

**POLICY 39. CONSTRUCTION AND DEVELOPMENT STANDARDS**

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**Chapter 39.01. General Provisions.**

**39.01.010. Improvement Requirements.**

- A. General.
- B. Improvements Made Before Recording.
- C. Variations, Substitutions and Exceptions.
- D. Protection of Existing Improvements.
- E. Maintaining Existing Road Surfaces.
- F. New Materials.
- G. City Furnished Products
- H. Product Delivery and Handling.
- I. Product Storage and Protection.
- J. Building Permits.
- K. Other Specifications and Standards.

**39.01.020. Definitions.**

**39.01.010. Improvement Requirements.**

A. General. This policy defines the general requirements for improvements to be built by the Developer, subdivider, owner, or Contractor for all types of construction, (to include residential, commercial, industrial, institutional, governmental and professional office). All improvements which are in areas that are or will become public rights-of-way and/or easements, or that will be under the responsibility of a homeowners association shall meet the requirements of these specifications.

The improvements shall include all street improvements in front of all lots and along all dedicated streets to a connection with existing improvements of the same kind ~~or~~ and to the ~~boundary~~ boundaries of the ~~development~~ subdivision nearest existing improvements. Layout must provide for future extension to adjacent development and to be compatible with the contour of the ground for proper drainage. All ~~culinary~~ water, sanitary sewer, ~~pressurized irrigation, electric, communication, storm, land or groundwater drains~~ and any other buried utilities or conduits shall be installed to the boundary lines of the Subdivision or development.

B. Improvements Made Before Recording. Prior to the commencement of any improvements made before recording, the following must be in place:

1. Approved sets of construction plans;
2. The minimum cash security required by Spanish Fork City Municipal Code §16.20.110 deposited with the City;
3. All inspection fees for the development paid to the City;
4. The development agreement; and
5. The preconstruction meeting.

All construction and development standards must be met and inspections must be obtained and passed. All off-site improvements must be bonded for the full 125% of the total estimated cost as required by these standards.

C. Variations, Substitutions and Exceptions. Any variation, substitution or exception from the standards in this policy must be authorized in writing by the City Engineer or his/her designee. Product options and substitutions must meet the requirements of APWA 01630. Any item of construction not covered in these standards must have plans and specifications approved by the City Engineer or his/her designee.

D. Protection of Existing Improvements. The Contractor shall be responsible for the protection of any existing improvements on public or private property at the start of work or placed there during the progress of the work. Existing improvements shall include but are not limited to permanent surfacing, curbs, ditches, driveways, culverts, fences, walls and landscaping. Any surface improvements damaged as a result of construction shall be restored or replaced to an equal or better condition then before. This shall be accomplished in a timely manner.

E. Maintaining Existing Road Surfaces. The Contractor shall be responsible for maintaining existing road surfaces suitable for travel by the public. The Contractor shall be responsible for all dust and mud control and all claims and damages resulting from failure to maintain the construction area.

F. New Materials. Only new materials may be used during construction unless otherwise authorized by the City.

**G. City Furnished Products.** If the City furnishes any products the Contractor shall conform to requirements and specifications of APWA 01640.

**H. Product Delivery and Handling.** The Contractor shall conform to requirements and specifications of APWA 01650 for product delivery and handling.

**I. Product Storage and Protection.** The Contractor shall conform to requirements and specifications of APWA 01660 for product storage and protection.

**J. Building Permits.** The City may issue a building permit upon application, in compliance with all laws, ordinances, rules, and regulations. No building permit will be issued until all the improvements are installed, accepted, and in service for the entire plat.

When asphalt pavement plants are closed for the winter, building permits may be issued before paving if there is six inches of compacted road base in all areas to be paved.

The City Engineer or his/her designee is hereby designated as the responsible official to accept the improvements.

**K. Other Specifications and Standards.** City standards and ordinances shall supercede all other Standards whenever they conflict.

### 39.01.020. Definitions.

**APWA.** The Utah Chapter, American Public Works Association Manual of Standard Specifications, 2002 Edition. These standard specifications can be viewed on-line at <http://www.apwa.utah.usu.edu/>. When sections of the APWA manual are referred to in these standards, the Contractor shall also adhere to the requirements and specifications of all related sections referred to by the section of the APWA manual.

**AWWA.** The American Water Works Association Standards, April 2002 Edition.

**City.** The City of Spanish Fork, Utah.

**City Engineer.** The person appointed by the City to be the City Engineer.

**City Planner.** The person appointed by the City to be the City Planner.

**Civil Engineer.** A person registered with the State of Utah to practice as a professional engineer.

**County.** Utah County, Utah.

**General Plan.** The general plan document as approved by the city council.

**Construction Plans.** Construction plans include drawings showing all required improvements for a development showing their location, size, grade, and elevations.

**Consumer.** A person or company receiving service from any City utilities.

**Contractor.** A person or company hired by the City or a Developer to perform construction in or for the City, having appropriate state licenses to perform said work.

**Council or City Council.** The governing body of the City.

**Cul-de-sac.** A permanent dead end street.

**Development Review Committee.** The Development Review Committee (DRC) of Spanish Fork City.

**Developer.** Person, persons, partnership or corporation developing residential, commercial or industrial property.

**Energy Division.** The division of City government responsible for the City owned Electric and Communication utilities.

**Final Plat.** An original recordable plat drawn on mylar in a form approved by the City and County, showing all lots, streets, utility easements, etc.

**Flood Plain.** That area designated on the most recent Flood Insurance Rate Map for the City of Spanish Fork, prepared by the Federal Emergency Management Agency, as a flood plain as amended.

**Improved Lot.** A lot which has all the improvements required in the Subdivisions ordinance.

**Improvements.** Includes roads, streets, curb, gutters, sidewalks, grading, landscaping, water and sanitary sewer systems, irrigation systems, drainage systems, power and communication systems, fences, public facilities, trees or other requirements by this chapter or by the City.

**Land Surveyor.** A person registered with the State of Utah to practice as a licensed land surveyor.

**Lot.** A parcel or tract of land within a subdivision which is or may be occupied by a building or structure and the accessory buildings, structures or uses customarily incident thereto, including such open spaces as are arranged and designed to be used in connection with the building according to the zone within which the lot is located.

**Offsite Facilities.** Facilities outside of the boundaries of the subdivision or development site which are designated and located to serve the needs of the subdivision or development or adjacent property, usually lying between a development and existing facilities.

**Onsite Facilities.** Facilities installed within or on the perimeter of the subdivision or development site.

**Parcel of Land.** A contiguous area of land in the possession or ownership of one person with one tax identification number.

**Planning Commission.** The Planning Commission of Spanish Fork City.

**Preliminary Plat.** A map or plat of a proposed subdivision or development with accompanying supplementary documents.

**Public Utility Easements.** The easements required to place public utilities across any privately owned property.

**SFCN.** The Spanish Fork Community Network.

Site Plan. A plan for a commercial, industrial, institutional, governmental or planned residential development in the City.

Streets. A thoroughfare which has been dedicated and accepted by the city council, which the city has acquired by prescriptive right or which the city owns, or is offered for dedication on an approved recorded final plat. For further explanation see the streets section.

Subdivision. Any parcel of land that is divided, re-subdivided or proposed to be divided into two or more lots, parcels, sites, units, plots, or other division of land for the purpose, whether immediate or future, for offer, sale, lease, or development either on the installment plan or upon any and all other plans, terms, and conditions. A subdivision includes (1) the division or development of land whether by deed, metes and bounds description, devise and testacea, lease, map, plat, or other recorded instrument; and (2) divisions of land for all land for all residential and nonresidential uses, including land used or to be used for commercial, agricultural, and industrial purposes.

Utilities. Includes culinary water lines; irrigation lines; sanitary sewer; storm, land and groundwater drains; gas lines; electric power lines; cable television and telephone lines; underground conduits; and junction boxes and all appurtenances to the above.

Zoning Ordinance. The comprehensive zoning ordinance adopted by the city council as Title 17 of the Spanish Fork Municipal Code.

**Chapter 39.05. Preliminary Plat.**

**39.05.010. Filing.**

- A. Submission.
- B. Review.

**39.05.020. Form and Contents.**

- A. Preliminary Plat.
- B. Master Planned Development Subdivision Packet.
- C. Soils Report.
- D. Storm Water Plan.

**39.05.010. Filing.**

A. Submission. Developers should review conceptual plans with the City Planner before preparing preliminary plats. To apply for a preliminary plat, complete a preliminary plat application form. Forms are available at the City office or City website. Submit the completed form to the engineering secretary with the following:

1. Seven 24x36 inch copies of the preliminary plat drawings folded to a 9x12 inch size so the name of the subdivision is visible;
2. Two clearly legible 11x17 inch copies of the preliminary plat drawings;
3. A computer aided design (CAD) file of the plat must be submitted on a 3 1/2" disk, zip disk, CD, or by an e-mail in an .dwg or .dxf format. The CAD file of the subdivision must be in the 1927 North American Datum (NAD27) State Plane Coordinate System, Utah Central Zone, US Foot, with a tie to a section corner;
4. Payment of all the fees for preliminary plats.

If anything is submitted by e-mail the engineering secretary must be contacted for the proper e-mail address and for confirmation the e-mail was received.

B. Review. The City will review the submission and notify the Developer of any changes that must be made. Once these changes are made, one 24x36 inch copy, one 11x17 inch copy and a CAD file of the plat must be submitted to the engineering secretary. Ten bound subdivision packets must also be submitted for master planned developments.

All drawings, CAD files, and packets must be updated and re-submitted to the City with any changes made that were required by the Development Review Committee, Planning Commission, or City Council after each meeting.

**39.05.020. Form and Contents.**

A. Preliminary Plat. The preliminary plat of a subdivision shall contain the following information:

1. The proposed name of the subdivision;
2. The names and addresses of the Developer, the Civil Engineer of the subdivision, and other persons to whom notice of the hearing to be held by the City Council should be sent;

3. The names of all adjacent subdivisions and property owners;
4. The location of the subdivision as a part of some larger subdivision or tract of land referred to in the records of the county recorder. In such case, a sketch of the prospective street system of the unplatted parts of the subdivider's land shall be submitted and the street system of the part submitted shall be considered in light of existing master street plans or other Planning Commission street studies;
5. A tie to a section corner. All horizontal data shall be based on the 1927 North American Datum (NAD27) State Plane Coordinate System, Utah Central Zone, US Foot. Horizontal datum shall be clearly written on all plat drawings;
6. A contour map with vertical intervals not to exceed two feet. Contours shall be clearly labeled. All vertical data shall be based on the 1929 North American Vertical Datum (NAVD29). Vertical datum shall be written on plat; and
7. ~~The location, areas and principal dimension of~~ **Show** all existing and proposed streets, alleys, easements, watercourses, fence lines, utilities, buildings, public areas and any other important features within 200 feet of the tract to be subdivided;
8. A table including: total acreage of area proposed for development, total acreage in lots, total acreage in open space, percent of open space, total number of lots, density in lots per acre.
9. The date of preparation, a standard engineering scale of not more than 100 feet to the inch, a north arrow, and a vicinity map;
10. A stamp and signature of a Civil Engineer licensed in the state of Utah.

B. Master Planned Development Subdivision Packet.

The subdivision packet shall include a project overview, plat drawings, product elevations, landscape plan, description and design of amenities, CC&R's, and soil reports. The description and design of amenities shall include detailed drawings and pictures of proposed playgrounds, open space, trails, streetscapes, architectural variety, fencing, and any other items deemed necessary by the City Planner.

C. Soils Report. The Developer must provide a detailed soils report addressing the following issues for the subdivision: hill stabilization, road design including CBR of existing soils, foundation design, groundwater impacts, and general soil stability. Report must be stamped and signed by a Civil Engineer licensed in the state of Utah.

**Whenever the soils report for a development requires foundation drains a storm drain system with laterals to each**

foundation drain must be installed. Storm drain system must be at a lower elevation than the sewer system.

D. Storm Water Plan. The Developer must provide a detailed storm water plan for the subdivision. This plan shall include all calculations showing that it meets all the requirements of the Construction and Development Standards. Plan and calculations required by Chapter 39.20. Improvement and Design Requirements must be stamped and signed by a Civil Engineer licensed in the state of Utah.

**Chapter 39.10. Final Plat.****39.10.010. General.**

A. Time Limitation for Improvements.

**39.10.020. Filing.**

A. Submission.

B. Review.

C. Recordation.

**39.10.030. Form and Contents.**

A. Final Plat.

B. Construction Plans.

**39.10.010. General.**

A. Time Limitation for Completion. All improvements within subdivisions must be completed within one year of the date of **pre-construction meeting approval by the Development Review Committee.** Improvements which are not completed within the time limitation imposed herein shall work a forfeiture of any bond or surety which shall have been posted by the owner or subdivider.

**39.10.020. Filing.**

A. Submission. To apply for a final plat, complete a final Plat application form. Forms are available at the City office or City website. Submit the completed form to the engineering secretary with ~~four~~ **seven** ~~five~~ 24x36 inch copies of the final plat and construction drawings stapled and folded to a 9 x 12 inch size so the name of the subdivision and plat is visible, the final plat on top.

~~Two 11x17 inch copies of the Final Plat and construction drawings;~~

~~3. A computer aided design (CAD) file of the plat must be submitted on a 3 1/2" disk, zip disk, CD or by e-mail in an .dwg or .dxf format. The CAD file of the subdivision must be in the 1927 North American Datum (NAD27) State Plane Coordinate System, Utah Central Zone, US Foot, with a tie to a section corner;~~

~~4. A copy of exhibit "A" for the Conditions, Covenants and Restrictions (CC&R's).~~

~~If anything is submitted by e-mail the engineering secretary must be contacted for the proper e-mail address and for confirmation the e-mail was received.~~

B. Review. The City will review the submission and notify the Developer of any changes that must be made. Once these changes are made **submit the following:**

1. **One 24x36 inch copies of the final plat and construction drawings stapled and folded to a 9 x 12 inch size so the name of the subdivision and plat is visible, the final plat on top;**
2. **One 11x17 inch copies of the Final Plat and construction drawings;**

3. **A computer aided design (CAD) file of the plat must be submitted on a 3 1/2" disk, zip disk, CD or by e-mail in an .dwg or .dxf format. The CAD file of the subdivision must be in the 1927 North American Datum (NAD27) State Plane Coordinate System, Utah Central Zone, US Foot, with a tie to a section corner.**

**If anything is submitted by e-mail the engineering secretary must be contacted for the proper e-mail address and for confirmation the e-mail was received.**

Once accepted by the Development Review Committee, four 24x36 inch copies, ~~two~~ **one** clearly legible 11x17 inch copies and a CAD file of the plat must be submitted to the engineering secretary. Two 24x36 inch copies will be retained by the City, the other two 24x36 inch copies will be signed and stamped by the City and returned to the Developer. The Developer must insure that a copy of the signed and approved construction plans is on site at all times during construction.

C. Recordation. Only the City may record final plats with the county recorder. All inspection, testing and/or connection fees required by ordinance shall be paid and permits required shall be obtained prior to the recording of Final Plat.

**39.10.030. Form and Contents.**

A. Final Plat. The Developer must submit a mylar of the Final plat to the City in a format approved by the City and the County. The Final plat of a subdivision shall contain the following:

1. A tie to a section corner and the state plane coordinates of each point. All horizontal data shall be based on the 1927 North American Datum (NAD27) State Plane Coordinate System, Utah Central Zone, US Foot. Horizontal datum shall be clearly written on the plat;
2. Accurate dimensions for all lines, angles and curves used to describe boundaries, streets, alleys, easements, areas to be reserved for public use, and other important features; the lines, angles, dimensions, state plane coordinates, bearings, areas and numbers of all lots, blocks and parts reserved for any reason within the subdivision. All dimensions shall be determined by an accurate field survey which shall balance and close **as required by the county;** ~~within a limit of one in ten thousand;~~
3. All lots and blocks are to be numbered, addressed, and named in accordance with the street numbering and naming system assigned by the City on the preliminary plat;
4. A statement that "All **culinary water and pressurized irrigation** lines up to and including the meter, all **sanitary sewer mains, pressurized irrigation lines up to and including the stop and**

- ~~waste~~, all electric meters, and all electric and SFCN communication service lines up to the mast on overhead installations and to the top of the meter base for underground installations are dedicated to Spanish Fork City.”;
5. Plats and signatures shall be in waterproof ink on a 24x36 inch mylar sheet. There shall be an unencumbered margin of one and one-half inches on the left-hand side of the sheet and not less than a half inch margin around the outer three sides of the sheets. The scale shall be a standard engineering scale of no more than 100 feet to the inch;
  6. A stamp and signature of a surveyor licensed in the state of Utah.

B. Construction Plans. A complete set of construction plans must be submitted with all Final Plats. Construction plans must conform to the standards for construction plans found in the Improvement and Design Requirements section.

**Chapter 39.15. Site Plans.**

**39.15.010. General.**

A. Time Limitation for Completion.

**39.15.020. Filing.**

A. Submission.

B. Review.

**39.15.030. Form and Contents.**

A. Site Plan.

B. Construction Plans.

C. Easements and Deeds.

D. Soils Report.

E. Storm Water Plan.

F. Elevations.

G. Landscaping Plan.

**39.15.010. General.**

A. Time Limitation for Completion. All City improvements required for a site plan must be completed within one year of the date of approval by the Development Review Committee.

Improvements which are not completed within the time limitation imposed herein shall work a forfeiture of any bond or surety which shall have been posted by the owner or subdivider.

**39.15.020. Filing.**

A. Submission. Developers should review conceptual plans with the City Planner before preparing Site plans. To apply for a Site plan, complete a Site plan application form. Forms are available at the City office or City website. Submit the completed form to the engineering secretary with the following: ~~1. Seven~~ **one** 24x36 inch copies of the Site plan drawings folded to a 9x12 inch size so the name of the Site plan is visible.

~~2. Two clearly legible 11x17 inch copies of the Site plan drawings;~~

~~3. A computer aided design (CAD) file of the plan must be submitted on a 3 1/2" disk, zip disk, CD, or by an e-mail in an .dwg or .dxf format. The CAD file of the subdivision must be in the 1927 North American Datum (NAD27) State Plane Coordinate System, Utah Central Zone, US Foot, with a tie to a section corner;~~

~~4. Payment of all the fees for Site plans.~~

~~If anything is submitted by e-mail the engineering secretary must be contacted for the proper e-mail address and for confirmation the e-mail was received.~~

B. Review. The City will review the submission and notify the Developer of any changes that must be made. Once these changes are made **submit the following:**

1. **One 24x36 inch copies of the final plat and construction drawings stapled and folded to a 9 x**

- 12 inch size so the name of the subdivision and plat is visible, the final plat on top;
2. **One 11x17 inch copies of the Final Plat and construction drawings;**
3. **A computer aided design (CAD) file of the plat must be submitted on a 3 1/2" disk, zip disk, CD or by e-mail in an .dwg or .dxf format. The CAD file of the subdivision must be in the 1927 North American Datum (NAD27) State Plane Coordinate System, Utah Central Zone, US Foot, with a tie to a section corner.**

**If anything is submitted by e-mail the engineering secretary must be contacted for the proper e-mail address and for confirmation the e-mail was received.**

Once accepted by the Development Review Committee, four 24x36 inch copies, ~~two~~ **one** clearly legible 11x17 inch copies and a CAD file of the plat must be submitted to the engineering secretary. Two 24x36 inch copies will be retained by the City, the other two 24x36 inch copies will be signed and stamped by the City and returned to the Developer. The Developer must insure that a copy of the signed and approved construction plans is on site at all times during construction.

**39.15.030. Form and Contents.**

A. Site plan. A Site plan shall contain the following information:

1. The proposed name of the development;
2. The names of all adjacent property owners;
3. A tie to a section corner. All horizontal data shall be based on the 1927 North American Datum (NAD27) State Plane Coordinate System, Utah Central Zone, US Foot. Horizontal datum shall be clearly written on all plat drawings;
4. **A statement that "All culinary water and pressurized irrigation lines up to and including the meter, all sanitary sewer mains, all electric meters, and all electric and SFCN communication service lines up to the mast on overhead installations and to the top of the meter base for underground installations are dedicated to Spanish Fork City.";**
5. A contour map with vertical intervals not to exceed two feet. Contours shall be clearly labeled. All vertical data shall be based on the 1929 North American Vertical Datum (NAVD29). Vertical datum shall be written on the plan; and
6. The location, areas, and principal dimension of all existing and proposed streets, alleys, easements, watercourses, fence lines, utilities, buildings, public areas and any other important features within 200 feet of the site;
7. A table including the following:
  - a. Total area of site;

- b. Total area of landscaping;
  - c. Total area of building;
  - d. Total developed and undeveloped area;
  - e. Total impervious area;
  - f. Total number of parking spaces;
  - g. Total number of handicap parking spaces;
  - h. Type of building construction for the Fire Code;
  - i. Whether the building will have sprinklers inside for fire protection.
8. The date of preparation, a standard engineering scale of not more than 100 feet to the inch, a north arrow, and a vicinity map;
  9. A stamp and signature of an engineer licensed in the state of Utah.

B. Construction Plans. A complete set of construction plans must be submitted with each Site Plan. Construction plans must conform to the standards for construction plans found in the Improvement and Design Requirements section.

C. Easements and Deeds. The Developer must provide the legal documents for all easements and deeds required by the City.

D. Soils Report. The Developer must provide a detailed soils report addressing the following issues for the site: hill stabilization, road design, foundation design, groundwater impacts, and general soil stability. Report must be stamped and signed by an engineer licensed in the state of Utah.

Whenever the soils report for a development requires foundation drains a storm drain system with laterals to each foundation drain must be installed. Storm drain system must be at a lower elevation than the sewer system.

E. Storm Water Plan. The Developer must provide a detailed storm water plan for the site. This plan shall include all calculations showing that it meets all the requirements of the Construction and Development Standards. Plan and calculations required by Chapter 39.20. Improvement and Design Requirements must be stamped and signed by an engineer licensed in the state of Utah.

F. Elevations. The Developer must provide a detailed elevation in color for all buildings for a Site Plan.

G. Landscaping Plan. The Developer must provide a detailed landscape plan for the entire area of a Site Plan.

**Chapter 39.20. Improvement and Design Requirements.****39.20.010. General.**

- A. Easement.
- B. Traffic Control.
- C. Survey.
- D. Temporary Controls.
- ~~D. Ground Water.~~

**39.20.020. Construction Plans.**

- A. General.
- B. Plan Sheets.
- C. Electric and Communication Plans.
- D. Street, Parking Lot and Driveway Plans.
- E. Sanitary Sewer, Storm, Land and Groundwater Drain Plans.
- F. Culinary Water and Pressurized Irrigation Plans.
- G. Landscaping Plans.
- H. Irrigation Canal and Pipe Plans.

**39.20.030. Street Improvements.**

- A. General.
- B. Cul-de-sacs.
- C. Curbs, Gutters, and Sidewalks.
- D. Partial-Streets Widths.
- E. Driveway and Intersection Location.
- F. Parking.
- G. Reverse Frontage Lots.
- H. Temporary Turn-Arounds.
- I. Allowable Grades.
- J. Stamped Concrete.
- K. Precast Concrete or Block Walls.
- L. Pedestrian Ramps.
- M. Minimum Curve Radius.

**39.20.040. Utility Improvements.**

- A. General.
- B. Communication.
- C. Electric.
- D. Pressurized Irrigation.
- E. Sanitary Sewer.
- F. Storm Drain.
- G. Culinary Water.

**39.20.010. General.**

A. Easements. Developer shall provide easements for all utility extensions through private property. Developer shall also provide a 10 foot public utility easement along public right-of-ways or streets and **along one side of all other property lines.** ~~a 7 1/2 foot public utility easement along all other property lines.~~ If setbacks are less than ~~7~~ **10** feet then public utility easements shall be the extent of the setback.

B. Traffic Control. A traffic control plan shall be submitted to the City prior to construction in or along public streets. All traffic control shall comply with **APWA**

~~01555. the Manual for Uniform Traffic Control Devices (MUTCD).~~

C. Survey. The alignment of the side property lines for each lot in a subdivision shall be marked in the top back of curb with a **lot line witness marker that meets the requirements and specifications of APWA 02895** ~~permanent property pin.~~ All property pin materials and installation methods shall have prior approval of the City Engineer.

All property corners shall be marked with a **rebar corner marker that meets the requirements and specifications of APWA 02895.** ~~30-inch rebar and licensed land surveyor's cap.~~ **Corners must be marked** before acceptance of a subdivision's improvements by the City. These rebars must be offset 2 to 4 inches by a steel tee post four feet out of the ground on the property line alignment.

D. Temporary Controls. **Temporary controls such as noise, dust, mud, surface water, ground water, pollution and erosion controls shall be made when applicable.** **Controls shall meet the requirements and specifications of APWA 01570.**

~~D. Ground Water. Potential groundwater or subsurface drainage problems may have additional requirements. These requirements will be reviewed and approved by the City Engineer or his/her designee. The pumping of groundwater across sidewalks, into gutters or into the sanitary sewer system is prohibited.~~

**39.20.020. Construction Plans.**

A. General. The following instructions are for the purpose of standardizing the preparation of construction plans to obtain uniformity in appearance, clarity, size, and style. Plans and designs shall meet the standards defined in the specifications and drawings hereinafter outlined. All drawings and/or prints shall be clear and legible and conform to good engineering and drafting room practice.

Include the following in construction plans for all developments:

1. A copy of the proposed final plat or site plan;
2. A plan view of the entire project showing all utilities, roads, and appurtenances;
3. Plan and profiles of all **storm, land and groundwater drains, sanitary sewer, curb, gutter, and irrigation;**
4. **Detail drawings of street cross sections according to the standard drawings and other detail drawings only for items not found in the City standard drawings.** Detail drawings shall be to scale and completely dimensioned and described. All items shall be designed in accordance with minimum requirements established by the City Construction and Development Standards;
5. Complete plans for all off-site work to be done in conjunction with the project.

6. A stamp and signature of a Civil Engineer licensed in the state of Utah on each plan sheet, detail drawing, and design sheet.
  7. **Engineer's take off quantities and cost estimate for all construction work related to the project.**
- B. Plan Sheets. Include the following on each plan sheet:
1. North Arrow;
  2. A standard engineering scale between 1 inch equals 10 feet and 60 feet. A scale of 1 inch equals 100 feet may be used on the plan view of the entire project if necessary to fit project on one sheet.
  3. Title block along right side of sheet with title of drawing in lower right corner. Include in title block:
    - a. Name of subdivision and plat or site plan;
    - b. Name of city;
    - c. Specific type of drawing (construction drawings, plan view, plan and profiles, off-site construction, detail drawings);
    - d. Name of engineer, surveyor, or firm preparing drawings;
    - e. Drawing number of total number of drawings.
  4. Also include the following with profile drawings:
    - a. Vertical scale of 1 inch equals 1, 2, 3, 4, 5, or 6 feet.
    - b. Reference to the vertical datum. The 1929 North American Vertical Datum (NAVD29) shall be used for all elevation data.
    - c. Benchmark location and elevation for checking construction.
    - d. Stationing aligned from plan view with the profile view.
    - e. Existing ground, ditch, and utility lines.
- C. Electric and Communication Plans. Construction plans must include the location of all existing poles, transformers, secondary junction boxes, sectionalizers, overhead electrical wire and overhead communication cable. After plans are updated to meet the approval of the Development Review Committee, the Developer shall submit a computer aided design (CAD) file of the plans to the Energy Division. CAD file must be in a dwg or dxf format. Thereafter the energy division will design and make available plans for the proposed electric and communication lines for the development.
- D. Street, Parking Lot, and Driveway Plans. Include the following for curb, gutter, storm, **land and groundwater** drains, drainage structures, sidewalks, and street surfacing plans:
1. Plan and profile for top back of curb for each side of the street. Label profile line as top back of curb for both sides of street if it is the same.

2. Stationing and top back of curb elevations with curve data for curb returns.
  3. Flow direction and type of cross drainage structures at intersections with adequate flow line elevations.
  4. Type of curb and gutter if other than the standard two foot curb and gutter in the standard drawings.
  5. Location and width of driveways if known.
  6. **Street cross sections with all proposed and existing utilities and base sections as per soils report.**
- E. Sanitary Sewer, Storm, Land and Groundwater Drain Plans. Include the following for **sanitary sewer, storm, land and groundwater drain** plans:
1. Plan and profile of all new and existing mains and manholes.
  2. Box and manhole size, location, and elevations of flowlines and rim.
  3. Location, size, grade, and type of pipe of new and existing mains.
  4. Location of each lateral with distance stubbed back into property clearly drawn and dimensioned.
  5. Storm water calculations for a 25 year and 100 year storm.
- F. Culinary Water and Pressurized Irrigation Plans. Include the following for **culinary** water and pressurized irrigation plans:
1. Location, size, and type of pipe of new and existing water mains.
  2. Location of valves, fittings, hydrants, boxes, meters, and appurtenances.
  3. Minimum cover.
  4. Location of each lateral with distance stubbed back into property clearly drawn and dimensioned.
- G. Landscaping Plans. For landscaping that will be maintained by the City or a homeowner's association submit one copy of the landscaping plans including all irrigation system layouts, details, legends, and drawings. These project plans shall meet the requirements of the Chapter 30.90. Landscaping and Chapter 30.95. Irrigation Sprinkler Systems.
- H. Irrigation Canal and Pipe Plans. Plans that affect canals or irrigation ~~pipes-companies~~ must be stamped approved by **those responsible for their maintenance-these companies** before they will be approved by the City.

### 39.20.030. Street Improvements.

A. General. The Developer shall construct all streets and appurtenances required for the development as specified by the City Council in accordance with the city Construction and Development Standards and/or other codes adopted by the City. The design and all street work

shall be done as directed and under the supervision of the City Engineer or his/her designee.

B. Cul-de-sacs. The maximum length of a cul-de-sac is 400 feet measured from the nearest right-of-way line of the adjoining street to the center of the cul-de-sac, and the minimum radius of the cul-de-sac is 60 feet at the property line.

C. Curbs, Gutters, and Sidewalks. Curbs, gutters, and sidewalks shall be built along all public streets according to the standard drawings. All curbs, gutters, and sidewalks shall connect to existing curbs, gutters, and sidewalks within a reasonable area as determined by the City Engineer or his/her designee.

D. Partial-Streets Widths. In certain conditions, and when special approval is given, partial road widths may be allowed. A partial road width shall include half the road plus 10 feet. **The road shall also include a 2 foot shoulder along the unfinished portion of the street with a minimum 3% slope away from the edge of pavement.** All City improvements must be made in dedicated City right-of-way or public utility easements.

E. Driveway and Intersection Location. No driveways or streets shall be constructed within the following distances from an adjoining street. These distances are from right-of-way to the edge of driveway for accesses and from right-of-way to right-of-way for streets and offset intersections:

1. Along Local Streets:
  - 50' from an adjoining local street
  - 50' from an adjoining minor collector
  - 75' from an adjoining major collector
  - 150' from an adjoining arterial
2. Along Minor Collectors:
  - 75' from an adjoining local street
  - 75' from an adjoining minor collector
  - 100' from an adjoining major collector
  - 150' from an adjoining arterial
3. Along Major Collectors:
  - 100' from an adjoining local street
  - 100' from an adjoining minor collector
  - 100' from an adjoining major collector
  - 150' from an adjoining arterial
4. Along Arterials:
  - 150' from all adjoining streets

Curb cuts shall only be allowed for driveways. Driveways shall be a minimum of 3 feet from any above grade utility box. All accesses and streets onto collectors and arterials must be approved by the City.

F. Parking. Parking shall meet the requirements of the zoning ordinance and standard drawings.

G. Reverse Frontage Lots. New residential developments shall not be designed to allow direct access from individual lots or dwelling units to arterial streets or major collector streets.

Masonry walls shall be provided along the sides of residential developments, which have reverse or side frontage to arterial streets, major collector streets or interstates. The walls will be of decorative block, brick, or similar materials together with design elements such as columns, capping, inlays, and variations in materials. The material, style, and color of the wall must be reviewed and approved by the City. The wall shall be constructed according to a design stamped by a licensed professional civil engineer and City construction standards. The City Council may waive this requirement in those instances where the height of the interstate, arterial street, or major collector street is significantly higher than the top of the wall. The City Council may also waive the requirement for a masonry fence if a park or open space area is adjacent to such streets. The Council may waive all fencing requirements or impose non-sight obscuring fencing, at their sole discretion.

H. Temporary Turn-Arounds. Temporary turn-arounds are to be provided on all streets which extend more than one lot from an intersection. These are to be recorded as easements. They shall be 84 feet in diameter and consist of a minimum of 8 inches of compacted road base.

I. Allowable Grades. The maximum grade allowed for any City street is 8.0% unless otherwise approved by the City. In no case shall grades greater than 12.0% be allowed. The minimum grade allowed for any City street 0.45%.

J. Stamped Concrete. The color and pattern of stamped concrete shall be approved by the Development Review Committee.

K. Precast Concrete or Block Walls. The design of all walls must be approved by the Development Review Committee. Design must be stamped and signed by an engineer registered in the state of Utah.

L. Pedestrian Ramps. Pedestrian ramps shall be placed at all corners of intersections and at all other locations of regular pedestrian traffic across roads as determined by the City. All ramps shall conform with the requirements of the American Disabilities Act and City standards.

**M. Minimum Curve Radius. Minimum curve radius shall be determined by AASHTO design standards.**

**39.20.040. Utility Improvements.**

A. General. It shall be the responsibility of the Developer to connect to existing utilities or improvements wherever they are located and extend those improvements to and through the development.

Workmanship and details of construction shall be in accordance with the City Construction and Development Standards and/or other codes adopted by the city. All work shall be done under the supervision of the City Engineer or his/her designee.

B. Communication. Communication lines shall be underground except when the City feels that such underground lines are not in the best interest of the City.

C. Electric. Electrical lines shall be underground except when the city feels that such underground lines are not in the best interest of the City.

D. Pressurized Irrigation. The Developer shall connect the development with the city pressurized irrigation system with all appurtenances and shall make such pressurized irrigation available to each lot or unit within the development . Adequacy of supply and sizes of pressurized irrigation mains shall be established by the City Engineer or his/her designee.

E. Sanitary Sewer. The Developer shall provide each lot with a sanitary sewer system in accordance with the ordinances of the city. All said work shall be done as directed and under the supervision of the City Engineer or his/her designee.

F. Storm Drain. The Developer shall provide on-site facilities for a 24 hour long 25 year storm event and piping and appurtenances to convey a 100 year storm event to a regional storm facility. The maximum allowable storm water discharge from any commercial and industrial development will be limited to 0.2 cfs/acre of development.

G. Culinary Water. The Developer shall connect the development with the **culinary** city water system with all appurtenances and shall make such **culinary** water available to each lot or unit within the development. Adequacy of supply and sizes of **culinary** mains shall be established by the City Engineer or his/her designee.

**Chapter 39.25. Inspection and Testing.****39.25.010. General.**

- A. Quality Assurance.
- B. Submittals.
- C. Preconstruction Meeting.
- D. Inspection and Testing Notification.
- E. Lot Information Signs.
- F. Testing and Sampling.
- G. Testing Agency.
- H. Work without Required Inspection and Testing.
- I. Inspection and Testing Fees.
- J. Sub-standard Work and Pay Factors.
- K. Weekly Progress Meetings.
- L. Road Construction.
- M. As-Built Survey.
- N. Acceptance of Improvements.

**39.25.020. Communication.**

- A. Conduit Inspection.
- B. Service Stub Inspection.
- C. Final Communication Inspection.
- D. Bedding Inspection

**39.25.030. Earthwork.**

- A. Compaction and Moisture Content Tests.
- B. Red-head Inspection.
- C. Proof Roll Inspection.
- D. Thickness Test.

**39.25.040. Electric.**

- A. Conduit Inspection.
- B. Service Stub Inspection.
- C. Street Light Base Inspection.
- D. Bedding Inspection.
- E. Final Electrical Inspection.

**39.25.050. Landscaping and Irrigation Sprinkler Systems.**

- A. Plant Material Inspection.
- B. Sprinkler System Assembly Inspection.
- C. Fall Sprinkler Winterizing Test.
- D. Spring Sprinkler Energizing Test.
- E. Final Acceptance Inspection.

**39.25.060. Portland Cement Concrete Work.**

- A. General.
- B. Slump, Temperature and Air Entrainment Test.
- C. Compression Test.
- D. Forms and String Line Inspection.
- E. Gutter Drainage Inspection.
- F. Thickness Test.
- G. Curing Inspection.

**39.25.070. Pressurized Irrigation.**

- A. General.
- B. Main Line Inspection.
- C. Pressurized Irrigation Service Inspection.
- D. Pressure Test.
- E. Leakage Test.

**39.25.080. Sanitary Sewer.**

- A. General.
- B. Main Line Inspection.
- C. Service Inspection.
- D. Air Pressure Test.
- E. Video Inspection.
- F. Deflection Test.

**39.25.090. Storm, Land and Groundwater Drains.**

- A. General.
- B. Main Line Inspection.
- C. Air Pressure Test.
- D. Video Inspection.

**39.25.100. Streets.**

- A. Asphalt Pavement Material Tests.
- B. Compaction Tests.
- C. Grading Inspection.
- D. Thickness Test.

**39.25.110. Culinary Water.**

- A. General.
- B. Main Line Inspection.
- C. Culinary Water Service Inspection.
- D. High Chlorine Test.
- E. Pressure Test.
- F. Leakage Test.
- G. Bacteria Test.

**39.25.010. General.**

A. Quality Assurance. The following work shall be subject to the inspection and testing requirements of this chapter:

1. Work in existing or proposed City property;
2. Work in property that will be owned by a property owners association;
3. Work in existing or proposed streets, easements, or right-of-ways;
4. Work on existing or proposed City utilities.

The Contractor must ensure that all inspection and testing required by these standards is performed and accepted by the City. The Contractor must also ensure that any additional inspection and testing required by the City or a testing company is performed and accepted by the City. In projects other than those bid out by the City the Developer is ultimately responsible for the work of the Contractor.

B. Submittals. Contractor shall turn in submittals for all testing not performed by the City.

- a. Field Test Report. Contractor must submit original field test report immediately to City whenever possible. Reports may not be submitted later than the end of the current day.
- b. Laboratory Test Report. Submit original report to the City within 48 hours after test results are determined.
- c. Material and Equipment Specifications. **Four copies of the** manufacturer's specifications and manuals for equipment and materials used must

be submitted to the City 7 days before the pre-construction meeting. Pre-construction meeting may not be held until material and equipment specifications are approved. installation.

The initial submittal for materials and equipment specifications must be turned in to the City 7 days before the preconstruction meeting.

C. Preconstruction Meeting. The Contractor must schedule a preconstruction meeting with the City's engineering secretary before any work on a new development or City project may begin.

The Contractor, Developer, project engineer, and all sub-contractors must be present at the preconstruction meeting. Any sub-contractor not attending the preconstruction meeting must schedule an additional preconstruction meeting with the City before beginning work. Work must begin within 4 weeks of the preconstruction meeting or a new preconstruction meeting must be scheduled by the Contractor.

D. Inspection and Testing Notification. The City may contract with a private company to conduct any inspections or testing specified to be performed by the City. All inspections and tests must be scheduled with the City or company contracted by the City a minimum of 1 full business day before needed. Requests for inspection on work requiring continuous inspection shall be made 3 full business days prior to commencing the work.

E. Lot Information Signs. A lot information sign shall be obtained from the City for each building permit. The lot information sign shall be posted next to the culinary water meter at all times during construction.

F. Testing and Sampling. The City Engineer or City Inspector may require that sampling be performed in their presence, in which case the Developer or Contractor shall be notified of this requirement in writing at the time the building permit is issued, or at the preconstruction meeting, or when construction drawings are released by the City for construction, as applicable.

Each sample or test shall be accompanied by the following written data, which shall be reported to the City with test results:

1. Name of Project
2. Name of Developer/Contractor
3. Project Street Address
4. Appropriate Test Name
5. Date of Sampling
6. Sample Number (if more than one sample per day)
7. Name of technician who performed the testing
8. Location of sample

G. Testing Agency. All materials testing, whether in a laboratory or in the field, shall be conducted by a testing agency approved by the City.

The City will contract with an independent certified testing company for the compaction and concrete testing on improvements in the public right of way, or improvements in a PRD which would be public if not for the PRD, or improvements in common areas. The Developer shall pay a fee for this testing before construction commences. Fees shall be based on the current contract the City has with the testing company and shall be non-refundable. Additional tests and all re-tests shall require additional fees to be paid. Final acceptance of improvements shall not be issued until all additional fees are paid. The City may deduct these additional fees from the 15% cash bond paid by the Developer.

H. Work without Required Inspection and Testing. Any work performed without required inspection or testing will give the City the option to hold the bond covering that portion of the improvements in violation, or, require the removal and replacement of the un-inspected work. The City shall have the option of retaining part or all of the bond for 10 years after installation of improvements constructed without required inspection or testing. The City Engineer may also accept the work at a reduced price if the lowest pay factor is applied.

I. Inspection and Testing Fees. Inspection fees and/or connection fees required by ordinance Resolution 99-18 shall be paid and permits required shall be obtained prior to the preconstruction meeting.

J. Sub-standard Work and Pay Factors. If any inspection or test indicates that work does not meet City standards the City Engineer may require that the work be redone. If the work has a pay factor option in the standards the City Engineer may accept the work at a reduced price upon condition that the pay factors outlined in the City standards apply. Payment reduction amounts shall either be assessed to the developer as a fee based upon bond estimates for the work, or be applied against payments to Contractors for City contracts. When any work is done to a lower standard than allowed for in the pay factor tables the work shall be redone until it meets City standards.

K. Weekly Progress Meetings. All construction projects in the City will have a weekly progress meeting at the City office. The City Engineer or his/her designee, City inspectors, the Contractor, and sub-contractors shall be in attendance.

L. Road Construction. Road construction may not commence until all underground utilities are installed and pass all the inspections and tests required by these standards.

M. As-Built Survey. The Contractor shall notify the City to survey all underground utilities either installed or uncovered in the course of construction. Contractor shall give the City 24 hours notice to survey utilities.

N. Acceptance of Improvements. Inspections made by the City or a company hired by the City to determine compliance with the specifications do not imply final

acceptance of the work. The City requires the completion of all facilities before any are accepted for maintenance. The following inspections must be scheduled and passed before final acceptance of any improvements:

1. End of Construction Inspection. The Contractor must schedule with the City an end of construction inspection once all the improvements in a development or project are completed according to the Construction and Development Standards.
2. Final Acceptance Inspection. One year after the Contractor or Developer passes the end of construction inspection, he or she must schedule a final acceptance inspection. This inspection must be conducted after the 1 inch overlay and concrete rings are installed when applicable.

If the Contractor or Developer does not pass one of these inspections a punch list of work items necessary to pass the inspection will be given to the Contractor or Developer within 2 business days of the inspection. The Contractor or Developer must reschedule inspections with the City until the project or development passes the inspection.

All improvements shall be free from defects, damage, or debris at the time of these inspections. The Contractor or Developer shall not be responsible for debris or damage not caused as a result of the his or her work or quality of work.

Any faulty or defective work shall be corrected by the Contractor within 30 days of the failed inspection or according to the contract the City has with the Contractor. If the Contractor or Developer fails to do so, the City Engineer or his/her designee shall have such repairs made, and the cost of such repairs shall be paid by the Developer together with 25% in addition thereto as and for stipulated damages for such failure on the part of the Developer to make the repairs.

#### **39.25.020. Communication.**

A. Conduit Inspection. The City must inspect all conduit before backfilled.

B. Service Stub Inspection. The City must inspect all service stubs before backfilled.

C. Final Communication Inspection. Once all communication work for a development is completed to City standards a final communication inspection must be done by the City. This may be done at the same time as the final electrical inspection.

D. Bedding Inspection. The City must inspect the bedding in all communication trenches.

#### **39.25.030. Earthwork.**

A. Compaction and Moisture Content Tests. The City will test all sub-grade and fill material for compaction and

moisture content. Test locations shall be determined by the City.

1. Trenches. Tests will generally be taken 1 per 200 lineal foot of trench per 8 inch lift.
2. Streets. Tests will generally be taken 3 per 200 lineal foot of street per 8 inch lift.
3. Other Cuts and Fills. Tests will generally be taken 1 per 2,000 square feet of compacted area.

B. Red-head Inspection. The project engineer must provide red-heads for all grade work when brought to within 3 inches of finish grade. The City must inspect and accept finished grading to the engineered red-heads.

C. Proof Roll Inspection. Prior to placing fill material for roadbed backfills, proof roll sub-grade using gross weight of 18,000 pounds per tandem axle, with a tire pressure at least 90 psi, **unless otherwise specified by the soils report.** Contractor shall proof roll under the supervision of the City according to the following conditions:

1. Passes. All proof roll passes will traverse the sub-grade parallel to the roadbed centerline. All subsequent passes will be offset half the vehicle width until the entire sub-grade is tested.
2. Mitigation. The City will analyze, determine, designate, and measure the areas, if any, requiring additional compaction or reconstruction.
3. Sub-grade Protection. Once sub-grade passes the proof rolling test, protect the surface from construction operations and traffic damage. Repair all cuts, ruts, and breaks. Keep surface in a satisfactory condition until geotextile fabric or base course has been placed.

D. Thickness Test. Material thickness tests will be conducted by the City when the City Engineer or his/her designee considers it necessary. The total depth shall be reasonably close to that shown on the typical section. Depth analysis shall be made on at least four holes for each section. Base thickness shall be accepted if 75% of the test holes are less than 1/4" below the specified thickness and no individual hole shall be more than 3/4" below the specified thickness.

#### **39.25.040. Electric.**

A. Conduit Inspection. The City must inspect all conduit before backfilled.

B. Service Stub Inspection. The City must inspect all service stubs before backfilled.

C. Street Light Base Inspection. The City must inspect all street light bases before they are backfilled around.

D. Bedding Inspection. The City must inspect the bedding in all electrical trenches.

E. Final Electrical Inspection. Once all electrical work for a development is completed to City standards a final electrical inspection must be done by the City.

**39.25.050. Landscaping and Irrigation Sprinkler Systems.**

A. Plant Material Inspection. All plant materials are to be inspected and approved by the City at the time of delivery on site. This approval does not constitute final acceptance of any plant material by the Spanish Fork City Parks Department Representative. All plant materials will be inspected again at time of final inspection and once again at the end of the warranty period. Any plant found to be unacceptable at any of these inspections shall be immediately removed and replaced.

B. Sprinkler System Assembly Inspection. An on-site inspection shall be conducted by the City after the entire sprinkler system is assembled and prior to backfilling the trenches. **During this inspection all fittings, bends, sweeps, valves, sprinkler heads and any other appurtenance on the system shall be surveyed by the City.**

C. Fall Sprinkler Winterizing Test. In the fall of the year during the installation and guarantee period, the Contractor shall meet with the City on the project site. The Contractor shall winterize the system by draining all the water and doing everything necessary to insure the protection of the system until spring. Blowing out the lines by compression shall be permitted during the 1 year guarantee. The individuals involved from both parties shall exchange all information necessary for the eventual take over of the system by the Spanish Fork City Maintenance Personnel.

D. Spring Sprinkler Energizing Test. The Contractor with the Spanish Fork City Maintenance Personnel in attendance shall energize the sprinkler irrigation system the Spring following the Fall winterizing test. Contractor shall repair all defects found as a result of Winter damage, improper installation, improper maintenance, defective materials or inadequate sprinkler drainage.

E. Final Acceptance Inspection. At the end of the guarantee period the all landscaping and irrigation sprinkler systems must then be inspected and tested by the City. As-built drawings shall be furnished to the City at the time of the final inspection.

Irrigation sprinkler systems must operate in a satisfactory manner, with a full uniform coverage of the areas that are indicated to be sprinkled. Sprinkler heads shall be adjusted to proper level.

Landscape and irrigation sprinkler systems will not be inspected for acceptance in parts. Where inspected work does not comply with requirements, Contractor shall replace rejected work and continue specified maintenance until reinspected by the City and found to be acceptable. Remove rejected plants and materials promptly from the project site.

**39.25.060. Portland Cement Concrete Work.**

A. General. All materials and processes involved in concrete work shall be subject to inspection and testing as detailed in the various paragraphs of this section and in general compliance with ASTM E105-54T. Results of tests performed by laboratories approved by the City to the satisfaction of the City Engineer or his/her designee shall be accepted by the supplier as a basis for acceptance or rejection of any and all materials.

The latest appropriate ASTM tests and methods shall be considered to be standard, and will include but not be limited to concrete, cement, aggregates additives, curing compounds, parting compounds and jointing materials. A copy of all batch tickets for concrete placed shall be submitted to the City.

B. Slump, Temperature and Air Entrainment Test. The City shall test slump, temperature, and air entrainment on every fifty cubic yards or less of concrete placed each day. Tests shall be taken after ~~2 yards~~ **have ½ to 1 yard has** been poured from the mixer. Once a sample is taken the concrete pour shall be stopped until tests show that the concrete meets City standards. Concrete that does not meet City requirements for slump, temperature, and air entrainment shall not be used. Any that may already have been poured shall be removed before hardening.

C. Compression Test. The City shall test compression on every fifty cubic yards or less of concrete placed each day. Three cylinder specimens shall be taken for each test, one shall be broken at 7 days, one at 28 days and the third held for 45 days after submittal in case further testing is required.

Specimens shall attain the specified strength at 28 days. One lot is 1 day's production. A lot with sub-standard compressive strength may be accepted at reduced price if the appropriate pay factor is applied to the whole lot. The following table outlines the pay factors for sub-standard portland cement concrete strength:

PORTLAND CEMENT CONCRETE  
COMPRESSIVE STRENGTH PAY FACTORS

Pay Factor	Tolerance (psi below 28 day specified strength)
0.98	1 to 100
0.94	101 to 200
0.88	201 to 300
0.80	301 to 400
0.50	401 to 600
Replace	More than 600

These pay factors may not be applied toward concrete in structures.

D. Forms and String Line Inspection. The City shall inspect all forms and string lines before concrete may be placed. ~~This includes all drive approaches, between the curb and the sidewalk.~~

E. Gutter Drainage Inspection. The City shall inspect all gutters for drainage prior to paving. ~~the final inspection of a project or development.~~ Water shall be let into all gutters and any gutters with standing water in excess of 1/4 inch after runoff shall be replaced. **Contractor must supply water truck for gutter drainage inspection.**

F. Thickness Test. The City shall determine the number, if any, and location of core tests necessary to ensure the proper thickness of portland cement concrete. Tests shall be taken at equal intervals in a test area. A test area shall be defined as a total area placed at the same time and by the same process. The average thickness shall then be determined from all the cores taken. Tests shall be taken and verified by a certified testing lab contracting to the City.

When the average thickness is more than 0.25 inches below the specified thickness. A minimum of 1 core per 1,500 square feet of pavement shall be taken. Work with sub-standard thickness may be accepted at reduced price if the appropriate pay factor for the lowest tested thickness is applied to all of the sub-standard work. The following table outlines the pay factors for sub-standard portland cement concrete thickness:

PORTLAND CEMENT CONCRETE  
THICKNESS PAY FACTORS

Pay Factor	Tolerance (inches below specified thickness)
1.00	0.00 to 0.25
0.90	0.26 to 0.50
0.70	0.51 to 0.75
0.50	0.76 to 1.00
Replace	More than 1.00

G. Curing Inspection. The City shall inspect the curing of all portland cement concrete work within 24 hours of pouring the concrete.

**39.25.070. Pressurized Irrigation.**

A. General. The inspections and tests in this section are required for all pressurized irrigation construction in the City boundaries and on all construction relating to the City pressurized irrigation system outside the city boundaries.

B. Main Line Inspection. The City must inspect all pressurized irrigation main line installation on an ongoing basis. Inspection notification must be given before any construction of the main line may begin. All crosses, tees, bends, valves, and drains must be inspected and surveyed by the City before they are covered.

C. Pressurized Irrigation Service Inspection. The City must inspect all pressurized irrigation services before service trenches are backfilled. The City must be able to survey services at the main during the inspection.

D. Pressure Test. The Contractor must pressure test all pressurized irrigation systems, system extensions **and service laterals to the setter** in the presence of the City Engineer or his/her designee or have tests documented and submitted by a certified testing company approved by the City. A minimum pressure of 200 psi shall be maintained on the portion being tested for a minimum period of 2 hours, using either pneumatic or hydraulic means to maintain the pressure.

E. Leakage Test. Leakage tests shall be conducted concurrently with the pressure tests. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.

No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$0.000106 \times L \times D = AL$$

in which AL is the allowable leakage, in gallons per hour; L is the length of pipeline tested in feet; and D is the nominal diameter of the pipe, in inches. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gallons per hour per inch. of nominal valve size shall be allowed.

If any test of pipe laid discloses leakage greater than specified, the Contractor shall, at it's own expense, locate and repair the defective material until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.

**39.25.080. Sanitary Sewer.**

A. General. The inspections and tests in this section are required for all sanitary sewer construction in the City boundaries and on all construction relating to the City sanitary sewer system outside the city boundaries.

B. Main Line Inspection. The City must inspect all sanitary sewer main line installation on an ongoing basis. Inspection notification must be given before any construction of the main may begin.

C. Service Inspection. The City must inspect all sanitary sewer services before service trenches are backfilled. The City must be able to survey services at each end during the inspection.

D. Air Pressure Test. Contractor shall conduct a low pressure air test by the following method under the direction of the City Engineer or his/her designee with equipment equal to Cheme Industrial, Inc., or provide proof that test was conducted by a certified testing company. ~~Tab~~ **Sanitary sewer pipes with inside diameters of 30 inches or larger shall be leak tested according to manufacturer's specifications.**

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. After a manhole to manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs.

Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4 psi-G greater than the average back pressure of any ground water that may be over the pipe. At least 2 minutes shall be allowed for the air pressure to stabilize.

The portion of line being tested shall be accepted if the portion under test does not lose air at a rate greater than 0.003 cubic feet per minute per square foot of internal pipe surface of 2.0 cubic feet per minute minimum when tested at an average 3.0 psi-G greater than any back pressure exerted by ground water that may be over the pipe at the time of the test.

The pipe and joints shall also be considered acceptable when the time required in minutes for pressure to decrease from 3.5 To 2.5 psi-G (greater than the average back pressure of any ground water that may be over the

pipe) shall not be less than the time shown for the given diameters in the following table:

PRESSURE REDUCTION TIME LIMITS

Pipe Diameter (inches)	Time (minutes)
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

If the installation fails to meet this requirement, the Contractor shall determine at his/her own expense the source of leakage. He shall repair or replace all defective materials and/or workmanship. All sanitary sewer mains shall be tested, cleaned and accepted by Spanish Fork City before laying the street surface.

E. Video Inspection. Contractor shall clean and then video inspect all sanitary sewer main lines prior to paving. The City must approve video inspection company.

Cleaning shall be done using a high pressure jet cleaning machine, producing a minimum of 800 psi. Waste water and debris shall not be permitted to enter the City sanitary sewer system, but shall be removed at the lowest manhole of the extension.

Video inspection shall clearly show any debris, broken pipe, misaligned pipe, displaced pipe and defective joints for all sections of the main line. All defects and their location shall be detailed on a separate video log report. A tape of video inspection and log report shall be submitted by the inspection company to the City Engineer or his/her designee.

**Log reports must be submitted with a 11x17 copy of the plans. All manholes in the log report must reference the labeled manholes numbers on the plans. Each manhole must also have a street address clearly shown on the log report.**

Main line determined to be defective by the City Engineer or his/her designee shall be remedied by the Contractor. Contractor shall then clean and video inspect the main lines again.

F. Deflection Test. Contractor shall perform a displacement test on all **storm drain lines sewer main** after video inspection. Deflections tests must be conducted in the presence of the City Engineer or his/her designee or be documented and submitted by a certified testing company approved by the City. In no case shall pipe be accepted that has a deflection of more than 5% after it has been backfilled. Mandrel must be pulled by hand or air. A pipe deflection test shall be required of the Developer/Contractor after backfilling and compaction of the trench.

**39.25.090. Storm, Land and Groundwater Drains.**

A. General. The inspections and tests in this section are required for all storm, **land and groundwater** drain construction in the City boundaries and on all construction relating to the City storm, **land and groundwater** drain system outside the city boundaries.

B. Main Line Inspection. The City must inspect all storm, **land and groundwater** drain main lines during installation on an ongoing basis. Inspection notification must be given before any construction of the pipe may begin.

C. Air Pressure Test. Contractor shall conduct a low pressure air test for all sealed drains by the following method under the direction of the City Engineer or his/her designee with equipment equal to Cherne Industrial, Inc., or provide proof that test was conducted by a certified testing company. ~~tab:~~ Storm drain pipes with inside diameters of 30 inches or larger shall be leak tested according to manufacturer’s specifications.

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. After a manhole to manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs.

Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4 psi-G greater than the average back pressure of any ground water that may be over the pipe. At least 2 minutes shall be allowed for the air pressure to stabilize.

The portion of line being tested shall be accepted if the portion under test does not lose air at a rate greater than 0.003 cubic feet per minute per square foot of internal pipe surface of 2.0 cubic feet per minute minimum when tested at an average 3.0 psi-G greater than any back pressure exerted by ground water that may be over the pipe at the time of the test.

The pipe and joints shall also be considered acceptable when the time required in minutes for pressure to decrease from 3.5 To 2.5 psi-G (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameters in the following table:

PRESSURE REDUCTION TIME LIMITS

Pipe Diameter (inches)	Time (minutes)
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

If the installation fails to meet this requirement, the Contractor shall determine at his/her own expense the source of leakage. He shall repair or replace all defective materials and/or workmanship. All storm drain lines shall be tested, cleaned and accepted by Spanish Fork City before laying the street surface.

D. Video Inspection. Contractor shall clean and then video inspect all storm, **land and groundwater** drain ~~main~~ lines before paving. The City must approve video inspection company.

Cleaning shall be done using a high pressure jet cleaning machine, producing a minimum of 800 psi. Debris shall not be permitted to enter the City storm drain system.

Video inspection shall clearly show any debris, broken pipe, misaligned pipe, displaced pipe and defective joints for all sections of the main line. All defects and their location shall be detailed on a separate video log report. A tape of video inspection and log report shall be submitted by the inspection company to the City Engineer or his/her designee.

Main line determined to be defective by the City Engineer or his/her designee shall be remedied by the Contractor. Contractor shall then clean and video inspect the main lines again.

Log reports must be submitted with a 11x17 copy of the plans. All manholes in the log report must reference the labeled manholes numbers on the plans. Each manhole must also have a street address clearly shown on the log report.

**39.25.100. Streets.**

A. Bituminous Pavement Material Tests. Material tests will be conducted by the City when the City Engineer or his/her designee considers it necessary.

B. Compaction Tests. The City will test all bituminous pavement for compaction and moisture content. Test locations shall be determined by the City but will generally be taken 3 per 200 lineal foot of street or 1 per 2,000 square foot of paved area. **Pay factors as per APWA 02745 shall apply.**

C. Grading Inspections. The sub-grade, sub-base, and road base shall all be graded to an engineered red-head and accepted by Spanish Fork City. Red-heads shall be placed every 50 feet at the crown of the road. If the distance between red-heads and edge of pavement exceeds 25 feet additional redheads shall be installed half way between the crown and edge of pavement. Red-heads shall also be placed every 50 feet at the edge of pavement where there is no curb and gutter.

D. Thickness Test. Material depth tests will be conducted by the City when the City Engineer or his/her designee considers it necessary. The total depth shall be reasonably close to that shown on the typical section. Depth analysis shall be made on at least four holes for each section. Base thickness shall be accepted if 75% of the test holes are less than 1/4" below the specified thickness and no individual hole shall be more than 3/4" below the specified thickness. Work with sub-standard thickness may be accepted at reduced price if the appropriate pay factor for the lowest tested thickness is applied to all of the sub-standard work. The following table outlines the pay factors for sub-standard asphalt pavement thickness:

PAVEMENT DEPTH PAY FACTORS

Pay Factor	Tolerance (inches below specified thickness)
0.95	0.00 to 0.25
0.90	0.26 to 0.50
0.70	0.51 to 0.75
0.50	0.76 to 1.00
Replace	More than 1.00

E. Profile Tolerance Inspection. Profile tolerance inspections may be required by the City any time within a year of paving. The maximum vertical distance from the pavement surface to a straight edge for a local streets is:

1. 1/4-inch in 10-feet parallel to centerline.

2. 3/8-inch in 10-feet perpendicular to centerline except at cross section grade breaks.

Collector and arterial streets shall meet the requirements of APWA 02745 Hot-Mix Asphalt Concrete Paving.

F. Asphalt Concrete Temperature Test. This test shall be conducted on the first load of asphalt concrete installed, and on any future loads as required by the City. Test shall be conducted according to the requirements and specifications of APWA 02745 Hot-Mix Asphalt Concrete Paving. Temperature gauge shall be allowed to stabilize for 1 minute before taking reading.

**39.25.110. Culinary Water.**

A. General. The inspections and tests in this section are required for all **culinary** water construction in the City boundaries and on all construction relating to the City **culinary** water system outside the city boundaries.

B. Main Line Inspection. The City must inspect all **culinary** water main line installation on an ongoing basis. Inspection notification must be given before any construction of main line may begin. All crosses, tees, bends, valves and hydrants must be inspected and surveyed by the City before they are covered.

C. Culinary Water Service Inspection. The City must inspect all **culinary** water services before service trenches are backfilled. The City must be able to survey services at the main during the inspection.

D. High Chlorine Test. **High Chlorine tests shall meet the requirements and specifications of APWA 02518.** The City must conduct a high chlorine test at every hydrant on a new **culinary** water main installation. If a hydrant does not exist on the test section, tests must be taken at the end of each line. The chlorine residual shall be at least 25 mg/L.

E. Pressure Test. Pressure test must be conducted after all pipelines are flushed following the high chlorine test. The Contractor must pressure test all culinary water systems, system extensions **and service laterals to the setter** in the presence of the City Engineer or his/her designee or have tests documented and submitted by a certified testing company approved by the City. **Pressure tests must meet the requirements and specifications of APWA 01815. A minimum of 200 psi pressure shall be maintained on the portion being tested for a minimum period of 2 hours, using either pneumatic or hydraulic means to maintain the pressure.**

F. Leakage Test. Leakage tests shall be conducted concurrently with the pressure tests. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.

$$0.000106 \times L \times D = AL$$

AL is the allowable leakage, in gallons per hour; L is the length of pipeline tested in feet and D is the nominal diameter of the pipe, in inches. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr/in. of nominal valve size shall be allowed. When hydrants are in the test section, the test shall be made against the closed hydrant.

If any test of pipe laid discloses leakage greater than specified, the Contractor shall, at its own expense, locate and repair the defective material until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.

G. Bacteria Test. **Bacteria tests shall meet the requirements and specifications of APWA 02518. Tests may only be scheduled at certain regular times set by the city.** ~~After the chlorinating and flushing new water lines according to City standards the City shall take bacteria test samples at test points determined by the City Engineer or his/her designee.~~ The Contractor shall be present and open all hydrants or other locations to be tested from. ~~All new lines shall be isolated from existing lines when tested. These lines must remain isolated until the City recognizes that the testing is completed.~~ The City shall submit samples to a certified lab to be tested according to state drinking water regulations.

If any sample point fails on the first test, the line will be flushed and re-tested at all sample points. If any sample point fails a second time the complete line will re-disinfected and re-tested at all sample points. If any samples come back marked "presence", which means coliform bacteria is present, the line will be re-disinfected and re-tested at all sample sites. Contractor is responsible to pay for all bacteria tests and retests.

Culinary water services will not be installed until bacteria sample results have been approved by the City Engineer or his/her designee. All testing lab fees shall be paid for by the Contractor.

**Chapter 39.30. Contractor Requirements.****39.30.010. General.**

- A. Contractors Working for a Developer.
- B. Contractors Working for the City.

**39.30.020. Insurance.**

- A. General.
- B. Workers' Compensation.
- C. Commercial General Liability Insurance.
- D. Automobile Liability Insurance.

**39.30.030. Bonding.**

- A. General.

**39.30.040. Excavation Permits.**

- A. General.
- B. Contractors.
- C. Property Owners.

**39.30.050. Inspection Fees.**

- A. General.

**39.30.010. General.**

A. Contractors Working for a Developer. Contractors and Sub-Contractors working for a Developer must prequalify before doing any work in existing or proposed City property, streets, easements, or right-of-way and for any work on existing or proposed City utilities. To prequalify the following must be on file in the City Engineer's office:

1. A current Contractor's license;
2. Insurance information;
3. Contractor information sheet;
4. Project Bond;
5. Excavation Permit;
6. UDOT Permit for construction in state right-of-way; and
7. Railroad Permit for construction in railroad right-of-way.

Failure to pre-qualify before doing any construction shall constitute grounds for legal action.

B. Contractors Working for the City. Bids for City projects will only be awarded to the lowest responsible bidder as specified in the Utah State Code. The Cities' contractor qualifications and experience forms shall be completely filled out and submitted with bid. Failure to do so is basis to reject the bid. Spanish Fork City reserves the right to determine a non-responsible bidder based upon these forms or any other research conducted by the city.

**39.30.020. Insurance.**

A. General. A Contractor must acquire the insurance stipulated in this section to prequalify to do construction work. The city must receive and accept proof of the insurance before any work may begin. The submittal of said evidence to the City shall not relieve or decrease the liability of the Contractor hereunder.

B. Workers' Compensation. Contractor shall obtain workers compensation insurance as required by State law.

C. Commercial General Liability Insurance. The follow commercial general liability insurance must be obtained and submitted on ISO Form CG 00 01 (11/85) or equivalent, occurrence policy, with limits not less then

- |                                     |             |
|-------------------------------------|-------------|
| 1. General Aggregate                | \$1,000,000 |
| 2. Products - Comp/OPS Aggregate    | \$1,000,000 |
| 3. Personal and Advertising Injury  | \$ 500,000  |
| 4. Each Occurrence                  | \$ 500,000  |
| 5. Fire Damage (any one fire)       | \$ 50,000   |
| 6. Medical Expense (any one person) | \$ 5,000    |

Also include the follow endorsements or their equivalents attached thereto:

1. ISO Form CG 25 03 (11/85), Amendment Of Limits Of Insurance (Designated Project or Premises), describing the subject contract and specifying limits as shown above.
2. ISO Form CG 20 10 (11/85), Additional Insured -- Spanish Fork City, Lessees, or Contractors (Form B), naming the City as additional insured and containing the following statement, "This Endorsement Also Constitutes Primary Coverage in the Event of any Occurrence, Claim, or Suit".

D. Automobile Liability Insurance. Contractor shall obtain automobile liability insurance with limits of not less than \$500,000 Combined Single Limit per accident. Coverage shall apply to any auto.

**39.30.030. Bonding.**

A. General. The owners and/or developers of property shall deposit security with the City to guarantee proper installation of all required improvements in accordance with the plans, specifications, time limitations, and conditions relating thereto as meets with the approval of the city council or such personnel as the city council shall designate. Security shall be in the form of cash in the minimum amount of 15% of the City's bond amount. The balance of the security shall be in the form of cash, an irrevocable letter of credit, or an escrow bond. The amount of the security shall be 125% of the City's estimated costs of the improvements.

Irrevocable letters of credit or escrow bonds shall be executed by financial institutions acceptable to the City and authorized to conduct business in the State of Utah, and must be in the form approved by the city. The bond or letter of credit as required by this section must be posted prior to recording. **Upon completion of the punch list for the end of construction inspection, the security less the 15% cash bond and the amount estimated for the 1 year overlay shall be released to the Developer.** ~~Upon completion, inspection, approval, and acceptance of the improvements, the security, less fifteen percent (15%), shall be released to the developer.~~ Fifteen percent (15%) of the security amount shall be held for a period of one (1) year following

final inspection and acceptance to warrant improvements for this time period. The fifteen percent retained shall be the cash amount required as the minimum security.

**39.30.040. Excavation Permits.**

A. General. Contractors are required to pre-qualify before obtaining an excavation permit to do construction work unless a project is already approved, bonded and insured. The permit must be approved 48 hours prior to construction. The permittee is given a copy of the permit and plan after the City Engineer or his/her designee has approved and signed them.

The City may stipulate time limits for completion of work and suspend permits for non-compliance. A copy of the excavation permit shall be on site during construction. The following fee factors shall be applied toward excavation permits for more recently paved streets:

FEE FACTORS

Fee Factor	Age of Pavement
4.00	Less than 1 Year
3.00	1 to 3 Years
2.00	3 to 5 Years
1.50	5 to 10 Years

If utilities are bored then the excavation permit fee shall be reduced by one half.

B. Contractors. Contractors are required to submit the following information to obtain an excavation permit:

1. Copy of Contractors license;
2. Certificate of Insurance;
3. Cash bond of \$10,000.00;
4. Detailed drawing of proposed work and traffic control (4 copies).

C. Property Owners. Individual property owners doing his/her own work for drive approaches and other similar, minor concrete work in the City right-of-way are required to submit the following information to obtain an excavation permit:

1. Proof of homeowners or similar insurance;
2. Cash or escrow bond in the amount of \$1,000.00;
3. Detailed drawings of the proposed work, including safety, barricades, traffic and pedestrian control.

**39.30.050. Inspection Fee.**

A. General. For bonded developments an inspection fee will be collected. The fee will be for city costs relating to the construction. These costs include but are not limited to survey, inspection, testing and administration. The fee will be estimated based upon previous projects. Portions of

the fee not used shall be refunded to the Developer after the punch list of the final acceptance inspection is completed.

If City costs relating to inspection exceed the inspection fee, these costs will be paid for by the developer or they will be deducted from the 15% cash bond. The City will hold 10% of the inspection fee until the final acceptance inspection punch list is completed.

## Chapter 39.35. Earthwork and Trenches.

## 39.35.010. Excavation.

- A. General.
- B. Safety.
- C. In Gravel and Paved Surface Areas.
- D. In Areas with Concrete.
- E. Rock Excavations ~~Blasting.~~
- ~~F. Dewatering.~~
- F. Site Clearing and the Disposal of Excess Materials.

39.35.020. Sub-surface Pipe Installation. ~~Boring, Jacking, Auguring, and Tunneling.~~

- A. General.
- B. Boring or Jacking, and Auguring.
- C. Tunneling.

## 39.35.030. Subgrade.

- A. Preparation.
- B. Soft and Yielding Areas.
- C. Trenches.
- D. Roads.
- E. Structures.

## 39.35.040. Fill Material.

- A. General.
- B. Bedding Material.
- C. Engineered Fill.
- D. Untreated Base Course.
- E. Cement Treated Fill.
- F. Defective Fill.

## 39.35.050. Slopes, Embankments, Fills and Open Channels.

- A. Preparation.
- B. Material.
- C. Grading.
- D. Slope Safety.
- E. Erosion and Sedimentation Control.
- F. Gabions.
- G. Rip Rap and Rock Lining.

## 39.35.060. Installation and Compaction of Earth Materials.

- A. General.
- ~~B. Layers.~~
- ~~C. Moisture Content.~~
- B. Water Settling.
- C. Streets.
- D. Soft and Yielding Spots.
- E. Backfill in Trenches.
- H. Backfill Around Structures.
- F. Pipe Zone.

## 39.35.070. Geotextiles, Geogrids and Geocomposites.

- A. General.

## 39.35.010. Excavation.

A. General. Excavation shall meet the requirements and specifications of APWA 02315 unless otherwise indicated.

B. Safety. All construction shall be done in accordance with the provisions of the Utah State Industrial Commission, OSHA regulations and APWA 02250 Excavation Protection. No trenches deeper than 4 feet shall be left open at anytime unless construction is in process. When construction is in process only 200 feet of trench may be open at one time and must be completely backfilled before proceeding. No trenches shall be left open at any time unless guarded with adequate barricades, warning lamps and signs.

~~When required, excavation shall be braced and shored to support the walls of the excavation to eliminate sliding and settling and as may be required to protect the workers, the work in progress, and existing utilities and improvements. All such sheeting, bracing and shoring shall comply with the requirements of the Utah State Industrial Commission and OSHA.~~

Any injury or damage resulting from lack of adequate bracing and shoring shall be the responsibility of the Developer/Contractor and the Developer/Contractor shall, at his/her own expense, effect all necessary repairs or reconstruction resulting from such damage. No inspections will be done in unsafe trenches and will be the cause for immediate shutdown at the project.

C. In Gravel and Paved Surface Areas. Where any excavation occurs in a gravel or paved surface area such as a road, driveway or parking area, the surface shall be restored according to the requirements and specifications of APWA 02985 and the following conditions:

1. Base. Only engineered fill may be used as backfill or sub-base material under gravel and paved surfaces. A minimum of 8 inches of untreated base course shall be placed over backfill or sub-base. All fill material shall be placed and compacted to City standards. Flowable fill shall not be allowed for backfill unless authorized by the City.
2. Surface Maintenance. The surface shall be maintained by blading, sprinkling, rolling, adding gravel, etc., to maintain a safe uniform surface satisfactory to the City.
3. Cutting of Pavement. Before any excavation in a paved area, the surface along the entire excavation shall be cut to provide a vertical joint in the surface. Cut shall be made 6 inches from the edge of excavation in straight lines parallel or perpendicular to the trench or edge of pavement. A pavement saw shall be used for all pavement cutting. If excavation damages the cut pavement, pavement shall be cut again before patching. A rotomilled edge shall be acceptable as a cut.

- ~~4. *Priming of Pavement Edges.* All pavement edges and sub-base along areas to be patched shall be primed with an asphalt tack coat.~~
- ~~5. *Pavement.* Pavement shall meet all the requirements of Chapter 39.60. Pavement. Pavement shall match the depth of the existing pavement to a minimum of 3 inches and a maximum of 6 inches.~~
- 4. *Time Limitation.* All road cuts shall be repaired within 2 working days of excavation unless otherwise authorized by the City Engineer or his/her designee.
- 5. *Cold Weather Patching.* Trenches cut during winter months or when asphalt plants are not operating, shall be patched the same day of the cut with a good quality cold mix **according to the requirements and specifications of APWA 2985. These trenches shall be** and maintained until asphalt plants open. When asphalt plants open, the **temporary** cold patch shall be removed and a new patch of hot mix asphalt shall be placed. All cold mix patches shall be replaced with hot mix patches within 20 days of the opening of the hot mix plant.
- f. *Adjust Incidental Structures to Grade.* **Adjust incidental structures to grade according to APWA 02990. City standard concrete collars around valves and manholes shall be installed 1 year from the time that pavement is placed or at the time of an overlay.**

D. In Areas with Concrete. When damaged, existing concrete improvements shall be removed and replaced to the next joint or scoring line beyond the damaged or broken sections. In the event that joints or scoring lines do not exist or are three or more feet from the removed or damaged section, the damaged portions shall be removed and reconstructed to neat, plane faces. All concrete work shall ~~conform to the requirements~~ **meet the requirements and specifications** of Chapter 39.65. Portland Cement Concrete Work and APWA 02985.

E. Rock Excavations~~Blasting.~~ **Rock excavations shall meet the requirements and specifications of APWA 02317. Blasting will not be allowed except by permission from the City Engineer or his/her designee. The Contractor shall comply with all laws, ordinances, and applicable safety code requirements and regulations relative to the handling, storage, and use of explosives and protection of life and property. He/she shall be fully responsible for all damage attributable to his/her blasting operations.**

~~Excessive blasting or overshooting will not be permitted and any material outside the authorized cross section which may be shattered or loosened by blasting shall be removed by the Contractor.~~

~~F. Dewatering. All seepage or storm water that may occur or accumulate in the excavation during the progress of~~

~~the work shall be removed. In areas where the nature of the soil and the hydrostatic pressures are of such a character as to develop a quick condition in the earth mass of the trench, the dewatering operation shall be conducted so that the hydrostatic pressure will be reduced to or near zero in the immediate vicinity of the trench.~~

~~Where water is encountered in a trench, it shall be removed during pipe laying operations and the trench so maintained until the ends of the pipe are sealed.~~

~~All excavations shall be kept entirely free of water at all times during the construction of the work or until otherwise directed by the City Engineer or his/her designee. If this water is pumped into the gutter, the Contractor is responsible for all downstream clean-up. No water may be pumped into the sanitary sewer system.~~

~~The excavated area or trench shall be over excavated to a sufficient depth and bedded with crushed rock or gravel conforming to the following gradation:~~

~~DEWATERING BASE GRADATION~~

<del>Screen</del>	<del>% Passing</del>
<del>1"</del>	<del>100</del>
<del>1/2"</del>	<del>5</del>

~~The gravel material shall be deposited over the entire trench width in 8 inch maximum layers, each layer shall be consolidated by tamping, rolling, vibrating, spading, slicing, rodding, or by a combination of one or more of these methods. In addition the material shall be graded to produce a uniform and continuous support for the installed pipe.~~

F. Site Clearing and the Disposal of Excess Materials. **Site clearing shall be conducted according to APWA 02115. All excavation material, which is not required for construction or is unsuitable for fill material, shall be immediately disposed of by the Contractor. All roads, sidewalks, curbs, gutters and ditches shall be kept clean of excavated material except as outlined in Title 12.04.050 of the Spanish Fork City Municipal Code.**

**All demolition work shall meet the requirements and specifications of APWA 02220 for site demolition, 02222 for pavement demolition and 02223 for pavement pulverizing.**

**39.35.020. Sub-surface Pipe Installation.~~Boring, Jacking, Auguring, and Tunneling.~~**

A. General. **Pipes, conduits or casings, 4 inches in diameter or less, may be bored, jacked, augured or jetted under sidewalk, curb, gutter if authorized by the City Engineer or his/her designee. provided**The resulting hole diameter does not exceed 1 inch plus the outside diameter of the pipe or **sleeve casing** installed.

B. Boring or Jacking, and Augering. Boring or jacking work shall meet the requirements and specifications of APWA 02445.

C. Tunneling. Where sidewalk, curb, and gutter exists, excavation may be made by tunneling provided the following requirements are met:

1. Excavation shall be vertical and as near to the curb or sidewalk as possible;
2. The length of the tunnel shall not exceed the width of the sidewalk, curb, and gutter;
3. Where a separate sidewalk and curb exist, an excavation shall be made between the sidewalk and the curb;
4. At least three feet of undisturbed earth shall be left under the sidewalk or curb; and
5. Where the sidewalk has been tunneled, the hole shall be filled from each end with flowable fill.

Where the excavation cannot meet these requirements, a section of sidewalk, curb, or gutter, from joint to joint shall be removed and replaced.

**39.35.030. Sub-grade.**

A. Preparation. All sub-grade shall be shaped and compacted in reasonably close conformity with lines, grades and typical cross section as established by the City Engineer or his/her designee. All grading shall be based on an engineered survey, accepted by Spanish Fork City.

In trenches and cut or fill areas the subgrade shall be scarified to a depth of 8 inches and compacted according to the compaction standards of this chapter. No rocks larger than 4 inches in diameter, organic material, soft clay, spongy material, or other deleterious material will be permitted in this scarified sub-grade layer.

B. Soft and Yielding Areas. Soft and yielding areas which do not compact to City standards shall be removed and replaced with enough compacted engineered fill to bridge the area.

C. Trenches. When the sub-grade material does not afford a sufficiently solid foundation to support the pipe and superimposed load, the trench shall be over-excavated to a sufficient depth and backfilled with enough compacted ~~engineered fill~~ **as approved by the City** to bridge the area.

D. Roads. Road sub-grades shall be shaped and graded to within a tolerance of 0.15 feet of design grade. Drainage shall be maintained at all times.

E. Structures. Sub-grade material for all concrete structures, regardless of type or location, shall be firm, dense, thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workmen engaged in sub-grade surfacing, laying reinforcing steel, and depositing concrete.

Coarse gravel or crushed stone may be used for subsoil reinforcement if results are satisfactory to the City Engineer or his/her designee. Such material shall be applied in layers,

not exceeding 6 inches in thickness, each layer being embedded in the sub-soil by thorough tamping. All excess soil shall be removed to compensate for the displacement of the gravel or crushed stone and the finished elevation of any subsoil reinforced in this manner and shall not be above the specified sub-grade.

The City Engineer may require a soil analysis and design for any area.

**39.35.040. Fill Material.**

A. General. All fill material shall be placed on sub-grade prepared according to the specifications of this chapter. All fill material shall be compacted according to the specifications of this chapter.

Only engineered fill or untreated base course may be used as fill material under and within a foot of streets, future street areas, driveways, and concrete unless otherwise specified. All fill material under and within a foot of electrical and communications boxes shall be untreated base course. In other areas native excavated material may normally be used unless such material cannot be properly compacted according to specifications in this chapter. All fill material, **including native fill material**, must be free from debris, organic material, and rocks larger than 6 inches in diameter **and have a liquid limit not to exceed 35 and plastic limit not to exceed 15.**

B. Bedding Material. **Use APWA No. 4 sewer rock for gravity pipe bedding material. Use sand as a bedding material for pressure pipe and electrical and communication conduit.** ~~Bedding material shall consist of 3/4 inch minus crushed gravel, sand, or untreated base course. Only sand may be used as a bedding material in areas where the native material is not free draining or is predominately made up of clays. In dry conditions, sand must be used to bed polyvinyl chloride pipe. Only sand may be used as bedding material for electrical and communication conduit.~~ Bedding sand must compact sufficiently to support the pipe and shall meet the following gradation:

SAND GRADATION

Sieve/Screen Size	% Passing
No. 4	100
No. 200	10 to 20

C. Engineered Fill. Engineered fill shall be used for all imported material unless otherwise specified. Engineered fill shall be granular and well graded meeting the following gradation:

ENGINEERED FILL GRADATION

Sieve/Screen Size	% Passing
4"	100
3/4"	70 to 100
No. 200	0 to 15

On that portion of the aggregate passing the No. 40 sieve, the liquid limit shall not exceed 30, nor shall the plasticity index exceed 15 when tested in accordance with AASHTO T89 and T90. Imported material under city streets shall have a minimum CBR of 25.

Reclaimed asphalt pavement (RAP) that meets the requirements and specifications of APWA 02748 may be used as engineered fill.

D. Untreated Base Course. All untreated base course shall meet the requirements and specifications of APWA 02060 for untreated base course. Untreated base course shall consist of natural gravel, crushed gravel, crushed rock or crushed slag conforming to the gradation hereinafter specified, placed on a prepared sub-grade as specified herein:

The mineral aggregate shall conform to the following requirements:

1. On that portion of the aggregate passing the No. 40 sieve, the liquid limit shall not exceed 25, nor shall the plasticity index exceed 6 when tested in accordance with AASHTO T89 and T90.
2. The dry mineral aggregate shall be uniformly graded with the following gradation when tested in accordance with AASHTO T-27:

UNTREATED BASE COURSE GRADATION

Sieve Size	% Passing
3/4"	100
1/2"	---
3/8"	69 to 100
No. 4	46 to 75
No. 16	22 to 44
No. 50	10 to 28
No. 200	4 to 13

Total amount of material passing the No. 200 Sieve shall be determined by washing with water in accordance with AASHTO T-11.

3. Aggregate shall have a percentage of wear not exceeding 50 when tested in accordance with AASHTO T-96. This requirement shall be used only in determining the suitability of the aggregate source and shall not be used for routine control testing.

E. Cement Treated Fill. Cement treated fill shall meet the requirements and specifications of APWA 02062.

Cement treated fill includes following fill materials:

- a. Controlled low-strength material (CLSM) (flowable fill),
- b. Lime treated fill,
- c. Asphalt treated fill.

F. Defective Fill. Fill not conforming to the requirements of this specification shall be reworked to the requirements or removed and replaced with acceptable fill.

39.35.050. Slopes, Embankments, Fills and Open Channels.

A. Preparation. Unsuitable materials that occur in the foundation for slopes, embankments, and fills shall be removed by clearing, stripping, and/or grubbing. Where suitable materials occur, after stripping, the foundation shall be scarified to a depth of not less than 8 inches. All materials in slopes, embankments, and fills, including the scarified foundation layer, shall be placed, moistened, and compacted according to the compaction standards in this chapter.

B. Material. When the slope, embankment, or fill exceeds the amount of excavation, sufficient additional material shall be obtained from borrow pits provided by the Contractor. All material proposed to be imported shall be subject to the review and approval of the City Engineer or his/her designee prior any hauling operations.

The materials used for slope, embankment and fill construction shall be free from sod, grass, trash, rocks larger than 6 inches in diameter and all other material unsuitable for construction of compacted fills.

C. Grading. Grading of completed slope, embankment, or fill shall bring the surfaces to a smooth, uniform condition with final grades being within 0.1 foot of the design grade. All grading shall be done to an engineered red-head.

D. Slope Safety. All slope construction shall be in accordance with all City, State and Federal regulations. Plans and Specifications for structures must be approved by the city if the excavation is greater than five (5) feet. No permanent slopes steeper than 3:1 shall be allowed without a retaining structure unless otherwise approved in writing by the City Engineer or his/her designee. The width of the excavation shall be increased if necessary to provide space for sheeting, bracing, shoring and/or other supporting installations. Unsafe slopes will be the cause for immediate shutdown of the project.

E. Erosion and Sedimentation Control. Erosion and sedimentation control shall meet the requirements and specifications of APWA 02370.

F. Gabions. Gabions shall meet the requirements and specifications of APWA 02372.

G. Rip Rap and Rock Lining. Rip rap and rock lining work shall meet the requirements and specifications of APWA 02376.

### **39.35.060. Installation and Compaction of Earth Materials.**

A. General. The installation of all fill material shall meet the requirements and specifications of APWA 02320 Backfilling Trenches, 02321 Backfilling Structures and Landscapes, 02322 Backfilling Pavements and 02324 Compaction. Fill material outside of pavement areas, as defined by APWA 02322, and more than 24 inches from any utility box shall be compacted to not less than 90% of the maximum dry density. ~~All fill material under and within a foot of streets, future street areas, driveways, electric and communication ground sleeves and pads, and concrete work shall be compacted to a density equal to not less than 95% of maximum dry density as measured by AASHTO T-180, method C or the modified proctor test ASTM D-1557. Fill material in all other areas shall be compacted to 90% of the maximum dry density as measured by the same method. — If the required relative density is not attained, test sections will be required to determine any adjustments in compacting equipment, thickness of layers, moisture content, and compactive effort necessary to attain the specified minimum relative density.~~

~~— Approval of equipment, thickness of layers, moisture content, and compactive effort shall not be deemed to relieve the Contractor of the responsibility for attaining the specified minimum relative densities. The Contractor in planning his/her work shall allow sufficient time to perform the work connected with the test sections and to permit the City Engineer or his/her designee to make tests for relative densities.~~

~~— B. Layers.~~ The material shall be deposited in horizontal layers having a thickness of not more than 8 inches after being compacted as hereinafter specified; provided, that when mechanical equipment is used for placing and compacting the material on a sloping foundation, the layers may be placed parallel to the foundations. The distribution of materials shall be such that the compacted material will be homogeneous and free from lenses, pockets, or other imperfections.

~~— C. Moisture Content.~~ During the rolling operation, moisture content shall be maintained at no less than 97% or more than 105% of optimum moisture content. Moisture content shall be uniform throughout the layers, insofar as practical. Moistening of the material shall be performed at the site of excavation, but such moistening shall be supplemented, as required by sprinkling at the site of

~~construction. If the moisture content is more than optimum for compaction the compaction operations shall be delayed until such time as the material has dried to the optimum moisture content.~~

B. Water Settling. Water settling may be permitted with preapproval by the City Engineer or his/her designee, depending upon the type of soil and location. When water settling is approved, a City representative shall be at the job site during the compaction.

Water shall be applied by jetting unless flooding is specifically authorized by the City Engineer or his/her designee. Water for consolidation shall be furnished by the Contractor at his or her's own expense.

In the jetting procedure the jets shall be inserted at not more than 4 foot intervals, staggered throughout the length of the backfilled area and shall be slowly forced down to the bottom of the trench or top of previously jetted lift and held until the trench backfill is completely saturated with water. Depth of jetted lift shall not exceed 5 feet.

When the material has dried sufficient to allow compaction tests, the Contractor shall dig test holes for compaction tests at locations and depths required by the City Engineer or his/her designee. Authorization by the City Engineer or his/her designee to use any consolidation method does not relieve the Contractor of it's responsibility to meet the specified density requirements.

C. Streets. Sub-base and road-base shall be graded to an engineered red head. Loose rock, roots, brush, and other materials that may be encountered in shaping the sub-base must be removed.

D. Soft and Yielding Spots. Any soft and yielding spots in the fill or sub-grade which do not compact to the specified density shall be removed and replaced with engineered fill installed and compacted to City standards.

E. Backfill in Trenches. Backfill shall be carefully placed around and over pipes and shall not be permitted to fall directly on a pipe from such a height or in such a manner as to cause damage.

~~— H. Backfill Around Structures.~~ Backfill around structures shall be placed to the lines shown on the approved drawings, or as directed by the City Engineer or his/her designee. After completion of foundation, footings and walls and other construction below the elevation of the final grades, and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all trash and debris.

~~— Material for backfilling shall consist of excavated material or borrow of sand, gravel, or other suitable material, and shall be placed in layers not exceeding eight 8 inches in uncompacted thickness. Each layer shall be compacted by hand or machine tampers or by other suitable equipment as allowed by the City Engineer or his/her designee.~~

F. Pipe Zone. The pipe zone includes the full width of trench from 3 inches below the pipe to 6 inches above the

pipe for all pipes except for large reinforced concrete pipe (RCP). Large RCP includes RCP with internal diameters larger than 24 inches. The pipe zone for large RCP shall include the full width of trench from 6 inches below the pipe to 6 inches above the pipe. The pipe zone shall extend horizontally a minimum of 6 inches from either side of the pipe except for electrical and communication conduit. Electrical and communication conduit may be placed against the sides of trenches. Trenches shall be wide enough to compact fill material according to the specifications in this chapter.

The pipe zone for all pipes shall be filled with ~~consolidated~~ compacted bedding material. Pipe zone materials shall be placed and compacted under and around the pipe in horizontal layers not to exceed 8 inches and tamped by hand or pneumatic tampers.

**39.35.070. Geotextiles, Geogrids and Geocomposites.**

**A. General.** All geotextile work shall meet the requirements and specifications of APWA 02075. Geogrid and geocomposite work shall meet the requirements and specifications of APWA 02076. Geotextile, geogrid and geocomposite work includes but is not limited to the following geotextile applications:

- a. Stabilization-separation,
- b. Silt fence,
- c. Erosion control,
- d. Roadway pavements,
- e. Drainage,
- f. Weed barrier
- g. Granular base reinforcement,
- h. Asphalt concrete reinforcement and
- i. Soil reinforcement.

**Chapter 39.40. Culinary Water.****39.40.010. General.**

- A. Specifications.
- B. Pipe.
- C. Size.
- D. Location.
- E. Unusual Piping and Plumbing.

**39.40.020. Installation.**

- A. General.
- B. Care and Handling of Material.
- B. Pipe Cleanliness.
- C. Identification Tape.
- E. Magnetic Locator Tape.
- ~~F. Tracer Wire.~~
- D. Lateral Displacement.
- E. Restraining.
- F. Cutting.
- F. Connections to Existing Culinary Water Lines.
- K. Separation from Sewer.

**39.40.030. Pipe and Fittings.**

- A. General
- ~~B. Polyvinyl Chloride Pipe (PVC).~~
- C. Ductile Iron Pipe.
- D. Polyethylene Pipe.
- E. Steel Pipe - Lined and Coated.
- F. Fittings

**39.40.030. Polyvinyl Chloride Pipe:**

- ~~A. General.~~
- ~~B. Pipe.~~
- ~~C. Joints.~~
- ~~D. Fittings.~~
- ~~E. Color.~~

**39.40.040. Ductile Iron Pipe:**

- ~~A. General.~~
- ~~B. Pipe.~~
- ~~C. Mechanical Joints.~~
- ~~D. Push-on Joints.~~
- ~~E. Flanged Joints.~~
- ~~F. Coatings and Linings.~~
- ~~G. Flanges.~~
- ~~H. Fittings.~~
- ~~I. Polyethylene Tubular Wrap.~~

**39.40.040. Valves and Couplings.**

- A. General.
- B. Resilient Seated Gate Valve.
- C. Butterfly Valve.
- D. Valve Boxes.
- E. Couplings.
- F. Pressure Regulation Valves.
- G. Tapping Valves.
- H. Air Vacuum and Release Valves.

**39.40.050. Fire Hydrants.**

- A. General.
- B. Placement and Location.

**39.40.060. Meters and Services.**

- A. General.
- B. Placement and Location.
- C. Meters.

**39.40.070. Flushing.**

- A. General.
- B. Velocity.

**39.40.080. Disinfection of Culinary Water Lines.**

- A. Cleaning.
- B. Methods.

**39.40.010. General.**

A. Specifications. These specifications cover the installation of **culinary** water lines. See Chapter 39.20. for improvement and design requirements, Chapter 39.25. for inspection and testing requirements, and Chapter 39.35. for earthwork and trench requirements. See standard drawings related to water.

B. Pipe. Polyvinyl chloride (PVC) pipe shall be used for all **culinary** water mains unless authorized by the City Engineer or his/her designee.

C. Size. The City must approve the sizes of all proposed **culinary** water lines. The minimum size of **culinary** water pipe is 8 inch diameter for main lines and 1 inch diameter for services.

D. Location. **Culinary** water mains shall be located on either the north or east sides of a street 10 feet from the centerline. **See standard drawings for utility locations.**

E. Unusual Piping and Plumbing. Special and unusual piping and plumbing for equipment or structures are treated as separate items and are not included in these standards.

**39.40.020. Installation.**

A. General. **Culinary water distribution and transmission systems shall be installed according to the requirements and specifications of APWA 02510. PVC pipe shall also be installed according to the requirements and specifications of AWWA C605.**

~~A. Pipe Laying. All pipe shall be laid and maintained to the required lines and grades with fittings and valves at the required locations. The Contractor shall be responsible to establish offset hubs parallel to the line of the pipe and to transfer alignment and grade from the hubs set by the project's engineer.~~

~~B. Care and Handling of Material. All materials used for pipe installation shall be carefully lowered when unloading or when installing into a trench. This should be done one piece at a time in order to prevent damage to materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped from the truck or into the trench. Proper implements, tools, and facilities shall be provided and used for safe and~~

convenient prosecution of the work. All material used shall be carefully inspected prior to installation. Any or all defective piece shall be rejected:

B. Pipe Cleanliness. All foreign matter or dirt shall be removed from the inside of the pipe before it is placed and it shall be kept clean during and after laying. No debris, tools, or other materials shall be placed in the pipe during laying operations. When laying of pipe is not in progress, the pipe shall be closed by a water-tight plug.

~~D. Minimum Cover. All water mains and service laterals shall have a minimum cover of 4 feet to the top of the pipe.~~

~~E. Magnetic Locator Tape. All pipe shall include a 3 inch magnetic locator tape installed in the pipeline trench approximately 12 inches below the ground surface. Water tape shall be prepared with white or black printing on a blue field, having the words: WATER.~~

C. Identification Tape. All culinary water mains shall be installed with identification tape that meets the requirements and specifications of APWA 02320. Tape shall be buried 12 inches below grade.

~~F. Tracer Wire. A 12 gauge solid THHN tracer wire shall be installed with all pipe. DBY 3M underground splices shall be made at all tees, crosses and service lines. Wire shall be pulled tight along the pipe.~~

D. Lateral Displacement. All pipes shall be protected from lateral displacement resulting from impact or unbalanced loading during backfilling operations.

E. Restraining. Either thrust blocks or mechanical restraining devices shall be used for all tees, valves, plugs, caps and at bends deflecting 22½ degrees or more. Restraining shall be accomplished according to the standard drawings.

~~I. Cutting. Cutting of pipe for closure pieces or for other reasons shall be done in a neat and workmanlike manner by a method recommended by the manufacturer. After cutting, the pipe shall be beveled and filed to prevent gasket damage in joint assembly except when connecting to mechanical joint fittings.~~

F. Connections to Existing Culinary Water Lines. The Contractor will be responsible to verify actual size, type of material and location of existing utilities in the field. The fittings and materials required for construction must be approved by the City Engineer or his/her designee.

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.

~~K. Separation from Sewer. Water lines shall have a minimum of 1 foot vertical and 10 foot horizontal separation from sewer lines.~~

**39.40.030. Pipe and Fittings.**

A. General. Polyvinyl Chloride (PVC ) pipe shall be used for all culinary water mains 12 inches in diameter and smaller unless otherwise authorized by the City Engineer or

his/her designee. Ductile iron or polyethylene pipe shall be used for culinary water mains larger than 12 inches in diameter. Only PVC or polyethylene pipe may be used in corrosive soils.

B. Polyvinyl Chloride Pipe (PVC). PVC pipe shall meet the standards and specifications of APWA 15014, AWWA C900 and C905. Only blue or white, pressure class 150 psi PVC pipe may be used for culinary water mains.

C. Ductile Iron Pipe. Ductile iron pipe shall meet the standards and specifications of APWA 15011. Only a pressure class of 150 psi or larger may be used. A tubular black polyethylene encasement must be installed according to AWWA C105 over all ductile iron pipe and fittings. Flanges, when required, shall meet the requirements and specifications of AWWA C115.

D. Polyethylene Pipe. Polyethylene pipe shall meet the standards and specifications of APWA 15013.

E. Steel Pipe - Lined and Coated. Steel pipe shall meet the standards and specifications of APWA 15010.

F. Fittings. Use Ductile Iron fittings that conform to the provisions of ANSI/AWWA C110/A21.10 or C153/A21.53 unless otherwise recommended by the manufacturer and authorized by the City Engineer or his/her designee. All PVC pipe being inserted into fittings shall have the bevel end removed. All the bolts and nuts of all fittings shall be greased. All fittings shall have an 8 mil vinyl wrap plastic cover.

**39.40.030. Polyvinyl Chloride Pipe:**

~~A. General. This pipe shall be used for water mains unless authorized by the City Engineer or his/her designee.~~

~~B. Pipe. Pipe for the transmission and distribution of culinary water shall be manufactured in accordance with AWWA C900. -97, "AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 8 inch through 12 inch, for Water". The PVC pipe shall have a cast iron pipe equivalent outside diameter. PVC pipe 14 inches and larger shall be manufactured in accordance with AWWA C905-88, "AWWA Standard for Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 inch through 36 inch". All PVC pipe 4 inch and larger shall be DR. 18 with a working pressure of 150 PSI.~~

~~C. Joints. Joints shall be push on rubber gasket type. Lubrication shall be water soluble, non-toxic, non-objectionable in taste and odor imparted to the water, non-supporting of bacteria growth, and have no deteriorating effect on the PVC pipe or rubber gaskets.~~

~~E. Fittings. All fittings to be used with the PVC pipe shall be the same as fittings for Ductile Iron Pipe and shall conform to the provisions of ANSI/AWWA C110/A21.10 or C153/A21.53. All PVC pipe being inserted into fittings shall have the bevel end removed. All fittings shall be poly-wrapped.~~

— E. Color. All PVC pipe shall be blue or white for water mains and purple for pressurized irrigation mains.

#### **39.40.040. — Ductile Iron Pipe.**

— A. General. This pipe may only be used when authorized by the City Engineer or his/her designee.

— B. Pipe. Ductile iron pipe shall conform to all requirements of ANSI/AWWA C151/A21.51, "American National Standard for Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined molds, for Water or Other Liquids." Minimum pressure Class will be 250 for pipes larger than 12 inch diameter. Pipes of 12 inch diameter and smaller shall be pressure Class 350.

— All pipe shall be made of good quality Ductile Cast Iron and of such chemical composition and structure as is required to meet the physical and mechanical property requirements of the standard.

— C. Mechanical Joints. All mechanical joints shall meet requirements of ANSI/AWWA C111/A21.11. All gasket surfaces shall be smooth and free from imperfections. Gaskets shall conform to tests in accordance with specifications and shall be less than one year old.

— D. Push-on Joints. All push-on joints shall meet the requirements of ANSI/AWWA C111/A21.11. Gaskets shall be free from defects and not over one year old.

— Lubricants shall be non-toxic and have no deteriorating effects on gasket materials. It shall not impart taste to water in a pipe. It shall conform in every way to ANSI 21.11.

— E. Flanged Joints. Flanges shall meet the requirements of ANSI/AWWA C110/A21.10, "American National Standard for Ductile Iron and Gray Iron Fittings, 3 inch Through 48 inch for Water and Other Liquids." Flanged joints shall be bolted firmly with machine, stud or cap bolts of proper size. Flange may be cast integrally with the pipe or may be screwed on threaded pipe. Flanges shall be faced and drilled and of proper dimensions for size and pressure required. Bolts and nuts, unless otherwise specified, shall be made of the best quality refined iron or metal steel and have clean, well-fitting threads. Bolts will be provided with standard hexagonal nuts and standard hexagonal heads. Bolts shall be of the diameter required for each flange and when installed shall be of length so that no more than 3/8 inch nor less than 1/8 inch extends past face of nut. [All buried fittings having steel bolts shall be coated with a non-oxide wax and wrapped with polyethylene].

— Gaskets shall be rubber, either ring or full face, and are 1/8th inch thick. A gasket for each flanged joint of proper size as shown on the drawings.

— F. Coatings and Linings. All exterior surfaces of pipe and fittings shall be coated with hot coal tar approximately 1 mil thick. All interior surfaces shall be cement mortar lined with a standard thickness according to ANSI/AWWA C104/A21.4.

— G. Flanges. Flanges when required shall conform to ANSI/AWWA C115/A21.15.

— H. Fittings. Fittings for Ductile Iron Pipe shall conform to the provisions of ANSI/AWWA C110/A21.10 or C153/A21.53. All fittings shall be poly-wrapped.

— I. Polyethylene Tubular Wrap. All ductile iron pipe shall be wrapped with a polyethylene tubular wrap. Black wrap shall be used for water mains. Wrap shall meet or exceed the requirements of AWWA C105, ANSI A21.5-99, ASTM D4976, and NT4112-99.

— Polyethylene tubular wrap shall be cut to lengths that provide a 1 foot overlap beyond each end of a pipe section. Slip the tubing over the pipe with the printed side up, and bunch it back to clear both ends. A shallow bell hole should be made to facilitate installation of the polyethylene.

— Lower pipe into position and make up the joint. Pull tubing over the joint from the preceding pipe length and tape it securely to the new pipe length. Overlap the polyethylene from the new pipe length back over the same joint and tape in place on the preceding pipe barrel.

— Pull the polyethylene along the length of the new pipe, folding excess tubing over the top of the pipe barrel and securing it every 3 to 4 feet. Keep the excess polyethylene for the overlap of the next joint bunched back from the joint in preparation for making the next joint. Repeat this process for each new pipe length. Repair any tears, holes, or other damage with tape or small sections of polyethylene taped into place.

#### **39.40.040. Valves and Couplings.**

A. General. All valves shall meet the requirements of APWA 02510 and 15030.

B. Resilient Seated Gate Valve. All valves on 4 inch to 10 inch culinary water mains shall be resilient seated gate valves. Valves shall also be of iron body have non-rising bronze stems and meet the following specifications: Valves in sizes 4" through 10" shall be of the iron body, non-rising bronze stem, resilient seated type, manufactured to equal or exceed all applicable AWWA standards of C-515 latest revision and all specific requirements outlined in these specifications:

- 1. Control. Valves shall open left and be provided with 2 inch square operating wrench nuts unless otherwise specified.
  1. Mechanical Joint. When valves are Mechanical Joint, they shall be furnished with all necessary glands, followers, and bolts and nuts to complete installation.
- 3. Disc. The disc shall have integrally cast ASTM B-62 bronze stem nut to prevent twisting, binding or angling of the stem. Designs with loose stem nuts are not acceptable.
  2. Valve Stems. Bronze valve stems shall be interchangeable with stems of the double disc valves of the same size, direction of opening and manufacture.

- 5. ~~Coating.~~ All internal ferrous surfaces shall be coated, holiday free, to a minimum thickness of 4 mils with a two part thermo setting epoxy coating. Said coating shall be non-toxic, impart no taste to the water, formulated from materials deemed acceptable in the Food and Drug Administration Document Title 21 of the Federal Regulations on food additives, Section 121.2514 entitled Resins and Polymeric Coatings. It shall protect all seating and adjacent surfaces from corrosion and prevent build-up of scale or tuberculation.
- 6. ~~Sealing Element.~~ The sealing element shall be secured to the disc with self locking stainless steel screws, and it shall be field replaceable, and shall be such that it cannot be installed improperly.
- 7. ~~Torque.~~ Stem failure from over torquing in either the open or closing position shall occur externally at such a point as to enable the stem to be safely turned by use of a readily available tool after exposure of the valve through excavation.
- 8. ~~Valve Stop.~~ Valve design shall incorporate a positive metal to metal stop to prevent over-compression of the sealing element.
- 9. ~~Bonnet Flange Gasket.~~ A full faced composition gasket placed between machined body and bonnet flanges is required to eliminate cold flow or creep action present with "O" ring gasketed bodies.
- 10. ~~Exterior.~~ The exterior of the valves shall be Asphalt Varnish, JAN-P-450. If exterior epoxy is used, all bolts and nuts shall be made of Stainless Steel to prevent galvanic corrosion of said nuts and bolts due to insulation from the ferrous valve and line.

C. Butterfly Valve. Unless otherwise noted, All valves 12 inches and larger shall be butterfly valves **which meet the requirements and specifications of APWA 02510, 15030 and the following specifications:** conforming to the latest revision of AWWA Standard C-504, Class 150-B, and shall comply with the following:

- 1. *General.* Valve bodies shall be cast iron, ASTM A-126 Class B. Body ends shall be flanged with facing and drilling in accordance with ANSI B16.1, Class 125; or mechanical joint in accordance with AWWA C111. All mechanical joint end valves shall be furnished complete with joint accessories (bolts, nuts, gaskets, and glands). All valves shall conform with AWWA Standard C-504, Table 3, Laying Lengths for Flanged Valves and Minimum Body Shell Thickness for all Body Types.
- 2. *Disc.* Valve disc shall be ductile iron ASTM A-536, grade 65-45-12. Valve disc shall be of the offset design providing 360 degree uninterrupted seating.

- 3. ~~Seat.~~ The resilient seat shall be natural rubber bonded to an 18-8, Type 304 stainless steel retaining ring secured to the disc by 18-8, Type 304 stainless steel screws. The seat shall be capable of mechanical adjustment in the field and field replaceable without the need for special tools. Valve body seat shall be 18-8, Type 304 Stainless Steel.
- 4. ~~Shaft.~~ Valve shafts shall be 18-8, Type 304 stainless steel. Shafts shall be of the two piece stub design and attached to the disc by means of "O" ring sealed taper pins with lock nuts.
- 5. ~~Thrust Bearing.~~ The valve assembly shall be furnished with a non-adjustable factory set thrust bearing designed to center the valve disc at all times.
  - 3. *Shaft Bearings.* Shaft bearings shall be contained in the integral hubs of the valve body and shall be self-lubricated sleeve type.
- 7. ~~Valve Shaft Seal.~~ Valve shaft seal shall consist of "O" Rings. Where the valve shaft projects through the valve body for actuator connection, the "O" Ring packing seal shall be field replaceable as a part of a removable bronze cartridge.
- 8. ~~Actuators.~~ When manual actuators are required they shall be of the traveling nut design capable of withstanding 450 foot pounds of input torque against the open and closed stops. All actuators shall have adjustable mechanical stop limits. The closed position stop shall be externally adjustable. Valves shall be installed with the shaft horizontal unless otherwise directed by the Engineer and shall be provided with a 2-inch square operating nut for manually operating the valve with a "T" handle wrench.
- 4. *Coating.* All valves shall be coated with epoxy in conformance to AWWA Standard C-550, latest revision. Interior wetted ferrous surfaces shall be coated a nominal 10 mils thick for long life; and body exterior shall have a minimum of 3 to 4 mils coating thickness in order to provide superior base for field-applied finish coats.

D. Valve Boxes. ~~All buried valves shall be installed complete with two-piece, cast iron, slip type, 5-1/4-inch shaft valve box with drop lid. The lid shall have the word "WATER" cast in the metal. The lids for valves on fire lines shall have the word "FIRE" cast in the metal.~~

~~Valves and valve boxes shall be installed where shown on the drawings. Valves and valve boxes shall be set plumb. Valve boxes shall be centered directly over the valve. Valves shall be aligned with the front of sidewalk property lines where possible. Earth fill shall be carefully tamped around the valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face if less~~

than 4 feet. ~~Valves shall have the interiors cleaned of all foreign matter before installation.~~

All top of valve boxes located in streets shall be installed 1/4 inch below grade. When a 1 inch overlay is required a year after the road construction, the pavement surrounding the valve box shall be neatly cut to form a 30 inch round opening with the valve box centered, and a concrete collar shall be cast around the box **1/4 inch below grade and the valve box set 1/2 inch below grade.** Valve boxes in off-road areas shall extend 6 inches above grade. Lid detail shall be similar to Comco C-6517.

E. Couplings. Couplings shall be equal to the product of Smith-Blair or Dresser with cast iron couplings being used on all cast iron and PVC pipe. Couplings shall be of the straight, transition, or reducing style as required by the specific installation. All steel fittings and bolts shall be coated with a non-oxide coating and wrapped with polyethylene.

F. Pressure Regulation Valves. Pressure regulation valves (PRV) which are required in a development shall be designed by the Developers engineer and the design shall be submitted to the City Engineer or his/her designee for review and approval prior to starting construction. All PRV's shall be Cla-Val with a bypass, be placed in a concrete vault and have telemetry included.

G. Tapping Valves. Tapping valves may only be used when previously approved by the City Engineer or his/her designee. Tapping saddles with an "O" ring may be used if the **culinary** water main line to be tapped is larger than the new **culinary** water main line. Where the tap is the same size as the existing main, cast iron or stainless steel tapping sleeves shall be used, which encase the full perimeter of the pipe. The valve shall be a tapping valve with a guide lip on the flanged side. The opposite side of the valve shall have a mechanical joint connection.

~~G. Air Vacuum and Release Valves. Air vacuum and release valves shall be placed at the end of every dead-end line which grades to the dead-end. They shall also be placed.~~

**H. Air, Vacuum and Release Valves. Combination air, vacuum and release valves shall be installed according to the standard drawings at high points in the system as required by the City.**

#### 39.40.050. Fire Hydrants.

A. General. **Fire hydrants shall meet the requirements and specifications of APWA 02512.** All fire hydrants shall be Waterous WB-67 **or approved equivalent** and red in color. They shall have a 5 1/4 inch barrel diameter and 6 inch flange connection ~~and Waterous and conform to Specification C-502-64 of the American Water Works Association, including a 6 inch gate valve and valve box complete for a 4 foot 6 inch trench with one 4 1/2 inch streamer nozzle and two 2 1/2 inch hose nozzles.~~ Hydrants shall ~~open to the left and be frost proof.~~ The threads shall be

National Standard Fire Hose Thread. All outlets will have a national standard thread and the hydrant shall be red in color. Spacing of fire hydrants shall be according to the Uniform Fire Code.

B. Placement and Location. Fire hydrant location to be determined by the City. Fire hydrants shall be set vertical and held in place by adequate concrete blocking which shall be left in the trench. Hydrants shall be set at a height that will allow approximately 2 inches exposed between the finished ground and the sidewalk flange. A gravel filled drip area shall be provided. See standard drawing for fire hydrants.

**The relocation of fire hydrants shall meet the requirements and specifications of APWA 02993 and related sections.**

#### 39.40.060. Meters and Services.

A. General. See the standard drawings for **culinary** water services. The minimum size of new **culinary** water service lines is 1 inch. All **culinary** water services shall have dual check valves. **Culinary** water services shall extend 13 feet beyond the back of sidewalk until connected to a building.

B. Placement and Location. All meters boxes shall have their location and grade staked prior to installation. No meter boxes shall be set in sidewalks or driveways. Service taps shall be a minimum of 36 inches apart. No taps will be allowed within 36 inches of the end of the pipe.

Service laterals shall extend perpendicular from the main to the meter box. If a meter must be moved it may only be displaced a maximum of 24 inches to either side. If it must be moved more than 24 inches, a new service line must be installed. When a new service line is installed the old corporation stop shall be shut off at the main and the old service line cut two feet from the main.

**Culinary** water service lines shall meet the separation from **sanitary** sewer requirements in this chapter. **Culinary** water services shall extend ~~13~~ **12** feet beyond the back of sidewalk and plugged until connected to a building.

**The relocations of culinary water meters shall meet the requirements and specifications of APWA 02993 and related sections. Only Type K copper pipe conforming to the requirements and specifications of APWA 15012 shall be permitted between the culinary water main and the meter.**

C. Meters. All meters shall be paid for by the ~~Contractor and supplied-developer and purchased~~ by the City. Meter boxes shall be in good repair. They shall not be set at an angle, crushed, or dented. The inside of boxes must be free from obstructions such as dirt, rocks or debris.

#### 39.40.070. Flushing.

A. General. All **culinary** water lines shall be flushed after the high chlorine test and prior to the pressure test. See Chapter 39.25. Testing and Inspection for testing

information. Flushing shall be accomplished through hydrants and at the end each line.

B. Velocity. The Contractor shall install a tap sufficient in size to provide for 2½ foot per second flushing velocity in the line. The following is the flow quantity required to provide a 2½ foot per second flushing velocity.

FLOW REQUIREMENTS FOR FLUSHING

Pipe Diameter in Inches	Flow in Gallons per Minute
4 inch	100
6 inch	220
8 inch	390
10 inch	610
12 inch	880
16 inch	1,567
18 inch	1,980
20 inch	2,450
24 inch	3,525
30 inch	5,507

**39.40.080. Disinfection of Culinary Water Lines.**

A. Cleaning. The pipe shall be clean prior to disinfection. If in the opinion of the City, contamination is such that it cannot be removed by flushing, the pipe shall be cleaned by mechanical means and then swabbed with a 1% hypochlorite disinfection solution.

B. Methods. All **culinary** water pipeline shall be disinfected as outlined in AWWA C651 by one of the following methods:

1. *Tablet Method*. The tablet method shall consist of placing calcium hypochlorite tablets at the specified rate in the main during construction at the upstream end of each section of pipe. The tablet shall be attached with an adhesive, such as Permatex No. 1 or equal. The line shall then be filled slowly (velocities less than 1 ft/sec), expelling all air pockets and maintaining the disinfection solution in the line for at least 24 hours, 48 hours if the water temperature is less than 41° F. The disinfection solution shall have a concentration of at least 25 mg/l of available chlorine.
2. *Continuous Feed Method*. The continuous feed shall be done exactly as outlined in AWWA C651

and shall have a twenty-five mg/l available Chlorine after 24 hours.

Under both methods the Contractor shall not be allowed to flush the line until the chlorine residual test has been passed by the City. If necessary **culinary** water lines shall be re-chlorinated until satisfactory bacteriological testing is obtained. See Chapter 39.25. Testing and Inspection for testing information.

**Chapter 39.45. Pressurized Irrigation.****39.45.010. General.**

- A. Specifications.
- B. Pipe.
- C. Size.
- D. Location.
- E. Unusual Piping and Plumbing.

**39.45.020. Installation.****A. General.**

- ~~— A. Pipe Laying.~~
- ~~— B. Care and Handling of Material.~~
  - B. Pipe Cleanliness.
  - C. Minimum Cover.
  - D. Magnetic Locator Identification Tape.
- ~~— F. Tracer Wire.~~
- E. Lateral Displacement.
- F. Restraining.
- ~~— I. Cutting.~~
  - G. Connections to Existing Pressurized Irrigation Lines.
- ~~— K. Separation from Water.~~

**39.45.030. Pipe and Fittings.**

- A. General
- B. Polyvinyl Chloride Pipe (PVC).
- C. Ductile Iron Pipe.
- D. Polyethylene Pipe.
- E. Steel Pipe - Lined and Coated.
- F. Fittings

**39.45.030. Polyvinyl Chloride Pipe:**

- ~~— A. General.~~
- ~~— B. Pipe.~~
- ~~— C. Joints.~~
- ~~— D. Fittings.~~
- ~~— E. Color.~~

**39.45.040. Ductile Iron Pipe:**

- ~~— A. General.~~
- ~~— B. Pipe.~~
- ~~— C. Mechanical Joints.~~
- ~~— D. Push-on Joints.~~
- ~~— E. Flanged Joints.~~
- ~~— F. Coatings and Linings.~~
- ~~— G. Flanges.~~
- ~~— H. Fittings.~~
- ~~— I. Polyethylene Tubular Wrap.~~

**39.45.040. Valves and Couplings.**

- A. General.
- B. Resilient Seated Gate Valve.
- C. Butterfly Valve.
- D. Valve Boxes.
- E. Couplings.
- F. Pressure Regulation Valves.
- G. Tapping Valves.
- H. Air, Vacuum and Release Valves.

**39.45.050. Meters, Boxes and Services.**

- A. General.
- B. Placement and Location.
- C. Meters and Boxes.
- D. Polyethylene Pipe.

**39.45.060. Flushing.**

- A. General.
- B. Velocity.

**39.45.010. General.**

A. Specifications. These specifications cover the installation of pressurized irrigation lines. See Chapter 39.20. for improvement and design requirements, Chapter 39.25. for inspection and testing requirements, and Chapter 39.35. for earthwork and trench requirements. See standard drawings related to pressurized irrigation.

B. Pipe. Polyvinyl chloride (PVC) pipe shall be used for all pressurized irrigation mains unless authorized by the City Engineer or his/her designee.

C. Size. The City must approve the sizes of all proposed pressurized irrigation lines. The minimum size of pressurized irrigation pipe is 4 inch diameter for main lines and 1 inch diameter for services.

D. Location. Pressurized irrigation mains shall be located on either the south or west sides of a street 5 feet from the centerline. See standard drawings for utility locations.

E. Unusual Piping and Plumbing. Special and unusual piping and plumbing for equipment or structures are treated as separate items and are not included in these standards.

**39.45.020. Installation.**

A. General. Pressurized irrigation distribution and transmission systems shall be installed according to the requirements and specifications of APWA 02510. PVC pipe shall also be installed according to the requirements and specifications of AWWA C605.

~~— A. Pipe Laying. All pipe shall be laid and maintained to the required lines and grades with fittings and valves at the required locations. The Contractor shall be responsible to establish offset hubs parallel to the line of the pipe and to transfer alignment and grade from the hubs set by the project's engineer.~~

~~— B. Care and Handling of Material. All materials used for pipe installation shall be carefully lowered when unloading or when installing into a trench. This should be done one piece at a time in order to prevent damage to materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped from the truck or into the trench. Proper implements, tools, and facilities shall be provided and used for safe and convenient prosecution of the work. All material used shall~~

be carefully inspected prior to installation. Any or all defective piece shall be rejected.

B. Pipe Cleanliness. All foreign matter or dirt shall be removed from the inside of the pipe before it is placed and it shall be kept clean during and after laying. No debris, tools, or other materials shall be placed in the pipe during laying operations. When laying of pipe is not in progress, the pipe shall be closed by a water-tight plug.

C. Minimum Cover. All pressurized irrigation mains shall have a minimum cover of 2 feet to the top of the pipe.

~~E. Magnetic Locator Tape. All pipe shall include a 3 inch magnetic locator tape installed in the pipeline trench approximately 12 inches below the ground surface. Water tape shall be prepared with white or black printing on a blue field, having the words: WATER.~~

D. Identification Tape. All pressurized irrigation mains shall be installed with identification tape that meets the requirements and specifications of APWA 02320. Tape shall be buried 12 inches below grade.

~~F. Tracer Wire. A 12 gauge solid THHN tracer wire shall be installed with all pipe. DBY 3M underground splices shall be made at all tees, crosses and service lines. Wire shall be pulled tight along the pipe.~~

E. Lateral Displacement. All pipes shall be protected from lateral displacement resulting from impact or unbalanced loading during backfilling operations.

F. Restraining. Either thrust blocks or mechanical restraining devices shall be used for all tees, valves, plugs, caps and at bends deflecting 22½ degrees or more. Restraining shall be accomplished according to the standard drawings.

~~I. Cutting. Cutting of pipe for closure pieces or for other reasons shall be done in a neat and workmanlike manner by a method recommended by the manufacturer. After cutting, the pipe shall be beveled and filed to prevent gasket damage in joint assembly except when connecting to mechanical joint fittings.~~

G. Connections to Existing Pressurized Irrigation Lines. The Contractor will be responsible to verify actual size, type of material and location of existing utilities in the field. The fittings and materials required for construction must be approved by the City Engineer or his/her designee.

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.

~~K. Separation from Water. Pressurized Irrigation mains shall have a minimum of 1 foot vertical and 10 foot horizontal separation from water lines.~~

### 39.45.030. Pipe and Fittings.

A. General. Polyvinyl Chloride (PVC) pipe shall be used for all pressurized irrigation mains 12 inches in diameter and smaller unless otherwise authorized by the City Engineer or his/her designee. Ductile iron or polyethylene pipe shall be used for pressurized irrigation mains larger

than 12 inches in diameter. Only PVC or polyethylene pipe may be used in corrosive soils.

B. Polyvinyl Chloride Pipe (PVC). PVC pipe shall meet the requirements and specifications of APWA 15014 and AWWA C900, C905 and C909. Only purple, pressure class 150 psi pipe may be used for pressurized irrigation mains.

C. Ductile Iron Pipe. Ductile iron pipe shall meet the standards and specifications of APWA 15011. Only a pressure class of 150 psi or larger may be used. A tubular purple polyethylene encasement must be installed according to AWWA C105 over all ductile iron pipe and fittings. Flanges, when required, shall meet the requirements and specifications of AWWA C115.

D. Polyethylene Pipe. Polyethylene pipe shall meet the standards and specifications of APWA 15013.

E. Steel Pipe - Lined and Coated. Steel pipe shall meet the standards and specifications of APWA 15010.

F. Fittings. Use Ductile Iron fittings that conform to the provisions of ANSI/AWWA C110/A21.10 or C153/A21.53 unless otherwise recommended by the manufacturer and authorized by the City Engineer or his/her designee. All PVC pipe being inserted into fittings shall have the bevel end removed. All the bolts and nuts of all fittings shall be greased. All fittings shall have an 8 mil vinyl wrap plastic cover.

### 39.45.030. Polyvinyl Chloride Pipe:

~~A. General. This pipe shall be used for pressurized irrigation mains 4 inch through 12 inch in diameter.~~

~~B. Pipe. Pipe for the transmission and distribution of pressurized irrigation water shall be manufactured in accordance with AWWA C900-97 DR 18 "AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 8 inch through 12 inch, for Water" or AWWA C909 "AWWA Standard for Molecularly Oriented Polyvinyl Chloride Pressure Pipe. The PVC pipe shall have a cast iron pipe equivalent outside diameter and have a working pressure of 150 PSI.~~

~~C. Joints. Joints shall be push on rubber gasket type. Lubrication shall be water soluble, non-toxic, non-objectionable in taste and odor imparted to the water, non-supporting of bacteria growth, and have no deteriorating effect on the PVC pipe or rubber gaskets.~~

~~D. Fittings. All fittings to be used with the PVC pipe shall be the same as fittings for ductile iron pipe and shall conform to the provisions of ANSI/AWWA C110/A21.10-82 or C153/A21.53-58. All PVC pipe being inserted into fittings shall have the bevel end removed. All fittings shall be polywrapped.~~

~~E. Color. All PVC pipe shall be purple for pressurized irrigation mains.~~

### 39.45.040. Ductile Iron Pipe:

— **A. General.** This pipe shall be used for pressurized irrigation mains greater than 12 inches in diameter.

— **B. Pipe.** Ductile iron pipe shall conform to all requirements of ANSI/AWWA C151/A21.51, "American National Standard for Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined molds, for Water or Other Liquids." Minimum pressure Class will be 250 for pipes larger than 12-inch diameter. Pipes of 12-inch diameter and smaller shall be pressure Class 350.

— All pipe shall be made of good quality Ductile Cast Iron and of such chemical composition and structure as is required to meet the physical and mechanical property requirements of the standard.

— **C. Mechanical Joints.** All mechanical joints shall meet requirements of ANSI/AWWA C111/A21.11. All gasket surfaces shall be smooth and free from imperfections. Gaskets shall conform to tests in accordance with specifications and shall be less than one year old.

— **D. Push-on Joints.** All push-on joints shall meet the requirements of ANSI/AWWA C111/A21.11. Gaskets shall be free from defects and not over one year old.

— Lubricants shall be non-toxic and have no deteriorating effects on gasket materials. It shall not impart taste to water in a pipe. It shall conform in every way to ANSI 21.11.

— **E. Flanged Joints.** Flanges shall meet the requirements of ANSI/AWWA C110/A21.10, "American National Standard for Ductile Iron and Gray Iron Fittings, 3-inch Through 48-inch for Water and Other Liquids." Flanged joints shall be bolted firmly with machine, stud or cap bolts of proper size. Flange may be cast integrally with the pipe or may be screwed on threaded pipe. Flanges shall be faced and drilled and of proper dimensions for size and pressure required. Bolts and nuts, unless otherwise specified, shall be made of the best quality refined iron or metal steel and have clean, well-fitting threads. Bolts will be provided with standard hexagonal nuts and standard hexagonal heads. Bolts shall be of the diameter required for each flange and when installed shall be of length so that no more than 3/8 inch nor less than 1/8 inch extends past face of nut. [All buried fittings having steel bolts shall be coated with a non-oxide wax and wrapped with polyethylene].

— Gaskets shall be rubber, either ring or full face, and are 1/8th-inch thick. A gasket for each flanged joint of proper size as shown on the drawings.

— **F. Coatings and Linings.** All exterior surfaces of pipe and fittings shall be coated with hot coal tar approximately 1 mil thick. All interior surfaces shall be cement mortar lined with a standard thickness according to ANSI/AWWA C104/A21.4-80.

— **G. Flanges.** Flanges when required shall conform to ANSI/AWWA C115/A21.15-83.

— **H. Fittings.** Fittings for Ductile Iron Pipe shall conform to the provisions of ANSI/AWWA C110/A21.10-82 or C153/A21.53-58. All fittings shall be polywrapped.

— **I. Polyethylene Tubular Wrap.** All ductile iron pipe shall be wrapped with a polyethylene tubular wrap. Purple wrap shall be used for pressurized irrigation mains. Wrap shall meet or exceed the requirements of AWWA C105-99; ANSI A21.5-99; ASTM D4976; and NF4112-99.

— Polyethylene tubular wrap shall be cut to lengths that provide a 1 foot overlap beyond each end of a pipe section. Slip the tubing over the pipe with the printed side up, and bunch it back to clear both ends. A shallow bell hole should be made to facilitate installation of the polyethylene.

— Lower pipe into position and make up the joint. Pull tubing over the joint from the preceding pipe length and tape it securely to the new pipe length. Overlap the polyethylene from the new pipe length back over the same joint and tape in place on the preceding pipe barrel.

— Pull the polyethylene along the length of the new pipe, folding excess tubing over the top of the pipe barrel and securing it every 3 to 4 feet. Keep the excess polyethylene for the overlap of the next joint bunched back from the joint in preparation for making the next joint. Repeat this process for each new pipe length. Repair any tears, holes, or other damage with tape or small sections of polyethylene taped into place.

#### 39.45.050. Valves and Couplings.

**A. General.** All valves shall meet the requirements of APWA 02510 and 15030.

**B. Resilient Seated Gate Valve.** All valves on 4 inch to 10 inch water mains shall be resilient seated gate valves. Valves shall also be of iron body have non-rising bronze stems and meet the following specifications: Valves in sizes 4" through 10" shall be of the iron body, non-rising bronze stem, resilient seated type, manufactured to equal or exceed all applicable AWWA standards of C-515 latest revision and all specific requirements outlined in these specifications:

- 1. **Control.** Valves shall open left and be provided with 2 inch square operating wrench nuts unless otherwise specified.
  1. **Mechanical Joint.** When valves are Mechanical Joint, they shall be furnished with all necessary glands, followers, and bolts and nuts to complete installation.
- 3. **Disc.** The disc shall have integrally cast ASTM B-62 bronze stem nut to prevent twisting, binding or angling of the stem. Designs with loose stem nuts are not acceptable.
  2. **Valve Stems.** Bronze valve stems shall be interchangeable with stems of the double disc valves of the same size, direction of opening and manufacture.
- 5. **Coating.** All internal ferrous surfaces shall be coated, holiday free, to a minimum thickness of 4 mils with a two part thermo setting epoxy coating. Said coating shall be non-toxic, impart

no taste to the water, formulated from materials deemed acceptable in the Food and Drug Administration Document Title 21 of the Federal Regulations on food additives, Section 121.2514 entitled Resins and Polymeric Coatings. It shall protect all seating and adjacent surfaces from corrosion and prevent build-up of scale or tuberculation:

- ~~6. *Sealing Element.* The sealing element shall be secured to the disc with self-locking stainless steel screws, and it shall be field-replaceable, and shall be such that it cannot be installed improperly.~~
- ~~7. *Torque.* Stem failure from over-torquing in either the open or closing position shall occur externally at such a point as to enable the stem to be safely turned by use of a readily available tool after exposure of the valve through excavation.~~
- ~~8. *Valve Stop.* Valve design shall incorporate a positive metal to metal stop to prevent over-compression of the sealing element.~~
- ~~9. *Bonnet Flange Gasket.* A full-faced composition gasket placed between machined body and bonnet flanges is required to eliminate cold flow or creep action present with "O" ring gasketed bodies.~~
- ~~10. *Exterior.* The exterior of the valves shall be Asphalt Varnish, JAN-P-450. If exterior epoxy is used, all bolts and nuts shall be made of Stainless Steel to prevent galvanic corrosion of said nuts and bolts due to insulation from the ferrous valve and line.~~

C. Butterfly Valve. Unless otherwise noted, All valves 12 inches and larger shall be butterfly valves **which meet the requirements and specifications of APWA 02510, 15030 and the following specifications: conforming to the latest revision of AWWA Standard C-504, Class 150-B, and shall comply with the following:**

- 1. *General.* Valve bodies shall be cast iron, ASTM A-126 Class B. Body ends shall be flanged with facing and drilling in accordance with ANSI B16.1, Class 125; or mechanical joint in accordance with AWWA C111. All mechanical joint end valves shall be furnished complete with joint accessories (bolts, nuts, gaskets, and glands). All valves shall conform with AWWA Standard C-504, Table 3, Laying Lengths for Flanged Valves and Minimum Body Shell Thickness for all Body Types.
- 2. *Disc.* Valve disc shall be ductile iron ASTM A-536, grade 65-45-12. Valve disc shall be of the offset design providing 360 degree uninterrupted seating.
- ~~3. *Seat.* The resilient seat shall be natural rubber bonded to an 18-8, Type 304 stainless steel retaining ring secured to the disc by 18-8, Type~~

304 stainless steel screws. The seat shall be capable of mechanical adjustment in the field and field-replaceable without the need for special tools. Valve body seat shall be 18-8, Type 304 Stainless Steel.

- ~~4. *Shaft.* Valve shafts shall be 18-8, Type 304 stainless steel. Shafts shall be of the two-piece stub design and attached to the disc by means of "O" ring sealed taper pins with lock nuts.~~
- ~~5. *Thrust Bearing.* The valve assembly shall be furnished with a non-adjustable factory set thrust bearing designed to center the valve disc at all times.~~
- 3. *Shaft Bearings.* Shaft bearings shall be contained in the integral hubs of the valve body and shall be self-lubricated sleeve type.
- ~~7. *Valve Shaft Seal.* Valve shaft seal shall consist of "O" Rings. Where the valve shaft projects through the valve body for actuator connection, the "O" Ring packing seal shall be field-replaceable as a part of a removable bronze cartridge.~~
- ~~8. *Actuators.* When manual actuators are required they shall be of the traveling nut design capable of withstanding 450 foot pounds of input torque against the open and closed stops. All actuators shall have adjustable mechanical stop limits. The closed position stop shall be externally adjustable. Valves shall be installed with the shaft horizontal unless otherwise directed by the Engineer and shall be provided with a 2-inch square operating nut for manually operating the valve with a "F" handle wrench.~~
- 4. *Coating.* All valves shall be coated with epoxy in conformance to AWWA Standard C-550, latest revision. Interior wetted ferrous surfaces shall be coated a nominal 10 mils thick for long life; and body exterior shall have a minimum of 3 to 4 mils coating thickness in order to provide superior base for field-applied finish coats.

D. Valve Boxes. All buried valves shall be installed complete with two-piece, cast iron, slip type, 5-1/4-inch shaft valve box with drop lid. The lid shall have the word "IRRIGATION" or "DRAIN" according to the standard drawing cast in the metal.

Valves and valve boxes shall be installed where shown on the drawings. Valves and valve boxes shall be set plumb. Valve boxes shall be centered directly over the valve. Valves shall be aligned with property lines where possible. Earth fill shall be carefully tamped around the valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face if less than 4 feet. Valves shall have the interiors cleaned of all foreign matter before installation.

All top of valve boxes located in streets shall be installed 1/4 inch below grade. When a 1 inch overlay is required a year after the road construction, the pavement surrounding the valve box shall be neatly cut to form a 30 inch round opening with the valve box centered, and a concrete collar shall be cast around the box. Valve boxes in off-road areas shall extend 6 inches above grade. Lid detail shall be similar to Comco C-6517.

E. Couplings. Couplings shall be equal to the product of Smith-Blair or Dresser with cast iron couplings being used on all cast iron and PVC pipe. Couplings shall be of the straight, transition, or reducing style as required by the specific installation. All steel fittings and bolts shall be coated with a non-oxide coating and wrapped with polyethylene.

F. Pressure Regulation Valves. Pressure regulation valves (PRV) which are required in a development shall be designed by the Developers engineer and the design shall be submitted to the City Engineer or his/her designee for review and approval prior to starting construction. All PRV's shall be Cla-Val with a bypass, be placed in a concrete vault and have telemetry included.

G. Tapping Valves. Tapping valves may only be used when previously approved by the City Engineer or his/her designee. Tapping saddles with an "O" ring may be used if the water main line to be tapped is larger than the new water main line. Where the tap is the same size as the existing main, cast iron or stainless steel tapping sleeves shall be used, which encase the full perimeter of the pipe. The valve shall be a tapping valve with a guide lip on the flanged side. The opposite side of the valve shall have a mechanical joint connection.

H. Air, Vacuum and Release Valves. **Combination air, vacuum and release valves shall be installed according to the standard drawings at high points in the system as required by the City.**

#### **39.45.060. Meters, Boxes and Services.**

A. General. See the standard drawings for pressurized irrigation services. The minimum size of new pressurized irrigation service lines is 1 inch. Pressurized irrigation services shall be installed after electric services. Every lot, including both sides of a twin home lot, shall have it's own pressurized irrigation service.

B. Placement and Location. All meters and boxes shall have their location and grade staked prior to installation. No meters or boxes shall be set in sidewalks or driveways. Service taps shall be a minimum of 36 inches apart. No taps will be allowed within 36 inches of the end of the pipe.

Service laterals shall extend perpendicular from the main to the meter or box. For dual pressurized irrigation services, laterals shall extend perpendicular from the main to the tee.

If a meter must be moved it may only be displaced a maximum of 24 inches to either side. If it must be moved

more than 24 inches, a new service line must be installed. When a new service line is installed the old corporation stop shall be shut off at the main and the old service line cut two feet from the main.

C. Meters and Boxes. All meters shall be paid for by the developer and purchased by the City. Meter boxes and pressurized irrigation boxes shall be in good repair. They shall not be set at an angle, crushed, or dented. The inside of boxes must be free from obstructions such as dirt, rocks or debris. Meters shall be installed by the Developer or Contractor.

D. Polyethylene Pipe. Only CTS SDR9 200 psi purple polyethylene pipe shall be use for pressurized irrigation service lines. Pipe damaged by scratches, cuts, kinks or buckled areas shall not be installed.

The bottom of trench shall be flat with no hollows, no lumps and no rock. If these conditions do not occur pipe must be bedded in coarse sand. No rocks shall be allowed within six inches of pipe.

Pipe shall be cut with either a wheel or scissor type tubing cutter with a blade specifically designed for plastic. Cuts shall be square and clean. Cutter manufacturer instructions shall be followed when cutting pipe. All connections shall have stainless steel stiffeners.

There shall be no unnecessary bending of pipe. Taps shall be exactly horizontal to the pressurized irrigation main. If bending cannot be avoided maximum bending radius shall be 25 times the pipe diameter. There shall be no bending within 3 feet of a fixed point and no "S" shape curves.

#### **39.45.070. Flushing.**

A. General. All pressurized irrigation lines shall be flushed before placed in service. Flushing shall be accomplished through the end of each line.

B. Velocity. The Contractor shall install a tap sufficient in size to provide for 2 ½ foot per second flushing velocity in the line. The following is the flow quantity required to provide a 2 ½ foot per second flushing velocity.

FLOW REQUIREMENTS FOR FLUSHING

Pipe Diameter	Flow in Gallons per Minute
4 inch	100
6 inch	220
8 inch	390
10 inch	610
12 inch	880
16 inch	1,567
18 inch	1,980
20 inch	2,450
24 inch	3,525
30 inch	5,507

**Chapter 39.50. Sanitary Sewer.**

**39.50.010. General.**

- A. Specifications.
- B. Pipe.
- C. Size.
- D. Location.
- E. Minimum Slopes.
- F. Sanitary Sewer Lift Stations.
- G. Unusual Piping and Plumbing.

**39.50.020. Installation:**

- A. Pipe Laying.
- B. Care and Handling of Material.
- C. Joints.

**39.50.020. Pipe and Fittings.**

- A. General.
- B. Concrete Pipe.
- C. Polyvinyl Chloride Pipe (PVC).

**39.50.030. Reinforced Concrete Pipe:**

- A. General.
- B. Joints.
- C. Gaskets.

**39.50.040. Polyvinyl Chloride Pipe:**

- A. General.
- B. Deep Pipe.

**39.50.050. Manholes and Appurtenances:**

- A. Material.
- B. Frames and Covers.
- C. Manhole Bases.
- D. Connecting to Existing Sewers.

**39.50.030. Services.**

- A. General.
- B. Clean-outs.

**39.50.010. General.**

A. Specifications. Sanitary sewer facilities shall meet the requirements and specifications of APWA 02535. These specifications cover the installation of sanitary sewer lines. See Chapter 39.20. for improvement and design requirements, Chapter 39.25. for inspection and testing requirements, and Chapter 39.35. for earthwork and trench requirements. See standard drawings related to sanitary sewers.

B. Pipe. All sanitary sewer pipe 18 inches in diameter and larger shall be reinforced concrete pipe (RCP) unless otherwise approved by City Engineer or his/her designee.

C. Size. The City must approve the sizes of all proposed sanitary sewer lines. Minimum size of pipe is 8 inch diameter for main lines and 4 inch diameter for services.

D. Location. Sanitary Sewer mains shall be located on either the south or west sides of a street 10 feet from the centerline. A maximum of 400 feet of pipe shall be allowed between manholes.

E. Minimum Slopes. Slopes shall be designed to have a 2 foot per second velocity unless otherwise approved by the City Engineer. The following table lists minimum slopes for sanitary sewer for each size of pipe:

MINIMUM SANITARY SEWER SLOPES

Pipe Diameter (inches)	Minimum Slope (%)
4	2.000
6	1.000
8	0.334
10	0.248
12	0.194
14	0.158
15	0.144
16	0.132
18	0.113
21	0.092
24	0.077
27	0.066
30	0.057
36	0.045
48	0.031
54	0.027
60	0.023

F. Sanitary Sewer Lift Stations. Sanitary sewer lift stations which are required in a development shall be designed by the Developer's engineer and the design shall be submitted to the City Engineer or his/her designee for review prior to starting construction. Lift stations will be the wet well / dry well type, will have standby power, proper ventilation, telemetry, and will be designed for large areas, not individual subdivisions.

G. Unusual Piping and Plumbing. Special and unusual piping and plumbing for equipment or structures are treated as separate items and are not included in these standards.

**39.50.020. Installation:**

~~— A. Pipe Laying. All pipe shall be laid true to line and grade with the bell end up grade. All pipe shall be laid up grade with a suitable excavation for the bell. No length of pipe shall be laid until the preceding length has been thoroughly embedded and secured in place, so as to prevent any movement or disturbance of the finished joint.~~

~~— All pipe shall be laid and maintained to the required lines and grades with manholes at the required locations. The Contractor shall be responsible to establish offset hubs parallel to the line of the pipe and to transfer alignment and grade from the hubs set by the project's engineer. Each section of pipe shall be checked for alignment and grade before each joint is made. If a laser beam is used, a grade stake shall be established at each manhole and every 200 feet.~~

~~— B. Care and Handling of Material. All materials used for pipe installation shall be carefully lowered when unloading or when installing into a trench. This should be done one piece at a time in order to prevent damage to materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped from the truck or into the trench. Proper implements, tools, and facilities shall be provided and used for safe and convenient prosecution of the work. All material used shall be carefully inspected prior to installation. Any or all defective piece shall be rejected.~~

~~— C. Joints. All rubber gasket joints shall be completed in accordance with installation instructions supplied by the manufacturers of the pipe, taking particular care to avoid twisting of the pipe or other damage to the gasket. After jointing, approved backfill material shall be placed along the lower half of the pipe section and tamped thoroughly so as to maintain the section firmly in position. Any subsequent adjustment or damage to jointing shall require the pipe section to be removed and rejoined as for new pipe. All joints shall be water tight.~~

#### **39.50.020. Pipe and Fittings.**

**A. General.** Reinforced concrete pipe shall be used for all sanitary sewer lines larger than 36 inches in diameter and for all sewer mains of smaller size with less than 2 feet of cover or more than 8 feet of cover. Non-reinforced concrete pipe may be used for pipe sizes with inside diameters smaller than 18 inches. All other sanitary sewer lines shall be constructed with polyvinyl chloride (PVC) pipe.

Pipe buried more than 12 feet deep shall require manufacturing and engineering specifications to be submitted to the City Engineer or his/her designee for written approval.

**B. Concrete Pipe.** Concrete pipe shall meet the requirements and specifications of APWA 15015. Reinforced concrete pipe (RCP) shall be Class III. Only new pipe may be used unless otherwise authorized by the City Engineer or his/her designee.

**C. Polyvinyl Chloride Pipe (PVC).** PVC pipe shall meet the requirements and specifications of APWA 15014.

#### **39.50.030. Reinforced Concrete Pipe:**

~~— A. General.~~ Reinforced concrete pipe shall be ASTM specification C-76 with rubber gasket joints ASTM specification type C-443 reinforced concrete pipe class III. Only new pipe may be used.

~~— B. Joints.~~ Pipe Joints shall conform to ASTM Specification C443 and shall be of the bell and spigot type, and shall be so designated as to provide for self-centering and, when assembled, to compress the gasket to form a watertight seal.

~~— C. Gaskets.~~ Rubber Ring Gaskets for use on concrete pipe with rubber gasket joints shall be molded or extruded and cured in such a manner that any cross section will be dense, homogeneous, and free from porosity and other imperfections. The gaskets shall be extruded or molded to the specified size within a tolerance of plus or minus 1/32 of an inch for any diameter measured at any cross section. The gaskets shall be fabricated from a high-grade tread-type compound. The basic polymer shall be natural rubber, or a copolymer of butadiene styrene synthetic. The gaskets shall meet the physical tests requirements in ASTM Designation C443.

#### **39.50.040. Polyvinyl Chloride Pipe:**

~~— A. General.~~ All sewer pipe 8 inch to 15 inch pipe shall conform to ASTM 3034 and polyethylene pipe shall conform to ASTM F 405 and ASTM F 667. Polyvinyl Chloride (PVC) pipe shall have a minimum wall thickness of SDR 35. The City Engineer or his/her designee may require a heavier wall thickness when needed.

~~— B. Deep Pipe.~~ Pipe buried more than 12 feet deep shall require manufacturing and engineering specifications to be submitted to the City Engineer or his/her designee for written approval.

#### **39.50.050. Manholes and Appurtenances:**

~~— A. Material.~~ Manholes shall be precast reinforced Portland Cement Concrete. Excavation and concrete shall conform to applicable specifications meeting ASTM C478. Concrete shall be low alkali Type II.

~~— B. Frames and Covers.~~ All castings shall be of ASTM A-48, Class 35 iron free from blowholes and shrinkage defects. Castings shall be free from fins and burrs and shall be shot-blasted to remove sand and other foreign matter. Freedom from cracks and defects shall be ascertained by the engineer prior to installation.

~~— Manhole covers and frames on all manholes shall be standard circular, solid, non-rocking type with pick hole with the word "SEWER" cast on the cover. Clear openings shall be of the diameter shown on the plans. The minimum weight of the cover shall be 160 pounds. The minimum~~

weight of the frame shall be 280 pounds. (COMCO A-1180 or A-1181 as required).

— After castings have seasoned sufficiently so that there will be no further distortion due to temperature changes, the cover and ring seat shall be machined so the entire area of the seat will be in contact with the cover, in any position of the cover on the seat.

— The tops of the cover and frame shall be flush and there shall be one-eighth inch (1/8") clearance all around the periphery of frame between the cover and the frame.

— ~~C. Manhole Bases.~~ Manhole bases shall be constructed of concrete. Main line sewer pipe and projecting ends of the sewer and pipe stubs shall be adequately supported to prevent displacement from line or grade during installation of the base.

— All manholes shall have the invert shape to provide an adequate channel between the inlet and outlet pipes. The entire surface of the manhole invert, including channels and shelves shall be steel-troweled to a smooth dense surface. All inverts of junction manholes shall be shaped while the bases of the manholes are under construction. All inverts shall follow the direction of the pipe entering the manholes. Rubber boots shall be provided to connect the inlet and outlet pipes and provide watertight joints.

— ~~D. Connecting to Existing Sewers.~~ Manholes used to connect the sewer to the existing sewer shall be plumb and centered on the existing sewer. The new pipe shall be placed against the existing pipe at the elevation designated by the project engineer and the base poured as specified above. Care shall be taken not to disturb the alignment of the existing sewer during the excavation procedure. Any damage to the existing sewer shall be repaired.

#### 39.50.030. Services.

A. General. All **sanitary** sewer services shall be connected to existing **sanitary** sewer mains by use of a Inserta-tee brand connection or an approved equivalent. Sewer services shall extend ~~12~~ **13**-feet beyond the back of sidewalk and plugged until connected to a building. The minimum cover of sewer laterals is at 3' 6" at the property line.

B. Clean-outs. Any bend in a service line between the main line and the property line greater than 22.5° needs to have a clean-out.

**Chapter 39.55. Storm, Land and Groundwater Drains.**

**39.55.010. General.**

- A. Specifications.
- B. Pipe.
- B. Size.
- C. Location.
- D. Minimum Slopes.
- E. Unusual Piping and Plumbing.
- F. Groundwater Drains.

**39.55.020. Installation.**

- ~~A. Pipe Laying.~~
- ~~B. Care and Handling of Material.~~
- ~~C. Joints.~~

**39.55.020. Pipe and Fittings.**

- A. General.
- B. Concrete Pipe.
- C. Polyethylene Pipe.
- D. Polyvinyl Chloride Pipe.
- E. Corrugated Metal Pipe.

**39.55.030. Concrete Pipe.**

- ~~A. General.~~
- ~~B. Joints.~~
- ~~C. Gaskets.~~

**39.55.040. Smooth High Density Polyethylene Pipe.**

- ~~A. General.~~
- ~~B. Fittings.~~
- ~~C. Joints.~~
- ~~D. Pipe Markings.~~

**39.55.050. Corrugated High Density Polyethylene Pipe.**

- ~~A. General.~~
- ~~B. Fittings.~~
- ~~C. Joints.~~
- ~~D. Pipe Markings.~~

**39.55.030. Manholes, Sumps and Appurtenances.**

- ~~A. Material.~~
- ~~B. Frames and Covers.~~
- ~~C. Manhole Bases.~~
- A. Connecting to Existing Storm-Drains Lines.
- B. Sumps.
- C. Inlet and Clean Out Structures.
- D. Headwalls.

**39.55.040. Retention/Detention Basins.**

- A. Retention Basins.
- B. Detention Basins.

**39.55.010. General.**

A. Specifications. Storm, land and groundwater drain facilities shall meet the requirements and specifications of APWA 02630. These specifications cover the installation of storm, land and groundwater lines. See Chapter 39.20. for improvement and design requirements, Chapter 39.25. for

inspection and testing requirements, and Chapter 39.35. for earthwork and trench requirements. See standard drawings related to storm, land and groundwater drains.

~~B. Pipe. Reinforced concrete pipe shall be used for all storm drain larger than 36 inches in diameter and for all storm drain of smaller size with less than 2 feet of cover or more than 8 feet of cover.~~

B. Size. The City must approve the sizes of all proposed storm drain lines. Minimum size of pipe is 12 inch diameter.

C. Location. Storm mains-Drain lines shall be located along the centerline of the street. A maximum of 500 feet of pipe shall be allowed between manholes.

D. Minimum Slopes. Slopes shall be designed to have a 2 foot per second velocity unless otherwise approved by the City Engineer. The following table lists minimum slopes for storm drain lines for each size of pipe:

MINIMUM STORM DRAIN LINE SLOPES

Pipe Diameter (inches)	Minimum Slope (%)
12	0.194
14	0.158
15	0.144
16	0.132
18	0.113
21	0.092
24	0.077
27	0.066
30	0.057
36	0.045
48	0.031
54	0.027
60	0.023

E. Unusual Piping and Plumbing. Special and unusual piping and plumbing for equipment or structures are treated as separate items and are not included in these standards.

F. Groundwater Drains. All plans groundwater drains must be designed and stamped by licensed professional engineer. Only rigid pipe may be used.

**39.55.020. — Installation:**

~~— A. Pipe Laying. All pipe shall be laid true to line and grade with the bell end up grade. All pipe shall be laid up grade with a suitable excavation for the bell. No length of pipe shall be laid until the preceding length has been thoroughly embedded and secured in place, so as to prevent any movement or disturbance of the finished joint.~~

~~— All pipe shall be laid and maintained to the required lines and grades with manholes at the required locations. The Contractor shall be responsible to establish offset hubs parallel to the line of the pipe and to transfer alignment and grade from the hubs set by the projects engineer. Each section of pipe shall be checked for alignment and grade before each joint is made. If a laser beam is used, a grade stake shall be established at each manhole and every 200 feet.~~

~~— B. Care and Handling of Material. All materials used for pipe installation shall be carefully lowered when unloading or when installing into a trench. This should be done one piece at a time in order to prevent damage to materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped from the truck or into the trench. Proper implements, tools, and facilities shall be provided and used for safe and convenient prosecution of the work. All material used shall be carefully inspected prior to installation. Any or all defective piece shall be rejected.~~

~~— C. Joints. All rubber gasket joints shall be completed in accordance with installation instructions supplied by the manufacturers of the pipe, taking particular care to avoid twisting of the pipe or other damage to the gasket. After jointing, approved backfill material shall be placed along the lower half of the pipe section and tamped thoroughly so as to maintain the section firmly in position. Any subsequent adjustment or damage to jointing shall require the pipe section to be removed and rejoined as for new pipe. All joints shall be water tight~~

**39.55.020. Pipe and Fittings.**

**A. General.** Reinforced concrete pipe shall be used for all drain lines larger than 36 inches in diameter and for all drain lines of smaller size with less than 2 feet of cover or more than 8 feet of cover. Non-reinforced concrete pipe may be used for pipe sizes with inside diameters smaller than 18 inches. Corrugated metal pipe (CMP) may only be used when authorized by the City Engineer or his/her designee.

**B. Concrete Pipe.** Concrete pipe shall meet the requirements and specifications of APWA 15015. Reinforced concrete pipe (RCP) shall be Class III. Only new pipe may be used unless otherwise authorized by the City Engineer or his/her designee.

**C. Polyethylene Pipe.** Polyethylene pipe shall meet the requirements and specifications of APWA 15013 Type S for storm drains and Type SP for land or groundwater drains.

**D. Polyvinyl Chloride Pipe (PVC).** PVC pipe shall meet the requirements and specifications of APWA 15014.

**E. Corrugated Metal Pipe (CMP).** CMP shall meet the requirements and specifications of APWA 15019.

**39.55.030. — Concrete Pipe:**

~~— A. General. Reinforced concrete pipe (RCP) shall be ASTM specification C-76 with rubber gasket joints ASTM specification type C-443 reinforced concrete pipe class III. Non-reinforced concrete pipe shall be manufactured to comply with the requirements of ASTM Designation C-14 Class III. Only new pipe may be used.~~

~~— B. Joints. Pipe Joints shall conform to ASTM Specification C443 and shall be of the bell and spigot type, and shall be so designated as to provide for self-centering and, when assembled, to compress the gasket to form a watertight seal.~~

~~— C. Gaskets. Rubber Ring Gaskets for use on concrete pipe with rubber gasket joints shall be molded or extruded and cured in such a manner that any cross section will be dense, homogeneous, and free from porosity and other imperfections. The gaskets shall be extruded or molded to the specified size within a tolerance of plus or minus 1/32 of an inch for any diameter measured at any cross section. The gaskets shall be fabricated from a high-grade tread-type compound. The basic polymer shall be natural rubber, or a copolymer of butadiene styrene synthetic. The gaskets shall meet the physical tests requirements in ASTM Designation C443.~~

**39.55.040. — Smooth High Density Polyethylene Pipe:**

~~— A. General. Smooth high density polyethylene pipe (HDPE) pipe shall be polyethylene code designation PE 3408 as rated in ASTM D 2239 with a minimum ASTM D 3350 cell classification of 345434C, and an SDR or pressure class rating as indicated.~~

~~— B. Fittings. Fittings shall be manufactured of same resin as the pipe.~~

~~— C. Joints. Joints shall have thermally welded butt fusion in accordance with ASTM D 3261. They shall be flanged in accordance with ASTM D 2657. They shall also have ultra high molecular weight electrofusion tape with a polyethylene coupler meeting ASTM F1055 requirements.~~

~~— Nuts and Bolts shall be carbon steel machined heavy hex heads, Class 2 fit in accordance with ASTM A 307; Grade B, threads in accordance with ASME B1. Steel materials shall be tape wrapped for protection against corrosion after piping installation.~~

~~— D. Pipe Markings. Mark pipes continuously to identify:~~

- ~~— 1. Manufacturer's name (or trademark) and code.~~
- ~~— 2. Nominal size.~~
- ~~— 3. Polyethylene code designation.~~
- ~~— 4. SDR rating.~~
- ~~— 5. Date of manufacture.~~

- 6. Pressure class. (Not applicable to corrugated polyethylene.)
- 7. ASTM or AWWA designation number.

**39.55.050. Corrugated High Density Polyethylene Pipe.**

— A. General. Corrugated high density polyethylene pipe shall be smooth lined and meet the requirements of AASHTO M294 Type S.” It shall also meet the specifications of ASTM F 405 or ASTM F 667, Type III, Category 4 or 5, Grade P33, Class C, or Grade P34, Class C as defined by ASTM D 1248.

— B. Fittings. Fittings shall be manufactured of same resin as the pipe.

— C. Joints. Joints shall be a bell/spigot type joint, meeting modified ASTM D-3212 and ASTM F-477 (Elastomeric gasket).

— D. Pipe Markings. Mark pipes continuously to identify:

- 1. Manufacturer’s name (or trademark) and code.
- 2. Nominal size.
- 3. Polyethylene code designation.
- 4. Date of manufacture.
- 5. Pressure class. (Not applicable to corrugated polyethylene.)
- 6. ASTM or AWWA designation number.

**39.55.030. Manholes, Sumps, and Appurtenances.**

— A. Material. Manholes shall be precast reinforced Portland Cement Concrete. Excavation and concrete shall conform to applicable specifications meeting ASTM C478. Concrete shall be low alkali Type II.

— B. Frames and Covers. All castings shall be of ASTM A-48, Class 35 iron free from blowholes and shrinkage defects. Castings shall be free from fins and burrs and shall be shot-blasted to remove sand and other foreign matter. Freedom from cracks and defects shall be ascertained by the engineer prior to installation.

— Manhole covers and frames on all manholes shall be standard circular, solid, non-rocking type with pick hole with the words “STORM DRAIN” cast on the cover. Clear openings shall be of the diameter shown on the plans. The minimum weight of the cover shall be 160 pounds. The minimum weight of the frame shall be 280 pounds. (COMCO A-1180 or A-1181 as required).

— After castings have seasoned sufficiently so that there will be no further distortion due to temperature changes, the cover and ring seat shall be machined so the entire area of the seat will be in contact with the cover, in any position of the cover on the seat.

— The tops of the cover and frame shall be flush and there shall be one-eighth inch (1/8”) clearance all around the periphery of frame between the cover and the frame.

— C. Manhole Bases. Manhole bases shall be constructed of concrete. Main line storm pipe and projecting ends of the

storm drain and pipe stubs shall be adequately supported to prevent displacement from line or grade during installation of the base.

A. Connecting to Existing Storm. Manholes and sumps used to connect proposed storm drain to existing storm drain shall be plumb and centered on the existing storm drain. The new pipe shall be placed against the existing pipe at the elevation designated by the project engineer and the base poured as specified above. Care shall be taken not to disturb the alignment of the existing storm drain during the excavation procedure. Any damage to the existing storm drain shall be repaired.

B. Sumps. If the sump is located in an area where the earth is stratified with gravel layers, care shall be taken during backfill to be sure that these layers are not sealed off from the sump beginning 4 feet below the bottom of the sump up to the top of the sub-grade.

After backfilling is completed, the entire excavation shall be thoroughly flooded to insure that settlement is complete. Grates shall be set in place and adjusted for final elevation and alignment.

Sumps may only be constructed of reinforced concrete, precast sections and shall meet the requirements of ASTM C478-73. Sumps shall have eccentric lids to ensure adjustments in alignment.

C. Inlet and Clean Out Structures. **Storm Surface** water must enter the City storm drain system through standard City inlet boxes. In no case may water inlet directly into storm manholes, clean-outs, or sumps,

All inlet and clean out structures shall be reinforced concrete boxes. They may be precast or cast-in-place. Grate and Frame Material. All castings shall be of ASTM A-48, Class 35 iron free from blowholes and shrinkage defects. Castings shall be free from fins and burrs and shall be shot-blasted to remove sand and other foreign matter. Freedom from cracks and defects shall be ascertained by the engineer prior to installation.

D. Headwalls. **A headwall shall be installed at all ditch to pipe transitions. Headwall designs must be stamped by a licensed professional engineer and approved by the City Engineer or his/her designee.**

**39.55.040. Retention/Detention Basins.**

A. Retention Basins. All retention basins shall be constructed with a maximum water depth of 12 inches. Detained water from a 24 hour long 25 year storm event must drain completely within 12 hours. All retention basins shall have a series of interconnected sumps connected to curb inlet boxes or storm drain main lines. All retention basins shall be landscaped in accordance with City Standards.

All retention basins shall be constructed for drainage areas designated in the general plan. Basins for smaller areas may be allowed only with prior written approval of the City Engineer or his/her designee.

B. Detention Basins. All detention basins shall be constructed with a maximum water depth of 18 inches; with that depth remaining for no longer than a 6 hour period. Detention basins may be constructed in landscape or parking areas. Each detention basin shall have an outlet to the City storm drain system.

**Chapter 39.60. Streets and Pavements.**

**39.60.010. General.**

- A. Street Designations.
- B. Time Limitation after Curb and Gutter.
- C. Geotextiles, Geogrids and Geocomposites.
- D. Pavers.
- E. Painted Traffic Lines and Markings.
- F. Traffic Barriers.
- G. Delineators.

**39.60.020. Street Section.**

- A. Soils Investigation.
- B. Pavement Section.
- C. Road-base Section.
- D. Sub-base Section.
- E. Grading.

**39.60.030. Trail Section.**

- A. General.
- B. Survey.
- C. Weed Abatement.
- D. Geotextile Fence.
- E. Sub-grade.
- F. Weed Barrier.
- G. Limestone Crusher Fines.
- H. Clean-up.

**39.60.040. Bituminous Surface Course.**

- A. Paving Asphalts.
- B. Asphalt Concrete.
- C. Prime Coat.
- D. Tack Coat.
- E. Overlays and Patcher.
- F. Slurry Seal.
- G. Chip Seal.
- H. Micro-Surfacing.
- I. Pavement Crack Seal
- ~~A. General.~~
- ~~B. Materials.~~
- ~~C. Mix Design.~~
- ~~D. Temperature Control.~~
- ~~E. Spreading and Compaction.~~
- ~~F. Weather Limitations.~~

**39.60.010. General.**

- A. Street Designations. Street designations include: local streets, minor and major collector streets and arterial streets. Designations shall be assigned by the City.
- B. Time Limitation after Curb and Gutter. Pavement must be finished within 45 days of the placement of curb and gutter unless an extension is granted by the City Engineer
- C. Geotextiles, Geogrids and Geocomposites. All geotextile work shall meet the requirements and specifications of APWA 02075 and 02745. Geogrid and geocomposite work shall meet the requirements and specifications of APWA 02076 and 02745.

D. Pavers. Pavers and installation shall meet the requirements and specifications of APWA 02782 and 02783. See standard drawing: Pre-cast Concrete Pavers.

E. Painted Traffic Lines and Markings. Painted traffic lines and markings shall meet the requirements and specifications of APWA 02765 and the MUTCD.

F. Traffic Barriers. Traffic barriers shall meet the requirements and specifications of APWA 02841 and the MUTCD.

G. Delineators. Delineators shall meet the requirements and specifications of APWA 02842 and the MUTCD.

**39.60.020. Street Cross Section.**

A. Soils Investigation. A soils investigation shall be performed for all new roads and those roads for which work will be performed. The results of this investigation and a design of the road cross section shall be submitted to and accepted by the City Engineer or his/her designee.

The following guidelines shall be used as a minimum requirement for street cross sections. They should be used unless the soils investigation indicates they are not adequate. Any variations from these standards must be approved by the City Engineer or his/her designee.

B. Pavement Section. All roads shall be paved with asphalt concrete according to City standards unless authorized by the City Engineer or his/her designee. The following table shall be used for **minimum** pavement depths for each type of pavement application:

PAVEMENT COURSE THICKNESS

Application	Minimum Pavement Thickness (inches)
Parking Lots and Driveways	2 ½
Local Streets	2 ½ + 1 inch overlay after 1 year
Collector Streets	3 + 1 inch overlay after 1 year
Arterial Streets	4 + 1 inch overlay after 1 year

Pavement shall be a **minimum** 3 inches thick within 30 feet of a cross gutter. Streets shall have a 1 inch overlay 1 year after the end of construction inspection.

C. Road-base Section. All roads shall have a **minimum** 8 inches of road-base under the pavement section. Road-base shall be an untreated base course installed according to City standards. See Chapter 39.35. Earthwork and Trenching. Road-base shall be finished to a smooth uniform line and grade.

D. Sub-base Section. All sub-base shall be an engineered fill installed according to City standards. See Chapter 39.35. Earthwork and Trenching. Sub-base shall

be finished to a smooth uniform line and grade. The following table shall be used for **minimum** sub-base course thicknesses for the following California Bearing Ratio (CBR) values of sub-grade:

PARKING LOTS AND DRIVEWAYS  
**MINIMUM SUB-BASE COURSE THICKNESSES**

Sub-grade CBR	Minimum Sub-base Thickness (inches)
Less than 2	12
2 to 8	8
More than 8	No Sub-base Required

LOCAL STREET  
**MINIMUM SUB-BASE COURSE THICKNESS**

Sub-grade CBR	Minimum Sub-base Thickness (inches)
Less than 2	15
2 to 3	12
3 to 10	8
More than 10	No Sub-base Required

COLLECTOR STREET  
**MINIMUM SUB-BASE COURSE THICKNESS**

Sub-grade CBR	Minimum Sub-base Thickness (inches)
Less than 2	18
2 to 3	15
3 to 5	12
5 to 15	8
More than 15	No Sub-base Required

ARTERIAL STREET  
**MINIMUM SUB-BASE COURSE THICKNESS**

Sub-grade CBR	Minimum Sub-base Thickness (inches)
Less than 2.5	24
2.5 to 3.5	18
3.5 to 6	12
6 to 25	8
More than 25	No Sub-base Required

E. Grading. The sub-grade, sub-base, and road base shall all be graded to an engineered red-head and accepted by the City. Red-heads shall be placed every 50 feet at the crown of the road. If the distance between red-heads and edge of pavement exceeds 25 feet additional redheads shall be installed half way between the crown and edge of pavement.

**39.60.030. Trail Section.**

A. General. A soils investigation shall be performed for all new trails. The results of this investigation and a design of the trail section shall be submitted to and accepted by the City Engineer or his/her designee.

The following guidelines shall be used as a minimum requirement for trail cross sections. They should be used unless the soils investigation indicates they are not adequate. Any variations from these standards must be approved by the City Engineer or his/her designee. All trail materials shall be placed according to City standards.

1. Engineered Fill. Compacted engineered fill shall be placed in all areas where fills are required to meet grade or the requirements of the soils investigation.
2. Untreated Base Course. 6 inches of compacted untreated base course shall be placed under the surface course of all trails.
3. Bituminous Surface Course. 2 1/2 inches of APWA AC-20-DM-1/2 bituminous surface course shall be placed across 10 feet of the trail section.
4. Limestone Crusher Fines. When required, 2 1/2 inches of limestone crusher fines shall be placed along the edges of the trails to the top of the bituminous surface course.

B. Survey. Both sides of a trail shall be laid out by a survey and approved by the City before construction. Lath shall be placed at 100 foot intervals and at bends and obstacles the trail comes near.

C. Weed Abatement. All weeds shall be sprayed and killed with Roundup or an approved equivalent one week

before any work may be performed, and within 3 weeks of the placement of untreated base course.

D. Geotextile Silt Fence. An APWA 02075 silt fence shall be installed along the limits of the trail construction at hillsides and river embankments.

E. Sub-grade. The sub-grade shall be grubbed of all trees, bushes and other organic matter. Sub-grade shall be graded to meet the following A.D.A. requirements for walkways:

1. *Maximum Slope.* Sub-grade shall not have a slope greater than 8.33%.
2. *Maximum Run for Steep Slopes.* For slopes between 5.00% and 6.25% the maximum run shall be 40 feet. For slopes between 6.25% and 8.33% the maximum run shall be 30 feet.

F. Weed Barrier. Weed barrier geotextile shall meet the requirements and specifications of APWA 02075.

G. Limestone Crusher Fines. The compacted limestone crusher fines shall meet the following gradation:

LIMESTONE CRUSHER FINES GRADATION

Sieve	Passing
3/8 inch	100%
No. 4	70 to 90%
No. 10	30 to 70%
No. 40	5 to 30%
No. 200	5 to 15%

H. Clean-up. Upon completion of the trail section all windrows, survey and construction debris shall be removed from along the edges of the trail.

**39.60.040. Bituminous Surface Course.**

A. Paving Asphalts. Paving asphalts shall meet the requirements and specifications of APWA 02703. Recycled asphalt (RA) content may not exceed 25% in any mix design.

B. Asphalt Concrete. Asphalt concrete shall meet the specifications and requirements of APWA 02705 Asphalt Concrete, 02745 Hot-Mix Asphalt Concrete Paving and 02747 Cold-Mix Asphalt Concrete Paving. Use AC-20-DM-3/4 unless otherwise specified.

Cold-mix asphalt concrete shall only be installed when allowed by the City. All cold-mix asphalt concrete shall be replaced with hot-mix within 30 days of when it becomes available.

Superpave performance graded asphalt concrete that meets the specifications and requirements APWA 02706 shall be used in all arterial streets. All other streets and

asphalt concrete applications shall meet the specifications and requirements of the APWA medium traffic classification.

C. Prime Coat. Prime coat only as required by the plans or the City. Prime coat shall meet the requirements and specifications of APWA 02708.

D. Tack Coat. Install tack coat as required and according to APWA 02709.

E. Overlays and Patches. Use APWA AC-20-DM-1/2 for overlays less than 2 inches thick. Use APWA AC-20-DM-3/4 for overlays 2 inches thick or greater. Use SS-1 emulsified asphalt tack coat. ~~The minimum overlay thickness shall be 1 inch. Before an overlay Contractor shall clean streets of all loose impediments and apply SS-1 tack a minimum of 0.05 gallons per square yard.~~

F. Slurry Seal. Slurry seals shall meet the requirements and specifications of APWA 02785. Only type SS-I asphalt slurry seals shall be applied to City streets.

G. Chip Seal. Chip seals shall meet the requirements and specifications of APWA 02786.

H. Micro-Surfacing. Micro-surfacing shall meet the requirements and specifications of APWA 02787.

I. Pavement Crack Seal. Pavement crack seals shall meet the requirements and specifications of APWA 02975.

~~A. General. Bituminous surface course shall consist of a mixture of mineral aggregate and bituminous binder conforming to one of the gradings hereinafter specified. It shall be mixed at a central mixing plant and spread and compacted with laydown machines or boxes as approved by the City.~~

~~B. Materials. The following specifications are for materials used in the bituminous surface course:~~

- ~~1. Bituminous Material. The bituminous material shall be penetration asphalt cement conforming to the requirement of Section 704 of the State of Utah Standard Specifications for Road and Bridge Construction, 1970 issue.~~
- ~~2. Mineral Aggregate. Mineral aggregate shall be in accordance with Section 403.03 of the State of Utah Specifications for Road and Bridge Construction, 1970 edition, paragraph (H) through (J).~~
- ~~3. Graduation. The combined dry mineral aggregate shall be uniformly graded and of such a size that will meet one of the gradation limits specified below when tested in accordance with AASHTO T-27.~~

BITUMINOUS SURFACE COURSE  
 DRY MINERAL AGGREGATE GRADATION

Sieve Size	% Passing
3/4 inch	100
1/2 inch	70-100
3/8 inch	---
No. 4	48-76
No. 8	36-59
No. 16	27-45
No. 50	16-29
No. 200	5-11

For overlays and patches the following gradation will be used:

BITUMINOUS SURFACE COURSE  
 DRY MINERAL AGGREGATE GRADATION

Sieve Size	% Passing
1/2 inch	100
3/8 inch	70-100
No. 4	48-76
No. 8	36-59
No. 16	27-45
No. 50	16-29
No. 200	5-11

C. Mix Design. The Contractor shall prepare a mix design using the Marshall Method and the following Marshall criteria test properties:

1. Stability - all mixtures;
2. Flow - all mixtures;
3. Percent air voids;
4. Percent voids in mineral aggregate 3/4" max;
5. Percent voids in mineral aggregate 1" max; and
6. 50 compaction blows each end of specimen.

After a mix design has been approved, the mixture furnished shall conform within the following ranges of tolerance:

BITUMINOUS SURFACE COURSE  
 MIX DESIGN TOLERANCES

Passing No. 4 and larger sieves	Greater than 7%
Passing No. 4, 16, and 50 sieves	Greater than 5%
Passing No. 200 sieve	Greater than 3%
Asphalt content	Greater than 0.4%

D. Temperature Control. The viscosity of the asphalt being used shall be between 150 and 300 centistokes as determined in accordance with ASTM designation D2170. The temperature range corresponding to this viscosity range will depend on the type and source of asphalt. The engineer will specify as a part of the mix approval the temperature limits for asphalt, aggregate, mixing and laydown.

E. Spreading and Compaction. The bituminous mixture shall be spread with self-propelled mechanical spreading and finishing equipment or box approved by the City Engineer or his/her designee. The mixture shall be spread and struck off in such a manner that the finished surface shall conform to the grades and cross sections required by the plans approved by the City Engineer or his/her designee.

After the mixture has been spread, the surface shall be rolled in a longitudinal direction commencing at the outside edge or lower side and proceeding toward the higher side. Each pass of the roller shall overlap the preceding pass by at least one-half the width of the roller. Rolling shall continue until 95% of laboratory density, as determined by Utah Department of Highways Test Procedure No. 8-942, has been achieved.

Thickness shall be reasonably close to the specified thickness. Depth analysis shall be made by cores located at random pattern with no less than four cores per day's paving. No cores shall show a deficient thickness of less than 1/4". Deficient thickness shall be corrected by adding additional surface course as directed by the engineer.

F. Weather Limitations. No bituminous surface course shall be placed when the temperature of the air or the road is 50 degrees Fahrenheit and falling; or during rainy weather; or when the base is wet. The air temperature shall be measured in the shade.

**Chapter 39.65. Portland Cement Concrete and Masonry Work.**

**39.65.010. General.**

- A. Specifications.
- B. Allowable Grades.
- C. American Disabilities Act (ADA) Requirements.
- D. Slip Forming.
- E. Combination Curb, Gutter, and Sidewalk
- F. Cold Weather Concrete.
- G. Debris in Gutters.
- H. Sidewalk.
- I. Drive Approaches.
- J. Protection of Wet Concrete.
- K. Repair.

**39.65.020. Installation.**

- A. Cutting Pavement.
- B. Forms and Joints.
- C. Base Material.
- D. Mixing and Conveying.
- E. Finishing.
- F. Curing.

**39.65.030. Materials.**

- A. Coarse Aggregate.
- B. Fine Aggregate.
- C. Cement.
- D. Water.

**39.65.040. Concrete Mixes.**

- A. Mix Design.
- B. Proportioning.
- C. Control.
- D. Water Adjustments.

**39.65.050. Masonry.**

- A. General.

**39.65.010. General.**

A. Specifications. These specifications cover the installation of concrete work including but not limited to curbs, gutters, sidewalks, boxes, and thrust blocks. **All concrete work shall meet the requirements and specifications of APWA Division 3 (03060 through 03600) and related sections. Concrete driveway, sidewalk, curb and gutter work shall meet the requirements and specifications of APWA 02770.** See Chapter 39.20. for improvement and design requirements, Chapter 39.25. for inspection and testing requirements, and Chapter 39.35. for earthwork and trench requirements. Also, see standard drawings related to concrete work.

All concrete work shall be constructed where indicated on the plans or as directed by the project engineer and shall conform in all respects to the specified lines, grades, and dimensions and City standards.

B. Allowable Grades. The minimum grade allowed for any gutter is 0.45%. See Chapter 39.20. Improvement and

Design Requirements for maximum allowable grades of City streets.

C. American Disabilities Act (ADA) Requirements.

All pedestrian facilities will conform to the current federal ADA standards.

D. Slip Forming. In each drive approach and at each pedestrian ramp, 12 inch #4 rebars shall be placed at 24 inches on center with 4 inches extending into the curb, 2 ½ inches below the top back of curb.

E. Combination Curb, Gutter, and Sidewalk.

Combination curb, gutter, and sidewalk will not be allowed unless authorized by the City Engineer.

F. Cold Weather Concrete. Concrete shall not be placed when a descending air temperature in the shade and away from artificial heat falls below 35°F. Concrete shall not be poured on frozen ground. Where high temperatures are likely to descend below 32°F, concrete shall be covered or otherwise protected against freezing. No calcium based add mixtures may be used. Any other add mixtures must be approved by the City Engineer or his/her designee.

**If concrete is not protected by insulation blankets for 72 hours following installation and the temperature drops below 45 degrees a pay factor of 0.50 shall apply.**

G. Debris in Gutters. Once curb and gutter and surface course is in place they shall be kept as clean as possible. Dirt and gravel will not be placed in gutter or on street. Gutter will flow freely at all times.

H. Sidewalk. When equipment is required to cross over sidewalk, bridging will be provided to protect concrete.

I. Drive Approaches. All concrete for a drive approach shall be 5 inches thick in the public right-of-way.

J. Protection of Wet Concrete. The Contractor shall be responsible to protect wet concrete. Any concrete that is vandalized before setting up shall be replaced at the contractor's expense.

K. Repair. When authorized by the City contractor may repair concrete damage with Concrete Solution's Ultra Surface Concrete Polymer installed to manufacturer's specifications.

**39.65.020. Installation.**

A. Cutting Pavement. When replacing gutter the pavement shall be cut along the entire excavation to provide a vertical joint in the surface. Cut shall be a minimum of 12 inches from lip of gutter. A pavement saw shall be used to for all pavement cutting. If excavation damages the cut pavement, pavement shall be cut again before patching. All road cuts shall be repaired within 2 working days.

B. Forms and Joints. ~~All forms shall be of steel, free from warps, bends or other deformations. They shall be of a size to match the sections shown on the plans. Forms shall be held firmly in place with stakes and shall be true to line and grade.~~ **When pouring concrete along a curve**

flexible forms with enough stakes to hold the forms at an even curve shall be used.

Curb and gutter contraction joints shall be constructed every 10 feet by using steel templates 1/8 inch in thickness. Sidewalk contraction joints shall meet APWA requirements with the minimum distance between joints being 5 feet. Expansion joints shall be constructed every 50 feet in sidewalks. The templates shall be removed as soon as the concrete has set sufficiently to hold its shape.

C. Base Material. A minimum of 4 inches of untreated base course shall be installed under all concrete and shall extend out 1 foot in all directions from concrete unless otherwise specified. Untreated base course shall be compacted and installed according to City standards. See chapter 39.35. Earthwork and Trenches.

D. Mixing and Conveying. Concrete transported in a truck mixer, agitator, or other transportation device shall be discharged at the job and placed in its final position in the forms within 1 hour after the introduction of the mixing water to the cement and the aggregate, or the cement to the aggregate, except that in hot weather or under other conditions contributing to quick stiffening of the concrete, the maximum allowable time may be reduced by the City Engineer or his/her designee. The maximum volume of mixed concrete transported in an agitator shall be in accordance with the specified rating.

E. Finishing. As soon as the concrete has set sufficiently to retain its shape without support of the face form, the clamps, spreaders and face forms shall be removed. While the concrete is still green, the surface shall be thoroughly floated with a magnesium or moist wooden float to provide an even smooth surface, then broomed lightly.

F. Curing. As soon as possible after final finishing the finished surface shall be coated with a curing compound. The compound shall be an ASTM C-1315 Type 2 curing compound that meets the APWA 03390 specifications. The compound shall be applied in accordance with the manufacturer's recommendations. During the months of October through February exposed concrete shall be covered with an insulated curing blanket that meets the ACI 306 specification for 3 days when temperatures remain at 15 degrees Fahrenheit or higher and for 7 days for temperatures below 15 degrees Fahrenheit. Insulated curing blankets shall only be removed during the warmest parts of the day. The curing compound shall then be applied within 24 hours of the blankets being removed.

**39.65.030. Materials.**

A. Coarse Aggregate. A coarse aggregate shall consist of hard durable particles of a mixture of crushed and natural gravel possessing at least 50% of broken surface area. The coarse aggregate shall be free from substances which are chemically active relative to hydrated cement and shall be subject to particularly the following:

1. Loss on abrasion by Los Angeles Abrasion Test not more than 40% by weight.
2. Loss on exposure to 5 cycles of sodium sulfate soundness test, not more than 8% by weight.
3. Deleterious substances shall not exceed the values in the following table:

PORTLAND CEMENT CONCRETE  
COURSE AGGREGATE DELETERIOUS SUBSTANCES

Substance	Maximum % by Weight
Soft Fragments	3.0
Coal Lumps	1.0
Clay Lumps	0.5
Material passing 39 100 Sieve	1.5
Organic Material	0.1
Total for All of the Above	3.0

The maximum size of aggregate to be used shall not exceed 1 1/2 inches in terms of this size definition contained in ASTM Standards except that the maximum size shall not exceed 1/4 of the least dimension of the finished concrete in which the aggregate is to be used.

Coarse aggregate shall be uniformly graded within the following range:

PORTLAND CEMENT CONCRETE  
COURSE AGGREGATE GRADATION

Sieve Size	Minimum Retained (%)	Maximum Retained (%)
1 1/2 inch	0	10
3/4 inch	30	70
1/4 inch	75	100
No. 4	95	100

B. Fine Aggregate. Fine aggregate shall consist of clean, hard durable particles of natural sands, subject to the following limitations:

1. Organic Calorimetric Test using sodium hydroxide shall result in a color not darker than Number 2 in the acceptance range.
2. Loss on exposure to 5 cycles of the sodium sulfate soundness tests shall not exceed 8% by weight.

3. Deleterious substances shall not exceed the values in the following table:

PORTLAND CEMENT CONCRETE  
FINE AGGREGATE DELETERIOUS SUBSTANCES

Substance	Maximum % by Weight
Soft Fragments	3.0
Coal Lumps	1.0
Material passing 39 100 Sieve	3.0
Micaceous or Flaky Particles	3.0
Total for All of the Above	5.0

Fine aggregate shall be uniformly graded within the following range:

PORTLAND CEMENT CONCRETE  
FINE AGGREGATE GRADATION

Sieve Size	Minimum Retained (%)	Maximum Retained (%)
No. 4	0	5
No. 8	0	20
No. 16	20	50
No. 30	50	75
No. 50	75	90
No. 100	95	100

C. Cement. All cement used shall be Type II unless otherwise allowed by the City Engineer or his/her designee. All cement and dry additives shall be stored in damp-proof conditions. Shipments of cement shall be marked and stored in such a manner as to provide positive identification. The supplier shall keep and have available for inspection at all times an accurate record of supplies and use of cement of the various types and shipments. No cement shall be used which has been subject to dampness or exposure.

D. Water. Water used for concrete shall be potable and free from excess salts, organic material, or other deleterious substances. Addition of water to the mixed concrete after specified workability has been obtained will not be allowed, nor shall any concrete be re-tempered or re-mixed.

39.65.040. Concrete Mixes.

A. Mix Design. Concrete mix designs shall meet the following requirements:

PORTLAND CEMENT CONCRETE  
MIX DESIGN REQUIREMENTS

Property	Requirement
Cement Content	6.5 Bags per Cubic Yard (Minimum)
28 Day Compressive Strength	4000 psi (Minimum)
Slump Range	1 to 3 inches
Flatwork Slump Range	3 to 4 inches
Air Content	5% to 7%

B. Proportioning. The supplier shall determine proportions by weight of aggregates, cement, additives, and water required to comply with strength, workability, and other requirements detailed herein. Such proportions shall be submitted to the City Engineer or his/her designee in three copies annually along with the following tests on materials and shall be subject to his/her approval.

1. Coarse aggregate
  - a. Source
  - b. Deleterious substances
  - c. Los Angeles Abrasion Test
  - d. Sodium Sulfate Soundness Test
  - e. Sieve
2. Fine aggregate
  - a. Source
  - b. Deleterious substances
  - c. Calorimetric Test for Organics
  - d. Sodium Sulfate Soundness Test
  - e. Sieve and fineness modulus
3. Cement
  - a. Type
  - b. Supplier
  - c. Analysis

Upon approval all concrete shall be prepared in terms of the proportions so approved unless variation becomes necessary by reason of materials or conditions to achieve the requirements of these specifications, in which case such variation shall be approved in writing by the City Engineer or his/her designee. Approval by the engineer of mix proportions shall not relieve the supplier from the responsibility for obtaining the concrete strengths specified or complying will all other provisions of this specification.

C. Control. Measurements of materials except water shall be by weight. Equipment used shall be capable of controlling weight within 1% of each ingredient. Water may be measured either by volume or weight provided that

an accuracy of 1% is maintained. Cement may be assumed to weight 94 pounds per sack but proportioning aggregates for fractional sacks of cement will not be permitted unless the fractional amount is weighed for each batch.

D. Water Adjustments. Compensation for the water contained in the aggregates shall be made at least once daily or as often as inspection of the concrete may indicate that variation from this cause has occurred. The Pycnometer Method of assessing water in aggregate may be used for its determination for the purposes of this paragraph.

**39.65.010. Masonry.**

A. General. All masonry work shall meet the requirements and specifications of APWA Division 4 (04065 through 04220) and related sections.

## Chapter 39.70. Electrical Service.

**39.70.010. General.**

- A. Standards and Specifications.
- B. Construction Costs.
- C. Attaching to Existing City Facilities Prohibited.
- D. Unusual Service Extensions.
- E. Permits and Inspections.
- F. Access to Premises.
- G. Electrical Plan Drawings.
- H. Electrical Box Clearance.

**39.70.020. Voltage and Energy Regulation.**

- A. Available Voltages.
- B. 3 Phase Service.
- C. Power Factor Correction.
- D. Load Control.
- E. Voltage Control.
- F. Fluctuating Load Limitations.
- G. Penalties.

**39.70.030. Materials.**

- A. Conduit.
- B. Enclosures.

**39.70.040. Installation.**

- A. General.
- B. Underground Lines.
- C. Conduit Depths.
- D. Tracer Wire and Pull Strings.
- E. Caution Tape and Stub Markers.
- F. Underground Metal Conduit.
- G. Berms, Slopes, and Hillside Conditions.
- H. Labels.

**39.70.050. System Requirements.**

- A. Additional Capacity Requirements.
- B. Substations.

**39.70.060 . Services.**

- A. Point of Service.
- B. Service Entrance Requirements.
- C. Underground Service Requirements.

**39.70.070. Metering.**

- A. General.
- B. Location.
- C. Meter Base.
- D. Commercial Meters.
- E. Location of Multiple Meters.
- F. Meter Location Regarding Remodeling.
- G. Meter Accessibility.
- H. Outdoor Meters for Non-Residential General Service.
- I. Instrument Transformers for Metering.
- J. Current Transformer Cabinet.

**39.70.080. Lighting.**

- A. General.
- B. Location.
- C. Orientation.
- D. Grounding.

**39.70.010. General.**

A. Standards and Specifications. All electrical work shall be installed in accordance with these development standards, the most current edition of the National Electrical Code (NEC) and the National Electric Safety Code (NESC).

These specifications cover the installation of the electrical system. See Chapter 39.20. for improvement and design requirements, Chapter 39.25. for inspection and testing requirements, and Chapter 39.35. for earthwork and trench requirements. See standard drawings related to electrical system.

B. Construction Costs. All costs to install ~~or relocate additional overhead or underground~~ facilities to provide electrical service shall ~~not~~ be paid for by the ~~City Developer or Consumer.~~ ~~In the event a developer, consumer or property owner requests relocation of electrical facilities, the costs shall be the responsibility of the Consumer developer or property owner.~~

C. Attaching to Existing City Facilities Prohibited. Consumer shall install no wiring or attachments on poles or other equipment of City unless specifically authorized, in writing, by the City.

D. Unusual Service Extensions. Special and unusual service extension requirements for equipment or structures are treated as separate items and are not included in these standards.

E. Permits and Inspections. Service will not be established until all necessary permits have been obtained and not until Consumer's wiring installation has been inspected and approved by the City. The City reserves the right to inspect wiring and to refuse service to any installation that is, in the opinion of the City, unsafe or if the operation of same may be detrimental to the service furnished other Consumers or the City.

F. Access to Premises. Any properly identified representative of the City shall, at all reasonable hours, have free access to and from the premises of the Consumer for the purpose of inspecting Consumer's installations and electric equipment and for the purpose of reading, repairing, testing, or removing the City's meter or its other property. When, in the opinion of City, emergency conditions exist with respect to City's service, City's representative shall have immediate and free access to Consumer's premises.

G. Electrical Plan Drawings. Utility shall provide electrical plan drawings. If you would like to request any changes to these drawings, please contact the electrical superintendent with your proposal. Approved electrical drawings must be initialed by an approved electrical division supervisor, and signed by the electrical superintendent in order to be valid for construction of the electrical system improvements. Photo-copies of approved drawings will not be considered valid. Revisions, if

needed, must also include the date the revision was approved.

H. Electrical Box Clearance. All electrical boxes shall have 12 feet clearance to the front and 3 feet clearance to the back and on either side. Secondary pedestals shall only require 3 feet of clearance on all sides.

#### **39.70.020. Voltage and Energy Regulation.**

A. Available Voltages. Standard residential service shall be 1 phase, 3 wire, 120/240 volt. Standard commercial and industrial service shall be 3 phase, 4 wire, 120/208Y volt, or 3 phase, 4 wire, 277/480Y volt. Developer must contact the City for the availability of other service options.

City reserves the right to deny a customer 3-phase service if the City determines that single-phase service will adequately supply Consumer's load requirements.

B. 3 Phase Service. 3 phase service may, at the Cities' option, be furnished where 3 phase facilities of adequate capacity are already installed immediately adjacent to the point where service is to be delivered to Consumer, or where, as determined by City, it is economically feasible to extend such 3 phase facilities.

City reserves the right to refuse to extend or install 3 phase facilities to serve motors individually rated at 20 HP or less and to furnish only 1 phase service for such motors. In such an event, Consumer may elect to install 1 phase to 3 phase conversion equipment to operate 3 phase motors.

C. Power Factor Correction. City reserves the right to require the Consumer to install power factor corrective equipment. This equipment shall maintain the power factor on all of consumers electric power meters to not less than 90% lagging at all times.

D. Load Control. The City reserves the right to require Consumers to install equipment to limit load and reduce voltage fluctuations.

E. Voltage Control. Where Consumer installs power factor corrective equipment, the City reserves the right to require Consumer to install controls and equipment to prevent voltage, frequency, and/or harmonics problems that may be detrimental to other Consumers or the City.

F. Fluctuating Load Limitations. Where large fluctuating 1 phase loads, such as spot welders, are involved, the City reserves the right to require such loads to be supplied by means of a 3 phase to a single-phase converter or other similar equipment. All conversion equipment shall be installed, owned, operated and maintained by the Consumer.

In the event a separate service or transformer installation or additional transformer capacity is required to adequately serve fluctuating loads (such as X-ray equipment, welders, etc.). Such equipment costs and installations shall be the responsibility of the consumer.

G. Penalties. If, such voltage control equipment is not installed by Consumer, consumer may be required to pay a power factor penalty and/or all electric service shall be

subject to disconnection as provided by Title 13.44. of the Spanish Fork Municipal Code. Consumer's wiring used to supply such fluctuating loads shall be installed in a continuous run of rigid conduit and cable as approved by City

#### **39.70.030. Materials.**

A. Conduit. All conduit shall be electrical grade conduit. Conduit shall be schedule 40 PVC unless otherwise specified by the City. Electrical grade rigid metal conduit shall be used under collector and arterial streets and for all sweeps over 30 degrees. All conduit extending out of the ground outside of an enclosure shall be rigid metal from the elbow up a minimum of 10 feet. All buried metal conduit shall be coated with anti-corrosion tape. Tape shall be a minimum of 2 inches wide. Use 3 inch conduit for 1 phase lateral line and a minimum of a 4 inch conduit for 3 phase lateral line.

B. Enclosures. All enclosures including, primary and secondary junction boxes, shall be level. Opening mechanisms and locking devices on all transformer equipment shall be 4 to 6 inches above final grade. Opening mechanisms and locking devices on all primary and secondary junction boxes shall be 10 inches above final grade.

If ground sleeves or pads settle, Developer shall be required to re-level to the above specifications. If primary enclosures or transformers settle after being energized, the City shall re-level the equipment at the Developer's expense.

#### **39.70.040. Installation.**

A. General. All electrical facilities will be installed by a licensed electrical contractor. A certified journeyman electrician or lineman shall be on site during all conduit installation, cable pulling and connecting of electrical wiring.

Contractor shall construct all electrical facilities in a development except for the following which shall be completed by the Utility:

1. Pulling high voltage underground cable;
2. Installing high voltage cable terminations;
3. Setting transformers and switch gears (contractor shall install sectionalizers);
4. Secondary connectors shall be connected in ~~both~~ transformers (exception: contractor shall connect secondary connectors in 3 phase transformers);
5. All overhead facilities, including extension of risers as shown in the standard drawings.

B. Underground Lines. All new facilities shall be constructed underground unless otherwise authorized by the City. No overhead power will be allowed unless required by the Utility.

C. Conduit Depths. The following depths shall be used for electrical conduit:

ELECTRICAL CONDUIT DEPTHS

Conduit Size	Depth to Top of Conduit
2 Inch Service	4 Feet
3 and 4 Inch	4 Feet
Street Light	4 Feet
5 Inch	5 Feet
6 Inch	6 Feet

D. Tracer Wire and Pull Strings. A 12 gauge solid THHN tracer wire shall be installed with all stubbed conduits according to standard drawings. All primary conduits shall have a pull sting in the conduit securely tied off in each pad or enclosure.

E. Caution Identification Tape and Stub Markers. All conduits shall have ~~caution tape taped directly on the conduit, and buried 12 inches below grade. Tape shall meet the requirements and specifications of APWA 02320.~~ a red "Caution - Power Cable" tape at least 4 inches wide, one foot below grade. The end of each stubbed conduit, including service laterals, shall be marked to the surface according to the standard drawings.

~~All electrical conduit shall also have a 4 mil. thick 3 inch red marking tape, Blackburn catalog #31FTREL or an approved equivalent, taped to the conduit.~~

F. Underground Metal Conduit. All buried metal conduit shall be coated with corrosion protective tape. Tape shall be a minimum of 2 inches wide.

G. Berms, Slopes, and Hillides. For installation instructions around berms, slopes, and hillides contact the City electric division.

H. Labels. An imprinted, plastic label shall be securely taped to the end of each conduit run. The label shall indicate whether the conduit run is primary or secondary. The label shall also include the address of where the run ends.

**39.70.050. System Requirements.**

A. Additional Capacity Requirements. In the event a Consumer makes application for additional capacity, subject to provisions of the applicable rate schedule, Consumer shall install the necessary transformer capacity, service wires and other equipment required to adequately serve Consumer's requirements.

All applications for service involving the furnishing of additional capacity or equipment by the City may be required of the Consumer. The application shall state that any service entrance wiring and main switches required for the utilization of such additional capacity to be furnished by consumer, shall be considered as permanent fixtures

belonging to the property being served and property except for replacement or enlargement if necessary.

B. Substations. Substation May Be Required of Consumer. The City reserves the right, where unusual substation capacity or voltage is involved, to require the Consumer to install the necessary complete substation as provided for in City's rate schedule. In such an event, the Consumer will receive the substation ownership discount specified in the applicable rate schedule.

Where the Consumer furnished the necessary complete substation equipment to take service at primary service voltage, such equipment shall be owned and maintained by the Consumer and shall include the necessary transformers, structure, controls, and protective equipment, and shall be of such quality and construction as meets City approval.

**39.70.060. Services.**

A. Point of Service. The City determines the point of delivery for all developments. City reserves the right to meter service at either primary or secondary voltage. For large or unusual loads, City reserves the right to require Consumer to take service at primary voltage and to require Consumer to furnish the necessary complete substation equipment. In such an event, the substation ownership discount shall apply. The City will decide if multiple buildings, business and residential, or portions of buildings will be metered from one or from multiple metering points.

B. Service Entrance Requirements. The service entrance shall be defined as the facilities that consist of approved service entrance conduit and cable enclosing conductors and appurtenances. Said conductors shall extend from the point of contact with City's meter installation and thence to and including Consumer's service entrance safety switch.

1. Service Entrance Safety Switch. A residential service safety switch shall be a combination meter base and main disconnect device. A commercial service safety switch shall be an outdoor service disconnect device, which will remain accessible at all times. This device may be a main breaker, but minimum requirement shall be a safety switch which will disconnect all power to the entire facility.
2. Service Entrance Conductors. All service entrance conductors and any conduit enclosure shall be continuous, unbroken, and completely exposed for external inspection throughout their entire length, extending for said point of contact with City's service wires to the meter socket (or meter cabinet if installed) and thence to Consumer's service entry safety switch.

Consumer shall provide service wire from house to junction box or pole according to City

standard drawings. Overhead services shall also include mast knob and service grips. Wiring shall meet load and installation requirements as indicated in the NEC.

3. *Service Drop Support and Attachments.* For one story buildings, or where conditions will not permit proper ground clearance to be maintained by City's service wires, Consumer shall install, at consumer's expense, suitable conduit or service entrance mast pipe or other structure or support that will properly support the City's service drop conductors and to maintain the minimum ground clearance as required by the NESC.
4. *Service Entrance Weatherhead Clearance.* The service entrance weatherhead shall be located so as to meet or to exceed NESC clearance from readily accessible windows, doors, or porches. The weatherhead must also be located so that when the service drop conductors are attached to the building structure or other service drop support, adequate clearance will be maintained away from telephone or other wires, windows, awnings, drainpipes, chimneys, or other obstructions.
5. *Service Entrance Mast Pipe.* This installation shall be made by Consumer, at his/her expense, and shall conform to City's specifications. The service entrance mast pipe shall be of galvanized steel of not less than 2 inch inside diameter and shall be attached to the wall of the building by means of an adequate number of approved fastening devices. All service conduit shall be 2 inches in diameter, or larger.

The mast pipe and/or conduit shall be continuous, extending from the service entrance weatherhead located at the top of the mast pipe to Consumer's meter socket base.

The service entrance mast pipe shall extend above the roof surface (through weatherproof roof flashing) so that the point of attachment of City's service wires to the mast pipe will be not less than 18 inches above said roof line, plus such additional height as is necessary so that the point of attachment of City's service wires will maintain minimum ground clearance, specified in the NESC.

6. *Service Drop Attachment to Buildings.* The consumer will furnish and the City will install the necessary attachment brackets and appurtenances to attach City's service wires to Consumer's service drop termination facilities.

City further reserves the right to require that the installation of the necessary mast pipe or equivalent facilities required to support City's service wires, be made by Consumer during the course of building construction.

Where the exterior of buildings is finished with brick facing, concrete, plastered metal lathe, sheet iron, stucco, tile or similar material, suitable facilities of adequate strength to hold City's wires and attachments, shall be installed by Consumer at Consumer's expense.

7. *Service Drop Conductor Ground Clearance.* The service drop conductors, must be located at such height as will enable adequate clearance to be maintained through the entire service drop length. The minimum ground clearance shall be as specified by the NESC, but not less than 12 feet over driveways not subject to truck traffic; 16 feet over commercial areas, parking lots and other areas subject to truck traffic; and 22 feet over public streets, alleys and roads.
8. *Service Entrance Conductor Specifications.* The service entrance conductors may be either copper or aluminum, and shall be continuous without any joints, splices or connections, extending from the point of connection with service drop conductors to the termination of same at the meter socket or meter cabinet and thence same shall continue without joints, etc., to Consumer's service entrance safety switch.

The Consumer shall have electrical Contractor provide at the service entrance weatherhead, sufficient excess service entrance conductor length or "tails" (18 inch minimum) so that City can connect same directly to the service drop conductors.

The service entrance installation shall conform in every respect to City's specifications, as to conductor connectors, and the method of making connections and all other related matters involved.

The service entrance conductor size for the ampere load to be carried shall be based on a maximum conductor operating temperature of 75°C (type RH, RHW, XHHW, or equivalent.)

The minimum capacity for new 3 wire installations shall be 100 amperes, requiring a minimum size of ~~No. 2~~ **4** for copper or ~~No. 1~~ **2** aluminum conductors. **For 125 ampere capacity, the minimum size shall be No. 2/0 copper or No. 1/0 aluminum.** For 150 ampere capacity, the minimum size shall be ~~1/0~~ **No. 1** copper or **No. 2/0** aluminum. For 200 amperes, ~~2/0~~ **No. 2** copper or **No. 4/0** aluminum.

The entrance safety switch capacity shall be not less than the rated capacity of the service conductors. Other specifications, including of the National Electrical Code.

Upon special application, City may permit 2 or 3 wire service entrance installations of less than 100 ampere capacity for signs, etc., where the load requirements, as determined by City, justify the same. In no event will 2 wire service be furnished except at City's option.

- 9. *Temporary Service Drops.* For temporary service furnished to individual small single phase loads, such as house trailers, small construction projects (such as house and small buildings, portable tools, etc.) City will install a standard temporary service drop, at Consumer's expense. City's General Service Rate shall apply.

Where the temporary service installation requires additional facilities in excess of the aforesaid standard service drop (such as an extension of City's primary line), such installation will be at the consumers expense.

- 10. *Service to Mobile Homes and Trailer Courts. Through One Meter.* For service to trailer courts where more than 1 dwelling unit, mobile home, or trailer is supplied through 1 meter, the furnishing of such service shall be provided and installed by the facility owner.
- 11. *Load to be Balanced on Circuits.* The Consumer shall use reasonable care in designing electric wiring and circuits; also, the connection of the loads to the circuits, so that the loads on the individual phases and circuits of City's service are properly balanced at all times.
- 12. *Temporary Service to be Installed on Consumer's Pole.* All such temporary service drops shall be supported on a pole or post as approved by City and shall be installed by Consumer at his/her expense.

C. Underground Service Requirements. Consumer shall, install all conduit and wire from the building to the pole according to the City standards.

**39.70.070. Metering.**

A. General. The City will furnish and install all electric revenue meters. Normally outdoor socket-mounted meters will be used by City whenever practical. The meter base will be furnished and installed by Consumer's electrical contractor for all normal installations.

If instrument transformers are required, City reserves the right to require Consumer to furnish and install a suitable steel cabinet to house City's instrument transformers and accessories. Said cabinet shall contain only the City's metering equipment and shall be equipped so that it can be sealed and locked by the City. The City shall have sole access to this cabinet.

B. Location. The City shall approve the location of service entrance and meter. The following conditions must be met for the location of all meters:

- 1. *Visibility.* All entrance wiring connections shall not be concealed and shall always be in plain view for inspection by City.
- 2. *Protection.* No meter shall be installed in any location where it may be unnecessarily exposed to heat, cold, dampness or other cause of damage, or in any unduly dirty or inaccessible location.
- 3. *Height.* The meter socket shall be mounted at a height of not less than 4½ feet, nor more than 6 feet above ground or ground line, as the case may be.

When a combination 3 phase and 1 phase service is supplied to the same premises, all meters and service entrance switches shall be at the same location.

C. Meter Base. Residential meter bases shall be furnished and installed by the Contractor according to City standard drawings. No smaller than a 100 amp service entrance will be accepted other than by approval from the electrical superintendent. The meter base shall be kept sealed and under the control of the City at all times.

D. Commercial Meters. Single-phase and three-phase self contained meter bases shall be installed by the Developer, and shall have bypass capability in the meter base. For details and specific information regarding this requirement, please contact the Electric Meter Shop.

The Contractor's portion shall be completely installed, inspected, and the electrical hook-up fee paid before the City will complete the final electrical hookup.

E. Location of Multiple Meters. Where more than one meter is required for a building, such as an apartment house, all of the meter sockets shall be located side by side at an outside location as determined by the City.

F. Meter Location Regarding Remodeling. When remodeling, where 2 or more houses or dwelling units are combined to form one building, the meter socket shall be moved to a single location. In all remodeling where the meter is changed or moved, or wiring changes made, outdoor meter sockets and an approved new service entrance shall be installed by Consumer at Consumer's expense.

G. Meter Accessibility. In the event a structural change is made by the owner that results, in the opinion of City, to be an undesirable meter location, the meter socket, meter cabinet, and/or service entrance installation shall be moved by the Consumer at his/her expense to an accessible location as determined by City.

Whenever the construction of a building on an adjacent lot prevents proper access to any meter, or access to the point of attachment of service drop conductors, or results in inadequate service drop clearance, the Consumer shall move, at Consumer's expense, the meter socket and service entrance to a location that is acceptable to City.

H. Outdoor Meters for Non-Residential General Service. All single phase meters installed for Non-residential use shall be socket type. The meter socket

shall be furnished and installed by Consumer at Consumer's expense.

I. Instrument Transformer Metering. In all outdoor installations requiring current transformers, whether 1 phase or 3 phase, the Consumer shall provide an approved meter loop for meter connections. The City shall furnish any instrument transformers, meter bases, or other devices required, to properly meter the Consumer's electrical needs. Such instrument transformers and devices shall be installed by City.

J. Current Transformer Cabinet. Any cabinets required to house said instrument transformers and accessory equipment shall be furnished and installed by Consumer at Consumer's expense. This requirement applies to all installations.

Such metering or instrument cabinets are for the exclusive use of City, and shall, at all times, be under the control of, and kept sealed by City.

### **39.70.080. Lighting.**

A. General. Local streets, minor collectors, and parking lots, in residential areas shall have the decorative street light as shown in the standard drawings. Major collectors and arterial street light poles shall be a 25 foot steel galvanized street light pole with a 6 foot arm and a 250 watt H.P.S. fixtures. All street light poles on any state road will be 45 foot steel galvanized pole with a 10 foot arm, and a 250 watt H.P.S. fixture. All fixture types will be of the Luminaire type with 90 degree cutoff lens.

B. Location. Street lights will be installed at all intersections with except where a four way intersection has an offset of less than 100 feet. Street lights will be installed with a minimum of 300 feet and a maximum of 600 feet between. Any street that extends more than 600 feet without an intersection shall have street lights placed at equal intervals not to exceed 400 feet. All mid block street lights shall be installed 18 inches from a property line. Collector and arterial streets shall have lights spaced at 250 feet apart alternating sides of the street.

Each street light will be installed so that the street light pole is centered in the planter strip, or within 18 inches of the sidewalk if no planter strip exists.

C. Orientation. Street lights at intersections of local streets shall aim to the center of the intersection. On collector or arterial streets street lights shall be set at a 90 degree angles at regular intervals determined by the City.

D. Grounding. A ground wire shall be connected from a ground rod in the pole base to the street light pole using NEC, approved methods and a separate ground wire will be ran from the pole base to the closest secondary pedestal or transformer. If the street light is fed from a secondary pedestal, an 8 foot by 5/8 inch copper clad ground rod must be installed at the pedestal, and the street light ground will be attached using an NEC approved connector.

**Chapter 39.75. Communication Service.****39.75.010. General.**

- A. Standards and Specifications.
- B. Construction Costs.
- C. Attaching to Existing City Facilities Prohibited.
- D. Unusual Service Extensions.
- E. Permits and Inspections.
- F. Access to Premises.
- G. Communication Plan Drawings.

**39.75.020. Materials.**

- A. Conduit.
- B. Enclosures.

**39.75.030. Installation.**

- A. General.
- B. Underground Lines.
- C. Depth.
- D. Tracer Wire and Pull Strings.
- E. Caution Tape and Stub Markers.
- F. Underground Metal Conduit.
- G. Labels.

**39.75.040. Services.**

- A. Point of Service.
- B. Underground Service Requirements.

**39.75.050. Inside Wiring Recommendations.**

- A. General.
- B. Coax wire and fittings.
- C. Home Communications Panel.

**39.75.010. General.**

A. Standards and Specifications. These specifications cover the installation of the communication system being installed to provide a wide range of communication services to include high speed internet service, cable television, and metering reading for electric, water, and pressurized irrigation meters, etc., See Chapter 39.20. for improvement and design requirements, Chapter 39.25. for inspection and testing requirements, and Chapter 39.35. for earthwork and trench requirements. See standard drawings related to electrical system.

B. Construction Costs. The underground conduit in to provide communication service shall be paid for by the Developer or Consumer. In the event a consumer or property owner requests relocation of communication facilities, the costs shall be the responsibility of the Consumer.

C. Attaching to Existing City Facilities Prohibited. Consumer shall install no wiring or attachments on poles or other equipment of City unless specifically authorized, in writing, by the City.

D. Unusual Service Extensions. Special and unusual service extension requirements for equipment or structures are treated as separate items and are not included in these standards.

E. Permits and Inspections. Service will not be established until all necessary permits have been obtained and not until Consumer's wiring installation has been inspected and approved by the City. The City reserves the right to inspect wiring and to refuse service to any installation that is, in the opinion of the City, unsafe or if the operation of same may be detrimental to the service furnished other Consumers or the City.

F. Access to Premises. Any properly identified representative of the City shall, at all reasonable hours, have free access to and from the premises of the Consumer for the purpose of inspecting Consumer's on premise box (OPB) and cable installation for the purpose of repairing, testing, or removing the City's OPB or other City property.

G. Communication Plan Drawings. Utility shall provide communication plan drawings. If you would like to request any changes to these drawings, please contact the energy superintendent with your proposal. Approved communication drawings must be initialed by an approved energy division supervisor, and signed by the energy superintendent in order to be valid for construction of the communication system improvements. Photo-copies of approved drawings will not be considered valid. Revisions, if needed, must also include the date the revision was approved.

**39.75.020. Materials.**

A. Conduit. All conduit shall be communication grade PVC conduit. ~~Conduit shall be or orange~~ SDR 11 HDPE pipe meeting ASTM-3035 specifications unless otherwise specified ~~in these standards or by the City.~~ ~~"SFCN" shall be imprinted on all conduit at a minimum 3 foot interval.~~ Rigid metal conduit shall be used under collector and arterial streets.

At no time shall the pipe be deformed to make any bend. The minimum radius for any bend or sweep in the conduit shall be 36 inches. When sweeps are required, they shall be rigid metal. The total number of bends in any conduit run shall not exceed 360 degrees.

B. Enclosures. All enclosures shall be level and set according to utilities construction standards. If ground sleeves or pads settle, Developer shall be required to re-level to the above specifications.

**39.75.030. Installation.**

A. General. Contractor shall construct all communication facilities in a development except for the following which shall be completed by the Utility:

1. Pulling underground or overhead cable;
2. Installing communication cable terminations;
3. Setting of large communications pedestals which house Nodes, and Fiber Optic Equipment;
4. Installing communication connections and terminations;

5. All overhead facilities, including extension of risers as shown in the standard drawings.

B. Underground Lines. All new facilities shall be constructed underground unless otherwise authorized by the City. No overhead communication lines will be allowed unless required by the Utility.

C. Depth. Conduit depth shall be a minimum of 18 inches to top of pipe. When installed with electric conduit it shall be installed 12 inches above electric conduit.

D. Tracer Wire and Pull Strings. A 12 gauge solid THHN tracer wire shall be installed with all stubbed conduits according to standard drawings. Wire shall be pulled tight along the pipe. All fiber and main communication conduits shall have a pull string in the conduit securely tied off in each pad or enclosure.

E. Caution Tape and Stub Markers. All conduits shall have a 3 inch identification tape attached to each conduit and a 6 inch tape buried 12 inches below graded above the conduit. Tape shall read "Caution - SFCN Fiber Optics Buried Below" or "Caution - SFCN CATV Buried Below" as applicable. ~~a yellow "Caution - Fiber Optic or Communication Cable" tape at least 4" wide, one foot below grade.~~ The end of each stubbed conduit, including service laterals, shall be marked to the surface according to the standard drawings.

F. Underground Metal Conduit. All buried metal conduit shall be coated with corrosion protective tape. Tape shall be a minimum of 2 inches wide. PVC coated rigid metal conduit may be used instead.

G. Labels. An imprinted, plastic label shall be securely taped to the end of each conduit run. The label shall indicate whether the conduit run is fiber or coax. The label shall also include the address of where the run ends.

### 39.75.040 . Services.

A. Point of Service. The City determines the point of delivery for all developments. The City will decide if multiple buildings, business and residential, or portions of buildings will be serviced using single or (MDU) multiple distribution unit enclosures.

B. Underground Service Requirements. Consumer shall, install all conduit from the building to the pole according to the City standards.

### 39.75.050. Inside Wiring Recommendations.

A. General. The following information is for informational purposes only, but provides wiring information adequate to facilitate either AT&T or SFCN communication services inside the home.

B. Coax wire and fittings. Only use RG-6 coax cable. The following are recommended specifications for a home communication panel.

1. *Coax Wire.* Only use RG-6 coax cable.
2. *Center Conductor.* Center conductor should be copper covered steel center.

3. *Dielectric Insulation.* Dielectric insulation should be flame retardant polyethylene with a low dissipation factor of 0.00015, a low dielectric constant of 2.3, and foam velocity of propagation greater than 80 % and manufactured using micro cell technology for greater strength, to resist deformation, and to prevent moisture ingress.

4. *Shielding.* Shielding should consist of a foil layer which is to be bonded to the insulation with a wire shielding of 60% braid coverage on the outside of the foil shielding. The material for both the braid, and the foil should be all aluminum.

5. *Non-Plenum Jacket.* Non-plenum jacket should be PVC material, and rated for general indoor use, and must meet NEC article 820 for flame 5. retardant protection.

6. *Crimp Fittings.* Crimp fittings should incorporate a 360 degree compression type crimp.

7. *Splitters.* Splitters should be 5-900 Mhz or broader.

C. Home Communications Panel. The following are recommended specifications for a home communication panel.

1. *Mounting.* The minimum necessary for a communications center would be a simple 2' X2' piece of ½" ply wood securely attached to the wall in the basement, although manufactured panels are available for a more professional, and finished look. The manufactured panels would be a good choice in a finished closet, under the stairs, or in other visible areas.
2. *Location.* The location of the communication center should be readily accessible, either in the furnace or utility room, or under the stairs, in a closet, or other similar area. You will need access to this panel in order to reset your cable modem, network hub, or pre-amp for your cable TV where applicable.
3. *Electrical Outlet.* A standard electrical outlet would need to be adjacent to the communications center to power the cable modem, network hub, or pre-amp when multiple computers, or televisions are used.
4. *Wiring.* One RG-6 wire should be run from the On Premise Box (OPB) to the home communications panel for the internet and one for the cable hookup. An RG-6 wire should be ran from the panel to each cable television outlet. A CAT5 cable should be ran from the panel to each internet access outlet. See standard drawings. It is also recommended that telephony wiring be run out of the panel as well.

**Chapter 39.80. Hillside Site Development.**

**39.80.010. General.**

- A. Average Slope-Definition.
- B. Liability.

**39.80.020. Reports.**

- A. Certified Report Required.
- B. Certified Report Specifications.

**39.80.010. General.**

A. Average Slope-Definition. For the purpose of this chapter, the definition of “average slope” shall be as follows: The average slope of the parcel of land or any portion thereof shall be computed by applying the formula,

$$S = (0.00229 \times I \times L) / A$$

to the natural slope of the land before any grading is commenced, as determined from a topographic map having a scale of not less than one inch equals 100 feet and a contour interval of not less than 5 feet, where:

- 0.00229 = A conversion factor of square feet to acres
- S = Average percent slope
- I = Contour interval, in feet
- L = Summation of the length of contour lines, in feet within the subject parcel
- A = Areas in acre of the parcel being considered.

B. Liability. The purpose of this chapter is to point out to the owner and/or Developer of any property that the liability and responsibility of such persons to protect the integrity of their own and adjoining properties, existing water courses and utilities lies upon the person doing the development and upon the owner of the property being developed and not upon the city or any other person. The City may require additional information on any development or building which may have potential hazards.

**39.80.020. Reports.**

A. Certified Report Required. It shall be unlawful for the owner, Developer, or any Contractor or other person to excavate, grade, level, or build upon any lot or property within the city when the average slope of the lot exceeds 10 percent or if such a slope is within 200 feet of the building lot. Nor shall any person grade, level, or improve in any manner any parcel of land which is crossed by a natural or manmade water course or existing utility or has existing or proposed slopes greater than 10 percent, before such person has submitted to the chief building official a certified report from a qualified civil engineer licensed in the State of Utah containing the information set forth in the following section.

B. Certified Report Specifications. The certified report required in the previous section shall contain at least the following information:

1. *Plat.* A plat of the property showing the following:
  - a. Contour lines at 5 foot intervals. Existing contours shall be indicated by dashed lines and proposed contours by solid lines;
  - b. Elevations at the corners of foundations and at the corners of driveways; and
  - c. Show or reference any existing or potential groundwater flows which may cause unstable conditions such as debris flow or slides.
2. *Assessment.* An assessment of a professional civil engineer as to the seriousness of any development problems such as erosion, drainage, flood and geologic hazards or unstable soil conditions and their potential effect on adjoining properties and on any proposed improvements to be built on the property.
3. *Mitigation.* The proposed method for mitigating the problems noted in the assessment.

**Chapter 39.85. Surface Irrigation Systems.****39.85.010. General.**

- A. Specifications.
- B. Adopted Policy.
- C. Approval.

**39.85.010. General.**

A. Specifications. These specifications cover the installation of irrigation systems. See standard specifications for storm, **land and groundwater** drains for construction standards.

B. Adopted Policy. The irrigation ditch policy, Title 13, requires a Developer to pipe an irrigation ditch if it is on the development or adjacent to the development. If the ditch carries greater than 50 cubic feet per second (5 streams) average flow the City Council has the discretion to require piping, fencing, and/or landscaping.

Any ditch carrying less than 50 cubic feet per second (5 streams) will be required to be piped. The Development Review Committee may waive this requirement for commercial and industrial areas.

C. Approval. The City has no direct control over irrigation works and will require written approval from the irrigation company **or ditch owner** involved. All irrigation system plans shall be prepared by a professional engineer and approved by the City and the irrigation company **or ditch owner. Construction shall meet requirements and specifications of the City standards for storm drains unless otherwise authorized by the City Engineer or his/her designee. The irrigation company or ditch owner must accept in writing any work related to surface irrigation systems before the end of construction inspection.**

## Chapter 39.90. Landscaping.

**39.90.010. General.**

- A. Specifications.
- B. Appurtenances.
- C. As-Built Drawings.
- D. Government Regulations.
- E. Source.
- F. Fences and Walls.
- G. Tree Grates.
- H. Vegetation Control.

**39.90.020. Lawns and Grasses.**

- A. General.
- B. Grading.

~~**39.90.020. Soil.**~~

- ~~A. Topsoil.~~
- ~~B. Sub-grade.~~

**39.90.030. Ground Cover.**

- A. General.

**39.90.040. Trees.**

- A. General.
- B. Tree Sizes.
- C. Labels.

~~**39.90.030. Plant Materials:**~~

- ~~A. Quality.~~
- ~~B. Tree Sizes.~~
- ~~C. Deciduous Trees.~~
- ~~D. Coniferous Evergreens.~~
- ~~E. Grass Materials.~~
- ~~F. Bark Mulch.~~
- ~~G. Chemical Fertilizer.~~

~~**39.90.040. Installation:**~~

- ~~A. Coordination.~~
- ~~B. Planting Operations.~~
- ~~C. Delivery, Storage and Handling.~~
- ~~D. Planting Schedule.~~
- ~~E. Planting.~~
- ~~F. Container Grown Stock.~~
- ~~G. Labels.~~
- ~~H. Adverse Planting Conditions.~~
- ~~I. Existing Soil.~~
- ~~J. Sod.~~
- ~~K. Hydro-seeding.~~
- ~~L. Trees.~~

~~**39.90.050. Maintenance:**~~

- ~~A. General.~~
- ~~B. Plants.~~
- ~~C. Lawns.~~
- ~~D. Maintenance Instructions.~~

~~**39.90.060. Cleanup and Protection:**~~

- ~~A. General.~~
- ~~B. Protection.~~
- ~~C. Cleanup.~~

**39.90.010. General.**

A. Specifications. These specifications are for landscape work completed on private property that will become public property.

B. Appurtenances. Any minor items of labor or materials not specifically noted on the drawings or specifications; but obviously necessary for the proper completion of the work, are to be considered as incidental to and are to be included in the contract.

C. As-Built Drawings. The contractor must furnish as-built drawings to the City. These drawings should be updated whenever a change from the design is made to assure accuracy. The drawings must show a record of all departures from the contract drawings that occur during construction. These shall be kept on a clean set of prints of the contract drawings.

The Project manager/Owner will review the "as-built drawings" to verify that changes are being recorded as construction occurs. These drawings and maintenance manuals must be submitted at the time of final inspection or in accordance to the general conditions.

D. Government Regulations. Ship landscape materials with certificates of inspection as required by governmental authorities. Comply with governing regulations applicable to landscape materials.

E. Source. Provide trees and shrubs, and other plants grown in a recognized nursery in accordance with good horticultural practice. Provide healthy, vigorous stock grown under climatic conditions similar to the locality of the project and free of disease, insects, eggs, larvae, and defects such as knots, sun-scale, injuries, abrasions, or disagreement.

Plant Materials and other landscape items will be evaluated according to compliance with drawings, schedules, and specifications; as well as overall aesthetic quality, grower or supplier reputation, physical inspection, and American Association of Nurseryman Standards (AANS). Select plants that will not be adversely affected by the existing soil chemistry at the planting location..

The source or supplier for all plant materials shall be furnished to the City prior to the delivery of any plant materials on site or stored elsewhere.

F. Fences and Walls. All fences and walls except those for individual single family lots must be approved by the City. **Chain link and field wire fencing shall meet the requirements and specifications of APWA 02821 and 02823 respectively. The relocation of fences and gates shall meet the requirements and specifications of APWA 02992 and related sections.**

G. Tree Grates. Only 4 foot square D&L O-8644 or approved equivalent grates shall be used. Grates shall be set to grade with the top back and sidewalk. Grates shall be set in metal frame manufactured specifically for grate. Frame shall be set in concrete extending a minimum of 6

inches from sides of frame. Concrete shall be installed to City standards for portland cement concrete.

H. Vegetation Control. Vegetation control shall meet the requirements and specifications of APWA 02363.

**39.90.020. Lawns and Grasses.**

A. General. Lawns and grasses shall meet the requirements and specifications of APWA 02920.

B. Grading. Till soil to a depth of 4 inches and remove rocks and debris over 1 inch in diameter. The elevation of top soil relative to walks, hard surfaces or edges shall be:

1. Seeded Areas. 1/2 inches below.
2. Sodded Areas. 1 1/2 inches below.

**39.90.020. Soil.**

A. Topsoil. Topsoil shall be as specified in the following. Provide soil test indicating compliance:

**TOP SOIL PROPERTIES**

Property	Amount Allowed
Soluble Salts	Less than 2dS/m or mmho/cm
PH	5.5 to 7.5
Clay	Less than 30%
Sand	Less than 70%
Silt	Less than 70%
Organic Matter	Greater than 5%
SAR	Less than 3

B. Sub-grade. Prior to the installation of any topsoil, Contractor shall inspect the existing sub-grade for compliance to the specifications with regards to the grade and cleanliness. Any discrepancy shall be brought to the attention of the City for appropriate action.

**39.90.030. Ground Cover.**

A. General. Ground cover shall meet the requirements and specifications of APWA 02930 and 02935. Install according to APWA plan number 683.

**39.90.040. Trees.**

A. General. Tree and work relating to trees shall meet the requirements and specifications of APWA 02932, 02933, 02934 and 02935. Install according to APWA plan number 681. Use 6 foot posts for any tree staking. Trees may be planted without a certified arborist when authorized by the City.

B. Tree Sizes. City ordinance specifies deciduous trees to be at least 2 inch caliper and evergreen trees to be at least 8 to 10 feet in height. Plants of a larger size may be used pending approval by the City. Sizes of root balls or containers shall be increased proportionately.

C. Labels. Label at least one plant of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

**39.90.030. Plant Materials.**

A. Quality. Provide trees, shrubs and other plants that comply with the recommendations and requirements of ANSI Z60.1 "Standard for Nursery Stock" and as further specified. The Spanish Fork City Parks Department Representative reserves the right to refuse plant materials that do not meet the quality required for the project.

B. Tree Sizes. City ordinance specifies deciduous trees to be at least 2 inch caliper and evergreen trees to be at least 8 to 10 feet in height. Plants of a larger size may be used pending approval by the City. Sizes of root balls or containers shall be increased proportionately.

C. Deciduous Trees. Provide trees of height and caliper listed or shown and with minimum branching configuration recommended by ANSI Z60.1 for type and species required. Provide single stem trees except where special forms are shown or listed.

All deciduous trees shall be balled and burlapped (B & B). Container grown deciduous trees will be acceptable in lieu of balled and burlapped deciduous trees and where specified in plant schedule subject to specified limitations of ANSI Z60.1.

D. Coniferous Evergreens. Provide unsharped evergreens of the sizes shown or listed. Provide normal quality evergreens with well balanced form complying with minimum requirements for other size relationships to the primary dimension indicated on the Planting Plans.

Provide balled and burlapped (B & B) evergreens. Container Grown Evergreens will be acceptable subject to the specified limitations for container grown stock.

E. Grass Materials. All sod shall be two-year-old Turf-Type Tall Fescue or Kentucky Blue Grass that has been cut fresh the morning of installation. Only sod that has been grown in a commercial sod farm shall be used. Do not use sod from any other source. All sod that has not been laid with 24 hours shall be deemed unacceptable and will be removed from the site.

F. Bark Mulch. Bark mulch material shall be a clean medium coarseness shredded bark mulch. All trees shall receive a 3-inch deep mulch in the sod-free area around the trunk to a radius of 3 feet. Avoid direct contact between mulch and the trunk of the tree.

G. Chemical Fertilizer. Do not use chemical fertilizer at the time of planting either in the planting hole or on the surface of the ground.

**39.90.040. Installation:**

— A. Coordination. The Contractor shall coordinate his work with that of other contractors on site, and shall cooperate to the fullest extent to see that the work is completed in a timely and workmanship like manner.

— B. Planting Operations. The City must approve the exact locations of all plants prior to the digging of any holes. Refer to the project plans and drawings for the location, sizes and preparation of holes. Prepare all holes according to the details on the drawings.

— C. Delivery, Storage and Handling. Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at the site.

— D. Planting Schedule. Prepare a proposed planting schedule. Schedule the dates for each type of landscape work during the normal seasons for such work in the area of the site. Correlate with specified maintenance periods to provide maintenance throughout the specified time period. Once accepted by Owner, revise dates only as approved in writing, after documentation of reasons for delays.

— E. Planting. Deliver trees after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set trees in shade, protect from weather and mechanical damage and keep roots moist.

— F. Container Grown Stock. Do not remove container-grown stock from container until planting time.

— G. Labels. Label at least one plant of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

— H. Adverse Planting Conditions. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Spanish Fork City Parks Department Representative before planting.

— I. Existing Soil. If it is determined for trees planted in existing soils, excavated soil material from planting holes should be inspected by the Contractor to determine if such soil should be used as backfill material. If the excavated material is not of good quality, then it should be modified to be of the same texture that was removed from the planting hole. Prior to the installing of any plant material in the prepared hole, Contractor must approve the size, including the width and depth of the hole according to the planting detail unless otherwise approved by the City.

— J. Sod. Smooth grade to blend to existing structures, and to allow for sod depth. Do not place sod until existing weeds have been removed and soil has been prepared. In all sodded lawn areas, before sodding, establish finished grades to within one and one-half inches of all walks, hard surfaces, and edgers. Time delivery of sod so that it will be placed within 24 hours after stripping. Protect sod against drying and breaking of rolled strips.

— Apply fertilizer in formulation and quantity required, and mix into the top 2 inches of the soil. Lightly water to aid breakdown of fertilizer and to provide moist soil for sodding. When sodding the contractor must do the following:

— 3. The surface on which the sod is to be laid shall be firm and free of depressions or undulations of any kind. The surface shall be free of all materials larger than 3/4 inch in diameter.

4. Maintain the sod moist, live and in good condition to encourage immediate growth.

— 3. Lay sod on smooth, moist topsoil, working off planks if required. Rake topsoil to loosen and level prior to placing each course of sod. Ensure that sod is not stretched or overlapped and that all joints are butted tight. Place sod in break joints on ends. Keep length seams in a straight line.

— 4. Roll sod immediately after placing. Thoroughly water with a fine spray to a depth sufficient that the underside of the new sod and the soil immediately below the sod are thoroughly wet.

— K. Hydro-seeding. Where grass is installed and established through hydro-seeding or any other seeding process a combination of 20% ryegrass and 80% bluegrass blend shall be used.

— L. Trees. Set out trees in the location where they are to be planted according to the approved project plan. Do not bend or bind-tie in such a manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery. The following must be done by the Contractor when planting trees:

— 1. Percolation Test. Prior to planting fill excavated tree pit with water and allow to percolate out. If, after 24 hours, the water has not percolated out of the pit, notify the City. Do not plant until the problem has been corrected.

— 2. Hole Depth. The tree planting holes should be 3 times the width of the root ball with sloping sides. The tree planting holes should be the same depth as the rootball. Trees must be placed on undisturbed soil at the bottom of the planting hole. The tree hole depth shall be determined so that the tree may be set at finish grade, placing the root flair at finish grade.

— 3. Rootball. Set tree on soil and remove top 1/2 of burlap. Burlap cut from the root ball must be removed from the hole. Do not fold burlap into the hole. Wire baskets shall be cut, and twine and wrappings should be cut and removed as backfilling operations are completed. If the root ball is firm, the wire basket shall be completely removed if the integrity of the root-ball can be maintained. If the rootball is loose, the wire basket shall be cut. See planting details and

notes. If the burlap and wire must remain on the rootball ensure that all portions of it are at least one foot below the finished surface.

- 4. ~~*Backfill.* All tree holes shall be backfilled in 12 inch lifts and settled and tamped to minimize any settling of the tree. Upon completion of backfilling operation, thoroughly water the tree to completely settle the soil and fill any voids that may have occurred.~~
- 5. ~~*Pruning.* The amount of pruning shall be limited to the minimum necessary to remove dead or injured twigs and branches. Cuts, scars and bruises shall not be treated with paint or any other compound or covering. Proper pruning techniques shall be used. Do NOT leave stubs and do NOT cut the leader branch. Improper pruning shall be cause for rejection of the plant material. Do not prune prior to delivery.~~
- 6. ~~*Mulching.* Upon completion of all planting operations, remove all undesirable material, including all rocks over the size of ½ inch diameter, and install the specified mulch at the base of all trees in lawn areas. Maintain a sod free area 6 foot in diameter around the tree trunk.~~
- 7. ~~*Saucers.* Saucer shall be formed at the base and it shall be watered the same day as planting.~~

**39.90.050. — Maintenance:**

- A. ~~*General.* All landscaping must be maintained until final acceptance.~~
- B. ~~*Plants.* Maintain plants by watering, pruning, cultivating and weeding as required for healthy growth. Restore planting saucers. Spray as required to keep plant materials free of insects and disease.  
— Remove and Replace trees found to be unacceptable at the final inspection and once again at the end of the warranty period. Replacements shall be made during the growing season and shall comply with all requirements and specifications. Any delay in the completion of any item of work in the planting operation that extends the planting into more than one season shall extend the guarantee period accordingly.~~
- C. ~~*Lawns.* Maintain lawns by watering, weeding, fertilizing and mowing. The Contractor shall be responsible for the protection, watering and replacement of any damaged sod until acceptance by the City. This guarantee shall include filling any voids sod pieces, repairing of any eroded places and maintaining the sod by watering, mowing and controlling of insects as well as advising the City of any maintenance or watering procedures necessary to care for and promote plant life. All sod must be in satisfactory condition at the time of the final inspection.~~
- D. ~~*Maintenance Instructions.* The Contractor shall instruct the City as to the watering following completion of the current year establishment/maintenance period. The~~

Contractor shall provide on-site maintenance instruction, along with the City, to train maintenance personnel prior to turning the project over to the City.

**39.90.060. — Cleanup and Protection:**

- A. ~~*General.* During Landscape Work, store materials and equipment where directed by Project manager. Keep pavements clean and work area in an orderly condition.~~
- B. ~~*Protection.* Protect Landscape Work and materials from damage due to operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance period. Treat, repair or replace damaged landscape work as directed by Project manager.~~
- C. ~~*Cleanup.* The Contractor shall keep the site free from accumulation of waste material. At the time of completion, all areas must be swept or washed clean and all rubbish removed to the satisfaction of the Spanish Fork City Parks Department Representative.~~

## Chapter 39.95. Irrigation Sprinkler Systems.

**39.95.010. General.**

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- B. Main Line Fittings.
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**39.95.020. Pipe:**

- A. 3 inches and Smaller.
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- D. Sleeves.

**39.95.030. Fittings:**

- A. 2 inches and Smaller.
- B. 2 ½ inch.
- C. 3 inches and Larger.
- E. Spray Head Assembly.
- F. Stream Head Assembly.

**39.95.030. Sprinkler Heads.**

- A. General.
- B. Spray Heads.
- C. Rotary Heads.

**39.95.040. Controller, Valves and Flow Meters.**

- A. General.
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- B. Manual Main Line Isolation Valve.
- C. Manual Circuit Isolation Valve.
- D. Control Automatic Valves.
- E. Master Valves and Flow Meters.
- F. Auto Drain Valves.
- E. Isolation Valves.
- G. Back Flow Preventer.
- H. Stop and Waste Valves.
- I. Quick Coupler Valves.
- J. Valve Boxes.

**39.95.060. Electric Wire:**

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**39.95.070. Installation.**

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- E. Existing Lawns.
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**39.95.010. General.**

A. Specifications. These specifications are for landscape work completed on private property that will become public property. **All underground irrigation systems shall meet the requirements and specifications of APWA 02810.**

B. Appurtenances. Any minor items of labor or materials not specifically noted on the drawings or specifications; but obviously necessary for the proper completion of the work, are to be considered as incidental to and are to be included in the contract.

C. Pressure Verification. The Contractor, prior to installing the system, must verify existing water pressure. If there is a failure to obtain the needed pressure or if an excess of pressure exists for normal operation, the Contractor shall contact the City for any adjustments to the system. Failure to report any discrepancies in pressure due to whatever reason, and installation done prior to notification of City Parks Department shall be done at the expense of the Contractor.

D. Plan Modifications. The plans show the general arrangement of all piping. Should local conditions necessitate the rearrangement of some, or if piping can be run to better advantage, the contractor, before proceeding with the work, shall prepare and submit drawings of such to the office of the Spanish Fork City Parks Department Representative and obtain written approval before commencing work shown by these drawings.

E. As-Built Drawings. Before the final inspection is complete, the contractor must furnish as-build drawings. These drawings should be updated on a daily basis to assure accuracy. The drawings must show the location of all valves, pipe, heads, controller control lines, and drain valves used on the job. These drawings and maintenance manuals must be submitted at the time of final inspection or in accordance to the general conditions.

F. Final Inspection. The Contractor shall operate, maintain, and guarantee the irrigation sprinkler system until all landscaping on the project is approved by the City Parks Department at a final inspection. Contractor shall submit manufacturer's technical product maintenance data and installation instructions for irrigation sprinkler system materials and products to the City before final inspection.

**39.95.020. Pipe and Fittings.**

A. Pipe. Use solvent weld schedule 40 PVC for main line pipe 3 inches in diameter and smaller. Use Class 200 PVC for main line pipe larger than 3 inches in diameter.

B. Main Line Fittings. Use solvent weld schedule 40 PVC fittings for pipe smaller than 3 inches in diameter. All fittings for pipe 3 inch and larger pipe shall be ductile iron, grade 65-45-12 in accordance with ASTM A-536.

Fittings shall have deep bell push on joints with gaskets meeting ASTM F977. Fittings shall be Harco Deep Bell as manufactured by the Hanington Corporation of Lynchburg, VA or approved equal. Transition gaskets are not allowed.

**C. Circuit Pipe Fittings.** Use solvent weld schedule 40 PVC fittings.

**39.95.020. — Pipe:**

~~A. 3 inches and Smaller.~~ All pipe, main, and laterals 3 inches and smaller, shall be schedule 40 PVC with ratings printed on pipe.

~~B. 4 inches and Larger.~~ All main line pipe 4 inches and larger shall be schedule Class 200 PVC, ring-tite gasketed pipe.

D. Sleeves. Pipe and control wiring and tubing under walks, roads and other hard surfaces shall be installed in solvent weld Class 40 PVC sleeves of adequate size. **Sleeves for pipes shall be a minimum of 3 inches in diameter or one and a half times the size of the pipes whichever is greater.** Sleeves shall be straight and level or less than 2% grade. **All wiring shall be placed in it's own conduit. Wire conduit may be ran inside of sprinkler pipe sleeves.** Conduit for control wires shall have minimum inside diameters according to the following chart:

MINIMUM SLEEVE CONDUIT SIZES

Number of Wires	Conduit I.D.
1 to 7	1 inch
8 to 11	1 ½ inch
12 to 22	2 inch
23 to 31	2 ½ inch
32 to 36	3 inch

**39.95.030. — Fittings:**

~~A. 2 inches and Smaller.~~ All fittings for pipe 2" or smaller shall be at least PVC schedule 40.

~~B. 2 ½ inch.~~ All fittings for 2 ½ inch pipe shall be PVC schedule 80.

~~C. 3 inches and Larger.~~ All fittings for pipe 3 inch and larger pipe shall be ductile iron, grade 65-45-12 in accordance with ASTM A-536. Fittings shall have deep bell push on joints with gaskets meeting ASTM F977. Fittings shall be Harco Deep Bell as manufactured by the Hanington Corporation of Lynchburg, VA or approved equal. Transition gaskets are not allowed.

~~E. Spray Head Assembly.~~ All lawn spray heads shall be installed on swing pipe with two ½ inch spiral barbed ends.

~~F. Stream Head Assembly.~~ All stream rotary and impact heads capable of distributing 10 gallons per minute or more shall be installed on pre-assembled swing joint by Spears or an approved equivalent.

**39.95.030. Sprinkler Heads.**

A. General. Install according to APWA plan number 621 and 622, but do not install PVC elbow and riser.

B. Spray Heads. All spray type sprinkler heads shall be Rainbird "1800" series or approved equal. **All lawn spray heads shall be installed on swing pipe with two spiral barbed ends.**

C. Rotary Heads. All rotary type sprinkler heads shall be Hunter "T" series or approved equal. **All stream rotary and impact heads capable of distributing 10 gallons per minute or more shall be installed on pre-assembled swing joint by Spears or an approved equivalent.**

**39.95.040. Controller, Valves and Flow Meters.**

~~A. General.~~ Controller and Valves shall be located in lawn or planted areas. Avoid locating valves in areas of high pedestrian and vehicular circulation. ~~Controllers valves shall be enclosed in an adequate size valve boxes and extensions to allow disassembly. Valve boxes shall be at finished grade with valve stems 4 inches minimum and 12 inches maximum below top of box and with 3 inches of pea gravel under the valve.~~

A. Controller. **Controller and pedestal shall be the same type as those used in the City central control system.** The controller shall be as described in the irrigation legend on the drawings. ~~Acceptable manufacturer and model is Rainbird ESP MC Controller or approved equal. Controller housing for exterior application shall be a stainless steel Strong Box pedestal model or approved equal.~~

B. Manual Main Line Isolation Valve. **See standard drawing for pressure pipe main line valves.**

C. Manual Circuit Isolation Valve. **Brass ball valve with handle. Install box**

D. ~~Control Automatic Valves.~~ **The control Automatic** valves shall be Weathermatic electric remote control valves or an approved equivalent. **A manual circuit isolation ball valve shall be installed on the supply side of each automatic valve. Install according to APWA plan number 633, but do not install schedule 80 PVC union.**

~~Control valve boxes shall be rectangular heavy duty, lock top or snap top flanged lid, green in color and large enough for easy removal or maintenance of valves. Acceptable manufacturers include Carson-Brooks or Ametek, or approved equal. No more than 1 control valve shall be installed within each valve box. An isolation ball valve shall be installed on the supply side of each automatic control valve.~~

E. Master Valves and Flow Meters. Master valves and flow meters must be installed on main supply line and/or according to design and must be compatible with the City central control irrigation system in existence at time of installation.

F. Auto Drain Valves. **Install according to APWA plan number 632. Do not install auto drain valves.**

~~E. Isolation Valves.~~ Isolation valves on the main line 3 inches or larger shall be a resilient wedge gate valve as located on drawings. Isolation valves on lateral lines shall be ball valves as indicated on the sprinkler system detail sheet.

G. ~~Back Flow Preventer.~~ **Shall be required on connections to the culinary water system. Install according to APWA standard plan number 631.** ~~Back flow preventer shall be as described in the irrigation legend on the drawings.~~

H. ~~Stop and Waste Valves.~~ Stop and waste valves shall be Mueller H - 10288 Oraseal or an approved equivalent. Stop and Waste valve shall be of manual type for operation by handle key.

I. ~~Quick Coupler Valves.~~ Quick coupler valves shall be as described in the irrigation legend on the drawings and shall be installed with brass riser and pre-manufactured swing joint. At least 2 quick coupler valves shall be installed, one at each end of main line. Valves shall be 1 inch standard. ~~Valves shall be installed in a valve box large enough to accommodate easy access and valve replacement.~~

J. ~~Valve Boxes.~~ Valves shall be located in lawn or planted areas. Avoid locating valves in areas of high pedestrian and vehicular circulation. Valve boxes shall be at finished grade with valve stems 4 inches minimum and 12 inches maximum below top of box and with 3 inches of pea gravel or 3/4 inch minus crushed gravel under the valve. Valve boxes shall be rectangular, heavy duty and green in color. Valve boxes for automatic valves shall be large enough to enclose manual circuit isolation valve and automatic valve.

#### 39.95.060. ~~Electric Wire.~~

K. ~~Control Wire.~~ Control wire shall be a direct burial cable PE insulated type not smaller than #14. **Install wire according to APWA plan number 651.** Add two extra blue control wires per controller to the longest run for emergency use and mark it in the control box as an extra wire. ~~Use blue color-coded wire.~~

~~B. Connections and Splices.~~ For all wire connections to remote control valves and all splices of wire in the field, use "One Step" wire connectors by King or 3M DBY connectors or approved equal. All wire splices shall be in a box. ~~All splices and connections to valves shall be watertight.~~

~~C. Color.~~ Electric controller shall be coded so that neutral wires are white in color, grass and shrub area wires are red in color, and spare wires are blue in color.

~~D. Pull Boxes.~~ Tie a loose 20" loop in all wiring in pull boxes.

#### 39.95.070 . **Installation.**

A. Schedule. Contractor shall submit a construction schedule of anticipated work time to facilitate timely visits

for review of work. Schedule must be submitted to the City before any landscaping may begin

B. Depth and Location. Trenches shall be dug as deep and wide as necessary to properly place the irrigation piping. All mainlines, as shown on drawings, shall be installed to a depth of 18 inches minimum. All lateral lines as shown on drawings shall be installed to a depth of 12 inches minimum. Lines bordering curbs or sidewalks shall be 6 inches away to allow for maintenance and access to the lines. Control wires must be buried at least 12 inches below finished grade and bundled with a plastic tape every 20 feet.

~~C. Trench Bedding Material.~~ Bedding material shall be a sandy material free of rocks over 1 inch in diameter. Where existing soil does not meet this requirement, imported material shall be used. Bedding material shall be placed a minimum of 6 inches in all directions around all mainline pipes prior to backfilling. Lateral line pipes shall have a minimum of 3 inches in all directions.

C. Trench Backfill Material. All trenches shall be backfilled in 12 inch lifts and tamped sufficiently to insure no settling of the surface. **No rocks larger than 1 inch shall be allowed within 3 inches of the pipe.** The Contractor, in placing the irrigation lines, and appurtenances etc., may uncover material not suitable for finished grading. This material shall be removed from the site. After the installation of the lines, the finished grading shall be smoothed over and restored to its original condition, using additional topsoil where necessary.

~~E. Existing Lawns.~~ Where trenching is required across existing lawns, uniformly cut strips of sod shall be cut to 6 inches wider than trench. Remove sod in rolls of suitable size for handling and keep moistened until replanted. Replant sod within 7 days after removal, roll and water generously. Replace damaged lawn areas and plants with new to match existing.

D. Thrust Blocks. All mainlines greater than 2 inches in size shall be installed with thrust blocks wherever a change of direction occurs. Thrust blocks shall be installed as follows:

1. *Bearing.* Bearing area of concrete thrust-block based on 200-PSI pressure and safe soil bearing load of 2,000 pounds per square foot.
2. Concrete blocking shall be cast in place and have a minimum of 1/4 square foot bearing against the fittings.
3. Block shall bear against fittings only and shall be clear of joints.
4. Contractor shall install block adequate to withstand full test pressure as well as to continuously withstand operation pressure under all conditions of service.

E. Flushing. When the pipe lines are connected and the sprinkler risers in place but before any heads are installed, the control valves shall be opened and flushed with a full head of water to clean out the system.

~~— H. Gluing. PVC joints shall be glued according to manufacturer's recommendations. Glued joints shall set for 24 hours before pressure is applied to lines. Before trenches are backfilled all lines shall be pressurized and checked for leaks.~~

~~— Glue - Solvent & Cement, shall be IPS Weld-On-Line No. P-70 Primer and No. 711 Cement or 721 Cement or approved equal, for PVC socket fittings for use on all pipe fittings. All solvent and glue shall be applied according to manufacturer's specifications.~~