

RICHMOND CITY MANUAL OF DESIGN & CONSTRUCTION STANDARDS

2nd EDITION

Prepared By:



Engineers • Surveyors • Planners

January 2013

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INTRODUCTION

This Manual sets forth the design and construction standards to be used for all public improvements and preparation of plans related to public work projects in Richmond City. The Manual of Design and Construction Standards is divided into the following three (3) parts.

Part I-Design Standards

This part of the manual sets forth standards for the preparation of construction drawings and outlines the requirements for general improvements which include permits, preconstruction conference, inspection, final inspection, as built drawings etc. This part also includes design standards for streets, building and lot sites, culinary water systems, sanitary sewer systems, storm drainage, etc. The design standards are to be used in the design of all subdivisions and public improvements approved for construction and permitted in Richmond City.

Part II-Amendments to the Manual of Standard Specifications

Part II of the this manual includes, by reference, the “Manual of Standard Specifications” by the Utah Chapter of American Public Works Association (APWA) and amendments which modify the standard specifications to better meet Richmond City’s needs. It is imperative that the referenced “Manual of Standard Specifications” be used with the Amendments contained in Part II as they supplement each other. The “Manual of Standard Specifications” by the Utah chapter of APWA has been developed by communities and industry as a part of the APWA standing committee to represent the latest construction standards and practices locally and nationally. The construction of all public improvement projects in Richmond City shall be according to these standards. General Conditions for improvement contracts between the City and Contractor are also set forth in the manual.

Part III-Amendments to the Manual of Standard Plans

Part III of the this manual includes, by reference, the “Manual of Standard Specifications” by the Utah Chapter of American Public Works Association (APWA) and amendments which modify the standard plans to better meet Richmond City’s needs. It is imperative that the referenced “Manual of Standard Specifications” be used with the Amendments contained in Part II as they supplement each other. The construction of all public improvement projects in Richmond City shall be according to these standards.

Changes, Amendments or Revisions may occur to these standards and specifications. It is the intent of Richmond City to be in the mode of constantly improving this document. On a periodic basis proposed changes, revisions or amendments will be reviewed and incorporated into this document as necessary. Vertical bold lines in the right hand margin of each edition will point out significant changes in the text adopted since the preceding edition.

Copies of these Design Standards, Specifications, Standard Plans and Amendments are available for purchase from Richmond City, 6 W Main St, Richmond, Utah, during normal working hours.

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INSERT ORDINANCE HERE

ADOPTING RICHMOND CITY MANUAL OF DESIGN AND CONSTRUCTION STANDARDS AND THE MANUAL OF STANDARD SPECIFICATIONS AND PLANS PUBLISHED BY THE UTAH CHAPTER OF THE APWA AS MODIFIED IN THE RICHMOND CITY MANUAL OF DESIGN AND CONSTRUCTION STANDARDS.

**RICHMOND CITY
MANUAL OF DESIGN &
CONSTRUCTION STANDARDS**

**PART I
DESIGN STANDARDS**

Revised:
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1.0 GENERAL IMPROVEMENT REQUIREMENTS

1.01 Scope of Work.

This section defines the general requirements for improvements to be designed and constructed as public infrastructure.

The improvements shall include all public utilities (i.e.; sanitary sewer, culinary water, storm sewer) grading, erosion control, traffic signing, traffic control and street improvements adjacent to and in front of all lots and along all dedicated streets, alleys or other easements which connect with existing improvements of the same kind or to the boundary of the development nearest existing improvements. Layout must provide for future extension beyond proposed development and must be compatible with the contour of the ground for proper drainage and for servicing future development. All utility lines and street improvements shall be installed to the boundary lines of the development.

When development occurs beyond the reach of available utilities or streets it shall be the responsibility of the developer to extend any and all required utilities or streets to service the developer's property. Such utilities or streets shall be constructed of sufficient size and capacity to accommodate all property that has the potential to be served by such utility or street. All necessary right-of-ways or easements must also be acquired by the developer for the benefit of Richmond City and at no cost to the City except as covered in other applicable City Ordinances. The developer is encouraged to work with adjacent property owners that will benefit from said utility or roadway improvements for the purpose of mutual participation. The developer however is responsible for all up front costs associated with the design, acquisition and construction of the offsite improvements.

Options may be available to the developer upon request to Richmond City in the establishment of a reimbursement district or payback agreement, which include undeveloped areas that may benefit from utility or street improvements. Such districts shall be accomplished by means of mutual agreements.

1.02 Construction Drawings

Complete and detailed construction plans and drawings of all improvements shall be submitted to "Richmond City Attention City Engineer" for review and approval prior to issuance of a permit. Prior to receiving preliminary plat approval for subdivisions, said completed and approved construction drawings shall be submitted to "Richmond City Attention City Engineer". The plans containing the appropriate approval signatures and the current adopted specifications shall be the only valid documents from which the contractor shall construct the permitted improvements. The contractor shall have a copy of the approved plans and permit available at the construction site and shall make them available to the City's representative upon request.

1.03 Electronic Deliverable Requirements

Prior to probationary acceptance, surveys in electronic format shall be submitted and accepted by Richmond City.

The electronic drawings shall be in either Computer Aided Drafting (CAD) or Geographic Information Systems (GIS) file format. The acceptable formats are AutoCAD 14 or later or Microstation. The deliverables for CAD submittals are AutoCAD drawing files and Microsoft Excel files. The deliverables for GIS submittals will be Arc Info export files or Arc View shape files.

All CAD and GIS files shall be registered to the North American Datum 83 (NAD 83) Utah State Plane North Zone coordinate system (grid) and NAVD 88 vertical datum with ties to two public monuments. Information on monuments is available through Cache County Surveyor.

1.04 Engineer's Seal required on documents

Any final plan, map, sketch, survey, drawing, document, plat, specification or report shall bear the seal of a Utah licensed professional engineer and/or surveyor when filed with Richmond City Corporation. This is a State requirement and applies to all documents filed with Richmond City including but not limited to filings related to site plans, preliminary and final plats, improvements plans, specifications or report of a building or structure. Additionally the signature of the individual named on the seal and the date shall appear across the face of each original seal.

1.05 Standards for Construction Drawings

The following instructions are for the purpose of standardizing the preparation of drawings to obtain uniformity in appearance, clarity, size and style. These plans and designs shall meet the standards defined in the specifications and drawings herein outlined. The minimum information required on drawings for improvements are as follows:

All drawings and/or prints shall be clear and legible and conform to good engineering and drafting practice, Auto CAD drawings plotted on Mylar sheets (4 mil). Size of drawings sheet shall be 24" X 36" with 1-1/2" border on left side and 1/2" border on all other sides. An electronic copy of the drawings shall be submitted along with the final Mylar being appropriately stamped & signed.

1. In general, the following shall be included on all drawings:
 1. North arrow (plan)
 2. Scale: 1" = 40' horizontal, 1" = 4' vertical (other appropriate scales as approved by the City Engineer)
 3. Elevations referenced to Utah State Plane North Zone, NAD 83 (No assumed elevations will be acceptable)
 4. Stationing and elevations for profiles
 5. Location map

6. Index map
 7. General and Construction notes
 8. Title block, located in lower right corner of sheet to include:
 1. Name of City
 2. Project title (subdivision, etc.)
 3. Specific type and location of work
 4. Signature block for approval signature of City Engineer and date
 5. Name, address, phone, etc. of engineer or firm preparing drawings with license number, stamp and signature
 9. Details at 1" = 10' or other appropriate scale to adequately provide required information
2. Curb and gutter, drains and drainage structures, sidewalks and street surfacing drawings shall show:
1. Plan and profile views must be shown for centerline of road. Profiles of both top back of curbs and centerline are required where approved deviations from standard cross section are proposed.
 2. Where no curb is proposed, profile of edge of pavement must be shown
 3. Existing profile of centerline and at both right-of-way lines and labeled accordingly
 4. All existing elevations shall be shown in parentheses - i.e.; (ex. elevation)
 5. All existing utilities within and adjacent to area proposed for construction must include actual existing elevations obtained from field survey/exploratory excavation where potential conflicts, cover or clearance requirements exists.
 6. Stationing, top back of curb elevations, centerline elevations, and curve data
 7. Flow direction and type of cross drainage structures at intersections with adequate flow line elevations
 8. Typical cross section for all street sizes and variations
 9. 100' minimum of existing plan and profile design when connection to existing improvements
 10. 300' minimum of future plan and profile design when roadway is to be extended (must also include 300' of existing profile along future R/W lines)
 11. Soil Boring Log along centerline
3. Sewer drawings shall show:
1. Location, size and slope of mains. Slopes shall be indicated in increments of hundredths of a percent (i.e. 0.04%).
 2. Stationing of manhole center lines, lateral connections and crossings
 3. Plan and Profile, bearings and lengths of segments.
 4. Manhole size, location and flow line elevation, lid elevations
 5. Type of mainline pipe
 6. Profile crossings of all other existing or proposed utilities with invert elevation

- with type and size of utility
7. All existing utilities within and adjacent to area proposed for construction. Must include actual existing elevations obtained from field survey/exploratory excavation where potential conflicts cover or clearance requirements exists.
 8. An overall development plan view of the sewer (Horizontal scale 1" = 200')
 9. Lateral locations and station for each lot or building served
4. Culinary Water drawings shall show:
1. Minimum scale: 1" = 40' horizontal
 2. Location and size of water mains, valves, hydrants, etc.
 3. Type of pipe
 4. When development occurs across pressure zones include pressure reducing valve stations in improvement designs.
 5. All existing utilities within and adjacent to area proposed for construction must include actual existing elevations obtained from field survey/exploratory excavation where potential conflicts, cover or clearance requirements exists.
5. Storm Sewer drawings shall show:
1. Minimum scale: 1" = 40' horizontal, 1" = 4' vertical
 2. Location, size and slope of mains and lateral connections
 3. Location, size and details of inlets, junction boxes, etc.
 4. Stationing of manhole center lines, lateral connections and crossings
 5. Manhole size, location and flow line elevation, lid elevations
 6. Flow rate (10 yr. storm), hydraulic grade line and velocity (all indicated in profile for each pipe section)
 7. Type of mainline pipe
 8. Profile crossings of all other existing or proposed utilities with invert elevation, type and size of utility
 9. All existing utilities within and adjacent to area proposed for construction. Must include actual existing elevations obtained from field survey/exploratory excavation where potential conflicts, cover or clearance requirements exist.
6. Drainage and Grading Plans
1. Plans showing site general layout and drainage patterns with spot elevations of final grades
 2. Existing contours at one foot intervals
 3. All existing utilities within and adjacent to area proposed for grading. Must include actual existing elevations obtained from field survey/exploratory excavation where potential conflicts, cover or clearance requirements exists.
 4. Detention facility details as well as inlets, outlets and piping facilities
 5. Calculations to substantiate design (include in submittal but not to be included

on plans)

7. Erosion Control Plans
 1. Plans showing site general layout and drainage patterns and outlets for water exiting construction site
 2. Desilting basin details as well as inlets, outlets and piping facilities
 3. Calculations to substantiate design (include in submittal but not to be included on plans)
 4. Erosion Control Construction notes
 5. Plan shall include an emergency phone number and name of the developer's responsible person who will be available 24 hrs a day if an emergency situation arises.

8. Traffic Signing and Traffic Control Plans
 1. All traffic signing and traffic control plans shall be designed and installed according to the Manual on Uniform Traffic Control Devices (MUTCD).
 2. All traffic signing and traffic control plans shall be submitted to Richmond City for review and approval prior to field installation.

1.06 Engineering Permits

Any Person desiring to perform work of any kind in a Public Way or on City owned property within the City shall make application for a permit. The decision by the City to issue a permit shall include, among other factors determined by the City, the following:

1. The capacity of the Public Way to accommodate the facilities or structures proposed to be installed in the Public Way;
2. The capacity of the Public Way to accommodate multiple utilities, such as electrical, telephone, gas, sewer, water or other conduits or pipes.
3. The damage or disruption, if any, of public or private facilities, improvements, or landscaping previously existing in the Public Way;
4. The public interest in minimizing the cost and disruption of construction from numerous excavations in the Public Way;
- E. Compliance with the City "Manual of Design and Construction Standards"
- F. Any other restrictions or requirements as established by current Richmond City ordinance(s).

No person shall be eligible to apply for or receive permits to do work within the Public Ways of the City, save and except they are one of the following:

1. Contractors licensed by the State of Utah to perform the type of work requested.
2. Providers (Utility Companies), provided that all work shall be performed by a contractor licensed by the State of Utah and identified on the permit.
3. The City acting through its Public Works Department.
4. Property owners who are replacing sidewalk in front of their own residence.

The City Engineer may deny the issuance of permits to applicants, including providers, who have shown by past performance that, in the opinion of the City Engineer, they will not consistently conform to the Engineering Regulations, Specifications, Design Standards, or the other City requirements.

It shall be unlawful for any Person to commence work upon any Public Way until the City Engineer has approved the application and until a permit has been issued for such work.

A permit is not required from the City for hand digging excavations for the installation or repair of sprinkler systems, mailboxes, or landscaping.

1.07 Preconstruction Conference

For a construction project a determination shall be made, either during the plan review process or at the time of permit issuance, as to whether a certain project will or will not require a preconstruction conference. All subdivisions, planned unit developments, or other projects of significant magnitude and complexity will require a preconstruction meeting. If required, a preconstruction conference shall be held before any excavation or other work is begun in a development. The meeting will be held at Richmond City Office with: (a) City Engineer or Engineer's representative (Inspector or Engineer); (b) developer; (c) Richmond City Development Engineer; (d) developer's design engineer; (e) all contractors and subcontractors involved with installing the development improvements; (f) representatives of the affected utility companies; (g) others as may be necessary.

It will be the responsibility of the developer to reserve the City facilities and to notify all parties required to attend the preconstruction conference. Capital Projects shall have all meetings scheduled by the Richmond City Project Manager. Such facility reservations can be accomplished by calling (435) 258-2092 Monday through Friday 9 am. to 5 pm.

The meeting will be conducted by the City Administrator/Engineer or their representative. Items to be discussed shall relate to project scheduling, materials used, coordination with all affected parties and other important items as may be deemed necessary by the City Administrator/Engineer. Minutes will be taken and distributed to all in attendance. Contractor will not be permitted to proceed with construction unless this meeting takes place and those responsible for all construction activities are in attendance.

1.08 Inspection

All construction work involving the installation or repair of public improvements in developments shall be subject to inspection by the City. It shall be the responsibility of the person responsible for construction to ensure that inspections take place where and when required as indicated in the specifications, on the permit and as discussed in the preconstruction conference. Certain types of construction will require continuous inspection, while others will only require periodic inspections. The type and amount of inspection performed by Richmond City shall be at the sole discretion of the City Administrator/Engineer.

1. Continuous inspection may be required on the following types of work:
 1. Placement of street surfacing
 2. Placing of concrete for curb and gutter, sidewalks, and other structures
 3. Laying of sewer pipe, drainage pipe, water pipe, valves and hydrants
 4. Testing and backfilling as per approved specifications
 5. Any connections to Richmond City Utilities
 6. Street grading and gravel base placement and compaction

For construction requiring continuous or periodic inspection, no work shall start until an inspection request has been made to the City by the person responsible for the construction and the required submittals received and approved by the City. Requests for inspection on work requiring continuous inspection shall be made at least two (2) working days prior to the commencing of the work. Notice shall also be given 24 hours in advance of the starting of work requiring periodic inspection, unless specific approval is given otherwise. Work installed without required inspection will be required to be removed and reinstalled at the Contractor's expense.

Work done by the Contractor which requires periodic or continuous inspection beyond the normal working hours of Richmond City (8 am to 5 pm Monday thru Friday), on weekends or City holidays shall require payment of current Richmond City overtime rates by the contractor.

1.09 Construction Completion Inspection

A FINAL INSPECTION shall be made by the City Engineer or their representative after all construction work is completed. Any faulty or defective work shall be corrected by the persons responsible for the work within a period of thirty (30) days of the date of the inspection report defining the faulty or defective work. If the contractor fails to complete the required work, the City Engineer, at his/her discretion, may arrange to have the work completed and bill the contractor, may use the monies in escrow or otherwise held by the City to complete the defective work and/or may withhold future permits from the affected contractor or subcontractor.

1.10 "As-Built" Drawings

"As-Built drawings will be required prior to final payment and release of security bonds for all improvement projects. 1 copy on Mylar as well as an electronic copy in accordance with 1.05

“Electronic Deliverable Requirements” is required.

As-Built Drawings shall depict all changes and deviations from the submitted plan set. The drawings shall include but not necessarily be limited to changes with the following:

- A. Culinary water main line, hydrant and valve locations
- B. Culinary water service lateral and meter locations
- C. Fire flow test data in gpm at 20 psi (1,500 gpm)
- D. Minimum water pressure of 40 psi during peak day (R309-105-9 UCA)
- E. Storm drain lines, manholes and grades
- F. Sub surface drain lines
- G. Changes in grade

1.11 Post-Construction Conference

Within 20 days after the Contractor has completed all Punch list Work to the satisfaction of Engineer and after the Engineer has indicated that the Work is acceptable, but prior to final application for payment, the Contractor shall attend a conference with the Engineer and others to discuss:

- 1. Project successes and failures;
- 2. Project procedures;
- 3. Change orders or work directives from the project;
- 4. Retainage and final payment;
- 5. Procedures pertaining to the processing of payments; and
- 6. Submittal of the “as-builts”; and
- 7. To review or discuss other items deemed necessary by Engineer or Contractor.

The conference will be held at a mutually agreed time and place attended by Contractor, its’ superintendent, and its’ Subcontractors as appropriate. Other attendees will be:

- 1. Engineer and/or Resident Project Representative
- 2. Representatives of Owner and Governmental representatives as appropriate.
- 3. Others as requested by Contractor, Owner, or Engineer.

The purpose of the conference is to review the project’s successes and shortcomings, discuss improvements for future projects and improved communications.

ENGINEER will preside at the Post-Construction Conference and will arrange for recording and distributing minutes to all persons in attendance.

1.12 Guarantee of Work

The Contractor shall warrant and guarantee (a retainage of an escrow or other security in the amount as dictated by city ordinance or contract) that the improvements and every part thereof, will remain in

good and serviceable condition for a period, as dictated by city ordinances or contract, after the date of the Construction Completion Inspection Report by the City Engineer or his/her representative.

Additionally the Contractor shall make all repairs to and maintain the improvements and every part thereof in good condition during that warrantee period at no cost to the city.

The Developer/Contractor will be responsible to see that the backfilling and compaction are properly and adequately done. Settlement of trenches within a period of two- (2) years after final acceptance of the project shall be considered incontrovertible evidence of inadequate compaction, and the Developer/Contractor shall be responsible for correcting the condition in accordance with the provisions of these standards and specifications.

1.13 Environmental Safety

It shall be the responsibility of the contractor to observe all best practices relative to ensuring a positive and non-hazardous environmental climate during all phases of construction.

Concrete washout point or points shall be established only after consultation with Richmond City or the Richmond City Engineer to ensure that no conflict exists with well or spring protection ordinance(s). Unauthorized concrete washouts will be prosecuted as a Class B misdemeanor due to possible contamination of the aquifer. This shall apply to both the operator and the respective company.

The developer or contractor must dispose of the residue concrete and/or concrete by-products upon completion of the project. Any petroleum-based spills in excess of the equivalent of one liquid quart must be immediately reported to the City. The use of pesticides or herbicides is prohibited without prior clearance from the City.

1.14 Development Safety

It shall be the responsibility of the developer and/or developer's representative to maintain and enforce all federal, state and local safety codes involved with the development.

All excavations shall be conducted in a manner resulting in a minimum amount of interference or interruption of street or pedestrian traffic. Inconvenience to residents and businesses fronting on the Public Way shall be minimized. Suitable, adequate and sufficient barricades and/or other structures will be available and used where necessary to prevent accidents involving property or persons. Barricades must be in place until all of the Permittee's equipment is removed from the site and the excavation has been backfilled and proper temporary gravel surface is in place, except where backfilling and resurfacing is to be done by the City; in which case the barricades, together with any necessary lights, flares or torches, must remain in place until the backfill work is actually commenced by the City. From sunset to sunrise, all barricades and excavations must be clearly outlined by adequate signal lights, torches, etc. The Police Department and Fire Department shall be

notified at least 24 hours in advance of any planned excavation requiring street closure or traffic detour.

2.0 STREET DESIGN

2.01 General

- A. The arrangement, character, extent, width, grade, and location of all streets shall be in conformity with the official city plan, regulations, and any further plans adopted by the city.
- B. The arrangement of streets in new developments shall make provision for the continuation of the existing streets in adjoining areas (or their proper protection where adjoining land is not subdivided, insofar as such may be deemed necessary for public use by the Richmond City Planning and Zoning Commission. Streets shall be designed and constructed to the points of the compass. If geographical/geological conditions prevent this from being observed, any deviations must first be approved by the Richmond City Planning and Zoning Commission. The street arrangement shall not cause unnecessary hardship to owners of adjoining property when they plat their own land and seek to provide for convenient access to it. Minor streets shall approach the major or collector streets at an angle of not less than eighty degrees.
- C. Street widths:
 - 1. Major Streets - Arterial and collector streets shall conform to the widths designated on the Richmond City Transportation Major Street Plan wherever a development falls in an area for which a Master Street Plan has been adopted. For areas where the street plan has not been completed at the time the preliminary plan is submitted to the Planning and Zoning Commission, arterial or collector streets shall be provided as required by the Planning and Zoning Commission.
 - 2. Local Streets - Local streets shall generally have a minimum right-of-way width of 66 feet. In extreme circumstances the City may allow a 48 foot right-of-way when curb and gutter is incorporated.
 - 3. Minor Terminal Streets – When approved, Cul-de-sacs shall not be longer than 300 feet from the centerline of the adjoining through street to the center of the cul-de-sac. Each cul-de-sac must be terminated by a turnaround of 100 feet in diameter at the property line with a paved diameter of 80 feet. If surface water drains into the turnaround due to the grade of the street, necessary catch basins and drainage systems and easements shall be provided. If potential drainage from the cul-de-sac exceeds the capacity of the installed drainage system or otherwise have the potential to contribute to flooding of the cul-de-sac area appropriate grading and structure placement shall occur to eliminate any potential flood damage to structures or property.

4. Turning Area - Where a street longer than 300 feet is designed to remain only temporarily as a dead-end street, an adequate turning area shall be provided as follows:
 - a. Where the street dead-ends into a subsequent phase of the same development, a temporary, all weather 80-foot diameter asphalt paved turnaround with a 100-foot diameter permanent easement or right-of-way on the subsequent phase property shall be provided.
 - b. Where a street dead-ends against property which is not part of a subsequent development phase, an 80-foot diameter asphalt paved turnaround with a 100-foot diameter permanent easement of right-of-way from the adjacent property owner, shall be placed.
 5. Intersections - The intersection of more than two streets at one point shall not be allowed, but where such occur roundabouts or traffic circles may be appropriate. Streets shall intersect at a 90 degree angle, or as near to a right angle as practicable, but not to exceed 5 degree deviation. Street intersections shall be rounded with a radius of 20 feet measured at the edge of asphalt for local streets and 35 feet for arterials and collectors.
- D. Temporary turnarounds shall be required on all streets which shall be extended in the future and which exceed 300 lineal feet from the centerline intersections of the closest intersecting street. Additional right-of-ways or easements necessary to construct and maintain the temporary turnaround are also required. At such time that the temporary turnaround is removed due to adjacent improvements, the developer shall remove the temporary turnaround and construct the typical street section.
 - E. Access to developments: Subdivisions containing ten (10) lots or more shall have at least two (2) street connections with existing public streets on an approved final plat for which a financial guarantee has been filed.
 - F. When a subdivision abuts or contains an existing or proposed arterial, the Planning and Zoning Commission shall require limited access streets, reverse frontage with screen planting contained in a non-access reservation along the rear property line, deep lots with rear service alleys, or such other treatment as may be necessary for adequate protection of residential properties and to afford separation of through and local traffic. The same will be required on major streets where deemed in the best interest of the community.
 - G. Street Visibility: In order to provide visibility for traffic safety, that portion of any corner lot shall be cleared of all growth (except isolated trees) and obstructions above a level of three feet (3') higher than the centerline of the street for a distance of at least thirty feet (30') from the right of way line. If directed, ground shall be excavated

to achieve visibility. Trees and hedges over four feet (4') high shall not be permitted within six feet (6') of the street right of way.

- H. All public roads are required to have a minimum 24" wide shoulder of compacted road base (washed rock or gravel shall not be allowed). If the 24" shoulder is disturbed, it must pass a compaction test of 95% MP at no cost to the City.

2.02 Curb, Swales, Sidewalk and Ramps

- A. Curbs and gutters or swales shall be installed by the developer through his/her contractor on existing and proposed streets in accordance with all the appropriate specifications of Richmond City. Curb and gutter shall be Type A of Standard Plan 205.
- B. Swales are permitted on local roads having a right-of-way of at least 66 feet. Swales will be considered on other roads. The minimum required width for a swale is 9 feet. The slope for swale sides shall not exceed 3 foot horizontal to 1 foot vertical. Swales shall be adequately designed to handle storm water runoff in accordance with the requirements in section 8 storm drainage design. Dip stone inlets (Standard Plan 325-N) are required at road intersections when swales are used.
- C. Handicap ramps, as per the approved Standard plan, and in compliance with the Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities (ADAAG) shall be constructed where any portion of the curb at a legal pedestrian crossing or marked crosswalk or any portion of the sidewalk in immediate contact with such curb is removed, except where there is an existing handicap ramp, then replacement of such portions removed shall occur. Technical infeasibilities require approval from City Engineer. ADA Standards more current than this version of the Manual shall prevail.
- D. Assure proper drainage away from ramps, roadway and sidewalk.
- E. All new projects require the installation of sidewalks. Unless otherwise approved, sidewalks shall be located on both sides of the road according to City Standards with a park strip located between the edge of road or curb and the sidewalk. Sidewalks shall be installed according to the specifications of Richmond City. Sidewalks shall be a minimum of 5 feet wide with a minimum of 4 inches of compacted untreated base course material as foundation materials. Depth of sidewalks shall be 4 inches, except at residential driveways, which shall be 6 inches (Industrial/Commercial shall be a minimum of 8 inches thick) with a minimum of 4 inches of compacted untreated base course material as foundation materials. Sidewalks adjacent to curbs, when allowed by Richmond City, shall provide for sufficient area for pedestrian safety while simultaneously providing areas for snow storage during winter months. These sidewalks shall be a minimum of 6 feet in width.

F. Street drainage and drainage structures will be required as outlined in Drainage Design section.

G. Driveways

1. All driveway approaches shall meet the following specifications:

	Residential	Commercial / Industrial
Minimum Width	10 feet	24 feet
Maximum Width	32' or 50% of lot frontage whichever is less	35'
Minimum Concrete Thickness	6 inches	8 inches
Minimum Base Course Thickness	4 inches	4 inches
Minimum Distance Between Driveways	see Driveway offsets	20 feet

2. Driveway Location – Driveways for all uses except single-family homes shall not be closer than eight feet (8') to an adjacent interior property line and shall be set back a minimum of eighty feet (80') from the intersection of two (2) arterial streets and fifty feet (50') from any other street classification intersection. Special restrictions apply on State Highways.

3. Driveway Offsets - All single family residential driveways shall be offset from other driveways by no less than twice the flare width as per standard plan 221. All others shall have a minimum separation of 20'.

4. Common Driveways - Driveways along the property lines may be installed for common use of both adjacent properties only upon approval by the City Engineer and guaranteed by a recorded access agreement. Such driveway width shall be limited to the maximum allowable individual driveway width. Common driveway width may be extended by up to 10' for Commercial and Industrial zones.

5. All driveways shall have a swale at least 6" deep, midway between the asphalt and sidewalk, or no less than 4 feet from the edge of the road.

2.03 Street Sections

- A. All proposed streets, whether public or private, shall conform to the City Street Cross Section Standards as adopted by the city in the Richmond Master Transportation Plan in the General plan. (See Standard Plan 250-N)
- B. All public streets shall be graded and surfaced in accordance with the standards and specifications of Richmond City.
- C. All cut and fill slopes shall be a maximum of 3 feet horizontal to 1 foot vertical unless otherwise justified by a detailed soils investigation.
- D. Roadway structural section is dependant on subsurface conditions and traffic volume. They shall be determined by developer's licensed geotechnical engineer and approved by the City Engineer. A soils investigation shall be submitted that includes:
 - 1. Soil borings along roadway centerline and other areas as needed
 - 2. Analysis on the overall bearing capacity of the soil
 - 3. Recommendation for structural street cross section
 - 4. Recommendation as to the requirements for land drains to adequately collect groundwater which could adversely affect development
 - 5. Cut and fill slope requirements
 - 6. Compaction requirements
 - 7. Minimum section shall be 3" Asphalt, 4" Untreated Base Course and 12" Structural Fill

2.04 Geometric Design Criteria

- A. The Vertical alignment shall be such as to minimize grade breaks along the centerline and curb lines. Allowable grade breaks shall not exceed 1% for local streets and minor 0.5% for collectors and arterials. Eliminate grade breaks in excess of the above criteria by means of a vertical curve of a seventy feet (70') minimum in length for local streets and three hundred feet (300') for major arterials. Vertical curve lengths shall be designed in accordance with the American Association of State Highway Transportation Officials (AASHTO) "Green Book"-A Policy on Geometric Design of Highways and Streets latest edition.
- B. Minimum slope allowed is 0.4% (applies to all gutter grades)
- C. Maximum longitudinal slope along centerline shall be 8 % on arterial public streets; 8 % on local and collector streets unless variance is granted by the City, but under no circumstances shall slopes exceed 10%.

- D. Intersecting street angles may vary between 85 and 95 degrees.
- E. Curve data is required for all centerline and curb line curves and also for all curb returns within intersections.
- F. Minimum horizontal centerline radius of 275' is required on all collector and higher classification streets. Local streets shall be designed with a minimum centerline radius of 165' unless otherwise waived by the City Engineer to provide a means for traffic calming. No angle points shall be allowed along centerlines except as allowed within intersections. Horizontal curve lengths shall be designed in accordance with the AASHTO "Green Book"-A Policy on Geometric Design of Highways and Streets latest edition.
- G. Compound Curves, Broken Back Curves and Spiral Curves are not allowed on any roads within Richmond City.
- H. Roundabouts shall be designed following Federal Highway Administration's publication No. FHWA-RD-00-067 "Roundabouts: An Informational Guide" and the Guide & Manual on Uniform Traffic Control Devices (MUTCD). Concept shall be approved in advance by city and the engineer.
- I. Minimum tangent between curves with a length of twice the right-of-way width is required along the centerline of all public roads.
- J. If possible the horizontal alignment shall be straight through the intersections, but where horizontal curves cannot be avoided, the following shall be observed:
 - 1. Use a curve of sufficient radius to provide adequate sight distance and eliminate the need for superelevation. Under no condition shall the curve radius be less than that required for the street classification.
 - 2. Do not begin or end a curve within an intersection.
 - 3. Eliminate angle points in excess of 2 degrees on major or secondary roads by use of a large radius curve.
 - 4. Angle points up to 5 degrees are permissible at the intersection of two local streets.
 - 5. Curve radii and superelevation shall consider the design speed for the given road.
- K. Jogs between intersecting centerlines of streets shall not be less than 150' for Local Streets with other Local Streets and shall not be less than 300' for any street classification intersecting a Collector or Arterial Street.
- L. Edge of Asphalt Radius =
20' - intersections local to local, collector to collector

30' – all arterial intersections, (local, collector & arterial).

- M. Street Grades - Street grades over a sustained length shall not exceed the following percentages: on arterial public streets, 8 %; on local and collector streets, 8 %. In no event shall the street grades exceed those indicated, except where the topography makes it impracticable to keep within such grade, and where evidence, which is satisfactory to the City Engineer, is given that a lower grade is not possible. Street grades near intersections shall be designed for adequate stopping and starting by adjusting grades on both sides of the intersection. Grades of all streets shall be a minimum of 0.4% unless specifically authorized by the City Engineer. The cross slope of the street cross section is defined on the standard drawings.
- N. Alleys - Alleys shall have a minimum width of 24 feet. Alleys may be required in the rear of business lots, but will not be accepted in residential blocks except under unusual conditions where such alleys are considered necessary by the Planning and Zoning Commission.
- O. Landings - A landing is defined as the area between the through street roadway and the point at which the side street grade begins to exceed 3%. The required minimum lengths of the landings are as follows:

Minor arterial	200 feet
Collector	100 feet
Local street	50 feet
Cul-de-sac	25 feet

2.05 Miscellaneous

- A. Street Signs - The developer shall install and pay the cost of traffic control signs, street name and other street signs required of his/her development. All signs and traffic control devices shall be designed and installed according to the current Manual on Uniform Traffic Control Devices (MUTCD). Signs required of the developer but installed by the City shall be paid within 30 days after the installation. The required signage shall be included in the escrow for improvements of the development and will not be released until either installed by the developer or until payment of the costs incurred by the City to install the necessary street signs has been made.
- B. Street Trees or Shrubs - Trees and shrubs planted on the City right-of-way (area between property line and street or road pavement) will be determined on a case-by-case basis. Factors to be considered will include, but not be limited to, interference with or impact upon sub-surface infrastructure, overhead utilities, visibility, and subsequent maintenance. Allowed plants, trees, and shrubs will become the property of the City at the expiration of twelve months from planting; however, the adjacent property owner is required to maintain the flora according to applicable City

standards. Typically, trees planted in the front yard, shall be no closer than 3 feet to the front property line

- C. Survey Monuments - Permanent survey monuments shall be accurately set and established at the intersections of centerlines of streets within the development and intersections with centerlines of existing streets and the beginning and ends of curves on centerlines or points of intersections or tangents. All permanent survey monuments shall remain in place, or be reset at the developer's expense when approved by the City Engineer, after curbs and gutter, sidewalks, base and pavement are installed. Monuments shall be of a type specified in City standards, and all development plans shall be tied to a section corner or monument of record, as established by the Cache County Surveyor.

- D. Bridges - Design and construction of new bridges or box culverts, whether essential for the overall circulation plan of the city or required only to serve a development, shall be approved in advance by the city. For bridges identified as essential structures to the city, the city may participate financially, and in the case of a bridge required to serve only a development, the developer shall pay the total cost of construction. The developer shall comply with all the conditions imposed by the City relative to the bridge location, design & construction. All bridge design shall be performed by a professional engineer as per applicable state laws.

3.0 STREET LIGHTING DESIGN

3.01 General

- A. The developer shall provide street lighting in all new residential, commercial and industrial subdivisions. The lighting shall conform to the goals and policies of Richmond City and as approved by the Planning and Zoning Commission and the Richmond City Council. The developer is responsible to construct the lighting, connections and fusing to Rocky Mountain Power standards. The developer is responsible to coordinate with the City to request electrical hookup by Rocky Mountain Power.
- B. Street lighting within Richmond City is to be designed in such a manner as to ensure the safe flow of nighttime pedestrian and vehicular traffic on dedicated public sidewalks and streets without being intrusive on the privacy of residences.
- C. All obstructions within traveled roadways shall be protected by signs, barricades, and lights where necessary for the safety of the traveling public. All barricades and obstructions shall be protected at night by signal lights which shall be suitably distributed across the roadway and kept burning from sunset to sunrise.
- D. In specially designated areas of the City, provide a level of street lighting which will contribute to economic growth, a sense of community identity, a reduction in street crime, and a feeling of security among the citizenry.
- E. Policies
 - 1. Provide street lighting at a level which reflects traffic safety needs.
 - 2. Provide multiple lights along each standard block of a commercially zoned district or location.
 - 3. Provide one 100 watt, 5600 lumen, high pressure Sodium (or LED equivalent) Street light at each residential roadway intersection. These “intersections” include only those roadway junctions which carry through traffic or which are formed by roadways which serve more than five residences. The style of fixture and pole shall be that as found on Main Street and 200 West and shall be pre-approved by the City.
 - 4. The City Council or such City staff member so designated by the City Council shall administer all City street lighting and is at liberty to require additional street lighting in order to satisfy foreseen traffic safety needs or to eliminate safety hazards. These traffic safety considerations may include the following;

- half block street intersection
- cul-de-sacs
- bending roadways
- parking lot entrances and exists

4.0 SITE DESIGN

4.01 General

- A. All grading design and earthwork shall comply with 2003 International Building Code Chapter 33 and Appendix J, GRADING.
- B. Fill slopes shall be no steeper than 2 horizontal to 1 vertical (2:1), or as determined by a soils engineer. All fills shall be compacted to a minimum of 90 percent of maximum density.
- C. Cut slopes shall be no steeper than 2 horizontal to 1 vertical (2:1), or as determined by a licensed geotechnical engineer.
- D. All public streets shall be maintained free of dust and mud caused by grading or construction operations.
- E. Compaction tests are required on all engineered fills and other locations which will be load bearing. All testing shall comply with the specification of Richmond City.
- F. All building pads at rough grade shall have a 1% slope from pad towards the street or designed drainage outlet.
- G. Dust shall be controlled during all phases of construction either by means of a water truck or other approved method.
- H. The minimum finished slope of any designed grade shall be 1% for soil, asphalt or gravel and 0.40% for concrete.
- I. No obstructions such as: railroad ties, rocks, boulders, campers, vehicles, etc., shall be allowed within the City right of way that will interfere with snow removal and maintenance efforts.

4.02 Subdivisions

- A. Blocks
 - 1. Richmond City blocks will measure six hundred sixty (660) feet by six hundred sixty (660) feet corner to corner along the points of the compass for a total of 435,600 square feet.
 - 2. Measurement shall be from right-of-way to right-of-way.
 - 3. The width of streets and roads, as determined in accordance with the

Richmond City Transportation Master Plan in Appendix B of the Richmond City General Plan, shall not be included in the block measurements.

4. Blocks intended for business or industrial use shall be designed specifically for such purposes, with adequate space set aside for off-street parking and delivery facilities.

B. Lot Design and Location.

1. The lot arrangement shall be such that in constructing a building in compliance with the zoning ordinance, there will be no foreseeable difficulties for reasons of topography, other natural conditions, existing or probable future utilities and right-of-ways.
2. Lots shall not be of such depth as to encourage the later creation of a second building lot at the front or rear.
3. All side lines of a lot shall be at right angles to straight street lines and radial to curved street lines, unless the city council grants a waiver from this requirement.
4. The lot dimensions shall not be less than the minimum required to secure the minimum lot area specified in the zoning ordinance unless a planned unit development involving a trade-off of increased trail or open space for adjusted lot sizes is approved.
5. Each lot shall have frontage on a public street dedicated by the development plan or an existing publicly dedicated street, or on a street which has become public by right of use.
6. Remnants of lots less than the minimum size required by the zoning after the subdividing of a larger tract shall be added to adjacent lots rather than allowed to remain as unusable parcels. In no event shall the development of land create a lot which does not conform to the Zoning Ordinance requirements of Richmond City. No remnant parcel may be used for the purpose of detaining storm water.
7. Lots abutting upon a watercourse, drainage way, channel, stream or water body shall have additional depth or width, as required to assure that house sites are not located in the 100-year floodplain.
8. In the subdividing of any land, regard shall be shown for all natural features, such as trees, watercourses and bodies, which, if preserved, will add attractiveness to the proposed development.

9. Where a proposed residential lot is adjacent to a limited access highway, major highway, or major city street, there shall be no direct vehicular access from individual lots to such roads
 10. Buildings constructed on corner lots shall comply with the minimum setback for both streets, as provided in the city Zoning Ordinance.
 11. In front of areas designed for commercial use, or where a change of zoning to a zone which permits commercial use is contemplated, the street width shall be increased by such amount on each side as may be deemed necessary by the Planning and Zoning Commission to assure the free flow of through traffic without interference by parked or parking vehicles, and to provide adequate and safe parking space for such commercial or business districts.
 12. Where the land included in a development includes two or more parcels in separate ownership and the lot arrangement is such that a property ownership line divides one or more lots, the land in each lot so divided shall be transferred by deed to either single or joint ownership before approval of the final plan, and such transfer certified to the Planning and Zoning Commission by the County Recorder.
 13. Lots deemed by the Council to be uninhabitable shall not be platted for occupancy, nor for such other uses as will increase danger to health, life or property, but such land within the plat shall be set aside for such uses as shall not produce unsatisfactory conditions.
 14. All plans, drawings, and details must conform with current Richmond City ordinances relating to planning, design and construction.
 15. Any subdivision of property, subdivision, or lot located within 100 horizontal feet of an irrigation canal, ditch or lateral shall provide written notification to the irrigation company and supply the City with a copy. The irrigation company will be allowed to provide comment. No dwelling shall be allowed within 10 horizontal feet of an irrigation canal without written approval from the irrigation company. The developer shall provide a deeded uninhibited 10 feet wide maintenance easement / access along both sides of any canal (High Creek, Lower High Creek, Cherry Creek). The developer shall provide a 20 feet wide maintenance easement for any irrigation ditch or lateral.
- C. Lot Grading- For residential developments, the plan shall be prepared in a manner that will allow the following conditions to be met prior to, or as part of, actual building construction. If necessary, individual lot grading plans will be required prior to issuance of building permits:

1. A minimum fall of six inches (6") in the first ten feet (10') away from any building is required;
2. A maximum gradient of twenty one percent (21 %) within four feet (4') of the foundation;
3. Usable minimum yard area of three hundred (300) square feet with a maximum slope of five percent (5%);
4. A minimum foundation exposure of eight inches (8") above finished grade;
5. Slopes of three to one (3:1) and steeper must be sodded or have other acceptable erosion control materials and plantings and will be accepted only when the developer and his/her engineer can show this to be the most feasible approach and is accepted by the city engineer;
6. Driveway grades shall be maintained between 0.5 percent and five percent (5%) when possible;
7. Driveways or other accesses to City streets and roads **shall** be designed in such a manner as to prevent draining water from any source, including but not limited to rain, snow melt, and irrigation surplus or cleaning, from flowing directly or indirectly onto the street or road surface. Driveways **shall** include a swale at least 6" deep midway between the asphalt and front of sidewalk, or a minimum of 4 ft from the edge of the roadway.
8. Entry walks shall not exceed five percent (5%);
9. Lot elevation shall be set so that a minimum slope of two percent (2%) can be maintained between the sewer flow line in the street and the finished grade of the lowest floor elevation;
10. Minimum depth of cover for any sewer line shall be five feet (5').
11. Do not cover or conceal the water meter lid or access to it. Water meters shall not be located behind fences.
12. Do not cause the water meter to be more than eighteen inches (18" to 24") below the meter lid. See Section 5.01.I.
13. Grading shall allow for all utility requirements to be met, i.e. Plumb meter barrels and aligned meters at proper depth.

4.03 Erosion Control

- A. Erosion Control Plan - Projects disturbing 1 acre or more must file a Notice of Intent with the Utah Division of Water Quality prior to construction. After receiving a proper permit from either the State of Utah (with a copy to Richmond City) or from the City of Richmond, a copy of the erosion control plan must be kept on site until construction is complete.
- B. An Erosion Control plan must be incorporated into projects to minimize soil erosion and to avoid sedimentation into the City storm sewer system, onto adjacent properties or into natural drainage courses.
- C. All grading and earthwork shall comply with 2003 International Building Code Chapter 33 and Appendix J, GRADING.
- D. Erosion control devices shall consist of one or more of the following: check dams, sand bags, hay bales, desilting basins, silt fences, berms, dikes, contour grading or other approved devices.
- E. Erosion control devices shall be modified as needed as the project progresses, and plans of these changes submitted for approval as required.
- F. All public streets and storm drain facilities shall be maintained free of mud and debris caused by grading or construction operations.
- G. Graded areas adjacent to fill slopes located at the site perimeter must drain away from the top of the slope at the conclusion of each working day.
- H. All loose soil and debris which may create a potential hazard to offsite property shall be fully protected onsite to prevent any damage or be removed from the site as directed by the Inspector.
- I. Desilting basins or excavated pits are required prior to discharge into any private or public street, into any City, State or County storm sewer system, onto adjacent properties or into natural drainage courses.
- J. Desilting basins shall not be removed or made inoperable without the approval of the Inspector.
- K. All silt and debris shall be removed from all devices within 24 hours after each storm event.

- L. All utilities must be protected to prevent damage due to erosion. If damage occurs, it shall be the responsibility of the developer to repair such damage at no cost to such utility and within a reasonable period.

- M. Erosion control devices shown on the approved plan may be removed when approved by the Inspector if the grading operation has progressed to the point where they are no longer required.

5.0 CULINARY WATER SYSTEM DESIGN

5.01 General

- A. Design of all portions of the culinary water distribution system shall comply with the State of Utah Administrative Rules for Drinking Water as amended for local conditions.
- B. Standard centerline alignment of culinary water lines will be no less than five feet off the paved edge of a road or street while remaining within the City right-of-way. Unless extenuating circumstances are present, the culinary water line will run along the South or East side of the street or road. Any exceptions must be based upon an engineering need and approved by the City Engineer.
- C. All culinary water systems shall be constructed of blue (or white if approved by the City) PVC meeting AWWA C900 or C905 with a minimum pressure rating of 200 psi. Ductile Iron pipe is not allowed.
- D. Magnetic locator tape is required with all new pipe installations. Tape shall be located 12" below finished grade and be centered on pipe alignment.
- E. Valves shall be located in all intersections. Locate additional valves so that a maximum segment length of 600' can be isolated.
- F. Fire Hydrants shall be spaced such that no structure requiring fire protection is more than 250 feet from a fire hydrant.
- G. Minimum mainline diameter shall be 8 inches.
- H. Service line shall be constructed of blue polyethylene pipe meeting AWWA C901. Minimum size shall be 1" inch diameter for residential connections. All taps to existing lines will be completed by Richmond City. Taps to lines in new subdivisions shall be completed and tested by the developer. Taps shall be wrapped with poly wrap and taped. The location of water service shall generally be located 10 to 15 feet from either property line of the lot served. No meter box shall be allowed in any driveway, driveway flare or sidewalk. Water and sewer laterals shall be separated by a minimum of ten feet (10'). No joint trench will be allowed.
- I. Meter barrels shall be installed plumb and to finished grade. Meter shall be located 18 to 24 inches below lid. Setter shall be plumb. Meter barrels shall have a minimum 48" diameter clearance from the center of the lid to permanent structures, fences, boulders or landscape for repairs and maintenance. Meter barrels shall not be located in paved areas. Under extenuating circumstances approved by the City, a meter located in a paved area, shall be in a 4 ft x 4ft x 4ft vault with a 24" lid. Water

meters are not allowed in flower beds, etc. Meters shall be readily accessible for maintenance. Meter barrel extensions shall not be allowed, meter and barrel shall be raised as a whole where required. No meter shall be closer than 18” to 24” to any sidewalk or driveway

- J. Service Meters shall be located adjacent to the property line. Service lines shall feed into the connection from the street side of the building. Exceptions must be approved by the City Engineer and be based on engineering need.
- K. Minimum cover required shall be 60 inches.
- L. Do not install water mains below sewer lines.
- M. Minimum pressure allowed to each individual service shall not drop below 40 PSI.
- N. If the installation of a water system requires easements to Richmond City, the developer of such system shall convey such easements by deed for Richmond City.
- O. All other utilities crossing the water main shall do so at as close to a right angle as possible.
- P. Perpendicular or skewed crossings between other utilities and water mains shall have clearance of at least 18 inches. Closer tolerances require a reinforcement concrete cradle in combination with no mechanical joints of either utility within 10 feet horizontally of the crossing or additional separation. Reinforcement shall be as per the current specifications.
- Q. Cover over utilities and between rail road tracks or roadways shall be sufficient to adequately protect such utilities from potential loading of track or roadway either during construction or final finished surface. If cover is insufficient to adequately protect utility, encasement or casings shall be provided to protect affected utility.
- R. Easements - If easements are necessary for the installation and maintenance of public culinary water systems such easements shall be a minimum of 20 feet in width with the water line centered within the easement. No buildings, utilities or structures shall be erected or constructed within such easements as to interfere with the activities necessary to properly access and maintain or replace such lines or water structures.
- S. Disinfection & Testing – All new main lines must be subjected to a hydrostatic pressure test in accordance with 3.4 Pressure Test of Part II of the Design Standards and Specifications Manual. All new main lines must be disinfected and subjected to a disinfection test in accordance with 3.7 Disinfection Test of Part II of the Design Standards and Specifications Manual and AWWA standards. Tests will be under the supervision of the Richmond City Maintenance Department.

6.0 IRRIGATION WATER DESIGN

6.01 General

- A. The Richmond Irrigation Company is the sole owner and operator of both ditch and pressurized (secondary) irrigation water within Richmond City.
- B. All design and construction must comply with the requirements and standards of Richmond Irrigation Company and Richmond City.
- C. Existing irrigation ditches or canals, of significant flow, must either be piped or fenced on both sides when adjacent to or contained within property to be developed.
- D. Clearance between other utilities shall be at least 18 inches. Closer tolerances require reinforcement concrete cradle or separation. Reinforcement shall be as per the current specifications.
- E. Covers over utilities and between railroad tracks or roadways shall be sufficient to adequately protect such utilities from potential loading of track or roadway either during construction or final finished surface. If cover is insufficient to adequately protect utility, encasement or casings shall be provided to protect affected utility.
- F. New lines must be buried with magnetic locator tape and be shown accurately on drawings given to the City.
- G. New and/or replacement/relocated main lines (6" and larger) shall be purple in color no matter the original color, and have a minimum pressure rating as required by the irrigation company but no less than 200 psi.

7.0 SANITARY SEWER DESIGN

7.01 Sewer Mains

- A. Minimum mainline size shall be 8" diameter.
- B. Allowable sanitary sewer pipe material is as follows:
 - 1. PVC (Poly Vinyl Chloride) meeting ASTM D 3034
 - 2. Shall be green in color, both main lines and laterals. White shall not be allowed.
- C. Standard centerline alignment of sewer mains will be no less than 5 feet off paved edge of the street or road while remaining within the City right-of-way. Unless extenuating circumstances are present, the sewer main will run along the north or west side of the street or road. Any exceptions must be based upon an engineering need and approved by the City Engineer.
- D. All sanitary sewer installation shall comply with current design standards and/or ordinance(s) pertaining to the sewer system.
- E. Minimum depth of mainline shall provide for eight feet (8') of cover to finished grade.
- F. Horizontal clearance to any culinary water line shall be at least 10 feet.
- G. Sewers shall be laid with uniform slope between manholes.
- H. No vertical or horizontal curves shall be allowed.
- I. Minimum grades required to provide a minimum velocity of (2 fps) two feet per second when flowing full, are as follows:

8 inch diameter	0.40%
10 inch diameter	0.32%
12 inch diameter	0.24%
15 inch diameter	0.16%
18 inch diameter	0.12%
21 inch diameter	0.10%
24 inch diameter	0.08%
- J. (Grades less than those shown above may be allowed upon submittal and approval of detailed hydraulic analysis proving the minimum velocities can be met.)

- K. Where sewers are anticipated to flow less than one-half full, consideration must be given to increasing the slope of sewer to provide two-feet (2') per second velocity in the pipe for the anticipated flow.
- L. All utilities crossing the sewer main shall do so at as close to a right angle as possible.
- M. Sewer mains and laterals will not cross above a culinary waterline
- N. Perpendicular or skewed crossings between other utilities and sewer mains shall have clearance of at least 18 inches. Closer tolerances require a reinforcement concrete cradle in combination with no mechanical joints of either utility within 10 feet horizontally of the crossing or additional separation is required. Reinforcement shall be as per the current specifications.
- O. Covers over utilities and between rail road tracks or roadways shall be sufficient to adequately protect such utilities from potential loading of track or roadway either during construction or final finished surface. If cover be insufficient to adequately protect utility, encasement or casings shall be provide to protect affected utility.
- P. Easements - If easements be necessary for the installation and maintenance of public sewer systems such easements shall be a minimum of 20 feet in width with the sewer line centered within the easement. No buildings, utilities or structures shall be erected or constructed within such easements as to interfere with the activities necessary to properly access and maintain or replace such lines or sewer structures.
- Q. If the installation of a sanitary sewer system requires easements to Richmond City, the developer of such system shall convey such easements by deed to Richmond City.

7.02 Sewer Manholes

- A. Sewer manhole spacing shall be 350 feet maximum.
- B. When a smaller sewer joins a large one, the invert of the larger sewer shall be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation. The following table represents the allowable normal drops between pipe sizes:

Normal Drops (in feet) straight through Manholes at inverts for minimum grades or greater (Except as noted below)						
INLET size		8"	10"	12"	15"	18"
OUTLET size	8"	0.10	---	---	---	---
	10"	0.17	0.10	---	---	---
	12"	0.33	0.17	0.10	---	---
	15"	0.58	0.42	0.25	CL	---
	18"	0.80	0.71	0.63	0.50	CL

Notes:

1. For all connection less than 135 degrees, add 0.10 of a foot to each of the above values.
 2. When pipes on both sides of the manhole are the same size and the average of the grades on both sides exceeds 2.50%, an average drop shall be taken across the manhole, not to exceed 0.60 feet, instead of the values in the above table.
 3. CL indicates no drop across the manhole and the elevation to be shown at the center of the manhole.
 4. Permission for deviations from the above values to be approved by the City Engineer.
- C. Access – Both legal and physical access are required to all sewer manholes. Physical access shall consist of an all-weather surface sufficient to provide the need of all routine maintenance and repair equipment.
- D. A manhole must be constructed at the terminus of any main no matter the distance to next manhole downstream unless a variance is allowed and approved by the City Engineer.
- E. Sewer manholes shall be 4' diameter for in-line manholes where grade changes occur. 5' diameter manholes are required when deflection angle is greater than or equal to 45 degrees, when the manhole is a junction manhole of three or more lines, for sewers whose inside diameter is 12" or greater, or when the cover above invert elevations is 14 feet or greater. All manholes shall be constructed with steps for maintenance access.
- F. Sewer manholes shall not be located in driveways or in the curb and gutter.

7.03 Sewer Laterals

- A. Sewer taps into existing 8" diameter sanitary sewer pipes shall not be greater than 4". When a 6" connection is required, a wye must be installed by the contractor and inspected by Richmond City.
- B. Drop manholes will be allowed only when terrain conditions so require, and only with prior approval of the City Engineer. The City Engineer may issue specific design criteria on a location by location basis.
- C. Sewage Collection - The developer shall connect to the sanitary sewer and provide adequate individual lateral lines to the property line of each lot. Such sewer connections and sewer systems shall comply with the regulations and specifications approved by the City. All sewer lines within the public right-of-way or public easements shall be a minimum of 8 inches in diameter, and one 4-inch diameter line shall be installed for each residential unit, and 6-inch minimum diameter lines shall be installed for multi-family, industrial and commercial developments. All sewer lines must be extended across the entire frontage of all existing streets and to the boundary of the development on all existing or proposed city streets unless such evidence can be provided to the satisfaction of the City Engineer that such extension would not be practical.
- D. Sewer laterals shall be installed at a 2% slope from mainline to building unless otherwise approved and generally located on the lower 1/4 of the lot frontage. Sewer lateral material shall be green PVC and shall be clearly marked in order to avoid confusion with other drainage systems. Location of extended service lateral towards building shall be located via a 2 x 4 with a green colored end visibly extended above adjacent surface.
- E. Joint trenching for sewer and culinary water will not be allowed regardless of State exception.
- F. All 4" diameter sanitary sewer laterals must be constructed at a minimum of 2% grade from mainline to the property line. 6" diameter sanitary sewer laterals must be constructed at a minimum of 1% grade from mainline to the property line.
- G. Sewer Laterals shall be installed with a tracer wire from the sewer main to the cleanout at the property line. The tracer wire shall come to the surface at the cleanout. The wire does not have to be connected to the main line tracer wire.

8.0 STORM DRAINAGE DESIGN

8.01 General

- A. Post-development peak runoff rates, including sheet flow, shall not exceed pre-development peak rates. Acceptable storm drainage and detention facilities will be required to meet this requirement.
- B. All storm water facilities must adequately handle runoff from the site development as well as all upstream contributing flows for specified storm events.
- C. A drainage system shall be designed to:
 - 1. Generally honor all natural drainage divides and create no adverse impact on downstream properties.
 - 2. Account for all off-site storm water and
 - 3. Convey discharge surface waters to the flow line of a natural watercourse or an adequate existing underground or above-ground conveyance system.
 - 4. Comply with the City's Storm Water Master Plan if one exists.
- D. Design shall consider the provision of drainage easements for offsite contributory runoff through the site, to allow future improvements of adjacent developments.
- E. A new discharge of concentrated storm water from a pipe, culvert, channel, or other drainage structure shall not be created through lands of another without first obtaining a permanent storm drainage easement and constructing a channel to guarantee continuity of an outfall from the point of discharge to the nearest natural or man-made watercourse.
- F. If off-site downstream construction and easements are required to construct an adequate channel outfall, no plans shall be approved until such storm drainage easements, have been obtained and recorded.
- G. If the installation of a storm water system requires easements to Richmond City, the developer of such system shall convey such easements by deed to Richmond City.
- H. Storm water design and construction methods must adequately address potential problems which may arise during construction or by design so as not to pollute, erode, deposit sediment or cause any other degradation to existing natural condition.

8.02 Drainage Calculations

- A. Drainage calculations by a professional engineer shall be provided to show that all storm water facilities can adequately handle runoff from the site development as well

as all upstream contributing flows. Hydraulic capacity must be verified with engineering calculations in accordance with the Utah Department of Transportation Roadway Drainage Manual of Instruction.

- B. Calculations shall include a copy of the of the site grading and drainage plan, at the plan scale with the boundaries, acreages and C-factors of the interior drainage areas shown.
- C. Calculations shall also include a map at an appropriate scale delineating the boundaries, flow paths, acreages and C-factors of the drainage areas upstream of the development, which contribute storm water to the development.
- D. Construction drawings shall show the location, size, flow line elevations, profiles and details of drainage facilities and structures, including, but not limited to swales, ditches, culverts under public streets and private drives, drop inlets, storm sewers and detention/retention ponds. Typical cross sections of all swales and ditches shall be shown.
- E. Profiles of streets shall show profiles of storm sewers and cross sections of culverts together with points of intersection. Profiles shall show clearance of such drainage facilities with water mains and sanitary sewers.

8.03 Hydrologic Procedures

- A. For purposes of computing runoff, all existing and proposed gravel drives and parking areas shall be treated as being asphalt paved.
- B. The Rational Method may be used to determine peak flows for sites smaller than 300 acres and having a time of concentration less than 30 min. if the site surface characteristics make it applicable.
- C. When the rational method is used, Times of Concentration for Pre-development and post development shall be shown with their corresponding rain intensity.
- D. Values from the following intensity duration frequency table shall be used with the rational method.

RAINFALL-INTENSITY-DURATION-FREQUENCY											
Precipitation Intensity Estimates (in/hr)											
FROM NOAA ATLAS 14											
LOGAN UTAH STATE UNIV , UTAH (42-5186) 41.7456 N 111.8033 W 4786 feet											
ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr
2	1.62	1.24	1.02	0.69	0.43	0.28	0.22	0.15	0.10	0.06	0.04
5	2.26	1.72	1.42	0.96	0.59	0.37	0.28	0.19	0.12	0.08	0.05
10	2.78	2.12	1.76	1.18	0.73	0.45	0.33	0.22	0.14	0.09	0.05
25	3.64	2.77	2.29	1.54	0.95	0.57	0.42	0.27	0.17	0.11	0.06
50	4.37	3.32	2.75	1.85	1.15	0.68	0.49	0.31	0.19	0.12	0.07
100	5.23	3.98	3.29	2.22	1.37	0.80	0.57	0.36	0.22	0.13	0.08
200	6.18	4.70	3.89	2.62	1.62	0.94	0.66	0.40	0.24	0.15	0.09
500	7.74	5.89	4.86	3.28	2.03	1.15	0.79	0.47	0.28	0.17	0.10
1000	9.07	6.90	5.70	3.84	2.38	1.34	0.91	0.53	0.31	0.18	0.11

- E. When the site surface characteristics warrant the use of a method other than the Rational Method, use an approved procedure in accordance with Chapter 7 Hydrology of the UDOT Drainage manual of Instruction. (7-13)
- F. The following precipitation frequency values shall be used in conjunction with an approved hydrological procedure.

Precipitation Frequency Estimates (inches)											
FROM NOAA ATLAS 14											
LOGAN UTAH STATE UNIV , UTAH (42-5186) 41.7456 N 111.8033 W 4786 feet											
ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr
2	0.14	0.21	0.26	0.34	0.43	0.56	0.66	0.90	1.21	1.55	1.86
5	0.19	0.29	0.35	0.48	0.59	0.74	0.84	1.13	1.48	1.90	2.26
10	0.23	0.35	0.44	0.59	0.73	0.90	1.00	1.33	1.73	2.18	2.59
25	0.30	0.46	0.57	0.77	0.95	1.14	1.25	1.62	2.07	2.58	3.05
50	0.36	0.55	0.69	0.93	1.15	1.36	1.47	1.86	2.34	2.89	3.42
100	0.44	0.66	0.82	1.11	1.37	1.60	1.71	2.13	2.64	3.23	3.81
200	0.52	0.78	0.97	1.31	1.62	1.88	1.98	2.41	2.95	3.58	4.22
500	0.65	0.98	1.22	1.64	2.03	2.31	2.38	2.83	3.39	4.05	4.78
1000	0.76	1.15	1.43	1.92	2.38	2.69	2.73	3.19	3.74	4.42	5.22

- G. An inflow and outflow hydrograph will be required on all retention/detention basins.
- H. The SCS 24-hr (Type II) rainfall distribution and the Farmer Fletcher rainfall distribution shall be used to generate runoff hydrographs for detention/retention basins.

SCS 24-hr Type II Storm Distribution				Farmer Fletcher 1-hr Storm Distribution		
Time	Cumm. Depth		Time	Cumm. Depth	Time	Cumm. Depth
(hrs)	(%)		(hrs)	(%)	(Min)	(%)
0	0		12.0	66.32	0.00	0
0.5	0.53		12.5	73.51	3.00	18.3
1.0	1.08		13.0	77.24	6.00	36.5
1.5	1.64		13.5	79.89	9.00	51
2.0	2.23		14.0	81.97	12.00	61.5
2.5	2.84		14.5	83.8	15.00	70
3.0	3.47		15.0	85.38	18.00	76.5
3.5	4.14		15.5	86.76	21.00	80.6
4.0	4.83		16.0	88.01	24.00	83.9
4.5	5.55		16.5	89.14	27.00	86.2
5.0	6.32		17.0	90.19	30.00	88
5.5	7.12		17.5	91.15	33.00	89.5
6.0	7.97		18.0	92.06	36.00	90.8
6.5	8.87		18.5	92.91	39.00	92
7.0	9.84		19.0	93.71	42.00	93.2
7.5	10.89		19.5	94.46	45.00	94.4
8.0	12.03		20.0	95.19	48.00	95.6
8.5	13.28		20.5	95.88	51.00	96.8
9.0	14.67		21.0	96.53	54.00	98
9.5	16.25		21.5	97.17	57.00	99
10.0	18.08		22.0	97.77	60.00	100
10.5	20.42		22.5	98.36		
11.0	23.51		23.0	98.92		
11.5	28.33		23.5	99.47		
			24.0	100.00		

8.04 Road Drainage

- A. Roads shall be designed for a minimum storm frequency of a 10-yr return period.
- B. The design spread for a 10-yr event shall be limited so that a minimum of 10 feet in each travel direction shall be kept free of flooding.
- C. Drainage flowing in street gutters shall be intercepted 100 percent, during a 10-year storm, prior to entering an intersection with another public street.
- D. No concentrated flow greater than one cubic fee per second shall cross a sidewalk or curb.
- E. Roadways shall be designed to handle a storm frequency of a 100-yr return period within the road right-of-way to prevent flooding of adjacent properties.
- F. Sag vertical curves classified as minor arterial or higher require the placement of three inlets in each curve. One inlet at the low point and one flanking inlet on each side of the low point. The flanking inlets shall be placed so that they will limit the spread in the low gradient approaches to the sag point and will act in relief of the sag inlet if plugged.
- G. No reverse curb and gutter shall be allowed in public rights-of-way.

8.05 Storm Sewers

- A. Storm sewer trunk lines and laterals shall be designed to adequately handle runoff from a 10-year storm.
- B. The hydraulic gradient of storm sewers for the post-development shall be lower than the gutter line or grate inlet top elevation at all points.
- C. Easements - If easements are necessary for the installation and maintenance of public storm sewer systems such easements shall be a minimum of 20 feet in width with the storm sewer line centered within the easement. No buildings, utilities or structures shall be erected or constructed within such easements as to interfere with the activities necessary to properly access and maintain or replace such lines or storm sewer structures.
- D. Allowable storm sewer pipe material is as follows:
 - 1. Concrete (reinforced or non-reinforced)
 - 2. High Density Poly Ethylene (HDPE)

- E. Pipe size shall be determined by required capacity but in no instance shall the minimum mainline size be less than 12" diameter.
- F. Cover over utilities and between railroad tracks or roadways shall be sufficient to adequately protect such utilities from potential loading of track or roadway either during construction or final finished surface. If cover is insufficient to adequately protect utility, encasement or casings shall be provided to protect affected utility.
- G. Minimum cover for storm sewer pipe shall be two feet vertically from finish grade to the outside crown of pipe, except where structural correction is provided and approved. Requests for less than two feet of cover shall be recorded on the plans and clearly denoted.
- H. Clearance between other utilities shall be at least 18 inches. Closer tolerances require reinforcement concrete cradle or other acceptable separation.
- I. Test pits will be required and shall be shown on the plans for all crossings which involve gas lines, water mains 12 inches in diameter and larger, sanitary sewer crossings which have minimum clearance, and all fiber optic telephone service lines. Test pits shall be dug and clearances verified prior to installing any portion of the storm sewer system.
- J. Lines shall be installed with no horizontal or vertical deflection, unless authorized by Engineer.
- K. Storm Sewer manhole spacing shall be 350 feet maximum.
- L. Storm Sewer manholes shall be 4' diameter for in-line manholes where grade changes occur. 5' diameter manholes are required when deflection angle is greater than or equal to 45 degrees, when the manhole is a junction manhole of three or more lines, for sewers whose inside diameter is 12" or greater, or when the cover above invert elevations is 14 feet or greater. All manholes shall be constructed with steps for maintenance access.
- M. All storm sewer taps, either public or private, into existing storm sewer piping shall be limited to 4" and 6" and shall be constructed by the contractor and inspected by Richmond City. All connections greater than 6" shall require a storm drain manhole to be constructed.

8.06 Subsurface Drainage

- A. When connected to the storm sewer allowable Sub-Drain pipe materials are as follows:
 - 1. Concrete (reinforced or non reinforced)

2. HDPE (High Density Polyethylene) for service laterals only
 - B. When connected to the storm sewer install magnetic locator tape 12 inches below finished grade centered along the subsurface drainage pipe alignment.
 - C. If drains are used around building foundations, a typical section and layout of the peripheral drain shall be shown on the development plan and on individual grading plans. The upper end invert shall be a minimum of six inches (6") below the finished grade of the basement floor and laid at a minimum grade of two percent (2%).
 - D. Easements - If easements are necessary for the installation and maintenance of public storm sewer systems such easements shall be a minimum of 10 feet in width with the subsurface drainage line centered within the easement. No buildings, utilities or structures shall be erected or constructed within such easements as to interfere with the activities necessary to properly access and maintain or replace such lines or storm sewer structures.
 - E. Subsurface drainage lateral material shall be ADS and shall be clearly marked with identifiable tape or other approved method in order to avoid confusion with other drainage systems. Connections to the mainline shall be accomplished via adapters provided by the manufacturer.
 - F. Subsurface drainage manholes shall be 4' diameter for in-line manholes where grade changes occur. 5' diameter manholes are required when deflection angle is greater than or equal to 45 degrees, when the manhole is a junction manhole of three or more lines, for sewers whose inside diameter is 12" or greater, or when the cover above invert elevations is 14 feet or greater. All manholes shall be constructed with steps for maintenance access.
 - G. Sumps designed as part of the development's detention systems shall only be allowed when approved by the City Engineer and only when no available outlet exists and the soil conditions are such that will adequately permit the water to infiltrate properly. In areas within a well or spring protection zone, sumps will not be allowed unless first approved by the State of Utah Division of Drinking Water and the State of Utah Division of water quality. Under no circumstance will a sump be created without the above approval in writing.
 - H. The capacity of sumps can only include the void area in calculating the required storage volume available. Percolation tests submitted by the developer must demonstrate that sumps can adequately dissipate the generated storm runoff in a reasonable time period.

8.07 Channels and Culverts

- A. Channels and culverts shall generally be designed to adequately handle runoff from a 10-year storm.
- B. Culverts and Channels shall be designed in accordance with Chapters 8 and 9 of the UDOT Manual of Instruction Drainage Manual.
- C. The sides of all conveyance channels shall be extended until a minimum of six inches of free board is provided above the ten-year event water surface elevation within the conveyance channel.
- D. Conveyance channels with side slopes steeper than 3H:1V shall be stabilized by paving, riprap, gabions, or other approved measures.
- E. Culverts shall be designed and installed to account for ultimate right-of-way and road widths.
- F. Culvert design calculations shall include exit velocities.
- G. Culvert exit velocity shall be consistent with the maximum velocity in the natural channel or shall be mitigated by using energy dissipation devices and / or channel stabilization in accordance with “UDOT Manual of Instruction – Roadway Drainage”.
- H. Reinforced concrete flared end sections shall be installed at the open ends of all storm drainage pipe. Concrete end walls may be accepted for pipes 42 inches in diameter or less subject to approval by the Engineer.

8.08 Detention / Retention Facilities

- A. Detention and Retention basins shall be designed to adequately handle runoff from a 10-year storm and a 100-year storm with 1 foot of freeboard.
- B. Basin outflow shall be limited to the maximum rate which maintains the adequacy of the channel and shall not exceed the pre-development rate of flow to the specific point of concentrated discharge, not the pre-developed flow from the entire drainage area. Under no circumstances shall an outlet flow exceed 0.2 cfs/acre for a 10-year storm event. If a channel does not exist at the point of discharge, then one shall be constructed to convey the drainage to a stable outlet.
- C. Detention and Retention basins shall be designed with an emergency overflow for events greater than the 100-year storm event that safely conveys flood waters to a nearby street or other acceptable facility.

- D. Hand or computer generated routing calculations are required along with inflow and outflow hydrographs.
- E. All above ground detention facilities shall be designed to handle the 10-year storm with a maximum depth of 2 feet and pass the 100-year storm while maintaining a minimum of one foot of freeboard. Sites designed with underground detention facilities shall be provided with a means of conveying the 100 year storm to a stable outlet without damage to structures, embankments, adjacent properties and other critical installations and without causing erosion.
- F. The use of pumps to drain detention facilities will not be allowed due to excessive and continual maintenance costs.
- G. Minimum conduit diameter for basin outlets shall be 12 inches. Basins requiring a lesser orifice size for flow control shall be provided with a manhole structure fitted with the required orifice. For smaller basins, it may be acceptable on a case-by case basis for the orifice to be provided within a sealed plug attached to the end of the pipe outlet. Above ground basins shall be provided with a low flow channel capable of conveying initial inflow to the control structure without eroding the basin sides or bottom.
- H. Safety measures shall be incorporated into the design of all stormwater detention facilities. These may include, but are not limited to safety ledges, fencing, warning signs, anti vortex devices, stadia rod indicating depth at the lowest point, and outlet structures designed to limit public access.
- I. All detention facilities must comply with current USEPA standards as a minimum.
- J. Detention basins shall be designed to provide the following:
 - 1. Side slopes of 3:1 maximum
 - 2. All weather vehicular maintenance access around the entire basin (min 10 foot width)
 - 3. Lot shall provide normal frontage requirements
 - 4. No flag lots shall be used for detention facilities
 - 5. Flow through design which eliminates “wet basin”
 - 6. Cross slope within basin shall provide adequate drainage. Under no circumstances shall the slope be less than 1% across any portion of the basin
 - 7. All detention lots or easements shall be properly surveyed and corners permanently marked prior to acceptance of improvements
 - 8. Detention lot shall be dedicated to the City.

- K. Infiltration systems will be considered for review only if a soils and geo-technical report is provided which discusses soil permeability, potential effects on ground water and potential effects on underlying geologic strata. A percolation test will be required to determine the capacity of retention basins.

9.0 MISCELLANEOUS DESIGN

9.01 Easements

- A. Easements for culinary water, sewer, power, irrigation water, storm water drainage, wetlands and/or other utilities or purposes shall be provided by the developer and designated on the improvement plans and final plat or separate document as required to accommodate the utility systems in the development. Where natural drainage channels, interceptor systems, or flood hazard or sensitive area overlay zones cross the development, the developer must obtain the necessary permits to modify such drainage facilities, and designate the channels, systems, or flood hazard zones, and any associated restrictions, on the plat as well as provide the necessary easement dedication.
- B. Public utility easements shall be established on the sides of each subdivided lot. Minimum widths shall be five (5) feet on the sides of lot and ten (10) feet along front and back of lot.
- C. Easements shall be provided along each side of the centerline of any watercourse or drainage channel whether or not shown in the comprehensive plan, to a sufficient width, or as shown in this Manual to provide proper maintenance and protection and to provide for water runoff and installation and maintenance of storm sewers.
- D. Easements and area descriptions shall be of sufficient width to completely identify and provide for access and maintenance of the utility or identified restricted area.
- E. Easements to be dedicated to Richmond City which are not shown and described on the dedication plat shall be submitted to the City Engineer on forms provided by the City. Said easements shall include, by attachment, a drawing of the easement being dedicated and a complete legal description of the easement.
- F. Under no circumstance shall permits be issued or construction allowed without the proper easements in place to accomplish the work.
- G. If easements are necessary to cross abutting private property to permit drainage or utility access of the development, it shall be the responsibility of the developer to acquire such easements at no cost to the City.
- H. Both legal and physical accesses are required to all manholes, cleanouts, valves or other structures requiring periodic maintenance. Physical access shall consist of an all weather surface sufficient to provide the need of all routine maintenance and repair equipment.

9.02 Public Land dedication, Parks, open Space

- A. Where a proposed park, playground, or open space on the comprehensive plan is located in whole or in part in a subdivision, the Planning and Zoning Commission shall require that such area or areas be shown on plats in accordance with the requirements specified in this section. Such area or areas shall be dedicated to the city by the subdivider if the city approves such development.
- B. The Planning and Zoning Commission shall require that plats show sites of a character, extent and location suitable for the development of a park, playground, or other recreation purposes.

9.03 Monumentation/Staking

- A. Survey stakes shall be placed at both front and back lot corners to completely identify the lot boundaries on the ground.
- B. All surveying, both horizontal and vertical, shall be tied to Cache County Monumentation, using UTM NAD 83 datum Zone 12 and NAVD 88 vertical datum..
- C. Hubs set for the construction of inlet boxes, manholes or other structures shall include a minimum of at least two hubs to adequately locate and align structure.
- D. Back lot corners shall be marked with a metal pipe or rod driven into the ground, and projected front lot corners shall be identified with permanent plugs in the sidewalk or back of the curb.
- E. All lot corners must be in place prior to the issuance of building permits and after the completion of all development improvements.
- F. It shall be the responsibility of the lot owner to ensure that all lot corners are in place prior to the final inspection. The City is not responsible to replace survey stakes or markers.
- G. Care must be taken to not disturb, remove or alter any existing monumentation found, recorded or otherwise encountered during the development of property.
- H. Monuments shall be installed at all corners of platted subdivisions as well as major points of centerline road alignments which include Points of Intersection (PI) and/or Points of Curvature (PC), Points of Tangency (PT).
- I. Monuments for subdivision corners and road alignment key points shall be marked with two inch (2") diameter brass caps. These caps may be set in concrete or be affixed to thirty inch (30") lengths of galvanized pipe and shall be properly marked

for identification as to location, shall carry the true elevation, shall be referenced if subject to destruction, and again shall show the proper identification and license of the certifying surveyor.

- J. All monumentation must be installed by the developer as required of the subdivision or as removed or disturbed during construction.

END OF DOCUMENT

**RICHMOND CITY
MANUAL OF DESIGN &
CONSTRUCTION STANDARDS**

PART II

**AMENDMENTS TO THE
“MANUAL OF STANDARD SPECIFICATIONS”
2012 edition by the Utah Chapter of APWA**

Revised:
January, 2013

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GENERAL CONDITIONS

PART 1 GENERAL

1.1 DEFINED TERMS:

Amended or added definitions:

- A.50 **Standard Plans:** The graphical and text displays contained in the Manual of Standard Plans published by the Utah LTAP Center, Utah State University, Logan UT; also in Section III Standard Drawings-Amendments and Supplements to the Manual of Standard Plans published by the Utah Chapter of the APWA in the RICHMOND City Manual of Design & Construction Standards.
- A.61. **Schedule of Values:** The Contractor's best estimate of costs associated with various portions of the Work.
- A.62. **Measurement of Failure:** The act of performing quality assurance through measurement by the City Engineer in accordance with the Specifications for Work which meet the definition of "Defective" as defined in the Standard Specifications.

PART 2 PRELIMINARY MATTERS

Article 2.2 of the General Conditions is repealed and the following is substituted therefore:

2.2 COPIES OF DOCUMENTS

- A. Copies of all Contract Documents including the Manual of Standard Plans and the Manual of Standard Specifications published by the Utah chapter of APWA as well as the RICHMOND City Manual of Design and Construction Standards shall be provided on site by the CONTRACTOR.
- B. OWNER shall not furnish to CONTRACTOR published Contract Documents which include the Manual of Standard Plans, the Manual of Standard Specifications and the RICHMOND City Manual of Design and Construction Standards. Such documents shall be purchased separately by the CONTRACTOR.

PART 3 CONTRACT DOCUMENTS, INTENT, AMENDING, REUSE

3.1 INTENT

Amend paragraph B to read as follows:

- B. **Contract Documents are Complementary:** The Contract Documents are complementary and cooperative and are intended to describe and provide for a complete project; what is required by one document or provisions thereof is

binding as if required by all the documents or provisions thereof. Anything in the Specifications and not on the Plans, or on the Plans and not in the Specifications, shall be as though shown or mentioned in both.

PART 5 BONDS AND INSURANCE

Article 5.1 of the General Conditions is hereby repealed and the following is substituted therefore:

5.1 PERFORMANCE, PAYMENT AND OTHER BONDS

- A. Prior to OWNER executing the Agreement, CONTRACTOR shall file with the OWNER a good and sufficient performance Bond and a payment Bond, each in the sum of not less than 100 percent of the Contract Price.
- B. The Bonds shall be executed by the CONTRACTOR and secured by a company duly and regularly authorized to do a general surety business in the State of Utah and named in the current list of Companies holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies as published in current Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department, with an underwriting limitation equal to or greater than the Contract Price which the Bond guarantees or with a current "A-" rating or better in A.M. Best Co., Inc.'s, Best Insurance Reports, Property and Casualty Edition.
- C. Said Bonds shall guarantee the faithful performance of the Construction Contract by the CONTRACTOR and payment of labor and materials. They shall inure by their terms to the benefit of the OWNER. Neither this nor any other provision requiring a performance Bond shall be construed to create any rights in any third party Claimant as against the OWNER for performance of the Work under the Construction Contract.
- D. If the surety on any Bond furnished by CONTRACTOR is subject to any proceeding under the Bankruptcy Code (Title 11, United States Code) or becomes insolvent or its right to do business is terminated in the State of Utah or it ceases to meet the requirements of this Article, CONTRACTOR shall, within 15 days thereafter, substitute another Bond and surety, both of which must be acceptable to OWNER.
- E. The Contractor shall warrant and guarantee (a retainage of an escrow or other security in the amount of 10% of the performance bond) that the improvements and every part thereof, will remain in good and serviceable condition for a period, of one year, after the date of the Construction Completion Inspection Report by the City Engineer or his representative. The Contractor shall make all repairs to and maintain the improvements and every part thereof in good condition during that warrantee period at no cost to the city. It is further agreed and understood that the determination for necessity of repairs and maintenance of the work rests with the City Engineer. His decision upon the matter shall be final and binding upon the developer, and the guarantee hereby stipulated shall extend to and include, but shall not be limited to, all improvements included in the project

scope and other accessories that are or may be affected by the construction operations; and whenever, in the judgment of the City Engineer, said work shall be in need of repairs, maintenance, or rebuilding, he shall cause a written notice to be served upon the developer and or permittee, or both, and there upon the responsible party(s) shall undertake and complete such repairs, maintenance, or rebuilding.

Article 5.2 of the General Conditions is hereby repealed and the following is substituted therefore:

5.2 INSURANCE

- A. In General: All policies of insurance provided shall be issued by insurance companies qualified to do business in the State of Utah and listed on the U.S. Treasury Department's current Department of Treasury Fiscal Services List 570 , or having a general policy holder's rating of not less than "A-" in the most current available A. M. Best Co., Inc.'s, Best's Insurance Report. CONTRACTOR shall furnish copies of certificates of insurance concurrent with or prior to the signing of the Agreement. The certificates shall name the OWNER as the certificate holder and as an additional insured. If requested, CONTRACTOR shall also furnish copies of the insurance policies secured for the Work. CONTRACTOR shall procure and maintain for the duration of the contract, insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or subcontractors. The cost of such insurance shall be included in Contractor's Bid. The amount of the insurance shall not be less than: \$1,000,000.00
- B. Worker's Compensation Insurance: In addition to other required insurance, the CONTRACTOR shall obtain and maintain during the life of the Construction Contract, worker's compensation insurance as required by Laws and Regulations for all of CONTRACTOR's employees employed at the site of the Work, and in case any Work is subcontracted, the CONTRACTOR shall require the Subcontractor similarly to provide worker's compensation insurance for all of the latter's employees, unless such employees are covered by protection as required by Laws and Regulations. Worker's compensation limits as required by the Labor Code of the State of Utah and Employers' Liability limits are 100/500/100 per accident.
- C. Business Automobile Liability: \$1,000,000.00 combined single limit per accident for bodily injury and property damage.
- D. Commercial General Liability Insurance: CONTRACTOR shall secure and maintain during the life of the Construction Contract and at all times thereafter when CONTRACTOR may be correcting, removing or replacing Defective Work, a comprehensive commercial general liability insurance policy. The policy shall protect the CONTRACTOR, the OWNER, the ENGINEER, and any Subcontractor performing work covered by the Construction Contract from claims for damages for personal injury, including accidental death, and from claims for

property damage which may arise from CONTRACTOR's operations under this Construction Contract, whether such operations be by itself or by any Subcontractor or by anyone directly or indirectly employed by either of them. Unless specified otherwise in the Supplementary Conditions, the minimum amounts of such insurance for combined single limit per occurrence shall be \$1,000,000.00 for bodily injury, personal injury and property damage.

The policies are to contain, or be endorsed to contain, the following provisions: The City, its officers, officials, employees, and volunteers are to be covered as additional insured. The Contractor's insurance coverage shall be primary insurance and any insurance or self-insurance maintained by the City, its officers, official, employees or volunteers shall be excess of the Contractor's insurance and shall not contribute with it. Each policy shall be endorsed to state that coverage shall not be suspended, voided, canceled, reduced in coverage or in limits except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the City.

Any deductibles or self-insured retention must be declared to and approved by the City. Insurance is to be place with insurers acceptable to and approved by the City. The City shall be furnished with certificates of insurance and with original endorsements affecting coverage required within, signed by a person authorized by the insurer to bind coverage on its behalf. All certificates and endorsements are to be received and approved by the City before work commences. The City reserves the right to require complete, certified copies of all required insurance policies at any time.

The CONTRACTOR shall include all subcontractors as insured under its policies or shall furnish separated certificates and endorsements for each subcontractor. All coverage for subcontractors shall be subject to all of the requirements stated herein.

- E. Automotive Public Liability Insurance: Whenever CONTRACTOR or any Subcontractor shall use and operate automobiles, trucks or other vehicles on public streets and highways in complying with the terms and conditions of the Construction Contract, CONTRACTOR or each Subcontractor shall carry automobile public liability insurance with limits not less than \$1,000,000.00 for any on accident or loss.
- F. Insurance Non-cancelable for 30 Days: Each policy of insurance provided in the Contract Documents shall be absolutely non-cancelable for a period of not less than 30 days after notice and shall contain the following provisions or one substantially the same as the following:
"This policy shall not be subject to cancellation, change, or reduction of coverage by the other party or parties hereto, unless notice, as defined herein is sent to the OWNER, with a copy to the ENGINEER and the OWNER's attorney."
- G. Builder's Risk: CONTRACTOR agrees to and assumes the risk of loss for any damage or loss to the Work and Project by any means or occurrence until

Substantial Completion. CONTRACTOR further agrees to obtain builder's risk or course of construction insurance in the total amount of the Contract Price.

- H. RICHMOND City Corporation and Engineer of Record Additional Insured: Each policy of insurance provided in the Contract Documents shall also protect the government of RICHMOND City Corporation and the Engineer of Record during the life of the Construction Contract and at all times thereafter from public liability and property damage claims indicated in paragraph 5.2D, and automotive public liability damage claims indicated in paragraph 5.2E above.

PART 6 CONTRACTOR'S RESPONSIBILITIES

6.17 INDEMNIFICATION

Amend Paragraphs A and B to read as follows:

- A. **Indemnification of OWNER:** CONTRACTOR shall indemnify, defend and hold harmless OWNER and ENGINEER, and their elected officials, officers, agents, employees, and volunteers from and against any and all claims, damages, losses and expenses, direct, indirect or consequential (including, but not limited to fees and charges of engineers, architects, attorneys and other professionals and court costs) arising out of or resulting from the negligent acts or omissions in performance of Work by CONTRACTOR, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not the claim, damage, loss, etc. arising from the act or omission is caused in part by a party indemnified hereunder or arises by or is imposed by Law and regulations regardless of the negligence of any such party.
- B. **Indemnification Not Limited:** In any claims against OWNER or ENGINEER or any of their elected officials, officers, agents, employees or volunteers by any employees of CONTRACTOR, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.16A shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR or any such Subcontractor or other person or organization under workers' compensations acts, disability benefit acts or other employee benefit acts.

DIVISION 31 SITE CONSTRUCTION

SECTION 31 05 13 COMMON FILL

PART 2 PRODUCTS

2.5 NATIVE

Replace paragraph B with the following:

- B. Maximum particle size shall not exceed 6" in the longest direction without approval of Engineer. All other larger native material which must be removed, shall be deposited offsite from work zone at no additional cost to the OWNER. Native material meeting the above specification of maximum particle size shall not be removed from the work zone until ENGINEER has made a written determination that said material will not be reused in any application within the scope of the project.

2.8 GRAVEL

Add the following to this section:

Sewer Rock. Allowed sizes are ASTM Size No. 4 & 5 (1.5" to 1/2")

SECTION 31 23 16 EXCAVATION

PART 1 GENERAL

Add the following paragraphs to Part I:

1.5 EXCESS EXCAVATED MATERIAL

- A. No compensation will be made to the CONTRACTOR for disposal of excess excavated material.

1.6 UPDES PERMIT FOR DEWATERING ACTIVITIES

- A. Obtain Utah Pollutant Discharge Elimination System (UPDES) permit from the Utah Department of Environmental Quality (DEQ) prior to dewatering.

3.3 GENERAL EXCAVATION REQUIREMENTS

Add the following paragraphs I and J:

- I. Placement of excavated material shall be placed so as to not endanger the work and avoid obstructing sidewalks and driveways,
- J. Gutters and swales shall be kept clear or other satisfactory provisions shall be made for street drainage and continuity of irrigation.

DIVISION 32 EXTERIOR IMPROVEMENTS

SECTION 32 12 16.13 PLANT-MIX ASPHALT PAVING

PART 1 GENERAL

1.5 WEATHER

Amend Paragraph A to read as follows:

- A. Temperature: Temperature restrictions may be waived only upon written authorization from ENGINEER.
1. Pave only when air and roadbed temperatures in the shade are greater than 40 degrees Fahrenheit and rising.
 2. Cease paving if air temperature falls below 40 deg. F.

1.7 ACCEPTANCE

C. Mix Temperature at Site:

Add the following table to Paragraph C:

Table for lower ambient air temperature ranges:

Ambient Air Temperature	Compacted Paving Mat Thickness					
	¾"	1"	1 ½"	2"	3"	4"
40 - 45 deg F	-	305	300	290	275	260
45 - 50	-	300	295	285		
50 - 59	-	295	290			
60 - 69	-	290				

E. Compaction:

Table 1 "Compaction Pay Factors" is amended to read as follows:

Table 1 – Compaction Pay Factors					
Criteria	Pay Factor	Marshal Method Basis (ASTM D 5581)		Rice Method Basis – optional method upon approval of ENGINEER (ASTM D 2041)	
		Average of all Tests	Lowest of all Tests	Average of all Tests	Lowest of all Tests
Density, % ASTM D 2950	0.70	> 98		> 97	
	1.0	95 to 98	92 or Greater	93 to 97	89 or Greater
	.90	95 to 98	Less than 92	93 to 97	Less than 89
	.80	Less than 95	92 or Greater	Less than 93	89 or Greater
	.50(a)	Less than 95	Less than 92	Less than 93	Less than 93

Note: (a) ENGINEER will determine whether the material will be rejected and removed or allowed to remain at the 0.50 pay factor.

PART 3 EXECUTION

3.8 TOLERANCES

Paragraph A amended as follows:

- A. Compact the mix to the following requirements:
 - 1. To an average relative density of 95 percent per ASTM D 5581 (Marshal method) with no density test result less than 92 percent; or
 - 2. To an average relative density of 93 percent per ASTM D 2041 (Rice method) with no density test result less than 89 percent. This method is only to be used upon approval of ENGINEER.

SECTION 32 16 13 DRIVEWAY, SIDEWALK, CURB, GUTTER

PART 3 EXECUTION

3.4 CONTRACTION JOINTS

D. Curb, Gutter, Waterway:

Subparagraph 1 is amended to read as follows:

1. Place joints at intervals not exceeding 10 feet.

3.5 EXPANSION JOINTS

Amend paragraph C by adding the following subparagraph:

C. Curb, Gutter, Waterway:

4. For all form placed curb and gutter, place expansion joints at intervals not exceeding 40 feet. Use preformed expansion material, type FI. Refer to 3.5.B.4 and 3.5.D for Slip Form Work.

DIVISION 33 UTILITIES

SECTION 33 05 06 POLYETHYLENE PIPE

PART 2 PRODUCTS

New Article 2.4 to read as follows:

2.4 HDPE (High Density Polyethylene) Pipe

- B. Material: AASHTO M-252 & M-294 Corrugated Polyethylene Pipe, solid or perforated. Smooth Inner Wall Type S, 4" to 36" inside diameter.
 - 1. 4" to 10" inside diameter meeting AASHTO M-252, and 12" to 36" inside diameter meeting AASHTO M-294.
 - 2. The appropriate material specification to be embossed on the pipe every 10 feet.
 - 3. Slots or perforations shall be in corrugation valleys only and should be clean and free of burrs.
- C. Fittings: Separate couplings and fittings should be marked with pipe mfg. name or logo. Tape shall not be used to join pipe sections unless intended for temporary use and then only as approved by the Engineer.
- D. Joint: Joints specified to have gaskets per ASTM F-477 have a rubber gasket seated in a groove on the spigot end. Foam-type weather stripping material is not in compliance.

PART 3 EXECUTION

3.1 INSTALLATION

New paragraph C to read as follows:

- C. Installation of HDPE pipe shall be as follows:
 - 1. Handle the larger sizes (24"-48") with slings, not chains, preferably at 2 pick-up points. When unloading pipe do not drop on end.
 - 2. HDPE corrugated pipe is lightweight which makes handling easy. However, it can be shifted laterally in the trench or may float if not held in place with soil or other methods.
 - 3. The pipe depends on a combination of pipe stiffness and select and common backfill strength to perform as a structure. Select material in the

pipe-zone should be compacted to at least 90% in non-traffic easement areas and 95% in traffic areas and should contain no particles which do not comply with the gradation of untreated base course, Grade 1.

4. Heavy construction equipment (axle loads > H-20) should not be permitted to pass over the pipe unless a minimum of 2 feet of well compacted (min. 90% Proctor) soil or gravel is covering the pipe.
5. High-energy compactors such as Hydro-Hammers should not be used until the pipe is covered by at least 4 feet of soil.
6. In the absence of a special provision provided by the CITY, use ASTM D-2321 as a recommended installation guide.
7. To ensure adequate compaction in the haunches, lift thickness prior to compaction from the bedding to the pipe spring line shall not exceed 4”.

SECTION 33 05 20 BACKFILLING TRENCHES

PART 2 PRODUCTS

2.1 BACKFILL MATERIALS

Amend paragraph A to read as follows:

- A. Common fill; Section 31 05 13. Sand is prohibited for use as backfill material in the pipe zone or trench above the pipe zone. Sand may be used immediately adjacent to some pipes and/or pipe coverings requiring protection from damage which may be caused by larger aggregate backfill material. An exception to this prohibition may be granted by the ENGINEER if adjacent native material consists entirely of a sandy material as defined by Section 31 05 13, paragraph 2.7. Common fill used as bedding and backfill material must be of a granular composition, non expansive material, well graded material containing a wide range of sizes and possesses the qualities to meet the required compaction requirements.

Pea Gravel and Squeegee material are prohibited for use as backfill material in the pipe zone or trench above the pipe zone. No exception to this prohibition may be granted by the ENGINEER.

PART 3 EXECUTION

3.4 GENERAL BACKFILLING REQUIREMENTS

Add subparagraphs H-M:

- H. Do not permit free fall of backfill material which may damage pipe, pipe finish, or alignment.
- I. Except where piping must remain exposed for test, fill pipe zone as soon as possible.
- J. Except where specified otherwise follow:
1. ASTM D 2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
 2. AWWA C605-(Latest Edition) Underground Installation of Polyvinyl Chloride Pipe (PVC) Pressure Pipe and Fittings for Water
- K. Do not damage adjacent structures or service line
- L. Notify City or Engineer of adjacent utilities that are damaged or in poor condition.
- M. Backfill shall be compacted by means of sheep foot rollers, pneumatic tire rollers, vibrating rollers, or mechanical tampers.

Replace section 3.3 with the following:

3.5 PIPE ZONE

- A. Foundation:
 - 1. Region between eight inches (8") and four inches (4") below the bottom of the pipe.
 - 2. Foundation material: One hundred percent (100%) passing two-inch (2") sieve and not more than five percent (5%) passing the one-half inch (1/2") sieve.
 - 3. Install foundation as required by the engineer according to conditions in the trench bottom.
 - 4. Where a chance for water in the trench exists, embedment materials should be selected for their ability to be readily densified while saturated (free-draining, cohesion less, granular materials)
 - 5. Provide a firm, stable, and uniform bedding for the pipe barrel and any protruding features of its joint.
- B. Bedding:
 - 1. Region between four inches (4") and the bottom of the pipe.
 - 2. Bedding material: Size No. 3 sewer rock (2"-1" nominal size) See section 31 05 13 Sewer Rock, Pea Gravel, or granular borrow meeting ASTM D 3282 classification of A-1-a or A-1-b.
 - 3. Material shall contain particles no larger than 2" for ductile iron pipe and 1" for PVC and HDPE
 - 4. Required unless specified by ENGINEER
- C. Haunching:
 - 1. Region between pipe bottom and spring line of pipe.
 - 2. Haunching material: Granular Borrow meeting ASTM D 3282 classification of A-1-a or A-1-b. See 31 05 13 Common Fill 2.2.
 - 3. Material shall contain particles no larger than 2" for ductile iron pipe and 1" for PVC and HDPE
 - 4. Do not permit free fall of backfill material which may damage pipe, pipe finish or pipe alignment
 - 5. Work in by hand and tamp the haunching material to support the underside of the pipe before placing and compacting additional material.
 - 6. Minimum density of 85% Modified Proctor.
- D. Initial Backfill:
 - 1. Region between spring line of pipe and twelve inches (12") above the top of pipe.

2. Initial backfill material: Granular Borrow meeting ASTM D 3282 classification of A-1-a or A-1-b. See 31 05 13 Common Fill 2.2.
3. Material shall contain particles no larger than 2" for ductile iron pipe and 1" for PVC and HDPE
4. Do not permit free fall of backfill material which may damage pipe, pipe finish or pipe alignment.
5. Minimum density of 85% Modified Proctor.

3.4 TRENCH ABOVE PIPE ZONE

- A. Final backfill:
 1. Region above twelve inches (12") from the top of the pipe.
 2. Final backfill material: Granular Backfill Borrow meeting ASTM 3282 classification of A-1, A-2, and A-3 - See 31 05 13 Common Fill 2.2; Untreated Base Course – See 32 11 23; Asphalt Concrete Paving – See 32 12 05; Plant-Mix Asphalt Paving – See 32 12 16.13; Cement Treated Flowable Fill – See 31 05 15
 3. Material shall contain particles no larger than six inches (6").
 4. Maximum lift thickness before compaction is 8-inches (8").
 5. Minimum density of 95% Modified Proctor for areas under pavements and other surface improvements including shoulders of road sections. Minimum of 90% Modified Proctor in other areas.
- B. Install continuous magnetic locator tape directly over buried lines 24" above pipe, unless specified otherwise by ENGINEER.

SECTION 33 05 25 PAVEMENT RESTORATION

PART 3 EXECUTION

3.5 ASPHALT PAVEMENT RESTORATION

Amend paragraph D as follows:

- D. Place asphalt concrete in lifts not exceeding three (3) inches after compaction.
Compact to:
 - 1. 92% of ASTM D 2041 (Rice) optimum; or
 - 2. 95% of ASTM D 5581 (Marshall) optimum.

SECTION 33 08 00 COMMISSIONING WATER PIPELINES

PART 1 GENERAL

1.3 SUBMITTALS

- A. Pipeline Test Report: Submit:

Modify subparagraph 5 to read as follows:

5. DVD and log of visual examination (only required for all gravity systems). CONTRACTOR shall provide said video inspection which shall include the actual footage of the line being inspected and shall be accomplished by a 3rd Party approved by the ENGINEER and at no additional costs to the OWNER.

Add article 1.7 to read as follows:

1.6 PIPE LINES IN EMBANKMENTS

- A. Before laying pipe that is to be in fill or embankment areas, the embankment shall first be placed and compacted to the specified density to a depth of not less than two feet above the top of the proposed pipe. After placing and compacting the embankment, the trench for the pipe or conduit shall be excavated through the fill and fine graded and the pipe installed as specified.

PART 3 EXECUTION

All Articles in Part 3 are hereby repealed and the following is substituted therefore:

3.1 PREPARATION

- A. Notify ENGINEER 48-hours in advance of test.
- B. Carry out tests as pipeline construction progresses to ensure construction methods are producing satisfactory results.
- C. Remove debris, sediment and other material from installed pipe prior to testing. Do not discharge or flush sand, gravel concrete, debris or other foreign material into any existing pipeline system. Flushing with clean water only will be allowed but with minimal flows to eliminate exceeding capacities of the existing gravity systems. Flushing into existing pressurized water systems will not be allowed.
- D. All tests are to comply with Utah Administrative Code

3.2 ALIGNMENT AND GRADE TEST

- A. Do not allow line and grade of pipe to vary more than 1/2-inch in 10-feet and not more than 1-inch variance from true line at any location.
- B. Do not allow grade of pipe to vary more than 1/4-inch in 10-feet for all design grades less than or equal to 1-percent and not more than 1/2 –inch total variance from true grade at any location. Also, do not allow grade of pipe to vary more than 1/2 –inch in 10-feet for all design grades greater than 1-percent and not more than 1-inch total variance from true grade at any location. These tolerances shall be acceptable provided that such variation does not result in a level or reverse sloping invert.
- C. The variation in the invert elevation between adjoining ends of pipe due to eccentricity of joining surface and pipe interior surfaces shall not exceed 1/64-inch per inch of pipe diameter, or 1/4-inch maximum.
- D. Do not exceed deflections allowed by pipe manufacturer.

3.3 PRESSURE TEST

- A. Air Test: The low pressure air test shall be conducted by the following method under the direction of the ENGINEER:
 - 1. All wyes, tees, or ends of lateral stubs shall be suitably capped and braced to withstand the internal test pressures. Caps shall be easily removable for future lateral connections or extensions.
 - 2. After manhole-to-manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs. One of the plugs shall have three hose connections. Air for inflation of the triple connection pneumatic plug shall be supplied through a factory-equipped control panel. There shall be three hose connections from the control panel to the pneumatic plug. The second hose shall be used for continuous reading of the air pressure in the sealed line. The third hose shall be used for introducing low pressure air into the sealed line.
 - 3. There shall be a 32 -inch or larger diameter, 0.30 psig gauge for reading of the internal pressure in the line being tested. Calibrations from the 0-10 psig range shall be in tenths of pounds and the 0-10 psig portion shall cover 90 percent of the complete dial range.
 - 4. Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any groundwater that may be over the pipe. Groundwater's contribution to the head pressure shall be at a rate of 0.433 psi per foot of head. At least 2 minutes shall be allowed for the air pressure to stabilize. After the stabilization period (3.5 psig minimum pressure in the pipe), the third hose shall be disconnected from the control panel.
 - 5. The pipe and joints shall be considered acceptable when the time required in minutes for pressure to decrease from 3.5 to 2.5 psig (greater than the

average back pressure of any groundwater that may be over the pipe) shall not be less than the time shown for the given diameters in the following tables:

<u>Pipe Diameter in Inches</u>	<u>Minutes</u>
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	8.5
21	10.0
24	11.5

6. If the installation fails to meet these requirements, the Contractor shall determine at his own expense the source of leakage and shall repair or replace all defective materials and/or workmanship.

A. Hydrostatic test:

1. Obtain authorization to discharge under the Utah Pollution Discharge Elimination System (UPDES) General permit for dewatering/hydrostatic testing.
2. Shall be conducted in accordance with AWWA C600-99 “Installation of Ductile-Iron Water Mains and Their Appurtenances”
3. Test Pressure. After the pipe has been laid and partially backfilled, all newly laid pipe, or any valve section of it shall be subjected to hydrostatic pressure of at least 1.5 times the working pressure. The specified test pressure shall be based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge.
4. Duration of Pressure Test. The duration of each pressure test shall be at least two (2) hours.
5. Allowable Pressure Drop. The pressure shall not vary by more than 5psi for the duration of the test.
6. Procedure. Each valved section of pipe shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner. When hydrants are in the test section, the test shall be made against the main valve in the hydrant. Testing against a new closed valve which separates the existing and new systems will be allowed only with permission from the CITY. All existing valves and new valves which separate the new and old systems shall be operated by the City. All valve operations should be coordinated with the CITY and with the local fire authority. The pump, pipe connection and all

necessary apparatus including gauges and meters shall be furnished by the Contractor. The Owner will make all taps into the pipe, but the Contractor shall furnish all necessary assistance for conducting the tests.

7. Expelling Air Before Test. Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, air release mechanisms shall be installed, if necessary, at points of highest elevation, and afterwards tightly capped.
8. No piping installation will be acceptable until the leakage is less than the amount allowed by industry standards for the type of pipe material being tested.
9. No piping installation will be acceptable until the leakage is less than the amount allowed by industry standards for the type of pipe material being tested or if no standard prevails, than the number of gallons per-hour is determined by the formula:

$$Q = \frac{LD \times (P)^{1/2}}{133,200}$$

Where: Q = allowable leakage, in gallons per-hour

L = length of pipe under test in feet

D = diameter of pipe in inches

P = average test pressure, in pounds per square inch (gage).

10. All visible leaks are to be repaired regardless of the allowance used for testing.

3.4 OBSTRUCTION AND DEFECTION TEST

- A. Visually examine pipe internally for obstructions, reductions in pipe shape, grade, infiltration and required lateral connections by means of a closed circuit televised recording. Said inspection shall be by closed circuit video inspection of the completed section or sections and shall log the location of all service taps and problem areas which shall include the actual footage of the line being inspected. Videotape shall become the property of RICHMOND City. Any defective workmanship indicated by video inspection shall be repaired by the Contractor at no expense to the Owner.
- B. Prior to commencement of Obstruction test, the pipe must be water flushed to clean and remove all debris. All debris must be trapped on a screen and/or blocked and removed from the downstream manhole and not allowed to enter the existing piping network.

- C. When visual test is not feasible, **and only when approved by the Engineer**, pass through pipeline a round incompressible mandrel which is 1 inch less in diameter than the internal diameter of the pipeline and 2 times the diameter in length.

3.5 INFILTRATION TEST

- A. Maximum is 50 gallons per inch diameter per mile per 24-hours.

3.7 TRACE WIRE CONTINUTY TEST

- A. Test all tracer wire sections for continuity

3.8 PIPE TESTING SCHEDULE

- A. Culinary Water System
 - 1. Pressure test.
 - 2. Disinfection test (Section 33 13 00)
- B. Sanitary Sewer System
 - 1. Alignment and grade test.
 - 2. Obstructions and deflection test (video/mandrel).
 - 3. Infiltration test for gravity pipeline systems.
 - 4. Pressure test – Air test.
- C. Storm Drains
 - 1. Alignment and grade test.
 - 2. Obstructions and deflection test (video/mandrel).
 - 3. Infiltration test for gravity pipeline systems.
 - 4. Pressure test – Air test.
- D. Sub-drains:
 - 1. Alignment and grade test: All pipelines drain.
 - 2. Obstruction and deflection test.
- E. Irrigation-Gravity System
 - 1. Alignment and grade test: All circuits drain.
- F. Irrigation-Pressure System
 - 1. Alignment and grade test: All circuits drain.
 - 2. Pressure test – Hydrostatic test.
 - 3. Operational Testing:

SECTION 33 11 00 WATER DISTRIBUTION AND TRANSMISSION

PART 1 GENERAL

1.2 REFERENCES

C. AWWA Standards:

Add the following standards to this section:

C153 Standard for Ductile-Iron Compact Fittings.

C909 Standard for Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe (ULTRA BLUE), 4 In. Through 12 In. for Water.

Add the following section and standard:

I. ANSI/NSF

61 Drinking Water System Components – Health Effects

1.3 PERFORMANCE REQUIREMENTS

Replace paragraph A with the following:

A. Depth of Cover:

1. 60-inches minimum to top of pipe. 72-inches maximum unless ENGINEER authorizes otherwise.

PART 2 PRODUCTS

2.1 PIPES AND FITTINGS

Add paragraphs E as follows:

E. Use AWWA C900 or AWWA C909 pressure pipe for all installations

2.6 TAPPING SADDLES

Amend paragraph A in its entirety to read as follows:

A. Tapping saddles shall be stainless steel double strapped and epoxy coated.

2.7 SERVICE CONNECTIONS

Amend paragraph A in its entirety to read as follows:

A. Taps: Saddle clamp. Provide plastic spacers or nipples to separate non-similar metals.

B. Service Line:

Add paragraph 3 as follows:

3. Residential service connections are to be 1-inch.

Add paragraph C as follows:

- C. All pipe fittings, valves, or other components that will come into contact with drinking water shall conform to ANSI/NSF 61, and shall bear either the ANSI/NSF 61 or ANSI/NSF – certification mark.

PART 3 EXECUTION

Amend article in its entirety to read as follows:

3.9 INSTALLATION - SERVICE LINE

- A. Pay all applicable fees prior to connection.
- B. Install service lines as indicated or directed by ENGINEER to meter. Additionally extend service line 3 feet beyond sidewalk towards structure being serviced. Provide a 2 x 4 wooden stake at the end of the service line, visibly extended above the finished ground surface and having a blue colored painted end.
- C. When relocating water service lines, replace non-polyethylene pipe with Polyethylene Pipe per Section 33 05 06.
- D. CONTRACTOR shall be responsible for all materials and labor involved with a service line tap.
- E. When existing meter and meter boxes are relocated, CONTRACTOR is required to reconnect the existing service line from property side to the new meter box location.

3.12 BACKFILLING

New paragraph D as follows:

- D. Prior to the execution of backfilling procedures for ductile iron pipe or other metallic pipe and fittings CONTRACTOR must request inspection by OWNER'S representative to verify compliance with poly wrap installation **per paragraph 3.14** and concrete thrust block installation.

Add the following article to read as follows:

3.14 POLY WRAP

- A. Unless otherwise directed by the ENGINEER, the pipe (ductile iron) and associated fittings and valves will be encased in an 8 mil polyethylene wrap. The wrap may be in either tube or sheet form and installed as described in *Installation Guide for Ductile Iron Pipe* by DIPRA. Locations for service taps must be prepared by fully taping the location following re-excavation. All holes must be recovered and properly sealed prior to burial.

Add the following article to read as follows:

3.15 CONNECT TO EXISTING WATERLINE

- A. CONTRACTOR to be responsible for determining the proper fittings and materials required, obtain the ENGINEERS approval of the planned connection, and perform the construction.
- B. Where fitting sizes, such as tees and crosses, are shown on the plans, those sizes will be used. However no attempt has been made to show all needed fittings or materials.

SECTION 33 12 33 WATER METER

PART 2 PRODUCTS

Replace Article 2.2 with the following:

2.2 METERS FOR SERVICE PIPING

- A. Meters 2" and smaller will be provided by the Owner.
- B. Meters larger than 2" will be provided by the Contractor/Developer.

2.4 METER BOXES

Replace paragraph A with the following:

- A. Provide meter barrel as specified on Standard Plan. Provide a meter box frame and cover of sufficient strength to withstand loadings in vehicular traffic areas without breaking.

PART 3 EXECUTION

Amend section 3.1 in its entirety to read as follows:

3.1 INSTALLATION

- A. Ensure all parts are in working order.
- B. Where water lines are located below paved streets or public right-of-ways containing curbs, install valves and meter boxes at the back of the curb per standard plan 521-R. Such installation shall be in accessible locations beyond limits of walks and driveway approaches or other pedestrian and vehicular interference.
- C. Where no curbing exists, install valves and boxes in accessible locations beyond limits of street surfacing, walks and driveway approaches or to other location with no pedestrian or vehicular interference.
- D. Meters shall not be installed in any driveway, pedestrian sidewalk or other location which locations may be a life/safety concern regarding access and maintenance of such meters.

SECTION 33 13 00 DISINFECTION

PART 2 PRODUCTS

2.1 DISINFECTANT

New paragraph E as follows:

- E. All chemicals used in performing the disinfection test shall conform to ANSI/NSF 60. Chemical containers shall bear the ANSI/NSF 60 certification mark.

PART 3 EXECUTION

Replace Article 3.2 with the following:

3.2 DISINFECTION OF WATER LINES

- A. Disinfection to be performed in accordance with AWWA C651-05 “Disinfecting Water Mains”
- B. Chlorination
 1. Chlorination of Completed Water Line. The new water line shall be disinfected by chlorination. The Contractor will be responsible for all related costs and fees related to the chlorination of the completed water line. This test shall be performed prior to connection of the new water lines to the existing RICHMOND City culinary water system unless approved and coordinated with ENGINEER.
 2. Tablet Method. Includes the placement of calcium hypochlorite granules or tablets in the water main as it is being installed and then filling the main with potable water when finished. Main shall be filled at a rate so that the main will flow at a rate no greater than 1ft/s. This method precludes pre-flushing. It requires contact time of 24 hours and an initial chlorine concentration of 25mg/L and a detectable amount of chlorine for a residual. CONTRACTOR must show that all portions of the main have contact with the chlorinated water.
 3. Continuous Feed Method. Includes flushing the main, and filling with chlorinated water so that after a 24-hour period there will be a free chlorine residual of not less than 10 mg/L.
 4. Slug Method. Includes flowing through the main a slug of water dosed with chlorine to a concentration of 100 mg/L. Ensure that the main and all its appurtenances will be exposed to the highly chlorinated water for a period of not less than 3 hours.

C. Final Flushing

1. Flushing Velocities. Flushing velocity in the main shall not be less than 2.5 ft/s to remove particulates.

Pipe Size (inches)	Flow Required to Produce 2.5 fps velocity	
	CFS	gpm
6	0.49	220
8	0.87	392
10	1.36	612
12	1.96	881
14	2.67	1,200
16	3.49	1,567
18	4.42	1,983
20	5.45	2,448
24	7.85	3,525

2. Neutralizing Chemical. If there is any possibility that the chlorinated discharge will cause damage to the environment , then a neutralizing chemical shall be applied to the water to be wasted in order to neutralize thoroughly the residual chlorine.
3. Diffuser. In all cases contractor should provide a diffuser to reduce the erosive effects of the discharge flows.

D. Bacteriological Tests

1. Performance of Test. The disinfection test shall be performed by RICHMOND City or an approved 3rd party with cooperation from the CONTRACTOR in performing any necessary excavation and subsequent backfilling at no additional cost to the CITY. The lab fees for the “Presence/Absence Coli form” test shall be paid by the CONTRACTOR.
2. Number of Tests. After final flushing and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new main. (Note: The pipe, the water loaded into the pipe, and any debris all exert a chlorine demand that can interfere with disinfection.)
3. Sample Locations. At least one set of samples shall be collected from every 1,200 feet of new line, plus one set from the end of the line and one set from each branch unless directed otherwise by city.
4. Sampling port. It is suggested that a combination blow off and sampling tap be used for mains up to and including 8-inches. No hose or fire hydrant shall be used in the collection of samples unless directed by city. If no other sampling port is available, well-flushed fire hydrants may be used with the understanding that they do not represent optimum sampling conditions.
5. Test Failure. Failure to pass the bacteriological test requires that the flushing or disinfection process be repeated.

SECTION 33 31 00 SANITARY SEWERAGE SYSTEMS

PART 2 PRODUCTS

2.3 MANHOLES

Amend paragraphs B and C as follows:

- B. Steps are required and shall be plastic.
- C. Offset cone or offset flat slab concrete.

SECTION 33 41 00 STORM DRAINAGE SYSTEMS

PART 2 PRODUCTS

2.1 PIPING AND FITTINGS

New paragraph D as follows:

- D. For all Sub-Drains, lateral piping for individual service connections shall be HDPE or similar product, from the mainline to the edge of the public right-of-way. When Sub-Drain mainline piping is of a material other than HDPE, provide appropriate adapter to the 4" or 6" HDPE lateral.

2.5 CLEANOUTS AND MANHOLES

Paragraphs B and C amended as follows:

- B. Steps: required.
 - 1. Material shall be plastic.
- C. Offset cone or offset flat slab concrete.

PART 3 INSTALLATION

3.5 SUB DRAIN SYSTEMS

Add paragraphs E as follows:

- E. Laterals for all sub drain systems shall be extended from the mainline to the property line and shall be connected to the mainline by means of an appropriate adapter.

END OF DOCUMENT

**RICHMOND CITY
MANUAL OF DESIGN &
CONSTRUCTION STANDARDS**

PART III

**AMENDMENTS TO THE
“MANUAL OF STANDARD PLANS”
2012 edition by the Utah Chapter of APWA**

Revised:
January, 2013

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**SUMMARY OF
AMENDMENTS TO THE
“MANUAL OF STANDARD PLANS”
2012 edition by the Utah Chapter of APWA**

PART 2 – ROADWAY

Curb, Gutter, Driveway, Sidewalk

205	Curb and gutter	Amended
	1. GENERAL	
	<i>Add paragraph C as follows:</i>	
	C. Type A curb and gutter is required unless approved otherwise by Engineer.	
209	Curbs	Not used
215	Dip driveway approach	Not used
216	Mountable curb driveway approach.....	Not used
221	Flare driveway approach 1 of 2	Amended
	<i>Amend the following in the drawing:</i>	
	The maximum allowed cross-slope for all sidewalk is 2%	
221	Flare driveway approach 2 of 2	Not used
229	Piped driveway approach.....	Not used
231	Concrete sidewalk.....	Amended
231	Sidewalk.....	Amended
	<i>Amend table for (T) with the following:</i>	
	DEPTH OF SIDEWALK (T):	
	A. New construction: 4’ in residential and non-residential zones.	
	B. Removal and replacement construction: Match existing.	
232	Patterned concrete park strip.....	Not Used
235	Corner curb cut assembly.....	Amended
	1. GENERAL	
	<i>Add paragraph D as follows:</i>	
	D. COMPLIANCE WITH ADA STANDARDS: All ramps shall comply with Americans with Disabilities Association (ADA) Standards.	

- 242 Form strip fillerAmended
1. GENERAL
Add paragraph B as follows:
B. Park strip to be maintained by homeowner.

Roadways

- 248-N Utility easement section (1 of 1).....New
249-N Roadway sections 66 foot - local – swales (1 of 3)New
249-N Roadway sections 66 foot - local – curbs (2 of 3)New
249-N Roadway sections 48 foot – local – curbs (3 of 3).....New
250-N Utility locations swales – option A (1 of 3).....New
250-N Utility locations swales – option B (2 of 3)New
250-N Utility locations curbs (3 of 3).....New
255 Asphalt concrete “T” patch.....Amended
Amend drawing as follows:
The widths of all second pavement section cuts (asphalt and untreated base course) shall be 12” from the edge of disturbed trench sides.

Survey Monument

- 271 Corner and boundary markers.....Amended
1. GENERAL
Add paragraph B as follows:
B. Type B corner marker required, Type D boundary marker required.

PART 3 – STORM DRAIN

Catch Basins, Inlets, Outlets and Hardware

- 317 Curb inlet/outletNot used
322 Curb outletNot used
325-N Dipstone Inlet.....New

PART 4 – SANITARY SEWER

Manholes and Hardware

411 Sanitary sewer manholeReplace with
411-R

PART 5 – WATER SYSTEMS

Fire Hydrants

511 Fire hydrant with valveReplace with
511-R

521 ¾” and 1” meterReplace with
521-R

Piping

541 Water service lineNot used

551 ¾” and 1” service tapsNot used

Thrust Blocks

562 Tie-down thrust restraintsAmended

2. PRODUCTS

Amend note D. to read as follows:

D. Reinforcing steel bars to be epoxy coated at least 15 mils thick.
Minimum stress yield strength of tie down bars is 60,000 psi.

End of Section