

**VINEYARD**

**ORDINANCE 2025-15**

**AN ORDINANCE OF THE VINEYARD CITY COUNCIL AMENDING THE  
CONSTRUCTION AND DESIGN STANDARDS**

**WHEREAS**, the Vineyard City Council last adopted the Vineyard City Design Standards and Specifications in February 2007; and

**WHEREAS**, the Standards have and will continue to be updated periodically as new technology, policy changes, procedure changes, updated methods of design and construction are implemented, or infrastructure materials change; and

**WHEREAS**, the Development Review Committee (DRC) shall review such periodical updates to determine if such updates are considered minor modifications, in which those updates are to align with federal, state, and other statutory standards, or to make corrections for errors or omissions. The DRC shall approve those modifications and corrections, or determine if the proposed updates should be submitted to City Council for approval; and

**WHEREAS**, in coordination with the City Public Works Director, Engineer, Staff, and Hansen, Allen, and Luce Engineering prepared and recommends revisions to the Construction and Design Standards; and

**WHEREAS**, the City Council held a public hearing on November 12, 2025, regarding updates to the Standards; and

**WHEREAS**, the City Council finds good cause for adopting the Standards as revised;

**NOW THEREFORE**, be it ordained by the Council of the Vineyard, in the State of Utah, as attached.

PASSED AND ADOPTED BY THE VINEYARD COUNCIL DECEMBER 10, 2025.

	<b>AYE</b>	<b>NAY</b>	<b>ABSENT</b>	<b>ABSTAIN</b>
Mayor Julie Fullmer	<u>X</u>	_____	_____	_____
<del>Ezra Nair</del> <del>Sara Cameron</del>	<u>X</u>	_____	_____	_____
Jacob Holdaway	<u>X</u>	_____	_____	_____
Mardi Sifuentes	<u>X</u>	_____	_____	_____
Brett Clawson	<u>X</u>	_____	_____	_____

Presiding Officer

Attest

  
\_\_\_\_\_  
Julie Fullmer, Mayor, Vineyard

  
\_\_\_\_\_  
Tony Lara, Deputy City Recorder, Vineyard



# Vineyard

## Construction and Design Standards

### 1.04 General Provisions

#### 1.04.010 Definitions

- A. AASHTO. The American Association of State Highway and Transportation Officials.
- B. APWA. The Utah Chapter, [American Public Works Association Manual of Standard Specifications and Plans](#), latest edition.
- C. AWWA. The American Water Works Association Standards, latest edition.
- D. City. The City of Vineyard, Utah.
- E. City Engineer. The City Engineer or delegated representative. This person shall be the ENGINEER and OWNER as defined by APWA.
- F. County. Utah County, Utah.
- G. Contractor. A person or company constructing Improvements having required state licenses to perform said work.
- H. City Council. The governing body of the City.
- I. DRC. The Vineyard City Development Review Committee.
- J. Developer. Person, persons, partnership, or corporation developing or making Improvements to a property.
- K. Development. A land Improvement that requires a Site Plan or Subdivision.
- L. Final Plat. An original recordable plat drawn in a form approved by the City and County, showing all lots, rights-of-way, utility easements, and other items required for recordation.
- M. Floodplain. That area designated on the most recent Flood Insurance Rate Map for the City of City, prepared by the Federal Emergency Management Agency, as a flood plain as amended.
- N. General Plan. The general plan document as approved by the City Council.

- O. Improved Lot. A lot which has all the improvements required in the Subdivision ordinance.
- P. Improvements. Improvements include all City infrastructure including but not limited to streets, curb, gutters, sidewalks, grading, landscaping, water, sanitary sewer, irrigation, drainage, power, communication, fencing, and public facilities.
- Q. Landowner. An owner of property.
- R. 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 a building according to the zone within which the lot is located.
- S. Minor Land Disturbance Permit. A permit required for construction work under 1 acre in size that does not require a SWPPP permit and is completed in less than 12 months.
- T. MUTCD. The Manual on Uniform Traffic Control Devices.
- U. 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.
- V. Onsite Facilities. Facilities installed within or on the perimeter of a Subdivision or Development site.
- W. OSHA. The Occupational Safety and Health Administration is the main federal agency charged with the enforcement of safety and health legislation.
- X. Parcel of Land. A contiguous area of land in the possession or ownership of one entity with one tax identification number.
- Y. Planning Commission. The City Planning Commission.
- Z. Preliminary Plat. A map or plat of a proposed subdivision or development approved by the City with accompanying supplementary documents.
- AA. Prime Subcontractor. Sub-contractor doing the majority of a specific work within the engineering permit.
- BB. Public Works Director. The City Public Works Director or delegated representative.
- CC. Public Utility Easements (PUE). A Public Utility Easement acquired by the city for city utilities. Easement shall read, "All Public Utility

Easements platted hereon are in perpetuity for installation, maintenance, repair, and replacement of municipal utilities, public walls, fences, sidewalks, trails, and appurtenant parts thereof, and the right to reasonable access. Easement shall run with the real property and shall be binding upon the grantor and the grantor's successors, heirs, and assigns."

- DD. Right-of-Way. A public strip of land that is granted, through an easement, deed, plat, or other mechanism, for transportation purposes, including but not limited to street, walkway, trail, or railway.
- EE. Site Plan. A plan for a commercial, industrial, institutional, governmental, or planned residential development in the City.
- FF. Storm Water Discharge. A Utah Pollutant Discharge Elimination System (UPDES) Storm Water permit may be required before any ground disturbance or construction activities. The purpose of the permit is to prevent storm water runoff from washing pollutants into local surface waters such as streams, rivers, or lakes.
- GG. 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.
- HH. 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 testacia, 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.
- II. Utilities. Includes drinking 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.

## **1.04.020 Standards and Codes**

- A. GENERAL. The purpose of the Construction and Design Standards and Standard Drawings is to govern Development and any public infrastructure or utility work done or Improvements installed within current or proposed public right-of-way, public easement, or that will be under the responsibility of a homeowner's association.

Owners, Contractors, Developers, and Civil Engineers should thoroughly read and understand these specifications and standards before designing or

constructing public improvements. They shall contact the City Engineering Staff for all matters dealing with construction work within a City right-of-way or with any work connecting onto a City utility. SPECIAL PERMITS AND BONDING ARE REQUIRED FOR ALL SUCH WORK.

- B. CITY CODE. Improvements shall comply with the [City Title 15 Zoning Code](#) and all other City ordinances and codes.
- C. APWA. [APWA standards shall apply to any standard not included in the City's Construction and Design Standards](#).
- D. CODES AND STANDARDS. Where codes and standards are referred to, they refer to the most current version of the code or standard. It shall be the duty of a supplier of any material to submit evidence, if requested, that its material is in compliance with the applicable codes and standards.

The City Construction and Design Standard Specifications and Standard Drawings are the minimum requirements of the City. If any provisions herein conflict with general industrial standards, or with other requirements specified by the City, the more stringent of the standards [as determined by the City Engineer](#) will apply.

- E. STATE AND LOCAL LAWS. The Contractor shall conform to all applicable state and local laws in carrying out its obligations under the Contract [or Land Disturbance Permit](#). This shall include, but is not limited to, compliance by the Contractor with the requirements of Chapter 30, of Title 34, of the Utah Code Annotated, 1953 as Amended. If the provisions of Section 34-30-1, of the Utah Code Annotated, 1953 as amended, are not complied with, this Contract shall be void.
- F. COMPLIANCE WITH GOVERNMENTAL REGULATIONS. The Contractor's personnel, equipment, and operations shall comply fully with all applicable standards, regulations, and requirements of existing Federal, Utah State, and Local governmental agencies. This shall include, but not necessarily be limited to, the following:
  - 1. United States Occupational Safety and Health Administration (OSHA). Title 29 of the Code of Federal Regulations, Part 1926 (29 CFR Part 1926), Safety and Health Regulations for Construction.
  - 2. Utah State Industrial Commission. The Utah Occupational Safety and Health Act (1973) and Employer-Employee Safe Practices for Excavations and Trenching Operations (Jan. 1, 1974), as published by the Utah State Industrial Commission, including any and all amendments or revisions effective prior to performance of the work.
  - 3. Utah Department of Transportation (UDOT). When crossing or working within UDOT rights-of-way the Contractor shall be responsible to obtain all necessary permits and comply with all appropriate UDOT

regulations including applicable sections in "State of Utah Standard Specifications for Road and Bridge Construction," latest edition.

4. Permits. The Contractor is responsible to obtain all required permits and licenses to complete the work, including land disturbance permits, contractor licenses, business licenses, engineering permits and building permits and all other applicable permits to this project. Contractor shall be subject to the conditions of all permits and agreements between the Owner and the permitting agencies. See Division 14, Rights-of-Way.

### **1.04.030 Pre-Construction**

A. GENERAL. It shall be unlawful to commence any Improvement or Development in the City without completing the following:

1. Application. Submit complete development application.
2. Application Fee. Pay application fees.
3. Construction Plans Approval. Receive City approval of plans according to Article 1.08.010 A (Plan approval).
4. Contractor Approval. Receive City approval of Contractor according to Section 1.12.010 (Contractor Approval).
5. Land Disturbance Permit. Obtain Land Disturbance Permit as required in Section 1.16.040 (Land Disturbance Permits). If a contract with the City to do such work for the City has been finalized, the contract fulfills the permit requirement.
6. Inspection Fee. Pay inspection fee according to Article 1.16.010 C (Inspection Fee).
7. Special Engineering Review Fee. If applicable, pay specialized engineering review fees according to Section 1.08.040 (Specialized Engineering).
8. Federal, State, and Local Permits. Obtain necessary Federal, State, and Local permits required for Improvements.
9. Bonds. Receive City approval of required bonds.

B. EASEMENTS. Developer shall provide Municipal Utility Easements (MUEs) and/or Public Utility Easements (PUEs) for all utility extensions through private property or property owned by public agencies other than the City and for 10 feet along public rights-of-way. Developments other than single family home developments shall provide 10-foot MUEs along all property lines. If setbacks are less than 10 feet, then MUEs shall be the extent of the setback. Single family lots shall have ~~10 feet~~ 10-foot public utility easements along

public rights-of-way or streets and not ~~necessarily~~ along the other property lines unless a utility is planned there.

- C. BONDS. All Development shall obtain payment and performance bonds for the total cost plus 10% of the Improvements in public Right-of-Way or Easements. Development bonds shall be in the form of an irrevocable letter of credit from a bank, a bond from a surety company, escrow, or ~~a cash~~ other bond approved by the City ~~bond paid directly to the City~~. Bonds must be approved by the City before construction begins.

At minimum, ~~E~~each contractor doing work in the City is required to maintain a \$2,000.00 contractor bond deposit with the City for public improvements. Improvements that do not require a Site Plan or Subdivision but do require a Minor Land Disturbance Permit shall only require a contractor bond deposit.

Payment ~~and of~~ performance and contractor bonds deposits are to guarantee the following:

1. Construction is completed and meets City Construction and Design Standards.
2. Final inspection is conducted.
3. Final inspection punch list items are completed.

No bond deposit shall be released until all improvements are completed and accepted by the City. See Article 1.16.010 (Acceptance of Improvements) and Section 1.04.070 (Post Construction).

- D. PRE-CONSTRUCTION CONFERENCE. A Pre-Construction Conference according to APWA 01 31 19 (Pre-Construction Conference) shall be held before any work on Improvements or a Development may commence. The following shall attend the conference:

1. City Engineer
2. Landowner, Landowner Representative, or Developer
3. Contractor
4. Major Prime Subcontractors.

Prime Major Subcontractors not attending the pre-construction meeting must schedule an additional Pre-Construction Conference with the City Engineer before beginning work. The location of the meeting shall be at the City Public Works Office, 240 East Gammon Rd, Vineyard, Utah 84058.

The following items shall be furnished at the meeting:

1. Construction Sequence Outline. A detailed outline showing the sequences of construction of principle items of work. The outline shall

show the beginning and ending dates of the major items of work on the Project.

2. Contact List. A list of names, titles, addresses, and mobile telephone numbers of the Developer and Contractor responsible personnel, indicating those who may be reached outside normal working hours.
3. Subcontractor and Material Supplier's List. A list of subcontractors and material suppliers.
4. Other Items and Minutes. Other items may be discussed at this Pre-Construction Conference as determined by the City Engineer. Official minutes of this meeting as prepared by the City ~~Engineer~~ shall become part of the project file for the project.
5. Pre-Construction Inspection Video. The Contractor shall be responsible to take time-dated footage of surrounding property before construction and submit to the City Engineer's office. Any disputes on damage will be resolved with the video. If the Contractor fails to turn in this video, it will be subject to the City Engineer's judgement on the resolution of damage disputes. The City may retain the documentation up until the end of warranty period.

#### **1.04.040 Land Disturbance Permits**

- A. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to land disturbance permits:
  1. Section 1.04.030 (Pre-Construction)
  2. Article 1.04.040 C (Land Disturbance Permit Fee)
  3. Section 1.04.060 (Traffic Control)
  4. Article 1.08.010 B (Construction Plans Approval)
  5. Section 1.12.010 (Contractor Approval)
  6. Article 1.12.010 A (Contractor's License)
  7. Section 1.12.020 (Insurance)
  8. Article 1.16.010 C (Inspection Fee)
- B. GENERAL. No person, firm, partnership, corporation, or entity of any kind shall open up, break, dig, excavate, construct, reconstruct, repair, alter a grade in or upon any public street, sidewalk, curb, curb cut, driveway, or gutter for any purpose or in any manner commence any construction in or upon any public

rights of way, street, or sidewalk without first procuring from the city engineer a Land Disturbance Permit for the specific construction or other work to be undertaken.

Any emergency activity that is immediately necessary for the protection of life, property, or natural resources including activities required to promote public safety, repairs to water lines, and/or other City infrastructure repairs is exempt from a Land Disturbance Permit with the approval of the City Engineer.

Use the [Online Land Disturbance Permit Application](#) to apply. Small Improvements may be constructed with a Minor Land Disturbance Permit as determined by the City Engineer.

- C. LAND DISTURBANCE PERMIT FEE. Land Disturbance Permit fees must be paid before a Land Disturbance Permit is issued. Fee shall be established by the City Council by resolution. ~~Fees shall be assessed on the following items:~~
1. ~~Sewer and water lateral installation inspection.~~
  2. ~~Re-inspection (When an inspection has been requested, the inspection is performed and the work is not complete, a re-inspection fee shall be assessed.)~~
  3. ~~Barricades (provided by, or called out by the City)~~
- D. TIME LIMITATIONS. Permits must be approved 48 hours prior to construction. The City may stipulate time limits for completion of work and suspend permits for non-compliance.

Minor Land Disturbance Permits shall expire and become null and void if substantial work authorized by such permit has not commenced within thirty (30) calendar days of issuance or is not complete within ninety (90) days from the date of issuance or the Pre-Construction Conference. Extensions may be given upon approval by the City Engineer.

Other land disturbance permits shall expire and become null and void if substantial work authorized by such permit has not commenced within six (6) months of issuance or is not complete within two ~~(182) years~~ [months](#) from the date of issuance or the Pre-Construction Conference. Extensions may be given upon approval by the City Engineer. [Two one-year extensions may be given prior to a new full permit, review is required.](#)

- E. LAND DISTURBANCE PERMIT REQUIREMENTS. Contractors are required to submit the following to obtain a Land Disturbance Permit:
1. License. Copy of contractor's license as required by Article 1.12.010 A (Contractor's License)
  2. Certificate of Insurance (COI). COI approved by City. COI shall meet the requirements of Section 1.12.020 (Insurance).

3. Land Disturbance Permit Fee. Pay the Land Disturbance Permit Fee according to Article 1.04.040 C (Land Disturbance Permit Fee).
4. Inspection Fee. Pay inspection fee according to Article 1.16.010 C (Inspection Fee).
5. Bond. Bond approved by the City. Bond shall meet the requirements of Article 1.04.030 (Bonds).
6. Approved Construction Plans. Receive City approval of plans according to Article 1.08.010 B (Construction Plans Approval).
7. Traffic Control Plan. If applicable, a copy of the approved Traffic Control Plan according to Section 1.04.060 (Traffic Control).
8. Contractor Approval. Receive City approval of Contractor according to Section 1.12.010 (Contractor Approval).
9. Local/State/Federal Permits. An approved copy of any Federal, State, and Local permits required for the Improvements. The applicant shall obtain from any state or federal agency including any ~~other~~ appropriate environmental permits that pertain to the property. Copies of these approved permits shall be included with the Land Disturbance Permit. However, the inclusion of those permits in the application shall not preclude the City Engineer from imposing additional development requirements and conditions, commensurate with this Chapter, on the development of property covered by those permits. Failure of the applicant to obtain the necessary permits may be a basis for denial of issuance of a Land Disturbance Permit among other required permits. Such other required permits will be to obtain and maintain coverage during the duration of the project under the UPDES with a Notice of Intent (NOI) permit. Developers are also required to maintain a SWPPP during the duration of the project. A completed SWPPP is required to obtain an NOI permit from the State.

Drainage Channels, Waterways, and Sensitive Areas. Property owners shall not fill, alter, or restrict natural channels, wetlands, waterways or any other Sensitive Lands without proper permits from all responsible governing agencies, including a Land Disturbance Permit from the City. Property owners proposing to redirect runoff, surface, and/or pipe flow to properties or facilities outside City boundaries must provide written approval from the applicable governing agency. Discharges or modifications to irrigation ditches or canals require written approval from the canal owners and applicable governing agencies. Property owners are responsible for the protection of channels located within their property in compliance with this ordinance.

### **1.04.050 Construction**

A. APWA. Unless otherwise specified in the City Construction and Design Standards, construction work shall meet the requirements and specifications of the following APWA sections and related sections:

1. APWA 00 72 00 4.4 (Reference Points and Monuments)
2. APWA 01 25 00 (Product Options and Substitutions)
3. APWA 01 26 00 (Contractor Modification Procedure)
4. APWA 01 57 00 (Temporary Controls)
5. APWA 01 64 00 (Owner-furnished Products)
6. APWA 01 65 00 (Product Delivery and Handling)
7. APWA 01 66 00 (Product Storage and Protection)
8. APWA 31 05 10 (Boundary Markers and Survey Monuments)
9. APWA 31 25 00 (Erosion and Sedimentation Control)

B. CITY CONSTRUCTION AND DESIGN STANDARDS. All construction work shall conform to the related City Construction and Design Standards. More specifically, See the following City Construction and Design Standards for additional specifications related to this section:

1. Chapter 1.16 (Inspection and Testing)
2. Section 1.12.030 (Submittals)
3. Section 1.20.020 (Excavation)

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 31 05 10 (Boundary Markers and Survey Monuments). Developer shall provide survey benchmarks and monuments as required by the City Engineer.

All property corners shall be marked with a rebar corner marker that meets the requirements and specifications of APWA 31 05 10 (Boundary Markers and Survey Monuments). Corners must be marked before acceptance of a subdivision's improvements by the City. The rebar must be offset 2 to 4 inches by a steel tee post four feet out of the ground on the property line alignment.

D. INSPECTION AND TESTING. All work shall be inspected and tested by the City according to Chapter 1.16 (Inspection and Testing).

E. VARIATIONS, SUBSTITUTIONS, EXCEPTIONS AND CHANGES. Any variation, substitution or exception from the standards in this policy must be authorized in writing by the City Engineer. Product options and substitutions must meet

the requirements of APWA 01 25 00 (Product Options and Substitutions) and APWA 01 26 00 (Contractor Modification Procedure). Any item of construction not covered in these standards must have plans and specifications approved by the City Engineer. Requests for changes to the Construction Standards shall be made in writing to the City Engineer. These requests will be reviewed during revision process conducted in conjunction with the APWA revisions.

- F. TEMPORARY CONTROLS. Temporary controls such as noise, dust, mud, surface water, ground water, pollution and erosion controls shall meet the requirements and specifications of APWA 01 57 00 (Temporary Controls).
1. Dust and Debris. The Contractor shall control dust and debris originating with the construction. Dust and other debris shall be controlled on a daily basis by methods that shall include, but not be limited to, the use of a dust setting spray, a “pick-up broom or street sweeper and trash disposal. The Contractor shall maintain on the project site a water truck with a minimum two thousand (2,000) gallon capacity.  
  
The Contractor shall be responsible to secure a source of water and shall obtain the necessary permission or permit for its use. Failure by the Contractor to adequately control dust and debris may result in the City initiating dust and debris control measures and deducting the cost from Bond.
  2. Groundwater. Pumping groundwater into the sanitary sewer system is prohibited.
  3. Erosion and Sedimentation Control. Erosion and sedimentation shall be controlled according to APWA 31 25 00 (Erosion and Sedimentation Control).
  4. Storm Water. Ground water and surface water must be kept on the construction site. If either ~~leave~~leaves the site by any manner, additional temporary controls must be implemented to protect the storm water drain system.

A Storm Water Pollution Prevention Plan (SWPPP) and Notice of Intent (NOI) may also be required. See [Vineyard Municipal Code: 7.08 Stormwater Management Requirements](#) and specifically [Section 7.08.060 Stormwater Design and BMP Manuals](#). SWPPP shall include a plan to control erosion and sedimentation according to APWA 31 25 00 (Erosion and Sedimentation Control).

- G. PUBLIC SAFETY AND CONVENIENCE. The convenience of the general public and the protection of persons and property is of prime importance and shall be provided for by the Contractor during this project. The Contractor shall use every reasonable precaution to safeguard persons and property. Failure of a Landowner or City to notify the Contractor of any deficiencies in providing for

public safety and convenience shall not relieve the Contractor from this responsibility.

No person shall be cut off from access to their residences or places of business without a permit from the City with specific time and duration of closure. Notice shall be provided to the residence or business 48 hours before the closure. In no case shall a closure for a period exceeding exceed eight (8) hours, unless the Contractor has made special arrangements in writing with the affected persons prior to commencing work in the area.

- H. NOTIFICATION OF RESIDENTS. All property owners and residents adjacent to the streets or easements affected by the construction shall be notified by the Contractor at least forty-eight (48) hours in advance of time construction begins. The Contractor can satisfy this requirement by placing a written notice on the door of each residence or business reading "Notice of Construction Operation". [Contractor] will be working on ~~the construction of street improvements on~~ your street starting about on [start day and time]." The Contractor shall provide their contact information on the notice and shall provide a copy of the notification form at the pre-construction meeting and the method to be used (hang on door, etc.) See Article 1.04.060 C (Traffic Control Plan) and Article 1.04.060 E (Road Closure Communication Plan) for additional notice requirements for road closures.
- I. WORK ZONE. The Contractor will be required to confine construction operations within the dedicated right-of-way for public thoroughfares or within areas for which construction easements have been obtained unless it has made special arrangements in writing with the affected property owners in advance. The Contractor will be required to protect stored materials, lawn, trees, and other features located adjacent to the proposed construction site. During construction operations, the Contractor shall construct and maintain such facilities as may be required to provide access by all property owners to their property.
- J. REFERENCE POINTS AND MONUMENTS. See APWA 00 72 00 4.4 (Reference Points and Monuments) for work affecting or related to reference points and monuments.
- K. ABANDONED UTILITY SERVICE. Abandoned water services shall first be permitted through the engineering office. Abandoned water services shall be disconnected at the main. Saddle and corporation stop shall be removed, and a Romac Industries stainless steel repair clamp (Style SSI) shall be installed. Unneeded sewer services shall have a cleanout at property line with a watertight plug on the private property side of the cleanout wye.
- L. INTERFERING STRUCTURES, UTILITIES AND FACILITIES. The Contractor shall exercise all possible caution to prevent damage to existing structures and utilities, whether above ground or underground. While these structures and utilities may be shown on the improvement plans, the information has been

compiled from the best available sources, its completeness and accuracy cannot be guaranteed, and it is presented simply as a guide to possible difficulties. See Section 1.20.020 (Excavation) In Areas with Concrete for repair of damaged concrete.

The Contractor shall notify all utility offices concerned at least forty-eight (48) hours in advance of construction operations in which a utility agency's facility may be involved. Notification to blue stakes does not necessarily cover all buried lines. This shall include, but not be limited to, irrigation, water, telephone, electric, sewer, storm drain, gas, and cable television. The Contractor shall be responsible for any and all changes to, relocation of, or re-connection to public utility facilities encountered or interrupted during the prosecution of the work, and all costs relating thereto shall be at the Contractor's expense.

The Contractor shall contract with and pay Public Utility Agencies for work required in connection with all utility interferences and handle all necessary notifications, scheduling, coordination and details. It shall be the responsibility of the Contractor to relocate and expose all existing underground structures and utilities in such a manner as to prevent damage to the same. Any structure or utilities damaged by the Work shall be repaired or replaced at the Contractor's expense.

If the Contractor encounters existing structures that will prevent construction, it shall notify the City Engineer before continuing with the construction in order that the he or she may make such field revisions as necessary to avoid conflict with the existing structures.

- M. MATERIALS. Acquire, provide, and safeguard materials and turn in submittals according to Section 1.12.030 (Submittals).

## **1.04.060 Traffic Control**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, traffic control work shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 01 55 26 (Traffic Control)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to traffic control:
  - 1. Article 1.04.060 D (Road Closures)
  - 2. Article [1.04.060 E \(Road Closure Communication Plan\)](#)

- C. TRAFFIC CONTROL PLAN. Construction Work that will impact vehicle or pedestrian traffic will require a City approved traffic control plan that meets the requirements of APWA 01 55 26 (Traffic Control) and the following:
1. Traffic Obstructions. The Contractor shall, at all times, conduct its work so as to ensure the least possible obstruction to traffic and normal commercial pursuits.
  2. UDOT and County Roads or Right-of-Ways. If vehicle or pedestrian traffic along a County or UDOT road is impacted, the traffic control plan must also be approved by the agency whose road is impacted.
  3. Road Closures. Traffic control plans must include any road closures with estimated dates for closing and opening the road. See Article 1.04.060 D (Road Closures). Traffic Control Plans shall also include Road Closure Communication Plans if required. See Article 1.04.060 E (Road Closure Communication Plan).
  4. Road Surfaces. The Contractor shall be responsible for maintaining existing road surfaces suitable safe for travel by the public.
- D. ROAD CLOSURES. If conditions are justified, the City Engineer may authorize the Contractor to close general traffic to not more than one (1) City block at any given time. No such closure shall be made without the authorization of the City Engineer. Closure of streets or highways shall be in conformance with APWA 01 55 26 (Traffic Control) and the following:
1. Garbage Pickup Day. Road closures are not permitted on garbage pick-up day. This requirement can be waived by the City Engineer.
  2. Overnight Road Closures. If a road is closed overnight, all open trenches shall be covered with a steel plate with appropriate warning sign.
  3. Forecasted Snow. If snow is forecasted and the road is to remain open, no steel plates are allowed. Instead, local road trenches shall be backfilled and compacted with road base. Other roads shall be backfilled with cold mix.
- E. ROAD CLOSURE COMMUNICATION PLAN. City Engineer may require a Road Closure Communication Plan for significant road closures. Road closure communication plans shall include the following:
1. Using a Public Involvement Firm. The contractor shall be required to hire a reputable public involvement firm to oversee public communication. This requirement can be waived by the City Engineer if the project would not measurably benefit from a public involvement firm. The public involvement firm shall ensure, as reasonably possible, the public that are affected by the project are well informed of project details, including schedule.

2. Map of Affected Entities. Public involvement firm shall provide the City with a map of properties affected by the closure. property owners.
3. Critical Notifications. The public involvement firm shall notify the following offices of all closures with the start and end date of closure:
  - a. PUBLIC WORKS
  - b. CITY ENGINEERING
  - c. POLICE
  - d. FIRE
  - e. AMBULANCE
  - f. SCHOOL DISTRICT
  - g. GARBAGE AND RECYCLING COLLECTION SERVICE
  - h. CITY PUBLIC INFORMATION OFFICER
  - i. COUNTY DISPATCH
  - j. UTA DISPATCH
4. Notice. Public involvement consultant shall send notice of closure with the approved traffic control plan to affected property owners within 500 feet of the closure or as defined in the traffic control plan. Notices shall be sent 5 days and again at 48 hours before closure unless otherwise approved in the traffic control plan. The traffic control plan shall include begin and end dates of closure. Notices may be in the form of a door hanger, phone call and/or email.

#### **1.04.070 Post-Construction**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, post-construction work shall meet the requirements and specifications of the following APWA sections and related sections:
  1. APWA 01 78 23 (Operation and Maintenance Data)
- B. BOND RELEASE. The Public Works Director will release bonds when the following is completed:
  1. Operation and Maintenance Manuals. Contractor must submit and make requested revisions to operation and maintenance manuals according to Article 1.04.070 C (Operation and Maintenance Manuals).
  2. Record Drawings. Record drawings must be submitted and revised according to Article 1.04.070 D (Record Drawings).

3. Final Inspection. The final inspection must be completed according to Article 1.16.020 Q (Acceptance of Improvements).
4. Final Inspection Punch List. Contractor must complete the final inspection punch list according to Article 1.16.020 Q (Acceptance of Improvements).
5. Payment and Performance Bond. A payment and performance bond will only be released once a warranty bond is received and approved according to Article 1.04.070 E (Warranty Bond).
6. Warranty Bond. A warranty bond will only be released once the warranty inspection and warranty inspection punch list are completed according to Article 1.16.020 Q (Acceptance of Improvements).

[Bonds for such improvements shall follow the City's standard bonding requirements. Nothing in this section alters or limits the City's right to seek correction of engineering or construction defects within the timeframes provided under the applicable Utah Statutes of Limitations and Statutes of Repose.](#)

- C. OPERATION AND MAINTENANCE MANUALS. [Operation and maintenance manuals shall meet the requirements of APWA 01 78 23 \(Operation and Maintenance Data\).](#) The Contractor shall furnish the City Engineer with [two \(2\) paper sets, a pdf, and a Word version](#) of all operation and maintenance manuals, drawings, diagrams, etc., for all pumps, motors, control panels, valves, meters, etc. The Contractor shall be responsible for all costs associated with the preparation of operation and maintenance manuals.

[Final inspection shall not be scheduled until the operation and maintenance manuals are received, reviewed by the City Engineer, and corrections made for use in the Operation and Maintenance Manual.](#) The Contractor shall be responsible for all costs associated with the preparation of operation and maintenance manuals.

- D. ~~ELECTRONICS AND RECORD DRAWINGS.~~ ~~When the Owner's Engineer has the capability,~~ Record Drawings including the plat, site plan, and [as-built](#) improvement drawings shall be furnished electronically in [a color PDF and MicroStation Format \(.dgn\)](#), AutoCAD format (.dwg) ~~or Data Exchange Format (.dxf).~~

Field record drawings shall be kept on site throughout the project duration. They will be used to create the electronic record drawings. The field Record 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 will review the field Record Drawings to verify that changes are being recorded as construction occurs.

Record drawings and the required electronic files may be required to be received, reviewed by the City Engineer, and corrections made prior to Final Inspection being schedule.~~shall not be scheduled until the records drawings and the required electronic files are received, reviewed by the City Engineer, and corrections made.~~ The Contractor shall be responsible for all costs associated with the preparation of record drawings.

~~In addition to the electronic files, after completion of all public works improvements the Owner shall provide the City with two sets of velum or sepia (reproducible) "Record Drawings" which have been corrected to show the constructed improvements. Final payment from the bond shall not be made until these records are received.~~

1. PDF File Submittal. PDF submittals shall consist of the Approved Final Construction Set with all construction updates and changes clouded. Dimensions shall be provided for all services and laterals from the nearest lot line to their constructed locations. All sewer, land drain, and storm drain pipes shall have sizes, slopes, and measurements between structures labeled. Actual constructed rim and flow line elevations for each manhole and or box shall be shown.
2. AutoCAD DWG File Submittal. All CAD files shall be registered to the North American Datum 83 (NAD83), U.S. Survey Feet, Utah State Plane Central Zone Coordinate system (grid) with ties to monument information available through the Utah County Surveyor.

Record drawings shall reflect all changes and show all constructed public improvements and utility line work with labeled survey points and elevations on all features (i.e. service laterals, valves, fittings, manholes, etc.). All feature types shall be given unique layer names and color coded by utility type as follows:

- |                                  |   |        |
|----------------------------------|---|--------|
| • Culinary                       | - | Blue   |
| • Storm Drain/Gravity Irrigation | - | Purple |
| • Sanitary Sewer                 | - | Green  |
| • Land Drain                     | - | Brown  |
| • Pressure Irrigation            | - | Orange |
| • Electrical and Dry Conduits    | - | Red    |
| • Road Features                  | - | White  |

All files shall be constructed in a format that is geometrically correct; meaning that all lines that intersect are snapped together at a common point (no overlapping lines or short shots vertically or horizontally).

Storm, land drain, and sewer pipes shall be drawn in the direction of flow and shall be a continuous polyline between structures and snapped together at the centerline of the structure. Water lines shall be continuous polylines between pipe intersections or changes in pipe size. Street centerlines shall be continuous polylines between intersections. The edge of pavement or curb and gutter, sidewalks, and street centerlines shall be as shown on the design drawing unless field adjustments are made, which will require resurveying for the record drawings. Culinary waterline, storm drain lines, and power conduit lines shall be polylines representing their actual horizontal location. Where text is being placed for a polygon feature, the text justification point shall be placed within the boundary of the polygon. It is acceptable to have the text overlap one another. FREE HAND DRAWINGS WILL NOT BE ACCEPTED!

E. WARRANTY BOND. All Development shall submit a ~~cash~~ [letter of credit](#) warranty bond after final inspection and before final acceptance. Bond shall be in the amount of 10% of the payment and performance bond. For Minor Land Disturbance Permits, [a minimum](#) \$500 of the contractor bond will be held for warranty.

## 1.08 Design Requirements

### 1.08.010 General Requirements

- A. GENERAL. The purpose of the Design Criteria is to govern any design and engineering performed regarding public improvements. Engineers and designers working on projects within the City should thoroughly read and understand these requirements before designing and creating construction plan sets for public improvements.

This division contains design criteria that are in addition to normal and acceptable engineering practices and are to be used on designs in the City. The City Engineer shall have authority to modify the criteria as needed to meet changing or unusual needs or conditions.

The design engineer shall contact the City for all matters dealing with engineering within the City's existing or proposed right-of-way or with any work connecting onto a City utility.

- B. ENGINEERING. The criteria contained in this document are organized into divisions and sections covering specific areas of design. It will often be necessary to use a number of sections for the design of a single project. For instance, the design of a street may require the use of standards regarding streets, sidewalks, pressure pipe, sewer, and storm drain.

These standards are a guide for design, but not a substitute for quality engineering. It is the obligation of the designer to use these standards responsibly and professionally to produce designs conforming with commonly accepted engineering practices and the Code of Professional Conduct. It will at times be desirable and/or necessary to vary from the standards in this document to produce a quality product. When the need arises, please refer to the following section on variances.

- C. VARIANCES. When it becomes necessary or desirable to vary from the standards presented in this document, a variance may be requested from the City Engineer. Such a request shall be made in writing and will include:
1. The standard to be varied.
  2. The proposed variation.
  3. Justification for the variance.

A written response will be given within a reasonable time period. A variance determination may be appealed to the [Development Review Committee](#); [then the Planning Commission](#); and then the City Council.

- D. AMENDMENTS. Amendments to these standards may be requested by writing the City Engineer with details and justification for an amendment. The

City Engineer along with ~~the City~~ the City Staff will meet periodically to discuss proposed amendments and make recommendations to ~~the City~~ the City Council. ~~The City~~ The City Council will entertain changes to the standards once a year at their discretion.

## 1.08.020 Construction Plans

- A. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to construction plans:
1. Chapter 1.44 (Landscaping)
  2. Chapter 1.48 (Irrigation Sprinkler Systems).
  3. Section 1.04.060 (Traffic Control)
- B. CONSTRUCTION PLANS APPROVAL. The City Engineer shall approve construction plans in accordance with this Chapter and cut sheets before any work begins. Contractors proceeding with work without such approvals shall have the project shut down until such approvals are obtained. Repeated offenses may result in the Contractor losing its pre-qualification to perform work in ~~the City~~ the City.
- C. Traffic Control Plan. If applicable, a copy of the approved Traffic Control Plan according to Section 1.04.060 (Traffic Control) shall be included in the construction plans submitted 7 working days prior to start of construction operations.
- D. CONNECTION. Developers shall extend street and utility improvements to the boundaries of the development and to a connection with existing improvements of the same kind according to master plans and as directed by the City Engineer. Developers are required to upsize utilities based on latest master plans. Development layout must provide for future street and utility extension to adjacent development and be compatible with the contour of the ground.
- E. PLAN SETS. 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. Final Plat or Site Plan. A copy of the final plat or site plan if applicable.

2. Comprehensive Plan View. A comprehensive plan view of the entire project showing all utilities, roads, and appurtenances.
  3. Plan and Profiles. Plan and profiles of all storm, land and groundwater drains, sanitary sewer, curb, gutter, and irrigation.
  4. Detail Drawings. Detail drawings of street cross sections according to the City Construction and Design 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 Design Standards.
  5. Off-Site Work Plans. Complete plans for all off-site work to be done in conjunction with the Development.
  6. Professional Civil Engineer Stamp and Signature. A stamp and signature of a Professional Civil Engineer licensed in the state of Utah on each plan sheet, detail drawing, and design sheet.
  7. Detailed Engineer's Estimate. Detailed engineer's take off quantities and cost estimate for all construction work related to the project.
  8. Existing and Proposed Conditions and Improvements. All plan and profile sheets shall show all existing and proposed improvements including but not limited to concrete, structures, pavement, landscaping, boxes, pipe, valves, manholes, poles, power and communications boxes, conduit, water ways, water bodies, and wetlands.
- F. PLAN AND PROFILE SHEETS. Include the following on each plan sheet:
1. North Arrow. Generally, north should be up or to the right if up is not feasible.
  2. Scale. Only use standard engineering scales 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. 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. Profile Sheets. 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 or 1988 North American Vertical Datum (NAVD29 or NAVD88) shall be used for all elevation data. NAVD29 may only be used when approved by the City Engineer.
  - c. Benchmark location and elevation for checking construction.
  - d. Stationing aligned from plan view.
  - e. Existing ground, ditch, and utility lines.
  - f. A sheet index on each sheet showing profiled area in relation to the overall project.
- G. ELECTRIC AND COMMUNICATION PLANS. Construction plans must include the location of all existing and proposed poles, transformers, secondary junction boxes, sectionalizers, switchgears, overhead or underground electrical wire and communication cable and any other significant electric or communication infrastructure.
- H. STREET, PARKING LOT, AND DRIVEWAY PLANS. Include the following for curb, gutter, sidewalks, and street surfacing plans:
- 1. Plan and Profile. 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. Elevations and Flow Direction Arrows. Flow line elevations and flow direction arrows for gutters.
  - 3. Curb and Gutter Type. Type of all standalone curbs and curb and gutter if other than the standard APWA Plan 205.1 Type A 30 inch Curb and Gutter. City Engineer may approve twenty four inch curb and gutter to match existing.
  - 4. Accesses. Location and width of all accesses.
  - 5. Street Cross Sections. Street cross sections with all proposed and existing utilities and base sections as per pavement design and soils report and Construction and Development Standards.
- I. SANITARY SEWER, STORM, LAND AND GROUNDWATER DRAIN PLANS. Include the following for sanitary sewer, storm, land and groundwater drain plans:

1. Plan and Profile. Plan and profile of all new and existing mains and manholes.
  2. Boxes and Manholes. Box and manhole size, location, and elevations of flow lines and rim.
  3. Pipe. Location, size, grade, and type of pipe of new and existing mains.
  4. Service Laterals. Location of each service lateral with distance stubbed back into property clearly drawn and dimensioned. For abandoned sanitary sewer services see Article 1.04.050 K (Abandoned Utility Service). Service lateral connections to the main shall be spaced a minimum of 4 feet apart.
  5. Storm Calculations. Storm water calculations required by Section 1.08.070.
  6. Storm Inlet Boxes. Storm inlet boxes shall be located on street corners and or property lines according to the Standard Drawings.
- J. DRINKING WATER PLANS. Include the following for drinking water and plans:
1. Pipe. Location, size, and type of pipe of new and existing water mains.
  2. Fittings. Location of valves, fittings, hydrants, boxes, meters, and appurtenances.
  3. Minimum Cover. Minimum cover of four (4) feet.
  4. Service Laterals. Location of each service lateral with distance stubbed back into property clearly drawn and dimensioned. For abandoned water services see Article 1.04.050 K (Abandoned Utility Service). Service lateral connections to the main shall be spaced a minimum of 4 feet apart.
  5. Redundant Water Loops. Looping of the drinking water lines will be required at the discretion of the City Engineer to provide adequate fire flows, pressures, water quality, and redundancy. Below are guidelines as to when redundant connections may be required:
    - a. **PRESSURE SWINGS:** Looping is required if modeled or existing pressure swings exceed 20 psi during a peak day.
    - b. **FIRE FLOW AND MINIMUM PRESSURE:** Looping is required if modeled or existing pressures and fire flow do not meet State or City minimum standards.
    - c. **NUMBER OF UNITS ON A DEAD-END LINE:** If a development's plans will create an additional drinking water line connection in future phases, 50 homes, or equivalent residential units, may be

installed onto the dead-end drinking water main line.  
Permanent dead-end lines may only have 35.

- d. **SUPPLY TO CRITICAL FACILITIES:** If the waterline will or does supply water to a critical facility (as determined by the City Engineer), looping is required.
  - e. **WATER QUALITY:** Looping is required if there is reasonable risk of the design causing degradation of water quality.
- K. **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 1.44 (Landscaping) and Chapter 1.48 (Irrigation Sprinkler Systems).
- L. **IRRIGATION CANAL AND PIPE PLANS.** Plans that affect canals or irrigation pipes must be stamped approved by those responsible for their maintenance before they are approved by the City unless otherwise required by law.

### **1.08.030 Land Development**

- B. **GENERAL.** The following land development criteria shall apply to all designs for land development in the City. It will be necessary to refer to the current general plan and zoning plan for correct land use designations. Design shall comply with the current City Zoning Ordinance and Subdivision Ordinance. Additional design criteria are specified in the Standard Drawings.
- C. **PROJECT IMPACT ON ADJACENT PROPERTIES.** The design of public improvement and utility projects shall evaluate the project impact to adjacent private and public property. The evaluation shall include mitigation measures for right-of-way acquisition, public utility easements, and construction easements. The design engineer shall give consideration to traffic and pedestrian safety, accessibility and storm water surface flows that may have an impact on all adjacent properties.

The design of the new development must not create a non-conforming use out of a neighboring parcel. For example, if a pre-existing lot designed to function as an interior lot will change to a corner lot because of the design of the new development, additional property may need to be deeded to that lot to insure it is in conformance to the current zoning ordinance for a corner lot.

- D. **DESIGN CONSIDERATIONS TO PRESERVE NATURAL FEATURES AND MITIGATE HAZARDOUS CONDITIONS.**
- 1. **Natural Features.** The design of public improvements shall preserve the natural features such as natural drainage, wetlands, existing native vegetation and wild life habitat where applicable. The Applicant(s) or his/her representative shall delineate the location of such natural

feature when submitting concept plans or preliminary design drawings for all public improvement projects. The design engineer shall be responsible to incorporate all natural features identified by City Staff reviews and shall be required to notify and get approval from all state and federal agencies that control the natural features.

2. Hazardous Conditions. Land subject to hazardous conditions such as wetlands, soil liquefaction, shallow water table, floods, landfill, and polluted or non-potable water supply shall be identified and shall not be developed until the hazards have been preserved or will be mitigated during development process and will appear on construction design plans. The approval of a subdivision plat or construction drawings do not terminate the responsibility of the design engineer in using standard duty of care in the investigation and design for the hazardous conditions associated with the project. The design engineer shall be required to notify and get approval from all state and federal agencies that control the preservation or mitigation processes.
- E. IDENTIFICATION OF EXISTING EASEMENTS AND RIGHTS OF WAY. The design engineer shall identify all easements and rights of way that exist on the subject property that is to be developed. Sufficient investigation and agreements must take place to illustrate to the City the status of all easements and rights of way on the property. These easements and rights of way must be illustrated on the appropriate drawings and in a clear manner.
- F. RECORDS DRAWING SUBMITTAL REQUIREMENTS. See Article 1.04.070 (Record Drawings). Record drawings ~~shall~~ may be required to be submitted before ~~warranty requests~~ scheduling final inspection.

### **1.08.040 Streets**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, street work shall meet the requirements and specifications of the following APWA sections and related Divisions:
  1. APWA DIVISION 34 (Transportation)
  2. APWA DIVISION 03 (Concrete)
  3. APWA 03 30 04 (Concrete)
  4. APWA 32 16 13 (Driveway, Sidewalk, Curb, Gutter APWA 31 05 19 (Geotextiles)
  5. APWA 31 05 21 (Geogrids/Geocomposites)
  6. APWA 32 12 16 (Plant-Mix Asphalt Paving)
  7. APWA 32 12 16.13 (Plant-Mix Bituminous Paving)

8. APWA 32 14 13 (Precast Concrete Unit Paving)
  9. APWA 32 14 16 (Brick Unit Paving)
  10. APWA 32 17 23 (Pavement Markings)
  11. APWA 34 71 13 (Vehicle Barriers)
  12. APWA 34 71 19 (Vehicle Delineators)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to Storm, Land, and Groundwater Drain design standards:
1. Chapter 1.36 (Streets and Pavements)
  2. Chapter 1.40 (Portland Cement Concrete and Masonry Work)
  3. Drawing 1 (Standard Street Intersection and Utility Locations)
  4. Drawing 2 (Standard Utility Locations in Knuckle)
  5. Drawing 3 (Standard Street Cross Sections and Utility Locations)
  6. Drawing 4 (Standard Street Cross Sections and Utility Locations)
  7. Drawing 5 (Curb, Gutter, and Sidewalk)
  8. Drawing 6 (Typical Curb Approach)
  9. Drawing 7 (Standard Curb Return at Intersection)
  10. Drawing 8 (Pedestrian Access)
  11. Drawing 9 (Pedestrian Access Mid Block)
  12. Drawing 15 (Standard Cul-De-Sac)
  13. Drawing 16 (Standard Knuckle)
  14. Drawing 31 (110-Foot Roundabout for Local Street Intersection)
  15. Drawing 32 (Typical Street/Stop Sign Installation Detail)
  16. Drawing 33 (Typical Street Light 1)
  17. Drawing 34 (Typical Street Light 2)
  18. Drawing 35 (Typical Street Light 3)
  19. Drawing 36 (Concrete Pole Base (Street Light))

- C. GENERAL. The following street design criteria shall apply to all street designs in the City. It will be necessary to refer to the current master transportation plan for correct street designation. Design shall comply with the current AASHTO guidelines on geometric design. Additional design criteria are specified in the Standard Drawings
- D. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to street improvements:
  - 1. Article 1.44.010 H (Fences and Walls)
- E. DRIVEWAY AND INTERSECTION LOCATION. Driveways and street intersection locations shall be designed according to the [City Transportation Master Plan](#). No driveways shall be constructed within the following distances from an adjoining street. These distances are from top back of curb (TBC) to the edge of driveway for accesses along local streets:
  - a. [34' from an adjoining local street](#).
  - b. [100' from adjoining collector/arterial \(approach\)](#).
  - c. [120' from adjoining collector/arterial \(departure\)](#).

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 Engineer.

[No at grade street intersection shall be allowed along the crossing road within 250 feet from the railroad right-of-way. No access shall be allowed along the crossing road within 250 feet unless authorized and approved by the Development Review Committee. Any access approved within 250 feet of the railroad right-of-way shall require a railroad crossing diagnostic be completed and approved by both Union Pacific Railroad and UDOT.](#)

- F. PARKING. Parking shall meet the requirements of the [City Title 15 Zoning Code](#) and City Construction and Design Standard Drawings.
- G. REVERSE FRONTAGE LOTS. New residential developments shall only be designed to allow direct access from individual lots or dwelling units to local streets unless otherwise authorized by the City Engineer.
- H. ALLOWABLE GRADES. The maximum grade allowed for any City street or private driveway is 8.0% unless otherwise approved by the City Engineer. In no case shall grades greater than 12.0% be allowed. The minimum grade allowed for any City street is [0.50%](#).
- I. STAMPED CONCRETE. The color and pattern of stamped concrete shall be approved by the [Development Review Committee](#).

- J. PRECAST CONCRETE OR BLOCK WALLS. Masonry walls, six feet tall, shall be provided along the sides of residential developments which have reverse or side frontage to arterial streets, collector streets, interstates or railroads. If a lot has frontage on a Residential collector street, a 6' masonry wall is required.
- K. 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 Engineer or his/her designee. All ramps shall conform to the requirements of the Americans with Disabilities Act and City standards. Utility access fixtures shall not be located within 2 feet of the closest edge of a pedestrian ramp. Concrete aprons for fire hydrants, electrical boxes & etc. shall extend to ramps or driveways to eliminate landscape strips between utility aprons and ramps/driveways. Storm inlet boxes are not allowed within the pedestrian ramp.
- L. HORIZONTAL AND VERTICAL CURVE. Horizontal and vertical curve alignments shall be determined by AASHTO Geometric Design of Highways and Streets (Greenbook) and additional ASSHTO design standards.
- M. MAILBOXES. Proposed neighborhood mailbox locations shall be required with the development plans.
- N. INTERSECTIONS. Full intersections that are encompassed in one subdivision need to be built in the same phase of the subdivision. Up to the curb returns on all 4 corners. Section of an intersection cannot wait for future phases.
- O. TRAFFIC IMPACT STUDIES. A traffic impact study may be necessary to identify, review and make recommendations for mitigation of the potential impacts a development may have on the roadway system. Physical and operational characteristics of the roadway are typically identified. The development design engineer is expected to follow the Utah Department of Transportation document entitled "Traffic Impact Study Requirements" (current edition). Generally, a traffic study may be required for all developments expected to produce over 100 average daily trips (ADT). The City engineer will have the authority to dismiss this requirement if it can be illustrated that the traffic impact will be negligible on the roadway system. All developments expected to produce over 100 ADT must be discussed with the City Engineer to determine the necessity of this requirement.
- P. STREET CLASSIFICATION. Streets will be classified according to their functional use as described below. Existing facilities may not fully comply.
  - 1. Boulevard Streets Arterials. The Boulevard Arterial Streets provide continuous routes for the movement of large volumes of all types of through traffic across the City and between the City and outlying areas. Geometric design and traffic control should emphasize the safe movement of through traffic and minimize property access. Access to arterials shall be limited from local streets or individual driveways.

Arterials will typically be multi-lane streets and shall have separate turning lanes at intersections. Arterials will connect to the Expressway system.

2. Parkway Streets-Collectors. The Parkway Collector Streets provide continuous routes for the movement of large volumes of all types of through traffic across the City and may also connect to outlying areas. Geometric design and traffic control should emphasize the safe movement of through traffic and minimize property access. Access to collectors shall be limited from local streets or individual driveways. Collectors will typically be two-lane streets with separate turning lanes at intersections and may be multi-lane streets if warranted by traffic volumes.
3. Local Streets. The Local Streets serve as a means of access to abutting property. They are intended to serve low speeds and short trip routes, with usually less than 500 vehicles per day.
4. Design Vehicle for Classification Type. All street classifications are designated to carry passenger vehicles and up to the following Design Vehicle Types:
  - a. Boulevard-Arterial Streets up to WB50.
  - b. Parkway-Collector Streets up to WB40.
  - c. Local Streets up to SU30.

Q. MINIMUM AND MAXIMUM GRADES. The minimum acceptable grade slope measured at the centerline of the street is one-half percent (0.5%). The flow line of curb returns, knuckles and cul-de-sacs' shall also be no less than one-half percent (0.5%). The maximum slope varies depending on road classification. The sub-sections below shall be used to determine maximum slope.

1. Boulevards and Parkways Arterial and Collector Streets. Boulevard and Parkway-s Arterial and Collector Streets shall be limited to a maximum grade of eight percent (8%). Sustained grades (600 feet or more) shall be limited to seven percent (7%).
2. Local Streets. Local streets shall be limited to maximum grade of ten percent (10%). Sustained grades (600 feet or more) shall be limited to nine percent (9%).
3. Cul-de-sacs. Cul-de sacs with shall be limited to a maximum grade of six percent (6%). The cul-de-sac shall terminate at the bulb with a grade not to exceed three percent (3%) for the last one hundred feet (100') of traveled surface.

4. Vertical Alignment. All changes in vertical alignment shall be made by vertical curves with minimum length of one hundred feet (100') for local streets and three hundred feet (300') for boulevard and parkway streets. Actual vertical curve length shall be a function of design speed.
- R. STREET DESIGN. The following street design criteria shall apply to all street designs in the City. Additional design criteria are specified in the Standard Drawings.
1. Design Speeds. The design speed will be used to design and establish geometric features including sight distance, intersections, etc. to current AASHTO standards. The following minimum design criteria shall be met.
    - a. Local street shall be designed to at least 30 mph.
    - b. ~~Parkway-Collector~~ Streets shall be designed to at least 40 mph.
    - c. ~~Boulevard-Arterial~~ Streets shall be designed to at least 50 mph.
      1. Posted speed limits shall be 5 mph less than the listed design speeds.
  2. Horizontal Curves. Changes in horizontal alignment of over one degree shall be made using horizontal curves. In some cases, horizontal alignment changes on local streets may be allowed without a horizontal curve if the resulting alignment functions as a two-legged intersection.
    - a. Local Streets shall have a centerline radius of at least 150 feet.
    - b. Collector Streets shall have a centerline radius of at least 370 feet.
  3. Vertical Curves. Streets shall be designed with vertical curves where grade changes greater than 1% occur. Vertical curves shall be designed using the appropriate design speed according to the latest AASHTO design guidelines. It is encouraged to include the "K" value in the profile illustrating the vertical curve.
  4. Cul-de-sacs. The cul-de-sac shall be limited to a maximum length of six hundred fifty feet (650') as measured from the intersection centerline to the center of the cul-de-sac. Downhill cul-de-sacs are strongly discouraged and may only be allowed if it can be demonstrated that surface drainage will be controlled in a manner acceptable by the City Engineer and approved by City Council.
  5. Widening Asphalt along an Existing Road. When a development project requires asphalt widening due to the placing of new curb and gutter along an existing road, the cross slope of the new asphalt must

be between one percent (1%) and four percent (4%). The construction drawings must adequately show the cross slope and the asphalt “saw cut line” required to create the slope. The new asphalt shall match the existing cross slope or shall be replaced from the crown of the roadway to the gutter.

- 6. Finished Width of Exterior Roads. When authorized by the City Engineer, roads with development on one side may construct a minimum of half the road plus ten (10) feet of pavement and three (3) feet of shoulder. roads are designed along the exterior of developed property, a minimum of ten (10) feet of unobstructed asphalt on the opposite side of the designed centerline must be constructed.

Depending on the classification of the road, additional width may be requested by the City.

- 7. Lane Widths, Turning Lanes and Clear Zones.

- a. The minimum traffic lane width will be 11 feet. Pavement widths are as defined in the City Standard Drawings.
- b. Turning lanes shall be incorporated on Boulevard Arterial and Parkway-Collector Street designs. Length of separate turning lanes shall be designed using the current addition of AASHTO and based on a capacity analysis. Width of separate turning lanes shall be 12-foot in width for Boulevard Arterial streets and 11-foot width for Parkway-Collector streets.
- c. A three (3) foot clear zone shall be required on all streets built with a curb and having a speed limit of 25 mph or less. Streets with speed limits greater than 25 mph will use the AASHTO Standard to determine clear zone limits. Variances to clear zone requirements will be considered for overhead electrical facilities where compliance will significantly impact existing trees. In no case will a clear zone of less than eighteen (18) inches be allowed. A clear zone variance must be approved by the City Engineer.

- 8. Pavement Loading and Design. The following charts shall be used in the determination of pavement loading and design.

TRAFFIC CLASSIFICATIONS			
Traffic Class	Maximum EAL(a)	Type of Street	Total Heavy Trucks During

			Design Period
I	5000	Light Traffic Cul-de-sac	7,000
II	10,000	Local Streets	7,000 - 15,000
III	100,000	Collector Streets	70,000 - 150,000
IV	1,000,000	Arterial Streets	700,000 - 1,500,000
(a) Equivalent axle load for 20 year design period			
(b) Roadway serving as access for construction vehicles may require additional structure design prior approval			

- a. The table below illustrates the traffic classifications to be used for determination of the minimum roadway structural sections.
- b. The table below illustrates the California Bearing Ratio (CBR) values as they relate to the subgrade soil classifications.

<b>SUBGRADE SOIL CLASSIFICATION</b>			
Subgrade Class	Resilient Modulus (Mpa)	Characteristics of Soil	CBR Value
Very Poor Soil	<30	Clay and fine silt - Extremely soft and plastic when wet	3
Poor Soil	30-80	Clay, fine silt and sandy soils - soft and plastic when wet	3-8
Medium Soil	80-170	Loans, silty sands and some clayey sand gravel, retains moderate degree of firmness with moisture	8-17
Good to Excellent Soil	170	Clean sands, sand gravel and free of plastic materials- retains load support when wet	17

- c. The table below illustrates the minimum required structural section based on the specific CBR value.

<b>ASPHALTIC CONCRETE PAVEMENT STRUCTURAL SECTION</b>					
Subgrade Class	Pavement Section	Traffic Classification			
		I	II	III	IV
Very poor CBR <3	Asphalt Concrete Surface	3"	3"	4"	6"
	Untreated Aggregate Roadbase	10"(b)	12"(b)	8"(b)	12"(b)

	Aggregate Subbase	-	-	12"(b)	16"(b)
Poor CBR 3-8	Asphalt Concrete Surface	3"	3"	4"	6"
	Untreated Aggregate Roadbase	8"	8"	8"	8"
	Aggregate Subbase	-	-	6"	12"
Medium CBR 9-17	Asphalt Concrete Surface	3"	3"	4"	6"
	Untreated Aggregate Roadbase	8"	8"	8"	8"
	Aggregate Subbase	-	-	4"	6"
Good to Excellent CBR >17	Asphalt Concrete Surface	3"	3"	4"	6"
	Untreated Aggregate Roadbase	8"	8"	8"	8"
	Aggregate Subbase	-	-	-	-
<p>(a) Subbase soil must be of sufficient depth for the stabilization of the road structural section.</p> <p>(b) Road structural design must be submitted by a licensed and qualified engineer for review and approval.</p> <p>(c) Traffic Classification III &amp; IV requires the addition of an appropriate geotextile fabric conforming to AASHTO M288-96 to separate the roadbase course from the subbase.</p> <p>(d) Traffic Classification III &amp; IV requires a 3/4" mix design.</p> <p>(e) Traffic Classification I &amp; II requires a 1/2" mix design.</p>					

S. INTERSECTION DESIGN. The following intersection design criteria shall apply to all intersection designs in the City. Additional design criteria are specified in the Standard Drawings.

1. Street Alignment and Offsets. Angular street alignment at an intersection shall be as close to perpendicular as possible. In no case shall an intersecting street be more than 10° from perpendicular. Centerlines of opposing streets should match at the intersection whenever possible. Offsets of up to ten (10) feet may be allowed in a single intersection but separate intersections must have at least one-hundred fifty (150) feet of separation.
2. Curb Returns. Curb returns shall be designed such that there is a smooth transition from one leg of the intersection to another, using vertical curves where grade changes greater than 2% occur. The designer shall include enough information on the plans to demonstrate compliance. In some cases, this requires profiling the top back of curb through the curb returns. Elevations at the PC, PT, and appropriate subdivided delta (central angle) locations will be required.

3. ADA Curb Ramp Design. Curb ramps shall be designed in accordance with current ADA standards and guidelines, and shall meet the Accessibility Standards found in the City Standard Specifications (see Division 12, Concrete Curb and Gutter and Sidewalk). The standard drawings also include specific dimensional information.
  4. Stop Controlled Grades at Intersections. Streets that will have stop control at an intersection shall not have a grade slope of greater than three percent (3%) for a distance of fifty (50) feet from the intersecting streets right-of-way.
  5. Roundabout Design. Roundabouts shall be designed in accordance with the U.S. Department of Transportation publication FHWA-RD-00-067 (Roundabouts: An Informational Guide). Roundabouts in local streets shall also follow the criteria shown in the standard drawings. The engineer shall submit the circulatory design speeds with the design drawings.
  6. Sight Distance Triangle. A clear line of sight must be provided at all intersections, [see Vineyard City Access Management Manual](#). The "Sight Distance Triangle" must be calculated using the stopping "Sight Distance" of the road being intersected. The stopping "Sight Distance" is 200 feet for a Local street, 300 feet for a [Parkway-Collector](#) and 425 feet for a [Boulevard-Arterial](#). The figure below illustrates the required "Sight Distance Triangle" based on the "Sight Distance".
- T. PARKING. ~~See Standard Drawing 30A and 30B. The dimensions of each off-street parking space shall be at least nine feet (9') by eighteen feet (18'). Diagonal parking spaces shall be nine feet (9') by eighteen feet (18') measured from the nearest curb face. Ninety (90) degree parking spaces shall be nine feet (9') by eighteen feet (18') measured from the curb face. Parallel parking spaces shall be nine feet (9') by twenty four feet (24') measured from the curb face~~
- U. STREET LIGHTING. All streets shall have street lights spaced 250 feet on center on alternating sides of the street. Street lights shall be located at or on property lines or corners.
1. Residential Streets. Street lights along residential streets shall be placed on 12-foot (12') poles. At a 4-way intersection a street light shall be placed at a minimum of 2 adjacent corners. At a 3-way or a tee intersection a street light shall be placed on the property line along the through street across from the odd street leg. At knuckles or 2-way intersections a street light shall be placed on the inside corner. A street light shall be placed at the end of cul-de-sacs.

2. Arterial and Collector Streets. Street lights along arterial and collector streets shall be placed on 20-foot (20') poles. At all intersections a street light shall be placed at each corner of the intersection.

### **1.08.050 Drinking Water**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, drinking water work shall meet the requirements and specifications of the following APWA sections and related Divisions:
  1. APWA DIVISION 33 (UTILITIES)
  2. APWA 33 11 00 (Water Distribution and Transmission)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to Storm, Land, and Groundwater Drain design standards:
  1. Chapter 1.24 (Drinking Water)
  2. Drawing 1 (Standard Street Intersection and Utility Locations)
  3. Drawing 2 (Standard Utility Locations in Knuckle)
  4. Drawing 3 (Standard Street Cross Sections and Utility Locations)
  5. Drawing 22 (Fire Hydrant and Water Valve Detail)
  6. Drawing 23 (Thrust Block Details)
  7. Drawing 24 (Typical Culinary Water Connection)
  8. Drawing 25 (Large Meter Assembly)
  9. Drawing 26 (Backflow Prevention Assembly)
- C. GENERAL. See Chapter 1.24 (Drinking Water). The Developer shall connect the development with the city drinking water system with all appurtenances and shall make such drinking water available to each lot or unit within the development. Adequacy of supply and sizes of drinking water mains shall be established by the City Engineer. Looped connection of the drinking waterlines will be required at the discretion of the City Engineer to provide adequate fire flows and redundancy.
- D. GENERAL. The following pressure pipe design criteria shall apply to all pressure pipe designs in the City. Design shall comply with the current applicable AWWA standards. Additional design criteria are specified in the Standard Drawings.
- E. CULINARY WATER PIPE DESIGN.

1. Pipe Material. Polyvinyl Chloride (PVC) pipe for the transmission and distribution of water shall be manufactured in accordance with the most current AWWA C900 standards, "AWWA Standard for Polyvinyl Chloride Pressure Pipe, 4-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 the most current AWWA C905 standards, "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. Pipe smaller than 4-inch shall be schedule 40 PVC.
  2. Fire Hydrant Spacing. Fire Hydrants shall be placed in locations that allow for accessibility by the lay of a fire hose of no more than two hundred fifty (250) feet from the hydrant to the most remote point of any structure intended for occupancy. Buildings that are to be equipped with sprinkled fire suppression are to have a hydrant within one hundred (100) feet of the "Fire Department Connection" (FDC). Other requirements shall be based on the "International Fire Code" or designated Fire Marshall. A fire hydrant shall be located at the end of a cul-de-sac or temporary dead-end street.
- F. PIPE LOOPING. Culinary pipe shall not be looped under a sanitary sewer pipe.
- G. AIR VAVLES. Water system designs shall be designed without the requirement of air valves.

### **1.08.060 Sanitary Sewer**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, sanitary sewer work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 33 (UTILITIES)
  2. APWA 33 31 00 (Sanitary Sewerage System)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to Storm, Land, and Groundwater Drain design standards:
1. Chapter 1.28 (Sanitary Sewer)
  2. Drawing 1 (Standard Street Intersection and Utility Locations)
  3. Drawing 2 (Standard Utility Locations in Knuckle)
  4. Drawing 3 (Standard Street Cross Sections and Utility Locations)
  5. Drawing 18 (Typical Sewer Manhole Detail)

- 6. Drawing 19 (Typical Manhole on Existing Pipe)
  - 7. Drawing 20 (Typical Sampling Manhole)
  - 8. Drawing 21 (Typical Sewer Drop Manhole)
  - 9. Drawing 27 (Typical Sewer Lateral)
  - 10. Drawing 28 (Typical Grease Trap)
  - 11. Drawing 14 (Typical Land Drain Manhole Detail)
- C. GENERAL. 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. Note that abandoned sewer services shall have a cleanout at property line with a watertight plug on the private property side of the cleanout wye.

The following sewer design criteria shall apply to all gravity sewer system designs in the City. Additional design criteria are specified in the Standard Drawings.

- D. PIPE SLOPES. Slopes shall be designed to have a 2 foot per second velocity unless otherwise approved by the City Engineer. Sewers shall be laid with uniform slope between manholes. Whenever possible the slope should exceed 0.006 ft/ft. The pipe should be sized to meet anticipated hydraulic loads, increasing the pipe size to reduce the minimum slope requirements shall not be allowed. Sewer slopes shall not exceed 0.12 ft/ft, drop manholes shall be used when steeper slopes are needed, drop manholes shall be used to keep line grade below maximum grade allowed.

The minimum sewer pipe-main shall be eight-inch (8") diameter and shall not be designed at a grade no flatter than that, which is specified in the table below. If the State guidelines require steeper grades than indicated below, the State guidelines shall apply. The engineer shall coordinate the pipe size with the City Engineer for future design capacities.

Minimum Sanitary Sewer Slopes

Pipe Diameter (inches)	Minimum Slope (%)
4	2.000
6	1.000
8	0.400
10	0.280
12	0.220
14	0.158
15	0.150
16	0.132

18	0.120
21	0.100
24	0.080
27	0.066
30	0.057
36	0.045
48	0.031
54	0.027
60	0.023

Unless otherwise approved and/or required by the City Engineer, sewer lines eight (8) through fifteen (15) inches in diameter shall be designed to flow no more than half-full during peak flow. Sewer lines larger than fifteen (15) inches in diameter shall be designed to flow three-fourths full.

- E. MANHOLE DESIGN. ~~See Section 1.28.020 (Manholes). Minimum interior diameter for manholes with one or two connections is four foot (4'). Minimum interior diameter for manholes with three or more connections is five-foot (5'). The diameter of the manhole shall be determined by the intersection pipe sizes and the clearances required between the pipes for proper construction. Generally, there should be a minimum of twelve inches (12") clear distance between any two connecting pipes. See Article 1.28.020 (Manholes Size) for sizing manholes.~~ Spacing between manholes shall be no more than four hundred (400) feet.

All manholes and combination boxes shall feature steps made of copolymer polypropylene conforming to ASTM D4101.

Pipe inverts through a manhole shall have a minimum two-tenths (0.20) fall from the inlet to the outlet when the pipes are greater than 100° apart in alignment. When the pipes are 90° to 100° apart in alignment, three-tenths (0.30) fall will be required. Pipe alignments under 90° will not be allowed and will require the construction of additional manholes.

A manhole must be provided at the end of all piping sections in a development. The manhole must be located as close to the edge of the project as reasonably allowable when future adjacent land development is possible. The manhole base shall be constructed for the future connections with a plug installed.

Separation between sewer and or land drain manholes shall be a minimum of three foot (3') measured from the outside of the structures. Where design requirements cannot accommodate the minimum separation, flowable fill will be required between the structures and a combined elongated concrete.

- F. SERVICES. See Section 1.28.040 (Sanitary Sewer Services). Service connections directly into a manhole will not be allowed. No service laterals will be allowed in stubs. Wherever possible, buildings shall be discharged to the Sewer Main

Line with a gravity flow Sewer Lateral. Sewer Laterals shall conform to the requirements of the Adopted Plumbing Code.

~~New sewer laterals installed to lots shall be located ten feet (10') uphill of the lowest front property corner.~~ The minimum cover of sewer laterals is 3 feet, and 3 foot 6 inches at the property line. One sewer service lateral per unit unless otherwise authorized by the City Engineer. ~~Each unit of separate ownership shall be required to have a separate sanitary Sewer Lateral, unless otherwise approved by the City Council.~~

~~Sewer Laterals shall have at least four (4) feet of cover unless otherwise authorized by the City Engineer.~~

#### *Gravity Sewer Laterals.*

The size of Sewer Laterals shall be determined on the basis of the total fixture units drained by such sewer, in accordance with the Adopted Plumbing Code. See Article 1.28.040 D (Clean-Outs) for clean-out requirements.

The minimum size for gravity Sewer Laterals shall be four (4) inches in diameter. Sewer Laterals shall be run at a uniform slope of not less than 2% grade. Where it is impractical to run the sewer at a 2% grade due to the depth of the Sewer Main Line, the design engineer will provide a solution to the City Engineer for approval.

#### *Pressure Sewer Laterals*

Professional advice should be obtained prior to installing pumping equipment or pressure Sewer Laterals.

In locations where buildings cannot be discharged to the Sewer Main by a gravity flow Sewer Lateral, flows shall be discharged into a tightly covered and vented sump from which the flows shall be pumped, by automatic pumping equipment and discharged into a gravity flow Sewer Lateral, connecting at a cleanout, or the Sewer Main, connecting in a manhole, with an approved restrained coupling(s).

Pumping equipment and pressure Sewer Laterals shall be designed to meet or exceed the anticipated use requirements. The total maximum system head shall not exceed the pump manufacturer's recommended allowable head for the pump system being proposed.

Pressure Sewer Laterals shall be constructed of HDPE. Pressure Sewer Laterals shall be sized to provide a minimum velocity of 2.0 feet per second at the design pumping rate. Pressure Sewer Laterals shall be designed and constructed on a constant reverse grade.

- G. SEWER LIFT STATIONS. Sewer lift stations will only be allowed upon written approval by the City Engineer.

## 1.08.070 Storm, Land, and Groundwater Drains

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, storm, land, and groundwater drain work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 33 (UTILITIES)
  2. APWA 33 08 00 (Commissioning of Water Utilities)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to Storm, Land, and Groundwater Drain design standards:
1. Chapter 1.32 (Storm, Land, and Groundwater Drains)
  2. Drawing 1 (Standard Street Intersection and Utility Locations)
  3. Drawing 2 (Standard Utility Locations in Knuckle)
  4. Drawing 3 (Standard Street Cross Sections and Utility Locations)
  5. Drawing 10 (Standard Curb Face Inlet Detail)
  6. Drawing 11 (Mountable Curb Inlet Detail)
  7. Drawing 12 (Manhole Access Curb Inlet Box (Combo Box) Detail)
  8. Drawing 13 (Storm Drain Junction Box Detail)
  9. Drawing 14 (Typical Land Drain Manhole Detail)
- C. GENERAL. The Developer shall provide on-site storm drainage facilities ~~according to the Storm Water Drainage Design Manual and~~ in accordance with the ordinances of the City and the City Construction and Design Standards.

Calculations will need to be completed and submitted to the City documenting the following design parameters:

1. Detention. All detention shall detain a 25 year 24 hour storm with a maximum 0.15 cfs per acre release rate. Release rates shall be determined by the City Engineer.
2. Retention. All retention shall retain and infiltrate a 100 year 24 hour storm event. Retention shall drain out after 48 hours.

The following storm drainage design criteria shall apply to all storm drainage designs in the City that will be maintained by the City. Additional design

criteria are specified in the Standard Drawings. The minimum allowed pipe size for all storm drain pipe is fifteen-inch (15") diameter.

D. INLET BOXES AND MANHOLES.

1. Storm Water Inlets. Curb face inlets must be constructed at all low lying areas. Curb face inlet boxes will serve tributary piping and shall not be used as junction boxes or manholes. If multiple piping is required in a structure using a curb face inlet, a combination box shall be constructed which must include a manhole for access. No inlets shall be allowed at the bottom of an ADA ramp structure or in a designated pedestrian path. Refer to standard details for more information.

As a general rule, inlets shall be installed at intervals not to exceed 500 feet. Inlet spacing shall be addressed during the design phase. Storm drain catch basins or inlets shall generally be located on both sides of the street to avoid cross gutters. Inlet spacing and configuration shall be designed to collect runoff from a 10-year design storm.

2. Storm Drain Boxes. No storm drain manholes allowed. Minimum junction box interior width is four-foot (4'). A minimum of six inches (6") clear distance between the pipe and a side wall is required. Refer to the Storm Drain Junction Box Standard Detail for additional details.

Spacing between storm drain boxes shall be no more than four hundred (400).

3. Pipe Material. Pipe material shall be reinforced concrete or solid-wall HDPE pipe dual wall polypropylene pipe as approved by City Engineer's office.

HDPE pipe for storm drain shall be manufactured in accordance with most current ASTM D 3350, "Standard Specification for Polyethylene Plastics Pipe and Fitting Materials" and most current AWWA C906, "AWWA Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 inch through 63 inch, for Water Distribution." Pipe and fittings shall be High Density Polyethylene made of PE 4710 material, and shall have a minimum cell classification of PE 445474C or higher.

Polyethylene pipe shall be joined by thermal butt-fusion, electrofusion, or other methods as recommended for use by the pipe manufacturer. Fusion shall be conducted only by persons who have received training in the use of fusion equipment according to the recommendations of the pipe supplier or equipment supplier. In situations where different polyethylene piping materials must be joined, the fusion procedure shall be approved by the Engineer. Polyethylene piping shall not be joined by solvent cements, adhesives (such as epoxies), or threaded type connections.

4. Storm Water Treatment. All new land development will require provisions for storm water treatment before the water is allowed to discharge into the existing City system. A design that will separate oils and particulates from the discharged water will have to be approved by the City Engineer. The treatment facility must be easily accessible and maintainable without unreasonable effort.
- E. MULTIPLE-LOT STORM DRAINAGE CALCULATIONS. The following information shall be included in the storm drainage calculations for multiple-lot development.
1. Hydrologic (Flow) Calculations.
    - a. A map showing drainage sub-basins and the piping system.
    - b. Cumulative peak flow calculations for each sub-basin (submit all input data, calculations and results).
  2. Hydraulic (Inlet and Pipe) Calculations.
    - a. Capacity calculations for each segment of the pipe system.
    - b. Calculations demonstrating that flow rates in streets do not exceed maximums before being caught in storm drain inlets. "Section 5.07, Sub-Section C: Inlet Spacing" dictates the criteria required for allowable water spread.
    - c. Calculations demonstrating that inlets are sufficiently long to capture peak design flows.
    - d. Calculations demonstrating that all pipes have a 2 fps minimum velocity for the design storm.
    - e. Detention Calculations.
      1. Detention volume requirement which includes an analysis that identifies the storm whose duration creates the greatest detention volume requirement, given storm duration and stage storage curve and outlet discharge curve.
      2. Orifice calculations illustrating that the maximum release rate is not exceeded.
      3. Engineer to provide certification with stamp that constructed detention meets design volumes and capacities

F. COMMERCIAL SITE STORM DRAINAGE CALCULATIONS. The following information shall be included in the storm drainage calculations for commercial site property development.

1. Hydrologic (Flow) Calculations.

- a. Peak flow calculations for the site (submit all input data, calculations and results).

2. Hydraulic (Inlet and Pipe) Calculations.

- a. Capacity calculations for each segment of the pipe system.

3. Detention Calculations.

- a. Detention volume requirement-an analysis that identifies the storm whose duration creates the greatest detention volume requirement, given storm duration and stage storage curve and outlet discharge curve.
- b. Stage storage curve - generally required only on large detention basins.
- c. Outlet discharge curve - generally required only on large detention basins.
- d. Orifice calculations illustrating that the maximum release rate is not exceeded.
- e. Detention Basins Acceptance. Prior to acceptance of detention basin construction, a Registered Professional Engineer shall provide a stamped letter and exhibit verifying that the constructed volume, side slopes, high water/spillway elevations, box/orifice plate elevations, pipe sizes and slopes, etc. have met the requirements set forth within the storm drainage report and the construction plans

G. LANDSCAPED STORM DETENTION BASIN REQUIREMENTS. Storm water must be detained such that the peak flow rate released from the site does not exceed 0.15 cubic feet per second per acre of development (cfs/acre). Detention basins must have vehicular access for maintenance and will not be allowed in the backyards of single family residences. The following limitations apply to detention basins.

1. The side slopes of the basin may not be steeper than 3:1 unless special circumstances warrant a change. The bottom of the detention basin must slope toward the drain.

2. Within 10 feet of the outlet, the slope of the basin bottom must not be flatter than 5% unless a concrete apron is constructed around the outlet.
  3. Excluding areas within 10 feet of the outlet, the maximum allowable depth of water in the basin is 3 feet. An additional one (1) foot of freeboard must be constructed on all basins.
  4. Storm drain pipes are to be continuous through detention areas to allow low flows to proceed through the storm drainage system without having to come to the surface. These flows must still pass through the outlet restriction that limits runoff rates.
  5. Basins are to be designed such that water does not run into them after storm water reaches a maximum depth (unless a free flowing overflow is provided)—this can usually be controlled by the elevation of an inlet box in the street adjacent to the basin.
  6. Basins are to be designed such that when runoff exceeds design values or when restrictions plug, excess storm water will be directed to the street system or bypass the restriction by entering the piped system via a free flowing overflow.
  7. A basin may be designed for dual use, but uses other than the detention of storm water must be approved by the City Engineer.
  8. In cases where the basin detains water from and is part of a project controlled by a “Home Owners Association” (HOA), the HOA will be responsible to maintain the operation, landscaping and irrigation sprinkling of the basin.
- H. HARD SURFACE STORM DETENTION STORAGE REQUIREMENTS. If property is not available for a landscaped detention basin or cannot meet the one-foot depth criteria, storm water shall be detained underground in an approved underground system. Storm water must be detained such that the peak flow rate released from the site does not exceed 0.15 cubic feet per second per acre of development (cfs/acre). Underground storage designs should be discussed with the City Engineer before submittal. The following limitations apply to underground detention storage.
1. Basins are to be designed such that when runoff exceeds design values or when restrictions plug, excess storm water will be directed to the street system or bypass the restriction by entering the piped system via a free flowing overflow.
  2. The private property owner benefiting from the hard surface or underground detention storage will be responsible to maintain the operation of the system.
- I. UNDERGROUND STORM DRAIN DETENTION. Standards coming soon.

J. STORM WATER QUANTITY CRITERIA AND DESIGN GUIDELINES. The following storm drainage criteria and design guidelines apply to all storm drainage plans in the City and shall be used in storm drainage calculations. The City Engineer has authority to modify the criteria and guidelines as needed to meet changing or unusual needs or conditions.

1. Design Storm.

a. Frequency.

1. Design storm drain piping system for a 10-year storm.
2. Design detention for the 25-year storm.
3. Design for the flooding hazard and overflow point of any storm greater than the 25-year storm.

b. Intensity—per the following table.

**Rainfall Intensities (inches/hour)**

<b>Duration</b>	<b>10 Year</b>	<b>25 Year</b>	<b>100 Year</b>
5 min	3.18	4.19	6.16
10 min	2.42	3.18	4.69
15 min	2.00	2.63	3.87
30 min	1.34	1.77	2.60
60 min	0.83	1.09	1.61
2 hours	0.47	0.61	0.87
3 hours	0.34	0.43	0.59
6 hours	0.20	0.24	0.31
12 hours	0.12	0.14	0.18
24 hours	0.07	0.08	0.10

2. Runoff Coefficients. The City requires the design engineer to calculate a composite runoff coefficient based on surface type and associated runoff coefficient, weighted by the area of each surface type.

3. Inlet Spacing. Two criteria must be met.

a. Spread of water in the street:

1. Storm water must be delivered from the street into an underground piped system when the spread of water in the street covers the outside 7 feet of asphalt on a local street, the outside 2 feet on a Parkway street and the

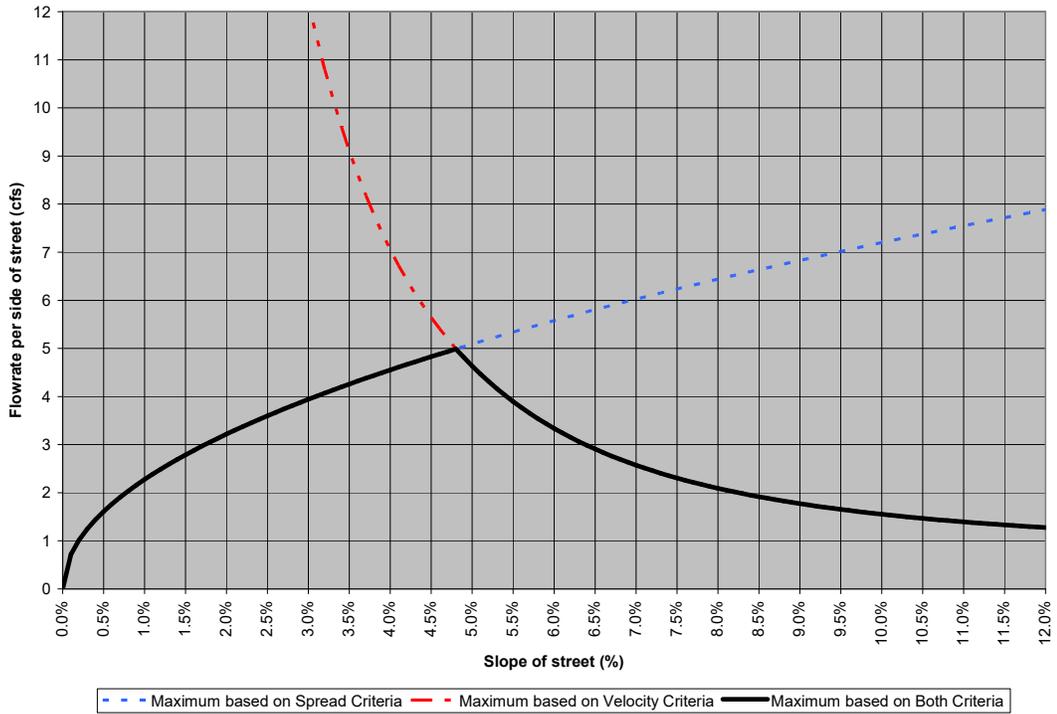
outside 2 feet on a Boulevard street. This will leave 12-feet of unsubmerged asphalt for local streets (that have 26 feet of asphalt), 10-feet in each direction of unsubmerged asphalt for Parkway streets (that have 24 feet of asphalt) and 22-feet in each direction of unsubmerged asphalt for Boulevard streets (that have 48 feet of asphalt).

b. Gutter velocity:

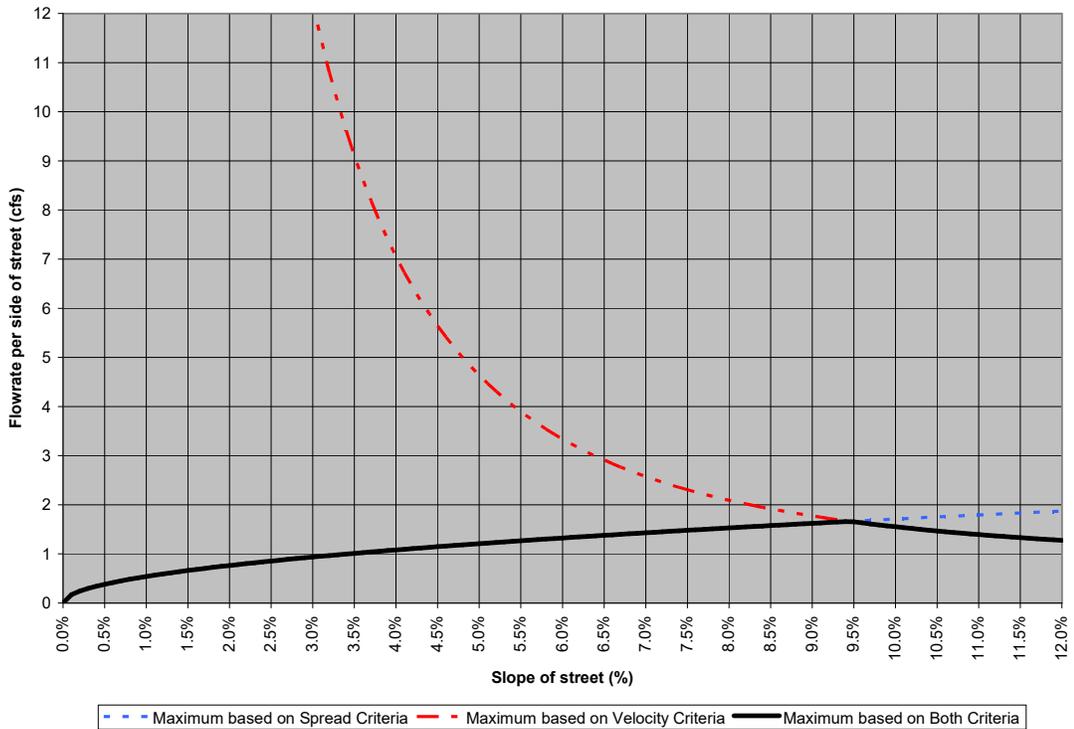
1. Water must be delivered from the street into an underground piped system when the velocity of water in the deepest part of the gutter reaches 10 feet per second (as a safety consideration).

Both of these requirements are a function of street slope and storm water flow rate. Storm water must be delivered from the street to storm drains when flows reach amounts shown in the following graphs. This means that for a given longitudinal street slope, flows on the street surface must be delivered into the underground piped system when they reach the amount indicated on the graph by the solid line.

### GRAPH FOR LOCAL STREETS



### GRAPH FOR PARKWAY AND BOULEVARD STREETS



Note: The spread of water in the street is calculated using the Manning equation in the form developed by Izzard, with a roughness coefficient of 0.013 and the standard street cross section. The velocity criteria is based on the velocity at the deepest part of the gutter with the Manning Equation, with a roughness coefficient of 0.013, and using a depth at a point six inches from the face of the curb as the hydraulic radius

4. Inlet Capacity. The designer is to assume 50% blockage of inlets when considering storm drain inlet capacity.
5. UPDES and Storm Water Pollution Prevention Plan. All construction sites, which disturb an area of 1 acre or more, or disturb less than one acre and are part of a common plan of development, need to obtain a UPDES permit from the State of Utah. As a condition of the permit, a Stormwater Pollution Prevention Plan (SWPPP) must be developed and implemented as outlined by the Department of Environmental Quality website (<http://www.deq.utah.gov/Permits/water/updes/stormwater.htm>).

### **1.08.080 Power and Communication**

- A. POWER. Electrical lines shall be underground except when the City Engineer feels that such underground lines are not in the best interest of the City. Lines shall be located opposite water and pressurized irrigation lines if possible
- B. COMMUNICATION. Communication lines shall be underground except when the City Engineer feels that such underground lines are not in the best interest of the City.

### **1.08.090 Specialized Engineering**

- A. GENERAL. Any specialized engineering beyond the expertise of city staff such as, but not limited to, geotechnical, traffic, environmental, hillside, floodplain, bank stabilization and erosion control will require the review of qualified consultants. All review costs shall be paid by the Developer.
- B. LANDFILL. [Any work on a landfill as defined by Utah Administrative Code R315-260-10\(84\) and 40 C.F.R. § 260.10 \[or as a backup R315-301-2\(7\)-\(11\)\] will require review and approval by Utah Department of Environmental Quality.](#)
- C. HILLSIDE GEOTECHNICAL ENGINEERING. Any development or land disturbance of any kind shall be required to submit a site specific geotechnical report including a slope stability analysis. Close proximity to a steep slope shall be defined as the horizontal distance from the slope which is less than or equal to the vertical distance from the crest of the slope to the toe of the slope. The geotechnical report shall include sufficient subsurface exploration, laboratory testing and geotechnical engineering analysis to

render design level geotechnical recommendations and opinions regarding slope stability and required mitigation to protect planned or future development above and below the slope(s) from earth deformations and other adverse soil or geological conditions.

All work completed in connection with the site specific geotechnical report shall be performed by an experienced geotechnical engineering firm and under the direct supervision and direction of a professional geotechnical engineer properly licensed in the state of Utah. The scope of work described below is considered the minimum requirement for the geotechnical investigation. The geotechnical firm shall use their experience and engineering judgment in conjunction with the minimum requirements outlined below to develop an appropriate site-specific geotechnical scope of work and report.

1. Field Explorations. Prior to commencing field explorations, the geotechnical engineer shall review available geologic maps, aerial photographs and other pertinent literature to develop an understanding of the site and its geologic setting.
2. Utilities. Locate utilities within areas of explorations by notifying the appropriate local one-call state utility locate service. Independent private utility locates may be required for utilities not identified by the local one-call service.
3. Soil Borings. Complete at least one (1) soil boring for every residential lot. The number of borings for other types of development shall be determined by standard geotechnical practice. Boring(s) shall be located within close proximity to slope crests so as to render a representative soil profile of the slope for analysis. The boring(s) shall extend to a minimum depth of 15 feet below the top of the slope. For example, if a 30-foot tall slope is being evaluated the boring shall extend at least 45 feet below the top of the slope. Borings shall extend through existing fill materials so that at least one sample is collected in native soil. Adjust boring depths for anticipated site development cuts and fills and for known soil conditions.

The geotechnical engineer shall consider past property use and location. Additional soil borings shall be planned for sites located in areas that are known or suspected to have had previous slope deformations or seeps, springs or other adverse features. Special attentions shall be given to identifying, to the extent practical, the presence and extent of existing fill.

4. Soil Samples. Collect a minimum of four (4) soil samples in the upper ten (10) feet of the profile and at intervals of five (5) feet thereafter. Adjust sampling intervals to include major changes in soil layering. Collect a sufficient number of undisturbed samples in fine-grained soils

to properly assess strength and consolidation properties. Perform split barrel sampling in granular soils. Field blow counts should be corrected for energy and depth and presented as Standard Penetration Test (SPT) blow counts on the soil boring logs.

Field classify encountered soil in accordance with the American Standard for Testing and Materials (ASTM) and Unified Classification System (USCS).

5. Bedrock. Borings encountering bedrock shall be extended a minimum of 5 feet into the bedrock. Rock coring equipment shall be used where practical to aid in assessing rock properties. Where cores are collected, Rock Quality Designator (RQD) values should be presented on the boring logs.
6. Laboratory Testing. Samples collected in the field shall be properly packaged to avoid disturbance or freezing and transported to an accredited geotechnical and materials testing laboratory for further observation and testing. Laboratory testing shall be performed under the direction of a Utah licensed professional geotechnical engineer and in accordance with appropriate ASTM standards. At a minimum laboratory testing shall include the following:
  - a. SIEVE ANALYSIS: Determine grain size distribution and percent fines (minus 200 sieve).
  - b. ATTERBERG TESTS: Classification, indexing, shrinkage and expansiveness.
  - c. DENSITY: In-place density.
  - d. MOISTURE CONTENT: Natural moisture content.
  - e. SHEAR STRENGTH: Direct shear and/or triaxial shear.

Additional laboratory testing may be required to address site conditions and provide necessary engineering properties for analysis. The geotechnical engineer shall use his professional judgment and local experience to determine an appropriate scope for laboratory testing. Laboratory test results shall be presented in the Geotechnical Report, on individual summary sheets in the report appendix or on the boring logs.

7. Geotechnical Report Requirements. The results of the field and laboratory programs shall be evaluated by a Utah registered professional geotechnical engineer. Based on the results of their evaluation, an engineering report shall be prepared that details the results of the testing performed, provides logs of the borings and a

diagram of the site/boring layout and provides geotechnical recommendations and information regarding the following:

- a. SUITABILITY: General suitability of the site for the planned development.
  - b. PRECAUTIONS AND LIMITATIONS: Recommended precautions and limitations.
  - c. PROCEDURES: Subsurface exploration procedures.
  - d. EXISTING CONDITIONS: Soil and rock conditions encountered.
  - e. GROUNDWATER: Groundwater depth during and after drilling.
  - f. SETTING: Geologic setting.
  - g. HAZARDS: Geologic hazards.
  - h. SLOPE STABILITY EVALUATION: Slope stability evaluation including provisions, recommendations and designs to mitigate the effects of unstable slopes and other geologic hazards that may adversely impact planned developments above and below the slope(s).
  - i. SPECIAL DESIGN AND CONSTRUCTION PROVISIONS: Special design and construction provisions for footings or foundations near steep slopes, including type and depth of foundation system and set back distance from slopes.
  - j. RUNOFF AND DRAINAGE: Surface water runoff control and drainage.
  - k. SUBSURFACE DRAINAGE: Existing subsurface drainage conditions.
  - l. SITE GRADING AND EARTHWORK REQUIREMENTS: Recommended site grading and earthwork requirements, as appropriate.
8. BORING LOGS. Detailed individual boring logs and graphical cross sections summarizing soil / rock profiles and slope stability analysis and results shall be included in the geotechnical report. The logs shall contain sufficient detail to render a clear description of the soil stratigraphy, soil descriptions and classifications, SPT blow counts, sample locations and depths, groundwater depths and appropriate laboratory test results. Individual boring logs shall include a description of the boring location, exploration equipment used, relative or actual elevation, date of exploration and other pertinent information relative to the field exploration. The cross sections shall contain sufficient detail

to render a clear description of the slope stability analysis results, and any mitigation measures required. The cross sections shall contain soil profile data, and a summary of engineering properties and parameters used in the analysis for each significant soil / rock layer.

9. SURFACE WATER BANK STABILIZATION. In order to protect future development adjacent to surface water and natural erosion hazards, all future development that borders surface water within the boundaries of the City shall complete a natural hazards analysis for flooding, erosion, and groundwater hazards. A technical report must be prepared by a professional engineer, registered in the State of Utah, to document that analysis. The analysis and report shall, at a minimum, include the following items:
10. WATER HAZARD MAPS. A figure with a recent aerial photograph for a base map showing the study area and the FEMA Special Flood Hazard Areas. The study area shall include the proposed lot(s) or parcel(s) that are to be developed 1,000 feet either side of Development along flood hazard (measured along the water bank) of the proposed development. Map shall show the location of proposed structures, or building envelopes, adjacent to the flood hazard.

A review of historic surface water in the area. Use the following items, if available:

- a. HISTORICAL AERIALS: Historical aerial photographs of the area.
  - b. ORIGINAL CADASTRAL SURVEY: Original government cadastral survey of the area.
  - c. HISTORICAL QUADANGLE MAPS: Historic quadrangle maps of the area.
  - d. RECENT AERIALS: Recent aerial photographs and maps of the area.
11. OTHER WATER HAZARD ANALYSIS. Include a figure in the report that documents the results of the following analysis:
    - a. CHANNEL MIGRATION AND EROSION TRENDS: An assessment of channel migration and erosion trends in the area.
    - b. TYPICAL FIELD CHANNEL: Provide a figure that shows one or more typical field surveyed channel cross sections of the river channel adjacent to the proposed development. Comment on banks slopes, material on channel bottom, and vegetation.
    - c. AVERAGE VELOCITY: Average anticipated flow velocities in the channel adjacent to the development associated with flood

events that have a 10-, 2- and 1-percent chance of occurring in any given year.

A field assessment of the condition and stability of the existing channel in the study area, on both sides of the river. This field assessment shall primarily be a visual assessment completed by a professional with a member of the City Engineering staff in attendance. It shall include, but not be limited to:

- a. SOILS: Soil types.
- b. ERODIBILITY: Erodibility of the channel bed and banks.
- c. CHANNEL AND BANKS: General condition of the channel and banks.
- d. VEGETATION: An assessment of the condition and percent cover of existing vegetation on the channel banks and in the floodplain.
- e. EXISTING EROSION CONTROL MEASURES: An assessment of any existing erosion control measures that exist in the area.
- f. EROSION HAZARDS: Identification of any erosion hazards that need to be mitigated.
- g. MAINTENANCE EASEMENTS: Identify maintenance easements needed to access the channel. surface water.
- h. EROSION AND FLOOD HAZARD: Provide an overall "professional opinion" based on previous experience, professional judgment, and technical analyses of any existing erosion and flood hazards that could potentially endanger proposed structures, utilities or infrastructure and recommend means to mitigate those hazards.

12. GROUNDWATER. In addition to the erosion hazard assessment, the following issues shall also be addressed in this report:

- a. RUNOFF: Generally identify how storm water runoff from the proposed development will be managed. If storm water will be discharged into the surface waters confirm that backwater will not back up into the pipe and cause flooding in the newly developed area during a 1-percent annual chance flood.
- b. BASEMENTS: Assess whether the area is suitable for basements based on anticipated groundwater levels during the 1-percent annual chance flood.

- c. GROUNDWATER LEVELS: Historic groundwater levels in the area (if any).
- d. 1-PERCENT FLOOD GROUNDWATER LEVELS: If a ground water drain is proposed as part of the development, assess how it will function during the 1-percent annual chance flood.
- e. CERTIFIED BASEMENT STATEMENT: Provide a certified statement from a professional geotechnical engineer regarding whether the proposed area is suitable for the construction of basements based on the assumption that the river will be conveying the 1-percent annual chance flood.

13. PROFESSIONAL GEOTECHNICAL ENGINEER STAMP AND SIGNATURE.

The final geotechnical report shall bear the geotechnical engineer's stamp and signature.

14. REPORT. One (1) electronically submitted PDF copy of the report shall be delivered to the City within sufficient time for review and comment. The City will have the report reviewed by its own geotechnical engineer. The cost of that review will be borne by the applicant.

## 1.12 Contractor Requirements

### 1.12.010 Contractor Approval

- A. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to contractor approval:
1. Article 1.04.030 C (Bonds)
  2. Article 1.08.010 B (Construction Plans Approval)
  3. Section 1.12.020 (Insurance)
- B. GENERAL. Before a Contractor performs any Improvement within the City, the City shall approve the Contractor. Approval is granted for a period of one (1) year upon submission of the following:
1. Contractor's License. An active Utah State Division of Occupational and Professional Licensing contractor's license. License must be an E100, S410, or S390. Work will be restricted to that authorized by the license.
  2. Certificate of Insurance (COI). COI approved by City. COI shall meet the requirements of Section 1.12.020 (Insurance).
  3. Status Verification. Contractor agrees that it, and its subcontractors, will register with and use a Status Verification System to verify the federal employment authorization status of all employees hired after July 1, 2009. Contractor, and its subcontractors, will comply, in all respects, with Utah Code Annotated §63-99a-103, as it may be amended from time to time.
- C. APPROVED PLANS. Contractor shall not begin construction without approved plans according to Article 1.08.010 B (Construction Plans Approval). Contractors proceeding with work without such approved plans shall have the project shut down until plans are approved. Repeated offenses may result in the Contractor losing its Contractor Approval to perform work in the City.

### 1.12.020 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 worker's compensation insurance as required by State law.

C. Proof of comprehensive general liability insurance. Bodily injury insurance will be in an amount of not less than three hundred thousand dollars (\$300,000.00) for any one occurrence. Property damage insurance will be in an amount of not less than two hundred thousand dollars (\$200,000.00) for any one occurrence and shall include underground exposure. Combined liability insurance will be in an amount of not less than five hundred thousand dollars (\$500,000.00) for any one occurrence.

D. COMMERCIAL GENERAL LIABILITY INSURANCE. A 30-day written notice shall be provided to the City in the event of cancellation and a 10-day written notice for non-payment of premium. Also, the following statement is required on the COI: "Vineyard City, its elected and appointed officials, employees, agents, volunteers and the Utah Department of Transportation are listed on the referenced policy as additional insureds." The ~~following~~ commercial general liability insurance must be obtained and submitted on ISO Form CG 00 01 (11/85) or equivalent, occurrence policy. Refer to state requirements for limits, with limits not less than:

<del>General Aggregate</del>	<del>—————</del>	<del>\$1,000,000</del>
<del>Products Comp/OPS Aggregate</del>	<del>—————</del>	<del>\$1,000,000</del>
<del>Personal and Advertising Injury</del>	<del>—————</del>	<del>\$ 500,000</del>
<del>Each Occurrence</del>	<del>—————</del>	<del>\$500,000</del>
<del>Fire Damage (any one fire)</del>	<del>—————</del>	<del>\$50,000</del>
<del>Medical Expense (any one person)</del>	<del>—————</del>	<del>\$5,000</del>

Also include the following ing 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 — Vineyard 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".

E. 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.

### **1.12.030 Submittals**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, material submittals work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA 01 33 00 (Submittal Procedure)
  2. APWA 01 64 00 (Owner-Furnished Products)
  3. APWA 01 65 00 (Product Delivery and Handling)
  4. APWA 01 66 00 (Product Storage and Protection)
- B. GENERAL. Contractors are required to provide to the City submittals according to APWA 01 33 00 (Submittal Procedure) for all materials to be used in the City for review and approval.
1. For pre-manufactured items, documentation must be submitted a minimum of 2 weeks before installation and must include sufficient information, including shop drawings, if applicable, to establish models, colors, sizes, installation requirements, etc. that will be used.
  2. For on-site manufactured items, such as asphalt, concrete or base courses, submit mix designs, hot/cold weather installation plans, and materials certifications a minimum of 5 working days prior to planned installation.
  3. Submittals for the following, at a minimum, should be submitted:
    - a. All pre-manufactured items meeting city standards such as light fixtures, electrical components, utility fixtures and piping, landscaping, etc.
    - b. Hot Mix Asphalt Mix Designs
    - c. Portland Cement Concrete Mix Designs
    - d. Treated Base Course Mix Designs
    - e. Untreated Base Course Job Mix Formulas
    - f. Tack and Prime Coats
    - g. Concrete Curing Compounds
  4. Submit copies of all Quality Control testing and inspection reports within 48 hours of placement of materials.
- C. NEW MATERIALS. Only new materials may be used during construction unless otherwise authorized by the City Engineer.

- D. CITY FURNISHED PRODUCTS. If the City furnishes any products the Contractor shall conform to requirements and specifications of APWA 01 64 00 (Owner-Furnished Products).
- E. PRODUCT DELIVERY AND HANDLING. The Contractor shall conform to requirements and specifications of APWA 01 65 00 (Product Delivery and Handling).
- F. PRODUCT STORAGE AND PROTECTION. The Contractor shall conform to requirements and specifications of APWA 01 66 00 (Product Storage and Protection).

### **1.12.040 Quality Assurance and Quality Control**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, quality assurance and quality control work shall meet the requirements and specifications of the following APWA sections and related Divisions:
  - 1. APWA 01 43 00 (Quality Assurance)
  - 2. APWA 01 45 00 (Quality Control)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to quality assurance and quality control:
  - 1. Chapter 1.16 (Inspection and Testing)
- C. QUALITY ASSURANCE. Perform Quality Assurance work in accordance with APWA 01 43 00 (Quality Assurance). Quality assurance work shall be conducted at the Contractor's expense. The City will verify quality assurance at their discretion and inform the contractor of acceptance or rejection.
- D. QUALITY CONTROL. Perform Quality Control work in accordance with APWA 01 45 00 (Quality Control). Quality Control work shall be conducted at the Contractor's expense. The City will verify quality Control at their discretion and inform the contractor of acceptance or rejection.
- E. MATERIALS PRODUCTION. Use UDOT certified facilities for asphalt and portland cement concrete. Submit verification of Plant Certifications with mix designs.
- F. TESTING. Perform testing in accordance with APWA 01 43 00 (Quality Control). Use UDOT certified laboratories and personnel. Submit verification of lab and personnel with mix designs.

## 1.16 Inspection and Testing

### 1.16.010 General

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, inspections and testing work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 1 (GENERAL REQUIREMENTS)
  2. APWA 00 72 00 Part 13 (Tests and Inspections; Correction, Removal or Acceptance of Defective Work)
  3. APWA 00 72 00 14.7 (Final Inspection)
  4. APWA 01 43 00 (Quality Assurance)
  5. APWA 01 45 00 (Quality Control)
  6. APWA 01 66 00 (Product Storage and Protection).
  7. APWA 03 20 00 (Concrete Testing)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to inspection and testing:
1. Chapter 1.16 (Inspection and Testing)
  2. Article 1.04.030 D (Pre-Construction Conference)
- C. INSPECTION FEE. Inspection fees established by the City Council in the annual budget or by resolution shall be charged for Improvements and Development. Inspection fees shall include a charge for inspection callbacks.
- D. INSPECTIONS. All inspections will be done by appointment only with a minimum 24-hour notice. If no inspection for a Minor Land Disturbance Permit is called for and performed 60 days after permit issuance, Contractor's Deposit will be forfeited. Items buried without City approval will be re-excavated by the permittee at no additional cost to the City.

Inspections and testing shall be conducted according to APWA 00 72 00 Part 13 (Tests and Inspections; Correction, Removal or Acceptance of Defective Work) and in accordance with City standards.

1. Notification of Needed Inspections:
  - a. Inspection performed during regular working hours requires at least twenty-four (24) hours' notification.

- b. Inspections needed after 4:00 p.m., require notification be given ~~by 1:00 p.m. on~~ the day of before the inspection and will be accommodated if personnel are available.
- c. Inspections needed on the weekend require that notification be given by 1:00 p.m. on the preceding ~~Friday~~ Thursday and will be accommodated if personnel are available.
- E. PRE-CONSTRUCTION CONFERENCE. The Contractor must schedule a Pre-Construction Conference according to Article 1.04.030 D (Pre-Construction Conference) before any inspection work.
- F. FEDERAL, STATE, AND LOCAL INSPECTING AGENCIES. The site of construction is to be open at all reasonable times and places for periodic observation by accredited representatives of the Federal, State, and local agencies who have regulatory or supervisory authority over any part of the work proposed or regulated thereto.
- G. DEFECTIVE WORK AND PROTECTION OF WORK AND MATERIALS. Contractor shall protect any construction work against damage from weather vandalism or any other hazard. See APWA 00 72 00 Part 13 (Tests and Inspections; Correction, Removal or Acceptance of Defective Work). See APWA 01 66 00 (Product Storage and Protection).
- H. TESTING AND SAMPLING. The City Engineer or City Inspector may require that testing or sampling be performed in his or her 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 Pre-Construction Conference, or when construction drawings are released by the City for construction, as applicable.~~

~~The Contractor will perform quality control inspection, sampling and testing in accordance with the APWA Manual of Standard Specifications and City standards. Quality control testing will consist of all testing identified for acceptance within the individual specifications. At minimum, this will include the following:~~

~~Material quantity, by weight or volume.~~

~~Aggregate gradations for all fill, asphalt or concrete materials.~~

~~Thickness testing for all materials with a specified thickness.~~

~~Density testing for all materials with a specified density.~~

~~Mix properties for asphalt, including binder content, air voids at design compaction, voids in the mineral aggregate (VMA) at design compaction.~~

~~Mix properties for asphalt, including air content, slump, and 28 day compressive strengths.~~

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

Name of Project

Name of Developer/Contractor

Project Street Address

Appropriate Test Name

Date of Sampling

Sample Number (if more than one sample per day)

Name of Technician

Location

- I. TESTING AGENCY. All materials testing, whether in a laboratory or in the field, shall be conducted by a testing agency approved by the City Engineer.
- J. WORK WITHOUT REQUIRED INSPECTION AND TESTING. Failure to provide proper notification or to perform work without inspection or testing will result in rejected material. Rejected material will be subject to additional verification requirements including, but not limited to, post-placement sampling and laboratory testing for material conformance, in-place testing for asphalt and base thickness and density, in-place testing for concrete strength and air content. All post-placement testing for uninspected work will be at no additional cost to the City.

Additionally, 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 uninspected work. ~~The City shall have the option of retaining part or all of the bond for up to 10 years after installation of improvements constructed without required inspection or testing~~The City Engineer may require specialized testing to verify acceptance. The City Engineer may also accept the work at a reduced price.

- K. 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 APWA or City 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.

- L. WEEKLY PROGRESS MEETINGS. All active construction projects in the City will have a weekly progress meeting at the City inspector. Progress meetings may be held on site.
- M. ROAD CONSTRUCTION. Road construction may not commence until all underground utilities are installed and pass all the inspections and tests required by these standards.
- N. ASPHALT PAVING ACCEPTANCE DETAILS. Unless otherwise stated, the City will determine acceptance of asphalt paving, including underlying base layers, based on a combination of contractor quality control testing, City quality assurance testing, and asphalt plant production records.
- O. 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. Final Inspection. The Contractor must schedule with the City Final Inspection according to APWA 00 72 00 14.7 (Final Inspection).
  - 2. One Year Warranty Inspection. One year after the Contractor or Developer passes the end of construction inspection, he or she must schedule a one year warranty inspection. This inspection must be conducted after the one year asphalt preservation coat is applied 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. 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 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 may have such repairs made, and the cost of such repairs shall be paid by the Developer before bond release.

## **1.16.020 Drinking Water**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, drinking water work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 33 (UTILITIES)
  2. APWA 01 45 00 (Quality Control)
  3. APWA 33 08 00 (Commissioning of Water Utilities)
  4. APWA 33 08 00 3.9 (Tracer Wire Continuity Test)
  5. APWA 33 11 00 (Water Distribution and Transmission)
  6. APWA 33 13 00 (Disinfection)
- B. GENERAL. Inspections and tests shall be conducted according to APWA 01 45 00 (Quality Control) and shall ensure drinking water installations meet the requirements of APWA DIVISION 33 (UTILITIES) and related APWA sections.
- C. MAIN LINE INSPECTION. The City must inspect all drinking water main line installations on an ongoing basis. Inspection notification must be given before any construction of main line may begin. All fittings, crosses, tees, bends, valves, bell insertions, and hydrants must be inspected by the City before they are backfilled.
- D. TRACER WIRE CONTINUITY TEST. Entire length of tracer wire shall be tested and approved prior to paving as required by APWA 33 08 00 3.9 (Tracer Wire Continuity Test).
- E. DRINKING WATER SERVICE INSPECTION. The City must inspect all drinking water services before service trenches are backfilled. The City must be able to survey services at the main during the inspection. Use stainless steel stiffeners installed to manufacturer's specifications in all small diameter polyethylene pipe, City must be able to verify that stainless steel stiffeners were installed.
- F. HIGH CHLORINE TEST. High chlorine tests shall meet the requirements and specifications of APWA 33 13 00 (Disinfection). The City must conduct a high chlorine test at every hydrant on a new drinking 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.
- G. PRESSURE TEST. Pressure test must be conducted after the successful completion of the bacteria test. The Contractor must pressure/leakage test all drinking water systems, system extensions and service laterals to the setter in the presence of the City Engineer or have tests documented and submitted by a certified testing company approved by the City. Test shall be performed in accordance with APWA 33 11 00 (Water Distribution and Transmission) requirements for leakage and exfiltration.

- H. LEAKAGE TEST. Leakage tests shall be conducted concurrently with the pressure tests and according to APWA 33 08 00 (Commissioning of Water Utilities). 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:

$$Q \equiv \frac{LD * \sqrt{P}}{133,200}$$

In which Q is the allowable leakage, in gallons per hour; L is the length of pipeline tested in feet; P is the average test pressure, in pounds per square inch (gage) and D is the nominal diameter of the pipe in inches.

Provide 20025 psi test pressure for 2 hours unless specified otherwise. If any test of pipe laid discloses leakage greater than specified, the Contractor shall, at their 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.

- I. BACTERIA TEST. Pipes shall be cleaned thoroughly before disinfection. If flushing alone is insufficient to remove debris or contamination (as determined by the City Engineer), mechanical cleaning will be required, followed by swabbing with a 1% hypochlorite disinfection solution. Only after proper cleaning should disinfection commence.

Bacteria tests shall meet the requirements and specifications of APWA 33 13 00 (Disinfection). Tests may only be scheduled at certain regular times set by the City. Only City staff may open and close valves and fire hydrants. The Contractor shall be present and when City opens all hydrants or other locations to be tested from. 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 be re-disinfected and re-tested at all sample points. If any samples come back marked "presence", which means coli form 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.

Drinking water services on main replacements will not be installed until bacteria sample results have been approved by the City Engineer. All testing lab fees shall be paid by the Contractor. Services on new subdivisions will be tested at the same time as the main line.

## 1.16.030 Earthwork

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, earthwork shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 31 (EARTH WORK)
  2. APWA DIVISION 32 (EXTERIOR IMPROVEMENTS)
  3. APWA DIVISION 33 (UTILITIES)
  4. APWA 01 45 00 (Quality Control)
  5. APWA 32 05 10 (Backfilling Roadways) Section 3.9
- B. GENERAL. The inspections and tests in this section are required for all sanitary sewerutility construction in the City boundaries and on all construction relating to the City sanitary sewerutility systems outside the city boundaries. Inspections and tests shall be conducted according to APWA 01 45 00 (Quality Control) and shall ensure earthwork meets the requirements of APWA DIVISION 31 (EARTH WORK), DIVISION 32 (EXTERIOR IMPROVEMENTS) and related APWA sections.
- C. COMPACTION AND MOISTURE CONTENT TESTS. The City will require testing on all sub-grade and fill material for compaction and moisture content by an appropriately licensed and certified testing agency. Test locations shall be determined by the City.
1. Trenches. Tests will generally be taken 1 per 200 lineal feet of trench per 8-inch lift.
  2. Streets. Tests will generally be taken 3 per 200 lineal feet 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.
- D. REDHEAD INSPECTION. The project engineer must provide redheads for all grade work when brought to within 3 inches of finish grade. The City must inspect and accept finished grading to the engineered redheads.
- E. PROOF ROLL INSPECTION. Proof roll inspections shall be conducted according to APWA 32 05 10 (Backfilling Roadways) Section 3.9.
- F. THICKNESS TEST. Material thickness tests will be conducted by the City when the City Engineer considers it necessary. The total depth shall be reasonably close to that shown in 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.

### **1.16.040 Landscaping and Irrigation Sprinkler Systems**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, landscaping and irrigation sprinkler systems work shall meet the requirements and specifications of the following APWA sections and related Divisions:
  - 1. APWA 01 45 00 (Quality Control)
- B. GENERAL. The inspections and tests in this section are required for all landscaping and irrigation sprinkler work that will be owned or maintained by the City or a Home Owners Association unless otherwise specified by the Construction and Design Standards or otherwise required by the City Engineer. Inspections and tests shall be conducted according to APWA 01 45 00 (Quality Control) and shall ensure work meets requirements of plans and City standards.

All work shall be inspected by the City Assistant Director Parks and Open Spaces or designee. All inspections shall be done by appointment only with a minimum 24-hour notice. Items buried without City approval shall be re-excavated by the permittee at no additional cost to the City.
- C. 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 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. See Article 1.16.020 Q (Acceptance of Improvements). Any plant found to be unacceptable at any of these inspections shall be immediately removed and replaced.
- D. FLUSHING INSPECTION. When the pipelines 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. This shall be done in the presence of the City.
- E. 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 may be surveyed by the City. This inspection will not be conducted for landscaping that is not planned to be owned by the City.
- F. 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 takeover of the system by the City Maintenance Personnel. This inspection will not be conducted for landscaping that is not planned to be owned by the City.

- G. SPRING SPRINKLER ENERGIZING TEST. The Contractor with the 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. This inspection will not be conducted for landscaping that is not planned to be owned by the City.
- H. FINAL INSPECTION. Landscaping shall be completed prior to the final inspection and acceptance of warranty with the appropriate phase of the development. 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 record drawings, manufacturer's technical product maintenance data, and installation instructions for irrigation sprinkler system materials and products to the City before final inspection.
- I. ONE YEAR WARRANTY INSPECTION. At the end of the one (1) year warranty period, all landscaping and irrigation sprinkler systems must then be inspected and tested by the Contractor with the City present. This inspection will not be conducted for landscaping that is not planned to be owned by the City.
  - 1. 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.
  - 2. 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 and replace with approved plants and materials.

### **1.16.050 Portland Cement Concrete Work**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, Portland cement concrete work shall meet the requirements and specifications of the following APWA sections and related Divisions:
  - 1. APWA DIVISION 3 (CONCRETE)

2. APWA 01 45 00 (Quality Control)
3. APWA 03 30 05 (Concrete Testing)
4. APWA 03 39 00 (Concrete Curing)

- B. GENERAL. The inspections and tests in this section are required for all concrete work that will be owned or maintained by the City or a Home Owners Association unless otherwise specified by the Construction and Design Standards or otherwise required by the City Engineer. Inspections and tests shall be conducted according to APWA 01 45 00 (Quality Control) and shall ensure Portland cement concrete work meets the requirements of APWA DIVISION 3 (CONCRETE), and related APWA and City standards.
- C. COMPRESSION, SLUMP, TEMPERATURE AND AIR ENTRAINMENT TEST. Test concrete work according to APWA 03 30 05 (Concrete Testing). The City Engineer may allow the following pay factors for sub-standard Portland cement concrete strength:

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 500
Replace	More than 500

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.
- E. GUTTER DRAINAGE INSPECTION. The City shall inspect all gutters for drainage prior to paving. 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 substandard work. The City Engineer may allow the following pay factors for substandard 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. Curing shall be completed according to APWA 03 39 00 (Concrete Curing).

### 1.16.060 Sanitary Sewer

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, sanitary sewer work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 33 (UTILITIES)
  2. APWA 01 45 00 (Quality Control)
  3. APWA 33 08 00 (Commissioning of Water Utilities)
  4. APWA 33 08 00 3.6 (Exfiltration Test)
  5. APWA 33 08 00 3.7 (Distortion Test)
- B. GENERAL. Inspections and tests shall be conducted according to APWA 01 45 00 (Quality Control), and APWA 33 08 00 (Commissioning of Water Utilities) and shall ensure sanitary sewer installations meet the requirements of APWA DIVISION 33 (UTILITIES) and related APWA sections.
- C. 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.

D. 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.

E. AIR PRESSURE TEST. Contractor shall conduct a low pressure air test according to APWA 33 08 00 3.6 (Exfiltration Test) by the following method under the direction of the City Engineer with equipment equal to Cherne Industrial, Inc., or provide proof that test was conducted by a certified testing company. Sanitary sewer pipes with inside diameters of 30 inches or larger shall be leak tested according to manufacturer's specifications.

1. All wyes, tees, or ends of lateral stubs shall be suitably capped and braced to withstand the internal test pressures. Caps shall be easily removable for future lateral connections or extensions. After a manhole to manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs.
2. 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.
3. 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 or 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.
4. 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 the City before laying the street surface.

- F. VIDEO INSPECTION. Contractor shall clean all sanitary sewer lines prior to video inspection. The ~~City-Contractor~~ shall video inspect all sanitary sewer main lines prior to paving with a NASSCO certified 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. Wastewater and debris shall not be permitted to enter the City sanitary sewer system but shall be removed at the lowest manhole of the extension.

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

- G. DISTORTION TEST (MANDREL TEST). Contractor shall perform a distortion test according to APWA 33 08 00 3.7 (Distortion Test) on all sewer lines after video inspection. Distortion tests must be conducted in the presence of the City Engineer or be documented and submitted by a certified testing company approved by the City. The Mandrel must be pulled by hand or air. A pipe distortion test shall be required of the Developer/Contractor after backfilling and compaction of the trench.

### **1.16.070 Storm, Land, and Groundwater Drains**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, storm, land, and groundwater drains work shall meet the requirements and specifications of the following APWA sections and related Divisions:

1. APWA DIVISION 33 (UTILITIES)
2. APWA 01 45 00 (Quality Control)

- B. GENERAL. Inspections and tests shall be conducted according to APWA 01 45 00 (Quality Control) and shall ensure storm water installations meet the requirements of APWA DIVISION 33 (UTILITIES) and related APWA sections.
- C. 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. All groundwater drain designs shall be pre-approved by the City Engineer.

- H. VIDEO INSPECTION. Contractor shall clean all sanitary sewer lines prior to video inspection. The City-Contractor shall video inspect all sanitary sewer main lines prior to paving with a NASSCO certified 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 but shall be removed at the lowest manhole or box of the extension.

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

## **1.16.080 Streets**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, streets work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 31 (EARTH WORK)
  2. APWA DIVISION 32 (EXTERIOR IMPROVEMENTS)
  3. APWA 01 45 00 (Quality Control)
  4. APWA 32 12 16 (Plant-Mix Asphalt Paving)
- B. GENERAL. Inspections and tests shall be conducted according to APWA 01 45 00 (Quality Control) and shall ensure street installations meet the requirements of APWA DIVISIONS 31 (EARTH WORK) and 32 (EXTERIOR IMPROVEMENTS) and related APWA sections.
- C. PRE-PAVING MEETING. The paving contractor must schedule a pre-paving meeting with the City's engineering secretary at least 7 days before any asphalt paving on a new development or city project may begin. Paving may not begin until after the pre-paving meeting and/or written notice-to-proceed is given by the City.

The paving contractor, developer, project engineer, supplier and testing firm must be present at the Pre-Paving Meeting. Topics for the meeting will include:

1. Contact Information and Project Responsibility
2. Submittal Review
3. Placement Schedule
4. Placement Tonnages

5. Density testing and inspection details, including field targets, roller pattern and whether cores will be used for thickness and density acceptance.
6. Mix sampling and testing details, including sampling locations, procedures, testing facility and result turnaround time.
7. Inclement weather plans.

Workmanship issues, including tack coverage, limitations on raking and smoothness requirements.

D. ASPHALT PAVEMENT MATERIAL TESTS. Material tests will be conducted by the Contractor when the City Engineer considers it necessary.

E. COMPACTION TESTS. The Contractor shall have a certified testing company test all bituminous pavement for compaction and moisture content. Test locations may 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 32 12 16 (Plant-Mix Asphalt Paving) shall apply. Test results shall be sent to the City by the testing company within 3 business days of the tests.

F. GRADING INSPECTION. The subgrade, 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 redheads and edge of pavement exceeds 25 feet additional redheads shall be installed halfway 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.

G. THICKNESS TEST. Material depth tests will be conducted by the Contractor with the City present. City Engineer may waive this requirement if he or she considers it unnecessary. 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 substandard 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

Replace	More than 0.5
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H. PROFILE TOLERANCE INSPECTION. Profile tolerance inspections may be required by the City any time within a year of paving. Collector and arterial streets shall meet the requirements of APWA 32 12 16 (Plant-Mix Asphalt Paving). For local streets profiling, the maximum vertical distance from the pavement surface to a straight edge 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.

I. ASPHALT CONCRETE TEMPERATURE TEST. This test shall be conducted on the first three loads of asphalt concrete installed, and on one in four of all future loads as required by the City. Testing shall be conducted according to the requirements and specifications of APWA 32 12 16 (Plant-Mix Asphalt Concrete Paving). Temperature gauge shall be allowed to stabilize for 1 minute before taking reading if using probe type. If using infrared “gun” type, reading shall consist of an average of a minimum of 3 readings, where reading is taken immediately after displacing a minimum of 2 inches of material from the surface being tested and the “gun” is within 18” of the surface being tested.

J. ASPHALT PAVING LIMITATIONS. Pave according to Section 02741 Part 3.8 of the 2012 Standard Specifications for Road and Bridge Construction published by the Utah Department of Transportation (UDOT) unless otherwise approved by the City Engineer. Place HMA between April 15 and October 15, and when the air temperature in the shade and the roadway surface temperature are above 50 degrees Fahrenheit. In the event the City Engineer approves paving between October 15<sup>th</sup> and April 15<sup>th</sup>, an overlay in the spring will be required as outlined in the table below. Do not place HMA on frozen base or during adverse climatic conditions such as precipitation or when roadway surface is icy or wet. Use a release agent that does not dissolve asphalt and is acceptable to the City Engineer for all equipment and hand tools used to mix, haul, and place the HMA.

Pavement Depth After October 15TH / Before April 15TH

Street	Typical	Base Asphalt	Spring Overlay	Total Asphalt
Local	3"	2.5"	2"	4.5"
Collector	4"	3"	2"	5"
Arterial	5"	4"	2"	6"
Parking lot & Driveway	3"	2.5"	2"	4.5"
Commercial Local	4"	3"	2"	5"

The City Engineer may, at his/her discretion, waive this date restriction requirement if outside temperatures are at least 60°F and the base material condition is approved.

## 1.20 Earthwork and Trenches

### 1.20.010 General

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, earthwork and trenches work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 31 (EARTH WORK)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to earthwork and trenches:
1. Chapter 1.08 (Improvement and Design Requirements)
  2. Chapter 1.12 (Inspection and Testing)
  3. Chapter 1.16 (Contractor Requirements)

### 1.20.020 Excavation

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, excavation work shall meet the requirements and specifications of the following APWA sections and related sections:
1. APWA 31 11 00 (Site Clearing)
  2. APWA 31 23 16 (Excavation)
  3. APWA 31 23 17 (Rock Removal)
  4. APWA 31 25 00 (Erosion and Sedimentation Control)
  5. APWA 31 41 00 (Shoring)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to excavation.
1. Article 1.20.030 E (Cement Treated Fill)
  2. Drawing 1 (Standard Street Intersection and Utility Locations)
  3. Drawing 2 (Standard Utility Locations in Knuckle)
  4. Drawing 3 (Standard Street Cross Section and Utility Locations)
  5. Drawing 17 (Typical Trench Section)
  6. Drawing 22 (Fire Hydrant and Water Valve Detail)

7. Drawing 23 (Thrust Block Details)
  8. Drawing 25 (Large Meter Assembly)
  9. Drawing 26 (Backflow Prevention Assembly)
- C. SAFETY. All construction shall be done in accordance with the provisions of the Utah State Industrial Commission, OSHA regulations and APWA 31 23 16 (Excavation). No trenches deeper than 4 feet shall be left open at any time 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.

Any injury or damage resulting from lack of adequate bracing and shoring shall be the responsibility of the Contractor and the Contractor shall, at his/her own expense, affect 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 until the trench is deemed to be safe by the City Engineer.

- D. 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 33 05 25 (Pavement Restoration) and the following conditions.
1. Base. Only engineered fill as outlined in this chapter 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 Engineer, see Article 1.20.030 E (Cement Treated Fill).
  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 roto-milled edge shall be acceptable as a cut.
  4. Time Limitation. All road cuts shall be repaired within 2 working days of excavation unless otherwise authorized by the City Engineer.

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 32 12 16.19 (Cold-Mix Asphalt Paving). These trenches shall be 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.
  6. Adjust Incidental Structures to Grade. Adjust incidental structures to grade according to APWA 33 05 14 (Utility Grade Adjustment).
- E. 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. If 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 meet the requirements and specifications of Chapter 39.65. (Portland Cement Concrete Work) and APWA 33 05 25 (Pavement Restoration).
- F. ROCK EXCAVATIONS AND BLASTING. Rock excavations shall meet the requirements and specifications of APWA 31 23 17 (Rock Removal). Blasting will not be allowed except by permission from the City Engineer and shall meet the requirements and specifications of APWA 02 41 13 (Selective Site Demolition). The Contractor shall comply with all laws, regulations, ordinances, and safety codes relative to the handling, storage, and use of explosives. The Contractor shall be fully responsible for all damage to life and property attributable to its blasting operations. Excessive blasting or overshooting will not be permitted. The Contractor shall remove any material outside the authorized cross section, which may be shattered or loosened by blasting.
- G. SITE CLEARING AND THE DISPOSAL OF EXCESS MATERIALS. Site clearing shall be conducted according to APWA 31 11 00 (Site Clearing). 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 10.06.040 of the City Municipal Code.

All demolition work shall meet the requirements and specifications of APWA 02 41 13 (Selective Site Demolition), APWA 02 41 14 (Pavement Removal) and APWA 02 41 15 (Pavement Pulverizing).

Removal and disposal of Asbestos Cement Pipe shall be per the Utah Department of Environmental Quality (DEQ) Division of Air Quality (DAQ) guidance document, How to Handle Non-friable Asbestos Cement Pipe, A

Guide for Meeting Utah Department of Environmental Quality/Division of Air Quality Rules (“Guidance”).

- H. BARRICADES. Barriers shall be placed at each end of all excavations, and at such places as may be necessary along excavations, to warn all pedestrians and vehicular traffic of such excavations. Lights shall also be placed along excavations from one hour before sunset each day to one hour after sunrise of the next day, until such excavations are entirely refilled, compacted, and surfaced or final graded. All excavations shall be barricaded in such a manner as to prevent persons from walking into, falling into, or otherwise entering those excavations.
- I. CONTROL OF GROUNDWATER. All trenches shall be kept free from water during excavation, fine grading, pipe laying and jointing, and pipe embedment operations. Where the trench bottom is mucky or otherwise unstable because of the presence of groundwater, and in all cases where the static groundwater is above the bottom of any trench or bell hole excavation, such groundwater shall be lowered to the extent necessary to keep the trench free from water and the trench bottom stable when the work within the trench is in progress. The discharge from excavation dewatering shall be conducted to natural drainage channels, gutters, drains, or storm sewers. No sanitary sewer shall be used for disposal of trench water. Surface water shall be prevented from entering trenches. [A state dewatering permit is required if the groundwater is pumped into the storm drain or leaves the site.](#)
- J. TRENCH CROSSINGS AND EASEMENTS. At road crossings or where existing driveways occur on a road, the Contractor shall make provisions for trench crossings either by means of backfill, tunnels, or temporary bridges.

Any disturbance to property caused by the Contractor’s activity within easements shall be restored to the satisfaction of the owner of the property. If necessary, shrubs, fences, or other objects shall be removed carefully. If work must occur on a lawn, the lawn shall be cut to a width of two feet (2’) wider than the intended work area (one foot (1’) on each side). The lawn sod shall be stacked separately from and shall not be mixed with other excavated material.

After the sod is removed, if excavation is necessary, the topsoil shall be removed to a depth of twelve inches (12”), or the actual depth of the topsoil, whichever is less. The topsoil shall be stored separately from and shall not be mixed with other excavated material.

Following completion of the backfilling and the compaction of the trench, the Contractor shall replace topsoil, lawn sod, shrubs, fences, and other items that may have been removed from within the easement area and shall clean up and remove any rocks, dirt or any other debris that remain from the construction work. The Contractor shall obtain a release from the property owner stating that the repairs have been made to the satisfaction of the Owner. A copy of said release shall be delivered to the City Engineer.

K. RESTORATION OF CONSTRUCTION SITE. During the progress of the Work, the Contractor shall clean up all construction debris, excess excavation, and excess materials, and shall restore all fences, irrigation structures, ditches, culverts, and similar items. The Contractor shall stockpile the excavated trench material so as to do the least damage to adjacent grassed areas, or fences, regardless of whether these are on private property or public rights-of-way. All excavated materials shall be removed from grassed and planted areas and these surfaces shall be left in a conditions equivalent to their original surface and free from all rocks, gravel, boulders, or other foreign materials.

### **1.20.030 Subgrade**

A. APWA. Unless otherwise specified in the City Construction and Design Standards, subgrade work shall meet the requirements and specifications of the following APWA sections and related sections:

1. APWA 31 23 16 (Excavation)
2. APWA 31 23 17 (Rock Removal)
3. APWA 31 23 26 (Compaction)
4. APWA 31 25 00 (Erosion and Sedimentation Control)

B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to subgrade:

1. Drawing 17 (Typical Trench Section)

C. PREPARATION. All subgrade shall be shaped and compacted in reasonably close conformity with lines, grades and typical cross section as established by the City Engineer. All grading shall be based on an engineered survey, accepted by the 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 subgrade layer.

D. 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. Trenches excavated within 10 feet of the lip of gutter shall remove the pavement to the gutter and replace it as part of the trench asphalt pavement repair unless otherwise approved by the City Engineer.

- E. 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 fill as approved by the City to bridge the area.
- F. 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.
- G. 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. 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.
- H. SOILS ANALYSIS. The City Engineer may require a soil analysis and design for projects in any area.

### **1.20.040 Fill Material**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, fill material work shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 31 05 13 (Common Fill)
  - 2. APWA 31 05 13 2.3 (Granular Backfill Borrow)
  - 3. APWA 31 05 13 2.7 (Sand)APWA 31 05 13 2.8 (Gravel)
  - 4. APWA 31 05 15 (Cement Treated Fill)
  - 5. APWA 31 05 15 2.1 (Cement Treated Flowable Fill)
  - 6. APWA 31 05 15 2.3 (Lime Treated Fill)
  - 7. APWA 31 05 15 2.4 (Asphalt Treated Fill)
  - 8. APWA 31 23 26 (Compaction)
  - 9. APWA 31 25 00 (Erosion and Sedimentation Control)
  - 10. APWA 32 11 23 (Aggregate Base Courses)

11. APWA 32 11 23 2.1 (Untreated Base Courses)
  12. [APWA 32 11 24 \(Pulverized Pavement Base Course\)](#)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to fill material:
1. Section 1.24.060 (Installation and Compaction of Earth Materials)
  2. Drawing 1 (Standard Street Intersection and Utility Locations)
  3. Drawing 2 (Standard Utility Locations in Knuckle)
  4. Drawing 3 (Standard Street Intersection and Utility Locations)
  5. Drawing 17 (Typical Trench Section)
  6. Chapter 1.20 (Earthwork and Trenches)
- C. GENERAL. Only bedding material, engineered fill, untreated base course, or cement treated fill as specified in this section may be used as fill material under and within a foot of streets, future street areas, driveways, and concrete unless otherwise specified.
- In other areas native excavated material may normally be used unless such material cannot be properly compacted according to specifications in this chapter, 1.20 (Earthwork and Trenches). 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.
- D. CONTRACTOR RESPONSIBILITY. The Contractor will be responsible for ensuring backfill and compaction are properly and adequately done according to APWA 31 23 26 (Compaction). Settlement of trenches within a period of two- (2) years after final acceptance of the project shall be considered incontrovertible evidence of inadequate compaction, and the Contractor shall be responsible for correcting the condition in accordance with the provisions of these Specifications. This includes the replacement of sidewalk, curb and gutter, and other surface improvements.
- E. BEDDING MATERIAL. Use APWA 31 05 13 2.8 (Gravel) No. ~~54~~ Sewer Rock for gravity pipe bedding material. Use APWA 31 05 13 2.7 (Sand) sand as a bedding material for pressure pipe and conduit. Bedding sand must compact sufficiently to support the pipe.
- F. ENGINEERED FILL. Use APWA 31 05 13 2.3 (Granular Backfill Borrow) granular backfill borrow for Engineered Fill.

- G. UNTREATED BASE COURSE. Use APWA 32 11 23 2.1 (Untreated Base Courses) Aggregate Class A for untreated base course. The use of slag as an untreated base course shall not be permitted.
- H. CEMENT TREATED FILL. Cement treated fill may only be used when approved by the City Engineer and shall meet the requirements and specifications of APWA 31 05 15 (Cement Treated Fill). Cement treated fill does not include treated/stabilized base materials that are part of the pavement design. Cement treated fill includes following fill materials:
  - 1. Controlled Low-Strength Material (CLSM) (Flowable Fill) APWA 31 05 15 2.1 (Cement Treated Flowable Fill)
  - 2. Lime Treated Fill, APWA 31 05 15 2.3 (Lime Treated Fill)
  - 3. Asphalt Treated Fill, APWA 31 05 15 2.4 (Asphalt Treated Fill)
- I. DEFECTIVE FILL. Fill not conforming to the requirements of this specification shall be reworked to the requirements or removed and replaced with acceptable fill.

### **1.20.050 Slopes, Embankments, Fills, and Open Channels**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, slopes, embankments, fills, and open channels work shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 31 25 00 (Erosion and Sedimentation Control)
  - 2. APWA 31 36 00 (Gabions)
  - 3. APWA 31 37 00 (Riprap or Rock Lining)
  - 4. APWA 31 41 00 (Shoring)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to slopes, embankments, fills, and open channels:
  - 1. Section 1.04.050 (Erosion and Sedimentation Control)
- C. 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.

- D. 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 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.

- E. 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.
- F. 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. 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.
- G. SHORING. Conduct work according to APWA 31 41 00 (Shoring). Excavations shall be shored as required to support the walls of the excavations. These measures shall be taken to protect the workers, the work in progress, existing utilities, structures, and improvements, from damage due to sliding and settling of trench walls.

The Contractor shall be fully responsible for the adequacy of methods and materials used in trench sheeting, bracing, shoring, and other systems provided to protect workers. Injury to or death of workers resulting from inadequate trench safety measures shall be the full and complete responsibility of the Contractor. All damages resulting from lack shoring shall be the responsibility of the Contractor, and the Contractor shall affect all necessary repairs or reconstruction at its own expense resulting from such damage.

Shoring that does not extend below the centerline of the pipe may be removed at the discretion and responsibility of the Contractor after the pipe embedment has been placed and compacted to a level twelve (12) inches above the top of the pipe. Following removal of the sheeting or bracing, the trench shall be immediately backfilled and compacted or consolidated.

- H. SEDIMENT AND EROSION CONTROL. See Section 1.04.050 (Erosion and Sedimentation Control).
- I. GABIONS. Gabions shall meet the requirements and specifications of APWA 31 36 00 (Gabions)

- J. RIP RAP AND ROCK LINING. Rip rap and rock lining work shall meet the requirements and specifications of APWA 31 37 00 (Riprap or Rock Lining).

## **1.20.060 Installation and Compaction of Earth Materials**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, installation and compaction of earth materials work shall meet the requirements and specifications of the following APWA sections and related sections:
1. APWA 33 05 20 (Backfilling Trenches)
  2. APWA 31 23 23 (Backfilling Structures)
  3. APWA 32 05 10 (Backfilling Roadways)
  4. APWA 31 23 26 (Compaction)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to installation and compaction of earth materials:
1. Article 1.20.030 D (Fill Material)
  2. Section 1.20.040 (Fill Material)
  3. Drawing 17 (Typical Trench Section)
- C. GENERAL. Fill material outside of pavement areas, as defined by APWA 32 05 10 (Backfilling Roadways), and more than 24 inches from any utility box shall be compacted to not less than 90% of the maximum dry density.
- D. 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. Any soft and yielding area in the fill which do not compact to the specified density shall be removed and replaced with engineered fill installed and compacted to City standards or as directed by a Geotechnical Engineer.
- 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 according to APWA 32 05 20 (Backfilling Trenches) and City Standard Drawing 17 (Typical Trench Section)
- F. PIPE ZONE. The pipe zone includes the full width of trench from 3 inches below the pipe to 12 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 12 inches above the pipe.

The pipe zone for all pipes shall be filled with compacted bedding material as specified in Article 1.20.030 D (Fill 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.

### **1.20.070 Geotextiles, Geogrids, and Geocomposites**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, geotextiles, geogrids, and geocomposites work shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 31 05 19 (Geotextiles)
  - 2. APWA 31 05 21 (Geogrids and Geocomposites)
  
- B. GENERAL. All geotextile work shall meet the requirements and specifications of APWA 31 05 19 (Geotextiles). Geogrid and geocomposite work shall meet the requirements and specifications of APWA 31 05 21 (Geogrids/Geocomposites). Geotextile, geogrid and geocomposite work includes but is not limited to the following geotextile applications:
  - 1. Stabilization-Separation
  - 2. Silt Fence
  - 3. Erosion Control
  - 4. Roadway Pavements
  - 5. Drainage
  - 6. Weed Barrier
  - 7. Granular Base Reinforcement
  - 8. Asphalt Concrete Reinforcement
  - 9. Soil Reinforcement

### **1.20.080 Subsurface Pipe Installation**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, subsurface pipe installation work shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 33 05 23.35 (Trenchless Utility Installation)
  - 2. APWA 33 05 23.40 (Cured-in-Place Pipe)

- B. GENERAL. Pipes, conduits, or casings, six (6) inches in diameter or less, may be bored, jacked, augured or jetted under sidewalk, curb, gutter if authorized by the City Engineer. The resulting hole diameter shall not exceed 1 inch plus the outside diameter of the pipe or sleeve installed.
- C. BORING OR JACKING. Boring or jacking work shall meet the requirements and specifications of APWA 33 05 23.35 (Trenchless Utility Installation).
- D. TUNNELING. Where sidewalk, curb, and gutter exists, excavation may be made by tunneling provided the following requirements are met:
1. Excavation. Excavation shall be vertical and as near to the curb or sidewalk as possible;
  2. Tunnel Length. The length of the tunnel shall not exceed the width of the sidewalk, curb, and gutter;
  3. Separate Sidewalk and Curb. Where a separate sidewalk and curb exist, an excavation shall be made between the sidewalk and the curb;
  4. Undisturbed Earth. At least three feet of undisturbed earth shall be left under the sidewalk or curb; and
  5. Tunnel Backfill. 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.

## 1.24 Drinking Water

### 1.24.010 General

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, drinking water work shall meet the requirements and specifications of the following APWA sections and related sections:
1. APWA DIVISION 33 (UTILITIES)
  2. APWA 33 08 00 (Commissioning of Water Utilities)
  3. APWA 33 11 00 (Water Distribution and Transmission)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to drinking water:
1. Chapter 1.08 (Improvement and Design Requirements)
  2. Chapter 1.12 (Inspection and Testing)
  3. Chapter 1.16 (Contractor Requirements)
  4. Chapter 1.20 (Earthwork and Trenches)
  5. Drawing 1 (Standard Street Intersection and Utility Locations)
  6. Drawing 2 (Standard Utility Locations in Knuckle)
  7. Drawing 3 (Standard Street Cross Sections and Utility Locations)
  8. Drawing 22 (Fire Hydrant and Water Valve Detail)
  9. Drawing 23 (Thrust Block Details)
  10. Drawing 24 (Typical Culinary Water Connection)
  11. Drawing 25 (Large Meter Assembly)
  12. Drawing 26 (Backflow Prevention Assembly)
- C. LOCATION. Drinking water mains shall be located on either the north or east sides of a street according to the following Standard Drawings unless otherwise authorized by the City Engineer. Drinking water distribution and transmission lines shall not be installed within 10' of any footing, foundation or pad of a structure.
- D. CROSS CONNECTION. There shall be no physical cross connections between the drinking water system and pipe, pumps, hydrants, or tanks that may be contaminated from any source, including pressurized irrigation. See Article

1.24.030 I (Backflow Devices) for service connections to sprinkler systems or other hazardous connection points.

Valve boxes, meter boxes, and other vaults or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to a storm drain or sanitary sewer, and shall be provided with a drain to daylight if possible. Where this is not possible gravel sumps may be used if the site is not subject to flooding and conditions will ensure adequate drainage. Sump pumps may also be considered if a drain to daylight or sump is not feasible.

- E. IDENTIFICATION TAPE. ~~All drinking water mains shall be installed with identification tape that meets the requirements and specifications of APWA 33 05 20 (Backfilling Trenches).~~ Tape shall be buried 12 inches below grade.
- F. TRACER WIRE. ~~All pipe shall include a 12-gauge solid THHN tracer wire installed according to NESC standards. The tracer wire shall be installed in the pipeline trench approximately 6 inches above the top of pipe. The tracer wire shall be brought up in the valve boxes to permit connecting to when doing line location.~~ All water line pipes shall include a 14 AWG solid direct bury red or blue wire. Tracer wire shall be installed and secured to the top of all main line pipe and service laterals. Use poly tape to secure wire at all joints and 5-foot intervals.

Tracer wire is to extend 24 inches above the finished grade at the base of fire hydrants. It shall be housed in a 1-1/2" x 24" PVC pipe located 6 inches in front of the fire hydrant. The 1-1/2" PVC will extend 2 inches above grade (concrete apron) and shall have a slip cap according to Drawing 22 (Fire Hydrant and Water Valve Detail). DO NOT GLUE THE CAP ON.

Tape service lateral tracer wire to corporation stop. If mainline has tracer wire, splice and connect service wire with 3M Direct Bury Splice Kit to main line tracer wire. Wires are to be run into each meter box with enough wire to extend 24" above grade.

DO NOT run tracer wire up inside valve boxes. Install along outside of valve boxes until near the top as required by Drawing 22 (Fire Hydrant and Water Valve Detail). Any splicing of tracer wire shall use a 3M Direct Bury Splice Kit and be tested for continuity. Tie tracer wire in a knot before splices.

- G. CONNECTIONS TO EXISTING DRINKING WATER LINES. Information in the plans may be based on inaccurate record drawings. The Contractor is responsible for verifying the actual size, material type, and location of existing water lines in the field before starting any connection work. ~~All connections shall comply with AWWA C600 (for ductile iron), AWWA C605 (for PVC), and AWWA C651 (for disinfection).~~ Not all required installation materials needed for installation are depicted in the plans. Contractor shall be responsible for acquiring and installing these materials.

Tapping tees may only be installed with City Engineer approval and when the existing main is at least one size larger than the new intersecting line. All tapping operations must follow AWWA C600/C605 standards, and disinfection must meet AWWA C651 requirements, including swabbing, flushing, and bacteriological testing.

All connections must be properly restrained, pressure tested and disinfected before being placed into service.

~~H. SURFACE WATER CROSSINGS. When a surface water crossing is proposed, the design and installation shall comply with the following:~~

- ~~1.—Utah Administrative Code R309-550-8~~
- ~~2.—APWA 33-08-00 (Commissioning of Water Utilities)~~
- ~~3.—APWA 33-11-00 (Water Distribution and Transmission)~~

~~The water main must be adequately supported and anchored to prevent movement, protected from damage and freezing, and made accessible for future repair or replacement. For underwater crossings, the pipe shall have a minimum of 2 feet of cover, or more if local conditions require, to provide adequate protection against erosion and external forces.~~

~~For watercourse crossings that span greater than 15 feet in width, the pipeline shall utilize the following special construction methods:~~

- ~~1.—Restrained Joints. The pipe must have restrained joints throughout the section within the watercourse to prevent joint separation and flexible restrained joints at both edges of the crossing to accommodate potential ground movement.~~
- ~~2.—Isolating Valves. Isolating valves shall be provided on both sides of the water crossing at locations not subject to high ground water or flooding, so that the section can be isolated for testing or repair.~~
- ~~3.—Sampling Tap. A sampling tap must be installed between the isolating valves for representative water quality testing. These taps shall be located in areas not subject to flooding.~~
- ~~4.—Pressure Test. A means shall be provided to pressure test the underground water crossing pipe in between the isolating valves.~~

~~H. 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. Their design shall be approved by the City Engineer.~~

## **1.24.020 Pipe and Fittings**

A. APWA. Unless otherwise specified in the City Construction and Design Standards, drinking water pipe and fitting work shall meet the requirements and specifications of the following APWA sections and related sections:

1. APWA 33 05 05 (Ductile Iron Pipe)
2. APWA 33 05 07 (Polyvinyl Chloride Pipe)
3. APWA 33 05 09 (Steel Pipe - Lined and Coated)

B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to drinking water pipe and fittings:

1. Drawing 1 (Standard Street Intersection and Utility Locations)

2. Drawing 2 (Standard Utility Locations in Knuckle)

2.3. [Drawing 23 \(Thrust Block Details\)](#)

3.4. [Section 1.24.050 \(Meters and Services\)](#)

C. PIPE. Polyvinyl chloride (PVC) pipe shall be used for all drinking water mains 24 inches in diameter and smaller unless otherwise authorized by the City Engineer. Pipe type for main lines larger than 24 inches in diameter and pipe material shall be designed. No used materials may be reused. The minimum main line pipe size for new installations is 8 inches in diameter.

Under no circumstances shall the pipe or accessories be dropped into the trench. 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. TRANSMISSION LINES. Transmission lines shall be designed to minimize unpressurized flows. Unpressurized transmission lines shall not be installed less than 20 feet from a concentrated source of pollution such as septic tanks, drain fields, garbage dumps, pit privies, sewer lines, and feed lots. They shall also not be placed in boggy areas or areas subject to the ponding of water.

E. POLYVINYL CHLORIDE PIPE (PVC). PVC pipe shall meet the standards and specifications of APWA 33 05 07 (Polyvinyl Chloride Pipe). Only blue or white, DR-18 pressure class 235 psi PVC pipe may be used for drinking water main lines.

PVC Pipe shall conform to AWWA C900 for 4-inch through 24-inch pipes. PVC pipes smaller than 4 inches shall be DR-21 ASTM D2241 pipe. Pipe materials for sizes larger than 24 inches in diameter shall be individually designed.

- F. DUCTILE IRON PIPE. Ductile iron pipe shall meet the standards and specifications of APWA 33 05 05 (Ductile Iron Pipe). 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. Ductile iron pipe shall be wrapped with V-Bio Polyethylene Encasement or approved equivalent.
- G. POLYETHYLENE PIPE. Polyethylene pipe shall meet the standards and specifications of AWWA C906 DR-11 pressure class 200 psi with NSF-61 certification for drinking water main lines 4 inches in diameter and greater. See Section 1.24.050 (Meters and Services) for polyethylene pipe specifications for sizes smaller than 4 inches in diameter.
- H. STEEL PIPE - LINED AND COATED. Steel pipe shall meet the standards and specifications of APWA 33 05 09 (Steel Pipe - Lined and Coated).
- I. 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. All PVC pipe being inserted into fittings shall have the bevel end removed.

All fitting bolts and nuts shall be greased. Only NSF-certified, food-grade, non-aerosol lubricants compliant with ANSI/NSF Standard 61 shall be used. All fittings shall have an 8 mil vinyl wrap plastic cover. 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. Pipe cutting for closure pieces or other purposes shall be cut cleanly and in a workmanlike manner, following manufacturer recommendations. All cut pipe ends must be beveled and filed to prevent damage to gaskets during joint assembly.

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. All steel fittings and bolts shall be coated with a non-oxide coating and wrapped with polyethylene.

- J. RESTRAINING. Thrust blocks shall be installed according to Standard Drawing 23. Mechanical restraint shall also be installed at each fitting requiring a thrust block. ~~Either thrust blocks or mechanical restraining devices shall be used for all tees, valves, plugs, caps and bends. Restraining shall be accomplished according to the standard drawings.~~ Thrust Blocks: Concrete thrust blocks shall be installed at all fittings subject to unbalanced thrust forces, including tees, valves, plugs, caps, and at bends deflecting 11 1/4 degrees or more. Thrust blocking shall be designed and installed as per AWWA C600/C605, taking into account pipe size, system operating pressure, and the soil's bearing capacity. Thrust blocks shall be poured against undisturbed soil. The concrete used for thrust blocks shall have a minimum compressive strength of 3000 psi at 28 days. All fittings shall be encased in a 12 mil protective plastic wrap (as per

~~AWWA C105) before the thrust block is poured. The area of bearing on both the pipe and the surrounding soil shall be as shown in the standard draw. Mechanical Restraints: In areas where thrust blocks are impractical (e.g., limited space or unsuitable soils), approved mechanical restraining devices, such as mechanical joint restraining glands or restrained joint systems, shall be installed following AWWA C600/C605 standards. These devices must be capable of withstanding the anticipated thrust forces based on system pressures and soil conditions. Design Considerations: The selection between thrust blocks and mechanical restraints shall be based on site-specific conditions, including available space, soil stability, and system pressures. All restraint systems must be designed to ensure that pipe and fittings remain securely in place under maximum operating pressures and transient surges.~~

- K. MAIN LINE DEAD ENDS. Dead-end mains must be equipped with a fire hydrant if flow and pressure are sufficient. If not, an approved flushing hydrant or blow-off valve shall be installed. All flushing devices shall be sized to provide a minimum velocity of 2.5 feet per second (fps) within the main being flushed. Under no circumstances shall a flushing device be directly connected to a sanitary sewer.

### **1.24.030 Valves and Couplings**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, drinking water valves and couplings work shall meet the requirements and specifications of the following APWA sections and related sections:
1. APWA 33 12 16 (Water Valves)
  2. APWA 33 12 16 2.2 (Gate Valves)
  3. APWA 33 12 16 2.3 (Butterfly Valves)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to drinking water valves and couplings:
1. Drawing 2 (Standard Utility Locations in Knuckle)
  2. Drawing 22 (Fire Hydrant and Water Valve Detail)
  3. Drawing 23 (Thrust Block Detail)
  4. Drawing 26 (Backflow Prevention Assembly)
- C. GENERAL. Only the City may open or close drinking water valves. A sufficient number of valves shall be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs. Valves shall be located at not more than 500-foot intervals in commercial districts and at not more than

one block or 800-foot intervals in other districts. Valves shall be bolted to all extensions of tee and cross fittings.

- D. RESILIENT SEATED GATE VALVE. All valves on 4-inch to 10-inch drinking water mains shall be resilient seated gate valves that meet the standards and specifications of APWA 33 12 16 2.2 (Gate Valves).
- D. BUTTERFLY VALVE. All valves 12-inch and larger valves shall be butterfly valves that meet the standards and specifications of APWA 33 12 16 2.3 (Butterfly Valves).
- F. VALVE BOXES. All top of valve boxes located in streets shall be installed 1/4 inch below grade centered in a 30 inch fiber reinforced concrete collar. Valve boxes in off-road areas shall extend 6 inches above grade. Lid detail shall be similar to Comco C-6517.
- G. RESSURE REGULATION VALVES (PRVs). PRVs which are required in a development shall be designed by the Developer's engineer and the design shall be submitted to the City Engineer for review and approval prior to starting construction. All PRV's shall be Cla-Val with a 4" bypass or unless otherwise required by the City Engineer. PRVs shall be placed in a concrete vault and have telemetry included.
- H. TAPPING VALVES. Tapping valves may only be used when approved by the City Engineer. Tapping saddles with an "O" ring may be used if the drinking water main line to be tapped is larger than the new drinking 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.
- I. 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 Engineer.
- J. BACKFLOW DEVICES. Installation of backflow devices shall conform to the state-adopted plumbing code and City Standard Drawing

## **1.24.040 Fire Hydrants**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, fire hydrants work shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 33 11 11 (Relocate Water Meters and Fire Hydrants)
  - 2. APWA 33 12 19 (Hydrants)
  - 3. AWWA C651 (Disinfecting Water Mains)

B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to fire hydrants:

1. Drawing 22 (Fire Hydrant and Water Valve Detail)

C. GENERAL. Only the City may open or close fire hydrants. Fire hydrants shall meet the requirements and specifications of APWA 33 12 19 (Hydrants) and the City standard drawing for fire hydrants. ~~Only Red~~ Mueller Super Centurion 250 fire hydrants or approved equivalent ~~may shall~~ be installed. A red Waterous WB-67 may be used when the Mueller hydrant is unavailable or if approved by the City Engineer. They shall have a 5 ¼ inch barrel diameter and 6-inch mechanical joint connection. The 6-inch gate valve will be mechanical joint by flange connected to the main line tee. The valve box lid shall read "FIRE".

Hydrants shall have one 4 ½ inch streamer nozzle and two 2 ½ inch hose nozzles. Hydrants shall be frost proof. The threads shall be National Standard Fire Hose Thread. Hydrants shall be set at a height that will allow approximately 2 inches exposed between the finished ground and the sidewalk flange. Fire hydrants shall be set vertically and held in place by adequate concrete blocking which shall be left in the trench. A gravel filled drip area shall be provided. See standard drawing for fire hydrants.

D. PLACEMENT AND LOCATION. Spacing of fire hydrants shall be according to the International Fire Code and the local fire code official. Fire hydrants shall be capable of providing fire flow amount determined by the local fire code official. An adequate number of hydrants or blow-offs shall be provided to allow periodic flushing and cleaning of water lines in compliance with AWWA C651 (Disinfecting Water Mains).

The relocation of fire hydrants shall meet the requirements and specifications of APWA 33 11 11 (Relocate Water Meters and Fire Hydrants) and related sections.

## **1.24.050 Meters and Services**

A. APWA. Unless otherwise specified in the City Construction and Design Standards, drinking water meters and services work shall meet the requirements and specifications of the following APWA sections and related sections:

1. APWA 33 05 06 (Polyethylene Pipe)
2. APWA 33 11 11 (Relocate Water Meters and Fire Hydrants)
3. APWA 33 12 33 (Water Meters)
4. AWWA C901 (Polyethylene Pressure Pipe and Tubing)

B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to drinking water meters and services:

1. Drawing 24 (Typical Culinary Water Connection)
2. Drawing 25 (Large Meter Assembly)
3. Drawing 26 (Backflow Prevention Assembly)

C. GENERAL. Pipe damaged by scratches, cuts, kinks, or buckled areas shall not be installed. No used materials may be reused. Deflection in joints shall meet manufacturer's specifications and shall be approved by the City Engineer or shall be replaced with the proper fitting.

All drinking water services shall have dual check valves. The minimum size for new drinking water service lines is 1 inch. Acceptable diameters for services lines are 1", 1.5", 2", 4", 6", and 8". Services shall conforming to ASTM B88 standards. Services 1 inch or larger may be polyethylene pipe conforming to the requirements and specifications of APWA 33 05 06 (Polyethylene Pipe) and AWWA C901 (Polyethylene Pressure Pipe and Tubing) and be NSF-61 Certified. Only CTS SDR9 200 psi blue polyethylene pipe shall be used for service lines. All connections shall have stainless steel stiffeners.

D. METERS. Install meters according to City Standard Drawing 24 (Typical Culinary Water Connection) and Drawing 25 (Large Meter Assembly). All meters shall be paid for by the Contractor and supplied 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.

E. PLACEMENT AND LOCATION. All meter boxes shall have their location and grade staked prior to installation. Service taps shall be a minimum of 24 inches apart along main line and extend perpendicular from the main to meter. No taps will be allowed within 24 inches of the end of pipe. Drinking water service lines shall meet the separation from sanitary sewer requirements in this chapter.

F. METER RELOCATION. Relocate meters according to APWA 33 11 11 (Relocate Water Meters and Fire Hydrants). 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 ever 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. City must verify disconnection before buried.

## 1.28 Sanitary Sewer

### 1.28.010 General

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, sanitary sewer work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 33 (UTILITIES)
  2. APWA 33 31 00 (Sanitary Sewerage System)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to sanitary sewer:
1. Chapter 1.08 (Design Requirements)
  2. Chapter 1.12 (Contractor Requirements)
  3. Chapter 1.16 (Inspection and Testing)
  4. Chapter 1.20 (Earthwork and Trench Requirements)
  5. Drawing 1 (Standard Street Intersection and Utility Locations)
  6. Drawing 2 (Standard Utility Locations in Knuckle)
  7. Drawing 3 (Standard Street Cross Sections and Utility Locations)
  8. Drawing 18 (Typical Sewer Manhole Detail)
  9. Drawing 19 (Typical Manhole on Existing Pipe)
  10. Drawing 20 (Typical Sampling Manhole)
  11. Drawing 21 (Typical Sewer Drop Manhole)
  12. Drawing 27 (Typical Sewer Lateral)
  13. Drawing 28 (Typical Grease Trap)
- C. LOCATION. Sanitary Sewer main lines shall be located on either the south or west sides of a street according to the following Standard Drawings unless otherwise authorized by the City Engineer:
1. Drawing 1 (Standard Street Intersection and Utility Locations)
  2. Drawing 2 (Standard Utility Locations in Knuckle)
  3. Drawing 3 (Standard Street Cross Sections and Utility Locations)

Sanitary Sewer mains shall not be installed within 10' of any footing, foundation or pad of any structure. A maximum of 500 feet of pipe shall be allowed between manholes.

- D. PIPE SLOPES. See Article 1.08.060 (Pipe Slopes).
- E. 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 and wastewater division for review and approval prior to starting construction. City owned lift stations will be the wet well/dry well type, will have standby power, proper ventilation, telemetry, a flow meter, and will be designed for large areas, not individual subdivisions unless approved otherwise by the City Engineer. Building permit and inspections shall be required.
- F. 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.

## 1.28.020 Manholes

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, sanitary sewer manhole work shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 33 31 00 2.3 (Manholes)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to sanitary sewer manholes:
  - 1. Drawing 18 (Typical Sewer Manhole Detail)
  - 2. Drawing 19 (Typical Manhole on Existing Pipe)
  - 3. Drawing 20 (Typical Sampling Manhole)
  - 4. Drawing 21 (Typical Sewer Drop Manhole)
- C. GENERAL. Manholes shall be furnished complete with cast-iron rings and covers.
- D. SIZE. Generally use 45-foot inside diameter (ID) manholes for main lines ~~less than 15-30 inches in diameter and smaller, 5-foot ID manholes for main lines 15 to 30 inches in diameter~~, and 6-foot ID manholes for main lines greater than 30 inches in diameter. ~~5-foot ID manholes are required in the following situations: At all intersections of 3 or more 8-inch or larger pipelines. All change-in-direction manholes. In manholes deeper than 15 feet. In manholes with a grade greater than 20% through the manhole.~~

- E. LARGE DIAMETER PIPE MANHOLES. Manholes on sanitary sewer trunk lines 152 inch in diameter or greater shall be monolithic, precast "Perfect Lined Manhole System, as manufactured by NWPX, HDPE/FRP Lined Precast Concrete Manholes for Sewers" or an approved equivalent installed to manufacturer's specifications.~~be HDPE lined manholes, precast polymer manholes, epoxy coated, or polyurea coated.~~

## 1.28.030 Pipe and Fittings

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, all sanitary sewer pipe and fittings work shall meet the requirements and specifications of the following APWA sections and related sections:
1. Division 33 (UTILITIES)
  2. APWA 33 05 07 (Polyvinyl Chloride Pipe)
  3. APWA 33 05 11 (Polypropylene Pipe)
- B. GENERAL. All sanitary sewer lines 8 inches to 18 inches in diameter shall be constructed with polyvinyl chloride (PVC) pipe. All sanitary sewer lines larger than 18 inches in diameter shall be constructed with the following:
1. Polyvinyl chloride (PVC) pipe
  2. Corrugated Polypropylene Pipe
  3. HDPE-Lined Reinforced Concrete Pipe
  4. Or approved equivalent.

The minimum main line pipe size for new installations is 8 inches in diameter. Pipe material for main lines larger than 24 inches or buried more than 12 feet deep shall be designed and require manufacturing and engineering specifications to be submitted to the City Engineer for written approval. No used materials may be reused.

- C. POLYVINYL CHLORIDE PIPE (PVC). PVC pipe shall meet the requirements and specifications of APWA 33 05 07 (Polyvinyl Chloride Pipe) and shall have a minimum rating of SDR-35.
- D. CORRUGATED POLYPROPYLENE. Triple Wall Corrugated Polypropylene per APWA 33 05 11 (Polypropylene Pipe). Diameters up to 30 inches shall meet the requirements and specifications of ASTM F2736. Diameters over 30 inches shall meet the requirements and specifications of ASTM F2764.
- E. HDPE-LINED REINFORCED CONCRETE PIPE. Reinforced concrete pipe (RCP) lined with High-Density Polyethylene, which shall meet the minimum design requirements of Class III RCP as defined in ASTM C76. Pipe joints shall be

weldless for diameters up to 60 inches. For diameters greater than 60 inches, field welding is permitted.

- F. CURED-IN-PLACE PIPE. Cured-in-Place pipe shall meet the requirements and specifications of APWA 33 05 23.40 (Cured-in-Place Pipe).
- G. FITTINGS. Fittings shall meet the requirements and specifications of APWA Division 33 (UTILITIES), manufacturer, and City standard drawings.

### **1.28.040 Services**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, sanitary sewer services work shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 33 31 00 (Sanitary Sewerage Systems)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to sanitary sewer services:
  - 1. Section 1.08.060 (Sanitary Sewer Design Requirements)
  - 2. Section 1.16.060 (Sanitary Sewer Inspection and Testing)
  - 3. Drawing 27 (Typical Sewer Lateral)
  - 4. Drawing 28 (Typical Grease Trap)
- C. PIPE. Pipe used for new service laterals shall be PVC Plastic Pipe conforming to ASTM D3034 SDR 35. The minimum sewer service pipe size is 4 inches in diameter. ~~New sewer laterals installed to lots shall be located ten feet (10') uphill of the lowest front property corner.~~

Deflection in joints shall meet manufacturer's specifications and shall be approved by the City Engineer or shall be replaced with the proper fitting. New service laterals shall be constructed with materials and procedures as specified herein and in the standard drawings. Existing service laterals shall be constructed with materials compatible with the existing laterals with appropriate connections for joining the ends of existing laterals.

Pipe damaged by scratches, cuts, kinks, or buckled areas shall not be installed. No used materials may be reused.

- D. CLEAN-OUTS. There shall be no ~~combination of bends of combined angle greater 90 degrees or greater~~ in a service line between the main line and the ~~building property line~~ without a clean-out. A clean-out shall be installed 2 feet behind the property line, ~~at every bend~~ and within 5 feet of the foundation wall on all service lines. The maximum distance between clean-outs on a

service line is one hundred (100) feet for 6 inch service lines and fifty (50) feet for 4 inch lines.

- E. CONNECTIONS TO MAIN LINE. All sewer lateral connections onto new sewer mains shall be made through preformed inline Y or approved equivalent ~~Insert a Tee type connection installed in the main line at the time of main line installation.~~

Connections onto existing sewer mains shall be made with field installed service saddles (gasketed and clamped). All connections by field installed service saddles on existing sewer mains shall be done with a sewer tapping machine and all required fittings and materials. Connections shall be made as shown in the standard drawing for sewer laterals.

When an existing sewer lateral is encountered along the line and grade of a new main line it shall be relocated using appropriate pipe and fittings and graded to insure adequate slope to drain properly. Minimum slope shall be one-quarter inch (1/4") per foot.

## **1.32 Storm, Land, and Groundwater Drains**

### **1.32.010 General**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, storm, land, and groundwater drain work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 33 (Utilities)
  2. APWA 33 41 00 (Drainage Systems)
  3. APWA 33 47 00 (Ponds)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to storm, land, and groundwater drains:
1. Chapter 1.08 (Design Requirements)
  2. Chapter 1.12 (Contractor Requirements)
  3. Chapter 1.16 (Inspection and Testing)
  4. Chapter 1.20 (Earthwork and Trenches)
  5. Drawing 1 (Standard Street Intersection and Utility Locations)
  6. Drawing 2 (Standard Utility Locations in Knuckle)

- 7. Drawing 3 (Standard Street Cross Sections and Utility Locations)
  - 8. Drawing 10 (Standard Curb Face Inlet Detail)
  - 9. Drawing 11 (Mountable Curb Face Inlet Detail)
  - 10. Drawing 12 (Manhole Access Curb Inlet Box (Combo Box) Detail)
  - 11. Drawing 13 (Storm Drain Junction Box Detail)
  - 12. Drawing 14 (Typical Land Drain Manhole Detail)
- C. SIZE. The City Engineer must approve the sizes of all proposed drain lines. The minimum size of pipe is 15 inches in diameter for main lines and 12 inches in diameter for laterals.
- D. LOCATION. Drain lines shall be located on either the north and east sides of the street 4 feet from the lip of gutter centerline according to the following Standard Drawings unless otherwise authorized by the City Engineer:
- 1. Drawing 1 (Standard Street Intersection and Utility Locations)
  - 2. Drawing 2 (Standard Utility Locations in Knuckle)
  - 3. Drawing 3 (Standard Street Cross Sections and Utility Locations)
- 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 drain lines for each size of pipe:

Minimum 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

- F. 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.
- G. LAND AND GROUNDWATER DRAINS. All plans for groundwater drains must be designed and stamped by a licensed professional civil engineer in the State of Utah. Only rigid pipe may be used.
- G. MANHOLES AND CLEANOUT STRUCTURES. A manhole or cleanout structure shall be located at the upstream end of the storm drain pipe and at all changes in pipe size, horizontal alignment, slope and material of the storm sewer. Maximum horizontal distance between manholes is 500 feet.
- H. ROADWAY DRAINAGE. Roads must provide for routing of the 100-year flood discharge to adequate downstream conveyance facilities. The 100-year flood flows in streets should be contained within street right-of-way. Provision shall be made to allow runoff within the street to enter any downstream detention basins or other such facilities.

Downhill cul-de-sacs will not be allowed unless specifically approved by the City Engineer. Special consideration shall be given to downhill "T" intersections to ensure that flooding will not occur outside of the right-of-way.

- I. INLETS AND OUTLETS. Outlets for storm drain pipe that discharge to an earth-lined channel or basin shall be stabilized to mitigate erosion potential. A concrete apron shall be constructed around curb inlets to allow sediment to be easily cleaned up.
- J. STORM WATER TREATMENT. Storm water treatment for oil, grease and other pollutants shall be provided at all sites with more than 6 parking spaces. Engineer design and calculations shall be submitted showing the effectiveness of the treatment. Provide a maintenance plan for the storm water treatment facility.
- K. CULVERTS. The minimum culvert size is 24 inches. Culverts shall be designed to convey the 100-year flood event without overtopping the road. A culvert blockage factor of 50 percent shall be used for culverts placed in drainages with upstream debris producing potential as determined by the City. Backwater surface computations shall be completed upstream of culverts and shall be shown to be non-damaging to upstream properties. Improvements must be installed at entrance and exit structures to minimize erosion and accommodate maintenance.
- L. BRIDGES. Bridges must pass the 100-year flood event with a minimum of 2 feet of freeboard.

Local and regional scour analyses shall be performed on the structure, upstream and downstream. All potential scour shall be properly mitigated.

M. OPEN CHANNELS. Open channels shall be designed to meet the following criteria:

1. Convey the 100-year flood event with a minimum freeboard of 1 foot.
2. Have low maintenance requirements.
3. Provide maintenance access through easements the entire channel length
4. Side slope of 2H:1V or flatter.
5. Bank stabilization shall be designed to minimize erosion and maintenance.
6. Irrigation ditches located in areas of new development shall be enclosed (pipe or culvert).

N. FLOODPLAINS. Development near water bodies shall be in accordance with the National Flood Insurance Program and the City's Flood Damage Prevention ordinance (See Chapter 20 of Municipal Code Title 15).

The Flood Damage Ordinance requires, among other things:

1. Bank Stabilization/Erosion Hazard Analysis. A bank stability/erosion hazard analysis shall be performed by a licensed professional engineer (15.4.20.030 C.5).
2. Geotechnical Report. A geotechnical report shall be prepared that includes (15.4.20.040 A.2.b):

a. AMBIENT GROUNDWATER SURFACE ELEVATION: At least one measurement of the ambient groundwater surface elevation on the site of proposed development collected between May 1 and May 31.

b. ESTIMATED MAXIMUM ANTICIPATED GROUNDWATER: An engineer's estimate of the maximum anticipated groundwater elevation anticipated on the site during periods of flooding, referencing nearby base flood elevations on the current FIRM and all other available sources.

c. RECOMMENDED LOWEST FLOOR ELEVATION: An engineer's recommendations with regard to the lowest elevation(s) that the lowest floor(s) (including basements) of all new and substantially improved structures should be constructed to be protected from flooding from groundwater and groundwater that could be influenced by surface water during periods of flooding.

3. Lowest Floor Elevation. The lowest floor (including basement), shall be elevated a minimum of two feet above the base flood elevation (15.4.20.040 B.1)
  4. Bank Setbacks. All permanent structures shall be set back a minimum of 60 feet from the top of bank of the nearest water body or open channel that conveys runoff water.
- O. CONNECTING TO EXISTING DRAIN LINES. 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.
  - P. SUMPS. 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.
  - Q. INLET AND CLEAN OUT STRUCTURES. 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. Inlets and clean out structures shall not exceed 500 ft spacing.
  - R. HEADWALLS. A headwall shall be installed at all ditch to pipe transitions. Headwall designs must be stamped by a licensed professional civil engineer in the State of Utah and approved by the City Engineer.

### **1.32.020 Drainage Plan and Report**

- A. GENERAL. A final Drainage Plan and Report is required for all proposed developments and shall be prepared by a professional civil engineer registered in the State of Utah.
- B. REPORT. The report portion of the Drainage Plan and Report shall contain the following:
  1. Title Page. Title page showing project name, date, preparer's name, seal and signature.
  2. Development Description. Description of the development, including location (township, range, section, subdivision and lot).
  3. Property Description. Description of property, area, existing site conditions including all existing drainage facilities such as ditches, canals, washes, swales structures, storm drains, springs, detention and retention basins.

4. Off-Site Drainage. Description of off-site drainage features and characteristics upstream and downstream of the site and any known drainage problems.
5. Proposed Facilities. A description of proposed facilities that will be used to manage on-site and off-site storm water runoff associated with the development, including calculations used to estimate runoff and size storm water facilities. See Section 4.78.12 for design criteria and Section 4.78.16 for approved rainfall-runoff computation methods.
6. On-Site Drainage. Description of existing and proposed on-site drainage features, characteristics, and facilities.
7. Master Planned Drainage Facilities. Description of master planned drainage facilities and how the development and proposed drainage facilities conform to the storm drain master plan.
8. Downstream Receiving Facilities. Description of downstream receiving facilities for storm water discharges and the capacities of those facilities. Include calculations.
9. FEMA Floodplain. Description of existing FEMA floodplain, if applicable.
10. Other Drainage Studies. Description of other drainage studies that affect the site.
11. Preliminary Drawings. Preliminary drawings of proposed drainage facilities that also show existing storm drain facilities on or adjacent to the site.
12. Flood Control Requirements. Description of compliance with applicable flood control requirements and FEMA requirements, if applicable.
13. Runoff Computations. Description of design runoff computations.
14. Design Calculations. Design calculations to support inlet spacing and sizing of facilities. Include a description of drainage facility design computations.
15. Easements. Description of any needed drainage easements or rights-of-way.
16. FEMA Calculations. Description of FEMA floodway and floodplain calculations, if applicable.
17. Groundwater Depth Estimate. Description of field work performed to estimate minimum depth to groundwater at the site.
18. Geotechnical Report. Commentary on geotechnical engineer's findings of percolation rates, soil structure, groundwater depth, and

recommendation on low impact development (LID) infrastructure implementation effectiveness. If not recommended, submit a proposal for alternative controls to meet the City's LID requirement. If recommended, provide details of how the LID infrastructure will meet our requirements.

19. Conclusion. Conclusions stating compliance with drainage requirements and opinion of effectiveness of proposed drainage facilities and accuracy of calculations.
  20. Appendices. Appendices showing all applicable reference information.
- C. DRAWINGS. Drawings shall be submitted with the Drainage Plan and Report and shall include the following information, if applicable.
1. Property Lines. Existing and proposed property lines.
  2. Topography. Existing and proposed topography (2-foot maximum contour interval) extending at least 100 feet beyond the site.
  3. Streets, Easements, and Rights-of-Way. Existing and proposed streets, easements, and rights-of-way.
  4. Drainage and Irrigation Facilities. Existing drainage and irrigation facilities.
  5. FEMA Floodplain. FEMA floodplain and floodway.
  6. Water Body and River Setbacks. Required setbacks for structures from the nearest top bank of the City if applicable.
  7. Basin Boundaries. Drainage basin boundaries and subbasin boundaries on a topographical map.
  8. Existing Flow Patterns. Existing flow patterns and paths.
  9. Proposed Flow Patterns. Proposed flow patterns and paths.
  10. Proposed Drainage Facilities. Location and size of proposed drainage facilities including: storm drain pipes, inlets, manholes, cleanouts, swales, channels, and retention and detention basins. Include spot elevations of proposed grade, flowline and top, back curb.
  11. Proposed Drainage Facility Details. Details of proposed storm drain facilities, including storm drain inlets. Include maintenance and monitoring plan for storage facilities.
  12. Proposed Irrigation Facility Details. Details of proposed improvements to existing irrigation facilities and any facilities to be used to manage high groundwater conditions on the site.

13. Drainage Easements. Location of drainage easements required.
14. Other Drainage Features. Other relevant drainage features.
15. Drawing Sheet Elements. Scale, north arrow, legend, title block showing project name, date, preparers name, seal and signature.

### **1.32.030 Pipe and Fittings**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, all storm drain pipe and fittings shall meet the requirements and specifications of the following APWA sections and related sections:
  1. APWA 33 05 02 (Concrete Pipe and Culvert)
  2. APWA 33 05 04 (Corrugated Metal Pipe)
  3. APWA 33 05 06 (Polyethylene Pipe)
  4. APWA 33 05 11 (Polypropylene Pipe)
- B. GENERAL. Reinforced concrete or polypropylene pipe shall be used for all main drain lines 15" or larger in diameter and for all drain lines of smaller size with less than 2 feet of cover or more than 8 feet of cover. Corrugated metal pipe (CMP) may only be used when authorized by the City Engineer.
- C. CONCRETE PIPE. Concrete pipe shall meet the requirements and specifications of APWA 33 05 02 (Concrete Pipe and Culvert). Reinforced concrete pipe (RCP) shall be Class III. Only new pipe may be used unless otherwise authorized by the City Engineer.
- D. CORRUGATED METAL PIPE (CMP). CMP shall meet the requirements and specifications of APWA 33 05 04 (Corrugated Metal Pipe).
- E. POLYPROPYLENE PIPE. Polypropylene pipe shall meet the requirements and specifications of APWA 33 05 11 (Polypropylene Pipe). Use HP Storm, SaniTite, or equivalent depending on bury depth, groundwater, and other factors. Diameters up to 30 inches shall meet the requirements and specifications of ASTM F2736. Diameters over 30 inches shall meet the requirements and specifications of ASTM F2764.
- F. HIGH DENSITY POLYETHYLENE PIPE (HDPE). HDPE pipe shall meet the requirements and specifications of APWA 33 05 06 (Polyethylene Pipe). Three (3) feet or less bury depths require triple wall HDPE pipe approved by the City Engineer.

### **1.32.040 Retention/Detention Basins**

A. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to retention/detention basins:

1. Article 1.08.030 F (Storm, Land, and Groundwater Drains)

H. GENERAL. Basins shall be designed to meet the requirements of Article 1.08.030 F (Storm, Land, and Groundwater Drains) and the following criteria:

1. Freeboard. A minimum of 1 foot of freeboard shall be provided.

2. Side Slope. (See table below)

Depth	Slope
18"	2:1
3'	3:1
Above 3'	4:1

3. Maintenance and Monitoring Plan. Provide a plan to maintain and monitor the facility.

4. Vehicular Access. Provide vehicular access to the facility.

5. Landscaping. All facilities shall be landscaped in accordance with City Standards.

6. Emergency Overflow Spillway. Design an emergency overflow spillway to safely discharge runoff from the facility assuming the outlet is inoperable, or the inflow exceeds the outlet capacity.

7. Maximum Depth. Maximum depth shall be [3 feet of detained water or as](#) approved by the City Engineer.

B. RETENTION BASINS. Design of retention basins shall be according to the Storm Water Drainage Design Manual. 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 Storm Drain Master Plan. Basins for smaller areas may be allowed only with prior written approval of the City Engineer.

C. DETENTION BASINS. Design of detention basins shall be according to the Storm Water Drainage Design Manual. Detention basins may be constructed in landscape or parking areas. Each detention basin shall incorporate LID storm drain principles and have an overflow to the City storm drain system. Pipes shall not be used as storage in storm water calculations.

Each detention basin shall have an outlet to the City storm drain system. A trash rack shall be installed at the outlet(s) to prevent debris from entering the storm drain system.

## 1.36 Streets and Pavements

### 1.36.010 General

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, streets and pavement work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 34 (TRANSPORTATION)
  2. APWA 31 05 19 (Geotextiles)
  3. APWA 31 05 21 (Geogrids/Geocomposites)
  4. APWA 32 12 16 (Plant-Mix Asphalt Paving)
  5. APWA 32 12 16.13 (Plant-Mix Bituminous Paving)
  6. APWA 32 14 13 (Precast Concrete Unit Paving)
  7. APWA 32 14 16 (Brick Unit Paving)
  8. APWA 32 17 23 (Pavement Markings)
  9. APWA 34 71 13 (Vehicle Barriers)
  10. APWA 34 71 19 (Vehicle Delineators)
  11. APWA Plan 205.1 (Type A Curb and Gutter)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to streets and pavements.
1. Chapter 1.08 (Improvement and Design Requirements)
  2. Chapter 1.12 (Inspection and Testing)
  3. Chapter 1.16 (Contractor Requirements)
  4. Drawing 1 (Standard Street Intersection and Utility Locations)
  5. Drawing 2 (Standard Utility Locations in Knuckle)
  6. Drawing 3 (Standard Street Cross Sections and Utility Locations)
  7. Drawing 4 (Standard Street Cross Sections and Utility Locations)
  8. Drawing 5 (Curb, Gutter, and Sidewalk)
  9. Drawing 6 (Typical Curb Approach)

10. Drawing 7 (Standard Curb Return at Intersection)
  11. Drawing 8 (Pedestrian Access)
  12. Drawing 9 (Pedestrian Access Mid Block)
  13. Drawing 15 (Standard Cul-De-Sac)
  14. Drawing 16 (Standard Knuckle)
  15. Drawing 31 (110-Foot Roundabout for Local Street Intersection)
  16. Drawing 32 (Typical Street/Stop Sign Installation Detail)
  17. Drawing 33 (Typical Street Light 1)
  18. Drawing 34 (Typical Street Light 2)
  19. Drawing 35 (Typical Street Light 3)
  20. Drawing 36 (Concrete Pole Base (Street Light))
- C. TIME LIMITATION AFTER CURB AND GUTTER IS PLACED. Pavement shall be placed at least 7 days after and before 45 days after the placement of curb and gutter unless ~~an extension is granted by otherwise authorized by~~ the City Engineer.
- D. GEOTEXTILES, GEOGRIDS AND GEOCOMPOSITES. All geotextile work shall meet the requirements and specifications of APWA 31 05 19 (Geotextiles) and APWA 32 12 16 (Plant-Mix Asphalt Paving). Geogrid and geocomposite work shall meet the requirements and specifications of APWA 31 05 21 (Geogrids/Geocomposites) and APWA 32 12 16.13 (Plant-Mix Bituminous Paving).
- E. PAVERS. Pavers and installation shall meet the requirements and specifications of APWA 32 14 13 (Precast Concrete Unit Paving) and APWA 32 14 16 (Brick Unit Paving).
- F. PAINTED TRAFFIC LINES AND MARKINGS. Painted traffic lines and markings shall meet the requirements and specifications of APWA 32 17 23 (Pavement Markings) and the MUTCD. If striping is to be removed it shall be removed by water blasting. ~~B~~Temporary black paint over existing paint ~~and grinding will~~ not be allowed unless otherwise authorized by the City Engineer.
- G. TRAFFIC BARRIERS. Vehicle barriers shall meet the requirements and specifications of APWA 34 71 13 (Vehicle Barriers) and the MUTCD.
- H. VEHICLE DELINEATORS. Vehicle delineators shall meet the requirements and specifications of APWA 34 71 19 (Vehicle Delineators) and the MUTCD.

### **1.36.020 Street Section**

- A. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to street sections.
1. See Section 1.08.040 (Street Design Requirements)
  2. See Section 1.016.080 (Street Inspection and Testing)
  3. See Section 1.20.030 (Subgrade)
  4. See Section 1.20.040 (Fill Material)
  5. Article 1.20.040 F (Engineered Fill)
  6. Article 1.20.040 G (Untreated Base Course)
  7. Drawing 3 (Standard Street Cross Sections and Utility Locations)
  8. Drawing 4 (Standard Street Cross Sections and Utility Locations)
- B. CURBS AND GUTTERS. Use APWA Plan 205.1 (Type A Curb and Gutter) 30 inch Curb and Gutter unless otherwise authorized by the City Engineer to match existing curb and gutter.
- C. 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 halfway between the crown and edge of pavement. See Section 1.20.030 (Subgrade).

### **1.36.030 Trail Section**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, trail section work shall meet the requirements and specifications of the following APWA sections and related sections:
1. APWA 31 05 19 (Geotextiles)
  2. APWA 32 12 05 (Bituminous Concrete)
  3. APWA 32 17 23 (Pavement Markings)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to trail sections.
1. Section 1.20.030 (Subgrade)
  2. Article 1.20.040 F (Engineered Fill)

3. Article 1.20.040 G (Untreated Base Course)

- C. GENERAL. A pavement and 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.

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. 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. See Article 1.20.040 F (Engineered Fill).
2. Untreated Base Course. 6 inches of compacted untreated base course shall be placed under the surface course of all trails. See Article 1.20.040 G (Untreated Base Course).
3. Bituminous Surface Course. A minimum of 3 inches of asphalt pavement (bituminous concrete) shall be installed according to Section 1.36.040 (Bituminous Surface Course) and more specifically Article 1.36.040 C1 (Trails and Parking Lots).
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. 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%

- D. 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.
- E. 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.
- F. GEOTEXTILE FENCE. An APWA 31 05 19 (Geotextiles) silt fence shall be installed along the limits of the trail construction at hillsides and river embankments.

- G. SUB-GRADE. The sub-grade shall be grubbed of all trees, bushes and other organic matter. See Section 1.20.030 (Subgrade). Sub-grade shall be graded to meet the following ADA 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 31 05 19 (Geotextiles).
- G. TRAIL MARKINGS. If required by the City Engineer, trail lanes shall be delineated by a center single dashed yellow line. Painted traffic lines and markings shall meet the requirements and specifications of APWA 32 17 23 (Pavement Markings) and the MUTCD.
- H. CLEAN-UP. Upon completion of the trail section all windrows, survey and construction debris and geotextile fence shall be removed from along the edges of the trail.

### **1.36.040 Bituminous Surface Course**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, bituminous surface course work shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 32 12 05 (Bituminous Concrete)
  - 2. APWA 32 12 13.19 (Prime Coat)
  - 3. APWA 32 12 16.13 (Plant-Mix Asphalt Paving)
  - 4. APWA 32 12 16.19 (Cold-Mix Asphalt Paving)
  - 5. APWA 32 12 16.19 (Cold-Mix Bituminous Paving)
  - 6. APWA 32 12 13.13 (Tack Coat)
  - 7. APWA 32 01 13 (Slurry Seal)
  - 8. APWA 32 01 14 (Chip Seal)
  - 9. APWA 32 01 15 (Micro-Surface Seal)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to bituminous surface course.
  - 1. Drawing 3 (Standard Street Cross Sections and Utility Locations)

2. Drawing 4 (Standard Street Cross Section and Utility Locations)

- C. ASPHALT PAVEMENT (ALSO REFERENCED AS BITUMINOUS CONCRETE). Asphalt concrete shall meet the specifications and requirements of APWA 32 12 05 (Bituminous Concrete), APWA 32 12 16.13 (Plant-Mix Asphalt Paving) and APWA 32 12 16.19 (Cold-Mix Bituminous Paving). Asphalt Binder (RAB) content may not exceed 15% in any mix design.
1. Trails and Parking Lots. Use an APWA 32 12 05 (Bituminous Concrete) Class I asphalt pavement (bituminous concrete).
  2. Local Residential Streets. Use an APWA 32 12 05 (Bituminous Concrete) Class II asphalt pavement (bituminous concrete).
  3. Local Non-Residential Streets, Parkways, and Boulevards. Use an APWA 32 12 05 (Bituminous Concrete) Class III asphalt pavement (bituminous concrete).
- D. Cold-Mix Pavement (Bituminous Concrete). Cold-mix pavement (bituminous concrete) shall only be installed when allowed by the City Engineer. All cold-mix asphalt concrete shall be replaced with hot-mix within 30 days of when it becomes available. Cold mix concrete shall meet the requirements of APWA 32 12 16.19 (Cold-Mix Bituminous Paving).
- E. PRIME COAT. Prime coat only as required by the plans or the City. Prime coat shall meet the requirements and specifications of APWA 32 12 13.19 (Prime Coat).
- F. TACK COAT. Install tack coat as required and according to APWA 32 12 13.13 (Tack Coat). Use CSS-1 or CSS-1h tack emulsion diluted 2:1 (concentrate to water) at the following application rates. Apply tack coat to all horizontal and vertical surfaces sufficient to achieve minimum 95% coverage prior to placement of overlay or patch.

<i>Application</i>	<i>Rate (Gal/SY - Diluted)</i>
<i>New Pavement (&lt;1 year Old)</i>	<i>0.06</i>
<i>Existing Pavement</i>	<i>0.08</i>
<i>Rotomilled Surface</i>	<i>0.12</i>

- G. THIN OVERLAYS AND PATCHES. Use binder and asphalt concrete as defined in Article A and Article B based on paver or hand applications.
- H. CRACK SEAL. Crack Seal material shall be ~~Deery 103 Sealant~~ Utah spec and or an approved equivalent. New roads should receive crack seal around all

[manhole collars, water valve collars, repair patches, cold joints, and along the edge of the road at the lip of gutter.](#)

- I. SLURRY SEAL. Slurry seals shall meet the requirements and specifications of APWA 32 01 13 (Slurry Seal). The type of slurry seal applied to a City street shall be approved and specified by the City Engineer. Use a Type II slurry seal with a CQS-1H emulsion, unless otherwise defined.
- J. CHIP SEAL. Chip seals shall meet the requirements and specifications of APWA 32 01 14 (Chip Seal). Use a Type A or C ceramic chip seal with an LMCRS-2 or CRS-2P chip emulsion.
- K. MICRO-SURFACING. Micro-surfacing shall meet the requirements and specifications of APWA 32 01 15 (Micro-Surface Seal). Use a Type II or type III microsurfacing with a CQS-1H emulsion, unless otherwise defined.

## 1.40 Portland Cement Concrete and Masonry Work

### 1.40.010 General

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, Portland cement concrete and masonry work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA DIVISION 03 (Concrete)
  2. APWA 03 30 04 (Concrete)
  3. APWA 32 16 13 (Driveway, Sidewalk, Curb, Gutter)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to Portland cement concrete and masonry work.
1. Chapter 1.08 (Improvement and Design Requirements)
  2. Chapter 1.12 (Inspection and Testing)
  3. Chapter 1.20 (Earthwork and Trenches)
  4. Drawing 5 (Curb, Gutter, and Sidewalk)
  5. Drawing 6 (Typical Curb Approach)
  6. Drawing 8 (Pedestrian Access)
  7. Drawing 9 (Pedestrian Access Mid Block)
- C. 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 03 (Concrete) and related sections. Concrete driveway, sidewalk, curb and gutter work shall meet the requirements and specifications of APWA 32 16 13 (Driveway, Sidewalk, Curb, Gutter). See Chapter 1.08 (Improvement and Design Requirements) for improvement and design requirements, Chapter 1.12 (Inspection and Testing) for inspection and testing requirements, and Chapter 1.20 (Earthwork and Trenches) for earthwork and trench requirements. Also, see standard drawings related to concrete work.
- D. GENERAL. Supply and Install concrete according to APWA 03 30 04 (Concrete). 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.

- E. AMERICAN DISABILITIES ACT (ADA) REQUIREMENTS. All pedestrian facilities will conform to the current federal ADA standards.
- F. ~~SLIP FORMING. In each known drive approach and at each pedestrian ramp, 12 inch #4 rebar shall be place at 24 inches on center with 4 inches extending into the curb, 2 ½ inches below the top back of curb.~~
- G. COMBINATION CURB, GUTTER, AND SIDEWALK. Combination curb, gutter, and sidewalk will not be allowed unless authorized by the City Engineer.
- H. COLD WEATHER. 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 temperatures are projected to descend below 32°F within 72 hours after placement, concrete shall be covered or otherwise protected against freezing. Calcium chloride may be used only upon City Engineer approval. No more than 1.5% (by weight) of calcium chloride can be used. No calcium chloride shall be used when metal is to be embedded into or in constant contact with the concrete, including but not limited to the following situations:
1. cross gutters
  2. sidewalks reinforced with rebar
  3. light post footings with embedded anchor bolts
  4. slabs with mesh
  5. openings in walls with angle iron headers
  6. steel base plates mounted or embedded in the concrete surface
  7. or any other concrete improvement with non-coated reinforcing steel

Any other admixtures must be approved by the City Engineer.

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.

- I. DEBRIS IN GUTTERS. Once curb and gutter and surface course is in place they shall be kept as clean as possible. Dirt and gravel shall not be placed in gutter or on street. Gutter shall flow freely at all times.
- J. SIDEWALK. When equipment is required to cross over sidewalk, bridging will be provided to protect concrete.
- K. DRIVE APPROACHES. All concrete for a drive approach shall be 65 inches thick in the public right-of-way for residential and 8 inches for non-residential and multi-family driveways. ———

- L. 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.
- M. REPAIR. When authorized by the City Engineer, Contractor may repair concrete damage with Concrete Solution's Ultra Surface Concrete Polymer installed to manufacturer's specifications or an equivalent that is approved by the City Engineer.

## **1.40.020 Installation**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, installation work shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 03 39 00 (Concrete Curing)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to installation.
  - 1. Chapter 1.24 (Earthwork and Trenches)
- C. CUTTING PAVEMENT FOR CURB AND GUTTER INSTALLATION. 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 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.
- D. FORMS AND JOINTS. When pouring concrete along a curve, flexible forms with enough stakes to hold the forms at an even curve shall be used. Straight forms shall not be used on curved sidewalk or curb or gutters.

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.
- E. 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 1.24 (Earthwork and Trenches).
- F. 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. The maximum volume of mixed concrete transported in an agitator shall be in accordance with the specified rating. During adverse weather conditions the City Engineer may deem it necessary for the use of a concrete pump truck.

- G. 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.
- H. 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 03 39 00 (Concrete Curing) 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.

### **1.40.030 Materials and Mixes**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, all materials and mixes work shall meet the requirements and specifications of APWA DIVISION 03 (Concrete).

~~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 in three copies annually along with the following tests on materials and shall be subject to his/her approval:~~

~~Coarse aggregate~~

~~Source~~

~~Deleterious substances~~

~~Los Angeles Abrasion Test~~

~~Sodium Sulfate Soundness Test~~

~~Sieve~~

Fine aggregate

Source

Deleterious substances

Calorimetric Test for Organics

Sodium Sulfate Soundness Test

Sieve and fineness modulus

Cement

Type

Supplier

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. Approval by the engineer of mix proportions shall not relieve the supplier from the responsibility for obtaining the concrete strengths specified or complying with all other provisions of this specification.

~~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 weigh 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. ~~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.

## **1.40.040 Masonry**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, masonry work shall meet the requirements and specifications of the following APWA sections and related sections:
1. APWA Division 04 (Masonry)

- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to masonry.
1. Drawing 3 (Standard Street Cross Sections and Utility Locations)
  2. Drawing 4 (Standard Street Cross Section and Utility Locations)
- C. GENERAL. All masonry work shall meet the requirements and specifications of APWA Division 04 (Masonry) and related sections.
- D. GRAFFITI PROTECTION. Apply [Prosoco Sure Klean Weather Seal Blok-Guard & Graffiti Control WB 6 Weather Seal](#) or approved equivalent to unpainted masonry surfaces at risk to graffiti with installation.

## 1.44 Landscaping

### 1.44.010 General

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, landscaping work shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA 31 05 19 2.7 (Weed Barrier Geotextile)
  2. APWA 31 31 19 (Vegetation Control)
  3. APWA 32 01 10 (Relocate Fences and Gates)
  4. APWA 32 31 13 (Chain Link Fences and Gates)
  5. APWA 32 31 16 (Welded Wire Fences and Gates)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to landscaping.
1. Article 1.04.070 C (Record Drawings)
- C. GENERAL. These specifications are for landscape work completed on public property or private property that will become public property or be owned by an HOA.
- D. 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 given contract payment schedule items.
- E. AS-BUILT OR RECORD DRAWINGS. The contractor must furnish as-built or Record Drawings according to Article 1.04.070 C (Record Drawings). drawings to the City.
- F. GOVERNMENT REGULATIONS. Ship landscape materials with certificates of inspection as required by governmental authorities. Comply with governing regulations applicable to landscape materials.
- G. 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.

- H. 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 32 31 13 (Chain Link Fences and Gates) and APWA 32 31 16 (Welded Wire Fences and Gates) respectively. The relocation of fences and gates shall meet the requirements and specifications of APWA 32 01 10 (Relocate Fences and Gates) and related sections.
- I. VEGETATION CONTROL. Vegetation control shall meet the requirements and specifications of APWA 31 31 19 (Vegetation Control). APWA 31 05 19 2.7 (Weed Barrier Geotextile) fabric shall be installed in all planter beds under rock mulch. Cover fabric with 3" minimum ~~of bark mulch or~~ rock mulch.

#### **1.44.020 Lawns and Grasses**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, lawns and grasses shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 32 01 90 (Plant Maintenance)
  - 2. APWA 32 92 00 (Turf and Grasses)
  - 3. APWA 32 93 13 (Ground Cover)
- B. GENERAL. Lawns and grasses shall meet the requirements and specifications of APWA 32 92 00 (Turf and Grasses) and APWA 32 93 13 (Ground Cover).
- C. GRADING. Till soil to a depth of 4 inches and remove rocks and debris over 1 inch in diameter. The elevation of topsoil relative to walks, hard surfaces or edges shall be:
  - 1. Seeded Areas. 1/2 inches below.
  - 2. Sodded Areas. 1 1/2 inches below.

#### **1.44.030 Trees**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, trees shall meet the requirements and specifications of the following APWA sections and related sections:
  - 1. APWA 32 93 43 (Tree)

2. APWA 32 01 91 (Tree Root Cutting)
  3. APWA 32 01 93 (Pruning Trees)
  4. APWA 32 01 90 (Plant Maintenance)
  5. APWA 31 05 13 (Common Fill)
- B. GENERAL. Tree and work relating to trees shall meet the requirements and specifications of the [City Tree and Landscape Manual](#), APWA 32 93 43 (Tree), APWA 32 01 91 (Tree Root Cutting), APWA 32 01 93 (Pruning Trees) and 32 01 90 (Plant Maintenance). Install per standard G-112. Trees may be planted without a certified arborist when authorized by the City Engineer.
- C. 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 Engineer. Sizes of root balls or containers shall be increased proportionately.
- D. IRRIGATION. All trees shall have an independent isolated irrigation zone with in-line drip (3 rings of drip).
- E. LABELS. Label at least one plant of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.
- F. TOPSOIL. Topsoil shall meet APWA 31 05 13 (Common Fill). A minimum of 4" of topsoil shall be placed in grass areas and 12" in planters. Native soil shall be scarified 6" deep and graded before topsoil is placed.
- G. CITY ARBORIST. City Arborist must be onsite at the beginning of the planting of any trees.
- H. 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 of curb 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.

## 1.48 Irrigation Sprinkler Systems

### 1.48.010 General

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, irrigation sprinkler systems shall meet the requirements and specifications of the following APWA sections and related Divisions:
1. APWA 32 84 23 (Underground Irrigation Systems)

- B. GENERAL. 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 32 84 23 (Underground Irrigation Systems).
- C. 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.
- D. 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.
- E. 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 City Parks Department Representative and obtain written approval before commencing work shown by these drawings.
- F. ~~AS-BUILT SURVEY. The Contractor shall notify the City to survey all underground utilities such as sprinkler pipes, wires and valves either installed or uncovered in the course of construction. Contractor shall give the City 24-hour notice to survey utilities.~~

### **1.48.020 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 equivalent. Transition gaskets are not allowed.
- C. CIRCUIT PIPE FITTINGS. Use solvent weld schedule 40 PVC fittings.
- D. SLEEVES. Pipe and control wire ~~e conduiting and tubing~~ under walks, roads and other hard surfaces shall be installed in solvent weld Class 40 PVC sleeves of

adequate size. Sleeves shall be a minimum of 3 inches in diameter or one and a half times the size of the pipes or conduit whichever is greater. Sleeves shall be straight and level or less than 2% grade.

All wiring shall be placed in its own conduit according to Article 1.48.040 M (Control Wire). There shall be one sleeve for each sprinkler pipe or control wire conduit pipe. A spare sleeve capped on both ends shall be installed at each crossing unless waived by the City Engineer. Sleeves shall extend 18 inches beyond the edge of walks, road, and other hard surfaces. Wire conduit may be ran inside of sprinkler pipe sleeves. Conduit for control wires shall have minimum inside diameters according to the following chart:

### **1.48.030 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 PRS 30 or approved equivalent. Minimum height of a sprinkler head in the lawn shall be 4" and 12" in shrub and flower beds. All ~~lawn~~ spray heads shall be installed on swing pipe with two spiral barbed ells and one street ell between the sprinkler head and the spiral barb. Hunter MP 1000 rotators, MPLCS 515, MPCS515, MPSS530, MP Corner or equivalents are not allowed. MP rotators or equivalents (that are allowed MP 2000, MP300) must be installed in a Hunter Pro-spray PRS 40 sprinkler body or equivalent.
- C. ROTARY HEADS. All rotary type sprinkler heads shall be Rainbird 5000 or 6504 series or approved equivalent. All stream rotary and impact heads capable of distributing more than 6 gallons per minute or more shall be installed on a pre-assembled swing joint by Spears or an approved equivalent.
- D. FILTER. Amiad T Filter with a Brushaway assembly or approved equivalent. The filter should be the same size as the mainline pipe. The Filter shall be enclosed with a lockable wire mesh enclosure. Filters 3" and larger should be the Amiad Mini Sigma automatic filter or approved equivalent. Automatic filters shall be enclosed in a stainless steel enclosure.

### **1.48.040 Controllers, Valves, and Flow Meters**

- A. APWA. Unless otherwise specified in the City Construction and Design Standards, controller valves and flow meters shall meet the requirements and specifications of the following APWA sections, plans, and related sections:
  - 1. APWA Plan 631.1 (Backflow Preventer – Less than 3-Inch Diameter)
  - 2. APWA Plan 631.2 (Backflow Preventer – 3-Inch and Larger)
  - 3. APWA Plan 632 (Drain Valve)

4. APWA Plan 633 (Control Valve)
  5. APWA Plan 651 (Isolation Valve)
- B. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to controller valves and flow meters.
1. Drawing 24 (Typical Culinary Water Connection)
  2. Drawing 25 (Large Meter Assembly)
  3. Drawing 26 (Backflow Prevention Assembly)
- C. CONTROLLER. Controller and pedestal shall be ~~the same type as those used in the City central control system~~ Rainbird ?? or approved equivalent. The controller shall be as described in the irrigation legend on the drawings.
- D. MANUAL MAIN LINE ISOLATION VALVE. See APWA Standard Plan 635 (Isolation Valve). Install a Nibco gate valve or approved equivalent.
- E. MANUAL CIRCUIT ISOLATION VALVE. Brass ball valve with handle.
- F. AUTOMATIC VALVES. Automatic valves shall be Rainbird PEB electric remote control valves or an approved equivalent. A manual circuit isolation valve shall be installed on the supply side of each automatic valve. Install according to APWA Plan 633 (Control Valve), but do not install schedule 80 PVC union. For valves 1.5" and larger allow only one valve per box. 1" valves; 2 valves per standard box or 3 valves per jumbo box.
- G. 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 ~~approved Calsense central~~ control system or be compatible with other approved controllers.
- H. AUTOMATIC DRAIN VALVES. Install according to APWA Plan 632 (Drain Valve).
- I. BACK FLOW PREVENTER. Shall be required on connections to the drinking water system. Install according to APWA Plans 631.1 (Backflow Preventer – Less than 3-Inch Diameter) and 631.2 (Backflow Preventer – 3-Inch and Larger).
- J. STOP AND WASTE VALVES. Stop and waste valves shall be Mueller H - 10288N Oraseal or an approved equivalent. Stop and Waste valve shall be of manual type for operation by handle key.
- K. QUICK COUPLER VALVES. Quick coupler valves 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. Rain Bird model 44LRC or approved equivalent. Must provide one quick coupler key that fits the specified model.

- L. VALVE BOXES. Must be Oldcastle plastic valve boxes, model numbers VB 910, VB 1419, and/or VB 1220 or approved equivalents. 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.
- M. CONTROL WIRE. Install control wire according to APWA Plan 651 (Isolation Valve). 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. Only 2 wire control systems may be installed. All splices must be in a valve box according to Article 1.48.040 L (Valve Boxes). Control wiring shall only be placed in solvent weld Class 40 PVC conduit with sweeps and sized according to the following table:

Minimum Wire 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

All control wire conduit under walks, roads, and other hard surfaces must be installed in sleeves according to Article 1.48.020 D (Sleeves).

**1.48.050 Installation**

- A. CITY CONSTRUCTION AND DESIGN STANDARDS. See the following City Construction and Design Standards for additional specifications related to installation.
  - 1. Article 1.16.040 D (Flushing Inspection)
- B. 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~~begin.
- C. DEPTH AND LOCATION. 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 in conduit according to Article 1.48.020 D (Sleeves)and bundled with a plastic tape every 10 feet.
- D. TRENCH BACKFILL MATERIAL. All trenches shall be backfilled in ~~12-inch~~12-inch lifts and tamped sufficiently to ~~insure~~ensure 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, 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. 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 per city standards. Mechanical joint restraint systems installed to manufacturer's specifications may be installed instead of thrust clocks if approved by city.
- F. FLUSHING. See Article 1.16.040 D (Flushing Inspection).