main shall be 2 inch straight tubing (hard temped-type K) and the connections shall be by approved compression fittings.

## 14.3 General Requirements for Meter Boxes for 1½ and 2 Inch Meter Service Hardware

a. Meter boxes in green areas (non-traffic) shall be two rectangle one-piece molded constructed for durability and impact strength out of high-density polypropylene material (bottom of box to bottom of box).
b. Meter box cover for polypropylene boxes shall be made of high-density polypropylene material with a 4 5/8"x 7 5/8" cast iron reader lid.
c. Meter boxes in sidewalk areas (non-traffic) shall be made of pre-cast concrete with a wall thickness of 2 inches.
d. Meter box covers for pre-cast concrete meter boxes shall be made of welded ¼ inch tread plate steel. The meter box cover shall be a full width, hinged cover with lock post.

## 14.4 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random meter service hardware and meter boxes to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All meter service hardware and meter boxes shall be domestically manufactured.

The following manufacturers are approved for meter service hardware and meter boxes.

**APPROVED 1½ AND 2 INCH METER SETTER MANUFACTURERS LIST**

| Manufacturer | Model Number |
|---|---|
| Ford Meter Company | VBHH77-87-12B-11-77-NL |
| A Y McDonald | NL 720R700KBFF 777 |

**APPROVED METER BOX MANUFACTURERS LIST**

| Manufacturer | Model Number | Meter Setter |
|---|---|---|
| Oldcastle (Carson) | 1730-24 w/ 1" meter reader lid | 1½" & 2" |

*Note: Approved meter boxes are for non-traffic, greenspace applications. RWU may consider approval of submittals for traffic and/or sidewalk applications on an individual basis.*

## *Section 15 - Repair Clamps*

### 15.1 Description

This product specification covers single and multiple band full circle clamps to be repair full circumferential breaks, holes, cracks or other damage on cast iron, ductile iron, asbestos cement and other types of pipe. Repair clamps are not an allowed for use on new construction.

### 15.2 General Requirements

a. Band or shell shall be of the OD size range and length specified. Band shall be of Type 304 stainless steel.
b. Lugs shall be of high strength ductile iron per ASTM A536 and securely attached to the band or shell. Each lug shall be designed to allow, “Drop in bolts” and stabilizing “Fingers” to provide maximum torque of the bolts.
c. Gasket shall provide a 360 degree sealing surfaces and of such size and shape to provide an adequate compressive force against the pipe after assembly to affect a positive seal under all combinations of joint and gasket tolerances. Materials used shall be vulcanized natural or vulcanized synthetic rubber with antioxidant and antioinzinant ingredients to resist set after installation. No reclaim rubber shall be used. A heavy gauge Type 304 stainless steel armor plate shall be vulcanized into the gasket to span the lug area.
d. Bolts shall be of high strength, low alloy steel with semi finished hexagon nuts and washers in accordance with AWWA/ANSI C111/A21.11.
e. Bolts and lugs shall be designed to be closed on one side.
f. The repair clamps shall be designed for a minimum working pressure of 200 psi for normal pipe sizes of 12 inch and smaller. Repair clamps shall not be used on pipes sizes of 18 inch and larger.

### 15.3 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random repair clamps to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All repair clamps shall be domestically manufactured.

The following manufactures are approved for repair clamps.

**APPROVED MANUFACTURERS LIST**

| Manufacturer | Repair Clamp Model | Tap Clamp Model |
|---|---|---|

| | | |
|---|---|---|
| Dresser Piping Specialties | 360 | 360 |
| JCM Industries, Inc. | 101,102 | 103, 133 |
| Romac Industries, Inc. | CL1, CL2, CL3 | CL1, CL2, CL3 |
| Smith-Blair, Inc. | 226, 227, 228 | 238, 239 |
| Mueller Company | 500 Series | CC504 |

## *Section 16 - Repair Couplings*

### 16.1 Description

This product specification covers couplings to be used on water mains for nominal pipe sizes of 6 inch, 8 inch, 12 inch, 18 inch and 24 inch through 54 inch. Repair couplings are used in connection of smooth end joints of cast iron, ductile iron, asbestos cement, PVC or other types of pipe. Repair couplings are not allowed for use on new construction.

### 16.2 General Requirements

a. Sleeve or center ring shall be a nominal OD size and length specified. Sleeve shall be of ductile iron ASTM A536-80, grade 65-45-12. Ends shall have a smooth inside taper to provide gasket seal.
b. Sleeve shall have a shop coat of oil-modified urethanes, corrosion-resistant paint, or epoxy coating.
c. Following flanges or end rings shall be of the thickness determined by the coupling size and shall be ductile iron conforming to ASTM A536-80 Grade 65-45-12.
d. Gaskets shall be compression type, formed with Virgin Styrene Butadiene Rubber (SBR), ASTM D2000 3 BA715 and compounded with ingredients to produce permanence and resistance to set after installation. OD range shall be imprinted/molded on the gasket in permanent ink (minimum).
e. Bolts and nuts shall be high strength steel conforming to AWWA/ANSI C219.
f. Where specifications states that a cast transition or reducing coupling be used in place of a straight coupling, the sleeve and follower flange shall be of the same manufacturer and compatible for the specific used intended.

### 16.3 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random repair couplings to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All repair couplings shall be domestically manufactured.

The following manufactures are approved for repair couplings.

**APPROVED STRAIGHT COUPLING MANUFACTURERS LIST**

| Manufacturer | Repair Coupling Model |
|---|---|
| Dresser Piping Specialties | 153 |

| | |
|---|---|
| JCM Industries, Inc. | 212 |
| Romac Industries, Inc. | 501 |
| Smith-Blair, Inc. | 441 |
| Mueller Company | MSC |
| Ford Meter Company | FC2A |

**APPROVED WIDE RANGE COUPLING MANUFACTURERS LIST**

| Manufacturer | Repair Coupling Model |
|---|---|
| Romac Industries, Inc. | RC501 |
| Smith-Blair, Inc. | R441 |
| Ford Meter Company | FRC |

## *Section 17 - In-Building Stainless Steel Fire Line Riser*

### 17.1 Description

This product specification covers in-building stainless steel fire line riser from nominal sizes of 4 inch, 6 inch, 8 inch and 10 inch.

### 17.2 General Requirements

a. Fire line riser shall be composed of a single extended 90-degree fitting of fabricated type 304SST stainless steel tubing in accordance with AWWA C220, Stainless Steel Pipe, and shall be one-piece construction.
b. The minimum design working water pressure of the fire line riser shall be 200 psi.
c. Fire line riser shall conform to NFPA 24, Section 8-3-2 and shall be UL/FM approved.
d. The inlet joint for the fire line riser shall conform to ANSI A21.11/AWWA C111, push-on joint with two ¾ inch tie rod brackets and the outlet joint for the fire line riser shall conform to AWWA C606, grooved and shoulder joint or flanged joint (150 lb.).
e. Fire line riser shall be domestically manufactured.

### 17.3 Quality Assurance

The following manufacturer is approved for stainless steel fire line riser.

**APPROVED MANUFACTURER LIST**

| | |
|---|---|
| Ames Fire & Waterworks | Series IBR |
| Zurn Wilkins | Series WBR |

## *Section 18 - [Reserved]*

## *Section 19 – [Reserved]*

## *Section 20 - Gravity PVC Sewer Pipe, PVC Sewer Service Pipe & Fittings*

### 20.1 Description

This specification covers gravity PVC sewer pipe, sewer service pipe and fittings for sewage water or other liquids, with push-on joints. Only pipe materials listed in this specification shall be used for sanitary sewer mains and service lines unless authorized by the Superintendent of the Rogers Water Utilities.

### 20.2 General Requirements of Gravity PVC Sewer Pipe

a. This specification covers sewer pipe, 8 in., 10 in., 12 in. and 15 in. in sizes. The minimum diameter of gravity PVC sewer pipe is 8 inch.
b. The sewer pipe shall conform to all the minimum requirements of ASTM D3034-00 (Type PSM) and shall have a cell classification of 12454 as defined in Specifications D1784.
c. The sewer pipe shall have a minimum Standard Dimension Ratio (SDR) of 26.
d. The minimum pipe stiffness (F/dY) at 5 percent deflection shall be 115 psi for all pipe sizes when tested in accordance with ASTM Method of Test D2122.
e. All sewer pipes shall be tested in accordance with ASTM D2122, D2152, D2412 and D2444.
f. All joints shall be push-on conforming to ASTM D3212. All gaskets shall be a lock-in elastomeric rubber (at point of manufacture) and conforming to ASTM F477.
g. Each length of pipe furnished shall bear all identification markings as specified in Section 12 of ASTM D3034-00.
h. Lubricant furnished for lubricant joints shall be as recommended by the manufacturer. The lubricant container must be labeled with the manufacturer's name.

### 20.3 General Requirements of PVC Sewer Service Pipe

a. This specification covers sewer service pipe, 4 inch and 6 inch in sizes. The minimum diameter of gravity PVC sewer service pipe is 4 inch.
b. The sewer service pipe shall conform to all the minimum requirements of ASTM D3034-00 (Type PSM) and shall have a cell classification of 12454 or 12364 as defined in Specifications D1784.
c. The sewer service pipe shall have a minimum Standard Dimension Ratio (SDR) of 26.
d. The minimum pipe stiffness (F/dY) at 5 percent deflection shall be 115 psi for all pipe sizes when tested in accordance with ASTM Method of Test D2122.
e. All sewer service pipes shall be tested in accordance with ASTM D2122, D2152 and D2444.

f. All joints shall be push-on conforming to ASTM D3212. All gaskets shall be a lock-in elastomeric rubber (at point of manufacture) and conforming to ASTM F477.
g. Each length of pipe furnished shall bear all identification markings as specified in Section 12 of ASTM D3034-00.
h. Lubricant furnished for lubricant joints shall be as recommended by the manufacturer. The lubricant container must be labeled with the manufacturer's name.

## 20.4 General Requirements of Fittings

a. This specification covers heavy wall SDR 26 sewer fittings such as wyes with an outlet 4 inch branches and end caps, end plugs and bends of 4 inch and 6 inch in size. Saddle type PVC fittings are not allowed on new construction.
b. All sewer fittings shall be molded and conform to ASTM F1336 and ASTM D3034 and shall be manufactured from high molecular weight compound having a minimum cell classification of 12454 as prescribed in ASTM D1784.
c. All molded wyes shall have a minimum of SDR-26 thickness for body of the fitting and all outlets of 4 inch branches (bodies) shall have a minimum thickness of a SDR-26.
d. All joints shall be push-on conforming to ASTM D3212. All gaskets shall be a lock-in elastomeric rubber (at point of manufacture) and conforming to ASTM F477 and F913.

## 20.5 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random gravity PVC sewer pipe, sewer services and fittings to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All gravity PVC sewer pipe, sewer service pipe and fittings shall be domestically manufactured.

**APPROVED GRAVITY PVC SEWER PIPE AND SERVICE PIPE MANUFACTURERS LIST**

JM Eagle
Certain Teed Corporation
North American Pipe Corporation (NAPCO)
Diamond Plastics Corporation
Jet Stream Plastic Pipe Co.
Northern Pipe Products Inc.
Sanderson Pipe

**APPROVED GRAVITY PVC SEWER FITTING MANUFACTURERS LIST**

IPEX, Inc./Multi Fittings
HARCO
GPK Products, Inc.

# *Section 21 - Gravity Ductile Iron Sewer Pipe, Sewer Service Pipe & Fittings*

## 21.1 Description

This specification covers gravity ductile iron sewer pipe, sewer service pipe and fittings for sewage water or other liquids, with push-on and mechanical joints.

## 21.2 General Requirements of Gravity Sewer Pipe and Sewer Service Pipe

a. This specification covers gravity sewer pipe, 8 in., 10 in., 12 in., 16 in., 18 in., 24 in., 30 in. and 36 in. in sizes and sewer service pipe, 4 inch and 6 inch in sizes. The minimum diameter of gravity ductile iron sewer pipe is 8 inch.
b. The sewer pipe shall be Class 51 or greater ductile iron pipe and conform to all requirements of AWWA/ANSI C151/A21.51 and ASTM A377.
c. Dimension and tolerance for each nominal pipe size shall be in accordance with AWWA C151 for pipe with nominal laying length of 20 feet.
d. All pipes shall have a ceramic polymeric or calcium aluminate cement motor interior lining.
e. Exterior coating shall consist of a nominal one-mil thick asphaltic material applied to the outside of the pipe as described in AWWA C151.
f. All rubber joint gaskets utilized on ductile iron pipe shall be conformance with ANSI A21.11/AWWA C111, latest edition.
g. Each length of pipe furnished shall bear identification markings OF “DI”, “Ductile” and “Sewer Use”.
h. Lubricant furnished for lubricant joints shall be non-toxic and shall conform to ANSI 21.11. The lubricant container must be labeled with the manufacturer’s name.

## 21.3 General Requirements of Ductile Iron Fittings

a. This specification covers ductile iron sewer fittings such as tees with an outlet 4 inch branches and end caps, end plugs and bends of 4 inch and 6 inch in size. Ductile iron service tees are allowed in lieu of ductile iron service wyes
b. Mechanical joint fittings shall be manufactured in accordance of ANSI A21.53/AWWA C153 (compact body).
c. All fittings shall have a ceramic polymeric or calcium aluminate cement motor interior lining.
d. Exterior coating of fittings and couplings shall consist of a nominal one-mil thick asphaltic material applied to the outside of the fitting as described in AWWA C151.
e. All rubber joint gaskets utilized on ductile iron fitting shall be in conformance with ANSI A21.11/AWWA C111, latest edition.
f. Each fitting shall bear identification markings of “DI”, “Ductile” and “Sewer Use”.
g. Lubricant furnished for lubricant joints shall be non-toxic and shall conform to ANSI 21.11. The lubricant container must be labeled with the manufacturer’s name.

### 21.4 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random gravity ductile iron sewer pipe, sewer services and fittings to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All gravity ductile iron sewer pipe, sewer service pipe and fittings shall be domestically manufactured.

The following manufacturers are approved for gravity ductile iron sewer pipe, sewer service pipe and fittings.

**APPROVED GRAVITY SEWER PIPE AND SEWER SERVICE PIPE MANUFACTURERS LIST**

| | |
|---|---|
| American Cast Iron Pipe Company | Protecto 401 |
| U.S. Pipe Company | Protecto 401 |
| McWane, Inc. | Protecto 401 |
| Griffin Pipe Company | Sewper Coat |

**APPROVED GRAVITY FITTING MANUFACTURERS LIST**

| | |
|---|---|
| American Cast Iron Pipe Company | Protecto 401 |
| U.S. Pipe Company | Protecto 401 |
| Tyler Pipe Company | Protecto 401 |
| Griffin Pipe Company | Sewper Coat |

## *Section 22 – PVC Force Main, Ductile Iron Force Main & Fittings*

### 22.1 Description

This specification covers 4 in., 6 in, 8 in., 10 in. and 12 in. in diameter force mains for the transportation of sanitary sewer from lift stations. Pipe material (ductile iron or PVC) shall be specified by the Engineer and approved by RWU.

### 22.2 General Requirements of PVC Force Main Pipe

a. This specification covers force main pipe, 4” – 12” in sizes. The force main pipe shall conform to all the minimum requirements of AWWA C900 and have a cell classification of 12454B as defined in Specifications ASTM D1784.
b. The force main pipe shall have a minimum Dimension Ratio (DR) of 18.
c. The force main pipe shall meet all test requirements as described in AWWA C900.
d. All joints shall be push-on conforming to ASTM D3139. All gaskets shall be a lock-in elastomeric rubber (at point of manufacture) and conforming to ASTM F477.
e. Each length of pipe furnished shall bear all identification markings as specified in AWWA C900.
f. Lubricant furnished for lubricant joints shall be as recommended by the manufacturer. The lubricant container must be labeled with the manufacturer’s name.

## 22.3 General Requirements of Ductile Iron Force Main Pipe

a. This specification covers force main pipe, 8 inch, 10 inch and 12 inch in size. The force main pipe shall be pressure class 350 ductile iron pipe and conform to all requirements of AWWA/ANSI C151/A21.51 and ASTM A377.
b. Dimension and tolerance for each nominal pipe size shall be in accordance with AWWA C151 for pipe with nominal laying length of 20 feet.
c. Flanged end pipe shall conform to ANSI A21.51/AWWA C115.
d. All pipes shall have a ceramic epoxy interior lining of 40 mils (nominal thickness) and must conform to the specifications of Protecto 401. Interior lining of calcium aluminate cement motor is not allowed in force main applications.
e. Exterior coating of pipe shall consist of a nominal one-mil thick asphaltic material applied to the outside of the pipe as described in AWWA C151.
f. All rubber joint gaskets utilized on ductile iron pipe shall be in conformance with ANSI A21.11/AWWA C111, latest edition.
g. Each length of pipe furnished shall bear identification markings OF “DI”, “Ductile” and “Sewer Use”.
h. Lubricant furnished for lubricant joints shall be non-toxic and shall conform to ANSI 21.11. The lubricant container must be labeled with the manufacturer’s name.

## 22.4 General Requirements for Ductile Iron Fittings

a. This specification covers fittings, 4 in., 6 in., 8 in. and 12 inch in sizes.
b. Mechanical joint fittings shall be manufactured in accordance of ANSI A21.53/AWWA C153 (compact body).
c. Couplings shall be made of ductile iron (full body) with mechanical joint (MJ) ends. Coupling shall conform to ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11.
d. Flanged fittings shall be manufactured in accordance of ANSI A21.10/AWWA C110 and have 150 lb. Flanges. Flanges shall be faced and drilled in accordance with ANSI Specification B16.1, Class 125.
e. All fittings and couplings shall have a ceramic polymeric interior lining of 40 mils (nominal thickness) and must conform to the specifications of Protecto 401. Interior lining of calcium aluminate cement motor is not allowed in force main applications.
f. Exterior coating of fittings and couplings shall consist of a nominal one-mil thick asphaltic material applied to the outside of the fitting as described in AWWA C151.
g. All rubber joint gaskets utilized on ductile iron fitting shall be in conformance with ANSI A21.11/AWWA C111, latest revision.
h. Each fitting shall bear identification markings of “DI”, “Ductile” and “Sewer Use”.
i. Lubricant furnished for lubricant joints shall be non-toxic and shall conform to ANSI 21.11. The lubricant container must be labeled with the manufacturer’s name.
j. Retainer glands shall be utilized on all mechanical joint fittings. Retainer glands shall conform to *PART II-MATERIALS*, *Section 9 - Joint Restraint Systems* of this specification. Retainer glands that are manufactured by EBBA, Inc. are approved for use on PVC force main pipe.

### 22.5 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random force main pipe and fittings to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All force main pipe and fittings shall be domestically manufactured.

The following manufactures are approved for force main pipe and fittings.

**APPROVED PVC FORCE MAIN PIPE MANUFACTURERS LIST**

Johns Mansfield (J-M Pipe) Company
Certain Teed Corporation
North American Pipe Corporation
Diamond Plastics Corporation
Jet Stream Plastic Pipe Co.

**APPROVED DUCTILE IRON FORCE MAIN PIPE MANUFACTURERS LIST**

| | |
|---|---|
| American Cast Iron Pipe Company | Protecto 401 |
| U.S. Pipe Company | Protecto 401 |
| McWane, Inc. | Protecto 401 |

**APPROVED DUCTILE IRON FORCE MAIN FITTING MANUFACTURERS LIST**

| | |
|---|---|
| American Cast Iron Pipe Company | Protecto 401 |
| U.S. Pipe Company | Protecto 401 |
| Tyler Pipe Company | Protecto 401 |

## *Section 23 – Manhole Frames & Covers*

### 23.1 Description

This specification covers iron and molded composite manhole frames and covers for sanitary sewer manholes or other structures.

### 23.2 General Requirement

a. Manhole frames and covers shall be made of fiber-reinforced polymer / composite materials conforming to AASHTO M306.
b. Manhole frames and covers shall have a minimum access diameter of 24 inches.
c. Manhole covers shall be of solid construction without any openings of any type except two (2) concealed pick holes that shall be located on direct opposite sides (180 degrees) of the manhole cover. The concealed pick holes shall be of such design as not to allow infiltration into the manhole.
d. All covers shall have non-skid surface with “Sanitary Sewer” cast into the lid. The specified wording shall be in 2 inch wide letters.

e. Watertight manhole frames and covers shall also include ¼ inch O-ring neoprene gasket, bonded to frame and stainless steel locking hardware.
f. The maximum height of vertical adjustment rings shall be eighteen (18) inches in landscaped (green) areas.
g. The maximum height of vertical adjustment rings shall be six (6) inches in paved parking and pedestrian areas.
h. Vertical adjustment rings are not allowed for use in streets, commercial driveways, and other high-traffic areas.
i. Concrete riser rings are not allowed.

### 23.3 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random manhole frames and covers to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All manhole frames and covers shall be domestically manufactured.

### 23.4 APPROVED MANUFACTURER LIST

| Manufacturer | Duty Type | Model | Clear Opening |
|---|---|---|---|
| Composite Access Products, LP | Watertight Composite | A-1BK24T1-C01DMDSS-H1 | 24.05” |
| EJ Group | Adjustment Ring (Green Areas Only) | V-1918-2<br>V-1918-3<br>V-1918-4<br>V-1918-6 | N/A |
| EJ Group | Watertight Composite | COM260234A01 (Cover & Frame Assembly)<br>COM260210 (Frame)<br>COM260234 (Cover) | 24” |

## *Section 24 – Gravity Sewer Miscellaneous*

### 24.1 Description

This specification covers PVC, SDR 35, sewer service pipe within street right-of-ways and public utility easements, flexible sewer service fittings and gasket manhole waterstops.

### 24.2 General Requirements PVC (SDR 35) Sewer Service Pipe

a. This specification covers PVC, SDR 35, sewer service pipe, 4 inch and 6 inch in sizes. The minimum diameter of PVC, SDR 35, sewer service pipe is 4 inch.
b. PVC, SDR 35, sewer service pipe shall not be used as gravity sanitary sewer lines other than sewer service lines from existing sanitary sewer lines within street right-of-ways and public utility easements.
c. Cast iron soil pipe is not allowed for the construction of sewer service lines or sanitary sewer lines.

d. The PVC sewer service pipe shall conform to all the minimum requirements of ASTM D3034.
e. All joints shall be either push-on conforming to ASTM D3212 or solvent cement.
f. All gaskets shall be a lock-in elastomeric rubber (at point of manufacture) and conforming to ASTM F477.
g. Solvent cement joints shall meet the requirements of ASTM D2564 and shall be appropriate solvent for the pipe material.
h. Each length of pipe furnished shall bear all identification markings as specified in Section 12 of ASTM D3034-00.

## 24.3 General Requirements of Flexible Sewer Service Fittings

a. This specification covers flexible rubber sewer service fittings such as couplings between PVC pipe and ductile iron pipe and end caps of 4 inch and 6 inch in size.
b. Flexible coupling and end cap shall be manufactured with natural and synthetic rubber conforming to ASTM C425 and C117.
c. Clamps shall be 300 series marine grade stainless steel conforming to ASTM A240.

## 24.4 General Requirements of Gasket Manhole Waterstops

a. This specification covers gasket waterstops used on sanitary sewer pipe within poured in-place concrete manholes.
b. Gasket material shall be Virgin SBR and conform to ASTM D2000 M2AA 60, compounded for water and sewer service.

## 24.5 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random PVC, SDR 35, sewer service pipe, flexible sewer service fittings and gasket manhole waterstops to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All PVC, SDR 35, sewer service pipe, flexible sewer service fittings and gasket manhole waterstops shall be domestically manufactured.

The following manufactures are approved for PVC, SDR 35, sewer service pipe, flexible sewer service fittings and gasket manhole waterstops.

**APPROVED GRAVITY PVC (SDR 35) SEWER SERVICE PIPE MANUFACTURERS LIST**

JM Eagle
Certain Teed Corporation
North American Pipe Corporation
Diamond Plastics Corporation
Jet Stream Plastic Pipe Co.

**APPROVED FLEXIBLE SEWER SERVICE FITTINGS MANUFACTURERS LIST**

Fernco, Inc.
NDS, Inc.
Mission Rubber Company

**APPROVED GASKET MANHOLE WATERSTOP MANUFACTURERS LIST**

Fernco, Inc.
Romac Industries, Inc.

# *Section 25 – Plug Valves*

## 25.1 Description

This product specification covers eccentric plug valves, 4 in., 6 in., 8 in., 10 in. and 12 in. for use on sewer force mains and lift station discharge piping.

## 25.2 General Requirement

a. Plug valves' design, component material construction, manufacture and testing shall be in accordance with AWWA C517 the latest edition thereof.
b. Plug valve body shall be of cast iron conforming to ASTM A126, Class B, for working pressures up to 175 psi. The words "Seat End" shall be cast on the exterior of the body seat end.
c. The exterior of the plug valve shall be coated with a universal alkyd primer.
d. Plug shall be of one-piece construction and made of ASTM A124, grade B cast iron with a resilient facing per the requirements of ASTM D2000-BG and AWWA C517 (latest requirements).
e. Shaft seals shall conform to AWWA C517 (latest edition) and consist of V-type packing in a fixed gland with an adjustable follower.
f. adial bearings shall be constructed of self-lubricating type 316 stainless steel. The top thrust bearing shall be Teflon. The bottom thrust bearing shall be type 316 stainless steel. Cover bolts shall be corrosion resistant with zinc plating.
g. All plug valves shall be provided with a fully enclosed, permanently lubricated actuator of the worm gear design. The actuator shall be connected to the valve shaft by means of a key and keyway connection.
h. All gear actuators for plug valves shall be operated by a standard 2" AWWA operating nut. All actuators shall be side mounted with a counter clockwise rotation of the operating nut.
i. A position indicator shall be provided on all gear actuators for non-buried installations.
j. Flanged ends (non-buried installation): Flanged fittings have 150 lb. flanges and shall be faced and drilled in accordance with ANSI Specification B16.1, Class 125.
k. Mechanical Joint Ends (buried installation): Mechanical joint bell dimensions shall conform to ANSI A21.11/AWWA C111.

### 25.3 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random plug valves to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All plug valves shall be domestically manufactured.

The following manufactures are approved for plug valves.

**APPROVED MANUFACTURERS LIST**

Val-Matic Mfg. Company
Mueller Company, Decatur, Illinois
Clow Corporation, Oskaloosa, Iowa
American Valve & Hydrant Co., Birmingham, Alabama
Kennedy Valve, Elmira, New York
Waterous, St. Paul, Minnesota

## *Section 26 – Swing Flex Check Valves*

### 26.1 Description

This product specification covers ductile iron check valves, 4 in., 6 in., 8 in., 10 in. and 12 in. for use on sewer force mains and lift station discharge piping.

### 26.2 General Requirement

a. Check valve body shall be of ductile iron conforming to ASTM A536, Grade 65-45-12. The flow direction arrow shall be cast on the exterior of the body.
b. The exterior of the check valve shall be coated with a universal alkyd primer and the interior shall be coated with an epoxy coating.
c. The disc shall be precision molded Buna-N (NBR), ASTM D2000-BG.
d. A screw-type backflow actuator shall be provided for check valves in non-buried installation.
e. A pre-wired limit switch (Open and Closed) shall be provided for check valves in non-buried installation. An external position indicator that is in continuous contact with the disc shall activate the mechanical type switch. The switch (two wire) shall be rated for NEMA 4 and shall have UL rated 5 Amp, 125 VAC contacts.
f. Flanged ends (non-buried installation): Flanged fittings have 150 lb. flanges and shall be faced and drilled in accordance with ANSI Specification B16.1, Class 125.
g. Mechanical Joint Ends (buried installation): Mechanical joint bell dimensions shall conform to ANSI A21.11/AWWA C111.

### 26.3 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random check valves to testing by an independent laboratory for compliance with these standards.
b. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
c. All check valves shall be domestically manufactured.

The following manufacturers are approved for swing flex check valves.

**APPROVED MANUFACTURERS LIST**

Val-Matic Mfg. Company

## *Section 27 – Combination Air-Vacuum Valves*

### 27.1 Description

This specification covers automatic valves installed on sewer force mains to vent accumulated air under system pressure, and to provide air exhaust during initial fill or to prevent a vacuum during draining of the system.

### 27.2 General Requirements

a. Valve body and cover shall be cast iron fabricated in accordance with ASTM A126, of stainless steel type 304, ASTM A240. Inlets shall be screwed (NPT) or flanged (125# ANSI B 16.1).
b. Internal seat trim float arm and pivot pin shall be stainless steel type 303 or 304. Floats shall be stainless steel ASTM A240 or non-corrosive composite material. Other internal parts shall be stainless steel ASTM A240 or ASTM A276.
c. Internal seat or orifice button shall be of Buna-N rubber compounded for water service. Cover bolts shall be alloy steel.
d. Ball valves, piping, nipples and plugs shall be schedule 40 stainless steel, ASTM type 315.
e. Valve body shall have a working pressure rating of 200 psi.

### 27.3 General Operation Requirements

Combination valves shall provide for both automatic air release under system pressure and to allow air movement during filling or draining operations. The combination valve may be housed in a single casting. The housing shall be designed to incorporate conventional or kinetic flow principles to properly vent the air without premature closure.

### 27.4 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random air-vacuum valves to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All air-vacuum valves shall be domestically manufactured.

**APPROVED MANUFACTURERS LIST**

| Manufacturer | 4”-8” PIPE | 10-12” PIPE |
|---|---|---|
| G.A. Industries, Inc. (Empire) | 939(2”x 1”NPT) | 993(3”Flg.) |
| Val-Matic Mfg. Co. | 48S/301S(2”NPT) | 48/303(3”NPT) |
| ARI (non-domestic) | D-020 (2” NPT) | D-020 (3” NPT) |

## *Section 28 – Sewer Force Main Miscellaneous*

### 28.1 Description

This specification covers cast iron valve boxes, valve stem extensions, air-vacuum valve boxes, detectable warning tape and trace wire.

### 28.2 General Requirements for Valve Boxes

a. Valve boxes shall be cast iron with iron lid suitable for heavy traffic and conform to ASTM A48, Class 20 Specifications.
b. Valve boxes shall be screw type and have 5¼ inch inside shaft diameter.
c. Cast iron drop lids shall have the word “Sewer” cast into the lid.
d. Valve boxes shall be provided with a petroleum asphaltic coating in accordance with the latest revision of AWWA/ANSI C151/A21.51.
e. At bury depths greater than 80 inch (6’-8”), the use of eight inch (8”) PVC, SDR 26 sewer pipe as an extension is allowed between the base and the bottom piece of a two piece valve box assembly.

### 28.3 General Requirements for Valve Stem Extensions

f. Valve stem extensions shall be required only in limited circumstances, as noted on design plans and at the direction of RWU.
g. Provide operating extension stems to bring the operating nut to a point within 24 inches to 12 inches below the surface of the ground and/or box lid. Extension stems shall be steel and shall be complete with 2 inch square operating nut.
h. A round center guide made from 3/16 inch or ¼ inch steel plate shall be placed on the valve stem extension approximately 6 inches from the upper end. The diameter of the guide shall be slightly less than the inside diameter of the valve box. The guide shall be affixed to the stem extension in such a way that it can rotate freely on the stem.

i. Valve stem extensions shall be of a solid design (no pinned couplings allowed) with guides.

## 28.4 General Requirements for Air-Vacuum Valve Boxes

a. This specification covers air-vacuum valve boxes for 4 inch through 8 inch sewer force mains.
b. Valve box shall be a round one-piece molded constructed for durability and impact strength out of high-density polypropylene material.
c. Valve box frames and covers shall be made of gray cast iron and conform to ASTM A48, Class 35B.
d. Valve box frames and covers shall be provided with a petroleum asphaltic coating in accordance with the latest edition of ANSI/AWWA C151/A21.51.
e. Valve box cover shall have, plainly marked, the word “SEWER”.

## 28.5 General Requirements of Detectable Warning Tape

a. This specification covers detectable warning tape for PVC and ductile iron sewer force mains.
b. Detectable warning tape shall consist of aluminum foil laminated between two layers of polyethylene.
c. Tape shall be minimum 2 inches wide, polyethylene, 35 gauge minimum thickness. The tape shall have a tensile strength of not less than 4000 psi (ASTM D-882) and a dart impact strength of not less than 120 grams per 1.5 mils.
d. Tape shall have a green background in accordance with the APWA national color code and boldly labeled every 18 to 32 inches as follows “Caution Buried Sewer Line”.
e. Colors shall not deteriorate with long term exposures to soil and water.
f. Tape shall be placed directly over the sewer main, not less than 24” below the finished grade, and not less than 12” above the top of pipe.

## 28.6 General Requirements of Trace Wire

a. This specification covers trace wire for PVC sewer force main (non-metallic). The tracer wire shall be installed 6 inches above the pipe.
b. Trace wire shall be shall be annealed copper in accordance with ASTM B-3 and shall be 12 gauge (AWG) solid copper wire.
c. The wire insulation shall be PVC material and shall be designated as type THHN/THWN (green in color).
d. Splices shall be made with copper split bolt wire connector and inserted into a direct bury gel-filled insulator tube.

### 28.7 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random valve boxes, valve stem extension, air-vacuum valve boxes, marking tape and tracer wire to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All valve boxes, valve stem extension, air-vacuum valve boxes and marking tape shall be domestically manufactured.

The following manufactures are approved for valve boxes, valve stem extension, air-vacuum valve boxes and marking tape.

**APPROVED VALVE BOX MANUFACTURERS LIST**

| Manufacturer | Model Number | Depth of Bury |
|---|---|---|
| Tyler Pipe Company | 6850 series, two piece #160 base | 27” to 39” |
| East Jordan Iron Works, Inc. | 8850 series, two piece #160 base | 27” to 39” |
| Tyler Pipe Company | 6860 series, three piece #160 base | 44” to 80” |
| East Jordan Iron Works, Inc. | 8860 series, three piece #160 base | 44” to 80” |

**APPROVED VALVE STEM EXTENSION MANUFACTURERS LIST**

R & B Pipe Manufacture, Inc. Trumbell Manufacturing

**APPROVED AIR-VACUUM VALVE BOX MANUFACTURERS LIST**

| Manufacturer | Model Number |
|---|---|
| Mid-States Plastics, Inc. | Box-18”(Dia.) x30” (Height) |
| East Jordan Iron Works, Inc. | Watertight; Model 1775 |

**APPROVED MARKING TAPE MANUFACTURERS LIST**

Allen Systems
Empire Level Mfg. Corporation

## *Section 29 – Service Saddles, Repair Couplings, and Clamps*

### 29.1 Description

This product specification covers service saddles, repair couplings and clamps to be used on sanitary sewer mains for nominal pipe sizes of 8 in., 10 in., 12 in., 15 in., 16 in., 18 in., 24 in., 30 in. and 36 in. Service saddles, repair couplings and repair clamps are not allowed for use on new construction.

## 29.2 General Requirements for Service Saddles

a. This specification covers flexible rubber sewer service saddles for 4 inch taps.
b. The service saddle shall have two clamps to the sewer main and one clamp to the sewer service.
c. Clamps shall be 300 series marine grade stainless steel conforming to ASTM A240.
d. Flexible service saddle shall be manufactured with natural and synthetic rubber conforming to ASTM C425 and C117.

## 29.3 General Requirements for Repair Couplings

a. Flexible coupling and end cap shall be manufactured with natural and synthetic rubber conforming to ASTM C425 and C117.
b. Clamps shall be 300 series marine grade stainless steel conforming to ASTM A240.
c. Couplings within traffic areas or unstable soil conditions shall have a 300 series marine grade stainless steel shearing conforming to ASTM A240.

## 29.4 General Requirements for Repair Clamps

a. Band or shell shall be of the OD size range and length specified. Band shall be of Type 304 stainless steel.
b. Lugs shall be of high strength ductile iron per ASTM A536 and securely attached to the band or shell. Each lug shall be designed to allow, “Drop in bolts” and stabilizing “Fingers” to provide maximum torque of the bolts.
c. Gasket shall provide a 360 degree sealing surface and of such size and shape to provide an adequate compressive force against the pipe after assembly to affect a positive seal under all combinations of joint and gasket tolerances. Materials used shall be vulcanized natural or vulcanized synthetic rubber with antioxidant and antioinzinant ingredients to resist set after installation. No reclaim rubber shall be used. A heavy gauge Type 304 stainless steel armor plate shall be vulcanized into the gasket to span the lug area.
d. Bolts shall be of high strength, low alloy steel with semi finished hexagon nuts and washers in accordance with AWWA/ANSI C111/A21.11.
e. Bolts and lugs shall be designed to be closed on one side.

## 29.5 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random service saddles, repair couplings and clamps to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All service saddles, repair couplings and clamps shall be domestically manufactured.

The following manufactures are approved for service saddles, repair couplings and clamps.

**APPROVED SERVICE SADDLE MANUFACTURERS LIST**

| Manufacturer | Model |
|---|---|

| | |
|---|---|
| Romac Industries, Inc. | 304 |
| NDS, Inc. | DFW-4T/C |
| Ford Meter Company | FS304 |

**APPROVED REPAIR COUPLING MANUFACTURERS LIST**

| Manufacturer | Repair Coupling Model |
|---|---|
| Fernco, Inc. | 1056 |
| NDS, Inc. | DFW01, DFW02, DFW56 |
| Mission Rubber Company | MR56 |

**APPROVED REPAIR CLAMPS MANUFACTURERS LIST**

| Manufacturer | Repair Clamp Model |
|---|---|
| Dresser Piping Specialties | 360 |
| JCM Industries, Inc. | 101,102 |
| Romac Industries, Inc. | CL1, CL2, CL3 |
| Smith-Blair, Inc. | 226, 227, 228 |
| Mueller Company | 500 Series |

# *Section 30 – Protective Concrete Coatings*

## 30.1 Description

This specification covers interior concrete surfaces of sanitary sewer manholes and lift station wet wells that require resistance to deterioration due to hydrogen sulfide ($H_2S$) and by-products thereof. Existing and proposed structures indicated on the plans or directed in the field to receive protective coatings shall adhere to these specifications.

## 30.2 General Requirements for Cementitious Manhole Coatings

a. All manholes (proposed or existing) with force main (proposed or existing) discharging into them shall be coated. Other manholes may be coated if specified on the construction plans.
b. Coating material shall be cement based, poly fiber reinforced, shrinkage, compensated, and enhanced with chemical admixtures and silicious aggregates.
c. Coating cementitious material shall meet ASTM C109 compressive strength of 9,000 psi and ASTM C293 flexural strength of 1,100 psi. Coating material shall not exceed a permeability value of 400 coulombs as tested by the methods established in the AASHTO T-277 specification.
d. Coating material shall be capable of a placement thickness of ½ inch to 4 inch in one pass monolithic application. Proposed manholes shall receive a ½ inch coating application and existing manholes shall receive a minimum 1 inch coating application.
e. Coatings shall be applied in accordance with the manufacturer's recommendations, including surface preparation as specified.

### 30.3 General Requirements for Epoxy Linings

a. Manholes and wet wells shall be lined if specified on the construction plans.
b. Lining material shall be a 100% solvent free solids, ultra high build epoxy lining formulated with high physical strength and broad range chemical resistance.
c. Lining material shall meet ASTM D695/ASTM C579 compressive strength of 18,000 psi/6,800 psi and ASTM D790/ASTM C580 flexural strength of 13,000 psi/4,600 psi.
d. Lining material shall be capable of a maximum placement thickness of 200 mils in one pass monolithic application. Wet well lining material shall be applied to a minimum thickness of 60 mils.
e. Coatings shall be applied in accordance with the manufacturer's recommendations, including surface preparation as specified.

### 30.4 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random manhole coatings and wet well linings to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. All manhole coatings and wet well linings shall be domestically manufactured.

The following manufactures are approved for manhole coatings and wet well linings.

**APPROVED MANHOLE COATING MANUFACTURERS LIST**

| Manufacturer | Product Number |
|---|---|
| Quadex, Inc. | Quadex |
| Strong Company, Inc. | Strong Seal MS-2A |

**APPROVED EPOXY LINER MANUFACTURERS LIST**

| Manufacturer | Product Number |
|---|---|
| Raven Lining Systems | Raven 405 |
| Sauereisen, Inc. | 210RS |

## *Section 31 – Casing Spacers and End Seals*

### 31.1 Description

This product specification covers casing spacers (insulators) for use in water or sanitary sewer service. Casing spacers are used to facilitate installing a water or sanitary sewer pipe (carrier) inside a casing pipe. Casing spacers shall consist of two or more segments of the circular steel that bolt together forming a shell around the carrier pipe. Casing spacers should protect the carrier pipe and any protective coating or wrapping from during the installation, and properly supported within the casing pipe.

## 31.2 General Requirements

a. Band shall have a minimum 14 gauge 304 stainless steel band. Bands shall be two segments, 8 inch wide. For carrier pipes, 26 inch diameter and larger, bands shall be three or more segments and 12 gauge 304 stainless steel.
b. Steel Riser shall be high grade 304 stainless steel, minimum 10 gauge thickness and shall be fabricated to support the carrier pipe and its liquid load. Riser shall be sized to position the carrier pipe in the casing, support all loads and provide proper contact for the isolation function.
c. Casing spacers shall have ample riser height to limit vertical movement of the carrier pipe within the casing pipe. A maximum of 1 inch clearance shall be provided between the top runner and the ID of the casing pipe for carrier sizes of 6 inch through 12 inch. A maximum of 2 inch clearance shall be provided between the top runner and the ID of the casing pipe for carrier pipe sizes of 18 inch through 64 inch.
d. The liner around the carrier pipe shall have a flexible PVC liner of 0.09 inch thickness with a Durometer “A” 85-90 hardness and a minimum 58,000 volt dielectric strength.
e. Runners shall be of high-pressure molded glass reinforced polymer with a minimum compressive strength of 18,000 psi, 2 inch in width and a minimum of 8 inches long. Polyethylene runners are not an acceptable alternative.
f. The runners shall be attached to the band or riser by 3/8 inch welded stainless steel studs and lock nuts, which shall be recessed far below the wearing, surface on the runner.
g. The band section shall be bolted together with 304 stainless steel studs, nuts and washers. Hardware shall be 5/16 inch for carrier pipes up to 36 inch diameter and 3/8 inch for carrier pipes 36 inch and larger.
h. A minimum of three casing spacers shall be required for each joint of carrier pipe (each end and middle) within casing pipe.
i. End seals shall be a pull-on or wrap around with stainless steel bands. End-seals shall be made of 1/8 inch compounded synthetic rubber.

## 31.3 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random casing spacers or end seals to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. The above specification is considered sufficient for carrier pipe sizes of 6 inch through 12 inch and casing lengths up 200 feet. For larger size pipes and longer or unusual casings, the casing spacer manufacture shall submit recommended spacer design to the design engineer and the Rogers Water Utilities for review and approval.
c. All casing spacers and end seals shall be domestically manufactured.

The following manufactures are approved for casing spacers and end seals.

**APPROVED MANUFACTURERS LIST**

| | |
|---|---|
| Advance Products & Systems, Inc. | APS SS18-2l |
| | APS SS112-2 |
| Power Seal Pipeline Products, Inc. | 48120 SS |
| CCI Pipeline Systems, Inc. | CSS8/CSS12 |
| J-Four Pipeline Products, Inc. | 63 SS |
| BWM | SS-8 |

# *Section 32 – Steel Casings*

## 32.1 Description

This product specification covers steel casings required under streets, highways, railroads and other structures of which water or sanitary sewer pipe (carrier) are installed with casing spacers. Steel casing pipe shall be supplied in nominal sizes of 16 in., 18 in., 20 in., 24 in., 30 in., 36 in. and 48 in.

## 32.2 General Steel Casing Requirements

a. Steel casing pipe shall have a minimum yield strength of 35,000 psi and conform to ASTM A139 for Grade B or ASTM A252. All casing pipe shall be new (used casing pipe is not allowed).

b. Steel pipe for casing installation shall be shop fabricated in sections at least 18 feet in length (except last section, if a shorter section is required to obtain total casing length) for transportation from the shop to the project site. Sections shall be combined by field welding to provide a single casing assembly to the required length as specified in the plans.

c. All welding procedures used to fabricate steel casings shall be performed under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not limited to, longitudinal and special welds for pipe cylinders, reinforcing plates and casing joint welds.

**The casing pipe diameter with minimum wall thickness are as follows:**

| Pipe Diameter | Minimum Wall Thickness |
|---|---|
| 16” | 0.250” |
| 18” | 0.250” |
| 20” | 0.375” |
| 24” | 0.375” |
| 30” | 0.500” |
| 36” | 0.500” |
| 48” | 0.625” |

### 32.3 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random steel casings to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. The pipe supplier/manufacturer shall furnish a certified affidavit of compliance for all casing pipe (including physical and chemical properties of all casing pipe) to the design engineer and the Rogers Water Utilities for review and approval.
c. All steel casings shall be domestically manufacture.

## *Section 33 – Pipe Embedment Material*

### 33.1 Description

This specification covers crushed limestone material used for embedment of water, sanitary sewer and force mains, sanitary sewer services and water services. Ductile Iron Pipe embedment materials may be either ArDOT Class 7 crushed limestone or Aggregate Size Number 67 (ASTM D448) crushed limestone. A modified Number 67 gradation (ASTM D448) with a maximum particle size of ¾" shall be used in ALL PVC applications.

### 33.2 General Requirements for ArDOT Class 7 Bedding Material

a. The embedment material shall be restricted to mechanically crushed limestone rock so proportioned as to conform to the requirements of ARDOT Test Method 304.
b. The embedment material shall be required to meet the sieve test of AASHTO T 11 & T 27.

**Class 7 Gradation**

| Sieve Size | Percent by Wt. Passing |
|---|---|
| 1½" | 100 |
| 1" | 60-100 |
| ¾" | 50-90 |
| No. 4 | 25-55 |
| No. 40 | 10-30 |
| No. 200 | 3-10 |

### 33.3 General Requirements for Aggregate Size NO. 67 (ASTM D448) Bedding Material

a. The embedment material shall be restricted to mechanically crushed limestone rock so proportioned as to conform to the requirements of ASTM D448 for a Standard Aggregate Size Number 67 (approximate ¾" to No. 8).
b. The embedment material shall be required to meet the sieve test of ASTM E11 to conformity to ASTM D448 for a Standard Aggregate Size Number 67 (approximate ¾" to No. 8).

**Modified ASTM D448 Size Number 67 Gradation (Modified to require maximum ¾" particle size)**

| Sieve Size | Percent by Wt. Passing |
|---|---|
| ¾" | 100 |
| 3/8" | 20-55 |
| No. 4 | 0-10 |
| No. 8 | 0-5 |

### 33.4 Quality Assurance

The results of the sieve test of the material shall be obtained by the Contractor for the source of supply and said test results shall be furnished to RWU. The results of the testing shall be used to approve or disapprove the source of supply by RWU and no further testing will be required for that specific project for which the test was made.

## *Section 34 – Granular Backfill Material*

### 34.1 Description

This specification covers crushed limestone material used to backfill trenches for water, sanitary sewer and force mains, sanitary sewer services and water services that pass through and/or within existing/proposed public roads/streets and existing private driveways within the public Right of Way. Granular backfill material shall be placed from the top of pipe bedding to the specified grade. Granular backfill materials shall be ARDOT Class 7 crushed limestone. Aggregate Size Number 67 (ASTM D448) crushed limestone may only be used as backfill where explicitly directed on approved plans, or under the direction of RWU personnel.

### 34.2 General Requirements for ARDOT Class 7 Backfill Material

a. The granular backfill material shall be restricted to mechanically crushed limestone rock so proportioned as to conform to the requirements of ARDOT Test Method 304.

b. The granular backfill material shall be required to meet the sieve test of AASHTO T 11 & T 27.

**Class 7 Gradation**

| Sieve Size | Percent by Wt. Passing |
|---|---|
| 1½" | 100 |
| 1" | 60-100 |
| ¾" | 50-90 |
| No. 4 | 25-55 |
| No. 40 | 10-30 |
| No. 200 | 3-10 |

c. The granular backfill material shall be placed in lifts or layers not to exceed 6 inches loose measure and properly compacted, tested, and approved before placing subsequent lifts.

d. The granular backfill material shall be compacted to a minimum of 95% of the maximum dry density determined by the modified proctor (ASTM D1557-02).

### 34.3 General Requirements for Aggregate Size NO. 67 (ASTM D448) Backfill Material

a. The granular backfill material shall be restricted to mechanically crushed limestone rock so proportioned as to conform to the requirements of ASTM D448 for a Standard Aggregate Size Number 67 (approximate ¾" to No. 8).
b. The granular backfill material shall be required to meet the sieve sizes of ASTM E11 to conformity to ASTM D448 for a Standard Aggregate Size Number 67 (approximate ¾" to No. 8).

**ASTM D448 Size Number 67 Gradation**

| Sieve Size | Percent by Wt. Passing |
|---|---|
| 1" | 100 |
| ¾" | 90-100 |
| 3/8" | 20-55 |
| No. 4 | 0-10 |
| No. 8 | 0-5 |

c. The granular backfill material has no compaction requirements.
d. The upper 18 inches of the trench backfill shall be capped with ARDOT Class 7 crushed limestone material placed and compacted in accordance with Item 2c and 2d of this specification.

### 34.4 Quality Assurance of Materials

The results of the sieve test of the material shall be obtained by the Contractor for the source of supply and said test results shall be furnished to RWU. The results of the testing shall be used to approve or disapprove the source of supply by RWU and no further testing will be required for that specific project for which the test was made.

## *Section 35 – Engineered Select Backfill Material*

### 35.1 Description

This specification covers engineered select backfill material used to backfill trenches for water, sanitary sewer and force mains that pass through and/or within proposed public roads and streets. Engineered select backfill material shall be placed from the top of pipe bedding to the specified grade and the backfill trench width shall be a minimum of four feet to accommodate compaction equipment.

### 35.2 General Requirements for Backfill Material

a. The engineered select backfill material shall be a clayey sand (SC), clayey gravel (GC) or gravelly clay/sandy clay (CL) having a maximum liquid limit of 45 and a maximum plasticity index (PI) of 20.

b. The engineered select backfill material shall be placed in lifts or layers not to exceed 10 inches loose measure and properly compacted, tested and approved before placing subsequent lifts.
c. The engineered select backfill material shall be compacted to a minimum of 95% of the maximum dry density identified by the Standard Proctor (ASTM D698-00). Moisture content shall not vary from optimum by more than 2% below or 3% above as determined by ASTM D3017-05.

### 35.3 Quality Assurance of Materials

The results of the geotechnical testing of the material shall be obtained by the Contractor for the source of supply and said test results shall be furnished to RWU. The results of the testing shall be used to approve or disapprove the source of supply by RWU and no further testing will be required for that specific project for which the test was made.

## *Section 36 – Flowable Fill Material*

### 36.1 Description

This specification governs the material used, measuring, proportioning, mixing or combining such materials in producing flowable fill for backfilling pipe trenches/encasement and pumpable flowable fill for abandoning an auger/directional bore hole.

### 36.2 General Requirements

a. The cement shall be Portland cement conforming to the requirements of ASTM C150-04, Type I.
b. Water used in mixing shall be clean and free from injurious amounts of oil, salts or other deleterious substances and shall not contain more than 1000 parts per million of chlorides.
c. The fine aggregates shall consist of clean, durable particles of natural sand and shall conform to the requirements of ASTM C33-03.
d. Fly ash or natural pozzolans shall comply with the requirements of ASTM C618-05, Class C.
e. Chemical admixtures may be used if approved by the Engineer and RWU personnel and must conform to the requirements of ASTM C494-05.
f. The flowable fill shall be plant batched and transit mix.

### 36.3 Mix Design

The mix design shall be proportioned to produce a flowable mixture without segregation. Material for one cubic yard, absolute volume, shall be as follows:

| Trench Backfill Flowable Fill | |
|---|---|
| Cement | 40-60 lbs. |
| Fly Ash | 90-170 lbs. |
| Sand | Variable to equal one cubic yard |

| Pumpable Flowable Fill | |
|---|---|
| Cement | 80-100 lbs. |
| Fly Ash | 220-300 lbs. |
| Sand | Variable to equal one cubic yard |

| | | | |
|---|---|---|---|
| Water | ± 46 gal. | Water | ± 65 gal. |

The minimum flow for the flowable fill shall be 8 inch in accordance with the ARDOT Test Method. The unit weight shall be a minimum of 110 lbs/cubic foot. The Pumpable Flowable Fill shall follow ARDOT Specification Section 206 Flowable Select Material.

### 36.4 Quality Assurance

The Contractor shall submit the mix design from his selected batch plant to the Engineer and RWU personnel for review of compliance with this specification. The submitted mix design shall consist of the weights of all components of the proposed mix (water and admixtures may be measured by volume) and the certified test results for flow and unit weight.

## *Section 37 – Concrete Material*

### 37.1 Description

This specification governs the material used, measuring, proportioning, mixing or combining such materials in producing concrete and grout for construction.

### 37.2 General Requirements

a. The cement shall be Portland cement conforming to the requirements of ASTM C150-04, Type I.
b. Water used in mixing shall be clean and free from injurious amounts of oil, salts or other deleterious substances and shall not contain more than 1000 parts per million of chlorides.
c. The fine aggregates shall consist of clean, durable particles of natural sand and shall conform to the requirements of ASTM C33-03.
d. The coarse aggregates shall consist of clean, crushed stone or gravel and shall conform to the requirements of ASTM C33-03.
e. ASTM No. 57 (Max. Size = 1 inches) shall be used where clearances permit including in walls greater than 8 inches thick and slabs greater than 5 inches thick.
f. ASTM No. 67 (Max. Size = 3/4 inches) shall be used when minimum clear spacing between individual reinforcing bars is less than 1½ inches.
g. Fly ash or natural pozzolans shall comply with the requirements of ASTM C618-05, Class C. Fly ash may be used as a partial replacement for Type 1 cement, not exceeding, 20 percent by cementations weight. Substitution shall be made at the rate of one pound of fly ash for each pound of cement replaced. Mixtures with fly ash shall meet the same requirements as mixtures without fly ash.
h. The concrete shall meet the requirements of ASTM C94-05 and all concrete and/or grout shall be plant batched and transit mix.

## 37.3 Admixtures

a. Chemical admixtures may be used if approved by the Engineer and RWU personnel and must conform to the requirements of ASTM C494M-05a.

b. Air entraining agent, when specified, shall comply with the requirements of ASTM C260-01 and shall be approved by the Engineer and RWU personnel.

c. Retarding agent or accelerating agent may be used when the Contractor requests permission of its use and its use is approved by the Engineer and RWU personnel. The retarding agent shall be a Type B or Type D admixture as defined in ASTM C494M-05a and the accelerating agent shall be a Type C admixture as defined in ASTM C494M-05a.

d. When air entrained concrete is specified, the air entraining agent and the retarding or accelerating agent shall be so incorporated that the air content of the concrete shall fall within the percentage range stipulated in these specifications.

e. The use of other admixtures conforming to the requirements of ASTM C494M-05a may be used if approved by the Engineer and RWU personnel and if used in strict accordance with the manufacturer's recommendations.

## 37.4 Classification and Proportions

a. The concrete/grout shall be classified as provided below. The strengths for each classification shall be the minimum 28 days compression strength for that class of concrete/grout.

b.

| Class | Minimum Compressive Strength @ 28 Days | Minimum Cement Factor (lb/CY) | Maximum Water/Cement Ratio (lb/lb) | Slump Range* (inch) | Air. Content (%) |
|---|---|---|---|---|---|
| A (Concrete) | 3,000 | 470 | 0.50 | 1-4 | 4.0-7.0 |
| B (Concrete) | 4,000 | 564 | 0.48 | 1-4 | 4.0-7.0 |
| C (Grout) | 2,000 | 600 | 0.58 | NA | NA |

* When using admixtures to increase slump, concrete shall have a slump of 4 inches +/- 1 inch before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added.

c. The usage of each class of concrete/grout are described as follows:

- Class A concrete shall be used for pipe thrust blocking and in sidewalks, curb and gutter, driveways, swales, valve pads, thrust blocking, manhole frames and equipment slabs.
- Class B concrete shall be used in manholes, wet wells and valve vaults.
- Class C grout (pumpable) shall be used to fill the annular space (void area) between the casing pipe and the borehole and the sloped floor of a wet well.

### 37.5 Quality Assurance

The Contractor shall submit the mix design from his selected batch plant to the Engineer and RWU personnel for review of compliance with this specification. The submitted mix design shall consist of the weights of all components of the proposed mix (water and admixtures may be measured by volume) and the certified test results for compression strength.

## *Section 38 – Reinforcing Steel Material*

### 38.1 Description

This specification governs the reinforcing steel material used in cast-in-place concrete construction.

### 38.2 General Requirements

a. Reinforcing steel shall be deformed, clean, free from rust and new. Reinforcing steel shall conform to ASTM A615-06 and shall be Grade 60 for No. 5 bars and larger and Grade 40 minimum for No. 4 and No. 3 bars.
b. Wire reinforcement shall be electrically welded wire fabric of cold-drawn wire (70,000 psi yield point) of the diameter and spacing required. Wire reinforcement shall conform to ASTM A185-06.

### 38.3 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random reinforcing steel and wire reinforcement to testing by an independent laboratory for compliance with these standards. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting.
b. The reinforcing steel and wire reinforcement supplier/manufacturer shall furnish a certified affidavit of compliance for all steel reinforcing (including physical and chemical properties of all steel/wire) to the Engineer and the Rogers Water Utilities for review and approval.
c. All reinforcing steel and wire reinforcement shall be domestically manufactured.

## *Section 39 – Joint Sealant Material (Manhole Adjustment Rings)*

### 39.1 Description

This specification governs the preformed plastic joint sealant material used in the installation of manhole cast iron vertical adjustment rings (riser rings).

### 39.2 General Requirements

a. Joint sealant material shall be supplied in 1½ inch by 3’-6” strips.

b. The joint sealant chemical composition shall consist of hydrocarbon (50-70 percent by weight) and inert mineral filler (30-50 percent by weight). The maximum percent by weight of volatile matter shall not exceed 2.0. The joint sealant chemical composition shall conform to ASTM D4-80, ASTM D6-80 and AASHTO T111.

### 39.3 Quality Assurance

a. The Rogers Water Utilities may, at no cost to the manufacturer, subject random to preformed plastic joint sealant material testing by an independent laboratory for compliance with these standards. Any failure to meet the quality standards herein will be grounds for rejecting.
b. The joint sealant material supplier/manufacturer shall furnish a certified affidavit of compliance for preformed plastic joint sealant material to the Engineer and the Rogers Water Utilities for review and approval.

The following manufacture is approved for joint sealant material.

**APPROVED MANUFACTURER LIST**

| Manufacturer | Type |
|---|---|
| Henry Company | Ram-Nek |

## *Section 40 – Asphalt Concrete Cold Mix Material (Temp Pavement Repair)*

### 40.1 Description

This specification governs the asphalt concrete cold plant mix material used for the temporary pavement repair of streets, parking lots and driveways from the results of utility cuts.

### 40.2 Composition Requirements

a. The mixture shall conform to the requirements shown below.

**Maximum Mix**

| Sieve Size | Percent by Wt. Passing | Tolerance (%) |
|---|---|---|
| ½" | 100 | |
| No. 4 | 60-80 | ± 7 |
| No. 8 | 43-63 | ± 5 |
| No. 50 | 15-28 | ± 4 |
| No. 200 | 4-10 | ± 2 |
| Asphalt Binder Content | 3.5%-6.5% | ± 0.4 |
| Mineral Filler | 3.0% | Minimum |

### 40.3 Materials Requirements

The asphalt shall be an MC-250, MC-800, MC-3000 or a summer or winter grade seasonal type asphalt. The asphalt concrete cold plant mix material type asphalt shall comply with the ARDOT Standard Specification for Highway Construction, Section 411-Asphalt Concrete Cold Plant Mix.

## *Section 41 – Polyethylene Material for Pipe Encasement*

### 41.1 Polyethylene Materials

Polyethylene material for the encasement of cast iron pipe (gray or ductile) shall conform to ANSI A21.5 /AWWA C 105.

### 41.2 Tape Materials

Tape material for field application shall be Polyken #900, or Scotchrap # 50, or equal, at least 2-inches wide.

## *Section 42 - TRACE WIRE*

### 42.1 Trace wire

Trace wire shall be 12-gauge, insulated copper wire.

# PART III - CONSTRUCTION PROCEDURES

## *Section 1 - Description*

### 1.1 General

This part of the specifications shall set forth minimum acceptable construction procedures for the installation of water and sanitary sewerage facilities under the jurisdiction of Rogers Water Utilities. Any construction procedures not outlined in these specifications must be submitted to RWU for approval prior to the beginning of construction. Complete specifications covering any unusual or special construction procedure not listed in this specification shall be submitted to RWU for approval prior to the beginning of construction.

## *Section 2 – Excavation / Trenching*

### 2.1 Description

This specification governs the excavation/trenching for water mains, water services, sanitary sewer mains, sanitary sewer services, force mains, sanitary sewer manholes, wet wells and other structures, unless otherwise noted on the project construction plans. The work shall include all necessary drainage, dewatering, pumping, bailing, timber bracing, sheeting, trench shoring boxes, manhole shoring boxes and incidental construction. All existing utilities and structures shall be protected from damage during the excavation/trenching operation and if damaged, the Contractor, at the Contractor's expense, will be responsible for repair to the damaged existing utility and/or structures. Unless otherwise shown on the project construction plans and/or contract documents, all excavation/trenching shall be unclassified and shall include all materials encountered regardless of their nature and manner in which they are removed, to include rock, stone, organic material or whatever material is encountered.

## 2.2 EXCAVATION OR TRENCH SAFETY SYSTEMS

All excavation/trenching, including the manner of supporting excavation/trenching and provision for access into the excavations, shall comply with the most recent provisions of 29 CFR 1926, Subpart P – Excavations, Trenching and Shoring of the Occupational Safety and Health Administration (OSHA), which is hereby incorporated into these Specifications. The Contractor shall comply with the OSHA provisions of said documents for all excavations/trenching. Furthermore, the Contractor shall be responsible for obtaining all trench permits as required by the City of Rogers and Rogers Fire Dept.

## 2.3 General

a. The excavation/trench depth for all water mains, water services, sanitary sewer mains, sanitary sewer services and force mains shall be excavated to at least inches below the pipe grade line as shown on the project construction plans.
b. The excavation/trench depth for sanitary sewer manholes shall be excavated to at least 12 inches below pipe grade line as shown on the project construction plans. Wet wells and other structures shall be excavated to the foundation grade as shown on the project construction plans.
c. All excavation/trenching below the established grade line shown on the project construction plans such as over-excavation and bore/receiving pits (working pits) shall be backfilled with granular material as specified in *PART II-MATERIALS, Section 33 –* of these specifications.
d. RWU shall have the right to limit the amount of trench excavated in advance of the pipe laying. In general, such trenching shall not exceed 400 feet.
e. The Contractor is prohibited from using continuous trenching machines in the construction of sanitary sewer mains, force mains and water mains with the exception of trench rock excavation.
f. The Contractor shall furnish and maintain street plates, barricades and other safety devices as required by local, state and federal laws, regulations, and ordinances, and all applicable permits around open excavations to safeguard traffic and pedestrians. The temporary suspension of work does not relieve the Contactor from the responsibility for the above requirements.
g. Safety on the construction project is the sole responsibility of the Contractor.

## 2.4 EXCAVATION/TRENCHING

a. GENERAL: Prior to the start of excavation, the Contractor shall physically locate vertically and horizontally by excavation all existing, potentially conflicting utilities and structures that are shown crossing and/or paralleling proposed water main, water services, sanitary sewer mains, sanitary sewer services and force mains. If a potential conflict exists, the Contractor shall notify the Engineer with measurements, dimensions, elevations, type and size of existing utility and/or structures in order to determine the proper resolution of the conflict. RWU personnel must approve all resolutions of conflicts by the Engineer.

1. Whenever existing utilities and/or structures that are not shown on the project construction plans are encountered during the progress of the work and interfere to such an extent that an alteration to the project construction plans is required, the Engineer shall have the authority to change the project construction plans and order a deviation from the pipe alignment and grade line only after the approval of the change by RWU personnel. The Engineer may also arrange with the owners of the existing utilities and/or structures in conflict for the removal, relocation or reconstruction of the obstruction.
2. The Contractor without additional compensation shall furnish temporary support, adequate protection and maintenance of all underground and surface utilities and/or structures encountered in the progress of work. The Contractor shall be held responsible for the repair of existing utilities and/or structures that are broken or otherwise damaged during the progress of work.

b. EXCAVATION/TRENCH WIDTH: Excavation for pipe, manholes and other structures shall have a minimum of 12 inches and a maximum 24 inches clearance on all sides. Trenches shall have vertical sides from a point 6 inches above the outside top of the pipe to the bottom of the trench, with a width within the limits shown on the RWU standard details. Additional excavation, bedding and backfill materials required for compliance with OSHA regulations is considered incidental to the cost of the construction project.

c. EXCAVATION/TRENCH SIDEWALLS: All excavation/trench sidewalls shall be sloped, benched, braced, shored or sheeted to assure safe working conditions and to prevent cave-ins. All excavation/trench operations including sloping or benching of the excavation/trench sidewalls and stockpiling of excavated materials shall be confined to the width of the utility easement and/or right-of-way plus any temporary construction easement.

d. DE-WATERING: All excavation/trenching shall be dewatered before any construction is undertaken therein. All pipes shall be laid in dry trenches and all concrete shall be placed only upon dry and firm foundation material. The Contractor shall furnish and maintain adequate equipment to properly remove and dispose of all water entering the excavation/trench or other part of work.

The discharge from any excavation/trenching operations shall be conducted to natural drainage channels or other structures as approved by the Engineer and in accordance with applicable permits. The Contractor shall be responsible for damage of any nature resulting from the de-watering operation.

Should de-watering of the excavation/trench prove unsuccessful, the trench or structure foundation shall be excavated to a depth of approximately 6 inch below grade. It shall then be backfilled to grade with granular material as specified in ***PART II-MATERIALS, Section 33 –*** of these specifications. A sump, approximately 6 inches below the granular material, shall be formed to provide a place for a pump to take

suction and thus lower the water level to a point below the bottoms of the pipe joints or structure foundation. The pumping shall be continued until the pipe or concrete has been placed and the presence of water will not injure them. Backfill shall not commence until the excavation/trench has been de-watered.

e. OVER-EXCAVATION: If the soil at the bottom of the excavation/trench and/or structure foundation is unsuitable material and in such condition that it cannot be properly shaped and graded, the excavation/trench depth shall be excavated to firm soil or to a depth determined by the Engineer. RWU personnel must also approve the excavation/trench depth that is determined by the Engineer.

f. BLASTING: In the event the use of explosives (blasting) is necessary for the efficient prosecution of the work, the Contractor shall notify the Engineer and RWU personnel in advance of their use, in writing. The Contractor shall exercise every precaution to protect work, neighboring property and existing utilities and/or structures. The Contractor shall hold a current blasting certification and adhere to all requirements of Code No. 13-Blasting Regulations of the State of Arkansas Department of Labor.

Any damage to property resulting from blasting shall be the liability of the Contractor. Any observation of this project by RWU personnel does not in any way reduce the responsibility of the Contractor for damage resulting in the use of explosives.

The Contractor shall provide, 48 hours prior to the time of blasting, written notification (certified letter) to each property resident/owner and each utility that is located within 1,000 feet to the site of the blasting operation. The Contractor shall provide the certified letter receipts to the Engineer.

### 2.5 STOCKPILE OF EXCAVATED MATERIAL

Excavated material that is suitable for backfill shall be stockpiled in an orderly manner at a sufficient distance from the banks of the excavation/trench to avoid overloading and to prevent slides or cave-ins.

### 2.6 DISPOSAL OF EXCAVATED MATERIAL

Any excess excavated material, not utilized after all fill requirements have been met, shall become the responsibility of the Contractor. The Contractor shall dispose of it by hauling and wasting outside the limits of watercourses, in conformity with pertinent City, County, State and Federal permits.

## *Section 3 – Auger Jack and Bore*

### 3.1 Description

This specification governs the jack and bore operation for the installation of casing pipe for water mains, sanitary sewer mains, sanitary sewer services and force mains using the auger

bore method. The directional bore operation for the installation of water mains, sanitary sewer mains and force mains is not allowed by RWU.

### 3.2 Materials

a. Casing spacers and end seals shall conform to PART II-MATERIALS, Section 31 – Casing Spacers and End Seals of these specifications.
b. Casing pipe shall conform to PART II-MATERIALS, Section 31 – Casing Spacers and End Seals of these specifications.
c. Pumpable flowable fill shall conform to PART II-MATERIALS, Section 36 – Flowable Fill Materialof these specifications.
d. Grout (Class D) shall conform to PART II-MATERIALS, Section 37 – Concrete Material of these specifications.

### 3.3 Permits

All work within the state highway right-of-way and/or the railroad right-of-way shall conform to the specifications and requirements of the Arkansas Dept. of Transportation (ArDOT) and/or Arkansas Missouri Railroad (AMR). All work within City of Rogers right-of-way and/or Benton County right-of-way shall conform to the specifications and requirements of the Rogers Water Utilities. The Contractor shall keep a copy of the required permit at the job site and comply with all the terms and conditions of said permit.

### 3.4 General

a. The depths and locations of bore and receiving pits (working pits) shall be established by the Contractor in accordance with the horizontal alignment and grade as shown on the project construction plans.
b. The working pits shall adhere to OSHA requirements. Barricades shall be furnished around working pits to safeguard traffic and pedestrians.
c. All discharge from dewatering of the working pits shall be directed into approved receiving basins in accordance with all applicable regulatory requirements.
d. The working pits shall be in locations that in no way interfere with the operation of highways, streets, driveways, railroads or other facilities. Working pits shall not weaken or damage any embankment, utility or structure.
e. The use of water or other fluids in connection with the boring operation will be permitted only to the extent to lubricate cuttings. Water jetting will not be permitted.
f. The trimming of casing spacers for the carrier pipe is not allowed to achieve horizontal alignment or grade in the casing.

### 3.5 Tolerances

The casing pipe shall be straight (end to end) and installed to horizontal alignment and grade as shown on the project construction plans. Should the misalignment of the casing pipe preclude the installation of a water main and/or sanitary sewer main to the tolerances specified, the Contractor shall perform corrective measures in accordance with Item 7 of this specification.

## 3.6 Construction

a. The auger bore/jack equipment shall be located at the low or downstream end, if possible.
b. The casing pipe shall be installed (jacked) into the borehole simultaneously with the auger head. The auger head shall be of sufficient diameter within the casing pipe to convey the excavation material to the bore pit.
c. Excavated material shall be removed from the bore pit and disposed of properly.
d. The ends of each casing pipe section (joint) shall have one beveled end/one plain end and shall be full penetration butt welded on the outside of the casing pipe in accordance with the applicable portions of the latest edition of AWWA C206 for field welded water pipe joints. The welding of the casing pipe shall be performed on the rails of the of auger bore/jack equipment.
e. If the void (clear) space between the casing pipe and the borehole is 2 inches or greater, the void (clear) space shall be completely filled by pressure grouting (Class D) for the entire length of installation. The wetting of said void (clear) with water is required prior to performing the pressure grout operation.
f. After the completion of the borehole and the casing pipe installation, the Engineer shall check the two ends of the casing pipe that are located within the bore and receiving pit for horizontal alignment and grade in accordance with Item 5 of this specification. The results of the horizontal alignment and grade checks shall be presented to RWU personnel for review and approval.
g. After the horizontal alignment and grade check of the ends of the casing pipe, the casing pipe shall be Lamp Tested to determine the grade alignment (straight barrel) by the Engineer and RWU personnel. A “full moon” shall be visible through the casing pipe for grade alignment. The casing pipe alignment shall be regular and in one direction.
h. The Contractor shall clean the interior of the casing pipe and remove all excess excavated material.
i. The carrier pipe shall be installed within the casing pipe using the number and size of casing spacer(s) as specified and the end seals. The carrier pipe shall be installed from the bore pit end of the casing pipe.
j. After completion of the bore/casing pipe installation, water main and/or sanitary sewer main installation and the backfill operation, the Contractor shall restore the profile of the right-of-way and/or surface to its original condition.

## 3.7 Rejection of Borehole/Casing Pipe

In the event that an obstruction is encountered during the bore or a borehole/casing pipe is misaligned, the casing pipe is to be removed from the borehole and the borehole shall be filled with pumpable flowable fill at a sufficient pressure to fill all voids. The cost of the pumpable flowable fill, removal of casing pipe and re-bore/re-installing the casing pipe is incidental to the cost of the project.

# *Section 4 – Pipe Embedment*

## 4.1 Description

This specification governs the pipe embedment for water mains, water services, sanitary sewer mains, sanitary sewer services and force mains, unless otherwise noted on the project construction plans.

## 4.2 Materials

Pipe bedding material shall conform to *PART II-MATERIALS, Section 33 –* of these specifications.

## 4.3 General

a. The granular pipe bedding material shall be either ARDOT Class 7 granular pipe bedding material or aggregate size 67 (ASTM D448) granular pipe bedding material as specified in *PART II-MATERIALS, Section 33 –* of these specifications.
b. The trench depth for all water mains, water services, sanitary sewer mains, sanitary sewer services and force mains shall be excavated to at least 6 inches below the pipe grade line as shown on the project construction plans. Additional bedding may be required on a case by case basis depending on the existing material conditions.
c. The trench shoring and/or bracing may be required by the geotechnical firm at the locations of the Quality Assurance tests. Any trench shoring and/or bracing cost associated with the Quality Assurance tests are the sole responsibility of the Contractor.
d. The Contractor shall furnish and maintain street plates, barricades and other safety devices as required by local, state and federal permits/ordinances around open excavations to safeguard traffic and pedestrians. The temporary suspension of work does not relieve the Contractor from the responsibility for the above requirements.
e. Safety on the construction project is the sole responsibility of the Contractor.

## 4.4 Pipe Embedment

a. The trench bottom shall be free of water, muck and debris. If water is present in the trench, the Contractor shall perform de-watering operation as specified in *PART III - CONSTRUCTION PROCEDURES, Section 5 – Excavation and Trench Backfill* of these specifications.
b. The granular pipe bedding material placement shall be a depth of 6 inches from the trench bottom to the bottom of the pipe, extend up the sides of the pipe between the pipe and the trench wall and to a depth of 6 inches above the pipe as shown on the RWU standard details.
c. All excavation/trenching below the established grade line shown on the project construction plans such as over-excavation and bore/receiving pits (working pits) shall be backfilled with granular pipe bedding material to 6 inches above the pipe.
d. The placing of granular pipe bedding material shall be performed in such a manner, which will assure no separation and/or change in the uniform gradation.

e. The initial 6 inches of granular pipe bedding material shall be placed prior to the installation of the pipe. The use of pipe support blocks or cribbing material is not allowed to support the pipe and/or fitting before the placement of initial granular pipe bedding material.
f. The initial 6 inches of granular pipe bedding material shall support the full length of the pipe with full bearing on the bottom segment of the pipe. Holes shall be excavated in the initial granular pipe bedding material to accommodate the pipe bell and/or fitting.
g. The Class 7 granular pipe bedding material shall be compacted by mechanical means. Aggregate size 67 (ASTM D448) bedding material has no compaction requirements.
h. Jetting or flooding shall not be allowed for the consolidation or compaction of Class 7 granular pipe bedding material.

### 4.5 Compaction

a. COMPACTION REQUIREMENTS: The Class 7 granular pipe bedding material shall be placed in lifts or layers not to exceed 6 inches loose measure and properly compacted, tested, and approved before placing subsequent lifts. The granular backfill material shall be compacted to a minimum of 95% of the maximum dry density determined by the modified proctor (ASTM D1557-02). The minimum frequency of the compaction tests shall be one test per 6 inch lift per 400 linear feet of completed pipe bedding or as directed by the Engineer.
b. COMPACTION TESTS: The Contractor is responsible for Quality Assurance testing during material production and the placement operations to produce work that conforms to the RWU Specifications requirements.
c. Material or workmanship that fails to meet the RWU Specifications requirements, as determined by the Quality Assurance tests, shall be either replaced or reworked to meet the RWU Specifications requirements. The cost of the Quality Assurance tests is the sole responsibility of the Contractor.
d. Copies of the compaction reports shall be distributed to the Engineer and RWU. Copies of the compaction reports shall also be distributed to the City of Rogers if test results are performed under existing/proposed public streets.

## *Section 5 – Excavation and Trench Backfill*

### 5.1 Description

This specification governs the backfilling for water mains, water services, sanitary sewer mains, sanitary sewer services, force mains, sanitary sewer manholes, wet wells and other structures, unless otherwise noted on the project construction plans. All existing utilities and structures shall be protected from damage during the backfilling operation and if damaged, the Contractor, at the Contractor's expense, will be responsible for repair of the damaged existing utility and/or structures.

## 5.2 Materials

a. Granular backfill material shall conform to PART II-MATERIALS, Section 34 – Granular Backfill Material of these specifications.
b. Engineered select backfill material shall conform to PART II-MATERIALS, Section 35 – Engineered Select Backfill Material of these specifications.
c. Flowable fill material shall conform to PART II-MATERIALS, Section 36 – Flowable Fill Material of these specifications.

## 5.3 General

a. The trenches shall be backfilled immediately after the pipe is laid and approved by the Engineer and RWU personnel. The Engineer and RWU per

RWU

## 5.5 Compaction Methods

Backfill shall be mechanically compacted by means of tamping rollers, sheep foot rollers, pneumatic tire rollers, vibrating rollers or other mechanical tampers. Jetting or flooding shall not be allowed.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will achieve the required compaction results or will not result in damage to adjacent ground, existing utilities or improvements installed under this construction project. The Contractor shall make his own determination in this regard.

## 5.6 Compaction

a. COMPACTION REQUIREMENTS: Trench and structure backfill shall be placed to the

d. All backfill for water mains, sanitary sewer mains and force mains that cross and/or located within the existing/proposed public streets shall have compaction tests performed based upon the backfill depth schedule. The Engineer and RWU personnel will determine the depth of each test per 400 Linear Feet test interval.
e. At least fifty percent (50%) of the total water and sanitary sewer service crossings of the existing/proposed public streets within the construction project shall have compaction tests performed based upon the backfill depth schedule. The service crossings to receive backfill compaction tests shall be selected by the Engineer.
f. COMPACTION TESTS: The Contractor is responsible for Quality Assurance testing during material production and placement operations and for necessary adjustments to material production and placement operations to produce work that conforms to these specifications.
g. Material or workmanship that fails to meet the RWU specification requirements, as determined by the Quality Assurance tests, shall be either replaced or reworked to meet these specification requirements. The cost of the Quality Assurance tests is the sole responsibility of the Contractor.
h. Copies of the compaction reports shall be distributed to the Engineer and RWU. Copies of the compaction reports shall also be distributed to the City of Rogers if test results are performed under existing/proposed public streets/sidewalks.

## *Section 6 – Installation and Testing of Tapping Sleeves and Valves*

### 6.1 Description

This specification governs the installation, testing and tapping of the tapping sleeve and valve for water mains, fire lines and sanitary sewer force mains. A tap for a tapping sleeve and valve shall only be made on pressurized mains (no dry taps will be permitted).

### 6.2 Materials

a. Tapping sleeves and valves shall conform to PART II-MATERIALS, Section 8 - Tapping Sleeves and Valves, of these specifications.
b. Concrete shall conform to to PART II-MATERIALS, Section 37 – Concrete Material of these specifications.
c. Thrust Blocking shall conform to to PART III - CONSTRUCTION PROCEDURES, Section 7 – Concrete Thrust Blocking of these specifications.

### 6.3 General Requirements

a. Tapping sleeves (outside sleeve edge) shall not be installed within 2 feet of a pipe joint/fitting of an existing main, tapping sleeve or tapped corp.
b. The Contractor shall make the excavation of sufficient size to allow the tapping machine and crew room to perform the tap.

c. Before assembly of the tapping sleeve and valve, the Contractor shall clean the existing pipe barrel thoroughly to provide a smooth, hard surface for the gasket of the tapping sleeve. The Contractor shall verify the pipe type and outside diameter dimension.
d. Tapping sleeve and valve shall be installed in accordance with the manufacturer instruction. The face of the outlet flange shall be plumb. The tapping valve shall be bolted securely to the tapping sleeve outlet flange.
e. The use of a shell type cutter with pilot drill shall be required. Whenever tapping a potable water main, the shell cutter shall be disinfected with straight bleach or super-chlorinated solution prior to start of tapping operation. The shell cutter shall be of the size required to cut full opening.
f. The Contractor shall furnish all equipment and labor required, including necessary piping/hoses, injection booster pump, test pressure gauge, ductile iron MJ plug and a water source for testing the tapping sleeve and valve. The test pressure gauge shall have a minimum range of 0-300 psi and the pressure gauge figure intervals shall be a maximum of 5 psi increments.
g. The tapping of the water mains and fire lines shall be performed by RWU crews for 4 inch, 6 inch, 8 inch and 12 inch pipe at the fee charge established for this service. Independent tapping service is required for water mains and fire lines sizes greater than 12 Inch diameter and all sanitary sewer force mains. The cost of independent tapping service will be at the expense of the Contractor.
h. Only qualified operators shall operate the tapping machine. The “coupon” shall be withdrawn and be given to the Engineer and RWU personnel for inspection.
i. Tapping sleeve with a run size 4 inch or larger shall be adequately horizontal concrete thrust block per the RWU specification after passing the hydrostatic and leakage test.

## 6.4 Hydrostatic and Leakage Procedures

a. After installing the tapping sleeve and valve, and prior to tapping of a pressurized main/line, a hydrostatic and leakage test shall be performed (tapping valve in closed and open position). The test will be conducted by introducing water through the test port on the tapping sleeve with the tapping valve in the closed position. The tapping sleeve with valve in the closed position shall be capable of maintaining a test pressure of 200 psi for 15 minutes duration, with no sign of visible leaks. The Contractor shall then install a MJ plug on the tapping valve and conduct the specified test with the valve in the open position. The tapping sleeve with valve in the open position shall be capable of maintaining a test pressure of 200 psi for 15 minutes duration, with no sign of visible leaks.
b. All leaks shall be repaired by removing and/or replacing defective items with items free of defects, after which the tapping sleeve and valve shall be re-tested. Such repair and re-testing shall be performed until the installation passes the specified test.
c. The test plug shall be inserted into the test port on the sleeve after completion of the test.

### 6.5 Acceptance

The tapping sleeve and valve shall have passed the hydrostatic and leakage test if the tapping sleeve and valve (tapping valve in closed and open position) is capable of maintaining a test pressure of 200 psi for a 15 minute duration, with no visible leaks.

## *Section 7 – Concrete Thrust Blocking*

### 7.1 Description

This specification governs the installation of concrete thrust blocking for water mains, fire hydrants, fire lines and sanitary sewer force mains.

### 7.2 Materials

Concrete shall conform to Class A or Class B concrete as specified in *PART II-MATERIALS, Section 37 – Concrete Material* of these specifications.

### 7.3 General Requirements

a. Concrete thrust blocking shall be provided for all fire hydrants, bends, caps, plugs (not attached to a restrained valve with tee or larger than 12 inch diameter), tees, tapping sleeve and others fittings where hydraulic thrust may develop.
b. The horizontal concrete thrust blocking must be braced against unexcavated soil and /or select backfill material.
c. The reaction bearing (contact) area calculation for horizontal concrete thrust blocking is based on a hydraulic test pressure of 150 psi and undisturbed soil bearing pressure of 2,500 pounds per square foot.
d. The Contractor shall make the excavation of sufficient size to provide the reaction area for the horizontal concrete thrust blocking as shown on the RWU standard details. The minimum reaction area and shape of the horizontal concrete thrust blocking are shown on the RWU standard details. The reaction area shall be required to prevent movement of the joint, but in no case shall the reaction area be less than one square foot.
e. If, in the opinion of the Engineer and RWU personnel, the reaction area of the undisturbed material for horizontal concrete thrust blocking is not sufficient to provide adequate restraint based on minimum reaction area shown on the RWU standard details, then the reaction area shall be increased to a size that will ensure adequate restraint.
f. If other trenching is located behind the reaction area of the undisturbed material for horizontal concrete thrust blocking (within 6 feet) or if undisturbed material is not present such as an non-engineered backfill, the Engineer and RWU personnel may require the installation of concrete anchor blocking or other necessary means of thrust restraint in lieu of horizontal concrete thrust blocking.
g. Vertical concrete thrust blocking shall be sized to resist hydraulic thrust with an equal weight of concrete. The weight of concrete is assumed to be 150 pounds per cubic foot.

h. The Contractor shall make the excavation of sufficient size for the installation of the vertical concrete thrust blocking and/or concrete anchor blocking as shown on the RWU standard details.
i. A visqueen bond breaker shall be placed between the fitting and the concrete thrust blocking to prevent permanent bonding to concrete. The fitting joints shall be accessible for repair.
j. The minimum cure time for concrete thrust blocking is 24 hours after placement before placing in service.
k. If the main/line must be immediately placed into service, the Contractor shall install wood timbers or steel tubing of such design as to support the hydraulic thrust between the fitting and the trench wall in addition to the required horizontal concrete thrust blocking as shown on the RWU standard details (Cut/Cap Blocking).
l. No mechanical tamping or compacting shall be allowed above the concrete thrust blocking for a minimum of 24 hours after placement. All wood forms for concrete placement shall be removed before backfilling.

### 7.4 Acceptance

a. The visqueen bond breaker at fitting, wood concrete forms and trench bank (reaction area) must be inspected and approved by the Engineer and RWU personnel prior to the placement of concrete. All fitting bolts and nuts shall be protected from concrete spatter or encapsulation.
b. The Contractor shall place the concrete for the thrust blocking in the presence of the Engineer and RWU personnel or the Contractor shall leave the trench open until the concrete thrust blocking has been inspected and approved by the Engineer and RWU personnel.

## *Section 8 – Directional Bore for Water Services*

### 8.1 Description

This specification governs the bore and pull back operation for the installation of casing pipe for water services using the directional bore method.

### 8.2 Materials

a. Sleeve pipe for water service bores shall be 4 inch diameter polyvinyl chloride (PVC) pipe, Schedule 40 and conform to ASTM D1785-06. Fittings for the PVC pipe shall be Schedule 40 and conform to ASTM D2476-06. Casing spacers are not required for the installation of the carrier pipe (copper tubing).
b. Pumpable flowable fill shall conform to PART II-MATERIALS, Section 36 – Flowable Fill Material of these specifications.

### 8.3 Permits

All work within the state highway right-of-way and/or the railroad right-of-way shall conform to the specifications and requirements of the Arkansas Dept. of Transportation (ArDOT) and/or

Arkansas Missouri Railroad (AMR). All work within City of Rogers right-of-way and/or Benton County right-of-way shall conform to the specifications and requirements of the Rogers Water Utilities. The Contractor shall keep a copy of the required permit at the job site and comply with all the terms and conditions of said permit.

## 8.4 General

a. The depths and locations of bore and receiving pits (working pits) shall be established by the Contractor in accordance with the horizontal alignment and grade as shown on the project construction plans.
b. The working pits shall adhere to OSHA requirements. Barricades shall be furnished around working pits to safeguard traffic and pedestrians.
c. All discharge from dewatering of the working pits shall be directed into approved receiving basins in accordance with all applicable regulatory requirements.
d. The working pits shall be in locations that in no way interfere with the operation of highways, streets, driveways, railroads or other facilities. Working pits shall not weaken or damage any embankment, utility or structure.

## 8.5 Tolerances

The casing pipe shall be straight (end to end) and installed to horizontal alignment and grade as shown on the project construction plans. Should the misalignment of the casing pipe preclude the installation of a water service to the tolerances specified, the Contractor shall perform corrective measures in accordance with Item 7 of this specification.

## 8.6 Construction

a. The directional bore machine shall be located at the low or downstream end, if possible.
b. The directional bore machine shall be equipped with a spoil transportation equipment using drilling fluid. The drilling fluid shall be compatible for the soil condition. The drilling fluid, such as bentonite, shall be used lubricating the casing during pull back operation.
c. The drill bit head shall not be greater than the diameter of the casing pipe.
d. The directional bore machine shall be equipped with an output signal that is located within the drill bit head. The output signal from the drill bit head shall allow the operator of the directional bore machine to track the location of the drill bit head.
e. Spoil material and drilling fluid shall be removed from the working pits and disposed of properly.
f. After the completion of the pilot hole and the casing pipe installation, the Engineer shall check the two ends of the casing pipe that are located within the bore and receiving pit for horizontal alignment and grade in accordance with Item 5 of this specification. The results of the horizontal alignment and grade checks shall be presented to RWU personnel for review and approval.

g. After the horizontal alignment and grade check of the ends of the casing pipe, the casing pipe shall be Lamp Tested to determine the grade alignment (straight barrel) by the Engineer and RWU personnel. A "full moon" shall be visible through the casing pipe for grade alignment. The casing pipe alignment shall be regular and in one direction.
h. The Contractor shall clean the interior of the casing pipe and remove all spoil material and drilling fluid.
i. After completion of the pilot bore/casing pipe installation, water service installation and the backfill operation, the Contractor shall restore the profile of the right-of-way and/or surface to its original condition.

### 8.7 Rejection of Pilot Hole/Casing Pipe

In the event that an obstruction is encountered during the pilot bore or the pilot hole/casing pipe is misaligned, the casing pipe is to be removed from the borehole and the borehole shall be filled with pumpable flowable fill at a sufficient pressure to fill all voids. The cost of the pumpable flowable fill, removal of casing pipe and re-bore/re-installing the casing pipe is incidental to the cost of the project.

## *Section 9 – Pipe Laying*

### 9.1 Description

This section covers the laying of pipe for potable water lines, sanitary sewer lines, and sanitary sewage force mains. All material shall be in accordance with these specifications.

### 9.2 General

#### 9.2.1 Alignment and Grade

All water mains shall be laid and maintained to the required lines and grades as shown on the plans with fittings, valves and hydrants, and other appurtenances at the required locations, spigots centered in bells, and all valve and hydrant stems plumb.

#### 9.2.2 Installing Ductile Iron Pipe

Ductile iron pipe and ductile iron pipe fittings shall be installed in accordance with AWWA C 600, latest edition, (Installation of Ductile Iron Water Mains and Their Appurtenances.)

### 9.3 Water Pipe and Force Main Laying

a. All pipe and fittings shall be installed to the line and grade as detailed on the plans. Subject to the approval of RWU, other fittings may be added to or substituted for those shown on the plans, should the need therefore arise during construction. This permissive stipulation in no way shall relieve the Contractor of the responsibility for furnishing and installing all fittings required for a complete and proper installation of pipeline as detailed on the plans.

b. All dirt and other foreign matter shall be removed from the inside of pipe and fittings before they are lowered into the trench. They shall be kept clean during and after laying, care shall be taken to keep dirt out of the jointing space. At the end of each days work, or when pipe laying is discontinued for an appreciable period, or, if the ditch is muddy, or if it begins to rain, open ends of pipe shall be closed with a watertight plug or cap firmly secured in place.
c. All pipe and fittings shall be lowered carefully into the trench in such a manner as to prevent damage to pipe, fittings or linings. Neither pipe nor fittings shall be dropped or dumped into the trench.
d. Cutting of pipe, where needed, shall be done in a neat and workmanlike manner without damage to pipe or pipe lining.
e. Unless otherwise directed by the Engineer, pipe shall be laid with bell ends facing in the direction of laying. For lines on an appreciable slope, bells shall, at the direction of the Engineer, face upgrade. Whenever necessary to deflect pipe from a straight line in either the horizontal or vertical plane, to avoid obstructions, or for other allowable reasons, the degree of deflection at any joint shall be not greater than that which will provide adequate gasket space entirely around the spigot end of pipe. The joint opening shall be approximately 1/8 inch. Joint Deflections shall not exceed the maximum recommended by the pipe manufacturer or 5 degrees, whichever is less.

## 9.4 Gravity Sewer Lines

a. Each joint of pipe shall be inspected carefully before being placed in the trench. Any joint found to be cracked, or otherwise damaged as to impair its usefulness, shall be plainly marked in such a manner that the marking will not rub or wash off. Damaged joints shall be removed from the site as soon as feasible.
b. All sewer pipe shall be laid with the bell up-stream. Each pipe shall be laid to plan line and grade, or to line and grade directed by the Engineer, using laser beam grade light. Care shall be taken that each spigot is centered properly in the bell or the proceeding pipe and properly seated, and that each pipe is solidly bedded. As the work progresses, the pipes shall be cleaned of all dirt and other foreign matter. They shall be maintained clean until accepted or put in service. At the end of each day's work, and when for any reason the laying of pipe will be discontinued for an appreciable period, the open ends of pipe line shall be closed temporarily with a watertight plug or cap.
c. The cutting of pipe for any reason shall be done in a neat and workmanlike manner without damage to pipe or pipe lining.
d. Pipe shall be lowered carefully into the trench in such manner that spigot and bell will not become contaminated. Spigot and bell shall be checked for cleanliness immediately before insertion of spigot into bell.

e. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe be laid in water and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Full responsibility for the diversion of drainage and for dewatering of trenches during construction shall be borne by the Contractor.
f. Spigot and bells shall be cleaned thoroughly before the application of lubricant and attachment of the preformed joint gasket. Application of lubricant and attachment of the gasket shall be in strict accordance with the manufacturer's recommendations.
g. Pipe shall not be placed in the trench without excavating for bells so that the entire barrel of the pipe is uniformly supported on the pipe bedding.
h. Pipe shall be supported to proper line and grade, and secured against upheaval or floating during the placement of concrete or bedding.

### 9.5 Steep Grades

Ductile iron pipe shall be used on all sewer or force main pipe when the grade is fifteen percent (15%) or greater. Sewers or force mains on twenty percent (20%) slopes or greater shall be anchored securely with concrete anchors or equal, spaced as follows:

a. Not over 36 feet center to center on grades 20 percent and up to 35 percent;
b. Not over 24 feet center to center on grades 35 percent and up to 50 percent;
c. Not over 16 feet center to center on grades 50 percent and over.

### 9.6 Connections to Existing Lines

No connection to existing sewer lines will be made until the newly constructed facilities meet with all required standards on construction, pass all required tests, and are approved by RWU for connection.

### 9.7 Potable Water Service Lines

Copper Tubing shall be installed with a minimum earth cover of 30 inches over the top of the pipeline.

## *Section 10 – Pipe Joints*

### 10.1 Description

This section covers the installation of pipe joints. Joint materials shall be as specified in *PART II-MATERIALS*.

### 10.2 Pipe Joint Installation

All pipe joints other than those specified herein shall be made in strict accordance with the manufacturer's recommendation and as approved. All joints shall be made watertight in accordance with the latest ASTM Standards. Excavation for bells or other joint protrusions shall

be made to insure that the bottom of the pipe firmly rests against the bedding for entire length of the pipe.

### 10.3 Installation of Slip-Type or Push-On Joints

Prior to jointing, the bell and spigot end of the pipes shall be cleaned thoroughly by whatever means as are necessary to remove all foreign matter and attain the required cleanliness. A wire brush shall be used as necessary. Particular care shall be exercised to clean the gasket seat.

Joints shall be made in strict accord with the recommendations of the pipe manufacturer. The rubber gasket shall be cleaned and inserted in the gasket seat within the bell. Apply lubricant in accordance with the manufacturer's recommendations. The spigot end of the pipe shall be inserted in the bell of the pipe to which connection is being made, and forced to a firm contact with the shoulder of the bell. When this initial insertion is made, the alignment of the added pipe shall deviate from true alignment not more than 5 degrees for 4-inch pipe, not more than 3 degrees for 12-inch pipe; deviations for intermediate size pipes shall be in conformance with the stated maximum deviations.

### 10.4 Installation of Mechanical Joints

The spigot end of pipe and the bell of fitting and the rubber gasket shall be cleaned thoroughly as specified for pipe joints in paragraph 10.3 above. The gland shall also be cleaned in a like manner.

After the gland and gasket are placed on the spigot end of the pipe, a sufficient distance from the end to avoid fouling the bell, the spigot end shall be inserted in the fitting bell to firm contact with the bell shoulder. The rubber gasket then shall be advanced into the bell and seated in the gasket seat. Care shall be exercised to center the spigot end within the bell.

The gland shall be brought into contact with the gasket, all bolts entered, and all nuts made hand tight. Continued care shall be exercised to keep the spigot centered in the bell. The joints shall be made tight by turning the nuts with a wrench, first partially tightening a nut, then partially tightening the nut 180 degrees therefrom and working thus around the pipe with uniformly applied tension until the required torque is applied to all nuts. Joint deflections shall not exceed the maximum recommended by the pipe manufacturer.

Required torque ranges and indicated wrench lengths for standard cast iron bolts are as follows:

| Pipe Size (Inches) | Bolt Size (Inches) | Range of Torque (Foot Pounds) | Length of Wrench (Inches) |
|---|---|---|---|
| 6-24 | 3/4 | 75 - 90 | 10 |
| 30-36 | 1 | 100 - 120 | 14 |

The torque loads may be applied with torque-measuring or torque indicating wrenches, which may also be used to check the application of approximate torque loads applied by a man trained to give an average pull on a definite length of regular socket wrench.

# *Section 11 – Pipe Fittings*

## 11.1 Description

This section covers the installation of pipe fittings, valves, plugs, caps, etc. for water lines and the installation of pipe fittings for sanitary sewer lines.

## 11.2 Pipe Fittings Installation

All pipe fittings shall be installed in strict accordance with the manufacturers' recommendations. Joints caused by the installation of fittings shall meet with the requirements of *Section 10 – Pipe Joints*. All pipe fittings shall meet with requirements of *PART II-MATERIALS*.

## 11.3 Fire Hydrant Installation

All fire hydrants shall be installed at the location shown on the plans or at the direction of the Engineer and shall be installed in accordance with the Standard Details as set forth in these specifications.

### 11.3.1 Examination of Material

Prior to installation, all hydrants shall be inspected for direction of opening, cleanliness of inlet elbow, handling damage, and cracks.

### 11.3.2 Placement

All hydrants shall stand plumb and shall have their nozzles parallel with, or at right angles to, the street with the pumper nozzle facing the curb. Hydrants shall be set to established grade with the pumper nozzle centerline at least 18 inches above the final grade, unless otherwise directed by the Rogers Water Utilities.

### 11.3.3 Location

Unless otherwise shown on the plans, hydrants shall be placed as follows: When placed beyond the curb, valves and hydrants shall be located out of paved or sidewalk areas and so that no portion of the hydrant or nozzle cap is within 18 inches of the gutter face of the curb. When set in the lawn space between the curb and the sidewalk, or between the sidewalk and the property line, no portion of the hydrant or nozzle cap shall be within 12 inches of the sidewalk. The location of all hydrants and appurtenances shall be within the street right of way or dedicated utility easement.

### 11.3.4 Connection to Mains

a. For hydrants located less than 20' from water main: Each hydrant shall be connected to the main with a 6 inch ductile iron pipe branch and independent (6) inch gate valve as shown on the Standard Detail of these specifications.

b. For hydrants located greater than 20' from the water main: Each hydrant shall be connected to the main with an 8" ductile iron pipe branch with an 8" valve at the main, and shall terminate with an 8" valve, 8"x6" reducer, and hydrant assembly.

### 11.3.5 Hydrant Drainage

Whenever a hydrant is set in any soil, pervious or impervious, drainage shall be provided at the base of the hydrant by placing coarse gravel or crushed stone mixed with sand over the reaction backing to at least 6 inches above the waste opening in the hydrant, and to a distance 3 feet around the barrel. In no instance shall the hydrant drain be within 10' from sewers per Section 8.4.4.c of the 10 states standards

### 11.3.6 Thrust Blocking for Hydrants

The bowl of each hydrant shall be braced against unexcavated earth at the end of the trench with 3000 psi concrete as shown on the Standard Detail sheet. The pipe, hydrants, and fittings shall be wrapped in visqueen to prevent permanent bonding to the concrete.

## 11.4 Thrust Blocking for Fittings

All plugs, caps, tees, and bends shall be provided with reaction backing or shall be restrained joint pipe. The fitting must be braced against unexcavated earth at the end of the trench with 3000 psi PC concrete as shown on the Standard Detail Sheet. Retainer glands may be required, as determined by the Rogers Water Utilities.

## 11.5 Retainer Glands

Retainer glands or other necessary means of thrust restraint shall be installed at designated locations where, in the opinion of the Rogers Water Utilities, they are needed.

## 11.6 Location of Valves

Valves in water mains shall be located as shown on the plans and valve boxes shall be set to finished grade.

## 11.7 Valve Boxes

A valve box shall be provided for every valve. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve with the box cover flush with the surface of the finished pavement or other level as may be directed. Valve boxes shall be installed as shown on the detail sheets of these specifications.

## 11.8 Valve Box Collar

All valve box lids outside of paved areas shall have a 2 foot square concrete collar placed around them. After the valve box lid has been adjusted to final grade, the collar shall be centered on the valve box lid and shall be 6 inches thick. The top of the pad shall be flush with the top of the box and the surrounding ground. Valve box collars shall not be constructed until every item of cleanup has been completed and the soil has compacted. Precast collars may be used in greenspaces.

### 11.9 Dead Ends

All dead ends on water mains shall have ductile iron plugs or caps and be suitably restrained and/or blocked as shown on the plans or directed by the Engineer. Blow off assemblies are not allowed as a means of flushing at the end of dead end lines unless approved by the Superintendent. Fire hydrants meeting the requirements of Part II Section 7 will be required in all cases unless otherwise approved by the Superintendent.

### 11.10 Sewer Wye Connections

Wye connections placed in sanitary sewer lines for services shall be installed in accordance with the manufacturer's recommendations and as approved by RWU. Installation of wye branches shall be as indicated on the Standard Detail Sheet.

## *Section 12 - Sanitary Sewer Manhole Construction*

### 12.1 Description

This specification governs the construction of 4 foot and 6 foot diameter concrete cast-in-place (monolithic) sanitary sewer manholes.

### 12.2 Materials

a. Manhole frames and covers shall conform to PART II-MATERIALS, Section 23 – Manhole Frames & Covers of these specifications.
b. Manhole gasket waterstops material shall conform to PART II-MATERIALS, Section 24 – Gravity Sewer Miscellaneous of these specifications.
c. Grout and epoxy coatings shall conform to PART II-MATERIALS, Section 30 – Protective Concrete Coatings of these specifications.
d. Concrete shall conform to PART II-MATERIALS, Section 37 – Concrete Material of these specifications.
e. Steel reinforcing dowels shall conform to PART II-MATERIALS, Section 38 – Reinforcing Steel Material of these specifications.

### 12.3 General

a. Pre-cast reinforced concrete sanitary sewer manholes and brick sanitary sewer Manholes are prohibited for use in the sanitary sewage collection system.
b. Steps are not allowed within the sanitary sewer manhole except when required under extenuating circumstances and only as approved by RWU.
c. Drop sanitary sewer manholes (interior drop and/or exterior drop) are not allowed except when required under extenuating circumstances and only as approved by RWU.
d. Sewer services larger than 4-inches shall enter at a sanitary sewer manhole and the maximum number of sanitary sewer mains and/or sewer services (combined number) penetrating a sanitary sewer manhole is four pipes.

e. A sanitary sewer main stub-out (future main extension) from the sanitary sewer manhole is not allowed. A block out (green hole) that is formed in the sanitary sewer manhole is allowed if location and size are specified upon project construction plans.
f. The cast-in-place (monolithic) sanitary sewer manholes shall be constructed in accordance with ACI 301-05, except as specified otherwise herein.
g. The Engineer shall be responsible for the staking of the center of manhole and offset staking. The survey stakes shall be marked with invert (cut) elevation and manhole cover (rim) elevation as shown on the project construction plans. If staking is self-performed by the Contractor, the Engineer shall be responsible for verification of staking prior to installation of manholes.
h. All sanitary sewer manholes shall have concentric top barrel (sections) unless otherwise shown on approved plans. The use of flat top or eccentric sections for sanitary sewer manholes must be approved by RWU.
i. The Contractor shall furnish manholes barrel forms that conform to the size and shape of the sanitary sewer manhole as shown on the RWU standard details.
j. The concrete used in the construction of sanitary sewer manholes shall be Class C (4,000 psi).
k. Epoxy coatings will only be required where specified on approved construction plans.

## 12.4 Construction Method

Sanitary sewer manholes shall be constructed of materials and workmanship as prescribed by these specifications and shall conform to the RWU standard details.

a. Manhole bases shall be placed against undisturbed soil or compacted engineered select backfill.
b. Manhole bases shall be a minimum of 12-inches in depth below the bottom of the sanitary sewer mains/sewer services for all sanitary sewer manholes.
c. The footing of the manhole bases shall extend past the exterior manhole wall a minimum distance on 2 feet in all direction for 4 foot and 6 foot diameter sanitary sewer manholes. The addition and/or extension of a manhole footing after the sanitary sewer manhole is constructed is prohibited.
d. All manhole invert channels shall be constructed and shaped accurately so as to be smooth, uniform and cause minimum resistance to flow. The invert channel shall have a slope of 1 tenth across the manhole (downstream sanitary sewer main entrance to the upstream sanitary sewer main entrance).
e. The manhole bench shall be constructed to the spring line of the sanitary sewer main for 4 foot diameter sanitary sewer manholes. The manhole bench shall be constructed to the top of pipe of the sanitary sewer main for 6 foot diameter sanitary sewer manholes. The bench shall have a smooth finish and shall be sloped to drain.
f. Sanitary sewer manholes that are constructed over existing sanitary sewer mains shall be benched as described in previous sections for the diameter of manhole. The existing sanitary sewer main shall be sawed out and the rough edges smoothed. The breaking out of the top of pipe of the sanitary sewer main is prohibited.

g. The joints of the sanitary sewer mains/sewer services shall not be cast or constructed within the walls of the sanitary sewer manhole.
h. Wall thickness of manholes shall be 8-inches for 4 foot and 6 foot diameter sanitary sewer manholes.
i. All sanitary sewer mains/sewer services entering the manhole walls shall have a gasket waterstop within the manhole base/wall.
j. The manhole base with footing and walls shall be cast monolithically.
k. The placement of concrete in the manhole barrel forms shall be limited to a maximum 18-inch depth layer (monolithic). Each 18-inch layer shall be vibrated to bond to the preceding layer.
l. A manhole wall (barrel) construction joint is allowed within a straight wall segment of the barrel at 12-foot above the manhole base. The construction joint shall have a key way and no. 4 reinforcing dowels (16-inch in length) at 12-inch on centers around the perimeter of the manhole as shown on the RWU standard details.
m. Manhole barrel forms shall not be removed after the placement of concrete for a minimum of 24 hours.
n. Manhole frames shall be encased with concrete as shown on the RWU standard details or the manhole frames shall be set/encased using Class C concrete (4,000 psi).
o. The manhole bench, channel and frame encasement shall have a broom finish. All fins inside the sanitary sewer manhole that are caused by manhole forms, construction joint or other projections shall be removed.
p. Minor concrete defects may, with the approval of the Engineer and RWU Personnel, be repaired with a non-shrink grout material for manholes that is specified in Section 30 – Protective Concrete Coatings of the RWU Specifications. Grout repair shall not be a substitute for improper concrete mix, formwork, consolidation, or curing.
q. No backfill operation and/or paving operation shall be performed against the sanitary sewer manhole for a minimum of 48 hours after the placement of concrete.

## 12.5 Cold Weather Requirements

Whenever the temperatures of the surrounding air is below 40 degrees F (or when the possibility exists that the temperature will fall below 40 degrees F) within the 24 hour period after concrete operations, the concrete placed in the forms shall have a temperature of between 50 degrees F and 70 degrees F. All concrete shall be maintained at a temperature of not less than 50 degrees F by means of concrete blankets or other approved methods for at least 48 hours or for as much time as is necessary to ensure proper curing of the concrete. No dependence shall be placed on surface treatment of the concrete with salt or other chemicals for the prevention of freezing. If, in the opinion of the Engineer and/or RWU personnel, a sanitary sewer manhole is damaged by freezing, the Contractor shall replace the sanitary sewer manhole. The cost of the manhole replacement is incidental to the cost of the project.

### 12.6 Testing

The Contractor shall perform a vacuum test in accordance with PART IV - TESTING of the RWU specification. Testing shall be performed prior to the installation of any manhole coatings or liners.

## *Section 13 – Sanitary Sewer Manhole Adjustments*

### 13.1 Description

This specification governs the adjustment of existing sanitary sewer manholes if required to meet site conditions.

### 13.2 Materials

a. Concrete shall conform to PART II-MATERIALS, Section 37 – Concrete Material of these specifications.
b. Steel reinforcing dowels shall conform to PART II-MATERIALS, Section 38 – Reinforcing Steel Material of these specifications.
c. Joint sealant material shall conform to PART II-MATERIALS, Section 39 – Joint Sealant Material (Manhole Adjustment Rings) of these specifications.

### 13.3 General

a. The Contractor shall furnish barricades around existing manholes to safeguard traffic and pedestrians.
b. The Engineer shall be responsible for establishing the vertical lowering and/or raising height required to achieve grade.
c. The Contractor shall take all necessary measures to prevent debris from entering the manhole under reconstruction. A temporary (waterproof) cover shall be required during the reconstruction period.
d. The Contractor shall take all necessary measures to prevent damage to the existing manhole frame and cover during the adjustment work.
e. In the event that the existing manhole is being located into paved area, the Contractor is required to replace existing manhole frame and cover with a traffic manhole frame and cover.
f. If an existing manhole frame and cover is damaged or debris enters the sanitary sewer main, the Contractor will be responsible for the cost of said damage.
g. No backfill operation and/or paving operation shall be performed against the adjusted manhole for a minimum of 48 hours after the placement of concrete.
h. All excess material such as paving and manhole cone shall be removed from the manhole adjustment work area and disposed of by the Contractor in an approved area. Removed manhole cones shall be broken by the Contractor prior to disposal.

## 13.4 Raising Manholes in Pavement Areas

a. The maximum height of vertical adjustment with a cast-in-place concrete riser block shall be 18 inches. The vertical height shall be measured from the top of the existing manhole cone to the top of the cast-in-place concrete riser block. Pre-cast concrete riser rings are not allowed.
b. If the vertical height adjustment is greater than 18 inches, the Contractor shall perform the adjustment in accordance with PART III - CONSTRUCTION PROCEDURES, 13.6 Lowering or Raising of Manholes in Paved and Green Areas That Require the Removal of the Manhole Cone of this specification.
c. The manhole frame and cover shall be removed from the existing manhole.
d. The Contractor shall construct a 4 foot by 4 foot cast-in-place concrete riser block with a 24 inch diameter opening as shown on the RWU standard details.
e. If the manhole frame is not reset as part of the cast-in-place concrete riser block pour, the Contactor shall apply a 1½ inch bed of concrete (Class B) for the re-install of the manhole frame on the cast-in-place concrete riser block. The Contractor shall also place a concrete (Class B) collar (8 inch at the bottom of the frame to 2 inch at the top of the frame) on exterior of the manhole frame. The concrete collar on exterior of the manhole frame shall receive a broom finish.
f. If no sewage flow is observed through the existing manhole, the Contactor shall preformed a vacuum test in accordance with PART IV - TESTING, Section 3 – Sanitary Sewer Manhole Testing. If sewage flow is observed through the existing manhole, the Engineer and RWU personnel will perform a visual inspection.

## 13.5 Raising Manholes in Green Areas

a. The maximum height of vertical adjustment with cast iron adjustment (riser) rings shall be 24 inches and riser rings shall only be used in green (grass) areas. The vertical height shall be measured from the top of the manhole frame to the top of the cast iron riser ring/cover. Pre-cast concrete riser rings are not allowed.
b. If the vertical height adjustment is greater than 24 inches, the Contractor shall perform the adjustment in accordance with Item 6 of this specification.
c. The number of riser rings shall be limited to the minimum number that is required to achieve grade.
d. Joint sealant shall be applied on existing manhole frame and each joint of the riser ring(s) that are required to achieve grade. If the outdoor temperature is below 70 degrees, the Contractor must heat the joint sealant before application.
e. The Contractor shall place concrete (Class B) collar (8 inch at the bottom of the frame to 2 inch at the top of the frame) on exterior of the manhole frame. The concrete collar on exterior of the manhole frame shall receive a broom finish.
f. If no sewage flow is observed through the existing manhole, the Contractor shall preformed a vacuum test in accordance with PART IV - TESTING, Section 3 – Sanitary Sewer Manhole Testing of these specifications. If sewage flow is observed through the existing manhole, the Engineer and RWU personnel will perform a visual inspection.

### 13.6 Lowering or Raising of Manholes in Paved and Green Areas That Require the Removal of the Manhole Cone

a. If the vertical height adjustment of the existing manhole is greater than 24 inches or the existing manhole must be lowered, the Contractor shall remove the manhole cone section to the straight barrel section of the existing manhole.
b. The manhole frame and cover shall be removed from the existing manhole.
c. The Contractor shall remove the manhole cone by either the saw cut method or explosive (shot) cord method.
d. The Contractor shall prepare the existing manhole barrel for the re-construction of the cast-in-place manhole as shown on the RWU standard details.
e. The Contractor shall re-construct the cast-in-place concrete manhole as shown on the RWU standard details.
f. If the manhole frame is not reset as part of the cast-in-place concrete manhole pour, the Contractor shall apply a 1½ inch bed of concrete (Class B) for the re-install of the manhole frame on the cast-in-place concrete manhole. The Contractor shall also place concrete (Class B) collar (8 inch at the bottom of the frame to 2 inch at the top of the frame) on exterior of the manhole frame. The concrete collar on exterior of the manhole frame shall receive a broom finish.
g. If no sewage flow is observed through the existing manhole, the Contractor shall perform a vacuum test in accordance with PART IV - TESTING, Section 3 – Sanitary Sewer Manhole Testing of these specifications . If sewage flow is observed through the existing manhole, the Engineer and RWU personnel will perform a visual inspection.

## *Section 14 – Sanitary Sewer Lift Station Facilities*

### 14.1 Description

This specification governs the construction of publicly operated wastewater lift stations and provides a set of design and construction criteria to ensure a level of quality and standardization for wastewater lift station construction within the City of Rogers.

### 14.2 General Requirements

a. The construction of sanitary sewer lift stations shall only be considered if no feasible gravity flow alternative exists. Prior to beginning detailed design work, the Engineer shall obtain written approval of Rogers Water Utilities for a lift station to serve the subject development.
b. Lift station design and construction shall conform with the latest edition of the “Recommended Standards for Wastewater Facilities” as reported by the Wastewater Committee of the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (10 States Standards).
c. Lift stations shall be designed to accommodate sanitary sewage flows from all proposed upstream drainage basins.

d. Buoyancy of the wastewater pumping station structures shall be considered and, if necessary, adequate provisions shall be made for protection.
e. Lift station site and access drive shall be deeded to the City of Rogers.
f. All sanitary sewer lift stations shall consist of a circular wet well, duplex submersible pumps, and above-ground electrical controls housed in a climate-controlled environment. Any alternative configuration requires prior approval from RWU.
g. Multiple pumps shall be provided. Where only two units are provided, they shall be of the same size. Units shall have capacity such that, with any unit out of service, the remaining units will have capacity to handle the design peak hourly flow. All pumps should be warranted by the manufacturer.
h. Electrical service to the lift station shall be 277/480 Volt, 3 phase, 4-wire WYE. Confirmation of service availability shall be required prior to construction.
i. Emergency backup power shall be provided for all lift stations. Backup power generation shall be capable of operating (2) pumps for a period not less than 12 hours.
j. Communications and SCADA control system shall be provided for all lift stations.

## 14.3 Hydraulic Capacity

a. A hydraulic study shall be provided for the basis of design of wastewater lift stations. At a minimum, the report shall include:
    1. Narrative of the methodology used in determination of wastewater flows.
    2. Maps showing the extent of drainage basins including topographic contour data, existing land use, potential areas of redevelopment, and comprehensive growth zones.
    3. Population projections of the proposed service area assuming 2.5 persons per living unit.
    4. Design average flow of the sewer collection system
    5. Peaking Factor shall be calculated by the following equation, where P is the total population served in thousands:

$$PF = \frac{Q\ peak\ hourly}{Q\ design\ average} = \frac{18+\sqrt{P}}{4+\sqrt{P}}$$ or 1.5, whichever is greater

    6. The design fill time and minimum pump cycle time shall be considered in sizing the wet well. The effective volume of the wet well shall be based on the design average flow with a filling time not to exceed 30 minutes. The pump manufacturer's duty cycle recommendations shall be utilized in selecting the minimum cycle time.
    7. Hydraulic calculations showing all head loss in the discharge pipe, fittings, and force main.
    8. Pump Curves for all proposed pumps

b. The sizing of wastewater facilities receiving flows from new wastewater collection systems shall be based an average daily flow of 100 gallons per capita plus wastewater flow from industrial plants and major institutional and commercial facilities unless water use data, wastewater flow monitoring data, or other justification upon which to better estimate flow is provided.
c. The 100 gal/cap/d value shall be used in conjunction with a peaking factor to cover normal infiltration for systems built with modern construction techniques. However, an additional allowance should be made where conditions are unfavorable.
d. If the new collection system is to serve existing development the likelihood of I/I contributions from existing service lines and non-wastewater connections to those service lines shall be evaluated and wastewater facilities designed accordingly.
e. Projections shall be made from actual flow data to the extent possible.
f. The probable degree of accuracy of data and projections for all critical design flow conditions shall be evaluated. This reliability estimation should include an evaluation of the accuracy of existing data, and an evaluation of the reliability of estimates of flow anticipated due to infiltration/inflow (I/I), or flow due to elimination of sewer bypasses and backups or hydraulic restrictions.
g. Critical data and methodology used shall be included in all reports.

## 14.4 Site Requirements

a. All site work shall conform to the City of Rogers Code of Ordinances regarding the development of lands.
b. A paved access drive shall be provided to service the lift station. The drive shall have a minimum width of 12', maximum cross slope of no more than 3%, maximum longitudinal slope of no more than 10%. An unobstructed access to the lift station shall be provided and maintained. Base material, compaction, and pavement recommendations shall be provided by a qualified geotechnical engineer.
c. The site shall be designed with ample maneuvering room for a vacuum excavation truck to service the lift station and turn around so as not to back out of the site or onto an adjacent street. Pavement grades in maneuvering areas shall be a minimum of 1% and a maximum of 5%.
d. Wet wells shall be a minimum of 6" above the surrounding pavement and a minimum of 2 feet above the 100-year flood hazard elevation.
e. A 6' high chain link fence (or alternate materials as approved by RWU) with posts set 1' inside the asphalt with a 14' roll back gate is required. The roll back gate shall have solid rubber tires. All areas inside of the fence shall be paved or otherwise maintenance-free. If a wooden fence is provided, the HOA or other controlling entity will be required to execute a maintenance agreement assuming full responsibility for the repair and maintenance of the fence.
f. A potable water supply shall be provided for wash down. The water supply shall consist of a meter service with a frost free yard hydrant equipped with an RPZ upstream of the frost-free hydrant.
g. Site lighting shall be provided and shall adequately illuminate the wet well area during night time hours.

h. A weatherproof, insulated and air-conditioned building shall be provided for the station control panel. The building shall consist of traditional stud wall framing or masonry. The inside of stud wall framed buildings shall be covered with plywood. Floor sills and roof overhangs shall be weatherproof. Doors shall be of sufficient size to provide ample room for installation and removal of all electrical cabinets and components. The Building shall be of sufficient size such that workspace dimensions comply with NEC 110.26 and OSHA 29 CFR 1910.333. The building shall have a light and switch with 120 volt spare receptacle.

i. Steel pipe bollards (per RWU Standard Detail WD-1 / 24) shall be provided for protection of the building, generator, vault, transformer, and other above-ground features in or adjacent to traffic areas.

## 14.5 Wet Well Requirements

a. The lift station will be constructed of min. 3,500psi concrete with reinforcement material per ACI 350 and ACI 315 (Latest Edition).

b. The wet well shall be lined with an epoxy coating per Section 30 – Protective Concrete Coatings.

c. All plumbing entering or leaving the wet well shall have a water stop and be grouted to prevent infiltration per RWU Specifications Section 24 – Gravity Sewer Miscellaneous and Section 30 – Protective Concrete Coatings.

d. The wet well shall be vented. Venting systems shall be appropriately sized, corrosion resistant, and protected from weather and rodents.

e. Wet wells shall be circular with a minimum diameter of 8 feet.

f. Wet well shall be cast-in-place. No precast structures will be allowed.

g. Access covers and safety grates shall be of aluminium construction and designed for access to submersible pumps. Covers shall be equipped with a guide bar bracket, safety chain hook, electric cable support, and a hasp for a padlock. Covers shall be of a size compatible with the pumps. Wet well hatch shall open toward the control panel and safety hatch towards the sides of the wet well and hold a live-load of at minimum 300 pounds per square foot. Door shall open to 90º, lock automatically in position; have closed position lock hasp and retractable grip for opening and closing with one hand.

h. All lift station mounting rails, guide rails, support brackets, cross bracing, anchors, bolts, nuts, washers and other hardware shall be stainless steel type 304 or 316 and of domestic manufacture.

i. Stainless steel chains, hooks and cord grip shall be provided for all pumps cables in wet well.

j. Each pump shall have an individual intake. Wet well and intake design should be such as to avoid turbulence near the intake and to prevent vortex formation.

k. Pumps weighing greater than 500 lbs. or wet wells with more than 2 pumps will require a monorail type overhead hoist system.

## 14.6 Pump Requirements

a. Submersible pumps and motors shall be designed specifically for raw wastewater use, including totally submerged operation during a portion of each pumping cycle, and shall meet the requirements of the National Electrical Code for such units.
b. All pumps shall have a minimum horsepower rating of 5hp and rated for a 277/480V, 3 phase, 4-wire WYE service. Pumps not meeting this criteria shall require prior approval from Rogers Water Utilities.
c. An effective method to detect shaft seal failure or potential seal failure shall be provided.
d. Submersible pumps shall be readily removable and replaceable without the necessity of personnel entering or dewatering the wet well or disconnecting any piping in the wet well. All lift stations require rail mounted submersible pumps as manufactured by Flygt (N-Series), or equivalent and interchangeable without alteration to the piping or electrical system. Proposed pumps other than Flygt shall require prior approval from Rogers Water Utilities.
e. Pump motor power cords shall be designed for flexibility and serviceability under conditions of hard usage and shall meet the requirements of the National Electrical Code standards for flexible cords in wastewater pump stations. Ground fault interruption protection shall be used to de-energize the circuit in the event of any failure in the electrical integrity of the cable. Power cord terminal fittings shall be corrosion-resistant and constructed in a manner to prevent the entry of moisture into the cable, shall be provided with strain relief appurtenances, and shall be designed to facilitate field connecting.
f. All pumps will meet or exceed the minimum requirements to pump the anticipated flow for the known number of houses, units, or number of persons. The pumps will meet or exceed required head values based on design.

## 14.7 Discharge Piping/Design

a. The “Discharge Pipe” is defined as all pipe and fittings required from the pump discharge to the check valve connection at the valve vault.
b. Discharge pipes shall be designed and constructed such that normal velocities are between 2 ft. /s and 8 ft. /s.
c. Head loss shall be calculated using Hazen-Williams with C=100 for stainless steel and C=120 for DIP, epoxy-lined sewer pipe, as well as appropriate “K” factors for minor losses in fittings.
d. All lift station piping 2” diameter or less shall be stainless steel. All piping 3” diameter or greater shall be DIP, epoxy lined pressure sewer pipe.
e. Pumps shall be mounted on stainless steel slide rails and use watertight pump connector as recommended by the pump manufacturer.

## 14.8 Valves & Valve Vault

a. Valves shall be located in a vault separate from the wet well.

b. Provisions shall be made to drain accumulated water from the valve chamber to the wet well through a 2" stainless steel drain line with a 2" stainless steel check valve.
c. Maximum vault depth shall be 6' from access hatch to base.
d. Discharge pipes 3" and larger shall be equipped with a swing check valve (PART II-MATERIALS, Section 26 – Swing Flex Check Valves). A plug valve (PART II-MATERIALS, Section 25 – Plug Valves) shall be located downstream of the check valve.
e. Discharge pipes smaller than 3" shall be equipped with a stainless steel swing check valve and stainless steel ball valve.
f. Access shall be provided for the valve vault. Access covers shall be aluminum construction, designed for access to valves. Covers shall be of a size compatible with the valves, and shall be located such that valve nuts can be operated from the surface without the need for personnel to enter the vault. Wet well hatch shall be rated for a live-load of at minimum 300 pounds per square foot. Door shall open to 90º, lock automatically in position; have closed position lock hasp and retractable grip for opening and closing with one hand.
g. The base of all piping shall be mounted a minimum of 24" above the floor of the vault with steel support stands.
h. All valves must be provided with 2" operating nuts so that valves can be operated without entering the valve vault.

## 14.9 Electrical

a. All electrical components shall be installed by a licensed electrician and comply with all applicable building and electrical codes. All equipment shall be UL listed.
b. Electrical systems shall comply with Arc Flash requirements per NEC 240.87 and NFPA 70E.
c. Electrical systems and components (e.g., motors, lights, cables, conduits, switch boxes, control circuits, etc.) in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present, shall comply with the National Electrical Code requirements for Class I, Division 1, Group D locations. No electrical equipment shall be located inside the wet well with the exception of pump cable and level sensing equipment. Each flexible cable shall be provided with a watertight seal and separate strain relief. A breaker type disconnect located above ground shall be provided for the main power feed for all pumping stations. When such equipment is exposed to weather, it shall meet the requirements of weatherproof equipment NEMA 3R or 4, at a minimum.
d. Lightning and surge protection systems should be incorporated in the electrical design on all wiring entering or leaving the panels, including incoming power and Ethernet.
e. Ground Fault Circuit Interruption (GFCI) protection shall be provided for any outdoor outlets.
f. An automatic transfer switch shall be incorporated for any backup power source.

g. All conduit entries and exits shall be galvanized to 5' outside structure. All conduit elbows shall be long sweep elbows. Conduits and conductors between transformers and main disconnect to be sized in accordance with NEC standards. Conduits to be minimum 18" depth. All conduits inside wet well shall be type 304 or 316 stainless steel.

h. Electrical supply, control, and alarm circuits shall be designed to provide strain relief and to allow disconnection from outside the wet well. Terminals and connectors shall be protected from corrosion by location outside the wet well and through use of watertight seals.

i. Control Panel (277/480V 3-phase)
    1. All pumps rated at 7.5 HP and smaller shall be installed with one "across the line" magnetic contactor or "soft start" per pump sized to HP and NEMA standards shall be provided and installed with overload protection sized to motor specifications.
    2. Lift stations requiring greater than 7.5-HP pumps shall be operated by variable frequency drives as manufactured by Schneider or approved equal. VFDs shall be sized in accordance with pump motor specifications.
    3. All operator controls, overload resets, circuit breakers, etc., shall be accessible without removing the dead-front panel.
    4. A disconnect for the High Voltage panel shall be provided to disconnect power before the panel can be opened.
    5. One combination circuit breaker/overload disconnect unit with magnetic trip elements sized for individual protection shall be provided for each pump.
    6. Each pump will have separate Terminals (Busman or equivalent) provided for each pump and mounted a minimum of 4" above the bottom of the control panel.

j. 3-phase power monitor must be installed to protect pump from low voltage, single phasing and phase reversal. (Motor Saver Model 460)

k. A 120 Volt Surge arrester (Mission Critical Guard MA035) shall be used for control circuit protection.

l. Surge protection shall be installed between the modem and the PLC to protect from lightning.

m. A backup float system shall operate a timer that allows both pumps to run without the need of a PLC. The float cord shall be of sufficient length to reach the lowest inlet.

n. 480/120VAC control transformer protected by combination circuit breaker/overload shall provide protection on both the primary and secondary control circuit. Neutral and ground wires shall be bonded inside the transformer.

o. All terminals coming from the wet well shall be manufactured by Busman or equivalent and must be mounted a minimum of 4" above the bottom of the control panel.

p. All terminal connections must be a minimum of 4" above the bottom of the control panel.

q. All pumps shall be protected by seal fail and hi temp relays.
r. Building air conditioning shall be relay-controlled by the PLC.
s. One 120 volt receptacle will be provided for the modem. The modem shall be powered by a relay that will sense power fail and switch to battery power.
t. Station service panel shall operate on 220 Volts AC with a minimum of eight breakers.
u. A lightning arrester shall be installed for pumps protection and mounted below and outside of the control panel.
v. A fuse shall be added for the phase monitor with 1/16 amp fuses on each leg.
w. High level alarms are required. A red warning light with flasher and audible alarm shall be installed at a height visible from the adjacent roadway.
x. The power company shall be contacted prior to design to determine type of electrical service and transformer requirements. Three-phase 277/480V power must be used. No single phase power will be accepted on duplex stations.

## 14.10 Communications/SCADA

a. NEMA 3R stainless steel enclosures with draw pull catch, provisions for padlocking and suitable for indoor or outdoor mounting shall be provided.
b. The SCADA panel shall have an Ingram (Anti-Condensate Heater AHC-50W) or equivalent.
c. The SCADA Control panel shall incorporate a hinged dead-front featuring the following features as a minimum:
    1. Individual selector switches to provide "hand-off-auto" control of each pump.
d. HAND POSITION - In this position, the pump controlled by the (HOA) switch will run regardless of the wet well level. The pumps will continue to run until the switch is turned “off” or in “auto” position
e. AUTO POSITION – Of the (HOA) switch shall operate the pumps and will be controlled automatically by the PLC and level sensors in the wet well. The control center will be designed to provide automatic operation, while maintaining motor protection.
    1. Pump HI TEMP pilot lights (red)
    2. Pump SEAL FAIL pilot lights (amber)
    3. Pump running pilot lights (green)
    4. Hour meters will be provided for each pump
    5. HMI (Scadapack Vision-60 or approved equal)

f. The generator shall have an automatic transfer switch and be connected to the station SCADA system and generator alarms transmitted to the office Wonder Ware program.
g. Communication between the generator and the PLC is to be fiber optic only. This reduces transient potential voltage.
h. The Chase way coming through the wet well will be 6” PVC with a 6” PVC cap with cord grips.

i. The developer / contactor will provide spare parts and software for any controls not commonly used by RWU Field operations.
j. Alternator shall be provided in the PLC for duplex units.
k. The level control system sensors shall be a Transducer 4 to 20 milliamps. (Chase Control Model 03271988-03042005) or equivalent.
l. All duplex pump stations shall be controlled with a (SCADAPACK 32 PN/P4-100-01-1-1) and have circuit protection for disconnect. The PLC shall be powered by a SCADAPack 5103 power supply. The power supply and PLC shall have a battery as a backup (12 volt 26 amp hour battery). Inline fuse shall be installed between the battery and the SCADAPack 5103 power supply. Battery to be placed in bottom of SCADA panel.

## 14.11 Final Acceptance

a. A spare pump, lifting chain, and mounting flange must be furnished with each sewer lift station and delivered to the Station Building prior to lift station final inspection and acceptance.
b. The electric and water meters shall be installed before a final inspection is requested.
c. A final lift station inspection shall be conducted at the developer's request once lift station construction has been completed, and pump start-up has been performed. A lift station startup report must be given to the Rogers Water Utilities Field Operations personnel. Field operation maintenance personnel must be present at the pump start up session.
d. The lift station final inspection and development final inspections are separate inspections and will take place at separate appointments.
e. The electric account shall be setup with Power Company by the contractor and after the final inspection shall be transferred to Rogers Water Utilities upon acceptance of the overall development and lift station.
f. All panels, disconnects and breakers will be labeled. The correct voltage shall be displayed on all panels. All disconnects shall be Lock Out/Tag Out compatible, and locked in "ON" position.
g. Warranty period will be 12 months to the Rogers Water Utilities after final acceptance.
h. The auxiliary generator, if required, must be test run and load bank tested to ensure proper operation, and to insure the correct rotation of the pumps.
i. The Developer/Contactor will provide 3 copies of operation & maintenance manuals, as well as one PDF digital copy. This manual shall include – Identification and contact information for all suppliers, installers, and programmers, hydraulic report, force main plans, station component cut sheets, valve vault components, electrical schematics, and electrical catalog, pump serial numbers, and pump curves. The books shall be submitted to the Rogers Water Utilities prior to final inspection.
j. The Contractor shall provide a basic parts list to RWU for the Electrical and Communications Panel.

# *Section 15 – Concrete and Reinforcing Steel*

## 15.1 Description

This section covers the construction methods for concrete and reinforcing steel. All material shall conform to the requirements of *PART II-MATERIALS,* Section 37 – Concrete Material *and Section 38 – Reinforcing Steel Material*.

## 15.2 Ready-Mix Concrete

All concrete for poured-in-place manholes and other structural applications shall be ready-mixed concrete. Ready-mixed concrete shall conform to ASTM Standard D 94 and to applicable portions of these specifications for on-site mixing. The concrete shall be delivered and placed within one hour after all materials, including mixing water, shall have been placed in the mixing drum. Each batch shall be accompanied by a load ticket with a copy for the inspector showing the concrete type, mixing proportions, and time mixing began.

## 15.3 Reinforcing Steel

Steel reinforcing shall be free from rust, scale, and from mortar, dirt, or other objectionable coatings. It shall be placed accurately in accordance with details shown on the plans and properly secured in position.

## 15.4 Vibration

All structural concrete must be vibrated as it is placed. The use of form vibrators is not acceptable. Internal vibrators shall be capable of transmitting vibration to the concrete at frequencies not less than 4,500 impulses per minute. Duration of vibration shall be limited to the time necessary to provide satisfactory consolidation without causing segregation. The vibrator shall not be inserted into the lower courses previously vibrated. Vibrators shall be applied in a substantially vertical position and at uniformly spaced points not further apart than the visible effectiveness of the vibrator. Vibration shall be supplemented by such spading as the Engineer may require. The slump of the concrete shall be the minimum that is practical. When vibration is used to consolidate the concrete, the slump shall not exceed 4".

## 15.5 Application of Structural Concrete Other Than Manholes

Utilization of reinforced or non-reinforced concrete for structural uses other than poured-in-place manholes shall be subject to individual design and specification of the responsible Engineer to meet the specific needs of the project. Design and specification shall be in keeping with current engineering practice, applicable codes of practice, and subject to the review and approval of the Rogers Water Utilities.

# *Section 16 – Pavement Repairs*

## 16.1 Description

This section covers the construction methods to be used in the repair of roads, streets, or other public rights-of-way.

### 16.2 Permanent Repair

All permanent repairs of streets, roads, alleys, sidewalks, or other public rights-of-way shall meet with the construction requirements of the governing agency or private owner and shall meet with the requirements of all local Ordinances, Regulations, Permits, or Codes governing the repairs to roads, streets, or other public rights-of-way. See RWU Standard Details for typical repair sections.

### 16.3 Temporary Surfacing

Methods of temporary surfacing shall meet with the requirements of Paragraph 9.2 or as otherwise approved to adequately maintain traffic and proper drainage, as directed by the Engineer and approved by the Rogers Water Utilities.

## *Section 17 – Water and Sewer Line Separation*

### 17.1 Protection of Water Supplies

There shall be no physical connections between the potable water supply system and a sewer, or appurtenance there to which permit the passage of any sewage or polluted water into the potable supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

### 17.2 Horizontal Separation

Sewers, manholes, wet wells, etc. shall be laid at least 10 feet horizontally from any existing or proposed water main and vice versa. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten foot separation, the Arkansas Department of Health, Division of Engineering, may allow deviation on a case by case basis, if supported by data and pertinent facts from the Engineer and agreed to by the Rogers Water Utilities.

### 17.3 Crossings

Refer to 6.3 Crossings of Water and Sewer Lines.

## *Section 18 – Separation of Public Water Mains from Other Water Sources*

### 18.1 Protection of Water Supplies

There shall be no physical connections between the potable water supply system and other sources of water supply, such as a private well, holding tank, surface water sources, or other appurtenances which permit the passage of any alternately-sourced water into the potable supply. RWU retains the right to inspect private plumbing systems to ensure that no physical connection with alternate sources exists.

### 18.2 Exceptions

Connections to other public water systems as recognized by the Arkansas Dept. of Health may be allowed with written approval of the ADH and Rogers Water Utilities.

# PART IV - TESTING

## *Section 1 - Description*

### 1.1 General

This part of the specifications outlines test requirements for materials, construction methods, and leakage tests for newly constructed water and/or sewer mains and their appurtenances. Testing for materials and construction methods shall be at the Developer's expense. RWU has the authority to require any test outlined in these specifications if, in the opinion of RWU, they are needed to demonstrate that the quality of materials and construction procedures meet the requirements of these specifications.

In all cases:

- Pressure lines shall be tested hydrostatically.
- Gravity sewer lines shall be air tested, deflection tested, and CCTV Inspected.
- Manholes shall be vacuum tested

All tests shall be made in the presence of the Engineer and a representative of RWU. All required tests must be successfully passed before new utilities are accepted by RWU.

If, for any reason, the quality of workmanship becomes questionable in the construction of sewer lines, RWU may, at the Developer's expense, order additional testing. Based on the results found, the Developer shall be required to correct all deficiencies as directed by RWU.

## *Section 2- Backfill Density Test*

### 2.1 Description

This section covers the testing of backfill around newly constructed manholes, water and sewer lines, service lines, and other structures to insure proper fill and compaction.

### 2.2 Requirements

Backfill density requirements are specified in PART III - CONSTRUCTION PROCEDURES of these specifications.

### 2.3 Methods of Testing

#### 2.3.1 Moisture Density Relation

The moisture density relations of material shall be determined in the laboratory in accordance with AASHTO Designation T-99 or Designation T-180, as specified.

#### 2.3.2 Field Density

Field density of backfill shall be determined in accordance with ASTM Designation D 2922 - 78.

# *Section 3 – Sanitary Sewer Manhole Testing*

## 3.1 Description

This specification governs the testing of sanitary sewer manholes by the vacuum test method. The hydrostatic (water/exfiltration) method of testing sanitary sewer manholes is not accepted by RWU. All manholes shall not leak after completion of vacuum testing.

## 3.2 General Requirements

a. Testing shall be performed on:
    1. All new sanitary sewer manholes;
    2. Existing manholes that have been adjusted in height (except by riser rings);
    3. Existing manholes that have been cored for a 6" or larger pipe penetration.

b. Manholes shall be vacuum tested for leaks upon the completion of the backfill and compaction operation.

c. The vacuum test method shall be in accordance with ASTM C1244-05a, except as specified otherwise herein.

d. The Contractor shall furnish all equipment and labor required, including necessary piping/hoses, pneumatic plugs, test vacuum equipment (vacuum pump and vacuum plate/head), vacuum gauge and second timer. The vacuum gauge shall have a maximum range of 0-30 inches of mercury (Hg) and the vacuum gauge figure intervals shall be in ½ inch increments.

e. The vacuum test shall be performed by the Contractor and witnessed by the Engineer and the RWU personnel. The Engineer shall furnish test reports of all manholes to the Contractor and RWU.

f. All sanitary sewer manholes on each project shall be vacuum tested as specified herein.

## 3.3 Test Procedures

a. After cleaning the interior surface of the manhole, the Contractor shall place and inflate pneumatic plugs in all the connecting pipes with the exception of sewer services to isolate the manhole. Complete sewer services entering the manhole shall be part of manhole vacuum test.

b. The vacuum plate/head shall be placed on the top of the manhole lid frame. The vacuum pump shall be connected to the outlet port with the valve open. When a vacuum of ten (10) inches of mercury has been attained, the outlet valve shall be closed and the test period is started.

c. The minimum allowable test times for manhole acceptance at the specified vacuum drop shall be as per ASTM C1244 (Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill) but in no case less than one (1) minute per the following table:

Diameter of Manhole (Foot)

| Depth of Manhole (Feet) | 4 | 6 |
|---|---|---|
| | Time (Seconds) | |
| <14 | 60 | 60 |
| 16 | 60 | 67 |
| 18 | 60 | 73 |
| 20 | 60 | 81 |
| 22 | 60 | 89 |
| 24 | 60 | 97 |
| 26 | 64 | 105 |
| 28 | 69 | 113 |
| 30 | 74 | 121 |

d. All pneumatic plugs shall be removed from the manhole after the test.

### 3.4 Failure of Manhole Test

a. Any manhole that fails the initial vacuum test must be inspected to determine the location of the failure. Deficiencies shall be corrected per the following schedule:
    1. Manhole Wall: No more than two isolated defects in the manhole wall may be repaired for every 6' of height. Repairs shall be made with a non-shrink grout material for manholes that is specified in *PART II-MATERIALS, Section 30 – Protective Concrete Coatings*. The Contractor shall excavate the manhole and apply non-shrink grout on the interior and exterior of the manhole.
    2. Pipe Penetrations: Any repair between the pipe(s) and the manhole (gasket waterstop area) requires the removal of the pipe by means of coring and the installation of a new pipe with waterstop (grouting the annular opening).
    3. Floor: Any deficiency in the floor (or within 6" of the floor) of the manhole requires removal and replacement of the manhole.

b. Upon completion of the repairs, the manhole shall be retested as described in the above test procedures. The cost of the manhole repair and backfill is incidental to the cost of the project.

c. Any manhole that fails the second vacuum test must be removed and replaced with a new manhole. The new manhole shall be backfilled to grade and tested as described in the above test procedures. The cost of the new manhole and backfill is incidental to the cost of the project.

### 3.5 Acceptance

d. The manhole shall have passed the vacuum test if the manhole vacuum does not drop below nine (9) inches of mercury during the minimum specified test period.

# *Section 4 - Sewer Main Low Pressure Air Test*

## 4.1 Description

This specification governs the testing of sanitary sewer mains by the low-pressure air test (time-pressure drop method).

## 4.2 General Requirements

a. All sanitary sewer mains must have passed the television inspection prior to the low-pressure air test and manhole vacuum test.
b. Sanitary sewer mains less than 18 inch diameter shall be low-pressure air tested for leaks upon the completion of the backfill and compaction operation. Sanitary sewer mains less than 8 inch and greater than 18 inch diameter will be tested for leaks per test method determined/specified by RWU.
c. The sanitary sewer manholes must have passed the manhole vacuum testing process and all sanitary sewer services must be complete with ends capped that are connected to said mains prior to the low-pressure air test.
d. The low-pressure air test method shall be in accordance with ASTM F1417, except as specified otherwise herein.
e. The Contractor shall remove all debris, soil and rocks from the sanitary sewer mains and manholes prior to the low-pressure air test by a cleaning ball, high velocity jet, cleaning mandrel or other means.
f. The Contractor shall furnish all equipment and labor required, including necessary piping/hoses, pneumatic plugs, compression pump, pressure-regulator valve, 9 psi pressure-relief valve, control valves, pressure gauges and second timer or stop watch. The test pressure gauge shall have a maximum range of 0-10 pounds per square inch (psi) and the pressure gauge figure intervals shall be a maximum of 0.25 psi increments.
g. The required low-pressure air test time shall be based upon the total length and diameter of sanitary sewer main from manhole to manhole (sewer service lines are not included). The minimum low-pressure air test period is 7 minutes and 34 seconds.
h. The low-pressure air test shall be performed by the Contractor and witnessed by the Engineer and the RWU personnel. The Engineer shall furnish low-pressure air test reports of sanitary sewer mains to the Contractor and RWU.
i. The low-pressure air test may be stopped (passed) if no pressure drop/loss has occurred during the first 50 percent of the test period as calculated from the 1.0 psi pressure drop table (not less than the minimum low-pressure air test period of 7 minutes and 34 seconds).

### 4.3 Safety Precautions

a. This low-pressure air test may be dangerous to personnel if, through lack of understanding or carelessness, a line is over pressurized or plugs/caps are installed or restrained improperly. The axial force on an 8 inch plug at the start of a properly conducted test is over 200 pounds. Restraint systems must be designed to handle these forces with adequate safety factors.
b. No one shall be allowed in the manholes or near a capped pipe during testing. All gauges, piping manifolds and control valves shall be located above ground.
c. When sanitary sewer mains are tested, it is mandatory that all caps and plugs be braced as an added safety factor.
d. Do not over pressurize the sanitary sewer main. Do not exceed 9.0 psi.

### 4.4 Test Procedures

a. After cleaning the interior surface of the sanitary sewer main, the Contractor shall place and inflate pneumatic plugs in the sanitary sewer main pipe at both connecting manholes. One of the plugs must have an inlet tap, or other provision for connecting a hose to a portable air control source.
b. Connect the air hose to the inlet tap and the portable air control source. The air equipment shall consist of necessary valves and pressure gauges to control an oil-free air source and the rate at which airflow into the test section.
c. Add air slowly to the test section until the pressure inside the sewer pipe reaches 4.0 psi. After the pressure of 4.0 psi is obtained, regulate the air supply so that the pressure is maintained between 3.5 psi to 4.0 psi for at least two minutes to stabilize air/ground temperature conditions.
d. Close the air supply valve; release the pressure in the pipe test section to 3.5 psi and the test period is started. Observe the time required for the pressure to drop from 3.5 psi to 2.5 psi. The minimum test time/period is determined from the following 1.0 psi pressure drop table.
e. All pneumatic plugs shall be removed from both connecting manholes after the test.

### 4.5 Failure of Low-Pressure Air Test

Any sanitary sewer main/services that fails the low-pressure air test must be repaired. Upon completion of the repairs and the backfill/compaction operation, the sanitary sewer main shall be retested as described in the above test procedures. The Engineer must witness the sewer main repair and backfill operation. The cost of the repair and backfill is incidental to the cost of the project.

### 4.6 Acceptance

The sanitary sewer main shall have passed the low-pressure air test if the pipe test section does not drop below 2.5 psi during the specified test period.

**MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 PSI PRESSURE DROP FOR SIZES AND LENGTH OF PIPE INDICATED FOR Q=0.0015**

**Specification Time for Length (L) Shown, Minutes: Seconds**

| Pipe Dia. (In.) | Minimum Time (Minutes) | Length For Minimum Time (Feet) | Time For Longer Length (Sec.) | 100 Ft. | 150 Ft. | 200 Ft. | 250 Ft. | 300 Ft. | 350 Ft. | 400 Ft. | 450 Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 7:34 | 298 | 1.520 L | 7:34 | 7:34 | 7:34 | 7:34 | 7:36 | 8:52 | 10:08 | 11:24 |
| 10 | 9:26 | 239 | 2.374 L | 9:26 | 9:26 | 9:26 | 9:53 | 11:52 | 13:51 | 15:49 | 17:48 |
| 12 | 11:20 | 199 | 3.418 L | 11:20 | 11:20 | 11:24 | 14:15 | 17:05 | 19:56 | 22:47 | 25:38 |
| 15 | 14:10 | 159 | 5.342 L | 14:10 | 14:10 | 17:48 | 22:15 | 26:42 | 31:09 | 35:36 | 40:04 |
| 16 | 15:10 | 149 | 6.282 L | 15:10 | 15:42 | 20:56 | 26:10 | 31:25 | 36:39 | 41:53 | 47:07 |
| 18 | 17:00 | 133 | 7.692 L | 17:00 | 19:13 | 25:38 | 32:03 | 38:27 | 44:52 | 51:16 | 57:41 |

## *Section 5 - Sewer Main CCTV Inspection*

### 5.1 Description

This specification governs the internal inspection of the sanitary sewer mains by a television camera. The purpose of the inspection is to locate misaligned or sagging sewer pipes and sewer pipe defects that are present in the sanitary sewer mains.

### 5.2 General Requirements

a. The CCTV inspection shall be performed at a minimum of 30 days after the sanitary sewer mains have been constructed and the trench has been completely backfilled.
b. All sanitary sewer mains must have passed the television inspection prior to the low-pressure air test and manhole vacuum test.
c. The Contractor shall remove all debris, soil and rocks from the sanitary sewer mains and manholes prior to the television inspection by a cleaning ball, high velocity jet, cleaning mandrel or other means.
d. The television inspection of sanitary sewer mains shall be performed by RWU or by a television inspection service that is approved by RWU. The cost of independent television service will be at the expense of the Contractor.
a. The Contractor must flush all sanitary sewer mains within 24 hours of the television inspection.

b. If the Contractor selects to use the RWU television inspection, the Contractor must schedule the television inspection with RWU personnel and the initial television inspection will be performed at no charge to Contractor. If RWU television inspection crew is scheduled and is unable to complete the inspection, due to debris in the sewer pipe, buried or inaccessible manholes or other causes attributable to lack of preparation by the Contractor, the RWU mobilization fee for television inspection will be billed to the Contractor.
c. The television inspection of sanitary sewer mains may be performed prior to the 30 day wait (settling) period. If the Contractor elects to use the RWU television inspection, the Contractor must submit a written request to RWU for television inspection prior to the 30 day wait (settling) period. The cost of the television inspection will be billed to the Contractor.

### 5.3 Failure of Sanitary Sewer Main

Defects shall include damaged pipe or service wye, leaking joints, misaligned or sagging pipe, bowed pipe sections, deflected pipe, cracked/defected pipe, pipe joints not fully seated, sewer wyes at other positions than 2:00 and 10:00 o'clock, improperly installed gaskets or other abnormalities not in conformances with these Specifications. Upon completion of the sanitary sewer main repairs and the completion of the trench backfill, the Contractor must reschedule the television inspection. The Engineer must witness the sewer main repair and backfill operation. The cost of the sanitary sewer main repair and backfill is incidental to the cost of the project. *The re-testing of the repaired section of the sanitary sewer main(s) by the low-pressure air test is required unless waived by RWU.* The cost of re-television inspection of the previous failed section of the sanitary sewer main(s) will be billed to the Contractor.

### 5.4 Acceptance

The sanitary sewer mains have passed the inspection if the pressure test has passed and no defects, misalignments and/or sagging sewer pipes are noted by television inspection and/or deflection testing. The camera inspection logs of the sanitary sewer mains that are performed by RWU will be furnished to the Contractor and Engineer. If an independent television service is used, RWU must approve the results of the television inspection prior to distribution of the camera inspection logs to the Contractor, Engineer and RWU.
RWU may televise the sewer mains prior to the expiration of the one-year warranty. If any defects are discovered, the Contractor shall be notified and shall correct the work in a manner approved by RWU.

## *Section 6 – Sanitary Sewer Wet Well Testing*

### 6.1 Description

This specification governs the testing of a sanitary sewer wet well by the exfiltration/water method. The wet well shall be watertight after completion of exfiltration testing.

## 6.2 General Requirements

a. The wet well shall be exfiltration tested for water tightness upon the completion of the backfill and compaction operation and the completion of the wet well structure and piping.
b. The exfiltration test method shall be based upon 0.0142 gallons/hour (gph) per foot diameter per foot depth.
c. The Contractor shall furnish all equipment and labor required, including necessary piping/hoses, pneumatic plug(s), water source with a measuring meter and stopwatch. The measuring meter dial shall be in 0.10 gallons increments.
d. The exfiltration test shall be performed by the Contractor and witnessed by the Engineer and the RWU personnel. The Engineer shall furnish test reports of the exfiltration test to the Contractor and RWU.

## 6.3 Test Procedures

a. After cleaning the interior surface of the wet well, the Contractor shall set the pneumatic plug in the gravity inlet pipe(s) and fill wet well with water to within 1 foot of the bottom of the wet well top slab.
b. The test water must be placed in the wet well to the specified depth for a minimum of 48 hours for stabilization prior to beginning the exfiltration test.
c. After the 48 hours stabilization period, the Contractor shall refill the wet well to the specified depth (test level). The test level shall be clearly marked by the Contractor on the wet well wall. The exfiltration test period is 2 hours. Once the exfiltration test begins, no water may be added to the wet well. The exfiltration test will be determined by measuring the amount of water required to raise the water level back to the marked level on the wet well at the end of the test period. The allowable water loss is determined from the following table.

| | **Diameter of Wet Well (Foot)** | |
|---|---|---|
| **Depth of Wet Well** | **10** | **16** |
| **(Feet)** | **Allowable Water Loss (Gallons)** | |
| **14** | **4.0** | **6.4** |
| **16** | **4.5** | **7.3** |
| **18** | **5.1** | **8.2** |
| **20** | **5.7** | **9.1** |
| **22** | **6.2** | **10.0** |
| **24** | **6.8** | **10.9** |
| **26** | **7.4** | **11.8** |
| **28** | **7.9** | **12.7** |
| **30** | **8.5** | **13.6** |

d. Pneumatic plug(s) shall be removed from the wet well after the test.

### 6.4 Failure of Exfiltration Test

If the measured water is more than the specified allowable loss during the 2-hour test period, the wet well has failed the exfiltration test. The wet well must be repaired with a non-shrink grout material that is specified in *PART II-MATERIALS, Section 30 – Protective Concrete Coatings*. The Contractor shall excavate the wet well and apply non-shrink grout on the interior and exterior of the wet well. Any repair between the pipe(s) and the wet well wall (gasket waterstop area) requires the removal of the pipe and the re-installation of a pipe with waterstop (grouting the annular opening). Upon completion of the repairs, the wet well shall be retested as described in the above test procedures. The Engineer must witness the wet well repair and backfill operation. The cost of the wet well repair and backfill is incidental to the cost of the project.

### 6.5 Acceptance

The wet well shall have passed the exfiltration test if the measured water is less than or equal to the specified allowable loss during the 2 hour test period.

## *Section 7 – Sanitary Sewer Force Main Hydrostatic Test*

### 7.1 Description

This specification governs the testing of sanitary sewer force mains by the hydrostatic test method.

### 7.2 General Requirements

a. Sanitary sewer force main(s) shall be hydrostatic tested for leaks upon the completion of the backfill and compaction operation.
b. The hydrostatic test method shall be in accordance with ANSI/AWWA C605, latest edition for PVC main(s) and ANSI/AWWA C600-, latest edition for ductile iron main(s) except as specified otherwise herein.
c. All sanitary sewer force main(s) shall be given a hydrostatic test of at least 1.5 times the shutoff head of the connected pump(s) or 150 pounds per square inch (psi), whichever is greater. The pressure measurement shall be made from the lowest elevation of the sanitary sewer force main section being tested. The test pressure shall not exceed the pipe or valve rated pressures.
d. The hydrostatic test duration of each sanitary sewer force main test section is 2 hours (uninterrupted).
e. The maximum allowable leakage of sanitary sewer force main(s) shall be based upon the following formulas:

PVC PIPE & DUCTILE IRON

$$L = \frac{SD\sqrt{P}}{148{,}000}$$

Where:

L = Allowable leakage (makeup water) in gallons per hour (GPH)
S = Length of pipe tested in feet
D = Nominal diameter of pipe in inches
P = Average test pressure maintained during leakage test in psi

f. The Contractor shall remove all debris, soil and rocks from the sanitary sewer force main(s) prior to the hydrostatic test.
g. The Contractor shall provide the water for the hydrostatic test and shall be responsible for hauling water. If water is to be used from a fire hydrant, the Contractor shall familiarize itself with the RWU's services fire hydrant meter rental rules and regulations. The existing water system shall be protected from cross-connection.
h. The Contractor shall furnish all equipment and labor required, including necessary piping/hoses, injection booster pump, test pressure gauge, water source for testing the sanitary sewer force main(s) with a measuring meter and stopwatch. The measuring meter dial shall be in 0.10 gallons increments. The test pressure gauge shall have a minimum range of 0-300 psi and the pressure gauge figure intervals shall be a maximum of 5 psi increments.
i. The Contractor shall install a test corporation at the location determined by the Engineer and RWU personnel. The Contractor shall be responsible for any holes excavated and/or left open for hydrostatic testing purposes.
j. The hydrostatic test shall be performed by the Contractor and witnessed by the Engineer and RWU personnel. The Engineer shall furnish hydrostatic test reports of sanitary sewer force main(s) to the Contractor and RWU.
k. The cost of the hydrostatic test including test corporation, filling water and the hydrostatic test is incidental to the cost of the project.

## 7.3 Test Procedures

a. After the sanitary sewer force main(s) has been laid and backfilled as specified, the Contractor shall slowly fill the sanitary sewer force main with water and remove/expel all air from the section of force main being tested.
b. After the section of force main being tested has been filled with water, the test section shall be allowed to stand under static pressure for 24 hours prior to the hydrostatic test.
c. The Contractor shall hydrostatic test (pre-test) the test section at the specified test pressure. The pre-test shall continue until the Contractor has satisfied himself that the test section will pass the hydrostatic test.
d. Once the test section has been pre-tested, the specified test pressure shall be supplied by means of the injection booster pump and the Engineer must record the initial pressure reading. After the 2 hour test period, the Engineer must record the ending pressure reading. RWU personnel must witness the pressure readings.

e. After the 2 hour test period, the computed allowable leakage volume (measured by the test water meter) must be injected into the force main test section by means of the injection booster pump. After the allowable leakage volume is added into the force main test section, the Engineer must record the final pressure reading. If the final pressure reading is less than the initial pressure reading, the force main test section has failed the hydrostatic test. If the final pressure reading is equal to or greater than the initial pressure reading, the force main test section has passed the hydrostatic test. RWU personnel must witness the pressure readings and leakage volume added.

f. After passing the hydrostatic test, remove the pneumatic plugs (test bulkheads) and/or open the line valves of the force main test section.

### 7.4 Failure of Hydrostatic Test

Any sanitary sewer force main that has visible leaks or fails the hydrostatic test must be repaired. Upon completion of the repairs and the backfill/compaction operation, the sanitary sewer force main shall be retested as described in the above test procedures. The Engineer must witness the sanitary sewer force main repair and backfill operation. The cost of the repair and backfill is incidental to the cost of the project.

### 7.5 Acceptance

The sanitary sewer force main shall have passed the hydrostatic test if the force main test section does not exceed the allowable leakage after the 2 hour test period.

**ALLOWABLE LEAKAGE OF FORCE MAINS**
**IN GALLONS PER HOUR (GPH) AT 150 PSI**

| Pipe Dia. (In.) | 100 Ft. | 200 Ft. | 300 Ft. | 400 Ft. | 500 Ft. | 600 Ft. | 700 Ft. | 800 Ft. | 900 Ft. | 1000 Ft. |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 0.02 | 0.03 | 0.05 | 0.07 | 0.08 | 0.10 | 0.12 | 0.13 | 0.15 | 0.17 |
| 3 | 0.02 | 0.05 | 0.07 | 0.10 | 0.12 | 0.15 | 0.17 | 0.20 | 0.22 | 0.25 |
| 4 | 0.03 | 0.07 | 0.10 | 0.13 | 0.17 | 0.20 | 0.23 | 0.26 | 0.30 | 0.33 |
| 6 | 0.05 | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.45 | 0.50 |
| 8 | 0.07 | 0.13 | 0.20 | 0.26 | 0.33 | 0.40 | 0.46 | 0.53 | 0.60 | 0.66 |
| 10 | 0.08 | 0.17 | 0.25 | 0.33 | 0.41 | 0.50 | 0.58 | 0.66 | 0.74 | 0.83 |
| 12 | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.79 | 0.89 | 0.99 |

If force main under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each pipe size.

## *Section 8 – Water Main Hydrostatic Test*

### 8.1 Description

This specification governs the testing of water mains and fire lines by the hydrostatic test method.

## 8.2 General Requirements

a. Water main(s) shall be hydrostatic tested for leaks upon the completion of the backfill/compaction operation and the curb/gutter for residential subdivision and multifamily construction.
b. The hydrostatic test method shall be in accordance with ANSI/AWWA C600, latest edition for ductile iron main(s) except as specified otherwise herein.
c. All pipelines, services, fire hydrants, air release valves and appurtenances shall be hydrostatic tested.
d. RWU personnel must operate the water main valve(s) connected to the existing water system. The Contractor shall operate all other water main valve(s) and fire hydrant(s) within the pipe network being hydrostatic tested. All valve(s) within the pipe network being hydrostatic tested shall be in the open position.
e. All water main(s) shall be given a hydrostatic test of at least 1.5 times water system operating pressure or 150 pounds per square inch (psi), whichever is greater. The pressure measurement shall be made from the lowest elevation of the water main section being tested. The test pressure shall not exceed the pipe or valve rated working pressures.
f. Fire line(s) shall be given a hydrostatic test of at least 200 pounds per square inch (psi).
g. The hydrostatic test duration of each water main/fire line test section is 2 hours (uninterrupted).
h. The maximum allowable leakage of water main(s) and/or fire line(s) shall be based upon the following formula:

Ductile Iron Pipe

$$L = \frac{SD\sqrt{P}}{148{,}000}$$

Where:

L = Allowable leakage (makeup water) in gallons per hour (GPH)
S = Length of pipe tested in feet
D = Nominal diameter of pipe in inches
P = Average test pressure maintained during leakage test in psi

i. All fire hydrants shall be bagged with black plastic bags until the connected water main(s) has passed the disinfection test.
j. The Contractor shall furnish all equipment and labor required, including necessary piping/hoses, injection booster pump, test pressure gauge, water source for testing the water main(s) with a measuring meter and stopwatch. The measuring meter dial shall be in 0.10 gallons increments. The test pressure gauge shall have a minimum range of 0-300 psi and the pressure gauge figure intervals shall be a maximum of 5 psi increments.

k. The Contractor shall install a test corporation at the location determined by the Engineer and RWU personnel. The Contractor shall be responsible for any holes excavated and/or left open for hydrostatic testing purposes.
l. The hydrostatic test shall be performed by the Contractor and witnessed by the Engineer and RWU personnel. The Engineer shall furnish hydrostatic test reports of water main(s) to the Contractor and RWU.
m. The cost of the hydrostatic test including test and air release corporations, filling water and bagging and unbagging fire hydrants is incidental to the cost of the project.

## 8.3 Test Procedures

a. RWU personnel will open the water main valve that is connected to the existing water system while the Contractor manipulates the water main valve(s) and fire hydrant(s) to slowly fill the water main and remove/expel all air from the section of water main being tested. If permanent air release valves are not located at all points of the water main(s), corporation taps shall be made by the Contractor and afterwards tightly plug as required on test corporation(s).
b. After the section of water main being tested has been filled with water, the section of water main being tested shall be allowed to stand under static pressure for 24 hours prior to hydrostatic testing.
c. The Contractor shall hydrostatic test (pre-test) the test section at the specified test pressure. The pre-test shall continue until the Contractor has satisfied itself that the test section will pass the hydrostatic test.
d. Once the test section has been pre-tested, the specified test pressure shall be supplied by means of the injection booster pump and the Engineer must record the initial pressure reading. After the 2 hour test period, the Engineer must record the ending pressure reading. RWU personnel must witness the pressure readings.
e. After the 2 hour test period, the computed allowable leakage volume (measured by the test water meter) must be injected into the water main test section by means of the injection booster pump. After the allowable leakage volume is added into the water main test section, the Engineer must record the final pressure reading. If the final pressure reading is less than the initial pressure reading, the water main test section has failed the hydrostatic test. If the final pressure reading is equal to or greater than the initial pressure reading, the water main test section has passed the hydrostatic test. RWU personnel must witness the pressure readings and leakage volume added.

## 8.4 Failure of Hydrostatic Test

Any water main that has visible leaks or fails the hydrostatic test must be repaired. Upon completion of the repairs and the backfill/compaction operation, the water main shall be retested as described in the above test procedures. The Engineer must witness the water main repair and backfill operation. The cost of the repair and backfill is incidental to the cost of the project.

### 8.5 Acceptance

The water main shall have passed the hydrostatic test if the water main test section does not exceed the allowable leakage after the 2 hour test period.

**ALLOWABLE LEAKAGE OF DIP WATER MAINS**
**IN GALLONS PER HOUR (GPH) AT 150 PSI**

| Pipe Dia. (In.) | 100 Ft. | 200 Ft. | 300 Ft. | 400 Ft. | 500 Ft. | 600 Ft. | 700 Ft. | 800 Ft. | 900 Ft. | 1000 Ft. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 0.07 | 0.13 | 0.20 | 0.26 | 0.33 | 0.40 | 0.46 | 0.53 | 0.60 | 0.66 |
| 12 | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.69 | 0.79 | 0.89 | 0.99 |
| 18 | 0.15 | 0.30 | 0.45 | 0.60 | 0.74 | 0.89 | 1.04 | 1.19 | 1.34 | 1.49 |
| 24 | 0.20 | 0.40 | 0.60 | 0.80 | 1.00 | 1.19 | 1.39 | 1.59 | 1.79 | 1.99 |

If water main under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each pipe size.

**ALLOWABLE LEAKAGE OF DIP WATER MAINS & FIRE LINES**
**IN GALLONS PER HOUR (GPH) AT 200 PSI**

| Pipe Dia. (In.) | 100 Ft. | 200 Ft. | 300 Ft. | 400 Ft. | 500 Ft. | 600 Ft. | 700 Ft. | 800 Ft. | 900 Ft. | 1000 Ft. |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 0.06 | 0.11 | 0.17 | 0.23 | 0.29 | 0.34 | 0.40 | 0.46 | 0.52 | 0.57 |
| 8 | 0.08 | 0.15 | 0.23 | 0.31 | 0.38 | 0.46 | 0.54 | 0.61 | 0.69 | 0.76 |
| 12 | 0.11 | 0.23 | 0.34 | 0.46 | 0.57 | 0.69 | 0.80 | 0.92 | 1.03 | 1.15 |
| 18 | 0.17 | 0.34 | 0.52 | 0.69 | 0.86 | 1.03 | 1.20 | 1.38 | 1.55 | 1.72 |
| 24 | 0.23 | 0.46 | 0.69 | 0.92 | 1.15 | 1.38 | 1.61 | 1.83 | 2.06 | 2.29 |

If water main under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each pipe size.

## *Section 9 – Water Main Disinfection*

### 9.1 Description

This specification governs the disinfection of water mains, valves and appurtenances used for potable water and the disinfection of fire lines from the demarcation valve to the blind flange on the fire system riser.

### 9.2 General Requirements

a. Water mains/fire lines shall be disinfected upon the completion of the hydrostatic (pressure) testing of the water mains/fire lines.
b. All water mains and fire lines shall be disinfected in accordance with the requirements of ANSI/AWWA C651 using the Continuous Feed Method, except as specified otherwise herein.

c. The chlorine compound used for disinfection shall be calcium hydrochlorite in granular form. The calcium hydrochlorite must contain a minimum of 65 percent available chlorine by weight and must conform to ANSI/AWWA B300.
d. The final concentration of the chlorine solution within the newly constructed water main(s) shall be 50 milligrams per liter (mg/l) and the chlorine residual of the treated water at the end of the 24 hour contact (holding) time shall not be less than 25 mg/l.
e. RWU personnel must operate the water main valve connected to the existing water system for flushing, disinfection and sampling for the pipe network being disinfected. The Contractor shall operate all other water main valve(s) and fire hydrant(s) within the pipe network being disinfected.
f. The Contractor shall maintain the bagged fire hydrant(s) within the pipe network being disinfected until the water main(s) has passed the disinfection test.
g. The Contractor shall furnish test corporation(s) for disinfection purposes at the beginning of the newly constructed water main(s) that is located not more than 10 feet from the beginning of the newly constructed water main(s). The Contractor shall be responsible for any holes excavated and/or left open for disinfection purposes.
h. The Contractor shall furnish all equipment, labor, calcium hydrochlorite, Arkansas Department of Health (ADH) sample bottles, necessary piping/hoses, injector booster pump with a measuring meter, chlorine solution container, a chlorine test kit (Hach test kit Model CN-66 or equal) and fire hydrant flow deflectors. The measuring meter dial shall be in 0.10 gallons increments.
i. The disinfection of water main(s) shall be performed by the Contractor and witnessed by the Engineer and the RWU personnel. RWU will furnish copies of the ADH bacteriological test reports of water main(s) to the Contractor and Engineer.
j. The Contractor shall be responsible for the procurement of all necessary permits and compliance from the Arkansas Department of Energy and Environment, Division of Environmental Quality (DEQ) and the United States Army Corps of Engineers for the disposal of highly chlorinated water from the pipe network being disinfected.
k. The Contractor shall be responsible for all erosion damage and any downstream flood damage caused by its flushing operation.
l. The cost of water main disinfection including test corporation(s) for disinfection purposes, bagging and unbagging fire hydrants and water sampling is incidental to the cost of the project.

## 9.3 Disinfection Procedures

a. RWU personnel will open the water main valve that is connected to the existing water system while the Contractor manipulates the water main valve(s) and fire hydrant(s) within the pipe network being disinfected to ensure that the 50 mg/l concentration has been attained. Care shall be taken to prevent the treated water in the pipe network being disinfected from flowing back into the existing water system.

b. Before the water main(s) are disinfected, the Contractor shall flush the water main(s) to remove trapped air, debris and other particulates through the connected fire hydrants(s) of the pipe network being disinfected. The flushing velocity in the water main(s) shall not be less than 2.5 feet per second unless RWU personnel determine that the existing water system pressures are falling below 40 pounds per inch.
c. The Contractor shall then introduce the chlorine solution at the determined test corporation by means of the injection booster pump at a continuous flow until the 50 mg/l concentration is attained throughout the pipe network being disinfected. A 50 mg/l concentration will be dark red or purple color indication with the test kit. The Engineer must witness the chlorine residual reading by the Contractor.
d. The treated water shall remain in the pipe network for a 24 hour holding time. After the 24 hour holding time, the Contractor shall measure the chlorine residual of the treated water at the sampling point(s). If the chlorine residual of the treated water is less than 25 mg/l, the disinfection of the pipe network shall be repeated. A 25 mg/l concentration will be dark red or purple color indication with the test kit. The Engineer must witness the chlorine residual reading by the Contractor.
e. The Contractor shall flush the treated water from the pipe network being disinfected through the connected fire hydrants(s) until the chlorine residual is less than 1.3 mg/l. The Engineer and RWU personnel must witness the chlorine residual reading by the Contractor.
f. After final flushing of the pipe network being disinfected, The Contractor shall collect the water samples from the test sample point(s) and Engineer and RWU personnel must witness the sampling. Water samples collected at 24 hours apart shall be taken by the Contractor and submitted for analysis to the ADH..
g. If any of the water samples collected by the Contractor are failed by the ADH, the disinfection procedure shall be repeated.

### 9.4 Acceptance

The disinfection of the newly constructed water main shall have passed the bacteriological testing if two consecutive water samples (24 hours apart) indicate that the water is safe for public consumption... After *passing* the disinfection test for the pipe network being disinfected, RWU personnel must perform the operating of water main valve(s) within said pipe network. The Contractor shall unbag all fire hydrants connected to the pipe network *passing* the disinfection test.

## *Section 10 – PVC Pipe Deflection Testing*

### 10.1 General

PVC sewer lines shall be mandrel tested in accordance with these specifications prior to acceptance by the Rogers Water Utilities.

### 10.2 Allowable Deflection

The maximum allowable pipe deflection shall not exceed (5) five percent of the inside diameter.

### 10.3 Mandrel

The mandrel (go/no-go) device shall be cylindrical in shape and constructed with either 9 or 16 evenly spaced arms or prongs. Mandrels with less arms will be rejected as not sufficiently accurate. The contact length of the mandrel's arms shall equal or exceed the nominal diameter of the sewer to be inspected. Critical mandrel dimensions shall carry a tolerance of plus or minus 0.01 inch. The mandrel and all necessary equipment for the mandrel test shall be provided by the Contractor.

### 10.4 Procedure

The mandrel shall be hand-pulled by the contractor through all PVC sewer lines no earlier than 30 days after the trench has been completely backfilled. Any sections of the sewer not passing the mandrel shall be uncovered and the Contractor shall re-bed, re-round, or replace the sewer to the satisfaction of the Engineer and/or the Rogers Water Utilities. Any repaired section shall be re-tested.

### 10.5 Mandrel O.D. (Outside Diameter)

The outside diameter of the mandrel shall be set according to the following table:

| Nominal Diameter (in) | Mandrel OD (in) |
|---|---|
| 8 | 7.11 |
| 10 | 8.87 |
| 12 | 10.55 |
| 15 | 12.90 |
| 18 | 15.76 |
| 21 | 18.57 |
| 24 | 21.36 |
| 27 | 23.51 |
| 30 | 27.32 |

### 10.6 Contractor's Warranty

The Rogers Water Utilities reserves the right to mandrel test any PVC sewer pipe before acceptance, and also prior to expiration of the first year of operation. If a previously accepted line fails a mandrel test performed during the first year of operation, the defects must be corrected at the Contractor's expense.

## *Section 12 – Concrete Testing*

### 12.1 Description

This section covers the testing of concrete used in the construction of sanitary sewer manholes and other concrete structures.

## 12.2 General

If in the opinion of Rogers Water Utilities, the concrete furnished in the field warrants concrete testing to demonstrate its quality and strength, the cost of all testing to demonstrate such shall be borne by the Contractor. The testing laboratory shall be one recommended by the Contractor and approved by the Engineer. Testing will be performed generally as outlined below in Section 12.3:

## 12.3 Testing

a. Composite samples shall be saved in accordance with ASTM C172 (Standard Method of Sampling Fresh Concrete).
b. Mold and laboratory cure three specimens from each test required in accordance with ANSI/ASTM C31 (Standard Method of Making and Curing Concrete Test Specimens in the Field).
c. Test the specimens in accordance with ANSI/ASTM C39 (Standard Test Method for Compressive Strength of Concrete Specimens). Two specimens shall be tested at 28 days for acceptance and one specimen shall be tested at 7 days for information.
d. The slump of the normal-weight concrete sample for each strength test shall be determined in accordance with ANSI/ASTM C143 (Standard Test Method for Slump of Portland Cement Concrete).

## 12.4 Acceptance

Should the test cylinders fail, the Contractor shall reconstruct the concrete structure at his cost. The Contractor shall then be responsible for the expenses involved in re-testing the concrete.

## 12.5 Routine Testing

Testing will be required on all job sites where 50 cubic yards of cement are placed or as directed by the Engineer. The cost of all testing made at the request of Rogers Water Utilities will be borne by the Contractor. The Engineer shall furnish the Rogers Water Utilities copies of any and all concrete testing performed by the Engineer or his representative during the course of the work.

# PART V - PROJECT CLEANUP

## 1.1 General

Cleanup shall be considered an important part of any project, and adequate equipment and qualified personnel shall be applied to this phase of the work from the very beginning of the project. There are generally four classifications of cleanup to be used on this project, as set out below.

a. Class I Cleanup - Areas of construction within lawns, gardens, or other well-kept areas, including street rights of way that are kept as lawns by adjacent landowners.
b. Class II Cleanup - Areas of construction within fields, meadows and street rights of way which are mowed or cultivated (gardens excepted).
c. Class III Cleanup - Areas of construction that are heavily brushed or wooded, steep rocky slopes, or other areas where it is not practical for the area to be cultivated.
d. Special Cleanup - Unless otherwise noted in construction documents or under *1.2.4 Special Cleanup* below, no special cleanup will be required.

## 1.2 Method of Cleanup

The method of cleanup for each of the classes defined above shall be as set out below.

### 1.2.1 Class I Cleanup

Lawns, Gardens, Etc. The trench shall be backfilled in accordance with *PART III - CONSTRUCTION PROCEDURES, Section 5 – Excavation and Trench Backfill*. After the topsoil has been spread over the damaged areas, the Contractor shall proceed immediately to hand rake the entire construction area to remove all rock l inch or larger in diameter. Debris of every type shall be removed and all damaged tree limbs shall be pruned. After the area has been raked and accepted by the Engineer, the area shall be seeded at the rate of 0.15 pounds per 100 square feet, using the following seed mixture (percent expressed in terms of weight).

| | |
|---|---|
| Lawn Fescue | 50% |
| Rye Grass (annual) | 40% |
| White Clover (Common) | 5% |
| Red Clover (Common) | 5% |

During or after seeding is complete, all areas shall be covered with 10-20-10 fertilizer at the rate of 250 pounds per acre, or approximately one-half pound per 100 square feet. No watering will be required. However, after seeding and fertilization, the entire area shall be rolled with a roller of sufficient size and weight to achieve a smooth finished surface prior to mulching.

Straw mulch consisting of good grade clean straw, free of weeds or seed and of a quality approved by the Engineer prior to use, shall be placed over damaged and seeded areas and

shall be uniformly spread so as to provide a thickness of approximately 2 inches when first spread.

Straw mulch shall be applied using an asphalt mixing blower. Asphalt shall be added to the straw in sufficient quantity to bind mulch together. Placing straw and top spraying with asphalt will not be permitted.

Where the existing ground cover contains grasses such as Bermuda grass, Zoysia, etc., grasses not included in the prescribed seed mixture, the Contractor shall be responsible for cutting, removing and stockpiling the existing sod on the job site. After constructing the line and backfilling the trench, the sod shall be replaced to a condition equal to or better than that prior to construction. In the event that insufficient sod has been stored, or sod has been lost or destroyed, the Contractor shall be responsible for providing and installing new ground cover of the existing type in accord with Technical Specifications for "Sodding," included in these Specifications, to complete the cleanup.

Photographs "before and after" as specified elsewhere in these Specifications shall be provided of lawns, gardens, etc. as directed by the Engineer.

**1.2.2 Class II Cleanup**

Fields, Meadows, Etc. The trench shall be backfilled in accordance with *PART III - CONSTRUCTION PROCEDURES, Section 5 – Excavation and Trench Backfill*. After the backfill is completed and the surface over the trench left slightly rounded, the area shall be machine raked to remove all rock to a condition equal to the existing surface on the better side of the adjacent existing right of way. All excess excavated material shall be removed from the site, including excess material which has accumulated around fence posts, trees, mailboxes, etc. All areas which have been disturbed, such as that caused by equipment tracks, shall be carefully backfilled and repaired as though it were a part of the actual trench excavation. Seeding and fertilizing of these areas is required using the seed mixture and application rates set out below (percent expressed in terms of weight).

| | |
|---|---|
| Field Fescue | 50% |
| Rye Grass (Annual) | 40% |
| White Clover (Common) | 3% |
| Red Clover (Common) | 7% |

After the area has been accepted by the Engineer, the area shall be seeded at the rate of 0.15 pounds per 100 square feet. During or after seeding is complete, all areas shall be covered with 10-20-10 fertilizer at the rate of 250 pounds per acre, or approximately one-half pound per 100 square feet. No watering will be required. However, after seeding and fertilization, the entire area shall be rolled with a roller of sufficient size and weight to achieve a smooth finished surface prior to mulching. Where the existing field grass is Bermuda, or other type not

specified above, the Contractor shall place such topsoil as required, and shall seed with the existing type grass so that an equivalent ground cover will be provided.

Straw mulch consisting of good grade clean straw, free of weeds or seed and of a quality approved by the Engineer prior to use, shall be placed over damaged and seeded areas and shall be uniformly spread so as to provide a thickness of approximately 2 inches when first spread.

Straw mulch shall be applied using an asphalt mixing blower. Asphalt shall be added to the straw in sufficient quantity to bind mulch together. Placing straw and top spraying with asphalt will not be permitted.

**1.2.3 Class III Cleanup**

Steep, Wooded or Rocky Areas. The trench shall be backfilled in accordance with *PART III - CONSTRUCTION PROCEDURES, Section 5 – Excavation and Trench Backfill*. After the trench backfill is complete, all damaged brush of every type shall be cut just below ground surface and all damaged limbs shall be trimmed. All brush and debris shall be disposed of by the Contractor and the entire area shall be machine raked so that the area of construction is in a condition equal to the existing surface on the better side of the existing adjacent right of way.

When directed by the Engineer, the area of the trench line shall then be seeded and fertilized at the rate of 0.15 pounds per 100 square feet using the same seed mixture, fertilizer and application rates as set out under Class II cleanup, except that tall fescue (Kentucky 31) shall be used in place of field fescue.

Straw mulch consisting of good grade clean straw, free of weeds or seed and of a quality approved by the Engineer prior to use, shall be placed over damaged and seeded areas and shall be uniformly spread so as to provide a thickness of approximately 2 inches when first spread.
Straw mulch shall be applied using an asphalt mixing blower. Asphalt shall be added to the straw in sufficient quantity to bind mulch together. Placing straw and top spraying with asphalt will not be permitted.

**1.2.4 Special Cleanup**

In cases where lines cross through or near to existing septic tank lateral fields, any damage caused by the Contractor to such field shall be repaired at the Contractor's expense. Where septic tank leaching fields are known to exist, they shall be brought to the Contractor's attention. This does not relieve the Contractor from the responsibility of assuring himself there are no other private utilities in the areas of construction.

### 1.2.5 All Areas

All work within the construction area shall be cleaned up to the satisfaction of the Owner and the Engineer. In general, all rocks, trash or rubbish of any nature shall be removed from the site of the work.

During construction, the Contractor shall at all times keep work areas in a clean, neat and workmanlike condition. Excess pipe, excavation, brush and materials of construction shall be removed and disposed of as the work progresses. In built-up areas, including lawns, at the job site shall be cleaned up immediately behind construction. Streets and driveways blocked by excess materials after basic construction is completed will not be tolerated.
If the trench should settle while the Contractor is still on the job or within one year of the project completion date, the Contractor shall make the required repairs at his cost in accordance with the continuing responsibility provisions of these Specifications.

### 1.2.6 Restoration of Damaged Surfaces and Property

Where any pavement, trees, shrubbery, fences, poles, or other property and surface structures have been damaged, removed or disturbed by the Contractor, whether deliberately or through failure to carry out the requirements of the contract documents, state laws, municipal ordinances or the specific direction of the Engineer, or through failure to employ usual and reasonable safeguards, such property and surface structures shall be replaced or repaired at the expense of the Contractor.

### 1.2.7 Access after Construction

Unless otherwise directed by the Engineer, all areas shall be graded after construction so as to be accessible by four wheel drive vehicle.

### 1.2.8 Erosion Control

The Contractor shall terrace slopes where, in the opinion of the engineer, potential erosion problems may arise after construction.

## 1.3 Sodding

Materials. The work to be included in this section of the Specifications shall consist of providing all materials, labor, equipment, tools, supplies and incidentals necessary for completion of sodding of areas required to replace sod disturbed by surface removal.
The Contractor shall furnish the following specified materials for work under this Specification.

### 1.3.1 Sod

Sod shall consist of a densely rooted growth of Bermuda grass, Zoysia, etc. substantially free from noxious weeds and undesirable grasses. The sod shall be cut in uniform strips with a minimum of 2 inches of root depth approximately 12 inches in width and not less than 12 inches in length but not longer than can be conveniently handled and transported.

### 1.3.2 Fertilizer

Fertilizer shall be a commercial grade, uniform in composition, free flowing and suitable for application with mechanical equipment, delivered to the site in labeled containers conforming to current Arkansas Fertilizer Laws and bearing the analyses of the available nutrients which shall be 10-20-10 (nitrogen-phosphorus-potash). Fertilizer shall be applied to areas seeded at a rate of 290 pounds per acre or 0.15 pounds per 100 square feet.

### 1.3.3 Seed

Annual rye grass seed for over-seeding shall be labeled in accordance with current rules and regulations of the Arkansas Plant Board and shall have a minimum of 98 percent pure seed and 85 percent germination by weight and contain no noxious weed seeds.

### 1.3.4 Water

Water shall be of irrigation quality, free of impurities which would be detrimental to plant growth.

### 1.3.5 Execution

**Sodding shall be installed by the Contractor as required on the plans.**
The area to be sodded shall be graded as specified elsewhere in these Specifications to the configuration shown by the Plans. The top 3 inches of the finished grade shall be topsoil, also as specified elsewhere in these Specifications.

Immediately prior to the placement of sod, the surface shall be scarified and have applied fertilizer as herein specified. The fertilizer shall be incorporated in the top 1 inch of the topsoil. The surface shall be moist and firm, but in an uncompacted condition at the time the sod is placed.

Sod shall be moist when placed, and shall be laid along contour lines, by hand, commencing at the lower elevation of the area to be sodded and working upward. Transverse joints of sod strips shall be staggered, and the sod strips carefully laid to produce tight joints.

At the edges of the areas to be sodded the sod shall be toed into the surface and backfilled with topsoil to provide a smooth transition from sodded areas to non-sodded areas.

The sod shall be compacted and watered as directed by the Engineer, and recompacted after it is placed. The compaction shall be accomplished by use of a lawn roller or tamper, with care being taken to avoid damage to the sod strips.

Water shall be applied to sodded areas as directed by the Engineer for a period of three weeks.

# PART VI - CROSSINGS AND MISCELLANEOUS

## *Section 1 – Arkansas State Highway Crossings*

### 1.1 General

The work to be included under this section of the Specifications shall consist of providing all material, labor, equipment, tools, supplies, and incidentals necessary to bore and insert a casing pipe, or to open cut as required, existing Arkansas State Highway(s).

### 1.2 Material

#### 1.2.1 Carrier Pipe

The carrier pipe shall be in conformance to that section of the Specifications governing ductile iron sewer lines and/or ductile iron force mains and/or ductile iron water mains.

#### 1.2.2 Casing Pipe

Unless otherwise shown on the Plans, casing pipe shall be welded or seamless steel pipe having a wall thickness as shown on the Plans and a minimum yield strength of 35,000 pounds per square inch.

### 1.3 Construction

The Plans show the location of highway crossings to be made. The crossings shall be accomplished by boring and inserting a casing pipe of the type and thickness, diameter and length as specified or shown on the Plans.

#### 1.3.1 Permit Application

The Engineer is responsible to prepare any application by the City of Rogers with the Arkansas Department of Transportation for permits which includes all crossings and construction on ARDOT right of way as shown on the Plans. A copy of the permit issued by the ARDOT will be furnished by the Contractor to the Owner. A copy of the license or permit issued by the ARDOT shall be kept on the job site at all times.

#### 1.3.2 Bond Posted

The Rogers Water Utilities maintains an acceptable bond with the Arkansas Department of Transportation.

#### 1.3.3 Location of Utilities

The Contractor shall be responsible for the location of all utility lines located within the area of construction.

### 1.3.4 Traffic Control

It shall be the responsibility of the Contractor to provide sufficient flagmen, signs, barricades, lights and other items required to insure complete safety of the public and the workmen at all times.

Traffic control on state or federal highways shall be conducted and maintained as set forth in the Manual on Uniform Traffic Control Devices as published by the U. S. Department of Transportation, Federal Highway Administration.

### 1.3.5 Borings

The crossing shall be made by boring or tunneling and inserting a casing pipe. The top of the casing pipe shall be a minimum of 2.5 feet below the low points of the roadbed cross section (including ditches) or 4.0 feet below the top of the pavement at any location along the casing pipe, whichever gives the greater depth. If rock is encountered and all available means of making the crossings by boring or tunneling have been exhausted, the Engineer will make application to the Arkansas Department of Transportation to make the installation by the open cut method.

### 1.3.6 Open Cut

If approval to open cut is received, the Contractor shall proceed with the installation in full accordance with all provisions and special conditions set forth by the Arkansas Department of Transportation. Any additional cost of deposits or bonds for open cutting shall be borne by the Contractor. Since the return of the deposit required by the ARDOT depends upon returning the roadbed to its original or better condition, the Contractor will be required to complete this item of construction to the satisfaction of the Highway Department.

### 1.3.7 Restoration of Property

Any highway property disturbed by the installation of the facility shall be restored to its original or equivalent condition including establishing a sod as required by the District Engineer.

## *Section 2 – Street and County Road Crossings*

### 2.1 General

This item shall consist of obtaining permits and posting bonds and/or deposits which may be required by the City of Rogers and Benton County, and providing all labor, equipment, tools, supplies and incidentals necessary for the crossing, maintaining and restoring streets and roads to the satisfaction of the permitting entity. The work shall include every item of work necessary for a complete and acceptable installation.

## 2.2 Materials

### 2.2.1 Pipe Bedding Material

Pipe bedding material shall be as specified elsewhere in these Specifications.

### 2.2.2 Crushed Stone Backfill

Backfill under streets and county roads shall be crushed stone (ARDOT Class 7).

### 2.2.3 Prime Coat

Prime coat material shall be Grade MC-30 as set forth in Section 403.03, Table II, on page 230 of the 1996 Edition of the Arkansas State Highway and Transportation Commission Standard Specifications.

### 2.2.4 Asphaltic Concrete Hot-Mixed Surface Course

The asphaltic concrete hot-mixed surface course shall be Type II as set forth in Section 407, page 249, of the 1996 Edition of the Arkansas State Highway and Transportation Commission Standard Specifications.

## 2.3 Referenced Materials and Construction

The following specifications are hereby referenced and made a part of these Specifications. These specifications are contained in the "Standard Specifications for Highway Construction," Edition of 1996, published by the Arkansas State Highway and Transportation Commission. The page numbers given below refer to pages in these "Standard Specifications for Highway Construction".

These specifications are available for inspection in the Engineer's office, or may be obtained from the Arkansas Department of Transportation, Little Rock, Arkansas, and are set out below:

## 2.4 Execution

The Contractor shall obtain required permits, and post required bonds and/or deposits with the permitting entity. Street crossings in the City of Rogers shall be performed in accordance with the City of Rogers Code of Ordinances.

The Contractor shall provide and maintain during his construction activities adequate barricades, construction signs, torches, lanterns and guards as required to protect persons from injury and to avoid property damage. All materials piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences and/or barricades and shall be protected by adequate torches and lanterns. Execution of adequate safety precautions set forth in these Specifications is the sole responsibility of the Contractor.

The Contractor shall carry on the work in a manner which will cause the least interruption to traffic, and may close to through travel not more than two consecutive blocks, including the cross street intersected. Where traffic must cross open trenches, the Contractor shall provide suitable bridges at street intersections and driveways.

The Contractor shall post suitable signs indicating that a street is closed and necessary detour signs for a proper maintenance of traffic.

All areas excavated for the construction of sewer lines force mains, water lines and appurtenances within city streets and/or county roads shall have bedding, pipe protection cover and backfill placed as specified elsewhere in these Specifications.

Crushed stone base (Class 7) shall be placed and compacted to 95 percent of modified Proctor density (ASTM D1557), as shown on the Plans detail.

All asphaltic surfaces shall be replaced with asphaltic concrete hot-mixed surface course. Asphaltic concrete hot-mixed surface course, Type II, shall be constructed as specified herein.

All Portland cement surfaces shall be replaced with Portland cement concrete. Portland cement concrete surfacing shall be constructed as specified elsewhere in these Specifications.

All unpaved driving surfaces shall be replaced with crushed stone base Class 7 as specified elsewhere in these Specifications, as shown on the Plans detail.

All street and county road rights-of-way disturbed by construction of these wastewater and water facilities shall be restored to its original or equivalent condition as required by the permitting entity.

# *Section 3 – Creek Crossings*

## 3.1 General

The work to be included under this section of the Specifications shall consist of providing all materials labor, equipment, supplies and incidentals necessary for the construction of sewers, force mains and water lines crossing creeks as shown on the Plans.

## 3.2 Permit Application

Applications for a Corps of Engineers Section 404 permit may be required. The Contractor will be responsible for compliance with the terms of the permits as issued. This may include the restriction of construction activity to certain times of the year as well as the quantity of fill which may be placed in the creek during construction.

## 3.3 Materials

### 3.3.1 Restrained Joint Pipe

Restrained joint pipe shall be as specified by the Engineer.

### 3.3.2 Concrete

Concrete for pipe encasement shall be as specified elsewhere in these Specifications.

## 3.4 Construction

Creek crossings shall be made at the locations shown on the Plans and shall be made in conformance to these Plans and Specifications.

### 3.4.1 General

The creek crossings shall generally consist of excavating the trench to a depth of 7 feet below the stream bed or to solid rock prior to laying any pipe. From this information, the Engineer will determine cover necessary and, using this information, compute grade for the pipe. The depth of bury may vary depending on actual conditions.

### 3.4.2 Excavation

The pipe shall be laid with 5 feet of cover if no rock is encountered in the excavation.

However, if rock is encountered in the excavation, the pipe shall be laid with the crown 2 feet below the top of the rock.

### 3.4.3 Placement of the Pipe

Mechanical Potential Joint pipe may be installed by pulling or other method recommended by the pipe manufacturer and approved by the Engineer. In any event, the allowable tensile stresses induced in the pipe shall not exceed limits recommended by the pipe manufacturer. If the pipe is pulled, the pipe manufacturer shall provide closure pieces with cable eyes as required.

#### 3.4.4 Backfilling the Trench

After the pipe is placed, the pipe, except for 2 feet either side of joints, shall be encased in concrete as shown on the Plans detail. Concrete encasement may be placed under water. The backfill shall be as specified elsewhere in these Specifications.

## *Section 4 – Paved Surface Repair*

### 4.1 General

The work to be included under this section of the Specifications shall consist of providing all labor, equipment, tools, supplies, and the incidentals necessary for the repair of driving surfaces, curb and gutter, and sidewalks. This Specification is intended for any driving surface, paved or unpaved, including but not limited to streets, roads, driveways, and parking lots.

This Specification does not apply to state or interstate highways, or driving surfaces within railroad rights of way unless otherwise directed by the Engineer.

### 4.2 Materials

#### 4.2.1 Prime Coat

Prime coat material shall be Grade MC-30 as set forth in Section 403, on page 229 of the 1996 Edition of the Arkansas State Highway Department Standard Specifications.

#### 4.2.2 Tack Coat

Tack coat material shall be Grade SS-1, as set forth in Section 401.02, Table III, on page 217 of the 1996 Edition of the Arkansas State Highway Department Standard Specifications.

#### 4.2.3 Hot-Mixed, Hot-Laid Asphaltic Concrete

The hot-mix asphalt surface course shall conform in composition and to weights and gradation of Type 2 asphalt as set forth under Section 408, page 253, of the 1996 Edition of the Arkansas State Highway Department Standard Specifications, using asphalt cement viscosity grade AC-30.

#### 4.2.4 Concrete

Concrete shall be as specified elsewhere in these Specifications.

#### 4.2.5 Crushed Stone Base

Crushed stone base shall be as specified elsewhere in these Specifications. The Contractor shall submit suppliers' certificates stating that the materials provided are in conformance with these Specifications.

#### 4.2.6 Curb and Gutter Joint Sealer

Curb and gutter joint sealer shall be either Type 1, Type 2, or Type 3 in accordance with Section 501 of the 1996 Edition of the Arkansas State Highway Department Standard Specifications.

## 4.3 Materials and Construction

The following specifications are hereby referenced and made a part of these Specifications. These specifications are contained in the "Standard Specifications for Highway Construction", Edition of 1996, published by the Arkansas State Highway and Transportation Commission. The page numbers given below refer to pages in these "Standard Specifications for Highway Construction".
These Specifications are available for inspection in the Engineer's office, or may be obtained from the Arkansas State Highway Department, Little Rock, Arkansas, and are set out below.



## 4.4 Construction

### 4.4.1 Pavement Removal, Pipe Protection Cover and Backfill

The pavement shall be removed, pipe protection cover placed, and trench backfilled in accordance with the pipe Specifications according to the type of pipe being installed.

All pavements which have been removed or damaged shall be repaired in accordance with these Specifications.

### 4.4.2 Asphaltic Pavement Repair

After the trench has been backfilled and compacted, as specified elsewhere in these Specifications, permanent repair shall be made as follows. The existing pavement shall be saw-cut and removed to a point 18 inches beyond the trench line limits, or as directed by the Engineer, and brought to grade 6 inches below the top of the existing pavement. This area shall then be resurfaced by applying asphaltic cement prime coat at the rate of 0.25 gallons/square yard, followed by a minimum course of hot-mixed, hot-laid asphaltic concrete of thickness as shown on the Plans detail, laid to an elevation matching the existing finished grade. The hot-mixed, hot-laid asphaltic concrete shall be compacted to 92 percent of theoretical density.

One nuclear density meter test per asphaltic patch or repair shall be performed.

The cost of determining the compacted density shall be at the expense of the Contractor.

Any unacceptable patch or repair shall be recompacted and re-tested at the Contractor's expense.

### 4.4.3 Unpaved Driving Surface Repair

After the trench has been backfilled and compacted as specified elsewhere in these Specifications, the surface shall be brought to the existing grade with additional Class 7 crushed stone base.

### 4.4.4 Barricades, Guards and Safety Provisions

To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, red lanterns and guards as required shall be placed and maintained during the progress of the construction work and until it is safe for traffic to use the roadway. All material piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences or barricades and shall be protected by proper lights when the visibility is poor. Execution of all safety precautions previously set forth in these Specifications is the sole responsibility of the Contractor.

### 4.4.5 Maintenance of Traffic and Closing of Streets

The Contractor shall carry on the work in a manner which will cause the least interruption to traffic, and may close to through travel not more than two consecutive blocks, including the cross street intersected. Where traffic must cross open trenches, the Contractor shall provide suitable bridges at street intersections and driveways.

The Contractor shall post suitable signs indicating that a street is closed and necessary detour signs for a proper maintenance of traffic.

### 4.4.6 Piling Excavated Material for Reuse

All excavated material which is to be reused shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed.

### 4.4.7 Removal of Excess Material

All excess excavated material shall be loaded in trucks during the excavating operation, hauled from the job site, and disposed of at the option of the Contractor.

### 4.4.8 Cleanup

Cleanup of areas behind the curb and gutter and around sidewalks shall be as specified elsewhere in these Specifications.

# *Section 5 – Dumped Stone Riprap*

## 5.1 General

The work to be include under this section shall consist of providing all materials, labor, equipment, tools, supplies and incidentals necessary to construct riprap bank stabilization where required as shown on the Plans.

## 5.2 Materials

### 5.2.1 Riprap

Material for dumped stone riprap shall be from a quarry source approved by the Engineer. Material for dumped stone riprap shall be reasonably free from overburden spoil and reasonably well graded between the maximum and minimum rock piece sizes specified. Based on any one hauling unit shipment or delivery, the maximum piece size shall be not greater than 18 inches in any dimension and at least 50 percent of the material by weight shall consist of pieces weighing 35 pounds or more. Dirt or fines passing a 1/2 inch sieve accumulated from quarrying or loading operations shall not exceed five percent of the total weight.

### 5.2.2 Filter Blanket

Filter blanket shall be class 7 crush stone base as specified elsewhere in these Specifications.

## 5.3 Execution

### 5.3.1 Subgrade

The pipe backfill shall be constructed as specified elsewhere in these Specifications. The toe trenches shall be excavated directed by the Engineer. The subgrade shall be stripped of vegetation and smoothed to conform to the general shape of the stream bank prior to construction activities.

### 5.3.2 Filter Blanket

The filter blanket material shall be spread uniformly to the thickness required by the Engineer. Placement of the filter blanket shall be by a method which will prevent damage to the subgrade and which will prevent segregation of the filter blanket material. Compaction of the filter blanket will not be required. However, it shall be finished to a smooth surface of uniform depth.

### 5.3.3 Dumped Stone Riprap

This item shall consist of a protective layer of riprap placed in accordance with these Specifications and to the thickness, line grade and location shown on the Plans or as directed by the Engineer. Dumped stone riprap shall be placed in such a manner as to produce a reasonably well graded, smooth surfaced mass of rock with the minimum practicable percentage of voids, and shall be constructed to the lines and grades as directed by the Engineer. Material shall be placed to its full course thickness in one operation and in such a manner as to avoid displacing

the underlying material. Placing dumped riprap in layers will not be permitted. The larger stones shall be well distributed and the entire mass of stones shall be roughly graded to conform to the gradation specified. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Hand-placing to a limited extent may be required but only to the extent necessary to secure the results specified immediately above. Placing rip-rap by dumping into chutes or by similar methods likely to cause segregation of the various sizes will not be permitted. Particular care shall be exercised by the Contractor to restore the area where rock is stockpiled to pre-construction conditions. The area shall be cleaned up and seeded as specified elsewhere in these Specifications for pipeline cleanup and seeding.

#### 5.3.4 Backfill of Toe Trenches

After the riprap placement is completed, the toe trenches shall be backfilled and cleaned up and seeded as specified elsewhere in these Specifications for pipeline cleanup and seeding.

## *Section 6 – Farm Type Fence*

### 6.1 General

The work to be included under this section of the Specifications shall consist of providing all materials, labor, equipment, tools, supplies and incidentals necessary for the construction of farm type fence. The work shall include every item of construction necessary for a complete and acceptable installation as shown on the Plans and hereinafter specified.

### 6.2 Materials and Construction

Unless otherwise required by these Specifications, all farm type fence shall be five strand barbed wire, steel "T" post and treated wood corner and brace posts.

#### 6.2.1 Posts

All corner and brace post assemblies shall be treated wood, first quality, and of such length that they may be embedded in concrete to a depth not less than 30 inches. All line posts shall be metal "T" posts.

a. End, Corner, Brace Assembly and Gate Posts. Posts shall be 6 inches minimum diameter, 7 feet in length, creosoted or penta treated Grade A southern yellow pine. Cross brace post shall be 4 inches minimum diameter.
b. Line Posts. Line posts shall be 1-1/4 inches by 1 -1/4 inches by 5 feet 6 inches minimum length painted steel "T" type posts. Minimum weight per foot shall be 1.44 pounds. All "T" posts used at one location shall be the same color and by the same manufacturer.

#### 6.2.2 Wire

Barbed wire shall be used in all locations unless specific requirements call for other types.

a. Barbed Wire. Barbed wire shall be zinc coated, two strand twisted No. 12-1/2 ASW gauge galvanized steel wire with four point barbs of No. 14 ASW gauge galvanized steel wire. Wire shall conform to Federal Specifications RR-F-221, Type A.
b. Miscellaneous. Bracing wire shall be smooth No. 9 gauge galvanized soft wire and shall be zinc coated.
c. Staples shall be No. 9 galvanized steel wire and shall be 1-1/2 inches long.

**6.2.3 Gates**

Gates shall be constructed to the height and width as shown on the Plans. Perimeter framework shall be 1-1/2 inches in diameter, Schedule 40 black pipe with all joints welded. Interior horizontal members shall be 3/4 inch diameter, Schedule 40 black pipe with vertical braces of 3/15 inch x 2 inch steel straps welded to each member as shown on the Plans. Gates shall be primed with a rust-inhibiting primer and shall be painted as set out elsewhere in these Specifications. Color will be as selected by the Rogers Water Utilities or his representative. Each installation of a farm gate alone shall be furnished with a single 42 inch length of 5/16 inch steel chain with the chain attached to the post by means of 3 inch x 1/4 inch lag screw. All padlocks will be provided by the Rogers Water Utilities.

**6.2.4 Concrete**

Where specified or shown on the Plans, all concrete shall conform to requirements as set out elsewhere in these Specifications.

# APPENDIX A – FEES

## *Section 1 - Access & Impact Fees*

Access Fees are to be collected from developers before water service may be established. These fees apply only to those developments with approved final plats after April 1, 2005.

Water Access Fee: $300.00 per living unit
Sewer Access Fee: $300.00 per living unit
Commercial additions will be charged on a per lot basis.
Impact fees are to be paid by the person or firm requesting a new water service, regardless of whether or not the access fees have been paid.

| Meter Size | Water Impact Fee | Sewer Impact Fee |
|---|---|---|
| **5/8”** | $700 | $2,200 |
| **1”** | $1000 | $5,000 |
| **1 ½”** | $2,000 | $10,000 |
| **2”** | $5,000 | $15,000 |
| **3”** | $10,000 | $30,000 |
| **4”** | $15,000 | $45,000 |
| **6”** | $30,000 | $90,000 |

## *Section 2 – Tap & Service Fees*

RWU will provide service to tap water mains up to a 12” tap size, and to construct meter services up to a 2” meter size. Contact RWU for current service pricing.

## *Section 3 – Plan Review Fees*

Fees shall apply to all site development plans prepared by engineering consultants for private developers. Projects may include large scale developments and commercial / residential subdivisions.

| Submittal # | Minimum Fee | $10,000 < Utility Construction Estimate < $50,000 | Maximum Fee |
|---|---|---|---|
| 1st Submittal | No Fee | | |
| 2nd Submittal | No Fee | | |
| 3rd Submittal | No Fee | | |
| 4th Submittal | $ 100.00 | 1.00% of the cost of water & sewer construction | $ 500.00 |
| 5th Submittal | $ 200.00 | 2.00% of the cost of water & sewer construction | $ 1,000.00 |
| 6th & Subsequent Submittals | $ 300.00 | 3.00% of the cost of water & sewer construction | $ 1,500.00 |

Plan review fees will not be assessed for any submittal following the conditional approval of plans. In order to be granted conditional approval, the development plans must satisfy all items as outlined in the current plan review checklist and the conditions of approval may not exceed ten minor comments (i.e. revisions that will not significantly affect the overall design).

# APPENDIX B – Standard Forms

## *Section 1 – Special Contract for Utility Extension (Standard Template)*

**ROGERS WATER UTILITIES**
**FACILITIES EXTENSION CONTRACT**

This Facilities Extension Contract ("this Contract") is entered into by the Rogers Water Utilities of the City of Rogers, Arkansas, ("Rogers Water Utilities" or "RWU"), and _____, ("Applicant").

## Recitals

**WHEREAS** the Rogers Water Utilities is the municipal water and sewer utility of the City of Rogers, Arkansas, consisting of the water department and the sewer department, operated under common management, and being supervised by the Rogers Waterworks and Sewer Commission of the City of Rogers, Arkansas ("the Commission"), a combined waterworks and sewer commission established by City of Rogers Ordinance No. 86-10, codified at Section 54-1 *et seq*. of the Code of Ordinances of the City of Rogers, Arkansas; and

**WHEREAS** the Rogers Water Utilities operates a municipal water system and a municipal sewer system in the City of Rogers, Arkansas and certain surrounding areas; and

**WHEREAS** Applicant is a [natural person(s)] or [entity type];
[Example: an Arkansas limited liability company]

as evidenced by the certificate of good standing from the Arkansas Secretary of State attached hereto as Exhibit [1].

[if Applicant is a foreign entity, attach certificate of good standing from home state and Arkansas Secretary of State registration]

**WHEREAS** Applicant is the Owner of certain real property in Benton County Arkansas as evidenced by that certain deed recorded with the Benton County Circuit Clerk as Instrument No. _____ **or** in the ____[year] Deed Book at Page _____; ("the Property"); and

**WHEREAS** Applicant requests that the public water system, public sewer system, or both, be extended to the Property in connection with a project or development to be known as [insert name of project/development] and requests installation of certain water mains and appurtenances, sewer mains and appurtenances, or both ("facilities") as shown herein below; and

**WHEREAS** Applicant is willing to pay for the costs of the facilities and is willing to dedicate the facilities to the Rogers Water Utilities, the Rogers Waterworks and Sewer Commission, and the City of Rogers, Arkansas upon acceptance of the facilities in accordance with the terms of this Contract; and

**WHEREAS** _____ [insert name of person(s) signing for Applicant] is [are] duly authorized to enter into this Contract on behalf of the Applicant and to bind the Applicant to this Contract as evidenced by the [certificate of authority, corporate resolution, other acceptable document showing authority] attached hereto as Exhibit [2].

**NOW THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties Agree as follows**:

1. **Recitals Incorporated**. The above recitals are substantive and incorporated herein and made part of this Contract.

2. **Definitions**.

As used herein, the following terms have the meanings listed below.

*Development* means the construction project to which Applicant requests that facilities be extended.

*Excess Capacity* means a water main and appurtenances, sewer main and appurtenances (or both) in a size and having a capacity greater than the size and capacity required by the *Standard Specifications* (or other applicable law, regulation, or standard) for the Applicant's Development or project.

*Facilities means* (a) water mains and appurtenances including the public portion of any water service lines; (b) sewer mains and appurtenances including the public portion of any sewer service lines, and (c) any other infrastructure installed pursuant to this Contract that is intended to become, upon dedication by Applicant, and acceptance by RWU, part of the public water system or public sewer system. The term "facilities" does not include the private portion of any water service lines, the private portion of any sewer service lines, or any other infrastructure installed on the property that is intended to be, or by its nature is, private property.

*Property* means the real property to which Applicant requests that facilities be extended.

*Public Portion (of water service lines)* means any portion of water service lines constructed pursuant to this Contract that is intended to become, upon dedication by Applicant and acceptance by RWU, public property and will be part of the "Utility System" as defined in Section 54-82 of the Code of Ordinances of the City of Rogers, Arkansas. The public portion (of water service lines) does not include any portion of the "Customer System" as defined in Section 54-82.

*Public Portion (of sewer service lines)* means any portion of sewer service lines constructed pursuant to this Contract that is intended to become, upon dedication by Applicant and acceptance by RWU, public property and will be part of the public sewer system. The point of demarcation between the public portion of the sewer system and the customer's system is the sewer wye or the manhole where the sewer service line connects to the public sewer collection system.

*Rogers City Code* means the most recent edition or revision of the Code of Ordinances of the City of Rogers, Arkansas.

*Standard Specifications* means the most recent edition or revision of the *Standard Specifications for Construction of Public Water and Sewer Improvements in the City of Rogers and Areas Under the Jurisdiction of the Rogers Waterworks and Sewer Commission* published by the Rogers Water Utilities.

3. **Facilities Requested**. Applicant requests installation of facilities as shown on the plans for water facilities, sewer facilities (or both) which are attached hereto as Exhibit [3] and incorporated into this Contract by reference. The estimated total construction costs of the facilities is $_____.

4. **Applicant Responsible for Cost of Facilities**. Applicant shall furnish all labor and materials and bear the entire cost of constructing the facilities. If RWU has agreed to reimburse Applicant for any costs of *excess capacity*, then such agreement will be contained in a separate *Excess Capacity Addendum* which will be attached to this Contract and made part hereof. **If no Addendum is signed by the parties and attached to this Contract, then RWU has not agreed to make any reimbursement for excess capacity**. Applicant must pay for all costs and complete construction of all facilities prior to receiving water service or any reimbursement for *excess capacity*. Moreover, reimbursement for *excess capacity* will not occur unless and until the facilities are accepted by RWU.

5. **Special Conditions**. This Contract is subject to and incorporates the following special conditions: [Describe Special Conditions]

[Example: See Horizontal Property Regime Development Agreement attached hereto and incorporated herein by reference as Exhibit [3]

6. **Plans and Specifications.** Applicant shall cause to be prepared detailed plans and specifications for the facilities, which incorporate the material requirements, installation requirements, and all other requirements of the *Standard Specifications*. No work may be commenced until the plans and specifications are approved by RWU in writing. After approval, the plans and specifications become a part of this Contract and applicant agrees to perform the work in strict adherence therewith. RWU will not accept any facilities that do not comply with the plans and specifications, *Standard Specifications*, or which do not otherwise comply with the requirements of this Contract.

7. **Engineer**. All plans and specifications shall be prepared under the direct supervision of an Engineer licensed to practice in the State of Arkansas (hereinafter called Engineer). The construction work shall be continuously supervised or inspected by the Engineer or by individuals who are under the Engineer's direct supervision and who are competent to supervise or inspect the work being performed. The Engineer shall submit written inspection reports to RWU and the Applicant during the process of the construction of the Facilities. Applicant shall hire the Engineer and bear all engineering costs and the costs of all other professional services required for construction of the facilities. Nothing herein shall preclude RWU, at its discretion, from inspecting the work periodically.

8. **Applicant's Engineer**. Applicant designates

**«Engineer_Contact_Mailing_InformationFir»**
**«Engineer_Contact_Mailing_InformationLas»,**
**«Engineer_Contact_Mailing_InformationLic» of**
**«Engineer_Contact_Mailing_InformationCom»** as Engineer,

who will provide the engineering services described herein above.

9. **Planning Agency Review**. Applicant shall give notice of Applicant's proposed facilities by submitting the plans for facilities which have been approved by RWU to the appropriate planning agency for review as follows: (1) the City of Rogers Planning Commission if any part of the project is located within the territorial jurisdiction of said Planning Commission; (2) the Benton County Planning Commission if any part of the facilities are to be located outside of the territorial jurisdictions of the Rogers Planning Commission or any other municipality's planning commission; (3) the Rogers City Council if facilities are to be located outside of the

Rogers city limits. Applicant shall not commence construction of the facilities prior to review and approval by any and all planning agencies having jurisdiction.

10. **Government Agency Review**. In addition to conformance to RWU's requirements, all plans and specifications for the facilities shall conform to the requirements of the Arkansas Department of Health and any other federal, state, county, or local government agencies having jurisdiction over any part of the work covered herein, including those agencies having jurisdiction over construction within the right-of-way of public roads, streets and highways. Applicant is responsible for complying with the requirements of all such government agencies and for the submittal of plans and specifications to all such agencies for review, and paying the cost of all fees and other expenses in connection therewith. Applicant shall not commence construction of facilities prior to approval of the plans and specifications by the aforesaid agencies and furnishing RWU with written evidence of such approval. Applicant shall construct the facilities in such a manner that will not interfere with any proposed future street, highway or drainage improvements.

11. **Permitting**. Applicant shall obtain or cause to be obtained all permits required in connection with the construction of facilities except those permits specifically requiring that RWU be designated as permittee, in which case the Applicant shall prepare and submit to RWU all documents necessary for such permits. Applicant shall pay the cost of all fees, bonds and other expenses in connection with obtaining permits, shall be responsible for conforming with all provisions thereof, and shall coordinate all post-construction inspections required by the issuer of permits.

12**. Grading Prior to Trenching and Facilities Installation.** Prior to construction of the facilities, streets and easements where the facilities are to be constructed shall be graded by Applicant to within 6" of final grade. Property lines adjacent to the location for the facilities shall be staked by Applicant prior to commencing construction of the facilities.

13. **Rights of Way and Easements Required**. If rights-of-way or easements not now in existence are required for the facilities, dedication documents thereof, in a form acceptable to RWU, shall be acquired by the Applicant and conveyed to RWU, the Commission, and the City of Rogers, Arkansas for the use and benefit of RWU. Permanent water service will not be established until Applicant has constructed paved streets, drives and/or parking areas adjacent to the facilities.

14. **Access Fees Required**. Water Access Fees **will be required** in accordance with Section 54-113 of the Code of Ordinances of the City of Rogers. Sewer Access Fees **will be required** in accordance with Section 54-212 of the Code of Ordinances of the City of Rogers. The total access fee applicable to this development on Applicant's property is_____ ($ .00) based upon ___living units and Error! Reference source not **found.** commercial lots

($300.00 water & $300.00 sewer) as depicted on the approved plans. The total amount of access fees for this phase of development must be delivered to RWU before the first service will be established.

15. **Development Impact Fees Required**. **Water Development impact fees will be required in accordance with Section 54-112 of the Code of Ordinances of the City of Rogers. Sewer Development impact fees will be required in accordance with Section 54-211 of the Code of Ordinances of the City of Rogers. These fees are based on the size of the meter, which is dependent upon the peak demand of the system. The fee schedule is as follows:**

| Meter Size | Water Development Impact Fee | Sewer Development Impact Fee |
|---|---|---|
| **5/8"** | **$700** | **$2,200** |
| **1"** | **$1,000** | **$5,000** |
| **1 ½"** | **$2,000** | **$10,000** |
| **2"** | **$5,000** | **$15,000** |
| **3"** | **$10,000** | **$30,000** |
| **4"** | **$15,000** | **$45,000** |
| **6"** | **$30,000** | **$90,000** |

**Based upon the approved plans the total impact fees will be [amount in words] dollars ( $ [insert numerals here] ) based upon [#] [size]" domestic meter (water and sewer) and a [size] irrigation meter (water only). If the number or sizes of meters changes, the total amount of impact fees will be revised accordingly. Development impact fees will be collected at the time each water service is requested.**

The access fees and development impact fees listed above do not include the cost of constructing the water service meters. Cost for constructing the meter set will be estimated based on the site conditions and must be paid to RWU before the service meter will be constructed.

16. **Inspection Fee**. All extensions of water mains and sewer mains, and the public portion of any water service lines or sewer service lines, proposed to become part of the public water system or public sewer system, require inspection by RWU to ensure conformance with the *Standard Specifications*. No service fees will be assessed for the initial and follow-up inspection. Should Applicant, Applicant's Engineer, or Applicant's utility contractor cause the need for additional inspections or unreasonable amounts of time to be expended by RWU's personnel due to nonconforming work or lack of performance by the Engineer, Applicant shall pay to RWU the sum of $250.00 per day or $100.00 per hour, whichever amount is greater, for each day that a RWU representative inspects Applicant's work hereunder. The hourly rate for Saturday, Sunday, and holidays shall be 150% of the aforesaid rates. Inspections are for the sole benefit of RWU, and no services are provided for the Applicant, either directly or implied. Inspections by RWU shall not relieve the Applicant of the duty to provide inspection as specified in paragraphs 6 and 7

herein above. Applicant shall pay to RWU all other costs for services rendered by RWU, including, but not limited to, disinfection, collecting and testing samples, performance testing and connections to mains if any of these functions are performed by RWU personnel or if RWU personnel assist the Applicant or its agent.

17. **Record Drawings**. After completion of the construction of facilities, Applicant shall file with RWU a PDF copy and an AutoCAD version of the Record Drawings prepared by the Engineer which depict the facilities as finally constructed, including point table files referencing valves, hydrants, meters, and other appurtenances in accordance with the *Standard Specifications*. Applicant shall also provide a certificate showing the total construction costs of the facilities, and if requested by RWU, a copy of invoices for materials used in the construction of the facilities. Facilities shall not be accepted by RWU until such plans, certificates and documents are submitted and approved.

18. **Certification of No Encumbrances; Bond Requirements.** RWU cannot accept dedication of any facilities that are subject to purported claims and encumbrances such as materialmen's liens or laborer's liens. Prior to dedication, Applicant must certify that all contractors, subcontractors, materialmen, laborers, etc. have been paid in full and that no purported liens or encumbrances are asserted against the Property.

If the estimated cost of the facilities exceeds Fifty Thousand Dollars ($50,000), then Applicant will provide performance bonds and payment bonds as described hereinbelow. The amount of such bonds shall be in an amount no less than the costs of the facilities and the bonds shall be in effect throughout the construction period. Bonds shall be in a form and from such sources as are acceptable to RWU. RWU may require performance bonds and payment bonds from any person or entity that is performing work on the facilities. Bonds are not required for fire lines or other portions of the private water system and private sewer system.

(a) *General Contractor Constructing Facilities*. If the general contractor is constructing the facilities, a written construction contract must exist between the general contractor and the Applicant. The general contractor shall provide a performance bond and a payment bond (or bonds) in favor of the Applicant. RWU may require that RWU and the Commission be listed as additional obligees on the bonds.

(b) *Subcontractor Constructing Facilities*. If a subcontractor will be constructing the facilities, a written contract must exist between the subcontractor and the general contractor for construction of the facilities. A written construction contract must also exist between the general contractor and the Applicant. The subcontractor shall provide a performance bond and a payment bond (or bonds) in favor of the general contractor and the Applicant. RWU may require that RWU and the Commission be listed as additional obligees on the bonds.

(c) *Applicant Constructing Facilities*. If the Applicant is serving as its own contractor for construction of the facilities, the Applicant shall provide a performance bond and a payment bond (or bonds) in favor of RWU and the Commission. If the project is organized in such a way that the Applicant is using a subsidiary, or related company, as the contractor, a contract must exist between the parent and subsidiary/related company. RWU will specify how the project will be bonded and may require bonds from the parent company, subsidiary/related company, or both.

19. **Dedication of Facilities**. Upon completion of the construction of the facilities and acceptance by RWU, ownership of the facilities shall vest by this Contract in RWU, the Commission, and the City of Rogers, Arkansas, for the use of RWU without the necessity of any other conveyance or formality, the acceptance of the facilities constituting acceptance of the dedication. The facilities shall become a part of the City of Rogers municipal water system, sewer system, (or both), as applicable. RWU shall have the right to connect to and to make extensions from the facilities without payment to or permission from Applicant.

20. **One Year Post-Acceptance Period**. If within one year after acceptance of facilities by RWU, any part of the facilities is found to be damaged, defective, becomes unserviceable, or otherwise fails to meet the requirements of the *Standard Specifications*; or if within one year, any part of the facilities requires relocation, in the opinion of RWU, due to construction of street, road, highway or drainage improvements, or other structures, Applicant shall, after written notice from RWU, within 60 days, remedy the defects or relocate the facilities to the satisfaction of RWU. Upon Applicant's failure to perform said work in a timely manner, RWU shall have the option of performing said work at Applicant's expense.

21. **Not a Contract for Services**. This is a Contract for extension of water facilities and sewer facilities and is not a contract for water service or sewer service. Applicant acknowledges that (1) the furnishing of water and collection of sewer by RWU are governmental functions and that RWU does not agree to furnish any specific amount of water or water pressure; (2) water will be delivered only to customers who enter into separate service contracts with RWU, but the right to contract, and the type of service to be rendered, shall always be subject to such rules, regulations and policies of RWU as may be in effect from time to time; and (3) water furnished under such separate service contracts will be supplied to such customers at whatever pressure and quantity available from time to time without liability for damages due to high or low pressure or stoppage of flow. Applicant will enter into all applicable customary and standard agreements for provision of water service and/or sewer service, including, without limitation, RWU's standard Customer Service Agreement, (as may be modified for Applicant's particular Development) in accordance with all applicable Ordinances of the City of Rogers, the rules, regulations, procedures, and specifications of the Commission and the Rogers Water Utilities, and any other applicable law, as they now exist or as they may be hereafter amended.

22. **Compliance**. Applicant acknowledges that providing water service from the facilities, or connections thereto, will not be commenced by RWU prior to Applicant fulfilling all its obligations in strict accordance with the terms of this Contract including the payment of all amounts due to RWU. Applicant will pay all applicable, customary, and standard deposits, service charges and fees, rates, meter connection charges, tapping fees, impact fees, access fees, sales taxes, fees for Federal Safe Drinking Water Act compliance, and any other applicable charges and fees in accordance with all applicable Ordinances of the City of Rogers, the rules, regulations, procedures, and specifications of the Commission and the Rogers Water Utilities, and any other applicable law, as they now exist or as they may be hereafter amended.

Applicant will comply with all applicable Ordinances of the City of Rogers, the rules, regulations, procedures, and specifications of the Commission and the Rogers Water Utilities, and any other applicable law, as they now exist or as they may be hereafter amended, said ordinances, rules, regulations, procedures, specifications, and applicable laws, being incorporated herein and made part of this Contract.

23. **Certification of Construction Cost.** Applicant understands and agrees after construction is completed that it must certify to RWU the total costs of the facilities by completing RWU's standard Cost Certification Form with Acknowledgement and delivering the same to RWU before any water and /or sewer service will be established.

24**.** **No Joint Venture.** This Contract is made at arm's length between independent contracting parties. Nothing in this Contract shall be deemed to create a joint venture, partnership, tenancy in common, joint tenancy, or any similar relationship between the parties.

25. **Risk of Loss**. Applicant is not a "contractor" of RWU as that term is used in Ark. Code. Ann. §22-9-203. Until the facilities are completed, dedicated, and accepted in accordance with this Contract, all such facilities remain the property of and responsibility of Applicant. Applicant bears the risk of loss for the facilities prior to dedication and acceptance and neither RWU, nor the Commission, nor the City of Rogers shall have any liability for any such loss.

26. **No Assignment of Rights or Delegation of Duties**. Applicant shall not assign its rights under this Contract without the express written permission of RWU. Nor shall Applicant delegate its duties under this Contract without the express written permission of RWU. Any Assignment or Delegation of this Contract made without RWU's consent is void and of no effect. RWU may require information and assurances that any proposed assignee or delegate shall perform Applicant's obligations under this Agreement.

27. **Choice of Law and Venue**. This Contract shall be governed by the laws of the State of Arkansas without regard to its principles of conflict of laws. Venue for any litigation

concerning this Contract shall lie exclusively in the state or federal courts embracing Benton County, Arkansas, unless another venue is specified by law.

28. **No Obligation of Indemnity by RWU; Tort Immunity Not Waived**. The parties hereto agree that RWU has no obligation of indemnity of any type (whether contractual, equitable, or otherwise denominated) to Applicant under this Contract. Nothing in the Contract shall operate as, or be construed as, a waiver, limit, modification, nullification, or alteration, of the tort immunity and other rights and immunities granted to RWU, the Rogers Waterworks and Sewer Commission, and the City of Rogers, Arkansas pursuant to Ark. Code. Ann. §21-9-301 and other applicable law.

29. **Notices**. Any notice or communication required or permitted (other than routine communications regarding plan review, progress of construction, etc. which may be sent by electronic mail) to be given shall be in writing and shall be deemed to have been given (i) when received if personally delivered; (ii) when received if sent by certified mail, return receipt requested, postage prepaid; or (iii) when received if sent by express courier (e.g. FedEx), if receipt is confirmed by the delivery agent, at the following addresses (or such other address as may be designated).

If given to RWU, notice shall be sent to:

Utility Engineer
Rogers Water Utilities
601 South 2nd Street
Rogers, AR 72756

with copies to:

Superintendent
Rogers Water Utilities
601 South 2nd Street
Rogers, AR 72756.

If given to Applicant, notice shall be sent to:

[Insert Notice Address]

30. **Waiver**. Failure of either party hereto to exercise any options herein contained upon breach by the other-shall not constitute a waiver of that party's right to exercise such options upon future breach.

31. **Complete Agreement**. All prior negotiations are merged into this Contract, the written addenda hereto, other written contracts signed by Applicant concerning the subject Development and all written addenda thereto; said written documents shall constitute the entire agreement between

Applicant, on the one hand, and RWU on the other hand. This Agreement shall not be hereafter amended or modified unless reduced to writing and signed by the parties hereto.

32. **Severability**. If any phrase, clause, sentence or paragraph of this Contract shall be declared invalid by the judgment or decree of a court of competent jurisdiction such invalidity shall not affect any of the remaining sentences, paragraphs or clauses of this Contract.

**IN WITNESS WHEREOF**, the parties have executed this Contract by their respective authorized representatives.

[signature pages follow]

**ROGERS WATER UTILITIES OF THE CITY OF ROGERS, ARKANSAS**

By: _____ _____
Brian Sartain, Utility Engineer date

_____("Applicant")

By: _____ _____
date

## *Section 2 – Utility Easement (Standard Template)*

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# UTILITY EASEMENT AND RIGHT OF WAY

**STATE OF ARKANSAS )**
**)** **KNOW ALL MEN BY THESE PRESENTS:**
**COUNTY OF BENTON )**

That the undersigned [name of landowner(s)] ("Grantor" or collectively "Grantors"), for and in consideration of the sum of One Dollar ($1.00), and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, to [me/us] in-hand paid by Rogers Water Utilities of Rogers, Arkansas [does/do] hereby grant, bargain, and sell unto Rogers Water Utilities of Rogers, Arkansas, the Rogers Waterworks and Sewer Commission of Rogers, Arkansas, and the City of Rogers, Arkansas, a municipal corporation, (collectively "Grantee"), and its successors and assigns, permanent and perpetual easements and rights-of-way to locate, re-locate, lay, re-lay, construct, re-construct, remove, enlarge, expand, maintain, inspect, patrol, repair, replace, use, and operate utility lines and/or pipelines, including, but not limited to, water lines, water transmission lines, water main lines, sanitary sewer lines (including, but not limited to, sewer collection and/or force main lines), and all utilities, structures, facilities and appurtenances thereto, including but not limited to, above and below ground valves and piping, standpipes, meters, meter equipment, manholes, hydrants, and all other necessary appurtenances, and to perform all other tasks pertaining to said utility lines and/or pipelines, together with the right of ingress and egress to and from same, on, over, across, through, and under the following described real estate as recorded in book ____ page ____ of the instrument records of the Circuit Clerk and Ex-Officio Recorder of Benton County, Arkansas:

[Identification of land and document number, deed book and page,] located in the office of the ex-officio recorder of Benton County, Arkansas.

Said easement(s) [is/are] described as follows:

A permanent easement and right-of-way across the above-described land more particularly described as follows:

[legal description of easement and right of way; metes and bounds]; [repeat for additional easements]

*Also a temporary construction easement and right of way of sufficient area to allow construction of said utility lines and/or pipelines utilities, structures, facilities and appurtenances thereto with an anticipated construction duration of __ calendar days (not including any delays due to weather)* **(The estimated duration is a non-binding estimate only and the temporary construction easement will continue until construction is completed).** *Any parking areas or landscaping disturbed by construction will be restored to pre-construction conditions.*

[A] sketch(es) of this grant [is/are] attached hereto and incorporated by reference as exhibit(s) "A" [additional exhibit letters] and is to be considered as a part of this easement document. It is understood that [this/these] [sketch/sketches] [is/are] descriptive only of the approximate size, shape and location of the easement(s) and rights-of-way and [does/do] not constitute a plat or survey of the [Grantor's/Grantors'] property.

Grantee shall have and is hereby granted the right of laying, re-laying, constructing, re-constructing, enlarging, locating, re-locating, inspecting, patrolling, operating, using, expanding, maintaining and/or removing utility lines and/or pipelines, utilities, structures, facilities, and appurtenances (including, but not limited to, new utility lines and/or pipelines, utilities, structures, facilities, and appurtenances; existing utility lines and/or pipelines, utilities, structures, facilities, and appurtenances; and/or such additional utility lines and/or pipelines, utilities, structures, facilities and appurtenances as may be required in the future). Further, Grantee shall have and is hereby granted the right to perform all other tasks, not otherwise listed herein above, pertaining to said utility lines and/or pipelines, utilities, structures, facilities, and appurtenances.

Grantee shall have the right of ingress and egress on, over, along, across, through, and under adjacent lands owned, leased, or controlled by Grantor[s] to and from said easements and rights-of-way for any and all purposes relating to, or in any way connected with, the laying, re-laying, construction, re-construction, enlargement, location, re-location, inspection, patrolling, operation, expansion, maintenance, removal, and/or use of utility lines and/or pipelines, utilities, structures, facilities, appurtenances, and all other property of Grantee located on the easements and rights-of-way described above. Further, Grantee shall have the right of ingress and egress on, over, along, across, through and under adjacent lands owned, leased, or controlled by Grantor[s] to or from said easements and rights-of-way in order to perform all other tasks, not otherwise listed herein above, pertaining to said utility lines and/or pipelines, utilities, structures, facilities, and appurtenances.

Grantee shall have and is hereby granted the further right at all times to remove from said lands all crops, vegetation, undergrowth, trees, and parts thereof, or other obstructions, which, in the opinion of Grantee, restrict access to, constitute a hazard, or endanger the safety, reliability and/or functionality of said utility lines and/or pipelines, utilities, structures, facilities, and appurtenances, and/or endanger the public and/or public safety. Grantee shall also have and is hereby granted the further right at all times to remove from said lands all crops, vegetation, undergrowth, trees, and parts thereof, or other obstructions, for the purpose of installing additional utility lines and/or pipelines, utilities, structures, facilities, and appurtenances and/or for the purpose of performing the various other tasks and actions described herein above.

The Grantor[s] and/or [its/his/her/their] successors or assigns shall not cause to be constructed any buildings, structures, or other improvements, other than "fences" within the above-described easements and rights-of-way. As used herein, the term 'fences" does not include walls, walled

fences, or combination wall/fences, or any other structure that cannot be readily dismantled if necessary. Further, no trees shall be planted by Grantor[s] or [its/his/her/their] successors or assigns on said easements and rights-of-way. Neither Grantor[s] nor [its/his/her/their] successors or assigns shall be entitled to any compensation for fences, trees, vegetation, undergrowth, crops, and/or structures which may be removed or disturbed within [this/these] permanent easements and rights-of-way by virtue of Grantee's exercise of the rights under this agreement. It is further understood that Grantee's easement(s) and rights-of-way shall be exclusive and that Grantor[s] and/or [its/his/her/their] successors and assigns shall convey no parallel and/or otherwise conflicting rights to any person, utility or corporation on, across, through, or under said easements and rights-of-way without the express written permission of Grantee.

The consideration hereinabove mentioned is paid by Grantee and accepted by Grantor[s], [its/his/her/their] successors and assigns, as full and total payment for the easements and rights-of-way, trees, crops, vegetation, undergrowth, or other obstructions, trimmed or removed from said lands during the construction and maintenance of Grantee's utility lines and/or pipelines, utilities, structures, facilities and all other property of Grantee located on the easements and rights-of-way described above; any and all other claimed damages, of any type, to [Grantor's/Grantors'] land; and for all other rights and privileges hereinabove set forth.

TO HAVE AND TO HOLD the above-described easements and rights-of-way unto said Grantee, their successors and assigns, forever or until said easements and rights-of-way are finally abandoned.

And Grantor[s] agree[s] to forever warrant and defend the above described easements and rights-of-way unto said Grantee against any and all claims whatsoever.

[This/These] easement(s) and rights-of-way [is/are] declared to and [does/do] inure to the benefit of the public generally, shall run with the land, and shall be binding upon the successors in title and/or interest to the lands herein described or any other part thereof, their mortgagees, lessees, heirs, administrators, executors, successors, and assigns.

IN WITNESS WHEREOF the hand and seal of Grantor[s] is hereunto set, this _____ day of _____, 20___.

[NAME OF PERSON/ENTITY]

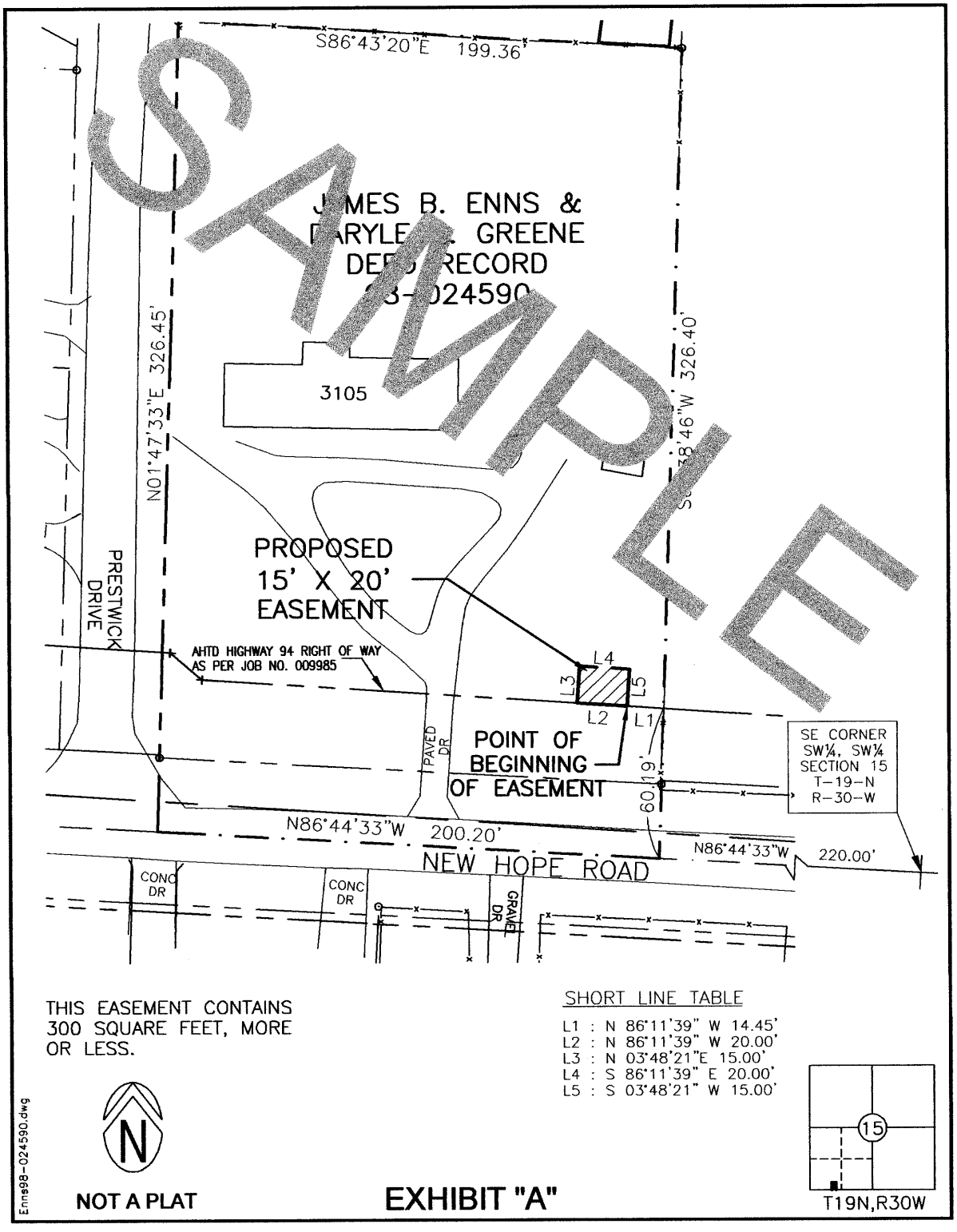
BY: _____

TITLE: _____

[NAME OF PERSON/ENTITY]

BY: _____

TITLE: _____



## ACKNOWLEDGMENT

**STATE OF ARKANSAS )**
**)**
**COUNTY OF BENTON )**

BE IT REMEMBERED, that on this date, before me, a Notary Public within and for said County and State, duly commissioned and acting, personally appeared_____, to me well known as the persons who executed the foregoing Utility Easement and Right of Way, and that they have executed the same for the consideration and purpose therein mentioned and set forth.

WITNESS my hand and seal on this _____ day of _____, 20___.

_____
Notary Public

My commission expires _____.

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# APPENDIX C – ENGINEERING GUIDELINES

## *Section 1 – Engineering Plan Checklist*

| | | | |
|---|---|---|---|
| | **GENERAL PROJECT REQUIREMENTS** | | |
| 1 | Pre-design Meeting | | Engineer should contact RWU to schedule a pre-design meeting. |
| 2 | Request to Uncover Water Mains | | Engineer should contact RWU to uncover existing water mains at critical crossings & points of connection to avoid potential construction conflicts. |
| 3 | Easements (On-Site/Off-Site) | | Submit formal easement documents, an easement dedication plat, or a final plat to dedicate easements for review before executing any required easement (Submit a copy of the property deed for each parent tract with easement submittal). Off-site easements must be approved and filed for record before a pre-construction meeting can be scheduled. |
| 4 | Responding to Review Comments | | In subsequent reviews submit responses to our review letter comments. |
| | **GENERAL PLAN REQUIREMENTS (for approved plans)** | | |
| 5 | Engineer's Seal, Signature, and Date | | Approved plans will display the engineer's seal, signature, and date on each plan sheet (except RWU Standard Details). |
| 6 | Engineering Firm's Certificate of Authorization | | Approved plans will display the engineering firm's Certificate of Authorization on the Cover Sheet. |
| | **COVER SHEET** | | |
| 7 | Area Map | | Clearly identify the location of the project on an area/vicinity map. |
| 8 | Project Address/Building Addresses | | Identify the project site address. (Building unit addresses and lot addresses will be shown on the Utility Plan). |
| 9 | Identify Building Use | | Identify the use of the building to determine if a sewer system pre-treatment review is required. (Will sand, oil, grease, solids, lint, or hair interceptors be necessary?) |
| 10 | Contact Information | | Show the contact information for the engineer and owner/developer on the plans (phone numbers, mailing addresses, email addresses). |
| 11 | Index of Plan Sheets | | Include an index of plan sheets. |
| | **SITE PLAN** | | |
| 12 | Existing & Proposed Utility Easements | | Show all existing (with Book and Page) and proposed utility easements-all adequately dimensioned. |
| 13 | Existing Above Ground Features | | Display all above ground features such as hydrants, meters, manhole lids, cleanouts, etc. |
| 14 | Sign Locations | | Locate all proposed signs outside utility easements. |
| | **GRADING PLAN** | | |

| | | | |
|---|---|---|---|
| 15 | Existing Water & Sewer Lines and Easements | | Show existing water and sewer mains and their easements on the grading plan. |
| 16 | Minimum Protective Cover | | Do not remove minimum protective cover from existing water or sewer mains. |
| 17 | Adjusted Manhole Rim Elevations | | If the rim elevation of an existing manhole needs to be adjusted, display the existing and proposed rim elevations. Reference the appropriate RWU Standard Detail for adjustment with each application. |
| | **UTILITY PLAN (GENERAL)** | | |
| 18 | Overall Plan | | Provide an overall Utility Plan sheet. |
| 19 | Existing & Proposed Street Names | | Show all existing and proposed streets and street names. |
| 20 | Existing Water & Sewer Lines | | Display all existing water & sewer lines with their diameter. |
| 21 | Water & Sewer Main Sizes | | Depict all proposed water & sewer line sizes (diameter). Also, differentiate between existing and proposed water & sewer mains. |
| 22 | Valves, Fire Hydrants & ARVs | | Show all valves, fire hydrants, & ARVs using clearly indicated symbols and notes. |
| 23 | Manholes in Sewer Design | | Eliminate any unnecessary manholes in the sanitary sewer design. |
| 24 | Existing Easements | | Show existing easements and their dimensions, along with book and page information. |
| 25 | Proposed Easements & Dimensions | | Show proposed easements and their dimensions. |
| 26 | Easement Boundary Lines | | The utility easement boundary lines must be located a minimum horizontal distance of 7-1/2 feet or the depth of the main, whichever is greater, from the water or sewer line. |
| 27 | Mains Within Easement/Right-Of-Way | | Locate all proposed public water and sewer mains within a Utility Easement or City Right-of-Way. |
| 28 | Acute Utility Line Crossings | | Minimize acute angles between water, sanitary sewer, & storm sewer crossings. |
| 29 | Utilities 90° to Centerline of Street | | Design all water and sewer street crossings to be made 90° to the centerline of street/road. |
| 30 | 10' Horizontal Separation - Water & Sewer | | Provide a minimum of 10-foot horizontal separation between parallel water mains and sewer mains/manholes and label the 10-foot minimum distance on the plans. |
| 31 | 5' Horizontal Separation with other Utilities | | Provide and label the minimum 5 foot horizontal separation between water & sewer mains and parallel storm sewer, gas, electric, and communications / telephone lines. |
| 32 | 7.5' Horizontal Separation from Slopes | | Provide and label a minimum separation of 7.5 feet for water or sewer mains from any detention/retention basin, or the slopes of its embankment. |
| 33 | 5' Horizontal Separation From Street Lights | | Depict the location of street lights. Maintain 5' minimum separation from water and sewer mains. |

| | | | |
|---|---|---|---|
| 34 | 30' Horizontal Separation from Transformers to Meters | | Depict the locations of the electric transformers. Locate them as far from water meters as is practical but in no case within 30 feet of water meters. (The purpose for this requirement is to eliminate interference when leak detectors are employed.) This does not apply to electric junction boxes which can be 5' from meters. |
| 35 | Water & Sewer to Property Line/Limits When Applicable | | Extend water and sewer mains to the property line / limits of development when applicable. |
| 36 | City of Bentonville's 48" Transmission Line | | If utilities cross the City of Bentonville's 48" transmission main, a copy of the plans & notification must be sent to the Bentonville water department. |
| 37 | One Water/Sewer Service Per Lot | | Verify that only one water and sewer service line extends to each lot. |
| 38 | Water/Sewer Services at Opposite Ends of Lots | | Water and sewer services should be located at opposite ends of lots. Pair like services on each side of a lot line. (Sewer with sewer and water with water). |
| 39 | Grease Interceptor Requirements | | When a grease interceptor is required indicate the size of the grease interceptor, and include sizing calculations. |
| | **UTILITY PLAN (WATER SERVICES)** | | |
| 40 | Meter Locations | | **1.** Identify existing and proposed meter locations. **2.** Locate all proposed water meters within a Utility Easement or City Right-of-Way. **3.** Locate water meters at the street corner when the lot is a corner lot. All other meters will be located on lot lines. (This will minimize the possibility of conflict with driveways.) **4.** Meters should be a minimum of 3' from backs of curb. |
| 41 | Connecting Water Service to Existing Main | | When connecting a water service to an existing main note on the plans that RWU will construct the water meter service at the developer's expense. |
| 42 | Meters For Leased Units | | One water meter per building is allowed when connecting to an apartment or townhome (residential) that will be leased to tenants. |
| 43 | Water Service Line Regulations | | **1.** All water service lines will be less than 100 feet long measuring from water main to meter service. **2.** Provide a 1" water service line for each residential lot with a width of 65 feet or more (1" service line may supply up to two 5/8" meters - 1 domestic and 1 irrigation). **3.** No water services will be connected to a fire line. (The fire line is that portion of line beyond the demarcation valve). **4.** The layout must conform to the Commercial, Irrigation, and Fire Line connection detail where applicable. |
| 44 | Public Meters | | For water meters designated to be public a 1" meter is the largest allowed. |
| 45 | Non-Residential Domestic & Irrigation Meter | | Label the size of each non-residential domestic water or irrigation meter. |

| | | | |
|---|---|---|---|
| 46 | Irrigation RPZA (Proposed & Existing) | | PROPOSED - Specify that a USC-FCCCHR approved RPZA will be required and located in a heated space or frost free enclosure prior to any tees or branches for all commercial service lines and all irrigation service lines. (Provide a detail for installation indicating manufacturer, model number--complete with all suffixes and prefixes, size, and installation orientation must be shown). EXISTING - Identify any existing cross-connection cross control devices (RPZA / DCDA, etc.) located on the property that will continue to be used in the future. Include the manufacturer, model number, and size. |
| 47 | Fire Line Plan & Profile | | Provide a Plan & Profile of Fire Lines up to the backflow preventer. |
| 48 | Fire Dept. Connection (FDC) | | The FDC line must connect downstream from the required Double-Check Detector Assembly on the fire line. |
| | **UTILITY PLAN (WATER MAIN)** | | |
| 49 | Water Main Configuration | | **1.** Water mains shall be configured with a looped connection to the existing system with valves located so no more than 20 services will be affected by a line break. **2.** Provide stub-outs with plugged valves to accommodate future water main extensions. **3.** The water main alignment must conform to the latest edition of AWWA C600 for the minimum radii using joint deflection. (The minimum radius for 8" and 12" pipe is 290'). Joint deflection meeting this requirement is preferred in lieu of additional fittings. |
| 50 | Fire Hydrant Location | | **1.** Locate fire hydrants at the end of all dead end water mains with the hydrant located just past the last service connection to the water main. **2.** Fire hydrants should be located on lot lines. **3.** Locate fire hydrants inside valve clusters, so that lines can be isolated for flushing. **4.** No fire hydrants will be located in the greenspace between the curb and the sidewalk. |
| 51 | Fire Hydrant Lines | | Show a maximum length of one joint of pipe for any 6" diameter fire hydrant lead in accordance with RWU standard details. Otherwise, 8" pipe diameter is required. (Provide a profile of the fire hydrant line when it exceeds 20' in length.) |
| 52 | Butterfly Valves | | Water valves 12" and larger are to be specified as butterfly valves. |
| 53 | Valve & ARV Locations | | Locate valves and air/vacuum release valves (ARVs) near hydrants or by other easily identifiable objects. Locate ARVs near lot lines whenever possible. |
| | **UTILITY PLAN (SEWER SERVICES)** | | **All sewer service lines must conform to the following service connection guidelines** |
| 54 | Service Line Guidelines | | **1.** 4" diameter sanitary sewer service lines can connect to sanitary sewer mains up to 12" in diameter. **2.** 4" diameter sanitary sewer service lines must connect at a manhole for sanitary sewer mains larger than 12" in diameter. **3.** Sanitary sewer service lines larger than 4" in diameter must connect to a manhole. **4.** Sanitary sewer service lines smaller than 4" (residential) should be located outside the manhole if possible. **5.** Specify sewer service line material as SDR 26 PVC for all public service lines. **6.** The minimum cover for sewer services is 3 feet, anything less will be reviewed by RWU for approval. |

| | | | |
|---|---|---|---|
| | **UTILITY PLAN (SEWER MAIN)** | | |
| 55 | Sewer Main Regulations | | **1.** All public sewer mains are required to be 8" minimum diameter in Arkansas. **2.** The maximum distance between manholes is 400 feet from centerline of manhole to centerline of manhole (unless approved otherwise by RWU). **3.** Provide a change in flow direction of less than a 90° from any line into a manhole and the out-flowing main. |
| 56 | Manhole Regulations | | **1.** A maximum of four pipe penetrations, including the outlet main, inlet mains, and service lines (preferably 6' or larger in diameter), is allowed at each manhole. **2.** Label each manhole located in areas subjected to flooding or pooling to have Water Tight Covers. **3.** When connecting a force main to a manhole note on the plans that the manhole shall be epoxy-lined with a composite ring & lid. |
| | **PLAN & PROFILE (GENERAL)** | | **(Utility Plan Requirements Also Apply to Plan & Profile Sheets)** |
| 57 | Layout (Plan & Profile) | | **1.** Show the plan and profile views at the same horizontal scale. **2.** Locate corresponding plan and profile views on the same sheet with the plan view located above the profile view. **3.** Show all water mains, sanitary sewer mains, storm sewer lines, and "other" (gas, electric, etc.) utility lines within utility easement or right-of-way area that run parallel to the sanitary sewer mains and/or water mains on the plan and the profile. **4.** Show casing pipes on plan and profile views in accordance with RWU standard details. |
| 58 | Plan View Layout | | **1.** Show water and sewer main stationing on plan views. **2.** Show, dimension, and label existing and proposed utility easements and right-of-way lines. |
| 59 | Profile View Layout | | **1.** Show the station (for water & sewer) and invert elevation (for sewer) at each end of all "jack & bore" casings. **2.** Show existing and finished grades at point of bury and adjacent street centerline. **3.** Show all water, sanitary sewer, and storm sewer line crossings. **4.** Show all "other" (gas, electric, etc.) utility crossings. **5.** Show the storm sewer line when it runs adjacent to the water or sewer main (to verify that water and sewer services will be able to cross the storm sewer). **6.** Show all street crossings and required granular backfill material. **7.** Water should be designed over sewer. When there is less than 18" between outside of pipes encasement will be required for the sewer main unless the sewer is an existing line in which case the water main will be encased. **8.** When sanitary sewer has to be designed over water, encasement will be required for the sewer main no matter what the vertical separation will be. The minimum separation is 18" and no less. |
| | **PLAN & PROFILE (WATER MAIN)** | | |
| 60 | Force Main Appurtenances | | Show and label all force main horizontal and vertical fittings, plug valves, and air release valve assemblies. |
| 61 | Water Main Appurtenances | | Show and label all water main appurtenances such as valves, crosses, tees, elbows, reducers, and ARVs on the plan and profile views. |
| 62 | Pipe Information | | **1.** Identify the diameter & material of water main pipe. **2.** Show the elevations on the profile for existing water mains. |

| | | | |
|---|---|---|---|
| 63 | Profile View Layout | | **1.** Provide Plan & Profiles for all Fire Hydrant Lines over 20 feet in length. **2.** Water mains shall be designed a minimum of 3.5 feet below street centerline or 3 feet below point-of- bury, whichever provides the most cover. (Street centerline should be taken for the street that is immediately adjacent to and abuts utility easement area for the subject water main.) **3.** Water mains shall be designed above storm sewers where they cross. When storm sewer must cross over the water main, water line encasement is required if the storm sewer is 36" in diameter or greater. **4.** Specify Ductile-Iron Pipe on the profiles for all water mains. SeePART II-MATERIALS. (Fire lines must also be specified as Ductile-Iron Pipe.) |
| | **PLAN & PROFILE (SEWER MAIN)** | | |
| 64 | Plan View Layout | | Show the upstream and downstream manholes when a new manhole is placed over an existing sewer main, along with rim and flow-line elevations. |
| 65 | Profile View Layout | | **1.** Specify sewer pipe material as SDR 26 PVC for all sewer mains. Terminate all sanitary sewer mains at a manhole. **2.** Provide a minimum depth of 6 feet for sanitary sewer mains and manholes. **3.** Label all sanitary sewer manholes with: stations, rim elevation, and all invert elevations (including service lines). **4.** Label the diameter & material of sanitary sewer main pipe. **5.** Label the slope and distance between manholes. **6.** Label manholes deeper than 14 feet to be six feet in diameter. **7.** For manholes 4’ deep or less a flat top manhole will be required. **8.** Invert drops across all proposed sanitary sewer manholes must be exactly 0.10 feet. Drop manholes are not allowed. Match pipe crown elevations where pipe diameter changes. |
| 66 | Jack & Bore Design | | Boring for sanitary sewer mains should be at a minimum grade of 1%. |
| 67 | Force Main Requirements | | Provide hydraulic grade lines on the force main profiles and hydraulic calculations. Ensure a scouring velocity is attained in the force main. |
| | **LANDSCAPE PLAN** | | |
| 68 | Utility Layout | | Show existing and proposed water and sewer mains on the Landscape Plan. |
| 69 | Tree Layout | | Large Trees (over 20' tall at maturity in City Code 14-46-paragraph G) must be located at least 10 feet from any water or sanitary sewer main. |
| | **DETAILS** | | |
| 70 | Standard Details | | All plan submittals must include RWU's current, unedited, Standard Water & Sewer Details. These are available in .pdf and .dwg format at www.rwu.org |

## *Section 2 – Meter Service Sizing Guidelines*

The table below outlines the general recommendations for the sizing of individual water services and does not constitute a guarantee of available flow. Flows may vary depending on available pressure, length of service lines, and other site conditions. It shall be the responsibility of the designer to evaluate the pressure and flow requirements of each facility to be serviced and ensure that hydraulic capacity of services is sufficient.

| **Meter Size** | **Flow Range (GPM)** | **Connection to:** | |
|---|---|---|---|
| | | New Main | Existing Main |
| 5/8" (single or double) | 1-20 | 1" Corp Stop | 1" Corp Stop |
| 1" | 3-50 | 1" Corp Stop | 1" Corp Stop |
| 1-1/2" | 4-120 | See detail WD-1/5 | 2" Tapping Saddle & Valve |
| 2" | 4-160 | See detail WD-1/5 | 2" Tapping Saddle & Valve |
| 3" | 5-350 | See detail WD-1/5 | 2" Tapping Saddle & Valve |
| 4" | 15-1,000 | Main x 4" Tee and Valve | Main x 4" Tapping Sleeve & Valve |
| 6" | 30 – 2,000 | Main x 6" Tee and Valve | Main x 6" Tapping Sleeve & Valve |
| 8" | 35 – 3,500 | Main x 8" Tee and Valve | Main x 8" Tapping Sleeve & Valve |

# APPENDIX D – CONSTRUCTION FORMS AND CHECKLISTS

## *Section 1 – Bond Requirements*

### 1.1 - PERFORMANCE AND PAYMENT BONDS

RWU cannot accept any water or sewer facilities that are subject to purported claims and encumbrances such as materialmen's liens or laborer's liens. Performance and Payment bonds shall be required if the estimated construction costs for the public portion of the water and sewer facilities exceed $50,000. Bonds are not required for fire lines or other portions of the private water system. The life of the bond(s) shall be for the construction period. Bonds shall be issued in accordance with the following conditions:

**A. GENERAL CONTRACTOR WILL CONSTRUCT WATER AND SEWER FACILITIES.**

- A contract must exist between the General Contractor and the Owner(s) of the Project.
- The General Contractor shall provide a performance and payment bond (or bonds) in favor of the Owner(s)
- RWU may require that RWU and the Commission be listed as additional obligees on the bond(s).

**B. A SUBCONTRACTOR WILL CONSTRUCT WATER AND SEWER FACILITIES.**

- A contract must exist between the Subcontractor and the General Contractor, and a contract must exist between the General Contractor and the Owner(s) of the Project.
- The subcontractor shall provide a performance and payment bond (or bonds) in favor of the General Contractor and Owner(s)
- RWU may require that RWU and the Commission be listed as additional obligees on the bond(s).

**C. THE DEVELOPER/OWNER OF THE PROJECT IS SERVING AS ITS OWN CONTRACTOR.**

- The Developer/Owner shall provide a performance and payment bond (bonds) in favor of RWU and the Commission. The life of the bond(s) shall be for the construction period.

- If the project is organized in such a way that the Developer/Owner is using a subsidiary, or related, company as the Contractor, a contract must exist between the parent and subsidiary/related company. RWU will specify how the project will be bonded and may require bonds from the parent company, subsidiary/related company, or both.

RWU may require performance and payment bonds from any person or entity that is performing work on the public portion of the water and sewer facilities.

## 1.2 - MAINTENANCE BONDS

Maintenance Bonds shall be in the amount of 50% on the actual constructed cost of the public water and sewer facilities and are required if actual construction costs for the public portion meets or exceeds $50,000. The life of the bond shall be one year.

- The Engineer shall submit a cost certification form stating the actual constructed cost for the public facilities.
- The Owner or Contractor shall issue the bond as a condition of final acceptance of the project with RWU being the Oblige.

## *Section 2 – Cost Certification Forms*

# COST CERTIFICATION
## FOR
# POTABLE WATER AND/OR SANITARY SEWER CONSTRUCTION

I, _____, Owner/Developer or authorized agent of the
(name of certifier)

Owner/Developer_____, of the _____
(name of owner/developer) (name of development)

Address or Location of Development_____

Do hereby certify that the costs to engineer and to construct the potable water and/or sanitary sewer to serve the stated development are as follows:

**Construction Costs:**

Potable Water Construction Cost:_____

Sanitary Sewer Construction Cost:_____

Lift Station Construction Cost:_____

**Engineering Costs:**

Potable Water Engineering Cost:_____

Sanitary Sewer Engineering Cost:_____

Lift Station Engineering Cost:_____

These costs are total in nature and reflect all expenditures necessary to complete water and/or sewer construction. I understand that my completion and transmittal of this certification to Rogers Water Utilities is one of the conditions that must be met before water and sewer service can be established in said development.

_____
(signature)

_____
(print name)

_____
(date)

**ACKNOWLEDGMENT**

STATE OF ARKANSAS )
) KNOWN ALL MEN BY THESE PRESENTS:
COUNTY OF BENTON )

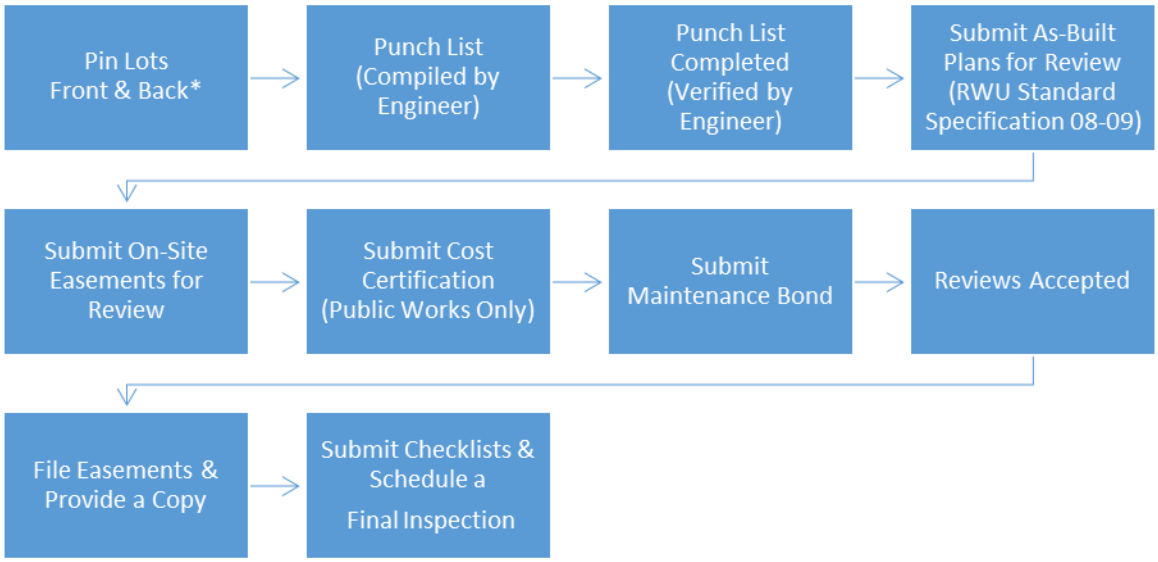
BE IT REMEMBERED, that on this day came before the undersigned, a Notary Public within and for said County and State aforesaid, duly commissioned and acting, appeared in person the within named _____ and stated that _____ is duly authorized to execute the forgoing certification of construction costs, and further stated and acknowledged that _____ has so signed, executed and delivered said certification for the consideration, uses and purposes therein mentioned and set forth.

Witness my hand and seal on this _____ day of _____ 20___.

_____
Notary Public

My Commission expires _____.

## *Section 3 – Project Completion Flowchart*




* On Subdivisions

Note: this flow chart is intended to provide a guideline to obtain the approval of RWU. This in no way ensures acceptance by other entities of the City of Rogers. Checklists may be submitted the day of the walkthrough.

# APPENDIX E – INSPECTION PROCEDURES

## *Section 1 - General Information*

### Introduction

The Inspector's job is vital to achieving high quality construction on every utilities infrastructure project. It is one of verifying that construction operations produce the results called for by the Plans and Specifications. This role is one of the toughest jobs in construction industry and demands knowledge, awareness, keen observational skills, and diplomacy. The Inspector has the responsibility to identify deviations from project Plans and Specifications and to bring them to the attention of the Contractor, Engineer and Rogers Water Utilities. This manual provides the Inspector the knowledge of practice and policy required during the construction of utilities infrastructure at Rogers Water Utilities.

### Purpose of Inspection

The purpose of inspection on construction projects is to ensure the **quality** of the work, and to verify that the finished construction meets project requirements. To accomplish this, the Inspector must be familiar with the Plans and Specifications. Together the Plans and Specifications explain requirements that the Contractor must observe to install or build a satisfactory project and receive payment in full for his work.

Plans are the Contract Documents that show the location, physical aspects, and dimensions of the work. The Plans include layouts, profiles, cross-sections, and other necessary details. The Specifications are the written technical directions and requirements for the work. Also, the Specifications complement the Plans by providing instructions that are not specifically indicated on the drawings. Specifications are the means of communications among the Engineer, the Contractor and Rogers Water Utilities. The Plans and Specifications are dynamic documents, subject to revisions as unknown conditions and requested design changes are encountered on the project. Therefore, it is imperative that the Inspector maintain a current awareness of these documents.

### Inspector Qualifications

The personal attributes of the Inspector extend beyond those expected of ordinary workman or technician. The Inspector must be:

- Honest and able to conduct himself/herself in a fair, straight forward professional manner;
- Able to maintain his/her composure and make good decisions; and

- A skilled diplomat, able to handle tough situations without causing hostility.

In addition to these positive personal attributes, the Inspector must have the organizational and technical ability to perform his/her job. The Inspector shall have a high school diploma and technical background, preferably with additional technical study or previous construction experience. The Inspector must:

- Know how to read and interpret Plans, Specifications, and other documents to understand the requirements of the work;
- Be able to observe ongoing construction progress, and identify existing or potential construction operations that are not according to the Plans and Specifications;
- Have the verbal communication skills to notify the Contractor in a courteous manner that unsatisfactory conditions exist, or that the Specifications are not being met;
- Have the writing skills to properly document and record the daily work progression and any factors affecting the progress or quality of the work;
- Be able to perform accurate mathematical calculations;
- Be knowledgeable of the physical characteristics of the materials involved in construction projects; and
- Understand the principles of materials testing, including the interpretation of test results.

### Inspector Authority

The Inspector is responsible for determining that the work being done and the materials being used meet the requirements of the Plans and Specifications. The Inspector has the authority to reject defective material or work that is being done improperly. The Inspector also has the authority and obligation to notify the Contractor when unusual conditions have been created or encountered during construction. The Inspector should realize that implementation of the authority should be regularly supplemented with advice and assistance from the Engineer.

The Inspector should realize that he/she is not authorized to revoke, alter, or relax any requirements of the Contract; or to issue a Stop Work Order to the Contractor. These actions are among the responsibilities of the Developer's Engineer and the Rogers Water Utilities administration.

## *Section 2 - Preconstruction & Post-Construction Responsibilities*

### Introduction

During the pre-construction phase, the Inspector shall review all required aspects of the project, and shall try to resolve any errors or conflicts which he/she observes. In general, the

Inspector shall obtain and review all Contract Documents, review pertinent engineering reports, visit the job site prior to construction, and attend the pre-construction conference.

During the post construction period, the Inspector shall review and verify that all aspects of the job have been completed, and shall review project record documentation for accuracy and completeness.

## Definitions

**Benchmark -** Point of known or assumed elevation used as a reference in determining and recording elevations.
**Punch List** - A summary of additional or corrective work required for completion of a project usually prepared after a site walk-over.
**Record Drawings (As-Builts)** - Engineering plans which have been revised to reflect all changes to the plans which occurred during construction. The Record Drawings also depict water and sewer appurtances locations, in accordance to the Standard Guidelines and Details for Water and Sanitary Sewer Construction Drawings Manual.
**Subgrade** - Soil exposed in a trench or roadbed and upon which the pipe bedding material or pavement base material will be placed.

## Pre-Construction Responsibilities

The Engineer's inspector is required to attend the pre-construction meeting. The Inspector is responsible for having a thorough understanding of the project Plans and Specifications and other appropriate parts of the Contract Documents. A complete and knowledgeable understanding by the Inspector of these documents is essential in performing proper inspections during construction. The Specifications represent detailed descriptions of the materials, workmanship, and testing methods required on the project. The Plans present layouts, profiles, dimensions, cross-sections, and details necessary to construct the project. Together, these documents define the scope and nature or the work to be performed.

During this review, the Inspector shall make note of any items in the Contract Documents which are unclear and discuss these with the Engineer. In addition, and detected errors, omissions, discrepancies, or deficiencies shall be reported to the Engineer and Rogers Water Utilities. At this time, any questions by the Inspector regarding the contents of the Contract Documents or scope of project shall be resolved.

### Site Visits

The Inspector shall visit the site prior to construction, and shall walk the site with the Plans in hand. At this time, the Inspector shall become familiar with the proposed area of construction and the proposed locations of all structures and earthwork indicated on the Plans. The Inspector shall look for any obvious errors in the Plans, as well as any areas which may require special attention during construction. All items for concern, error, or discrepancies noted by

the Inspector shall be discussed with the Engineer and Rogers Water Utilities Coordinator during the pre-construction meeting, as appropriate.

During the site visit, the Inspector shall look for the following items:

(1) job site alterations which may have occurred since preparation of site plans contained within the Contract documents;

(2) the obvious presence of any existing utilities which are not marked on the Plans but which may present problems during construction;

(3) the location of any trees or plants which are marked "Do Not Disturb" on the Plans. These trees/plants shall be marked by the Contractor with flagging to avoid any possible confusion later;

(4) the location of any bench marks (BMs) or temporary bench marks (TBMs) shown on the Plans. The Inspector shall confirm the bench mark locations are as shown on the Plans. If the bench marks have been obviously disturbed, they shall be replaced prior to construction.

In addition, during the site visit, the Inspector shall take a series of pre-construction photographs. These photographs shall be logged and indexed to allow future reference, if necessary.

**Pre-Construction Conference**

A pre-construction conference will be scheduled by the Rogers Water Utilities Project Coordinator and the Developer, Developers Engineer, Contractor, Inspector as well as other appropriate Rogers Water Utilities Staff shall attend. During the conference, matters such as the coordinating work, construction schedule, traffic controls, utility conflicts, and special construction considerations are addressed. The Inspector shall make it a point to introduce himself/herself to each contact, and begin building professional relationships to ensure open communication throughout the project.

## Post-Construction Responsibilities

**Preparation of Punch List**

After Rogers Water Utilities activates the subject utilities, the Inspector shall assist the Project Coordinator, Engineer and Contractor with preparing a punch list that itemizes all of the work tasks still necessary for completion of the project. When preparing the punch list, the Project Coordinator and/or RU Staff, Inspector, Engineer and Contractor shall walk the project site and note any areas which require additional or corrective work. The field review shall be very thorough because successful completion of these tasks will indicate that the project is

complete. During this walkover, the project status can be reviewed and discussed in detail to avoid any misunderstanding of the work required for final acceptance.

As the Contractor completes items on the punch list, Rogers Water Utilities Staff and the Inspector shall inspect each item. Items on the punch list shall be checked off only when Rogers Water Utilities and the Inspector has reviewed the work and decided that it is acceptable. The project is considered completed after all items on the list have been checked off and approved by Rogers Water Utilities.

**Review of Record Drawings (As-Builts)**

The project Record Drawings are a set of drawings that illustrate the as-constructed details and layout of the project as described in "Rogers Water Utilities Standard Guidelines and Details for Water& Sewer Construction Drawings". The Engineer shall be responsible for maintaining and updating the Record Drawings as construction progresses to reflect:

- minor design changes,
- deviations from the original Plans,
- unknown field conditions, and
- unknown utilities locations.

These drawings are important because they represent the final record of the constructed facility; these drawings are often relied upon for reference during future maintenance and expansion of the infrastructure system.

The Inspector, as a result of his intimate knowledge of day-to-day construction activities shall regularly review the Record Drawings, with the Rogers Water Utilities Project Coordinator, during construction to confirm that the drawings are accurately maintained. At the completion of the project, the Inspector shall review the Record Drawings. The Inspector shall note any errors or
omissions observed on the drawings and report these immediately to the Engineer and Rogers Water Utilities.

## *Section 3 - Records & Reports*

### Introduction

Construction records and reports provide documentation of the data, activities, transactions, and verbal communications relating to the project. The importance of good construction records and reports cannot be overemphasized. During execution of the project, records and reports enable other personnel who are not directly involved with its construction to monitor and assess the work as it progresses. Following completion of construction, the records and

report provide permanent documentation of the work as performed. This information may be used for payment purposes, resolution of disputes, and re-creation of the job history.

Reporting of the work should be secondary to the actual observation of the construction process. While it is essential that the Inspector not allow report writing to interfere with the prime objective of his job, records and reports must be considered as an integral part of the inspection process. Records and reports must be accurate and shall be written promptly while job occurrences are still easily recalled by the Inspector.

All records and reports must be completed in a neat and organized manner. The inspector should remember that his/hers reports and records will be viewed by others, and that they may be presented in a court of law as evidence relative of the project.

## Inspection Report Forms

The Daily Field Report is used as a permanent record of the job history, and to provide a means for re-creating job progress on a day-to-day basis. Any job-related items which the Inspector feels is relatively important shall be included in the Daily Field Report.

All Daily Field Reports must be completed daily, preferably as soon as possible after specific events occur. The Inspector will submit Daily Reports to the Engineer and Rogers Water Utilities bi- weekly or as specified by Rogers Water Utilities at the pre-construction meeting.

Daily Field Reports shall have, as a minimum, the following information:

1. **Site Specific Information** - The project name, date, Inspectors time of arrival and departure, Contractor's representatives, equipment on site, and visitors on site.
2. **Weather** - The daily temperature, skyconditions, presence of rain, snow, or wind.
3. **Daily Work Completed** - Summarize the construction activities of the day. List as much detail as possible such as: (began installing 12" pvc sanitary sewer pipe at Manhole station 5+00 ended at approximate station 11+25).
4. **Unusual Occurrences** - List any adverse conditions encountered such as soft soil conditions, unexpected bedrock, and presence of ground water, utility conflicts, equipment breakdowns, and unsafe conditions. Report any delays, and identify causes for the delays. Discuss any controversial matters, noting any deficiencies or violations by the Contractor with respect to the drawings and specifications, such as: (the Contractor indicated that he has no intentions of providing the required 4" bedding beneath the pipe due to rock. The Inspector pointed out to the Contractor that he has no choice per the specifications must have 6" bedding below pipe)... Also, describe any corrective measures undertaken by the contractor.

5. **Instructions Issued and Received** - Any instructions pertaining to the project that issued or received by the Inspector shall be recorded. The recipient or source of the instructions

must be identified.

## Sanitary Sewer Testing

1. **Low-Pressure Air Test Report** - Low- pressure air test shall be performed on flexible and rigid-pipe gravity sanitary sewer as described in accordance with Rogers Water Utilities Sanitary and Water Line Facilities Specifications and Details Manual. An example of a completed Low- Pressure Air Test Report is shown in Figure 2. In the report, the type, size, and location of the pipe tested are identified. The time required for completion of the air test varies with the pipe size and in accordance with applicable specification. In addition, the Low-Pressure Air Test Report is used to record the results of deflection tests. Following the completion of either test, the results of the test noted by writing either "passed" or "failed" on the appropriate line. Since low- pressure air test and deflection test of sewer lines are often conducted on separate days, the date of a particular test shall be properly noted. If an air or deflection test should fail, then the passing retest of that pipe section must be performed and documented. The Low-Pressure Air Test Report shall be submitted to the Engineer and Rogers Water Utilities, as an attachment to the Daily Report.

2. **Manhole Vacuum Test Report** - Vacuum test shall be performed on all sanitary manholes in accordance to the Sanitary Sewer and Water Line Facilities Specifications and Details Manual. An example of a completed Manhole Vacuum Test Report is shown in Figure 3. In the report, the depth, diameter, location, and required test time for the manhole are noted.

The minimum test time required for the completion of the vacuum test varies with manhole depth and diameter. Minimum test times are tabulated in ASTM C 1244 and on the report form.
Following the completion of a test, the results are noted by writing either "passed" or "failed" on the appropriate line. If a vacuum test should fail, then a passing retest of the manhole must be performed and documented. The Manhole Vacuum Test Report shall be submitted to the Engineer and Rogers Water Utilities as an attachment to the Daily Field Report.

3. **Pump Station Equipment Check List -** The Pump Station Equipment Check List shall be completed after the pump station is constructed and prior to the initial start-up of the station by the Engineer and witnessed by Rogers Water Utilities. An example of a completed Pump Station Equipment Check List is shown in Figure 4. The inspector shall carefully check the pump station to verify that pertinent items included on the form have been installed and are working. Any deviation from the Contract Documents shall be listed under remarks. Following completion of the check list the form shall be submitted to the Engineer and Rogers Water Utilities as an attachment to the Daily Field Report.

4. **Pump Station Start-Up Report** - Prior to final acceptance of a pump station by Rogers

Water Utilities, a Pump Station Start-Up Report must be completed by the Engineer. The purpose of the Pump Station Start-Up Report is to verify that all components of the pump stations are working properly. All information on the report must be completed by the Engineer including all pertinent data and shall be forwarded to the Project Coordinator. Any components which are found to not function properly shall be repaired or replaced as soon as possible, and a new Pump Station Start- up Report shall be submitted.

5. **Force Main Hydrostatic Test Report** - Hydrostatic testing is required on all force mains and shall be done in accordance to Rogers Water Utilities Sanitary & Water Line Facilities Specifications. An example of a completed Force Main Hydrostatic Test Report is shown in Figure 5. In the report, all pertinent information relative to the force main shall be entered on the lines provided. The force mains should be filled with water and subjected to an internal pressure of a minimum 150 psi or up to the maximum pressure rating of the pipe, measuring at the lowest possible elevation at the end of the line. The testing pressure should be held for a period of 4 hours. Evaluation of the final results is to be noted by writing "passed" or "failed" on the appropriate line. The Force Main Hydrostatic Test Report shall be submitted to the Engineer and to Rogers Water Utilities as an attachment to the Daily Field Report.

## Water Main Testing

1. **Hydrostatic Test Report** – The hydrostatic test shall be done in accordance to the Rogers Water Utilities Sanitary Sewer & Water Line Facilities Specifications Manual - Section 02610. An example of a completed Water Hydrostatic Pressure form is shown in Figure 5. In the report all pertinent information relative to the water main shall be entered on the lines provided. This test shall be witnessed by the assigned Project Inspector as well as the Rogers Water Utilities Project Coordinator and /or Rogers Water Utilities Water Staff.

2. **Disinfection Test Report** – The disinfections test shall be done in accordance to the Rogers Water Utilities Specifications. An example of a completed Water Line Disinfection form is shown in Figure 6. In the report all pertinent information relative to the water main shall be entered on the lines provided. This test shall be witnessed by the assigned Project Inspector as well as the Rogers Water Utilities Project Observer and/or Rogers Water Utilities Water Staff.

3. **Initial Water Punch List Report** - After the water line has passed all water test, the Project Inspector with the Project Coordinator and appropriate Rogers Water Utilities Staff, shall conduct an initial punch list in accordance to the Rogers Water Utilities Procedure Manual. An example of a completed Initial Punch List form is shown in Figure 7. In the report all pertinent information relative to the water main shall be entered on the lines provided.

## Construction Photographs

Construction photographs shall be taken with a digital camera having an automatic date recording function.

The importance of routinely taking and logging construction photographs cannot be over emphasized. These photographs are important for documenting construction activities, site conditions, and weather conditions. The Inspector shall make a habit of photographing all aspects of construction and not just those activities that may present potential conflict. The Inspector
shall prepare a description log of each photograph when the photograph is taken.
This description shall include measurements to valves, fittings and appurtenances including two
(2) point measurements to locate the top of valve box at surface grade and depth from surface to top of valve or appurtenance.

The log shall specifically identify the subject of the photograph and its location. The photographs should also be properly labeled to include as applicable station numbers, viewing observation point (North, South, East and West) Photographs and logs shall be submitted to the Engineer as soon as practicable.

Photographs along with written descriptions are to be bound in 3 ring binder and identified by Project name and/or contract identification number. Digital photographs and log booklet are to be submitted to the Rogers Water Utilities Board at the same time of the Record Drawing (As-Built) submittal.

## Record Drawings

The Record Drawings represent the final record of the as-constructed alignment, layout, and details of the facility. These drawings will be relied upon by Rogers Water Utilities for future expansion and maintenance planning. The Record Drawings are a dynamic set of plans that are continually updated by the Engineer during construction to reflect minor design changes, deviations from the original plans, and the location of previously unknown utilities and site conditions.

Considering the Inspector's knowledge of the site and construction activities, it imperative that he/she routinely review the Record Drawings during construction and at the completion of the project. The Inspector's independent review will reduce error and omissions present in the final documents.

The Developers Engineer and Inspector will also be responsible to insure that the Final Digital Record Drawings will properly geo-reference onto the Rogers Water Utilities Geographic Information System (GIS) Base Map.