**KAYSVILLE CITY**
**ORDINANCE 25-06-03**

**AN ORDINANCE AMENDING VARIOUS SECTIONS OF TITLE 8, TITLE 9, TITLE 18, AND TITLE 19; AMENDING SECTIONS OF THE CITY'S TECHNICAL SPECIFICATIONS AND STANDARD DRAWINGS CODE; AMENDING VARIOUS CITY DEVELOPMENT STANDARDS; AMENDING THE CITY'S EXCAVATION PERMIT; AND ADOPTING A CITY DRAINAGE EVALUATION AND DESIGN MANUAL AND A CITY CROSSWALK POLICY**

**WHEREAS,** City staff have completed a review of City Standards and Ordinances; and

**WHEREAS,** Staff are recommending various changes and updates to better safeguard current and future infrastructure.

**NOW THEREFORE,** be it ordained by the Council of the Kaysville City, in the State of Utah, as follows:

**SECTION 1:** **AMENDMENT** "8-5-7 Basis For Establishing The Areas Of Special Flood Hazard" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

8-5-7 Basis For Establishing The Areas Of Special Flood Hazard

The areas of special flood hazard identified by the Federal Emergency Management Agency in the current scientific and engineering report entitled, "The Flood Insurance Study (FIS) for Davis County, Utah", ~~dated June 18, 2007,~~ with accompanying Flood Insurance Rate Maps and/or Floor Boundary-Floodway Maps (FIRM and/or FBFM) ~~dated June 18, 2007~~ and any revisions thereto are hereby adopted by reference and declared to be a part of this Chapter.

**SECTION 2:** **ADOPTION** "9-1-4 Applicable Construction Standards" of the Kaysville City Code is hereby *added* as follows:

ADOPTION

9-1-4 Applicable Construction Standards*(Added)*

Kaysville City hereby adopts by this reference the latest version of American Public Works Association (APWA) Utah Chapter Standard Plans and Specifications. All construction and development within the City shall comply with provisions within the current APWA Standard Plans and Specification. City Code, City Technical Specification, the City's Drainage Evaluation and Design Manual will supersede APWA standards if there is a difference between the standards.

**SECTION 3:** **AMENDMENT** "9-2-10 Parkways" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

9-2-10 Parkways

1. It is the purpose of this Section to establish a means whereby the City may cause the construction, maintenance and/or repair of sidewalks, the trimming of trees, tree roots and other plant growth, and the maintenance of the area between private property lines and curb lines or edge of asphalt, which area is designated as a "parkway" within the City~~, pursuant to the powers granted to it by Chapter 8 of Title 10, Utah Code Annotated, 1953, as amended~~.
2. It is hereby declared that sidewalks which are cracked, buckling, missing or otherwise in disrepair, trees, or other plant growth, which are in need of trimming of roots and/or foliage and noxious weeds and vegetation in the parkways and litter, and obstructions on sidewalks are all a danger to public health and unsightly or deleterious to their surroundings and such conditions shall be prevented, repaired or removed by the abutting owner and/or occupant.
3. ADA ramps within City owned right-of-way shall be owned and maintained by Kaysville City. ADA ramps within private subdivisions that are not located within City owned right-of-way limits shall be privately owned and maintained.
4. The owners and/or occupants of abutting property shall maintain the parkway by removing litter therefrom and by trimming of trees, tree roots or other plant growth and shall promptly remove from the sidewalks abutting their property all litter and obstructions as soon as practicable after its accumulation upon such sidewalks.
5. The City Inspect or shall administer the provisions of this Ordinance subject to control and review as the City Council may from time to time direct. The Public Works Superintendent may appoint other inspectors as needed. The powers and duties of Assistant Inspectors shall be the same as those of the Inspector.
6. The Inspector so designated is authorized to inspect and examine real property situated within the City for the purpose of determining whether or not the parkways, including but not limited to, sidewalks, trees, and plant growth thereon are in need of maintenance or repair. Such Inspector may also inspect and determine whether or not weeds and noxious vegetation should be removed from sidewalks and/or parkways and take other necessary measures and steps to insure compliance with the requirement that sidewalks in front of properties be free from litter and obstructions. Such actions of the Inspector shall be for the purpose of determining whether such conditions pose a threat to the public health, safety and welfare or are unsightly and deleterious to their surroundings. If the Inspector concludes that such conditions exist, the Inspector shall:
    a. Ascertain the names of the owners and/or occupants and descriptions of the premises where such conditions exist.
    b. Serve written notice upon the owner and/or occupant of such land, either personally or by mailing a notice, postage prepaid, return receipt requested, addressed to the owner and/or occupant at their last known post office address, requiring such owner and/or occupant to reconstruct (with 50%

participation by Kaysville City), maintain or repair the defect and/or trim or remove trees or plant growth within such time as the Inspector may designate, which shall not be less than thirty (30) days from the date of service of each notice.

c. Inform the owner and/or occupant by means of said notice or attached document that in the event he or she disagrees with the determination of the Inspector and does not wish to reconstruct, maintain or repair the sidewalks, trim trees, or other plant growth, or maintain the parkway, he or she may request in writing a hearing before the City Council at a time and place to be set by the City Council. A written application for a hearing shall stay the time within which the owner and/or occupant must conform to the decision of the Inspector.

7. The Inspector may also inspect and examine real property situated within the City for the purpose of determining if the sidewalks have not been built and the need of construction.

   If the Inspector concludes that such need of construction exists, the Inspector shall so recommend to the City Council. The City Council shall consider the recommendation and if it concurs, direct that action be taken to have the sidewalk constructed.

   If the Council so directs, the Inspector shall:

   a. Ascertain the names of the owners and/or occupants and descriptions of the premises where such conditions exist.
   b. Serve written notice upon the owner and/or occupant of such land, either personally or by m ailing a notice, postage prepaid, return receipt requested, addressed to the owner and/or occupant at their last known post office address, requiring such owner and/or occupant to construct the sidewalk within such time as the Inspector may designate, which shall not be less than thirty (30) days from the date of service of each notice.
   c. Inform the owner and/or occupant by means of said notice or attached document that in the event he or she disagrees with the determination of the City Council and does not wish to construct the sidewalk, he or she may request in writing a hearing before the City Council at a time and place to be set by the City Council. A written application for a hearing shall stay the time within which the owner and/or occupant must conform to the decision of the City Council.

8. In the event the owner and/or occupant makes such request for a hearing, the City Council shall set the time and place for hearing such objections. The City Inspector shall notify the owner and/or occupant in writing of the time and place at which he or she may appear and be heard. Said hearing shall not be heard within less than five (5) days from the date of service or mailing of said notice. At the written request of an owner and/or occupant, the governing body shall conduct an informal hearing (which need not be reported) wherein said owner and/or occupant may present such evidence and argument as is pertinent to the question of whether or not the construction, maintenance and/or repair of sidewalk, trimming of trees or other plant growth or maintenance of parkway abutting his or her property is within the purview of this Section. The governing body shall also permit the presentation of evidence and argument by the Inspector and other interested parties. Thereafter within not more than

ten (10) days the governing body shall, over the signature of the Mayor or such member of the City Council as it may designate by resolution, render its written decision, a copy of which shall be mailed to or served upon the owner or occupant by the Inspector. In the event the decision of the City Council upholds the determination of the Inspector, the notice originally given by the Inspector as above provided shall be deemed to be sufficient to require the owner or occupant to con struct, maintain or repair sidewalks or trim trees or other plant growth abutting his or her property and owner or occupant shall have up to ten (10) days from the date of notice of the decision within which to conform thereto. In the event that the decision of the City Council either overrules or modifies the determination of the Inspector, the written decision of the City Council shall apprise him of that fact and set forth the details and extent to which the owner and/or occupant must make construction, repairs and/or maintenance of said sidewalks, trim trees or other plant growth, and/or maintenance of parkways, if any. The Inspector shall file an amended notice and proof of service of said notice upon the property owner and/or occupant and file the same in the office of the County Treasurer.

9. If any owner and/or occupant of lands described in such notice or decision shall fail or neglect to conform to the requirements thereof relating to the construction, maintenance, and/or repair of sidewalks abutting his or her property and/or trimming trees or other plant growth, and/or maintenance of parkway, the Inspector shall employ all necessary assistance to cause such construction, maintenance and/or repair, and/or maintenance of parkway to occur at the expense of the municipality. The Inspector shall prepare an itemized statement of all expenses incurred in the construction, maintenance and/or repair of said sidewalks and/or trimming of trees or other plant growth, and shall mail a copy thereof to the owner or occupant, or both, demanding payment within thirty (30) days of the date of mailing. Said notice shall be deemed delivered when mailed by registered mail addressed to the property owner's or occupant's last known address. In the event the owner or occupant fails to make payment of the amount set forth in said statement to the City Treasurer within said thirty (30) days, the Inspector either may cause suit to be brought in an appropriate court of law or may refer the matter to the County Treasurer as provided herein.
10. In the event collection of expenses is pursued through the courts, the City shall sue for and receive judgment for all of said expenses of construction, parkway maintenance, maintenance and/or repair of said sidewalks and/or trimming of trees or other plant growth, together with reasonable attorneys' fees, interest and court costs and shall execute upon such judgment in the manner provided by law.
11. In the event that the Inspector elects to refer the expenses of construction, parkway maintenance, maintenance and/or repair of said sidewalks and/or trimming of said trees or other plant growth for inclusion in the tax notice of the property owner, the Inspector shall make in triplicate an itemized statement of all expenses incurred in the construction, parkway maintenance, maintenance and/or repair of the same, and/or trimming of said trees or other plant growth, and shall deliver the three copies of said statement to the County Treasurer within ten (10) days after the completion of the work of construction, parkway maintenance, maintenance and/or repair of said sidewalks and/or trimming of said trees or other plant growth. Thereupon the costs of said work shall be pursued by the County Treasurer in accordance with the provisions of Section 10-11-4, Utah Code Annotated, 1953, as amended, and the recalcitrant owner shall have such rights and shall be subject to such powers as are thereby

granted.

**SECTION 4:** **AMENDMENT** "9-3-4 Ultimate Responsibility" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

9-3-4 Ultimate Responsibility

The standards and requirements set forth in this Title and promulgated pursuant to this Title are minimum standards and requirements. Any person or entity, including developers, shall also comply with the current standard of care for drainage design, the City's Drainage Evaluation and Design Manual, and best stormwater management practices. This Title does not int-end or imply that compliance by any person will ensure that there will be no contamination, pollution, or unauthorized discharge of pollutants. Any person violating the terms and conditions of this Title or dis-charging contaminated waters into the City's storm drain system shall be liable and responsible for such violations and/or contaminations.

**SECTION 5:** **AMENDMENT** "9-3-5 Storm Drainage Master Plan" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

9-3-5 Storm Drainage Master Plan

~~The City has adopted a master plan for the construction of storm drainage facilities within the City known as the Kaysville City Storm Drainage Master Plan.~~ All construction and development within the City and any connections or discharges of water into the City's storm drainage system shall comply with provisions of the Storm Drainage Master Plan, the Drainage Evaluation and Design Manual, City Code, and technical specifications, ~~as~~which may be amended from time to time.

**SECTION 6:** **AMENDMENT** "9-3-6 UPDES General Permit" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

9-3-6 UPDES General Permit

The City has applied for and received from the State of Utah, Department of Environmental Quality, Division of Water Quality, a UPDES General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (MS4's). All construction and development within

the City and any and all connect-ions and discharges of waters into the City's storm drainage system shall comply with terms, conditions and provisions of the City's U~~D~~PDES General Permit, as may be amended from time to time.

**SECTION 7:** **ADOPTION** "9-3-8 Low Impact Development Manual" of the Kaysville City Code is hereby *added* as follows:

A D O P T I O N

9-3-8 Low Impact Development Manual*(Added)*

All Low Impact construction and development within the City and any and all connections and discharges of waters into the City's storm drainage system shall comply with the provisions of the Low Impact Development Manual, as may be amended from time to time.

**SECTION 8:** **AMENDMENT** "9-3-8 Definitions" of the Kaysville City Code is hereby *amended* as follows:

A M E N D M E N T

9-3-~~8~~9 Definitions

For the purpose of this Title, the following terms, phrases and words shall have the following meanings:

As-built Plans - Drawings depicting conditions as they were actually constructed.

Authorized Enforcement Official - City employees designated to administer and enforce this Ordinance.

Berm - An earthen mound used to direct the flow of runoff around or through a structure.

Best Management Practices (BMPs) - Includes schedules of activities, prohibitions of practices, maintenance procedures, design standards, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly into the waters of the United States. BMPs also include treatment requirements, operating procedures, educational activities, and practices to control plant site runoff spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Catch Basin - A basin combined with a storm drain inlet used to trap solids.

Channel - A natural or artificial watercourse with a definite bed and banks that conducts flowing water continuously or periodically.

City - Kaysville City Corporation.

City Approvals - Any permit or approval required by the City prior to any construction activity, including, but not limited to, site preparation, grading, excavation or construction.

City Storm Sewer System - Storm systems that receive runoff from public rights-of-way, or natural water ways or are identified by easements.

Clean Water Act - The federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), and any subsequent amendments thereto.

Construction Activity - Any land disturbance or construction activities such as clearing, grubbing, grading, excavating, building, and demolition.

Contaminant - Any physical, chemical, biological, or radiological substance or matter in water.

Conveyance System - Any channel or pipe for collecting and directing the stormwater.

Culvert - A covered channel or large diameter pipe that directs water flow below the ground surface.

Degradation - (Biological or Chemical) The breakdown of chemical compounds into simpler substances, usually less harmful than the original compound, as with the degradation of a persistent pesticide. (Geological) Wearing down by erosion. (Water) The lowering of the water quality of a watercourse by an increase in the amount of pollutant(s).

Detention Basin - A depression, designed with an inlet and outlet that regulates water flow and allows debris to settle out, that is capable of detaining storm water runoff until it can be released downstream.

Developed Parcel - Any parcel that has been altered from its natural condition by grading, filling, or the construction of improvements or other impervious surfaces.

Dike - An embankment to confine or control water, often built along the banks of a river to prevent overflow of lowlands; a levee.

Discharge - The release of stormwater or other substance from a conveyance system or storage container.

Drainage - The collection, conveyance, containment, and/or discharge of surface and stormwater runoff.

Drain Inlet - A point of entry into a detention basin, storm drain, or other inlet used to trap solids.

Enterprise Fund - A fund designated to account for the following:

a. Operations, financed and operated in a manner similar to private business enterprises, where the City intends that the costs of providing goods or services to the public are financed or recovered primarily through user charges;
b. Operations where the city requires periodic determination of revenues earned, expenses incurred, and net income;

c. Operations for which a fee is charged to external users for goods or services; or
d. Operations that are financed with debt that is secured solely by a pledge of the net revenues from fees and charges of the operations.

Entity - Any corporation, partnership, limited liability company, organization, association, trust, governmental agency or any other legal entity.

Equivalent Residential Unit (ERU) - The average amount of impervious surface, expressed in square feet, on developed single-family residential parcels in Kaysville City.

Erosion - The wearing away of land surface by wind or water. Erosion occurs naturally from weather or runoff but can be intensified by land-clearing practices related to farming, residential or industrial development, road building, or timber-cutting.

Excavation Permit - A permit issued by the City in accordance with applicable City Ordinances to allow construction activities including, but not limited to, clearing, grubbing, grading and excavation.

Fill - A deposit of earth material placed by artificial means.

Final Stabilization - All soil disturbing activities at the site have been completed and a uniform (e.g. evenly distributed, without large bare areas) perennial vegetation cover with a density of seventy percent (70%) of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent stabilization measures (such as the use of riprap, gabions or geo textiles) have been employed.

First Flush - The delivery of a disproportionately large load of pollutants during the early part of storms due to the rapid runoff of accumulated pollutants.

General Permit - A permit issued under the NPDES or UPDES program to cover a class or category of stormwater discharges.

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Waste - By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (flammable, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

Heavy Metals - Metals of high specific gravity, present in municipal and industrial wastes, that pose long-term environmental hazards. Such metals include cadmium, chromium, cobalt, copper, lead, mercury, nickel, and zinc.

Hot Spot ("priority area") - An area where land use or activities generate highly contaminated runoff, with concentrations of pollutants in excess of those typically found in storm water.

Illegal Discharge - Any direct or indirect non-storm water discharge to the storm drainage system, except discharges from fire fighting activities and other discharges exempted in this Title.

Illicit Connection - Any physical connection to a publicly maintained storm drainage system

allowing discharge of non-storm water which has not been permitted by the public entity responsible for the operation and maintenance of the system.

Impervious Surface - Any hard surface area which prevents or retards the penetration, absorption or entry of water into the ground, or any hard surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from that present under natural conditions pre-existent to development. Common impervious surfaces include, but are not limited to: roofs; sidewalks; concrete or asphalt paving; walkways; patios; decks; driveways; parking lots; storage areas; trafficked or compacted gravel; road base; or other surfaces which similarly impede the natural infiltration storm and surface water.

Individual Permit - A permit issued under the NPDES or UPDES program for a specific facility, whereby the unique characteristics of that facility may be addressed through the imposition of special conditions or requirements.

Infiltration - The downward movement of water from the surface to the subsoil. The infiltration capacity is expressed in terms of inches/hour.

Ingress/Egress - The points of access to and from a property.

Inlet - An entrance into a ditch, storm sewer, or other waterway.

Land Disturbing Activity - Any activity on property that results in a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil.

Maintenance Agreement - A document recorded with land records that acts as a property deed restriction and which provides for long-term maintenance of storm water management practices.

Municipal Separate Storm Sewer System (MS4) - A municipally owned and operated storm water collection system that may consist of any or all of the following: curb, gutter, drainage swales, piping, ditches, canals, detention basins, inlet boxes, or any other system used to convey storm water that discharges into canals, ditches, streams, rivers, or lakes not owned and operated by that municipality.

Mulch - A natural or artificial layer of plant residue or other materials covering the land surface which conserves moisture, holds soil in place, aids in establishing plant cover, and minimizes temperature fluctuations.

Nonpoint Source - Pollution caused by diffuse sources (not a single location such as a pipe) such as agricultural or urban runoff.

Notice of Termination - An authorization, or license, or equivalent control document issued by the State of Utah to terminate the requirements of the NPDES and UPDES permit.

Notice of Violation (NOV) - Whenever the Storm Water Official finds non-compliance with this Title, he or she will order compliance by written notice of violation to the responsible person. Requirements in the NOV may include monitoring, payment of costs of non-compliance and the implementation of Best Management Practices.

NPDES (National Pollutant Discharge Elimination System) - EPA's program to control the discharge of pollutants to waters of the United States.

NPDES Permit - An authorization, or license, or equivalent control document issued by EPA or an approved state agency to implement the requirements of the NPDES program.

Off-site - Any area lying upstream of the site that drains onto the site, any area lying downstream of the site to which the site drains, and any area that is not on-site of the project.

On-site - The entire property that includes the proposed development.

Outfall - The point, location, or structure where wastewater or drainage discharges from a sewer pipe, ditch, or other conveyance to a receiving body of water.

Point Source - Any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

Pollutant - Generally, any substance introduced into the environment that adversely affects the usefulness of a resource. Pollutants may include, but are not limited to: paints, varnishes, and solvents; oil and other automotive fluids; non-hazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; and noxious or offensive matter of any kind.

Receiving Waters - Bodies of water or surface water systems receiving water from upstream constructed or natural systems.

Retention - The holding of runoff in a basin without release except by means of evaporation, infiltration, or emergency bypass.

Riparian - A relatively narrow strip of land that borders a stream or river.

Riprap - A combination of large stone, cobbles and boulders used to line channels, stabilize banks, reduce runoff velocities, or filter out sediment.

Runon - Stormwater surface flow or other surface flow which enters property other than that where it originated.

Runoff - That part of precipitation, snow melt, or irrigation water that runs off the land into streams or other surface water. It can carry pollutants from the air and land into the receiving waters.

Sedimentation - The process of depositing soil particles, clays, sands, or other sediments that were picked up by runoff.

Sheet Flow - Runoff which flows over the ground surface as a thin, even layer, not

concentrated in a channel.

Source Control - A practice or structural measure to prevent pollutants from entering stormwater runoff or other environmental media.

Stabilization - The proper placing, grading and/or covering of soil, rock, or earth to ensure its resistance to erosion, sliding, or other movement.

Storm Drain - A closed conduit for conducting storm water that has been collected by inlets or collected by other means.

Storm Drainage System - The City's storm drainage system is comprised of storm water facilities, improvements, streets, gutters, drains, swales, detention basins, property, or other interests therein made, constructed or acquired by the City for purposes of managing and controlling storm water.

Stormwater - Water produced by storms, surface drainage, snow and ice melt, and spring flows and drainage. Stormwater does not include infiltration.

Storm Water Pollution Prevention Plan (SWPPP) - A document which describes the Best Management Practices and activities to be implemented by a person or business to identify sources of pollution or contamination at a site and the actions to eliminate or reduce pollutant discharges to storm water, storm water conveyance systems, and/or receiving waters.

Structural BMP's - Devices that are constructed to provide control of storm water runoff.

Structural Practices - Constructed facilities or measures to help protect receiving water quality and control storm water quality. Examples include storage, vegetation, infiltration and filtration.

Swale - An elongated depression in the land surface that is at least seasonally wet, is usually heavily vegetated, and is normally without flowing water. Swales direct stormwater flows into primarily drainage channels and allow some of the stormwater to infiltrate into the ground surface.

Treatment Control BMP - A BMP that is intended to remove pollutants from stormwater.

UPDES - Utah Pollutant Discharge Elimination System.

UPDES Permit - An authorization, or license, or equivalent control document issued by the State of Utah to implement the requirements of the NPDES and UPDES program.

Waters of the State - Surface waters and ground waters within the boundaries of the State of Utah and subject to its jurisdiction.

Waters of the United States - Surface watercourses and water bodies as defined in 40 CFR § 122.2. including all natural waterways and definite channels and depressions in the earth that may carry water, even though such waterways may only carry water during rains and storms and may not carry storm water at and during all times and seasons.

Wetlands - An area that is regularly saturated by surface or ground water and subsequently

characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions. Examples include: swamps, bogs, marshes, and estuaries.

**SECTION 9:** **AMENDMENT** "9-3a-4 Destruction Or Interference With System" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

9-3a-4 Destruction Or Interference With System

It shall be unlawful for any person to destroy, modify, relocate, deface, injure, ~~or~~ interfere with, or fail to maintain the operation of any part, pipe, fixture, or appurtenance of the storm drainage system in any way that impairs the function of the system, or has a detrimental impact on that or other infrastruture or real property. The City Engineer shall determine impairments or impacts and shall have the authority to require removal or remediation.

**SECTION 10:** **AMENDMENT** "9-3a-5 Storm Drain Utility" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

9-3a-5 Storm Drain Utility

1. There is hereby created and established a storm drain utility as part of the city overall storm drainage system. The storm drain utility shall oversee the planning, design, construction, maintenance, and operation of~~plan, design, construct, maintain, administer and operate~~ the city storm drainage system.
2. There is hereby established a storm drain utility enterprise fund to handle all income, expenses and other financial transactions related to the storm drain utility. All storm drain utility service charges shall be deposited in the enterprise fund. Money in the storm drain utility enterprise fund may pay other city funds for services and expenses directly attributable to the storm drain utility. The enterprise fund shall be operated according to state law and city policy.
3. The storm drain utility shall operate independently of city operations funded by the general fund. The storm drain utility shall have the same relationship to the city as other city utilities, such as the sewer utility and the culinary water utility. Upon creation of the utility, all of the city storm water facilities and assets (other than streets and other facilities and assets designated by the City Council) shall be transferred to the storm drain utility in consideration for the storm drain utility assuming primary responsibility for planning, designing, constructing, maintaining, administering and operating the City storm drainage system.

**SECTION 11:** **AMENDMENT** "9-3c-4 Obstructions" of the Kaysville City Code is hereby *amended* as follows:

A M E N D M E N T

9-3c-4 Obstructions

1. **Obstruction**. It is unlawful for any person or entity to obstruct, allow an obstruction, or contribute to the obstruction of the flow of storm water runoff or non-storm water runoff into any detention basin, storm drain, curb and gutter, drain inlet, drainage ditch, open channel, or other associated structural controls that convey storm water and/or non - storm water runoff, unless the obstruction is authorized in writing by the City.
2. **Interference**. It is unlawful for any person or entity to cause any obstruction that inhibits the normal flow of storm water and/or non-storm water runoff in any curb and gutter, drainage ditch, open channel, or other associated structural controls that convey storm water and/or non-storm water runoff, unless the obstruction is associated with a street and/or storm drainage improvement project and is authorized in writing by the City and granted with the issuance of a permit signed by an authorized agent of the City.
3. **Covering Inlet**. It is unlawful for any person or entity to cover any drain inlet for any reason or purpose, unless the obstruction is authorized in writing by the City; provided, however, that a drainage system inlet may be temporarily obstructed in emergency situations in order to prevent contaminants from entering the storm drainage system.
4. **Exceptions**. Subsections (1) and (2) of this Section shall not apply during clean-up periods established by the City, provided the materials are placed according to any directions from the City and do not obstruct drain inlets.

**SECTION 12:** **AMENDMENT** "9-3d-8 Private Storm Water Facilities" of the Kaysville City Code is hereby *amended* as follows:

A M E N D M E N T

9-3d-8 Private Storm Water Facilities

1. In instances on private property, or outside of City right of way, where utilities are proposed for collecting, conveying, detaining, or treating storm water or ground water, and said water ultimately flows into a storm drainage system located within City right of way, the owner(s) of said utilities shall:
    a. Be required to first submit construction drawings stamped by a licensed professional engineer that detail the proposed installation, with supporting calculations. Construction of the private utility, its discharge volumes and general function shall comply with the requirements existing codes, Kaysville City Drainage Evaluation and Design Manual, the City LID Manual, laws and

regulations.

b. Be required to obtain a Storm Water Maintenance agreement detailing the ownership and maintenance requirements prior to any land disturbance. This agreement shall be recorded with the Davis County Recorder's Office.
c. Bear the cost and responsibility of installing and maintaining all private utilities and their connections to the City owned storm drainage system.

2. The owner(s) of a private utility shall be liable for the private utility, its maintenance, the water within it, and any impacts from said water or utility.
3. Any private utility that does not have a Storm Water Maintenance Agreement, but that was installed with approval from the City prior to the effective date of this chapter shall be allowed to continue operating, but shall not be altered without a storm water maintenance agreement.
4. Any private utility found to pose a significant hazard to property, public health or environmental quality, or that is found in violation of any laws or regulations regarding water quality shall be required to remedy any applicable deficiencies or halt any activities constituting or resulting in a violation of State laws or regulations, in accordance with the requirements of subsections (a)-(c) of this chapter. Failure to remedy deficiencies or halt said activities may result in the removal of the connection to the City storm drainage system and any applicable penalties.
5. Violations of this chapter may result in the private utility losing its ability to connect with or discharge into the storm drainage system, and may also result in penalties and fees.

**SECTION 13:** **AMENDMENT** "9-4-17 Water Use Time Restrictions" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

9-4-17 Water Use Time Restrictions

1. No outside use of culinary or secondary water shall be allowed between the hours of 10:00 AM and 6:00PM unless otherwise directed in writing by the public works director or specific water provider. This restriction shall not include supervised hand watering. This shall not have any effect on any entity covered by agricultural zoning designations.
2. Culinary water shall not be used for irrigation purposes prior to the first irrigation company, within Kaysville City, beginning their service or after the last irrigation company ends their service for the irrigation season.

**SECTION 14:** **AMENDMENT** "18-3-8 Drainage" of the Kaysville City Code is hereby *amended* as follows:

A M E N D M E N T

18-3-8 Drainage

Residential building sites shall be adequately drained.

1. The Owner shall make site improvements to protect the structures and provide adequate site drainage.
2. The Owner shall pay the sites proportional share of the cost of the regional detention facility and conveyance to the main channel. If the building site is within a subdivision that has fulfilled the controlled release requirements, this site participation is waived.
3. If a~~the~~ building site is within one hundred feet (100') of a main channel for which Davis County has jurisdiction, the Owner shall comply with all Davis County Flood Control requirements as approved by Davis County.
4. Wherever it is feasible, ~~T~~the Owner shall design and construct~~evaluate options for constructing~~ LID facilities that infiltrate, evapotranspire or naturally filter when required by State Code and the City's LID manual. The City's LID manual shall be used to determine feasibility and guide this evaluation.
5. A Water Quality Volume (WQV) shall be calculated per requirements in the City's LID manual. If required, ~~T~~the WQV shall be retained as feasible, with any portion of the WQV that is not able to be retained being treated before leaving the site instead. Feasible is defined in the LID manual.
6. The Owner shall comply with all requirements of Kaysville City subdivision code and the City's Drainage Evaluation and Design manual, which may be amended from time to time.

**SECTION 15:** **AMENDMENT** "18-4-2 Site Plan Requirements" of the Kaysville City Code is hereby *amended* as follows:

A M E N D M E N T

18-4-2 Site Plan Requirements

The following steps are required:

1. The Developer contacts the City Engineer for information concerning the City requirements and compatibility with the General Plan, and discusses with staff members the proposed plan of development.
2. The Developer submits the following to the City Engineer:
    a. Six (6) copies of the preliminary site plan. The preliminary site plan shall include the following minimum requirements.
        i. Title of development.
        ii. Name, address, and telephone number of owner, developer, and engineer.
        iii. North arrow, drawing scale of at least one inch equals fifty feet (l"=50') or larger, and date.
        iv. Vicinity map showing abutting properties and owners uses of abutting

properties, and City streets.

v. Dimensions of property and all lots (including area in square feet), drawn accurately to scale.
vi. Dimensions of existing and proposed buildings (including area in square feet), drawn accurately to scale and showing uses and type of construction.
vii. Adjoining buildings and uses.
viii. Layout of street system, including designations.
ix. Location of existing and proposed curb, gutter and sidewalk. If property abuts a State Highway, approval of the State Right-of-Way Engineer must be obtained for location of curb, gutter and sidewalk. Location and number of curb entrances must be approved by UDOT. On City streets the location and number of curb entrances must be approved by the City Engineer.
x. Location of existing edge of asphalt surfacing.
xi. Location of proposed paved areas, including entrances and exists, and walkways.
xii. Location of proposed LID and/or water quality treatment facilities.
xiii. Location and number of parking stalls, loading areas, and docks.
xiv. Easements.
xv. The flood hazard zone(s) if the development is in an area of special flood hazard.

b. Conditional Use Permit application if the development includes a conditional use (see KCC 17-30).

3. The City staff will review the documents and approve, modify, or disapprove the preliminary site plan. Ten (10) working days are allowed for completion of the staff review for each submittal or resubmittal. If a conditional use is included, the preliminary site plan approval is contingent upon and in conformity to the preliminary conditional use approval by the Planning Commission.
4. The Developer pays the site plan review fee at the City Office.
5. The Developer submits the following to the City Engineer:
    a. Three (3) copies of the final site plan. The final site plan shall include the following minimum requirements.
        i. All items required for a preliminary site plan.
        ii. Location and size of existing and proposed culinary water, sanitary sewer, storm sewers, and electric power utilities.
        iii. Calculations for and location of storm water detention facilities.
        iv. Calculations for and locations of storm water quality facilities.
        v. Location of nearest existing and proposed fire hydrants.
        vi. Location of any existing irrigation systems including open ditches, pipe culverts, diversion boxes and clean outs.
        vii. Location of any existing or proposed drainage facilities or channels, including streams, creeks, pipes, culverts, inlets, manholes, boxes, screens, clean outs.
        viii. Landscaping plan.
        ix. Location of all fences, lighting, signs, refuse collection areas and other items to be included on site.
        x. Drawings, sketches or perspectives of proposed buildings.

xi. The flood hazard zone(s) and the items listed in KCC 8-5-18, if the development is in an area of special flood hazard.

b. Utility service (load) information.
   i. Electrical power.
   ii. Culinary water and fire protection pressure and flow requirements.
   iii. Sanitary sewer quantity and quality parameters.
c. Building plans sufficient to meet the requirements for building permits.
d. A copy of the site plan review fee receipt.

6. As applicable, the Utah State Department of Transportation, Sewer District, irrigation provider, Davis County Flood Control, or other agencies will review the submitted items for compliance.
7. The City staff will review the documents and approve, modify, or disapprove the final site plan. Ten (10) working days are allowed for completion of staff review for each submittal or resubmittal.
   a. Approval of preliminary and final site plans shall not be construed as an approval of any violation of City, County, State or Federal Code. Plans should be designed in accordance with the Standard of Care, and the City's review and approval of plans does not constitute a "peer review" of the plans. City approval of plans is strictly limited to mean that the plans appear to meet City code and standards

8. The Developer does the following at the City Office:
   a. Furnishes proof of compliance with all the requirements of the pressure irrigation provider.
   b. Applies for a building permit(s) and pays the required fees to include:
      i. Impact fees.
      ii. Utility extension fees.
      iii. Plan checking fee(s).
      iv. Building permit fee(s).
9. The Developer and contractors and other representatives meet with City representatives in a preconstruction conference and then the Developer constructs the on-site and off-site improvements in accordance with the approved Plan and the City Subdivision Ordinance, Specifications, and Standard Drawings, with inspection by the City.
10. When the site improvements are completed, the Developer submits As-Built Drawings to the City Engineer who will then have the site inspected for Construction and certify completion.
11. The Developer provides the improvement warranty and cash deposit in an amount of ten percent (10%) of the actual cost of the improvements installed as in KCC 19-2-4 of the Subdivision Ordinance.
12. When structures are completed, with required inspection, the Developer notifies the Building Official.
13. The Building Official will conduct a final inspection of the structure(s) and issue the Certificate(s) of Occupancy upon finding all in compliance.
14. Near the end of the Warranty Period, the City inspects the improvements and the developer corrects deficiencies.
15. When the improvements comply with City standards, the developer has a Slurry Seal Type III applied to all new asphalt pavement in streets, then the improvement warranty

and cash deposit are released.

**SECTION 16:** **AMENDMENT** "18-4-8 Storm Water" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

18-4-8 Storm Water

The developer shall install storm water infrastructure as outlined in Kaysville Subdivision Code, the City's LID Manual, and the City's Drainage Evaluation and Design Manual.

~~A storm drainage plan has been prepared and is maintained by Kaysville City and Davis County. The developer shall implement the portion of that plan applicable to the development by: Preparing a detailed drainage plan for the development which is acceptable to the City. Making sufficient improvements, such as storm drains, cross gutters, catch basins, inlets, and other appurtenance structures, to adequately dispose of 10-year frequency storm runoff within the development and from adjacent properties. Said disposal system shall include the retention of treatment of the WQV, as detailed in the City's LID Manual. Storm drains shall be not less than fifteen inches (15") in diameter and meet City standards and specifications.Providing for restriction of the runoff from the development to 0.20 cubic feet per second per acre per 100-year frequency rainfall event through one or more of the following, at the direction of the City: If the development is within one hundred feet (100') of a main channel, complying with all Davis County Flood Control requirements and being approved by Davis County.Conveyance (including easements) of the runoff to a regional detention/retention/treatment site and paying the development's proportional share of the cost of the regional detention facility and conveyance to the main channel; or Dedicating land and constructing regional detention/retention/treatment within the development and conveyance to a main channel if said development contains a proposed detention/retention/treatment site. The developer may be compensated for the cost of the regional detention and conveyance to a main channel for that which is not the proportional share for the development; or If the development is within a subdivision that has fulfilled the controlled release requirements, complying with the storm drainage requirements of the subdivision. Conveyance of the runoff to a site within the development dedicated and constructed for detention/retention/ treatment.Unless otherwise directed or agreed to by the City Engineer, any infrastructure not located in a City right of way or on City owned property that is installed or used for the conveyance/treatment/detention/retention of storm water shall require a Storm Water Maintenance Agreement to be approved by the Storm Water Official and shall be recorded with the Davis County Recorder's Office, as per KCC 9-3d-8.~~

**SECTION 17:** **AMENDMENT** "19-1-7 Definitions" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

19-1-7 Definitions

The following words and phrases used in this Title shall have the respective meanings hereinafter set forth, unless a different meaning clearly appears from the context:

Adjacent Landowners - Any property owner of record, according to the records of the County Recorder. whose property adjoins or abuts property proposed for subdivision, or any portion thereof.

Administrative Land Use Authority - Kaysville City Staff

Alley - A public right-of-way less than 30 feet (30') wide.

Approval of Plans - Preliminary and Final site plans, subdivision plats and plat amendments are reviewed for overall design and compliance with City Code and Standards by the Administrative Land Use Authority. The City review shall not shift the liability, the Standard of Care responsibility, or the responsibility of a thorough peer review from the Engineer-of-Record to the City.

Block - The land surrounded by streets and other rights-of-way other than an alley, or land which is designated as a block on any recorded subdivision plat.

Boundary Adjustment - An agreement between adjoining property owners to relocate a common boundary that results in a conveyance of property between the adjoining lots, adjoining parcels, or adjoining lots and parcels. A Boundary adjustment does not create an additional lot or parcel. It does not include an adjustment made by the Department of Transportation.

Boundary Establishment - An agreement between adjoining property owners to clarify the location of an ambiguous, uncertain, or disputed common boundary. A Boundary establishment does not create an additional lot or parcel. It does not include an adjustment made by the Department of Transportation.

City - Kaysville City.

City Council - The Kaysville City Council.

City Engineer - The Kaysville City Engineer.

Condominium Project - A real estate condominium project. A plan or project whereby two or more units, whether contained in existing or proposed apartments, commercial or industrial buildings or structures or otherwise, are separately offered or proposed to be offered for sale. Condominium project shall also mean the property where the context so requires.

Dedication - Land set aside by an owner for any general and public uses, reserving for themself no other rights than such as are compatible with the full exercise and enjoyment of the public uses to which the property has been devoted. The intention to dedicate shall be evidenced by the owner by the presentment for filing of a final plat showing the dedication thereof.

Developer - Any person, including a corporate person, who undertakes to develop land, including Subdividers.

Development - The improvement of any tract. lot, or parcel of land by construction thereon.

Easement - That portion of a lot or lots reserved or granted for the present or future use by a person or agency other than the legal owner or owners of said property or properties. The easement may be for use under, on the surface, or above said lot or lots.

Final Plat - The final drawing of the subdivision and dedication prepared for filing for record with the County Recorder and in compliance with all the requirements set forth in this Title and adopted pursuant thereto.

General Plan - The Kaysville City General Plan.

Improvement Completion Assurance - A cash deposit furnished and filed with Kaysville City in an amount equal to one hundred fifteen percent (115%) of the current cost of a Slurry Seal Type III on all asphalt pavement in streets, as determined by licensed contractor quote.

Improvement Warranty - Applicant's unconditional warranty that the accepted improvements comply with Kaysville City's written Standards for Design, Materials, and Workmanship and will not fail in any material respect, as a result of poor workmanship or materials, during the Improvement Warranty Period, and a cash deposit furnished and filed with Kaysville City in an amount often percent (10%) of the actual costs of the improvements less the Slurry Seal Type III on all asphalt pavement in streets.

Improvement Warranty Period - A period of one (1) year after the Applicant provides the Improvement Warranty and the City accepts the improvements unless the City determines for good cause that a one-year period would be inadequate to protect the public health, safety, and welfare and has substantial evidence, on record, of prior poor performance by the Applicant or that the area upon which the improvements were constructed contains suspect soil and the Applicant has not mitigated the suspect soil.

Lot - A parcel of land comprising a unit within a subdivision or a unit of land for building development or transfer of Ownership, together with such yards, open spaces, lot width, and area as required by this Title and the Zoning Ordinance of Kaysville City.

~~Lot Line Adjustment - The adjustment of a mutual boundary between either multiple subdivided lots or multiple established lots of record where the property line is modified in compliance with yard, lot size, and frontage requirements for the applicable zoning district and where no new lot is created.Lot Consolidation - The combination of two or more lots whether previously subdivided or established lots of record where the legal description of more than one contiguous parcel of property is revised into one legal description encompassing all such parcels of property and where no zoning violation is created.~~

Major Street Plan - A plan, labeled "Major Street Plan" approved by the City Council which identifies the major street network of Kaysville City and requirements thereof.

Off-site - Outside a specific parcel of land being developed or considered for development.

On-site - Within a parcel of land owned by a private citizen or by a private legal entity.

Parcel of Land - A contiguous quantity of land in the possession of, owned by, or recorded as the property of the same owner or person.

Person - An individual, corporation, partnership, organization, association, trust, governmental agency or any other legal entity.

Pioneer Developer - A Developer that acquires easements or rights-of-way or installs improvements that provide service for development of a site other than the Development of the pioneer developer and enters into a Pioneer Developer Agreement approved by the City.

Planned Residential Unit Development - A subdivision of land guided by an integrated design in which residential lots may have areas less than the minimum lot area of the zone in which the subdivision is located, and other regulations, except use regulations, may be waived or varied to allow flexibility and initiative in site and building design and location, in accordance with an approved plan and imposed general requirements.

Planning Commission - The Kaysville City Planning Commission.

Plat - A map or depiction of a subdivision, showing thereon the division of a tract or parcel of land into lots, blocks, and streets, or other divisions and dedications.

Protection Strip - A strip of land bordering both the boundary of a subdivision and a street within the subdivision for the purpose of controlling the access of property owners abutting the subdivision to the street.

Simple Boundary Adjustment - a boundary adjustment that does not affect a public Right of Way, municipal utility easement, other public property, an existing easement, onsite wastewater system, an internal lot restriction, or result in a lot or parcel out of conformity with land use regulations.

Streets:

a. Street - Public rights-of-way, including highways, avenues, boulevards, parkways, roads, lanes, walks, alleys, viaducts, subways, tunnels, bridges, public easements and other ways.
b. Street, Arterial - A street, existing or proposed, which serves or is intended to serve as a major traffic way and is designated in the Major Street Plan.
c. Street, Collector - A street, existing or proposed, which collects and distributes traffic and is designated in the Major Street Plan.
d. Street, Significant Local - A street, existing or proposed, which is supplementary to an arterial street or a collector street and is designated in the Major Street Plan.
e. Street, Local - A street which is not otherwise classified.
f. Street, Private - A right-of-way or casement in private ownership, not dedicated or maintained as a public street, which affords the principal means of access to two (2) or more sites.
g. Street, Cul-de-sac - A terminal street provided with a turnaround with a 100-foot minimum diameter. Cul-de-sac streets shall not be any longer than six hundred feet (600') from the centerline of the adjoining street to the center of the turnaround.

Subdivider - Any person, including a corporate person, who undertakes to create a subdivision.

Subdivision - Any land that is divided, resubdivided 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. Subdivision includes the division or development of land whether by deed, metes and bounds description, devise and testacy, lease, map, plat, or other recorded instrument; and divisions of land for all residential and nonresidential uses, including land used or to be used for commercial, agricultural, and industrial purposes.

Subdivision Amendment - Means an amendment to a recorded subdivision that vacates all or a portion of the subdivision, increases the number of lots within the subdivision, alters a public right-of-way, a public easement, or public infrastructure, or alters a common area or other common amenity within the subdivision. A Subdivision amendment does not include a simple boundary adjustment.

Suspect Soil - Soil that has a high susceptibility for volumetric change, typically clay rich, having more than a three percent (3%) swell potential; bedrock units with high shrink or swell susceptibility; or gypsiferous silt and clay, gypsum, or bedrock units containing abundant gypsum commonly associated with dissolution and collapse features.

Zoning Ordinance - The Planning and Zoning Ordinance of Kaysville City, as adopted by the City Council and as amended.

Other definitions as used in the Municipal Land Use Development and Management Act, Section 10-9a-l03, may be used in applying and interpreting this Chapter, if applicable and not in conflict herewith.

**SECTION 18:** **AMENDMENT** "19-2-1 Subdivision Development Process" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

19-2-1 Subdivision Development Process

The following steps are required:

1. The Subdivider contacts the City for information concerning the City subdivision requirements and compatibility with the General Plan, and discusses the proposed plan of development prior to preparing any plats, plans or charts.
    a. If an applicant requests a pre-application meeting, Kaysville City shall, within 15 days after the request, schedule the meeting to review the concept plan and give initial feedback.
    b. At the pre-application meeting, the Staff shall provide or have available on the city website the following:

i. Copies of applicable land use regulations;
ii. A complete list of standards required for the project;
iii. Preliminary and final application checklists; and
iv. Feedback on the concept plan.

2. The Subdivider pays the preliminary plat fee at the City Office.
3. The Subdivider submits the following to the City for preliminary plat:
    a. The preliminary plat prepared by a registered engineer or surveyor and supporting documents as specified in KCC 19-3-3.
    b. A copy of the preliminary plat fee receipt.
    c. The Owner's affidavit.
    d. An electronic copy of all plans in PDF format.
4. The Subdivider submits copies of the preliminary plat and any applicable utility load information to agencies and service providers as needed. If a State highway is involved, the Subdivider provides evidence of approval of access, curbs, gutters, and sidewalks by the Utah Department of Transportation to the City.
5. City staff will review the documents and make recommendations. Fifteen (15) working days are allowed for completion of staff review for each submittal or re-submittal.
6. Upon completion of the staff review, the City will notify the Subdivider and provide comments on any necessary modifications or required additional information.
7. After a preliminary plat is submitted, the City shall provide a public comment opportunity, which shall:
    a. Include posting a notice at the proposed development site with instructions on how and when comments may be submitted.
    b. Encourage comments to identify specific sections of City code or standards which are applicable to the comment.
    c. Encourage a subdivider to meet with stakeholders prior to submitting a tentative final plat and solicit feedback regarding their proposed development.
8. The Subdivider pays the final plat fee at the City Office.
9. The Subdivider submits the tentative final plat to the City.
10. City Staff checks the tentative final plat for compliance with conditions and returns one copy to the Subdivider.
11. The Subdivider submits the final plat and irrigation system drawings to any irrigation providers involved and obtains approval.
12. The Subdivider submits the following to the City:
    a. The final plat prepared by a registered engineer or land surveyor in accordance with KCC 19-4-3.
    b. Cross sections and profiles of the streets and all other construction drawings related to all of the improvements to be constructed within the subdivision. All such drawings and materials must be signed and stamped by a registered professional engineer.
    c. Open space improvement drawings if applicable.
    d. Low Impact Development (LID) and/or storm water facility details. Depending on site conditions or complicating factors, the City may require a written geotechnical report supporting assumptions made when calculating the Water Quality Volume (WQV), as defined in the City's LID manual, and any subsequent calculations on infiltration and LID facility sizing.
    e. Title Report.

f. Written results of a test for suspect soils in the area upon which public improvements will be constructed.
g. Agreements, if applicable.
h. Copy of final plat fee receipt.

13. City staff will review the documents and provide comments on any necessary modifications or require additional information. Twenty (20) working days are allowed for completion of staff review for each submittal or re-submittal. No more than four (4) review cycle are permitted. The City may only add new relines after the first review cycle in response to changes made by the applicant or if a correction is necessary to protect public health or safety, or to enforce state or federal law.
    a. If, on the fourth or final review, the City fails to respond within twenty (20) business days, the City shall, upon request of the property owner, and within ten (10) business days after the day on which the request is received;
        i. For a dispute arising from the subdivision improvements plans, assemble an appeal panel in accordance with Utah Code to review and approve or deny the final revised set of plans. Unless otherwise agreed by the applicant and the municipality, the panel shall consist of the following three experts:
            (1) One licensed engineer, designated by the City;
            (2) One licensed engineer, designated by the land use applicant; and
            (3) One licensed engineer, agreed upon and designated by the two designated engineers, as appointed by the City and applicant.
        ii. A member of the panel assembled by the City may not have an interest in the application that is the subject of the appeal.
        iii. The land use applicant shall pay:
            (1) 50% of the cost of the panel; and
            (2) The City's published appeal fee; or
        iv. For a dispute arising from the subdivision ordinance review, advise the applicant, in writing of the deficiency in the application and of the right to appeal the determination to a designated appeal authority.
14. Upon completion of staff review, the City will notify the Subdivider.
15. The City Attorney will review the documents submitted to ensure adequacy and sign the plat when approved.
16. The Subdivider must then pay the following fees at the City Office:
    a. Development fees.
    b. Recording fees.
    c. Inspection fees.
    d. Utility extension fees.
17. The Subdivider submits the Storm Water Pollution Prevention Plan (SWPPP) and Notice of Intent (NOI) for the subdivision to the Storm Water Manager or their designee.
18. The Subdivider and contractors and other representatives meet with City representatives in a preconstruction conference.
19. The Subdivider submits an Excavation Permit application for work within City streets and/or right of way (KCC 9-2-9) and pays the necessary cash deposit and fee amounts.

20. The Subdivider constructs and installs all improvements, except the preventative maintenance surface treatment with inspection by the City. In the event the Subdivider desires to begin construction of ~~residential~~ buildings before improvements are installed in the subdivision phase, the City may accept building permit applications upon compliance with all other requirements, including recording the plat, plus the following:
    a. The Subdivider shall guarantee the proper installation of improvements in accordance with Kaysville City standards and specifications, by cash deposit furnished and filed with Kaysville City or escrow in an amount equal to one hundred ten percent (110%) of the cost of the installation of the improvements as determined by licensed contractor quote.
    b. Meet all requirements for the issuance of a building permit under the building and fire code.
    c. In accordance with building code, any retaining walls, or similar structures, in excess of four (4) feet from the bottom of the footing to the top of the wall, shall be designed by a licensed engineer. A report from, and stamped by the licensed engineer of record (or an agency approved by the City) shall certify the installed structure is compliant with the design.
    d. No final building inspection will be scheduled nor conducted and no occupancy allowed until all subdivision phase improvements have been completed and certified.

21. The Subdivider has as-built drawings prepared and submits them, the Improvement Completion Assurance and Improvement Warranty to the City.
22. The Public Works Superintendent certifies that the improvements are completed.
23. The City Engineer addresses the lots on the plat and has the final plat recorded at the office of the Davis County Recorder and then building permit applications will be accepted.
24. The City accepts the improvements and the Improvement Warranty Period begins.
25. Near the end of the warranty period, the Subdivider requests a City Inspection of the improvements and the Subdivider corrects all deficiencies identified in the punch list provided by the city inspector.
26. When the improvements comply with City standards as certified by the Public Works Superintendent, the Subdivider applies a preventative maintenance seal coat on all asphalt pavement in streets, then the Improvement Warranty Period ends and the Improvement Completion Assurance and Improvement Warranty are released.

**SECTION 19:** **AMENDMENT** "19-2-7 Lot Line Adjustments And Lot Consolidations" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

19-2-7 Lot Line Adjustments And Lot Consolidations

Applications that meet the definition of a boundary ~~lot line~~ adjustment ~~or lot consolidation~~ shall be processed in the following manner.

1. Simple Boundary Adjustments:
    a. The applicant petitioning for a simple boundary ~~lot line~~ adjustment contacts the City for information concerning the adjustment process. ~~City's amended plat requirements and discusses the proposed plan prior to preparing any plats, plans or charts~~.
    b. The applicant pays the simple boundary~~lot line~~ adjustment~~/lot consolidation~~ fee at the City Office.
    c. The applicant submits the following to the City:
        i. A conveyance document that complies with Utah State Code.~~n amended plat prepared by a registered engineer or surveyor and supporting documents as specified in KCC 19-4-3 with the signature blocks for the following:~~
        ~~City Engineer approval.~~
        ~~City Attorney approval~~.
        ii. A description of all lots or parcels affected by the proposed boundary adjustment~~ copy of the lot line adjustment/lot consolidation fee receipt~~.
        iii. ~~Preliminary Title Report.~~
        iv. ~~Agreements, if applicable.~~
        ~~The applicant submits copies of the amended plat and any applicable utility load information to agencies and service providers as needed.~~
        ~~The applicant submits the final plat and irrigation system drawings to any irrigation providers involved and obtains approval.~~
    d. The City staff will review the submitted documents. Fifteen (15) working days are allowed for completion of staff review for each submittal or re-submittal.
        i. City staff will review the documents to verify the following:
            (1) The conveyance document complies with Utah State Code.
            (2) Property descriptions are accurate.
            (3) Public Right of Way is not affected.
            (4) Municipal utility easements or other existing easements are not affected.
            (5) Public property is not affected.
            (6) Onsite wastewater systems are not affected.
            (7) No internal lot restrictions are violated.
            (8) No resulting lot or parcel will be out of conformity with land use regulations.
    e. Upon completion of the staff review, the City will notify the applicant of any necessary changes to comply with applicable standards and ordinances.
    f. Once it has been determined that the documents meet State and City requirements, the documents shall be recorded with Davis County.~~ the amended plat meets all applicable standards and ordinances, the City assign addresses to each lot on the plat as needed and notify the applicant to submit a mylar copy of the approved plat~~.
2. Full Boundary Adjustments:
    a. The applicant petitioning for a full boundary adjustment contacts the City for information concerning the adjustment process.
    b. The applicant pays the full boundary adjustment fee at the City Office.
    c. The applicant submits the following to the City:

i. A conveyance document that complies with Utah State Code.
ii. A survey that complies with Utah State Code.
iii. A proposed plat amendment corresponding with the proposed full boundary adjustment.
(1) The plat amendment shall include signature blocks for the following:
(A) City Engineer Approval
(B) City Attorney Approval
(C) A signature block in the lower right hand corner of the drawing for the County recording information
iv. Preliminary Title Report.
v. Agreements, if applicable.
vi. Any applicable utility load information to agencies and service providers as needed.

d. The City staff will review the submitted documents. Fifteen (15) working days are allowed for completion of staff review for each submittal or resubmittal.
i. City staff will review documents to verify the following.
(1) The proposal submitted to the City includes all necessary information.
(2) The survey does not violate any City Land Use regulation.
(3) The plat amendment meets State Code, City Land Use Code, City Subdivision Code, and any other applicable City Code.

e. Approval of the final plat shall be effective until the later of:
i. One (1) year after the date of approval by the City; or
ii. The last day of extension period approved by the City.
iii. If the plat amendment ~~final plat~~ has not been offered for recording, with all approval steps completed, within the applicable period, the plat shall not be recorded or received for recording and shall have no validity whatsoever.

f. Upon completion of the staff review, the City will notify the applicant of any necessary changes to comply with applicable standards and ordinances.

g. Once it has been determined that the documents meet State and City requirements, the documents shall be recorded with Davis County.

3. Boundary Establishment

~~4. The City Attorney will review the documents submitted to insure adequacy and sign the plat when approved.The City Engineer then signs the plat then has the final plat recorded at the office of the Davis County Recorder after which building permit applications will be accepted.It shall be unlawful for any person to change the lines, drawings, lot sizes or shapes, or any other provision of a plat after it has received approval by any person whose approval is required. Any plat that is changed in violation of this paragraph is void. The City may compel the person recording the plat to withdraw the plat from the County Recorder's office or to file a notice, or the City may itself file a notice that the recordation of the plat is void. The City is responsible for recording all subdivision plats. The applicant shall be responsible for all recording and associated fees.An amended plat is not required for adjusting a boundary line between a lot and a parcel located outside of a subdivision.~~

a. Is not subject to review by the City. Boundary Establishment shall meet State Code and all documents shall be recorded with Davis County.

b. The City may enforce City Code against property with a boundary establishment that violates land use regulations.

**SECTION 20:** **ADOPTION** "19-2-8 Subdivision Amendments" of the Kaysville City Code is hereby *added* as follows:

A D O P T I O N

19-2-8 Subdivision Amendments*(Added)*

Applications that meet the definition of a subdivision amendment shall be processed in the following manner:

1. The applicant petitioning for a subdivision amendment contacts the City for information concerning the amendment process.
2. The applicant pays the subdivision amendment fee at the City Office.
3. The applicant submits the following to the City:
    a. A proposed subdivision amendment plat corresponding with the proposed subdivision amendment the include the following:
        i. Signature blocks for the following:
            (1) City Engineer Approval.
            (2) City Attorney Approval.
            (3) Mayor (as a non-discretionary and ministerial act for the acceptance of land and public improvements that may be proposed for dedication to the City) Approval attested by the City Recorder.
            (4) Community Development Director Approval.
            (5) Utility Approval as required.
            (6) A signature block in the lower right hand corner of the drawing for the County recording information.
        ii. Description of land to be included in the subdivision amendment.
        iii. Registered professional engineer and/or land surveyors Certificate of Survey.
        iv. Owners dedication certificate.
        v. Notary publics acknowledgment.
    b. A copy of the protective covenants, if applicable.
    c. Preliminary Title Report.
    d. Agreements, if applicable.
    e. Any applicable utility load information to agencies and service providers as needed.
    f. Construction drawings regarding any applicable storm water drainage facilities, storm water quality infrastructure, sidewalks, roads, curb and gutter, planting and parks, utilities, grading, and all required improvements as required by Title 19 Subdivision in City Code.
    g. Storm water maintenance agreement for any proposed conveyance/retention/treatment/detention facilities.

4. The City shall provide notice of a petition by mail or email to:
    a. Each affected entity that provides a service to a property owner of record of the portion of the plat that is being vacated or amended.
    b. Each property owner of record within the portion of the subdivision that is proposed to be amended.
5. The notice of a petition shall include a deadline by which written objections to the petition are due to the City, but no earlier than 10 calendar days after the day on which the land use authority sends the notice.
6. If required by state code, the City shall hold a public hearing within 45 days after the day on which a petition is filed if:
    a. Any property owner within the subdivision that is proposed to be amended notifies the City of the owner's objection in writing before the deadline for objections.
7. The City may approve a petition for a subdivision amendment no earlier than:
    a. The day after the day on which written objections were due to the City; or
    b. If a public hearing is required, the day the public hearing takes place.
8. The public hearing requirement does not apply but the City may require a public meeting for a subdivision amendment petition if:
    a. The petition seeks to:
        i. Join two or more of the petitioner fee owner's contiguous lots.
        ii. Subdivide one or more of the petitioning fee owner's lots, if the subdivision will not result in a violation of City Code or a development condition.
        iii. On a lot owned by the petitioning fee owner, adjust an internal lot restriction imposed by the City.
        iv. Alter the plat in a manner that does not change existing boundaries or other attributes of lots within the subdivision that are not:
            (1) Owned by the petitioner; or
            (2) Designated as a common area; and
    b. Notice has been given to adjoining property owners in accordance with any applicable City Code.
9. Once it has been determined that the documents meet State and City requirements and petition requirements have been satisfied, the documents shall be recorded with Davis County.

**SECTION 21:** **AMENDMENT** "19-4-3 Final Plat Requirements" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

19-4-3 Final Plat Requirements

The final plat shall comply~~ies~~ with the requirements of the Davis County Recorder. The plat shall be signed by all parties (mentioned in Subsection (7) of this section) duly authorized and required to sign. The final plat and attached documentation shall show:

1. A subdivision name approved by the County Recorder and the general location of the subdivision in bold letters at the top of the sheet.
2. Where a subdivision complies with the Planned Residential Unit Development (PRUD) provisions of the Zoning Ordinance and of the regulations, the final plat shall indicate underneath the subdivision name the words Planned Residential Unit Development. In addition, when a subdivision complies with the Condominium Project provisions of this Title, the Record of Survey Map shall indicate underneath the condominium name the words Condominium Project.
3. A north point, scale of the drawing, and the date.
4. Accurately drawn boundaries showing the proper bearings and dimensions of all boundary lines of the subdivision. These lines should be slightly heavier than street and lot lines.
5. The widths, lengths, bearings, and curve data on centerlines of proposed streets, and easements; the boundaries, bearing the dimensions of all portions within the subdivision as intended to be dedicated to the use of the public; the lines, dimensions, bearings, minimum floor and crawl space elevations, and numbers of all lots. blocks, and parts reserved for any reason within the subdivision. All lots are to be numbered consecutively by numbering approved by the City Engineer. The City shall provide an address number to each residential or business structure.
6. Parcels of land to be dedicated as public parks or to be permanently reserved for private common open space shall also be titled Public Park or Private Common Open Space, whichever is applicable.
7. The Engineer-of-Record Certification Block shall be shown on the plans, as indicated below:

As the Engineer-of-Record (EOR), I hereby certify that these construction plans and supporting documentation (Plans) comply with Kaysville City Code and Standards (Standards). As the EOR, I acknowledge that:

1. The City's review or approval of these plans shall not be construed as an approval for any variance from any provision of City, County, State or Federal Codes or Standards.
2. The City's approval of these plans shall not be construed as a peer review, nor a confirmation of the efficacy or accuracy of the design.
3. I have considered the Engineering Standard of Care in the development of these plans.

_____
Engineer-of-Record Signature

_____
Date

8. The standard forms for all subdivision plats lettered for the following:
    a. Description of land to be included in the subdivision.
    b. Registered professional engineer and/or land surveyors Certificate of Survey.

c. Owners Dedication Certificate.
d. Notary Publics acknowledgment.

e. Community Development Director approval.
f. Utility approval as required.
g. City Attorney approval.
h. City Engineer approval.
i. Mayor (as a non-discretionary and ministerial act for the acceptance of land and public improvements that may be proposed for dedication to the city) approval attested by the City Recorder.
j. A three inch (3") by three inch (3") signature block in the lower right hand corner of the drawing for County recording information.

9. Copy of the Protective Covenants for approval by the City Council and recording if applicable.
10. Storm water quality infrastructure and facilities, including LID facilities and/or storm water treatment facilities as described in the City's LID manual with associated calculations. Calculations shall include a Water Quality Report (WQR), as described in the City's LID Manual.
11. A storm water maintenance agreement for all conveyance/retention/treatment/detention facilities owned and maintained privately (outside of City right of way or City owned property) between the City and the facility owner(s). Said agreement shall be recorded with the plat and transfer to subsequent owners of said property and/or facilities.
12. Final construction drawings regarding the proposed storm water drainage facilities and other proposed special improvements such as sidewalks, planting and parks, utilities, any grading of individual lots and all required improvements as required by section KCC 19-6-3.

**SECTION 22:** **AMENDMENT** "19-5-1 Arrangement Of Streets" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

19-5-1 Arrangement Of Streets

The arrangement of streets shall provide for access to and circulation within the vicinity of the subdivision and the continuation of streets in lands adjoining the subdivision, as determined by the City Engineer. The street arrangement shall not cause unnecessary hardship for maintenance crews or owners of adjoining property when they plat their own land and seek to provide for convenient access to it, and it shall enhance access and connectivity. Half streets along the boundary of land proposed for subdivision or within any part of a subdivision will not be permitted.

In accordance with the City's Drainage Evaluation and Design Manual, downhill-sloping cul-de-sac's or dead-end streets are not permitted. Cul-de-sac's are discouraged as much as possible by the City Engineer, but if approved, they shall provide adequate space for snow plow storage (as indicated in KCC 19-6-3 item 12).

**SECTION 23:** **AMENDMENT** "19-5-2 Streets" of the Kaysville City Code is hereby *amended* as follows:

AMENDMENT

19-5-2 Streets

1. **Major Streets**. Arterial, collector, and significant local streets shall conform to the width designated on the Major Street Plan wherever a subdivision falls in an area for which a Major Street Plan has been adopted. For areas where the street plan has not been completed at the time the preliminary plat is submitted to the City, arterial, collector, or significant local streets shall be provided as required by the City.
2. **Local Streets**. Local streets shall have a minimum width of fifty-five feet (55') with sixty-six feet (66') required for streets that will have greater use as determined by the City Engineer.
3. **Cul-de-sac Streets.** Cul-de-sacs shall not be longer than six hundred feet (600') from the centerline of the adjoining street to the center of the cul-de-sac. Each cul-de-sac must be terminated by a turnaround of not less than 100 feet in diameter. If surface water drains into the turnaround due to the grade of the street, necessary catch basins and drainage systems and easements shall be provided.
4. **Temporary dead-ends and turning Area**. Where a street longer than one lot is designed to remain only temporarily as a dead-end street, the following shall apply:
    a. Temporary dead-ends or turnarounds (at phase or property boundaries) are required, in accordance with Appendix D of the IFC, and are limited to a hammerhead configuration. A permanent easement of right-of-way on the hammerhead shall be provided for as long as the hammerhead is in use as a temporary turnaround. ~~Where the street dead-ends into a subsequent phase of the same subdivision, a temporary, graveled 80-foot diameter turnaround and a permanent easement of right-of-way on the subsequent phase property shall be provided.~~ However, if the subsequent subdivision phase is not recorded at the time of roadway paving in the preceding phase, the hammerhead~~an 80-foot diameter asphalt-surfaced turnaround~~ shall be placed on the subsequent phase property.
    b. Where the street dead-ends against property which is not owned by the developer or is not part of a subsequent subdivision phase, either a hammerhead ~~bubble~~ inside the subdivision, or a hammerhead on the adjacent property~~ as shown in the Standard Drawings, or an asphalted 80-foot diameter turnaroud~~, along with a permanent easement of right-of-way from the adjacent property owner, shall be placed. ~~If a bubble inside the subdivision is provided, the Subdivider shall pay to the City an amount equal to 115% of the cost of removing the bubble and installing standard street improvements and landscaping.~~
    c. When installing a hammerhead, the developer shall use the hammerhead as future driveways, which would not require future removal if the driveways meet City standards and meet the other requirements of D102.1 of the IFC.
5. **Intersections**. The intersection of more than two streets at one point shall not be allowed. Streets shall intersect at a ninety degree (90°) angle. Street intersections shall

be rounded with a minimum radius of twenty-five feet (25') measured at the back of curbs.

6. **Standard Street Sections.** All streets, whether existing or proposed, shall be made to conform to the City Street Cross Section Standards as adopted by the City. Existing streets shall be profiled and redesigned to full street width far enough beyond the subdivision boundaries to drain and function properly.
7. **Street Grades.** Street grades shall not exceed the following percentages: on arterial streets eight percent (8%); on local and collector streets ten percent (10%). Street grades near intersections shall be designed for adequate stopping and starting by adjusting grades on both sides of the intersection. Grades on all cul-de-sac streets shall be a minimum of 1.0% and on all other streets shall be a minimum of 0.5% unless specifically authorized by the City Engineer. The cross slope of the street cross section is defined on the standard drawings. The maximum difference in curb elevations shall not exceed one foot (1'), and then only with the approval of the City Engineer.
8. **Alleys.** Alleys shall have a minimum width of twenty-six feet (26'). Alleys may be required in the rear of business lots, but will not be accepted in residential blocks except under unusual conditions where such alleys are considered necessary by the City
9. **Bridges.** Design and construction of new bridges, whether essential for the overall circulation plan of the City or required only to serve a subdivision, shall be approved in advance by the City.
10. **Excavations and Fills.** Subdivision development adjacent to the Great Salt Lake or its natural drainage channels, or within any marsh or wetlands which will result in any discharge of excavated or fill materials. may require obtaining a permit from the U.S. Army Corps of Engineers prior to the issuance of local permits for the deposition of fill material into any wetland or stream channel. This determination shall be made a part of the preliminary plat staff review.
11. **Names and Numbers.** Names of new streets shall not duplicate existing or planed street names unless a new street is a continuation of, or in the alignment with, the existing or platted street. House numbers shall be assigned in accordance with the House Numbering System in effect in the City. All new streets shall be numbered if they are in alignment with the grid. They shall be named if not in alignment with the grid.

**SECTION 24:** **ADOPTION** "19-5-3 Traffic Impact Studies" of the Kaysville City Code is hereby *added* as follows:

A D O P T I O N

19-5-3 Traffic Impact Studies*(Added)*

1. A Traffic Impact Study (TIS) shall be required for all proposed developments or changes in land use that meet one or more of the following conditions:
    a. Trip Generation:
        i. Any development that generates 100 or more vehicle trips per day as determined using the latest edition of the Institute of Transportation

Engineers (ITE) Trip Generation.

ii. For residential developments, a TIS is required if the development includes 50 or more dwelling units.

iii. For commercial or industrial developments, a TIS is required for any project exceeding 30,000 square feet of building area or any development type that is expected to generate significant peak hour trips (e.g., restaurants, gas stations).

b. Proximity to Sensitive Areas

i. Any development located within 1,000 feet of a school, hospital, or emergency service facility shall be required to submit a TIS.

(1) The study must evaluate pedestrian safety, school zone impacts, and the interaction of development traffic with existing public safety operations.

c. Location-Based Requirements

i. A TIS is required for any development within:

(1) 500 feet of an arterial or collector road, railroad crossing, or a highway interchange.

ii. Developments in these areas must include an evaluation of intersection impacts, vehicular congestion, and access management to ensure safety and efficient flow of traffic.

2. Exemptions

a. Small-Scale Developments:

i. Projects generating fewer than 50 vehicle trips per day, as determined by ITE standards, are exempt unless otherwise directed by the City Engineer.

b. Minor Modifications:

i. Minor expansions or renovations to existing developments that do not significantly increase traffic volumes or alter access configurations may be exempt at the discretion of the City Engineer.

c. Developments in Well-Served Areas:

i. Projects located in areas with existing infrastructure that can handle the additional traffic without substantial impact may be exempt, provided a preliminary review by the City Engineer supports this conclusion.

3. Scope of Traffic Impact Study

a. Each Traffic Impact Study shall be prepared by a licensed professional engineer specializing in transportation planning and analysis. The scope of the TIS should include, but not be limited to, the following:

i. Trip Generation Analysis:

(1) Use ITE Trip Generation rates to estimate the daily and peak hour trips generated by the proposed development.

ii. Traffic Distribution and Assignment:

(1) Analyze how the generated trips will distribute across the transportation network, taking into account the likely routes used by vehicles accessing the site.

iii. Intersection Capacity Analysis:

(1) Conduct intersection-level analysis for all intersections within a 1,000-foot radius of the project boundary.

(2) Evaluate existing and future levels of service (LOS) and recommend mitigation measures where LOS falls below acceptable levels as defined by the City Engineer.

iv. Pedestrian and School Zone Impacts (if applicable):

(1) Evaluate the safety of pedestrians, especially near schools and hospitals, and determine if pedestrian crossings, signage, or school zone enhancements are necessary.

v. Safety Review:

(1) Review the accident history within the study area and identify any potential safety concerns. Recommend improvements to reduce crash potential, such as signal modifications, turn lane additions, or signage enhancements.

vi. Mitigation Measures:

(1) Provide specific mitigation measures to address any identified deficiencies or adverse impacts on traffic operations, safety, or pedestrian activity. Developers shall be responsible for implementing these improvements, which may include roadway widening, signalization, or turn lanes, as required by the TIS recommendations.

4. Required Items for a Traffic Study

a. Project Overview:

i. A project description including the type of development (residential, commercial, industrial, etc.), site location, and the development's scope (number of units, square footage, etc.)

ii. A site plan showing access points, proposed buildings, parking lots, internal roadways, and any relevant on-site transportation features.

b. Existing Conditions:

i. A description of the current traffic conditions in the area, including existing roads, nearby intersections, and traffic control devices (signals, signs, etc.).

ii. Existing traffic volume data for nearby streets and intersections, including daily and peak-hour volumes.

iii. A description of nearby land uses, such as schools, hospitals, residential areas, or major employers that might influence traffic patterns.

c. Trip Generation:

i. Trip generation estimates based on the most recent edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.

ii. Estimation of peak-hour trips for the AM and PM periods, as well as total daily trips.

d. Trip Distribution and Assignment:

i. A map or diagram showing the expected distribution of trips (inbound and outbound) across the transportation network, including which streets and intersections will be impacted.

ii. Assignment of trips to the roadway network, identifying which routes drivers are expected to use when accessing the development.

e. Intersection and Roadway Analysis:

i. Capacity analysis of nearby intersections and roadways, both for

existing conditions and future conditions (with and without the development). This analysis should include:

(1) Levels of Service (LOS) for intersections.
(2) Queue lengths for key movements.
(3) Delays and volume-to-capacity ratios for each approach at major intersection.

ii. Traffic signal warrant analysis (if applicable) based on anticipated traffic volumes and intersection conditions.

f. Pedestrian and Bicycle Analysis (if applicable):
   i. Evaluation of pedestrian and bicycle impacts, especially near schools, hospitals, parks, or areas with significant foot or bike traffic.
   ii. Identification of existing pedestrian crossings, sidewalks, and bicycle lanes, along with any proposed improvements or modifications.

g. Safety Analysis:
   i. Crash data for nearby intersections and roads, including the number and types of crashes over the past three to five years.
   ii. Identification of any existing safety concerns, such as poor sightlines, high speeds, or frequent accidents, and recommendations for mitigating those concerns.

h. Parking and Access Analysis:
   i. An evaluation of site access, including the number, location, and configuration of driveways, as well as any potential conflicts with existing traffic patterns.
   ii. On-site parking analysis, including parking lot layout, circulation, and the adequacy of parking supply relative to city standards.

i. Future Traffic Projections:
   i. Future traffic volumes, taking into account projected growth in the area, background traffic increases, and the proposed development.
   ii. A 20-year projection of traffic conditions, if applicable, for long-term planning and infrastructure needs.

j. Mitigation Measures:
   i. A list of proposed mitigation measures to address any adverse traffic impacts identified in the study. These measures could include:
      (1) Roadway improvements (e.g., additional lanes, turn lanes, road widening).
      (2) Traffic signal upgrades or installations.
      (3) Changes to access points (driveway consolidation, turn restrictions, etc.).
      (4) Pedestrian and bicycle safety improvements.
   ii. Cost estimates and timelines for implementing the mitigation measures.

k. Conclusions and Recommendations:
   i. A summary of the Traffic Impact Study's findings, including the overall impact of the development on the transportation network.
   ii. Specific recommendations for roadway or intersection improvements, safety enhancements, or other actions needed to maintain acceptable traffic conditions.

l.

Technical Appendices:

i. All supporting data, such as traffic counts, signal timing plans, and detailed calculations, should be included in an appendix for city review.

**Intersection and Access Spacing**

1. Intersections and Accesses (driveways) shall be spaced as specified in City Code 19-6-3. The City Engineer may require a traffic study, prepared by a professional engineer, to evaluate additional spacing requirements based on site conditions.

**SECTION 25:** **AMENDMENT** "19-5-3 Blocks" of the Kaysville City Code is hereby *amended* as follows:

A M E N D M E N T

19-5-~~3~~4 Blocks

**SECTION 26:** **AMENDMENT** "19-5-4 Lots" of the Kaysville City Code is hereby *amended* as follows:

A M E N D M E N T

19-5-~~4~~5 Lots

**SECTION 27:** **AMENDMENT** "19-5-5 Easements" of the Kaysville City Code is hereby *amended* as follows:

A M E N D M E N T

19-5-~~5~~6 Easements

**SECTION 28:** **AMENDMENT** "19-5-6 Parks And Other Public Places" of the Kaysville City Code is hereby *amended* as follows:

A M E N D M E N T

19-5-~~6~~7 Parks And Other Public Places

**SECTION 29:** **AMENDMENT** "19-5-7 Technical Specifications And Drawings" of the Kaysville City Code is hereby *amended* as follows:

A M E N D M E N T

19-5-~~7~~8 Technical Specifications And Drawings

The City's Technical Specifications and Drawing Standards shall apply to all development. A paper copy can be obtained, upon request, or ~~C~~click here to view the published version of the Technical Specifications and Drawings Standards.

**SECTION 30:** **AMENDMENT** "19-6-3 Improvements Required" of the Kaysville City Code is hereby *amended* as follows:

A M E N D M E N T

19-6-3 Improvements Required

The improvements shall include all street improvements in front of all lots and along all dedicated streets to a connection with existing improvements of the same kind or to the boundary of the development nearest existing improvements. Layout must provide for further extension to adjacent development and to be compatible with the contour of the ground for proper drainage. All water lines, sewer lines, and any other buried conduit shall be installed to the boundary lines of the development. The owner of any land located in or platted as a subdivision shall install the following improvements in compliance with the specifications contained in the Specifications and Standard Drawings:

1. **Sewage Collection**
    a. Unless the applicable sewer district deems it to be unfeasible, the Subdivider shall connect to the sanitary sewer and provide adequate lateral lines to the property line of each lot. Such sewer connections and subdivision sewer systems shall comply with the regulations and specifications of, and shall be approved by the applicable Sewer District and Kaysville City. All sewer lines must be extended across the entire frontage of all existing streets and to the boundary of the subdivision on all existing or proposed City streets.
2. **Groundwater.** The Subdivider shall protect the structures from groundwater by:
    a. Digging at least one test hole per acre or part thereof, at locations approved by the City Engineer, and determining the depth of the groundwater table and the permeability and percolation rate of the soils. These tests shall be performed by a qualified soils engineer at the Subdivider's expense. If a groundwater drainage system is installed to City standards, with a lateral provided to each lot for a footing drain, this testing is not required.
    b. Preparing a detailed groundwater plan for the subdivision. showing the minimum level of all floors and crawl spaces. If any floor or crawl space is to be installed within one foot or below the groundwater table or where the

permeability and percolation rate of the soil is not adequate, the Subdivider shall install a groundwater drainage system to City standards, with a lateral provided to each lot for a footing drain.

c. Making improvements to adequately remove groundwater and prevent groundwater entry into buildings, including crawl spaces.

d. Preventing the discharge of surface water drainage into the groundwater drainage system.

3. **Storm Water.** A storm drainage plan has been prepared and is maintained by Kaysville City and Davis County. The Subdivider shall implement the portion of that plan, in accordance with the City's Drainage Evaluation and Design applicable to the subdivision by:

   a. Preparing a detailed drainage plan for the subdivision which is acceptable to the City that has been prepared in accordance with the City's Drainage Evaluation and Design Manual, which may be amended from time to time.

   b. Making sufficient improvements, such as storm drains, cross gutters, catch basins, inlets, detention basins, LID facilities and other appurtenant structures, to adequately address the WQV and dispose of the appropriate ~~100-year~~ frequency storm runoff within the subdivision and from adjacent properties. Said disposal system shall include the retention or treatment of the WQV, as detailed in the City's LID Manual. Storm drains shall be not less than fifteen inches (15") in diameter for inlets and eighteen inches (18") in diameter for mainlines and meet all other City standards and specifications.

   c. Design storm frequencies are designated in the City's Drainage Evaluation and Design Manual.

   d. The post-construction release rate shall be equal to or less than the preconstruction discharge. Under no circumstances shall the post-development discharge be greater than 0.2 cfs per acre for a 100-year design storm. Runoff restrictions shall be provided~~Providing for restriction of the runoff from the subdivision to 0.20 cubic feet per second per acre per 100-year frequency rainfall event~~ through one or more of the following, at the direction of the City:

      i. Conveyance (including easements) of the runoff to a regional detention/retentions/treatment site and paying the subdivisions proportional share of the cost of the regional detention facility and conveyance to the main channel; or

      ii. Dedicating land and constructing regional detention/retention/treatment within the subdivision and conveyance to the main channel if said subdivision contains a proposed detention site. The Subdivider may be compensated for a portion of the cost of the regional detention and conveyance to the main channel for that which is not the proportional share for the subdivision.; or

      iii. Conveyance of the runoff to a site within the subdivision dedicated and constructed for detention and/or retention.

   e. If the subdivision is within one hundred feet (100') of a natural drainage over which Davis County has jurisdiction, complying with all Davis County Flood Control standards and shall be approved by Davis County if the drainage is a recognized Davis County Flood Control channel.

   f. The storm drainage plan is not intended to and may not eliminate periodic

accumulation of standing water on various lots in the subdivision during periods of heavy rainfall or runoff.

g. Unless otherwise directed or agreed to by the City Engineer, and infrastructure not located in a City right of way that is installed or used for the conveyance/treatment/detention of storm water shall require a Storm Water Maintenance Agreement to be approved by the Storm Water Official and shall be recorded with the Davis County Recorder's Office, as per KCC 9-3d-8.

4. **Culinary Water**. The Subdivider shall install water lines to make the water supply available to each lot within the subdivision, including laterals to the property line of each lot. The location and size of water mains shall be approved by the City Engineer. Unless otherwise directed by the City Engineer, subdivision water lines shall be a minimum of eight inches (8") in diameter and service laterals shall be a minimum of 3/4-inch in diameter. All water lines must be extended across the entire frontage of all existing streets and to the boundary of the subdivision on all existing or proposed City streets.
5. **Fire Hydrants.** Fire hydrants shall be installed as required. Such fire hydrants shall be of the type, size, and number as directed by the City Engineer, and installed in such locations as approved by the City. A fire hydrant shall also be placed at the end of every dead-end water line, including the end of cul-de-sac'ssacsde-ends.
6. **Irrigation Water.** In accordance with KCC 18-3-7, pressure irrigation shall be provided to each lot in residential subdivisions.
    a. All gravity flow ditches through which water will continue to flow within a subdivision after its completion, whether to serve as irrigation water and/or waste flow to go from any adjacent property, shall remain in use and be piped with a minimum pipe size of at least 15 inches and shall be approved by the City Engineer and irrigation provider. Irrigation ditches which will not carry irrigation water and/or waste flow shall be removed.
    b. The Subdivider shall install pressure irrigation lines to make pressure irrigation available to each lot within the subdivision including laterals to the property line of each lot. All plans and specifications for pressure irrigation systems shall be submitted to the City Engineer and irrigation provider. Such system must be approved by the City and irrigation provider. In accordance with KCC 9-4-15, it shall be illegal for any person to connect together a culinary water system and a non-potable water system by any method.
    c. The Subdivider shall comply with all the requirements of the provider and furnish proof thereof to the City.
    d. Unless otherwise directed by the City, irrigation water and infrastructure shall remain isolated from and independent of storm water and infrastructure.
7. **Street Grading and Surfacing.** All streets whether existing or proposed, shall be graded and surfaced, including a preventative maintenance surface treatment (as approved by the City) applied on all new asphalt pavement in streets, in accordance with the standards and specifications of Kaysville City and the design for each street. Existing streets shall be modified to drain and function properly.
8. **Curbs and Gutters.** Curbs and gutters shall be installed by the Subdivider on existing and proposed streets in accordance with all the appropriate specifications of Kaysville City. Curb and gutter shall be thirty inches (30") wide standard high back style, and shall be placed in six inches (6") of compacted untreated base course as foundation materials.

9. **Street Drainage.** Street drainage and drainage structures shall be required where deemed necessary by the City Engineer and/or as specified by the City's Drainage Evaluation and Design Manual. Drainage facilities and structures shall address storm water quality to comply with State and EPA regulations and requirements, as outlined in the City's LID Manual.
10. **Sidewalks.** Sidewalks shall be installed according to the specifications of Kaysville City. Sidewalks shall be at least four feet (4') wide with four inches (4") of compacted untreated base course material as foundation materials. Depth of sidewalks shall be four inches (4"). except at driveways, which shall be six inches (6"). Sidewalks located less than five feet (5') from the top back of curb shall be six feet (6') wide.
11. **ADA Ramps.** ADA ramps shall be constructed at legal pedestrian crossings or a marked crosswalk. Ramps shall meet the requirements of the ADA accessibility guidelines and City technical specifications. Running slopes shall not exceed 8.33% and cross slopes shall not exceed 2%. Ramps shall be four inches (4") thick over four inches (4") of compacted untreated base course as foundation material.
12. **Active Transportation Improvements**. Subdivisions which include or are adjacent to an element of the Kaysville City Active Transportation Plan shall account for and install the applicable improvements including off street shared use paths and street improvements such as striping.
13. **Driveway Approaches.** All driveway approaches shall meet the following specifications:

| Specification | Residential | Type Commercial, Industrial, and Institutional |
|---|---|---|
| Minimum width | 10 feet | 10 feet |
| Maximum width | 40 feet | 40 feet |
| Minimum concrete thickness | 6 inches | 8 inches |
| Minimum base course thickness | 6 inches | 6 inches |
| Minimum distance between driveways | 12 feet | 12 feet |
| Minimum distance between driveways in a cul-de-sac | 6 feet, 10 feet of clear space for snow storage from plowing required on either side of the center line (20 feet total) at the end of the cul-de-sac | |
| Minimum distance to the point of intersection of two property lines at any street intersection | 20 feet | 40 feet |

14. **Monuments.** Permanent survey monuments shall be accurately set and established at the intersections of centerlines of streets within the subdivision and intersections with centerlines of existing streets and the beginning and ends of curves on centerlines or points of intersections or tangents. All permanent survey monuments shall remain in place, or be reset at the Subdivider's expense, after curbs, gutter, and sidewalks are installed. Monuments shall be of a type specified in City standards, and all subdivision plats shall be tied to a section corner or monument of record, as established by the

Davis County Surveyor.

15. **Electric Power System**
    a. The Subdivider shall pay the cost of electric Ssystem extensions and street lights, installed by the City, to service the subdivision.
    b. The Subdivider shall be responsible to facilitate the extension of electrical distribution lines by:
        i. Planning the installation of utilities to each lot or site to be served to preclude conflict between other utilities and the electrical distribution lines.
        ii. Scheduling and coordinating the actual installation of improvements to allow adequate time for construction of electrical distribution lines.
        iii. Notifying the Kaysville City Power Superintendent upon completion of adequate site preparation to allow installation of electrical distribution lines.
    c. The Subdivider shall prepare the site for electrical distribution line installation before notifying Kaysville City to install said lines. Site preparation shall include but not be limited to:
        i. Installation of curb and gutter indicating permanent grade.
        ii. Markers installed on curb indicating property lines.
        iii. The area extending from property side of sidewalk away from the street for ten (10) feet leveled to final grade.
        iv. Utilities installed less than four feet (4') below final grade not extending beyond the property line more than twelve inches (12").
    d. The Subdivider shall provide the trenching and excavations for installation of underground facilities unless waived by the City.
    e. The Subdivider shall back fill, compact, test, and guarantee the back fill of excavations for underground facilities installed.

16. **Street Signs.** The Subdivider shall pay the cost of traffic control, street identification, and other street signs, installed by the City, in accordance with City standards. The cost will be charged to the Subdivider and shall be paid before the plat is recorded. The improvement assurance in the subdivision will not be released until after payment of the costs incurred to install the necessary street signs has been made.
17. **Fencing of Subdivision.** A permanent solid board, metal chain link (with opaque slats if required), masonry, or other similar fence not less than six feet (6') in height shall be installed prior to the start of building construction along all boundaries with properties adjacent to the subdivision where adjacent uses are found to be non-compatible by the City. In addition, temporary construction fencing shall be installed along appropriate boundaries or where required to contain blowing refuse prior to the start of building construction, as recommended by the City. The construction fence shall remain in place until 90% of the lots are built on. The construction fence shall be type "D" field fence as given in the specifications. Upon installation of the permanent fence by the Subdivider, and approval by Kaysville City, individual property owners shall assume full responsibility for maintenance of fences or portions of fences constructed upon their property and shall not hold Kaysville City responsible for any and all defects of workmanship, maintenance, repair, and liabilities of any nature arising from the construction or intended use of said fences. In situations where a temporary construction fence and a non-climbable permanent fence coincide, the non-climbable

permanent fence shall take the place of the temporary construction fence and shall be constructed prior to the beginning of construction within the subdivision.

18. **Marking of Lots.** Survey markers shall be placed at all lot corners and at lot boundary locations to completely identify the lot boundaries on the ground. Lot corners shall be identified with permanent plugs in the sidewalk or back of the curb or with a metal pipe or rod driven into the ground if sidewalks or curbs are not next to the lot boundary. All lot corners and lot boundaries shall be marked prior to the issuance of building permits, after the completion of all subdivision improvements and during building construction and inspections. It shall be the responsibility of the lot owner to einsure that all lot corner and boundary markers are in place. The City is not responsible to replace survey stakes or markers.
19. **Highway Noise Abatement.** Highway noise abatement, as determined through environmental studies and engineering analysis and approved by the City, shall be provided in all residential subdivisions within three hundred feet (300') of a freeway or principal arterial. Noise abatement may include distance of noise sensitive uses from noise sources, landscaping, earth berms, and other mitigation. The Subdivider shall pay the entire cost of any noise abatement studies and noise abatement facilities.

**SECTION 31:** **AMENDMENT** Kaysville City's Technical Specifications and Standard Drawings is hereby *amended* as attached as Exhibit A.

**SECTION 32:** **AMENDMENT** Various sections of Kaysville City's Development Standards is hereby *amended* as attached as Exhibit B.

**SECTION 33:** **AMENDMENT** Kaysville City's Excavation Permit is hereby *amended* as attached as Exhibit C.

**SECTION 34:** **ADOPTION** Kaysville City's City Drainage Evaluation and Design Manual is hereby *adopted* as attached as Exhibit D.

**SECTION 35:** **ADOPTION** Kaysville City's Crosswalk Policy is hereby *adopted* as attached as Exhibit E.

**SECTION 36:** **REPEALER CLAUSE** If any provisions of the City's Code previously adopted are inconsistent herewith, they are hereby repealed.

**SECTION 37:** **SEVERABILITY CLAUSE** If any section, subsection, sentence, clause or phrase of this ordinance is declared invalid or unconstitutional by a court of competent jurisdiction, said portion shall be severed and such declaration shall not affect the validity of the remainder of this ordinance.

**SECTION 38:** **EFFECTIVE DATE** This ordinance being necessary for the peace, health and safety of the City, shall become effective immediately upon posting.

PASSED AND ADOPTED BY THE KAYSVILLE CITY COUNCIL JUNE 19, 2025.

| | AYE | NAY | ABSENT | ABSTAIN |
|---|---|---|---|---|
| Council Member Adams | X | | | |
| Council Member Blackham | X | | | |
| Council Member Hunt | X | | | |
| Council Member Jackson | X | | | |
| Council Member Oaks | | | X | |

Presiding Officer

Tamara Tran, Mayor, Kaysville City

Attest

Annemarie Plaizier, City Recorder, Kaysville City

EXHIBIT A

# KAYSVILLE CITY

# DEVELOPMENT CODE

## TECHNICAL SPECIFICATIONS AND STANDARD DRAWINGS FOR ALL DEVELOPMENT AND CONSTRUCTION

SECONDARY WATER SPECIFICATION REFERENCES

~~July 2020~~May 2025

## DIVISION 1 GENERAL IMPROVEMENT REQUIREMENTS

### 1.01 SCOPE OF WORK:

This Division defines the general requirements for improvements to be built by the Developer or Subdivider or ~~Contractor~~Contractor ("Developer").

The improvements shall include all street improvements in front of all lots and along all dedicated streets to a connection with existing improvements of the same kind. Layout must provide for future extension to adjacent development and to be compatible with the contour of the ground for proper drainage. All water lines, sewer lines, power lines, secondary water lines, storm water and runoff management facilities and any other buried conduit shall be installed to the boundary lines of the development.

All construction and development within Kaysville City shall meet these technical specification requirements, City Code, APWA Utah Standards and specifications, and Kaysville City Drainage Evaluation and Design Manual.

### 1.02 CONSTRUCTION DRAWINGS:

Complete and detailed construction plans and drawings of all improvements shall be submitted to the City for review and approval prior to receiving final plat approval from the City. No construction shall be started until plans have been checked and approved by all responsible parties.

### 1.03 STANDARDS FOR CONSTRUCTION DRAWINGS:

The following instructions are for the purpose of standardizing the preparation of drawings to obtain uniformity in appearance, clarity, size, and style.

These plans and designs shall meet the standards defined in the specifications and drawings hereinafter outlined. The minimum information required on drawings for improvements are as follows:

All drawings and/or prints shall be clear and legible and conform to accepted engineering and drafting practices on a computer aided drafting program. Size of drawings shall be 22" x 34" with a 1-inch border on all sides.

A. In general, the following shall be included on drawings:

(1) North Arrow (plan)
(2) Scale and elevations referenced to State Plane datum
(3) Stationing and elevations for profiles
(4) Title block, located in lower right corner of sheet to include:
    i. Name of City
    ii. Project Title (subdivision, etc.)
    iii. Specific type and location of work

iv. Space for approval signature of City Engineer and date
v. Name of engineer or firm preparing drawings with license number, stamp and signature

B. Curb and gutter, drains and drainage structures, sidewalks and street surfacing drawings shall be in accordance with the City's Drainage Evaluation and Design Manual and show:

(1) Scale: No smaller than 1" = 50' horizontal and 1" = 5' vertical
(2) Both plan view and profiles must be shown for each side of the street; street centerline profile must be shown
(3) Stationing and top of curb elevations with curve data must be shown
(4) Flow direction and type of cross drainage structures at intersections with adequate flow line elevations
(5) Bench Mark (B.M.) location and elevation (use State Plane datum)
(6) Typical cross section for all street sizes and variations including pavement structure detail (thickness of granular subbase, base course, and asphalt surface course)

C. Where applicable, Storm Water Pollution Prevention Plans (SWPPP) shall be required. The plan shall meet State criteria and show Best Management Practices (BMPs) that will be used for the construction project. The SWPPP shall be reviewed and approved by the Storm Water Official prior to work commencing.

D. Sewer drawings shall conform to the applicable Sewer District Standards and show:

(1) Scale: No smaller than 1" = 50' horizontal and 1" = 5' vertical (may be shown on street or utility drawings)
(2) Location, size, and slope of mains
(3) Manhole size, location, and flow line elevation
(4) Type of pipe
(5) Bench Mark (B.M.) location and elevation (use State Plane datum)
(6) An overall development plan view of the sewer (horizontal scale 1" = 100')

E. Culinary water drawings shall show:

(1) Scale: 1" = 100' horizontal; an overall development plan view
(2) Size and location of water mains, valves, hydrants, and any other culinary water structure
(3) Type of pipe

F. Each set of plans shall be accompanied by a separate sheet of details for structures which are to be constructed. All structures shall be designed in

accordance with minimum requirements established by Kaysville City Development Standards.

(1) Drawing size: 22" x 34" (trim line)
(2) Scale of each detail
(3) Title block, lower right hand corner (same format on all sheets) including the name of the development
(4) Completely dimensioned and described

Six copies of the construction plans shall be submitted to the City. One copy will be stamped as "Approved" and returned to the Developer. This approved set shall be kept available at the construction site at all times. A reproducible and electronic copy of all drawings shall be submitted to the City at the time of the Preconstruction Conference. A reproducible and electronic copy of all drawings containing all "as constructed" information and a list detailing the location of all service laterals shall also be submitted to the City prior to the issuance of building permits.

**1.04 PRECONSTRUCTION CONFERENCE:**

A preconstruction conference shall be held before any excavation or other work is begun in the development. The meeting will be held at a time and location to be set by Kaysville City and will include: (a) City Engineer; (b) Developer; (c) development engineer; (d) all contractors and subcontractors involved with installing the development improvements; (e) a representative of Kaysville City Public Works and Power Departments; (f) a representative from Central Davis Sewer District; (g) a representative from Davis County Flood Control, where applicable; (h) representatives of utility companies including pressure irrigation, natural gas, telephone, and cable TV; and (i) a SWPPP Inspector.

The Developer shall give 5-days notice of when they will be ready for a Preconstruction Conference. Items pertaining to the construction and inspection of the development improvements will be discussed. Once work starts, an approved set of plans must be on site at all times.

**1.05 PERMISSIBLE MATERIALS:**

Permissible materials for use in constructing required improvements and related sections in the Technical Specifications are as follows:

A. Water Lines
(1) C-900 PVC Pipe (Division 4a)
(2) High Density Polyethylene Pipe (Division 4b), when specifically approved by the City Engineer.

B. Water Laterals/Services
(1) Copper Pipe (Division 4d)
(2) Poly Pipe Schedule 40

(3) Service Saddles (Division 4d)

C. Sanitary Sewer Line – As required by the applicable Sewer District (either Central Davis Sewer District "CDSD" or North Davis Sewer District "NDSD").

D. Sanitary Sewer Laterals – As required by CDSD or NDSD.

E. Storm Drain – Minimum 15-inch diameter for inlets and 18-inch diameter for mainlines, with a minimum of 2 feet of cover, unless otherwise approved by the City Engineer
(1) Reinforced Concrete Pipe (RCP) (Division 3a)
(2) Double Wall Polyethylene Pipe (Division 3c), when specifically approved by the City Engineer.
(3) High Density Polyethylene Pipe (Division 4b), when specifically approved by the City Engineer.

F. Gravity Flow Irrigation Lines
(1) Concrete Pipe (Division 3a)
(2) Double Wall Polyethylene Pipe (Division 3c), when specifically approved by the City Engineer.
(3) High Density Polyethylene Pipe (Division 4b), when specifically approved by the City Engineer.

G. Subsurface Drain Lines – are generally tight joint pipe and shall be open jointed and/or perforated only when specifically approved by the City Engineer.
(1) Concrete Pipe (Division 3a)
(2) Perforated PVC (Division 3b)
(3) Perforated Polyethylene (Division 3c)

H. Culinary Water Appurtenances–
(1) Water Meter Boxes and Lids
i. Concrete Boxes (Division 4d), when specifically approved by the City Engineer.
ii. Double Wall Polyethylene (Division 4d)
iii. Cast Iron Lids (Division 4d)
(2) Water Valves (Division 4c)
(3) Fire Hydrants (Division 4c)

I. Secondary Water – As required by the applicable service provider.

**1.06 INSPECTION:**

All construction work involving the installation of improvements in development shall be subject to inspection by the City. It shall be the responsibility of the person responsible for construction

to ~~i~~ensure that inspections take place where and when required. Certain types of construction shall have continuous inspection, while others may have only periodic inspections.

A. Continuous inspection shall be required on, but not limited to, the following types of work:
   (1) Laying of street asphalt surfacing
   (2) Placing of concrete for curb and gutter, sidewalks, and other structures
   (3) Laying of sewer pipe, drainage pipe, water pipe, valves, hydrants and testing

B. Periodic inspections shall be required on, but not limited to, ~~o~~ ~~n~~ the following:
   (1) Street grading and gravel base
   (2) Excavations for curb and gutter and sidewalks
   (3) Trenches for laying pipe
   (4) Forms for curb and gutter, sidewalks, and structures
   ~~(4)~~(5) Storm water management facilities

On construction requiring continuous inspection, no work shall be done except in the presence or by permission of the City Public Works (PW) Inspector, or the applicable utilities inspector.

**1.07 REQUESTS FOR INSPECTION:**

Requests for inspections shall be made to the City by the person responsible for the construction. Requests for inspection on work requiring continuous inspection shall be made 3-working days prior to the start of work needing inspection. Notice shall also be given 24-hours in advance of the starting of work requiring periodic inspection.

**1.08 CONSTRUCTION COMPLETION INSPECTIONS:**

A written inspection request shall be made by email or letter to the PW Inspector, after the necessary construction work is completed before building permits can be issued. Any defective work or work that does not comply with the applicable standards shall be corrected by the Developer within a period of 35-days from the date on punch list. If items are found to still be incomplete, there will be a $50.00 inspection fee charged to the Developer for the 2nd inspection and for every inspection thereafter.

Requests for inspection shall be made 3-working days prior to the needed inspection. Inspections shall require that all snow, ice or other visual obstructions be removed by the Developer from inspected items and surfaces before the inspection.

**1.09 GUARANTEE OF WORK:**

The Developer shall warrant and guarantee (and post bond in the amount of 10% of the estimated cost of improvements as approved by Kaysville City at the time of final approval) that the improvements provided for in the Subdivision Ordinance, and every part thereof, will remain in good condition during the warranty period. The Developer shall also make all repairs to and

maintain the improvements and every part thereof in good condition during that time with no cost to the City. The guarantee hereby stipulated shall extend to and include, but shall not be limited to, the entire street base and all pipes, joints, valves, backfill and compaction, as well as the working surface, curbs, gutters, sidewalks, and other accessories that are or may be affected by the construction operations.

No more than 30 days before the conclusion of the warranty period, a written inspection request shall be made by email or letter to the PW Inspector. A punch list shall be generated and delivered to the Developer listing any defective work or work that does not comply with the applicable standards. These items shall be corrected by the Developer, and a request for verification of punch list completion shall be made, via email or writing, to the PW Inspector. If items are found to still be incomplete, there will be a $50.00 inspection fee charged to the Developer for the 2nd inspection and for every inspection thereafter.

If the Developer fails to do so within 15-days from the date of the service of such notice, the City Engineer may have such repairs made, and the cost of such repairs shall be paid by the Developer, together with 25% in addition thereto, as and for stipulated damages for such failure on the part of the Developer to make the repairs.

In order to receive final acceptance of improvements, the following criteria must be met:

A. Completion of end of warranty period punch list items.
B. PW inspector or their designee shall get signed approval from utility companies. This includes, but not limited to, Public Works, Power, CDSD or NDSD, the secondary water provider, and Davis County Flood Control.
C. Notice of Termination (NOT) for Storm Water Pollution Prevention Plan (SWPPP) at the end of the warranty period.
D. Conclusion of the one (1) year warranty period.

**1.10 DEVELOPMENT SAFETY:**

It shall be the responsibility of the Developer and/or his development representative to maintain and enforce all Federal, State, and Local safety codes involved with the development.

## DIVISION 2a TRENCH EXCAVATION AND BACKFILL

### 2a.01 GENERAL:

This Division covers the requirements for trenching and backfilling for underground utilities. Unless otherwise directed by the City Engineer, pipe shall be laid in an open trench. All incidental clearing, preliminary grading, structure removal, and benching shall be considered a part of the trenching operation.

### 2a.02 BARRICADES:

It is the Developer's responsibility to submit a traffic control plan to the City for approval at least 48-hours prior to digging, and shall not commence until City approval is received. 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. Warning signs shall also be installed placed on both sides of overhead lines to warn workers, operators, truck drivers etc. of potential dangers. Lights or reflective barricades 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 falling, walking, or otherwise entering any excavation in any street, roadway, parking lot, or any other area, public or private. Impacted residents, businesses or other parties shall be contacted no less than 24-hours prior to excavations that will impact utilities at or access to those properties.

### 2a.03 BLASTING:

Blasting will not be allowed except by permission from the City Engineer. The Developer shall comply with all laws, ordinances, and applicable safety code requirements and regulations relative to the handling, storage, and use of explosives and protection of life and property, and it shall be fully responsible for all damage attributable to its blasting operations. Excessive blasting or overshooting will not be permitted, and any material outside the authorized cross section which may be shattered or loosened by blasting shall be removed by the Developer.

### 2a.04 SHEETING, BRACING AND SHORING OF EXCAVATIONS:

Excavations shall be sheeted, braced, and shored as required to support the walls of the excavations, to eliminate sliding and settling and as may be required to protect the workmen, the work in progress, and existing utilities, structures and improvements. All such sheeting, bracing, and shoring shall comply with the requirements of the Utah Labor Commission, Occupational Safety and Health Act (OSHA), and accident prevention and safety provisions of the contract.

The Developer shall be fully responsible for the adequacy of methods and materials used in trench sheeting, bracing, shoring, and/or other systems provided to protect workmen. Injury to or death of workmen resulting from inadequate trench safety measures shall be the full and complete responsibility of the Developer.

All damages resulting from lack of adequate sheeting, bracing, and shoring shall be the responsibility of the Developer, and the Developer shall affect all necessary repairs or reconstruction at its own expense resulting from such damage.

Sheeting or shoring that does not extend below the centerline of the pipe may be removed at the discretion and responsibility of the Developer after the trench backfill has been placed and compacted to a level 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.

**2a.05 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, or storm drains, in accordance with applicable water quality and SWPPP regulations and requirements. No sanitary sewer shall be used for disposal of trench water. If any evidence of contamination in the water based on olfactory or visual indication, cease excavation work until potential risks are evaluated. During evaluation, handle water as a contaminated material. Surface water shall be prevented from entering trenches.

**2a.06 TRENCH EXCAVATION**

Excavation for pipelines shall follow the line and grade shown on the approved plans. Trenches shall be excavated to the depths and widths required to accommodate construction of the pipelines, as follows:

A. Authorized Over-Excavation:

Excavation for trenches in ledge rock, cobble rock, stones, or other material unsatisfactory for pipe foundation shall extend to a depth of at least 6-inches below the bottom of the pipe. Where unstable earth or muck is encountered in the excavation at the grade of the pipe, a minimum of 12-inches below grade will be removed. Such over-excavation and placing imported special foundation material shall not be made except as directed by the City Engineer or their designee. Over-excavations not ordered, specified, or shown shall be handled the same as unauthorized over-excavation.

B. Unauthorized Over-Excavation:

Where any unauthorized excavation is carried below the elevation required to install the pipe to the grade shown on the plans, specified in these specifications or directed by the City Engineer, the excavation shall be backfilled in accordance with these specifications for "Imported Granular Material" and "Gravel Foundation for Pipelines and Pipeline Structures," all at the Developer's expense.

C. Trench Width:

The trench shall be excavated such that the pipe is always centered in the trench. The clear trench width at the horizontal diameter of the pipe must be equal to 18-inches on either side. If a trench is excavated to a greater width, the Developer will be required to restore the trench to an acceptable condition by following the steps outlined in these specifications for "Trenches in Embankments."

Trench width for pipeline structures, valves, or other accessories shall be sufficient to leave at least 12-inches clear between their outer surfaces and the trench. Backfill with native soil or excavated spoils under structures, pipes or valves will not be permitted. Any unauthorized excess excavation below the elevation indicated for foundation of any structures shall be backfilled in accordance with these specifications for "Imported Granular Materials," and "Gravel Foundation Pipelines and Pipeline Structures," all at the Developer's expense.

D. Trenches in Embankments:

Before laying pipes that are to be in fill or embankment areas, the embankment shall first be placed and compacted to the specified density to a depth of not less than 2-feet above the top of the proposed pipe. After placing and compacting the embankment, the trench for the pipe or conduit shall be excavated through the fill and fine graded and the pipe installed as specified.

E. Placement of Excavated Material:

All excess excavated material not fit for use in construction shall be hauled away from the construction site and disposed of in an area obtained by the Developer. The Developer shall be responsible for all rights-of-way, easements, and access associated with the disposal of excess excavated material. It shall further be responsible to obtain permission from the property owner or person(s) controlling the property where the Developer plans to dispose of excavated material.

Otherwise, excavated material shall be piled in a manner that will not endanger the work, will avoid obstructing sidewalks, driveways and streets and will comply with all applicable water quality rules and regulations. Gutters and irrigation ditches shall allow for street drainage and continuity of irrigation.

Grading of the area surrounding the trenches, including excavated materials, shall be performed as necessary to prevent surface water from flowing into trenches, or other excavations. Control of groundwater shall be as specified herein.

F. Fine Grading the Trench Bottom:

The bottom of the Trench shall be accurately graded and prepared to provide uniform bearing and support on undisturbed soil or compacted gravel foundation at every point along the entire length of the pipe. Bell holes shall be hand excavated after the trench bottom has been fine graded. Bell holes shall be only large enough to permit making the joints and to assure that the pipe is not supported by any portion of the joint or bell.

**2a.07 TRENCH BACKFILL**

A. Imported Granular Material:

(1) General. When the excavated materials are not satisfactory for pipe foundation, pipe bedding or backfill, as determined by the Engineer, the Developer shall provide imported granular material. Imported granular material for foundation, bedding and backfill shall be cleaned, crushed rock or gravel free from sod, vegetation and other organic or deleterious material. Slag will not be allowed in the pipe zone.

(2) Gradation. Imported granular material shall conform to the following gradation specifications:

i. Gravel Foundation Material:
100% passing a 1-inch screen and no more than 5% passing a ½-inch screen.

ii. Gravel Bedding Material:
Ductile Iron or concrete pipe – 100% percent passing a 1-inch screen and no more than 5% passing a No. 4 sieve.

iii. PVC or polyethylene pipe:
100% passing a ¾-inch screen and no more than 5% passing a No. 4 sieve.

iv. Copper tubing:
100% passing a ¾-inch screen and no more than 5% passing a No. 4 sieve.

v. Gravel Backfill Material:
100% passing a 3-inch square sieve and no more than 15% passing a 200 mesh sieve.

B. Gravel Foundation for Pipe and Pipeline Structures:

The Gravel foundation is defined as fill material below the bottom of the pipe, pipeline structure or accessory. Wherever the trench is excavated below the subgrade for the pipe, pipeline structure, or accessory the subgrade shall be replaced with crushed rock or gravel to an elevation sufficiently above the bottom of the pipe so that the trench can be properly fine graded as specified and the pipe will be true to line and grade. The gravel material shall be deposited over the entire trench width in layers. The layers shall have a maximum un-compacted thickness of 6-inches. The gravel material is to be compacted using vibratory equipment to 96% of the maximum index density of the material as determined by ASTM D4253 (Relative Density Test).

The material shall then be fine graded in accordance with the specification for Fine Grading herein.

C. Pipe Bedding:

Pipe bedding is fill material in the pipe zone. The pipe zone is defined as the area from the bottom of the pipe to 12-inches above the top of the pipe, or any area within 12-inches of any pipe, pipeline structure or accessory.

Excavated materials consisting of loose earth, sand or gravel having no material larger than 2-inches in any dimension, no greater than 1-inch in any dimension for PVC pipe or no greater than ½-inch for copper tubing may be considered for use as pipe bedding material. The City Engineer, or their designee, shall qualify excavated material for use as bedding.

If the excavated materials are not satisfactory, imported granular material as specified herein shall be used for pipe bedding. When gravel is used around pipe bedding, the Developer must place a fabric over gravel layer to keep fines from washing into gravel, creating a void. Fabric must be at

least a 200-pound tensile strength woven ground stabilization fabric (in accordance with AASHTO M 288) and shall be installed on top of gravel prior to sand or road base placement.

After the pipe is in place, bedding material shall be placed at any point below the mid-point of the pipe simultaneously and uniformly on both sides of the pipe in uncompacted layers not to exceed 10-inches or 1/2 the diameter of the pipe, whichever is less. Bedding material shall be placed with care to prevent displacement of or damage to the pipe during the bedding process, with each10-inch lift then compacted. Material shall be scattered alongside the pipe and not dropped into the trench in compact masses.

That section of the pipe zone from the mid-point of the pipe to 12-inches above the top of the pipe shall then be filled with bedding materials and compacted to the density required in these specifications for backfill in this section of the trench.

D. Trench Backfill:

The trench shall be backfilled from 12-inches above the top of the pipe to the natural surface level or the finished grade specified on the approved drawings. Excavated materials consisting of good sound earth, sand, and gravel may be used for backfill. No oil cake, asphalt, concrete, rocky, clay or other lumpy material may be used in the backfill. Perishable or spongy material shall not be used in backfilling. The City Engineer, or their designee, shall qualify excavated material for use as backfill.

Under pavements, shoulders or other surface improvements, the in-place density shall be a minimum of 96% of laboratory standard maximum dry density as determined by AASHTO T-180 (ASTM D1557). In shoulders and other areas the in-place density shall be a minimum of 90% of the maximum dry density as determined by AASHTO T-180 (ASTM D1557). The backfill in the trenches shall be either compacted or consolidated according to the requirements of the materials being placed.

Density and compaction testing shall be done at a frequency of one test per 200-feet of trench length.

E. Compaction of Backfill:

Backfill shall be compacted by means of sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or mechanical tampers. Where compaction methods are used, the material shall be placed at a moisture content and un-compacted lift thickness such that after compaction the required

relative densities will be produced. In no event will the material be placed in lifts which, prior to compaction, exceed 12-inches.

Prior to compaction each layer shall be evenly spread, moistened, and worked by disk harrowing or other equivalent means.

If the required relative density is not attained, test sections will be required to determine any adjustments in compaction equipment, thickness of layers, moisture content, and compactive effort necessary to attain the specified minimum relative density.

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

F. Consolidation of Backfill:

Consolidation of backfill, when authorized by the City Engineer, shall be accomplished by those methods in which water is used as the essential agent to produce the desired condition of density and stability. Water shall be applied by jetting unless flooding is specifically authorized by the City Engineer. Authorization by the City Engineer to use any consolidation method does not relieve the Developer of their responsibility to meet the specified density requirements. Water for consolidation shall be furnished by the Developer at their expense.

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

The minimum size of hose equipment shall be such as to provide a minimum pressure of 35-psi at the discharge. The jet shall be rigid iron pipe with a minimum diameter of 1-inch.

After the water-settled trench has set for several days, any depression in the trench shall be filled, mounded over and wheel rolled to compact the material thus placed.

All precautions necessary shall be taken by the Developer to prevent damage and movement (including floating) of the pipeline, structures, and existing adjacent improvements and utilities. The allowance of the use of

consolidation methods shall not be construed as guaranteeing or implying that the use of such methods will not result in damage to the adjacent ground. The Developer shall make their own determination in this regard and shall assume all risks and liability for settlement or lateral movement of adjacent ground, or improvements, or utilities, either on the surface of the ground or underground.

**2a.08 TRENCH CROSSINGS AND EASEMENTS:**

At road crossings or where existing driveways occur on a road, the Developer shall make provisions for trench crossings either by means of backfills, tunnels, or temporary bridges.

When excavating within easements, the Developer shall carefully remove all shrubs, fences, and other above ground items, carefully cut and remove any lawn sod and remove the topsoil for a depth of at least 12-inches (or the depth of the actual topsoil if less than 12-inches with the width of the lawn sod and/or topsoil removal being at least 2-feet wider (1-foot each side) than the excavated trench width and excavated material pile). The lawn sod and topsoil material shall be piled separately from and shall not be mixed with the remainder of the excavated material.

When working in already developed areas on private property the City Engineer may require that following completion of the backfilling and the compaction of the trench, the Developer shall replace topsoil, lawn sod, shrubs, fences, and other items that may have been removed from within the easement area and clean up and remove any rocks, dirt or any other debris that remain from the construction work. When required, the Developer 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.

**2a.09 RESTORATION OF CONSTRUCTION SITE:**

During the progress of the work, the Developer shall clean up all construction debris, excess excavation and construction materials, and shall restore all fences, irrigation structures, ditches, culverts, and similar items. The Developer 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 condition equivalent to their original surface and free from all rocks, gravel, boulders, or other foreign materials.

**2a.10 DEVELOPER'S RESPONSIBILITY:**

The Developer will be responsible to see that the backfilling, consolidation and compaction are properly and adequately done. Settlement of trenches within a period of 1-year after final acceptance of the project, shall be considered incontrovertible evidence of inadequate compaction, and the Developer shall be responsible for correcting the condition in accordance with the provisions of these Specifications, including the replacement of the surface materials. The Developer is responsible to maintain and repair any problems caused by them to adjoining properties.

The Developer is responsible for installing conduit for road crossings. The properties should be marked and radius for corners marked and staked. A representative from Kaysville City Power and Light (Power) will mark crossing for the Developer. The Developer is required to dig a trench 4-feet deep and stub 8-feet from the back of curb for future tie-in of conduit. The Developer will seal both ends of conduit crossing with conduit seal.

Prior to the digging of the trench for the conduit system, the Developer will have curb and gutter in with property marks on curb and property stakes in back of properties. The Developer shall excavate a serviceable trench 4-feet deep and 13-feet from the center of trench to the back of curb, exposing the road crossing conduit for Power (offsets may vary depending on type of subdivision). A serviceable trench is one that is level, does not have sidewalls that are collapsing, and does not having ponding water. A representative from Power shall determine if a trench is serviceable or not, and shall require issues to be remedied before being accepted as serviceable.

Once the trench is deemed serviceable, Power will install the conduit, according to their availability. Power shall be the only utility allowed in this trench, and will be notified prior to any changes or if problems arise, and will be responsible to approve any changes prior to them being incorporated and/or made.

Backfilled trenches should have the center of the conduit, or conduit bundles, located 13-feet behind the curb. Material used for backfill of the trench must not pose a risk of damaging the conduit during placement, compaction or loading. If backfill material is not suitable, as determined by Power, sand may be required to “shade” the conduit to help protect it from damage before backfilling the trench. Any broken, damaged or defective conduit shall be excavated by the Developer and repaired by Power. Once any necessary repairs are made, the Developer will be responsible to then backfill and make any other necessary repairs to complete the work.

DIVISION 2b EARTHWORK

**2b.01 GENERAL:**

This Division defines the requirements for excavation and backfill for structures, construction requirements for embankments and fills, and subgrade preparation for pavements and other surface improvements.

**2b.02 EXCAVATION FOR STRUCTURES:**

Where suitable subgrade soils exist, as determined by Kaysville City field inspectors, structures shall be founded on undisturbed original subsoil. All unauthorized excavation below the specified subgrade shall be replaced with concrete, monolithic with that of the slab above or with coarse gravel thoroughly compacted into place.

Subgrade soils for structures not suitable for proper support shall be replaced with firm, dense, thoroughly compacted and consolidated material free from mud and muck. Coarse gravel or crushed stone may be used for subsoil reinforcement if satisfactory results can be obtained thereby. A geotechnical report may be required to determine which type of material will be used beneath proposed structures. Such material shall be applied in thin layers, each layer being embedded in the subsoil by thorough tamping or as determined by the geotechnical report. All excess soil shall be removed to compensate for the displacement by ~~of~~ the gravel , ~~or~~ crushed stone, or proposed material in the geotechnical report and the finished elevation of any subsoil reinforced in this manner shall not be above the specified subgrade elevation.

**2b.03 BACKFILL AROUND STRUCTURES:**

Backfill around structures shall be placed to the lines shown on the drawings, or as directed. After completion of foundation footings and walls and other construction below the elevation of the final grades, and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all trash and debris. Material for backfilling shall consist of suitable excavated material or imported sand, gravel, or other suitable material, and shall be placed in lifts which will allow the densities to be achieved and which in any event shall not exceed 8-inches in uncompacted thickness. Each layer shall be compacted by hand or machine tampers or by other suitable equipment to a density equal to 96% of maximum dry density as measured by AASHTO T-180 (ASTM D1557).

**2b.04 CONSTRUCTION OF EMBANKMENTS AND FILLS:**

Unsuitable materials, such as roots, vegetation, or other organic material that occur in the foundations for 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 6-inches, and the loosened material shall be moistened and compacted as hereinafter specified for each layer. All materials in embankments and fills shall be placed, moistened, and compacted as provided in the following paragraphs.

When the embankment or fill exceeds the amount of excavation, sufficient additional material shall be obtained from borrow pits provided by the Developer. All material proposed to be imported shall be subject to the review and approval of the Engineer or their designee prior to starting of hauling operations.

The materials used for embankment and fill construction shall be free from sod, grass, trash, clods, rocks larger than 8-inches in diameter, and all other material unsuitable for construction of compacted fills.

Grading of completed embankments and fills shall bring the surfaces to a smooth, uniform condition with final grades being within 0.1-foot of the design grade.

**2b.05 COMPACTING EARTH MATERIALS:**

The material shall be deposited in horizontal layers having a thickness of not more than 10-inches prior to being compacted as hereinafter specified; provided that when mechanical equipment is used for placing and compacting the material on a sloping foundation, the layers may be placed parallel to the foundations. The distribution of materials shall be such that the compacted material will be homogeneous and free from lenses, pockets, or other imperfections.

Prior to and during compaction operations, the material shall have the optimum moisture content required for the purpose of compaction, and the moisture content shall be uniform throughout the layers, insofar as practicable. The moisture shall be controlled at two percent plus or minus of the optimum moisture as determined by AASHTO T-180 (ASTM D1557). Moistening of the material shall be performed at the site of excavation, but such material shall be supplemented as required by sprinkling at the site of construction. If the moisture content is more than optimum for compaction, the compaction operations shall be delayed until such time as the material has dried to the optimum moisture content. When the material has been conditioned as hereinbefore specified, the backfill or embankment shall be compacted as follows:

A. All trenches in the City Right of Way (typically under roadways and extending one foot beyond the proposed back of walk and under sidewalks and drive approaches to at least one foot each side of the edge of the slab), the fill or embankment material shall be compacted to a density equal to not less than 96% of maximum dry density as measured by AASHTO T-180 (ASTM D1557).

B. Other fills and embankments not listed above shall be compacted to a density equal to not less than 90% of maximum dry density, as measured by AASHTO T-180 (ASTM D1557).

## DIVISION 3a CONCRETE PIPE

### 3a.01 GENERAL:

This Division covers the requirements for concrete pipe materials and installation in sanitary sewer, storm drain, and other gravity line construction. For information regarding requirements for sanitary sewer, refer to the standard drawings and specifications of either the Central Davis Sewer District or North Davis Sewer District, depending on the location.

### 3a.02 PIPE:

Concrete pipe used in sewer line, storm drain line and other gravity line construction shall be reinforced concrete pipe for 15-inch and larger. The minimum size for storm drain pipes is a 15-inch inside diameter pipe for inlets and 18-inch inside diameter for mainlines, with a minimum of 2 feet of cover, unless otherwise instructed by the City Engineer. (See Sewer District standards for minimum pipe sizes for sanitary sewer lines.):

A. Reinforced Concrete Pipe:

All reinforced concrete pipe used in the construction shall be of the rubber gasket type, bell and spigot joint design, conforming to the requirements of the latest revision of ASTM C76. Pipe class shall be as shown on the approved set of plans. The minimum joint length of all pipe provided shall be 90-inches.

B. Bell and Spigot Joints:

Bell and spigot joints, including rubber gaskets, shall conform to the requirements of the latest revision of ASTM C443. The pipe joint shall be so designed as to provide for self centering, and when assembled, to compress the gasket to form a watertight seal. The gasket shall be confined in a groove on the spigot, so that pipe movement or hydrostatic pressure cannot displace the gasket.

C. Tracer Wire:

All non-conductive pipes require a tracer wire (12 gauge) for locating purposes placed on top of pipe from manhole to manhole. Where splices are to be made, a water tight splice kit must be used. See Drawings for tracer wire installation. Tracer wire tail length must not exceed 2-feet.

### 3a.03 PIPE LAYING:

All concrete pipe installation shall proceed upgrade on a stable foundation, with joints closely and accurately fitted. Rubber gaskets shall be fitted properly in place, and care shall be taken in joining the pipe units to avoid twisting of gaskets. Joints shall be clean and dry, and a joint

lubricant as recommended by the pipe supplier shall be applied uniformly to the mating joint surfaces to facilitate easy positive joint closure.

Pipe shall be installed with uniform bearing under the full length of the barrel, with suitable excavations being made to receive pipe bells.

Select material shall be compacted around the pipe to firmly bed the pipe in position. If adjustment of position of a pipe length is required after being laid, it shall be removed and re-jointed as for a new pipe. When laying is not in progress, the ends of the pipe shall be closed with a tight-fitting stopper to prevent the entrance of foreign material.

In addition to the above requirements, all pipe installation shall comply with the specific requirements of the pipe manufacturer.

**3a.04 GRAVEL FOUNDATION FOR PIPE:**

Wherever the subgrade material does not afford a sufficiently solid foundation to support the pipe and superimposed load, or where groundwater must be drained, the subgrade shall be excavated to such depth as may be necessary and replaced with crushed rock or gravel compacted into place.

Gravel for concrete pipe foundation shall be clean crushed rock or gravel with 100% passing a 1-inch screen ~~and~~with no more than 5% passing a No. 4 sieve.

**3a.05 INSTALLATION REQUIREMENTS FOR LINE AND GRADE:**

All concrete pipes shall be installed accurately to the defined line and grade with the following limits:

Variance from established line and grade shall not be greater than 1/16-inch per inch of pipe diameter in 10-feet, and not to exceed 1/2- inch in 10-feet, provided that such variation does not result in a level or reverse sloping invert; provided also that variation in the invert elevation between adjoining ends of pipe, due to non concentricity of joining surface and pipe interior surfaces, does not exceed 1/64-inch per inch of pipe diameter, or 1/2-inch maximum.

**3a.06 PIPE BEDDING:**

All pipe shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by being adequately bedded. Bell holes shall be excavated so that only the barrel of the pipe receives bearing from the trench bottom.

Pipe bedding materials placed at any point below the mid-point of the pipe shall be deposited and compacted in layers not to exceed 10-inches in uncompacted depth. Deposition and compaction of bedding materials shall be done simultaneously and uniformly on both sides of the pipe. Compaction shall be accomplished with hand or mechanical compactors. All bedding materials shall be placed in the trench in such a manner that they will be scattered alongside the pipe and

not dropped into the trench in compact masses. Bedding materials shall be loose earth, free from lumps; sand or gravel, free from rocks larger than 2-inch diameter. All materials shall be free from roots, sod, or other deleterious material.

In the event trench materials are not satisfactory for pipe bedding, modified bedding will be required. Modified bedding shall consist of placing compacted granular material on each side of and to the level of 12-inches above the top of the pipe.

Modified bedding material shall be graded as follows: 100% passing a 1-1/2-inch screen and 5% passing a No. 4 sieve. If gravel is used to bed pipe, then at least a 200-pound tensile strength woven ground stabilization fabric (in accordance with AASHTO M 288) should be installed on top of gravel prior to sand or road base placement.

**3a.07 QUALITY CONTROL TESTS:**

The Developer will be required to conduct an air test and displacement test in the presence of the City Engineer or representative. If these tests prove to be inconclusive, any or all of the other required tests shall be conducted in the presence of the City Engineer or representative. Tests shall be performed as follows:

A. Displacement Test:

In conducting the displacement test a light will be flashed between manholes or, if the manholes have not as yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a mirror. If the illuminated interior of the pipe shows broken, misaligned, or displaced pipe or other defects, the defects designated by the City Engineer shall be remedied at the Developer's expense.

B. Infiltration Test:

The Developer shall furnish labor, equipment, and materials, including pumps, and shall assist the City Engineer in making infiltration tests of the completed line before it can be placed into service. The Developer shall furnish and install the measuring weirs or other measuring devices. The length of line to be tested at nay time shall be subject to the approval of the City Engineer. The maximum allowable infiltration shall not exceed 150-gallons per inch diameter per mile per 24-hours for all installed pipe. If the quantity of infiltration is in excess of the maximum allowable, the leaking joints shall be repaired to the satisfaction of the City Engineer at the expense of the Developer.

C. Exfiltration Test:

The Developer shall furnish labor, equipment, and materials, including pumps, and shall assist the City Engineer in making exfiltration tests of the completed line before it can be placed into service. The length of line to be tested at one time

shall be limited to the length between adjacent manholes. The maximum allowable exfiltration shall not exceed 150-gallons per inch diameter per mile per 24-hours for all installed pipe. The end of the line which projects into the manhole shall be plugged. The pipe shall then be filled with water from the upper manhole, and the line maintained under a light pressure of 4-feet of head. The inflow of water necessary to maintain this head shall be recorded as the leakage of the system. If the quantity of exfiltration is in excess of the maximum allowable, the leaking joints shall be repaired to the satisfaction of the City Engineer at the expense of the Developer.

D. Air Testing:

The Developer or their representative (a qualified firm or individual agreed upon by the City Engineer and the Developer) shall furnish labor, equipment, and materials, including pumps and compressors, and shall perform, in the presence of the City Engineer, air tests of the completed pipe before it can be placed in service. Each section of sanitary sewer pipeline between manholes shall be tested after all the 4-inch service laterals (and plugs) have been installed. Each test section shall be pressurized to 4.0-psi. For the purpose of stabilizing the air pressure in each test section, the 4.0-psi pressure shall be maintained for a 2-minute period. Each test section shall then be re-pressurized to 4.0-psi for a period of 4-minutes. The test section shall be accepted if, after 4-minutes, the pressure gauge indicates 3.5-psi or greater. Failure of the Developer's testing equipment to properly function shall render the test unacceptable. All faulty sections of pipeline shall be repaired and retested until the minimum air testing requirements have been met.

E. Camera Inspection Test:

The Developer or their representative shall hire a qualified firm or individual to clean and then inspect, via camera, the entire length of the piping, and provide a digital copy of the video recording of that inspection on a thumb drive to the PW Inspector for review. At the City's discretion, any defects found with the pipe, its function or installation will be fixed at the Developer's expense. Pipes shall be left clean and free of debris.

## DIVISION 3b PVC PLASTIC PIPE FOR GRAVITY LINES

### 3b.01 GENERAL:

This Division covers the requirements for PVC plastic pipe materials and installation of main line storm drain, land drain, and other gravity line construction. For information regarding requirements for sanitary sewer, refer to the standard drawings and specifications of either the Central Davis Sewer District or North Davis Sewer District, depending on the location.

### 3b.02 PIPE:

PVC gravity pipe and fittings shall conform to ASTM D3034, for diameters from 4-inch to 15-inch and ASTM F679 for 18-inch to 27-inch, with integral bell gasket joints. Rubber gaskets shall be factory installed and conform to ASTM F477. Pipe shall be made of PVC plastic having a cell classification of 12454A or 13364B (with minimum tensile modulus of 500,000-psi) as defined in ASTM D1784 and shall have a SDR of 35, and minimum pipe stiffness of 46-psi according to ASTM D2412.

Pipe shall be installed in compliance with ASTM D2321 and the manufacturer's requirements. Land drain pipes will be white or green in color, and shall include locating tape labeled “LAND DRAIN” placed 2-feet above the top of the pipe, including laterals within the right of way.

### 3b.03 FITTINGS:

Fittings shall be made of PVC plastic conforming to ASTM D1784, have a cell classification as outlined in ASTM D3034.

### 3b.04 PIPE LAYING:

All pipe installation shall proceed upgrade on a stable foundation, with joints closely and accurately fitted. Joints shall be clean and dry, and a joint lubricant as recommended by the pipe supplier shall be applied uniformly to the mating joint surfaces to facilitate easy positive joint closure.

Pipe shall be installed with uniform bearing under the full length of the barrel, with suitable excavations being made to receive pipe bells.

Select material shall be compacted around the pipe to firmly bed the pipe in position. Haunching material (bed to springline) should be carefully worked under the haunches of the pipe and compacted from the pipe to the trench wall or 2-1/2-pipe diameters on each side of the pipe to ensure support. If adjustment of position of a pipe length is required after being laid, it shall be removed and re-jointed as for a new pipe. When laying is not in progress, the ends of the pipe shall be closed with a tight-fitting stopper to prevent the entrance of foreign material.

All non-conductive pipes require a 12 gauge tracer wire for locating purposes placed on top of pipe from manhole to manhole. Where splices are to be made, a water tight splice kit must be

used. Tail length on tracer wire shall not exceed 2-feet. See the Standard Drawings for details on tracer wire installation.

In addition to the above requirements, all pipe installation shall rigidly adhere to the specific requirements of the pipe manufacturer.

**3b.05 GRAVEL FOUNDATION FOR PIPE:**

Wherever the subgrade material does not afford a sufficiently solid foundation to support the pipe and superimposed load, or where groundwater must be drained, the subgrade shall be excavated to such depth as may be necessary and replaced with crushed rock or gravel compacted into place.

Gravel for PVC pipe foundation shall be clean crushed rock or gravel with 100% passing a 1-inch screen and no more than 5% passing a No. 4 sieve.

**3b.06 INSTALLATION REQUIREMENTS FOR LINE AND GRADE:**

All PVC pipe shall be installed accurately to the defined line and grade with the following limits:

Variance from established line and grade shall not be greater than 1/16-inch per inch of pipe diameter in 10-feet, and not to exceed 1/2-inch in 10-feet, provided that such variation does not result in a level or reverse sloping invert; provided also that variation in the invert elevation between adjoining ends of pipe, due to non concentricity of joining surface and pipe interior surfaces, does not exceed 1/64-inch per inch of pipe diameter, or 1/2-inch maximum. Ponding of 1/4-inch or more of water in a belly in the pipe, shall be dug up and fixed.

**3b.07 PIPE BEDDING:**

All pipe shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by being adequately bedded.

A groove shall be excavated in the bottom of the trench to receive the bottom quadrant of the pipe. Before preparing the groove, the trench bottom shall be excavated or filled and compacted to an elevation sufficiently above the grade of the pipe so that, when completed, the pipe will be true to line and grade. Bell holes shall be excavated so that only the barrel of the pipe receives bearing from the trench bottom.

Pipe bedding materials placed at any point below the mid-point of the pipe shall be deposited and compacted in layers not to exceed 10-inches in uncompacted depth. Deposition and compaction of bedding materials shall be done simultaneously and uniformly on both sides of the pipe. Compaction shall be accomplished with hand or mechanical compactors. All bedding materials shall be placed in the trench in such a manner that they will be scattered alongside the pipe and not dropped into the trench in compact masses. Bedding materials shall be gravel, free from rocks larger than 1-inch diameter. All materials shall be free from debris, roots, sod, or other deleterious material.

In the event trench materials are not satisfactory for pipe bedding, modified bedding will be required. Modified bedding shall consist of placing compacted granular material on each side of and to the level of 12-inches above the top of the pipe.

Modified bedding material shall be graded as follows: 100% passing a 1-1/2-inch screen and no more than 5% passing a No. 4 sieve. Gravel shall be used to bed pipe, then at least a 200-pound tensile strength woven ground stabilization fabric (in accordance with AASHTO M 288) shall be installed on top of gravel prior to sand or road base placement.

**3b.08 QUALITY CONTROL TESTS:**

The Developer shall be required to conduct a camera investigation. The Developer or their representative shall hire a qualified firm or individual to clean and then inspect, via camera, the entire length of the piping, and provide a digital copy of the video recording of that inspection on a thumb drive to the PW Inspector for review. At the City's discretion, any defects found with the pipe, its function or installation will be fixed at the Developer's expense. Pipes shall be left clean and free of debris.

**3b.09 MANHOLE CONNECTIONS:**

PVC pipe connections to manholes shall be achieved by use of manhole coupling adapters, rubber ring waterstops, or rubber boots with 300-series nonmagnetic corrosion-resistant steel bands. PVC may not be grouted directly to concrete.

## DIVISION 3c CORRUGATED POLYETHYLENE PIPE

### 3c.01 GENERAL:

This Division covers the requirements for corrugated polyethylene pipe with integrally formed smooth interior for use in ditch piping, storm drain, and other gravity line construction with water tight joints. All pipe shall be smooth bore double wall unless an alternate is specifically authorized in writing by the City Engineer.

### 3c.02 PIPE:

Corrugated polyethylene (PE) pipe and fittings shall conform to ASTM F667, for diameters from 3-inch to 6-inch and ASTM F667 for 8-inch to 24-inch, with gasketed PVC thermo-molded joints and fittings manufactured in accordance with ASTM D3034. Rubber gaskets shall be factory installed and conform to ASTM F477. Other applicable documents include:

ASTM Standards

| | |
|---|---|
| D618 | Methods of Conditioning Plastics and Electrical Insulating Materials for Testing |
| D1248 | Specifications for Polyethylene Plastics Molding and Extrusion Materials |
| D2412 | Test Method for External Loading of Plastic Pipe by Parallel-Plate Loading |
| D2444 | Test Method for Impact Resistance of Thermoplastic Pipe and Finttings by Means of a Tup (Falling Weight) |
| F412 | Definitions of Terms Relating to Plastic Piping Systems |
| F449 | Recommended Practice for Subsurface Installation of Corrugated Thermoplastic Tubing for Agricultural Drainage or Water Table Control |

AASHTO Standards

| | |
|---|---|
| M252 | Corrugated Polyethylene Drainage Tubing |
| M294 | Corrugated Polyethylene Pipe, 12-inch to 36-inch Diameter |

Pipe shall be installed in compliance with the manufacturer's requirements.

### 3c.03 FITTINGS:

Fittings shall be water tight rubber gasket fittings made of PVC plastic conforming to ASTM D1784, have a cell classification as outlined in ASTM D3034.

### 3c.04 PIPE LAYING:

All pipe installation shall proceed upgrade on a stable foundation, with joints closely and accurately fitted. Joints shall be clean and dry, and a joint lubricant as recommended by the pipe

supplier shall be applied uniformly to the mating joint surfaces to facilitate easy positive joint closure.

Pipe shall be installed with uniform bearing under the full length of the barrel, with suitable excavations being made to receive pipe bells.

Select material shall be compacted around the pipe to firmly bed the pipe in position. Haunching material (bed to springline) should be carefully worked under the haunches of the pipe and compacted from the pipe to the trench wall or 2-1/2-pipe diameters on each side of the pipe to ensure support. If adjustment of position of a pipe length is required after being laid, it shall be removed and re-jointed as for a new pipe. When laying is not in progress, the ends of the pipe shall be closed with a tight-fitting stopper to prevent the entrance of foreign material.

All non-conductive pipes require a tracer wire (12 gauge) for locating purposes placed on top of pipe from manhole to manhole. Where splices are to be made, a water tight splice kit must be used. Tail length on tracer wire shall not exceed 2-feet. See Standard Drawings for details on tracer wire installation.

In addition to the above requirements, all pipe installation shall rigidly adhere to the specific requirements of the pipe manufacturer.

**3c.05 GRAVEL FOUNDATION FOR PIPE:**

Wherever the subgrade material does not afford a sufficiently solid foundation to support the pipe and superimposed load, or where groundwater must be drained, the subgrade shall be excavated to such depth as may be necessary and replaced with crushed rock or gravel compacted into place.

Gravel for corrugated PE pipe foundation shall be clean crushed rock or gravel with 100% passing a 1-inch screen and no more than 5% passing a No. 4 sieve.

**3c.06 INSTALLATION REQUIREMENTS FOR LINE AND GRADE:**

All corrugated PE pipe shall be installed accurately to the defined line and grade with the following limits:

Variance from established line and grade shall not be greater than 1/16-inch per inch of pipe diameter in 10-feet, and not to exceed 1/2-inch in 10-feet, provided that such variation does not result in a level or reverse sloping invert; provided also that variation in the invert elevation between adjoining ends of pipe, due to non concentricity of joining surface and pipe interior surfaces, does not exceed 1/64-inch per inch of pipe diameter, or 1/2-inch maximum.

**3c.07 PIPE BEDDING:**

All pipe shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by being adequately bedded.

Bell holes shall be excavated so that only the barrel of the pipe receives bearing from the trench bottom.

Pipe bedding materials placed at any point below the mid-point of the pipe shall be deposited and compacted in layers not to exceed 10-inches in uncompacted depth. Deposition and compaction of bedding materials shall be done simultaneously and uniformly on both sides of the pipe. Compaction shall be accomplished with hand or mechanical compactors. All bedding materials shall be placed in the trench in such a manner that they will be scattered alongside the pipe and not dropped into the trench in compact masses. Bedding materials shall be loose earth, free from lumps; sand or gravel, free from rocks larger than 1-inch diameter. All materials shall be free from roots, sod, or other deleterious material.

In the event trench materials are not satisfactory for pipe bedding, modified bedding will be required. Modified bedding shall consist of placing compacted granular material on each side of and to the level of 12-inches above the top of the pipe.

Modified bedding material shall be graded as follows: 100% passing a 1-1/2-inch screen and no more than 5% passing a No. 4 sieve. If gravel is used to bed pipe, then at least a 200-pound tensile strength woven ground stabilization fabric (in accordance with AASHTO M 288) shall be installed on top of gravel prior to sand or road base placement.

**3c.08 QUALITY CONTROL TESTS:**

The Developer will be required to conduct an air test and displacement test in the presence of the City Engineer or representative. If these tests prove to be inconclusive, any or all of the other required tests shall be conducted in the presence of the City Engineer or representative. Tests shall be performed as follows:

F. Displacement Test:

In conducting the displacement test a light will be flashed between manholes or, if the manholes have not as yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a mirror. If the illuminated interior of the pipe shows broken, misaligned, or displaced pipe or other defects, the defects designated by the City Engineer shall be remedied at the Developer's expense.

G. Infiltration Test:

The Developer shall furnish labor, equipment, and materials, including pumps, and shall assist the City Engineer in making infiltration tests of the completed line

before it can be placed into service. The Developer shall furnish and install the measuring weirs or other measuring devices. The length of line to be tested at any time shall be subject to the approval of the City Engineer. The maximum allowable infiltration shall not exceed 150-gallons per inch diameter per mile per 24-hours for all installed pipe. If the quantity of infiltration is in excess of the maximum allowable, the leaking joints shall be repaired to the satisfaction of the City Engineer at the expense of the Developer.

H. Exfiltration Test:

The Developer shall furnish labor, equipment, and materials, including pumps, and shall assist the City Engineer in making exfiltration tests of the completed line before it can be placed into service. The length of line to be tested at one tie shall be limited to the length between adjacent manholes. The maximum allowable exfiltration shall not exceed 150-gallons per inch diameter per mile per 24-hours for all installed sewer pipe. The end of the line which projects into the manhole shall be plugged. The pipe shall then be filled with water from the upper manhole, and the line maintained under a light pressure of 4-feet of head. The inflow of water necessary to maintain this head shall be recorded as the leakage of the system. If the quantity of exfiltration is in excess of the maximum allowable, the leaking joints shall be repaired to the satisfaction of the City Engineer at the expense of the Developer.

I. Air Testing:

The Developer or their representative (a qualified firm or individual agreed upon by the City Engineer and the Developer) shall furnish labor, equipment, and materials, including pumps and compressors, and shall perform, in the presence of the City Engineer, air tests of the completed pipe before it can be placed in service. Each section of sanitary sewer pipeline between manholes shall be tested after all the 4-inch service laterals (and plugs) have been installed. Each test section shall be pressurized to 4.0-psi. For the purpose of stabilizing the air pressure in each test section, the 4.0 psi pressure shall be maintained for a two-minute period. Each test section shall then be repressurized to 4.0 psi for a period of 4-minutes. The test section shall be accepted if, after 4-minutes, the pressure gauge indicates 3.5-psi or greater. Failure of the Developer's testing equipment to properly function shall render the test unacceptable. All faulty sections of pipeline shall be repaired and retested until the minimum air testing requirements have been met.

J. Camera Test:

The Developer or their representative shall hire a qualified firm or individual to clean and then inspect, via camera, the entire length of the piping, and provide a digital copy of the video recording of that inspection on a thumb drive to the PW Inspector for review. At the City's discretion, any defects found with the pipe, its

function or installation will be fixed at the Developer's expense. Pipes shall be left clean and free of debris.

**3c.09 MANHOLE CONNECTIONS:**

Corrugated PE pipe connections to manholes shall be achieved by use of manhole coupling adapters, rubber ring waterstops, or rubber boots with 300-series nonmagnetic corrosion-resistant steel bands or concrete collars on the exterior and grouted on the interior.

## DIVISION 3d MANHOLES

### 3d.01 GENERAL:

This Division covers the requirements for manhole materials and installation. Manholes shall be installed at the locations and at the depth shown on the Drawings. Manholes shall be furnished complete with new cast iron rings and covers. Recycled rings and covers will not be accepted.

### 3d.02 CONCRETE BASES:

The manholes shall be furnished without bases.

### 3d.03 WALL AND CONE SECTIONS:

All manholes shall be precast, sectional, reinforced concrete pipe of either 48-inch or 60-inch inside diameter, as specified. Both cylindrical and taper sections shall conform to all requirements of ASTM C478 for Precast Reinforced Concrete Manhole Sections with the following exceptions:

A. The throat section of the manhole shall be adjustable, by use of manhole sections, up to 48-inches in height.

B. The taper section shall be a maximum of 3-feet in height, shall be of concentric conical design, and shall taper uniformly to 30-inches inside diameter.

C. The pipe used in the base section shall be furnished in section lengths of 1, 2, 3, and 4-feet as required. The base section shall be notched to fit over the pipe as shown on the Standard Drawings without bearing directly on the pipe. A 6-inch gravel base shall be furnished under the base section.

All joint surfaces of precast sections and the face of the manhole base shall be thoroughly cleaned and wet prior to setting precast sections. All joints, including grade rings shall be set in mortar consisting of 1-part cement and 1-1/2-parts sand with sufficient water added to bring the mixture to workable consistency, or the joints shall be sealed with a butyl rubber gasket that is permanently flexible and non shrinking. All joints shall be water tight and free from appreciable irregularities in the interior wall surface.

### 3d.04 CIRCULAR FLAT COVERS:

Where the line does not have sufficient depth to permit using a taper section a circular flat cover reinforced to meet H-20 Highway Loading shall be used. The cover shall have a 30-inch concentric opening for a standard ring and cover.

**3d.05 IRON CASTING:**

All iron casting shall conform to the requirements of ASTM A48 (Class 30) for grey iron castings.

Rings and covers shall be equal to the 24-inch standard with machined bearing surfaces and with cover weight of 150-pounds and ring weight of 233-pounds. Each cover shall contain one pick hole but shall not contain air vent holes. In addition to the foundry name and year of manufacture, the cover shall be marked for the type of line. All rings and covers shall be new; recycled or reused rings and covers shall not be allowed. Rings must be 6-inches tall; no flat rings will be permitted.

All manhole rings shall be carefully set to the grade shown on the Standard Drawings or as directed by the City Engineer. Manholes placed in asphalt surfacing shall require a concrete ring around the cast iron ring and cover to be 1/4-inch below the existing pavement. There must be a round concrete collar, 18-inches from edge of ring, or 12-inches if fiber mesh is used. The depth of the concrete collar shall be at least 12-inches.

**3d.06 PRECAST MANHOLE BOXES:**

Precast manhole boxes shall be constructed to the dimensions and requirements shown on the plans. Shop drawings shall be submitted for approval of the City Engineer, prior to construction of the precast manhole boxes.

Concrete and reinforcing steel shall comply to all requirements outlined in Division 5c and Division 5d, respectively.

All pressurized manholes as shown on the drawings shall have the manhole ring cast into the concrete lid.

**3d.07 BACKFILL:**

Backfill around manholes shall be per Division 2b. Compaction should be tested around all manholes.

**3d.08 Sewer Manholes**

All sanitary sewer improvements should be per CDSD or NDSD standards. The manholes should be concentric without any steps. The manhole lids should be stamped “Sewer” and not be vented. There must be no infiltration of groundwater or no exfiltration of water or sewer from the manholes. The manhole should be clean of debris. There should be only 12-inches or less of grade rings. The pan of the sewer manhole, where pipe comes in, must be grouted.

## DIVISION 3e LAND DRAIN SERVICE LATERALS

### 3e.01 GENERAL:

This Division covers the requirements for land drain and footing drain service laterals. They shall be constructed with the materials specified and at the locations shown on the Drawings or at the actual location established during construction by the City Engineer or their representative.

### 3e.02 SPECIFIC REQUIREMENTS:

Service laterals shall be constructed with materials and procedures stated in Division 3b. All laterals shall be 4-inches in diameter unless shown otherwise.

A. EXTENT OF LATERALS:

Service laterals shall extend from the land drain main to a point 10-feet beyond the street right of way line. A 2-inch by 4-inch by 6-foot marker, with the top 12-inches painted orange for footing drains, shall be installed to clearly mark the end of each lateral line. Laterals shall be capped with a cap suitable to withstand the test pressure. An identifying tape that says "Land Drain" must go the length of the lateral and wrap around the very end of the pipe.

Unless otherwise specified and approved in writing by the City Engineer, land drain main lines are maintained by the City, and service laterals are maintained by the property owner.

B. EXCAVATION AND BACKFILL:

Trench excavation, bedding and backfill shall conform to the applicable paragraphs of Division 2a. Gravel shall be used to bed the pipe, then at least a 200-pound tensile strength woven ground stabilization fabric (in accordance with AASHTO M 288) shall be installed on top of gravel prior to sand or road base placement. Fabric shall extend from the main to the edge of the City right of way.

C. PIPE:

Pipe used for service laterals shall be white PVC Plastic Pipe (unless shown otherwise) conforming to ASTM D3034 SDR 35.

D. CONNECTION TO MAIN:

Connections to the main shall be made with preformed wye's for new mains. Connections to existing mains shall be by means of a stainless steel saddle for concrete pipe or a gasketed tee for PVC pipe. The recommendations of the manufacturer of the materials used shall be carefully followed. All lateral connections into new land drain mains shall be through preformed wye fittings installed in the main line or with field installed service saddles (gasketed and clamped). All connections by field installed service saddles on new or existing sewer mains shall be done with a tapping machine and all required fittings and materials. Connections shall be at the locations shown in the approved set of plans or as staked in the field. Lateral connections shall be made at the 10 o'clock or 2 o'clock positions on the main. New laterals shall be located within 10-feet.

E. TESTING:

The service laterals shall be tested as a part of the footing drain main to which they are connected.

F. DAMAGE AND REPAIR OF MAINS AND APPURTENANCES

The Developer shall be responsible for the protection of existing improvements, and any damage resulting from their operations shall be their sole responsibility.

Damage to the mains and/or appurtenances shall be repaired by acceptable and approved methods.

## DIVISION 3f HIGH DENSITY POLYETHYLENE PRESSURE PIPE (for non-pressure applications)

### 3f.01 GENERAL:

This Division covers furnishing and installing High Density Polyethylene (HDPE) pressure pipe and fittings to the lines and grades shown on the Drawings and/or established in the field for non-pressure applications. See Division 4b for pipe specifications.

## DIVISION 4a PVC PRESSURE PIPE

### 4a.01 GENERAL:

This Division covers furnishing and installing PVC pressure pipe (as part of the City drinking water distribution system) to the lines and grades shown on the approved drawings and/or established in the field, and all flushing, testing, and repairing required to ensure adequate and safe operation of the water system. Minimum pipe size for culinary water main line is 8-inch diameter, and 6-inch diameter for fire lines, unless otherwise shown and approved by City Engineer. For information regarding furnishing and installing irrigation PVC pressure pipe, please see the standard drawings and specifications of Haights Creek Irrigation, Davis and Weber Canal Company or Benchland Water, depending on the location.

### 4a.02 MATERIALS:

Pipe for the transmission and distribution of water shall be manufactured in accordance with ANSI/AWWA C900, "AWWA Standard for Polyvinyl Chloride (PVC) 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 ANSI/AWWA C905, "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 SDR 18 with a working pressure of 150-psi. Pipe smaller than 4-inch shall be Schedule 40 PVC. Culinary water pipe must be blue in color and secondary water pipe must be purple.

### 4a.03 JOINTS:

Joints shall be push on rubber gasket type. Lubrication shall be water soluble, non-toxic, non-objectionable in taste and odor imparted to the water, non-supporting of bacteria growth, and have no deteriorating effect on the PVC pipe or rubber gaskets. It shall conform in every way to the National Sanitation Foundation NSF/ANSI Standard 61.

### 4a.04 FITTINGS:

All fittings to be used with the PVC pipe shall be the same as fittings for Ductile Iron Pipe and shall conform to the provisions of ANSI/AWWA C110/A21.10 or C153/A21.53. Mechanical joints should be restrained. Megalug by EBAA Iron is the preferred mechanical joint restraint.

### 4a.05 POLYETHYLENE WRAPPING:

All fittings for ~~PVC~~ all waterline pipe shall be wrapped as specified herein. All materials placed shall be wrapped with a polyethylene plastic wrap, including all fittings and valves, in accordance with the manufacturer's specifications.

All compression couplings, mechanical joints, flanged joints, and valves exposed to soil shall be wrapped with 8-mil thick polyethylene film adhesive tape equal to Polyken No. 900 or Scotchrap

No. 50. The tape shall be installed to adhere securely to both the pipe and polyethylene. Enough film shall be used to overlap the adjoining pipe a minimum of 1 foot.

Valves shall be wrapped by bringing the wrap on the adjacent pipe over the bells of flanges of the valve and sealing with the adhesive tape. The valve bodies are then wrapped with a flat sheet of the film passed under the valve bottom and brought up around the body to the stem and fastened in place with the adhesive tape.

All fittings that require concrete blocking should be completely wrapped prior to pouring the concrete backing block.

Polyethylene wrap shall be protected from the sun and weathering prior to use. Care shall be exercised during backfilling of the protected areas to prevent puncturing the film.

**4a.06 PIPE INSTALLATION:**

A. Cutting:

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

B. Dewatering of Trench:

Where water is encountered in the trench, it shall be removed during pipe laying operations and the trench so maintained until the ends of the pipe are sealed. See "Control of Groundwater" in Division 2 Trench - Excavation and Backfill.

C. Laying of Pipe:

The pipe and pipe coating (where applicable) shall be inspected for defects before installation. Any defects shall be repaired or the pipe shall be replaced, whichever is deemed necessary by the City Engineer or Representative.

All pipes shall be laid and maintained to the required lines and grades with fittings and valves at the required locations. The pipes shall be installed with 48 inches to the top of the pipe minimum cover from finished road surface for culinary water. The Developer shall be responsible to install the pipe line to the alignment set by the City Engineer or Representative or as shown on the Drawings.

All pipes, fittings and valves shall be carefully lowered from the truck when unloading or when installing into the trench. This should be done one piece at a time in order to prevent damage to pipe materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped from the truck or into the trench.

The Developer shall take the necessary precautions such that foreign materials do not enter into the pipe. 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.

Deflections in PVC pipe shall be made by longitudinal bending of the pipe barrel of the pipe rather than deflecting the pipe joints. Longitudinal bending shall be limited to eighty percent (80%) of that allowed by the manufacturer. This is accomplished by dividing the minimum recommended bending radius by 0.8.

All non-conductive drinking water pipes require a tracer wire (12 gauge) for locating purposes placed on top of the pipe and connected to the nearest fire hydrant, unless otherwise directed. Where splices are to be made, a water tight splice kit must be used. The wire should be run from the mainline, to the nearest fire hydrant, and connected to an above ground access station (a blue Snakepit RB14-TP, or approved equal). See standard drawings for additional detail.

D. Pipe Bedding:

All pipes shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by being adequately bedded.

In the event trench materials are not, in the judgment of the City Engineer or Representative, satisfactory for pipe bedding, imported granular bedding will be required. See Division 2a of these specifications.

E. Thrust Blocking:

Thrust blocking shall be applied at all tees, valves, plugs, caps and at bends deflecting 11 1/4 degrees or more. The fitting shall be encased in a 12 mil protective plastic wrap before the thrust block is poured. Reaction blocking shall be concrete, having a compressive strength of not less than 3000 pounds per square inch at 28 days. Blocking shall be placed between undisturbed soil and the fitting to be anchored. The area of bearing on the pipe and on the ground shall be as shown in the Drawings. Restraint sizing is based upon a maximum operating pressure of 150 psi and a test pressure of 200 psi, and a minimum soil bearing stress of 2,000 psf.

The blocking shall be so placed that the pipe and the fittings will be accessible for repair. Prior to backfilling around thrust block, secure inspection of installation by City Engineer or Representative. Concrete must be allowed to cure in thrust restraints for 5 days prior to pressurizing water lines or have additional approved thrust restraints installed prior to pressurizing the water line.

F. Connections to Existing Water Lines:

Information on the drawings regarding existing water lines is taken from "record" drawings from the city or utility company files and may or may not be accurate as to size, type of material or location. The Developer will be responsible to determine the proper fittings and materials required, obtain the City Engineer's approval of the planned connection, and perform the construction in a suitable fashion.

G. Magnetic Locator Tape:

All pipe shall include a three inch (3") magnetic locator tape installed in the pipeline trench approximately twenty four inches (24") above the top of pipe. This tape shall be prepared for culinary water with white or black printing on a blue field having the words: POTABLE WATER.

This tape shall be prepared for secondary water with white or black printing on a purple field, color Panatone 512C, having the words: CAUTION: NONPOTABLE WATER - DO NOT DRINK.

**4a.07 FLUSHING AND QUALITY CONTROL TESTING:**

A. Pressure Test:

A leakage test shall be conducted concurrently with the pressure test. After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing.

(1) Test Pressure Restrictions:
Test pressures shall:

i. Not be less than 1.25 times working pressure at the highest point along the test section or a minimum of 200psi.
ii. Not exceed pipe or thrust restraint design pressures.
iii. Be of at least 2-hour duration.
iv. Not vary by more than plus or minus five (± 5) psi for the duration of the test.
v. Not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants.
vi. Not exceed the rated pressure of the valves when the test boundary of the test section includes closed, resilient-seated gate valves or butterfly valves.

(2) Pressurization:

Each valved section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gage, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the City Engineer.

(3) Air Removal:

Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, the Developer shall install corporation cocks at such points so that the air can be expelled as the line is filled with water. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged.

(4) Examination:

All exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound materials and the test shall be repeated until it is satisfactory to the Owner.

B. Leakage Test:

A leakage test shall be conducted concurrently with the pressure test.

(1) Leakage Defined:

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.

(2) Allowable Leakage:

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

$$L = \frac{SD(P)^{0.5}}{133{,}200}$$

in which L is the allowable leakage, in gallons per hour; S is the length of pipeline tested in feet; D is the nominal diameter of the pipe, in

inches; and P is the average test pressure during the leakage test, in pounds per square inch gage.

i. Allowable leakage at various pressures is shown in Table 1.

ii. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr/in. of nominal valve size shall be allowed.

iii. When hydrants are in the test section, the test shall be made against the closed hydrant.

**TABLE 1**

**Allowable Leakage per 1000 ft of Pipeline - gph**

| Average Test Pressure *psi (Bar)* | Nominal Pipe Diameter—*in.* | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | 30 | 36 | 42 | 48 | 54 |
| 450 (31) | 0.480 | 0.640 | 0.950 | 1.271 | 1.591 | 1.911 | 2.232 | 2.552 | 2.872 | 3.183 | 3.823 | 4.784 | 5.735.4 | 6.696. | 7.647. | 8.608. |
| 400 (28) | 0.450 | | | | | | | | 2.702 | 3.002 | | | 5.415.0 | 6.315. | | |
| 350 (24) | 0.420 | 0.600 | 0.900 | 1.201 | 1.501 | 1.801 | 2.101 | 2.402 | 2.53 | 2.812 | 3.603 | 4.504 | 5.064.6 | 5.905. | 7.216. | 8.117. |
| 300 (21) | 0.390 | | | | | | | | 2.342 | 2.60 | | | 4.684.4 | 5.465. | | |
| 275 (19) | 0.370 | | | | | | | | | 2.492 | | | 4.484.2 | 5.234 . | | |
| 250 (17) | 0.360 | 0.560 | 0.840 | 1.121 | 1.401 | 1.691 | 1.971 | 2.252 | 2.242 | | 3.373 | 4.213 | 4.274.0 | 4 . 9 9 | 6.746. | 7.587. |
| 225 (16) | 0.340 | | | | | | | | | 2.372 | | | 4.053.8 | 4.734. | | |
| 200 (14) | 0.320 | 0.520 | 0.780 | 1.041 | 1.301 | 1.561 | 1.821 | 2.081 | 2.142 | | 3.122 | 3.903 | 3.823.5 | | 6.245. | 7.026. |
| 175 (12) | 0.300 | | | | | | | | | 2.252 | | | 3.583.3 | 4.464. | | |
| 150 (10) | 0 . 2 8 | 0.500 | 0.750 | 1.000 | 1.241 | 1.491 | 1.741 | 1.991 | 2.031 | | 2.992 | 3.733 | 3.313.0 | | 5.985. | 6.726. |
| 125 ( 9) | 0.250 | | | | | | | | | 2.121 | | | 3.022.7 | 4.173. | | |
| 100 ( 7) | | 0.470 | 0.710 | 0.950 | 1.191 | 1.421 | 1.661 | 1.901 | 1.911 | | 2.852 | 3.563 | 2.70 | | 5.705. | 6.416. |
| | 0 . 2 3 | | | | | | | | | 1.981 | | | | 3.863. | | |
| | | 0.450 | 0.680 | 0.900 | 1.131 | 1.351 | 1.581 | 1.801 | 1.791 | | 2.702 | 3.383 | | | 5.415. | 6.035. |
| | | | | | | | | | | 1.841 | | | | 3.533 . | | |
| | | 0.430 | 0.640 | 0.850 | 1.060 | 1.281 | 1.481 | 1.701 | 1.661 | | 2.552 | 3.192 | | | 5.094. | 5.735. |
| | | | | | | | | | | 1.681 | | | | 3 . 1 5 | | |
| | | 0.400 | 0.590 | 0.800 | 0.990 | 1.191 | 1.391 | 1.591 | 1.511 | | 2.382 | 2.982 | | | 4.774. | 5.364. |
| | | | | | | | | | | 1.50 | | | | | | |
| | | 0.370 | 0.550 | 0.740 | 0.920 | 1.101 | 1.291 | 1.471 | 1.35 | | 2.212 | 2.762 | | | 4.414. | 4.974. |
| | | 0.340 | 0.500 | 0.670 | 0.840 | 1.010 | 1.181 | 1.341 | | | 2.011 | 2.522 | | | 4.033 | 4.534 . |
| | | 0.30 | 0.45 | 0.60 | 0.75 | 0.90 | 1.05 | 1.20 | | | 1.80 | 2.25 | | | 3.60 | 4 . 0 5 |

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.
**To obtain leakage in liters/hour, multiply the values in the table by 3.785.

(3) Acceptance of Installation:

Acceptance shall be determined on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than specified, the

Developer shall, at its own expense, locate and repair the defective material until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.

C. Flushing:

All new water systems or extensions to existing systems shall be thoroughly flushed before being placed in service. Flushing shall be accomplished through hydrants, or end of line blow-off assemblies at a minimum flushing velocity of 2.5-feet per second.

***FLOW RATE AND OPENINGS TO FLUSH PIPELINES***
(40-psi Residual Pressure)

| Pipe Size (inches) | Flow Required to Produce 2.5 fps velocity (gpm) |
|---|---|
| 2 | 26 |
| 4 | 100 |
| 6 | 220 |
| 8 | 390 |
| 10 | 610 |
| 12 | 880 |
| 14 | 1,200 |
| 16 | 1,565 |
| 18 | 1,980 |
| 20 | 2,450 |
| 24 | 3,525 |
| 30 | 5,507 |

D. Disinfection:

After flushing, all culinary water lines shall be disinfected by chlorination. Chlorination shall provide a minimum of 25-ppm residual after 24-hours contact in the pipeline. This may be expected with an application of 50-ppm, although some conditions may require more. Chlorine in the form of a 1% slurry of high-test calcium hypochlorite (T-Chlor, HTH, Perchloron, Pittchlor, etc. which are 70% available chlorine by weight) shall be fed into the pipeline in such a manner as to mix with the water flowing in the pipeline. (A 1% slurry – 10,000 ppm – results from mixing one pound of calcium hypochlorite with 8.40 gallons of water.)

The following table provides information as to the required quantity of slurry to be used per 100 feet of pipe to provide a chlorine concentration of 50 ppm:

| Pipe Size (in.) | Vol. of 100 ft. Length (gal) | Required Amount of 1% Chlorine Slurry (gal) |
|---|---|---|
| 1 1/2 | 9.18 | 0.07 |
| 2 | 16.32 | 0.12 |
| 2 1/2 | 25.50 | 0.18 |
| 3 | 36.73 | 0.26 |
| 4 | 65.28 | 0.47 |
| 6 | 146.90 | 1.05 |
| 8 | 261.10 | 1.87 |
| 10 | 408.10 | 2.92 |
| 12 | 587.60 | 4.20 |

During the process of chlorinating the pipeline, all valves and other pipeline appurtenances shall be operated several times to provide sufficient contact with the chlorinating agent. Following chlorination, the water line shall be drained and thoroughly flushed according to Section A above and, if necessary, rechlorinated until a satisfactory bacteriological test is obtained. After passing a bacterialogical test, water must be flushed from the pipe and discharged in accordance with all local, state and federal water quality requirements.

Disinfection shall conform to the requirements of AWWA C651 (or latest edition). Main lines must pass bacterialogical test. Number of samples to be determined by inspector and will be based on the size of the development. If a new main is connected to an existing main, a bacteria test must be completed and passed prior to any pressure testing being conducted.

## DIVISION 4b HIGH DENSITY POLYETHYLENE PRESSURE PIPE

### 4b.01 GENERAL:

This Division covers furnishing and installing High Density Polyethylene (HDPE) pressure pipe and fittings to the lines and grades shown on the Drawings and/or established in the field, and all flushing, testing, and repairing required to ensure adequate and safe operation of the water system. Use of HDPE pipe in pressurized applications is restricted, unless otherwise approved by the City Engineer. The minimum size for culinary water mains is 10-inch SDR 11 IPS (Iron Pipe Size).

If approved by the City Engineer, use of HDPE in the culinary distribution system shall only be allowed for transmission lines, meaning no service connections or saddles. In addition, the standards in this division shall be considered a minimum and the City shall reserve the right to make additional requirements to ensure proper safeguarding of the distribution system, as well as other infrastructure.

### 4b.02 MATERIALS:

High density polyethylene pipe shall be manufactured from resins exhibiting a cell classification of PE 345434C as defined in ASTM D3350 with an established hydrostatic design basis of 1600-psi for water at 73° F. HDPE pipe shall conform to ASTM F714. HDPE pipe shall also conform in every way to ANSI/AWWA C-906, "AWWA Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 63-inch for Water Distribution." The HDPE pipe shall be Iron Pipe Size (IPS). Coloring or marking is to be submitted to and approved by City Engineer.

### 4b.03 JOINTS:

HDPE pipe shall be joined by thermal butt fusion or flange assemblies. If flange assemblies are used, stainless steel bolts will be required with full-faced rubber gaskets and torqued to manufacturer's specifications.

Only formally trained and certified technicians may conduct fusions, whether thermal butt fusions, electro fusions or otherwise. Qualification of the fusion technician shall be demonstrated for the type of fusion, the size of the pipe, and the equipment to be used on a project.

HDPE pipe shall not be joined by solvent cements, adhesives (such as epoxies) or threaded connections. All joining methods shall be capable of conveying water at a minimum of 2.0-times the working pressure rating of the pipe.

**4b.04 PIPE INSTALLATION:**

A. Cutting:

Cutting of pipe for shall be done in a neat and workmanlike manner by a method recommended by the manufacturer. Pipe should be cut with a chainsaw, with no bar oil. Use liquid dish soap as a lubricant. After cutting, the pipe shall be cleaned and prepared per the manufacturer's recommendations.

B. Dewatering of Trench:

Where water is encountered in the trench, it shall be removed during pipe laying operations and the trench so maintained until the ends of the pipe are sealed. See "Control of Groundwater" in Division 2a.

C. Laying of Pipe:

The pipe shall be inspected for defects before installation. Any defects shall be repaired or the pipe shall be replaced, whichever is deemed necessary by the City Engineer or Representative.

All pipes shall be laid and maintained to the required lines and grades with fittings and valves at the required locations. The pipes shall be installed with 48-inches to the top of the pipe minimum cover from finished road surface for culinary water. The Developer shall be responsible to install the pipe line to the alignment set by the City Engineer or Representative or as shown on the Drawings.

All pipes, fittings and valves shall be carefully lowered from the truck when unloading or when installing into the trench. This should be done one piece at a time in order to prevent damage to pipe materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped from the truck or into the trench.

The Developer shall take the necessary precautions such that foreign materials do not enter into the pipe. 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.

Deflections in HDPE pipe shall be limited to 80% of that allowed by the manufacturer. This is accomplished by multiplying the minimum recommended bending radius by 0.8.

All non-conductive pipes require a tracer wire (12 gauge) for locating purposes placed on top of pipe and be connected to all valves and fire

hydrants. Where splices are to be made, a water tight splice kit must be used. The wire should be looped up valve boxes and fire hydrants. See Standard Drawings for tracer wire installation.

D. Pipe Bedding:

All pipes shall be protected from lateral displacement and during backfilling operations by being adequately bedded.

In the event trench materials are not, in the judgment of the City Engineer or Representative, satisfactory for pipe bedding, imported granular bedding will be required. See Division 2a of these specifications.

E. Thrust Blocking:

Thrust blocking shall be applied at all tees, bends, plugs, caps and any non HDPE bends deflecting 11.25° or more. The fitting shall be encased in a 12-mil protective plastic wrap before the thrust block is poured. Reaction blocking shall be concrete having a compressive strength of not less than 3000-pounds per square inch at 28-days. Blocking shall be placed between undisturbed soil and the fitting to be anchored. The area of bearing on the pipe and on the ground shall be as shown in the Drawings Restraint sizing is based upon a maximum operating pressure of 150-psi and a test pressure of 200-psi, and a minimum soil bearing stress of 2000-psf.

The blocking shall be so placed that the pipe and the fittings will be accessible for repair. Prior to backfilling around thrust block, secure inspection of installation by City Engineer or Representative. Concrete must be allowed to cure in thrust restraints for 5-days prior to pressurizing water lines or have additional approved thrust restraints installed prior to pressurizing the water line.

F. Connections to Existing Water Lines:

Information on the drawings regarding existing water lines is taken from "record" drawings from the city or utility company files and may or may not be accurate as to size, type of material or location. The Developer will be responsible to determine the proper fittings and materials required, obtain the City Engineer's approval of the planned connection, and perform the construction in a suitable fashion. Connection to the existing PVC or Ductile Iron main shall be made using a mechanical joint Ductile Iron sleeve (long) or reducer or equivalent fitting which complies with the recommendations of the pipe manufacturer for transitioning from HDPE to PVC or ductile iron pipe.

G. Magnetic Locator Tape:

All pipe shall include a 3-inch magnetic locator tape installed in the pipeline trench approximately 24-inches above the top of the pipe. This tape shall be prepared for culinary water with white or black printing on a blue field having the words: POTABLE WATER.

H. Valving:

All valves 10- inches and smaller shall be gate valves (resilient seated gate valve), and all valves larger than 10- inches shall be butterfly valves made by Christy (no spacer needed) or approved equal (spacer required), in accordance with Division 4c.

**4b.05 FLUSHING AND QUALITY CONTROL TESTING:**

A. Pressure Test:

A leakage test described in ASTM F2164, "Standard Practice for Field Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure", shall be conducted concurrently with the pressure test.

The maximum permissible test pressure is measured at the lowest elevation in the test section. The maximum permissible test pressure is the lower of (a) 150% of the system design operating pressure provided that all components in the test section are rated for the test pressure, or (b) the pressure rating of the lowest pressure rated component in the test section.

(1) Pressurization:

Each valved section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gage, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the City Engineer. The maximum test duration is 8-hours including time to pressurize, time for initial expansion, time at test pressure, and time to depressurize the test section. Damage to the system may occur if testing at excessive pressure or for an excessive time period.

(2) Air Removal:

Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, the Developer shall install

corporation cocks at such points so that the air can be expelled as the line is filled with water. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged.

(3) Examination:

All exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound materials and the test shall be repeated until it is satisfactory to the City Engineer.

B. Leakage Test:

A leakage test described in ASTM F2164, "Standard Practice for Field Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure", shall be conducted concurrently with the pressure test.

Gradually pressurize the test section to test pressure, and maintain test pressure for three (3) hours. During the initial expansion phase, polyethylene pipe will expand slightly. Additional test liquid (typically water) will be required to maintain pressure. Immediately after the initial expansion phase, there are two alternatives to determine if there is leakage.

(1) Reduce test pressure by 10 psi, and stop adding test liquid. If test pressure remains steady (within 5% of the target value) for one (1) hour, then no leakage is indicated.

(2) (This alternative is applicable when the test pressure is 150% of the system design pressure.) Monitor the amount of make-up water required to maintain test pressure for 1, or 2, or 3-hours. If the amount of make-up water needed to maintain test pressure does not exceed the amount in the manufacturer's literature, then no leakage is indicated.

Acceptance of Installation:

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

C. Flushing:

All new water systems or extensions to existing systems shall be thoroughly flushed before being placed in service. Flushing shall be accomplished through hydrants, or end of line blow-off assemblies at a minimum flushing velocity of 2.5-feet per second.

| ***FLOW RATE AND OPENINGS TO FLUSH PIPELINES*** (40-psi Residual Pressure, assumed DR 11) | |
|---|---|
| Pipe Size (inches) | Flow Required to Produce 2.5-fps velocity (gpm) |
| 2 | 23 |
| 4 | 81 |
| 6 | 175 |
| 8 | 297 |
| 10 | 461 |
| 12 | 648 |
| 14 | 782 |
| 16 | 1,021 |
| 18 | 1,292 |
| 20 | 1,595 |
| 24 | 2,296 |
| 30 | 3,588 |

D. Disinfection:

After flushing, all culinary water lines shall be disinfected by chlorination. Chlorination shall provide a minimum of 25-ppm residual after 24-hours contact in the pipeline. This may be expected with an application of 50-ppm, although some conditions may require more. Chlorine in the form of a 1% slurry of high-test calcium hypochlorite (T-Chlor, HTH, Perchloron, Pittchlor, etc. which are 70% available chlorine by weight) shall be fed into the pipeline in such a manner as to mix with the water flowing in the pipeline. (A 1% slurry – 10000-ppm – results from mixing one pound of calcium hypochlorite with 8.40-gallons of water.)

The following table provides information as to the required quantity of slurry to be used per 100-feet of pipe to provide a chlorine concentration of 50-ppm:

| Pipe Size (in.) | Vol. of 100-ft. Length (gal) | Required Amount of 1% Chlorine Slurry (gal) |
|---|---|---|
| 2 | 14.98 | 0.11 |
| 4 | 53.82 | 0.40 |
| 6 | 116.63 | 0.88 |
| 8 | 197.70 | 1.48 |

| | | |
|---|---|---|
| 10 | 307.08 | 2.30 |
| 12 | 432.01 | 3.24 |

During the process of chlorinating the pipeline, all valves and other pipeline appurtenances shall be operated several times to provide sufficient contact with the chlorinating agent. Following chlorination, the water line shall be drained and thoroughly flushed according to Section A above and, if necessary, rechlorinated until a satisfactory bacteriological test is obtained.

Disinfection shall conform to the requirements of AWWA C651, latest edition. Main lines must pass bacteria test. Number of samples to be determined by inspector and will be based on site of development. If a new main is connected to an existing main, a bacteria test must be completed and passed prior to any pressure testing being conducted.

Following chlorination, the water line shall be drained and thoroughly flushed and, if necessary, rechlorinated until a satisfactory bacteriological test is obtained. After passing a bacterial test, water must be flushed from the pipe and discharged in accordance with all local, state and federal water quality requirements.

## DIVISION 4c VALVES, COUPLINGS AND FIRE HYDRANTS

### 4c.01 GENERAL:

This Division covers distribution valves to be used in the water system, couplings and fire hydrants.

### 4c.02 RESILIENT SEATED GATE VALVE:

Valves in sizes 4-inch through 12-inch shall be of the iron body, non rising bronze stem, resilient seated type, manufactured to equal or exceed all applicable AWWA C-509 latest revision and all specific requirements outlined in these specifications. Acceptable manufacturers are Mueller Company, American Flow Control and Clow Valve Company, as directed by the City.

A. Valves shall open left and be provided with 2-inch square operating wrench nuts unless otherwise specified.

B. When valves are 'Mechanical Joint', they shall be furnished with all necessary glands, gaskets, followers, bolts and nuts to complete installation.

C. The disc shall have integrally cast ASTM B62 bronze stem nut to prevent twisting, binding or angling of the stem. Designs with loose stem nuts are not acceptable.

D. Bronze valve stems shall be interchangeable with stems of the double disc valves of the same size, direction of opening and manufacture.

E. All internal ferrous surfaces shall be coated, holiday free, to a minimum thickness of 4-mil with a two part thermo setting epoxy coating. Said coating shall be non-toxic, impart no taste to the water, formulated from materials deemed acceptable in the Food and Drug Administration Document Title 21 of the Federal Regulations on food additives, Section 121.2514 entitled Resins and Polymeric Coatings. It shall protect all seating and adjacent surfaces from corrosion and prevent build-up of scale or tuberculation.

F. The sealing element shall be secured to the disc with self-locking stainless steel screws, and it shall be field replaceable, and shall be such that it cannot be installed improperly.

G. Stem failure from over torquing in either the open or closed position shall occur externally at such a point as to enable the stem to be safely turned by use of a readily available tool after exposure of the valve through excavation.

H. Valve design shall incorporate a positive metal to metal stop to prevent over-compression of the sealing element.

I. A full faced composition gasket placed between machined body and bonnet flanges is required to eliminate cold flow or creep action present with "O" ring gasketed bodies.

J. Valves shall have a test plug in the bonnet area to vent air and allow line pressure testing.

K. The exterior of the valves shall be Asphalt Varnish, JAN-P-450. If exterior epoxy is used, all bolts and nuts shall be made of Stainless Steel to prevent galvanic corrosion of said nuts and bolts due to insulation from the ferrous valve and line.

**4c.03 BUTTERFLY VALVE:**

All butterfly valves (Acceptable manufacturers are Mueller Company, M&H, Avtek and Clow Valve Company) shall conform to the latest revision of ANSI/AWWA Standard C504, Class 150-B, and comply with the following:

A. Valve bodies shall be cast iron, ASTM A126 Class B. Body ends shall be flanged with facing and drilling in accordance with ANSI B16.1, Class 125; or mechanical joint in accordance with ANSI/AWWA C-111/A21.11. All 'Mechanical Joint' end valves shall be furnished complete with joint accessories (bolts, nuts, gaskets, and glands). All valves shall conform with ANSI/AWWA Standard C-504, Table 3, Laying Lengths for Flanged Valves and Minimum Body Shell Thickness for all Body Types.

B. Valve disc shall be Ductile Iron ASTM A536, Grade 65-45-12. Valve disc shall be of the offset design providing 360 degree uninterrupted seating.

C. The resilient seat shall be natural rubber bonded to an 18-8, Type 304 Stainless Steel retaining ring secured to the disc by 18-8, Type 304 Stainless Steel screws. The seat shall be capable of mechanical adjustment in the field and field replaceable without the need for special tools. Valve body seat shall be 18-8, Type 304 Stainless Steel.

D. Valve shafts shall be 18-8, Type 304 Stainless Steel. Shafts shall be of the two piece stub design and attached to the disc by means of "O" ring sealed taper pins with lock nuts.

E. The valve assembly shall be furnished with a non-adjustable factory set thrust bearing designed to center the valve disc at all times.

F. Shaft bearings shall be contained in the integral hubs of the valve body and shall be self-lubricated sleeve type.

G. Valve shaft seal shall consist of "O" rings. Where the valve shaft projects through the valve body for actuator connection, the "O" ring packing seal shall be field replaceable as a part of a removable bronze cartridge.

H. When manual actuators are required they shall be of the traveling nut design capable of withstanding 450-foot-pounds of input torque against the open and closed stops. All actuators shall have adjustable mechanical stop limits. The closed position stop shall be externally adjustable. Valves shall be installed with the shaft horizontal unless otherwise directed by the City Engineer and shall be provided with a 2-inch square operating nut for manually operating the valve with a "T" handle wrench.

I. All valves shall be coated with epoxy in conformance to AWWA Standard C-550, latest revision. Interior wetted ferrous surfaces shall be coated a nominal 10 mils thick for long life; and body exterior shall have a minimum of 3 to 4-mil coating thickness in order to provide superior base for field-applied finish coats.

**4c.04 VALVE BOXES:**

All buried valves shall be installed complete with two-piece, cast iron, screw type, 5-1/4-inch shaft valve box with locking lid. The lid shall have the word "Water" or “Irrigation”, as appropriate, cast in the metal.

Valves and valve boxes shall be installed where shown on the drawings. Valves and valve boxes shall be set within 1/4 to 1/2-inch plumb. Valve boxes shall be vertically centered directly over the valve within a tolerance of +/- 1/2-inch. Valves shall be aligned with property lines where possible. Earth fill shall be carefully tamped around the valve box to a distance of 4-feet on all sides of the box, or to the undisturbed trench face if less than 4-feet. Valve boxes shall have the interiors cleaned of all foreign matter before installation and before and after backfill, being accessible and free of debris.

All valve boxes located in streets shall be installed as nearly to grade as possible. Valve boxes placed in bituminous asphalt concrete surfaces, after the pavement is in place, the valve boxes shall be raised to grade (1/4 – 1/2-inch lower than asphalt), the surrounding asphalt shall be neatly cut to form a circular opening 2.5-feet in diameter with the valve box centered, and a 12-inch thick concrete collar shall be cast around the box. Valve boxes shall be installed as shown on the Drawings. Valve boxes in off-road areas shall extend 6-inches above grade and be collared and marked.

**4c.05 COUPLINGS:**

Acceptable manufacturers of couplings are HYMAX (grip), Romac (alpha) or Smith-Blair (18-inch long). Cast iron sleeves may be utilized, as approved by the City Engineer. Couplings shall be of the straight, transition, or reducing style as required by the City for the specific installation. All steel fittings and bolts shall be coated with a non-oxide coating and wrapped with 12-mil polyethylene.

**4c.06 FIRE HYDRANTS:**

Fire hydrants shall be "traffic model" type designed to conform to AWWA C502 and shall be of either the compression or toggle joint type. Hydrants shall be the Mueller Modern Centurion A-442, Clow Medallion or Waterous Pacer (with alpha base).

Hydrant valves shall be a minimum of 6-inch size. Hydrants shall be supplied complete with two 2-1/2-inch hose nozzles and one 4-1/2-inch pumper nozzle. All nozzles shall be provided with National Standard threading. A one cubic yard gravel sump shall be provided at each hydrant. All hydrants shall be mechanical joint end and shall be connected to the main by means of a flanged tee and flanged by mechanical joint auxiliary gate valve (or flange by alpha gate valve) and box as shown on Kaysville Standard Drawings. Each hydrant shall also be supplied with O-ring seals, a National Standard pentagon operating nut which is designed for clockwise rotation closing, and a 6-inch mechanical joint inlet.

All hydrants shall be factory painted red and must function properly. Where a parkstrip exists, hydrants shall be centered in the parkstrip +/- 3-inches. Hydrants must have a 3-foot minimum clear space around the hydrant. Hydrants must be located as shown on approved plans/drawings and be set vertically within +/- 1-inch out of level (plumb).

## DIVISION 4d WATER SERVICE LATERALS

### 4d.01 GENERAL:

Water service laterals shall be constructed with materials specified and at the locations shown on the Drawings or at the actual location established during construction by the City Engineer or representative. The City shall maintain the service lateral from the main line to the end of the meter setter; the service lateral between the end of the meter setter and the property is to be maintained by the property owner.

### 4d.02 WATER SERVICE LATERALS:

Pipe for water service laterals shall be 3/4-inch Type K-soft copper tubing or blue HDPE SDR 9 Copper Tube Size (CTS) with a 200-psi rating.

A. Extent of Laterals:

Water service laterals shall extend from the water main to a point 10-feet beyond the street right-of-way line. A curb stop valve shall be installed on the end of the line. ~~Type K-soft copper tubing w~~Water services shall not have any joints between the corporation stop and the meter setter. A 2-inch by 4-inch by 6-foot marker, with the top 12-inches painted blue, shall be installed to clearly mark the end of each lateral line. Tracer wire (12 gauge) shall be installed from the main to the end of each lateral line, and come up the outside of each meter box, and come into the meter box in a notch between the meter ring and the box. Meter boxes shall be installed in accordance with the Kaysville City standard drawings.

B. Excavation and Backfill:

Trench excavation and backfill shall conform to the applicable paragraphs of Division 2a. Bedding shall meet the requirement of Division 2a for PVC or polyethylene pipe.

C. Connection to Main:

Connections to the main lines shall be made by means of corporation stops using direct pipe taps for 3/4-inch and 1-inch services on Ductile Iron pipe, tapped tees for 2-inch service or approved service saddles for PVC and any of the above. HDPE fused saddles should be Frialen 10-inch to 20-inch universal service saddle with 2-inch female threaded outlet or equivalent.

D. Service Saddle Specifications:

(For use with AWWA C-900 CI O.D. for PVC plastic pipe.)

All service clamps shall be a "Full encirclement design", and shall be O.D. controlled, which design will eliminate the possibility of pipe crushing due to the over torquing of the nuts upon installation.

All service clamps shall be manufactured of either brass cast or epoxy coated ductile iron with stainless steel bands in conformance to AWWA C800, General Section – 1, Paragraph 1.2 (ASTM B62).

The two sides of the clamp shall be held together by high quality ~~Silicon Bronze Hex~~Blue Epoxy Coated Bolts ~~(in sizes 1-inch and over) or Silicon Bronze Slotted Screws (in sizes under 1-inch),~~ no dissimilar metals shall be allowed at this point thus eliminating the possibility of galvanic corrosion.

~~All service clamps shall be Mueller Model H-13490 Series, or Ford Model S-91 Series for sizes through 12-inch and Romac 305 Series for 14-inch or larger.~~

(For use with Ductile Iron Pipe.)

All service clamps shall be of the double strap design with brass body or epoxy coated ductil iron with stainless steel bands, flattened silicon bronze or stainless stell straps, rolled strap threads and O-ring sealed outlet. Saddles shall meet all applicable parts of ANSI/AWWA C-800.

~~All service clamps shall be Mueller Model H-16000 Series or approved equal.~~

E. Water Service Terminations:

Water services shall be required to be terminated at the water main line if development or site changes require the old service line to be no longer in service. Corporation stops shall be removed and replaced by a repair band that meets AWWA requirements.

~~E.~~F. Sample Stations:

The City may require an above ground sample station for water quality testing (Eclipse 88 type or approved equal). When required, sample stations shall be installed at a depth of 3 to 4-feet, and in accordance with the Kaysville City standard drawings. Sample station locations shall be determined by the City Engineer.

The line from the main to the sample station shall be subject to the same requirements as a service lateral.

**Commented [DF1]:** Created separate bullet point for Sample Station but it didn't save as a track change.

~~F.~~G. Corporation Stops:

Connections of services to main lines shall be through a corporation type stop and a 24-inch gooseneck formed with copper tube. If blue HDPE SDR 9 is used for the service line, a gooseneck will be installed with the blue HDPE SDR 9 in place of the copper tube. -Inlet connection shall be a AWWA I.P. thread and the outlet shall be a compression fitting. Ford or Mueller are the approved manufacturers.

All connection made to pressurized water lines shall be done using a "wet-tap" method.

~~G.~~H. Service Tubing:

Water service lines from the main to the meter box shall be 3/4-inch, 1-inch, or 2-inch type K-soft copper tube or blue HDPE SDR 9 Copper Tube Size (CTS) with a 200-psi rating.

When transferring or replacing existing galvanized steel or plastic services, copper replacement tubing or blue HDPE shall be used, as detailed above.

All tubing for service lines shall be cut and installed in a neat and workmanlike manner by use of a wheel cutter.

~~H.~~I. Compression Connections:

(1) The interior surface of the coupling nut, including threads, shall have a baked on, fluorocarbon coating to reduce assembly friction and prevent the gasket from turning and twisting during tightening. The nut shall bottom on a cast or machined shoulder on the body when properly assembled. This design will provide a visual check to assure connection is properly assembled.

(2) The sealing gasket shall be of molded synthetic rubber (ASTM D-2000) with molded in place bronze spring (ASTM A-134 Alloy #6) to eliminate the possible cold flow of the gasket between the pipe and fitting.

(3) A gripper band of hardened Stainless Steel (ANSI Type 401) shall be fitted into the gasket. When the gasket is compressed it will cause the gripper ring to distort the pipe giving the fitting a high resistance to pull out. The gripper band shall overlap itself to prevent cold flow of the gasket into the cavity under the band.

(4) Compression connections and fittings shall be Mueller 110 or approved equal.

~~I.~~J. Flushing, Testing, and Disinfection:

Flushing, testing and disinfection shall be done at the time the water main is flushed, tested and disinfected. The end of the trench where the curb valve is located shall be left open to allow for discharging water out of the service line for proper flushing and to insure that the line has been adequately disinfected. Flushing, testing and disinfection shall conform to the applicable paragraphs of Division 4a or 4b.

~~J.~~K. Damage and Repair of Water Mains and Appurtenances:

The Developer shall be responsible for any damage to water mains and water facilities caused by their operations.

Any damage to water gates, hydrants, valve chambers, and other surface appurtenances which result from the Developer's operation shall be their sole responsibility.

## DIVISION 4e SECONDARY WATER

**4e.01 GENERAL:**

See the requirements of the applicable Secondary Water Provider with jurisdiction.

**4e.02 PIPES:**

All pipes will have locator tape and a tracer wire for locating. This should meet the City requirements for culinary water pipes (Divisions 4a-b).

**4e.03 VALVES:**

All valves in roadways will be set and have same requirements as culinary valves (Division 4c). The valve covers/lids must be stamped ‘Secondary’ or ‘Irrigation’.

**4e.04 SERVICE BOXES:**

All boxes in the park strip will be level with the TBC + 3/8”.

4e.05 **APPROVALS:**

Kaysville City will require a letter of approval from secondary water provider before acceptance/warranty.

## DIVISION 5a ROADWAY CONSTRUCTION

### 5a.01 GENERAL:

This Division covers roadway construction; earthwork, subgrade preparation, imported granular subgrade, base course, asphalt surface and raising manholes and valve boxes to grade.

All streets shall be built in accordance with the following, unless otherwise specified by the City Engineer:

A. Local Streets/Parking Lots/Trails
   1) 12-inch minimum crushed 1.25-inch minus (State spec.) gravel untreated base course over prepared subgrade.
   2) 3-inch minimum compacted thickness of ~~1/2-inch aggregate PG 58/28 with 15% max rap hot plant asphalt surfacing on streets.~~Class I bituminous concrete mix (SP-3/8 gradation).
   ~~2)~~3) 6-inch minimum Granular Borrow consisting of 3"-4" well-graded engineered fill meeting A-1-a (AASHTO M 145 or ASTM D3282) with a minimum CBR of 25 percent.

B. Significant Local Streets
   1) 12-inch minimum crushed 1.25" minus (State spec.) gravel untreated base course over prepared subgrade.
   2) 4-inch minimum compacted thickness of Class II bituminous concrete mix (SP-1/2 gradation).~~1/2-inch aggregate PG 58/28 with 15% max rap hot plant asphalt surfacing on streets. Lifts must be completed in two 2-inch thick levels.~~
   ~~2)~~3) 6-inch minimum Granular Borrow consisting of 3"-4" well-graded engineered fill meeting A-1-a (AASHTO M 145 or ASTM D3282) with a minimum CBR of 25 percent.

C. Minor Collector Streets
   1) 12-inch minimum crushed 1.25" minus (State spec.) gravel untreated base course over prepared subgrade.
   2) 4-inch minimum compacted thickness of Class II bituminous concrete mix (SP-1/2 gradation).~~1/2-inch aggregate PG 58/28 with 15% max rap hot plant asphalt surfacing on streets. Lifts must be completed in two 2-inch thick levels.~~
   ~~2)~~3) 6-inch minimum Granular Borrow consisting of 3"-4" well-graded engineered fill meeting A-1-a (AASHTO M 145 or ASTM D3282) with a minimum CBR of 25 percent.

D. Major Collector Streets
   1) 12-inch minimum crushed 1.25" gravel untreated base course over prepared subgrade.

2) 54-inch minimum compacted thickness of Class II bituminous concrete mix (SP-1/2 gradation).~~1/2-inch aggregate PG 58/28 with 15% max rap hot plant asphalt surfacing on streets. Lifts must be completed in two 2-inch thick levels.~~

~~2)~~3) 8-inch minimum Granular Borrow consisting of 3"-4" well-graded engineered fill meeting A-1-a (AASHTO M 145 or ASTM D3282) with a minimum CBR of 25 percent.

E. Arterial Streets

1) Pavement structure will be based on ~~1/2-inch aggregate PG 58/28 with 15% max rap hot plant mix asphalt surfacing on streets, and a modified or more specific design to meet conditions and traffic loads/volumes may be required.~~Class III asphalt mix (SP-1/2 gradation). Layer configuration and thicknesses will be determined by a site-specific design to meet conditions and traffic loads/volumes. A minimum of 5 inches of asphalt and 16" of untreated base course is required.

~~Note: Alternative designs, materials or cross sections may be proposed, however, the City retains the right to determine the adequacy of such proposal. An approved excavation permit may be required for work or repairs required on new road surfaces and/or rights of way, in which case, the requirements of said permit must be followed.~~

F. Seal Coating

1) All Parking Lots, Trails, Driveways and Streets shall have an approved asphalt coating installed within 1 year after acceptance of the Development or construction project. The type of preservation coat will be in accordance with the Asphalt Coating Schedule in article 5b.07. At the City's discretion, the contractor may arrange to have the City install the preservation coat at the Contractor's expense.

G. Pavement Design and Soils Investigation

1) Alternative designs, materials or cross sections may be proposed, however, the City retains the right to determine the adequacy of such proposal. An approved excavation permit may be required for work or repairs required on new road surfaces and/or rights of way, in which case, the requirements of said permit must be followed.

2) If a site-specific pavement design is to be performed, the results of this investigation and a design of the road cross section shall be submitted to and accepted by the City Engineer or his/her designee.

a. Pavement Design Engineer's Responsibilities. The design of pavement sections is a combination of several different and varied factors of civil and geotechnical engineering, which are under the control of the design engineer, not the City. This includes the preparation of an adequate soils report which is representative of

soil conditions in the field, at the proper location, both horizontally and vertically, a determination of the types of vehicles which are going to use these roads, the numbers of these types of vehicles, an assumption of the life of the roadway, the equivalent single axle loads (ESALs) the roadway will be subject to, all of which are based in original assumption prepared and made by the design professionals preparing these pavement sections designs. Assumptions and studies made of these initial design parameters are the sole responsibility of the design professional preparing these pavement designs and are not dictated by the City. The design professional is tasked with performing an adequate design of the pavement design and affixes his/her stamp and signature indicating he/she have performed the design, and it is adequate to provide the service life designed for.

b. Performance Period. This refers to the period of time that the initial pavement structure will last before it needs rehabilitation. This also refers to the time elapsed as a new pavement structure deteriorates from its initial serviceability to its terminal serviceability. When consultants perform pavement designs for Kaysville City, the "Performance Period" will be 20-years from project construction completion.

c. Pavement Design Process. The Pavement Design Engineer shall perform pavement designs and evaluations based on the recommendations found in the 1993 version of the "AASHTO Guide for Design of Pavement Structures" and on recommendations found in the November 1998 version of the "UDOT Pavement Design Manual". Alternate design methods may be proposed, provided that Pavement Design Engineer follows a well-established and proven method. In all designs, the Pavement Design Engineer shall show their work and stamp and sign the recommended pavement designs. This design method will be used in all cases for all classifications of roadways.

   i. Layered Approach. In addition to SN design of the entire section, the minimum required depth of asphalt shall be calculated using the layered approach, which determines asphalt surfacing thickness based on the strength of the base layer immediately below.

d. Soils/Geotechnical Investigation. Site evaluations for new pavement design and construction are performed following a defined testing plan that helps identify the necessary conditions to ensure the required information is obtained in the field.

   i. Required Design Information. The following list includes information that is required for pavement design.

      a) Soil types exposed at the ground surface.

      b) Soil conditions within a depth of 3 to 5-feet below the pavement subgrade including:

c) Soil classification units
d) In place soil moisture content and density
e) The occurrence of swelling soils
f) Soil plastic and liquid limits
g) Moisture-density compaction curves
h) The occurrence of moisture induced collapsing soils
i) The depth to groundwater below the pavement subgrade
j) Subgrade support variability
k) The approximate vertical distance of the pavement surface above or below the adjacent ground surface
l) Soft or weak soils that will not support or will limit the size of earthwork equipment
m) Vegetation, debris and other deleterious material that may affect pavement support.
n) A hazard rating for frost damage
o) Water hazards
p) Performance of nearby pavements
q) Design CBR for road sections

ii. Boring/Sample Locations. Location of the borings and samples shall be determined based on the centerline location of the planned road, the planned width of the road and the expected soil conditions for the area. Spacing of the test holes will be controlled by the type and profile of the soil at each location. For long road sections, the Spanish Fork City practice includes using 200 feet as a starting interval for exploration locations and varying this interval up to a maximum of 1000 feet for uniform conditions. If the soil types significantly change between test holes, intermediate locations shall be investigated. The determination of the number and location of samples and/or borings shall consider the reliability of the pavement design and the cost-effectiveness of the investigation. For new developments, with multiple roadways to be constructed, location of borings may be based on a minimum of two borings for each road to be built. Borings, samples, and other explorations shall be located so that the sites can be found during construction. The locations shall be referenced to the following:
    a) A construction station,
    b) Road centerline, and
    c) Elevations or road grades where possible.

iii. Selection of Design CBR – Subgrade soil CBR values shall be determined using samples compacted at optimum moisture content to 95 percent of the maximum density obtainable by the AASHTO T-180, Method D, of compaction. CBR tests shall be performed according to AASHTO T-193 except that a standard surcharge weight of 10 pounds shall be used for

soaking and the penetration test of all samples. The CBR chosen for pavement design purposes shall have a confidence level of 90% for a normal distribution of values. If it is determined that there is an insufficient number of CBR tests, then the lowest CBR value will be used for design. This will be determined by the City Engineer. The following table indicates the number of CBR tests that will provide a 90 percent confidence level that the average test value is within plus or minus 1 unit of the average for a normal t-distribution of values.

| CBR Test Range | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Number of Required Tests | 2 | 3 | 4 | 5 | 6 | 8-9 |

e. Pavement Design Inputs. The following defaults shall be used in performance of the pavement design. Alternate values may be proposed with supporting documentation. Any variations from these standards must be approved by the City Engineer or his/her designee.

i. Traffic. Traffic, in the form of Equivalent Single Axle Loads (ESALs), shall be based on actual traffic (AADT and %Trucks), ***including construction traffic,*** and appropriate truck load factors. If actual traffic data is not available, use the following ESAL value defaults.

a) Parking Lots/Minor Local: 60,000
b) Significant Local: 250,000
c) Minor Collector: 500,000
d) Major Collector: 750,000
e) Arterial: 1,000,000

ii. Material Inputs. Use the following inputs to represent pavement materials. Alternate values may be proposed with supporting engineering documentation. Any variations from these standards must be approved by the City Engineer or his/her designee.

| **Layer Coefficients** | |
|---|---|
| Hot Mix Asphalt | 0.4 |
| Treated Base Course | 0.3 |
| Untreated Base Course | 0.1 |
| Granular Borrow/Subbase | 0.08 |
| **Resilient Modulus Values (psi, Maximum)** | |
| Treated Base Course | 250,000 |
| Untreated Base Course | 30,000 |
| Granular Borrow/Subbase (A-1-a) | 25,000 |

| | |
|---|---|
| Subgrade | 15,000 |

iii. AASHTO Design Inputs. The following defaults shall be used in the AASHTO 1993 Design process.
   a) Reliability. 90%
   b) Deviation. 0.45 for asphalt, 0.35 for concrete
   c) Initial Serviceability. 4.2
   d) Terminal Serviceability. 2.5 for Arterials, 2.0 for all others
   e) Drainage Coefficient. 1.0

**5a.02 EARTHWORK:**

The earthwork needed for roadway construction shall meet the requirements of Division 2b, Earthwork.

**5a.03 SUBGRADE PREPARATION:**

This work shall consist of the shaping and compacting of the subgrade in accordance with these specifications and in conformity with the lines, grades, and typical cross sections shown on the Drawings or as established by the City Engineer. ~~The granular~~Fill material shall be placed and compacted to not less than 96% maximum dry density as determined by AASHTO T-180 (ASTM D1557). No less than a 2% crown unless approved by the City Engineer (no more than 7%).

Cut sections shall be graded and rolled with a roller weighing not less than 12-tons, until the subgrade is firm and unyielding. Mud or other soft or spongy material shall be removed and the void filled with untreated base course and rolled and tamped thoroughly in layers not exceeding 12-inches in thickness. Sink holes in asphalt shall be cut out, excavated and replaced.

Once the subgrade is properly graded, including a 2% crown, the Developer shall notify Kaysville City to determine if a deflection test is required for the subgrade. Any soft spots found during testing shall be repaired prior to the placement of any granular base course. A deflection test of the base course will be required prior to paving.

**5a.04 GRANULAR SUBBASE:**

Granular subbase material, if required, shall consist of non-plastic granular ~~bank run~~ material with a maximum size of 4 inches, ~~and~~ less than 15% passing a No. 200 sieve~~.~~, and a minimum CBR of 25% according to AASHTO T-193 (ASTM D1883).

The granular subbase material shall be compacted to not less than 96% maximum dry density as determined by AASHTO T-180 (ASTM D1557). Surfaces shall be true to the established grade with thickness being not less than 1/4-inch from the required layer thickness and with the surface elevation varying not more than 3/8-inch in ten feet from the true profile and cross section.

**5a.05 UNTREATED BASE COURSE:**

Base for all streets shall consist of crushed select material and shall be graded as per the latest edition of Section ~~02721~~ 32 11 23 of the ~~Utah Department of Transportation~~ APWA – Utah Chapter Manual of Standards ~~and~~ Specifications.

Mixing, placing, compacting, finishing, thickness tolerance, and quality control testing shall be in accordance with the applicable provisions of Section ~~02721~~ 32 11 23 of the above referenced Standard Specifications.

**5a.06 ASPHALT CONCRETE PAVEMENT:**

Asphalt Concrete Pavement shall be in accordance with the ~~applicable provisions~~ most current version (including supplemental specifications) of Section ~~02745~~ 32 12 05 ~~Asphalt Material~~Bituminous Concrete of the latest edition of the ~~Utah Department of Transportation~~ APWA Utah Chapter Manual of Standards ~~and~~ Specifications~~, except as noted herein: 1/2 inch aggregate PG 58-28 mix with max 15% RAP.~~. Installation of the designated bituminous concrete mix shall be in accordance with Section 32 12 16.13 Bituminous Paving of the same Standards.

Place asphalt between1/4-inch to 1/2-inch above the lip of curb and gutter. If the asphalt is more than 1/2-inch or less than 1/4-inch over the lip of the curb and gutter, an overlay to adjust the grade shall be required, as directed by the City Engineer.

It is the responsibility of the Developer to control traffic. All traffic shall be kept off the completed surface for a minimum period of 24-hours, unless otherwise approved by the City Engineer.

Pre-Paving Meeting
The Paving Contractor must schedule a pre-paving meeting with the Kaysville City Public Works department at least 7 days before any asphalt paving (bituminous mix) on a new development or City project may begin. Meeting may be in person or virtual.

The Paving Contractor, Developer, project engineer, supplier and testing firm must participate in the preconstruction meeting. Topics for the meeting will include:

1. Contact Information and Project Responsibility
2. Associated Submittal Review and Status
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.

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

Cold Weather Paving Limitations

Ambient and base course temperature at time of placement shall be 50° F and rising ~~for 2 hours prior to~~during placement and ~~2 hours~~ after rolling/compaction. Asphalt temperature should be at least 220° F at the time of initial rolling/compaction and no less than 200° F at the time of final rolling/compaction.~~. If less than 50° F degrees, an additional warranty term shall be required in writing.~~ unless a compaction aid is used. If deviating from these limitations, paving contractor must submit a cold-weather paving plan that conforms to Section 32 12 16.13 of the APWA Utah Chapter Standard Specifications. Cold weather plan must be submitted in writing no less than 48 hours before paving is to begin. Submission of a cold-weather paving plan relieve contractor of meeting minimum compaction requirements.

**5a.07 PRIME COAT:**

Prime Coat is NOT required when the granular base material is clean and free from other soils tracked onto the roadway. However, the City Engineer may at their discretion require a prime coat for any areas that have been contaminated or damaged in other ways.

**5a.08 ADJUSTING MANHOLES AND VALVE BOXES TO FINAL GRADE:**

This section covers the requirements for adjusting manholes and valves to final grade. The adjustment shall be made with cast in place concrete rings/collars. Rings shall be constructed after the asphalt surface has been placed. Rings shall be constructed in a neat, workmanlike manner.

Concrete shall conform to the requirements of Division 5c. Concrete shall be Class AA (AE).

Manholes and valves shall require a concrete ring/collar around the cast iron ring and cover constructed such that the cast iron ring is 1/4-inch lower than the existing pavement. On newly asphalted or overlaid streets, the cast in place concrete collar shall be placed 1/4-inch lower than the surrounding asphalt. This is to allow for some consolidation of the new asphalt due to traffic and other conditions.

Where manholes are to be raised this is to be accomplished by removing the cover and frame and raising the manhole to proper elevation with concrete. Any adjustments over 3-inches require that the ring and cover be removed and a concrete grade ring be added to the top of the cone. Concrete grade rings placed on the cone combined shall be 12-inches or less in height. In the case this is to be exceeded, the cone section shall be removed and a 1-foot manhole section installed with the cone reinstalled on top of the manhole section. “Whirlygig” riser systems, or an approved equal, will be allowed in place of concrete grade rings.

## DIVISION 5b RESTORATION OF SURFACE IMPROVEMENTS

### 5b.01 GENERAL:

The Developer shall be responsible for the protection and the restoration or replacement of any improvements existing on public or private property at the start of work or placed there during the progress of the work.

Existing improvements shall include but not to be limited to permanent surfacing, curbs, gutters, sidewalks, planted areas, sprinklers, ditches, driveways, culverts, fences, decorative features and walls. All improvements shall be reconstructed to equal or better, in all respects, than the existing improvements removed. Any work being done in the City right of way shall first require an approved excavation permit. There are costs associated with these permits, based on the consolidated fee schedule. All work done in the City right of way shall conform with the requirements of the excavation permit.

### 5b.02 FIELD VERIFICATION OF IMPROVEMENTS:

The Developer will be deemed to have carefully examined the site of the work and to have acquainted themselves with all conditions relating to the protection and restoration of existing improvements. The Developer shall be responsible to protect or restore existing improvements, whether shown on the drawings or not, unless agreed to in writing by the effected property owner and approved by the City.

### 5b.03 REMOVAL OF PAVEMENT, SIDEWALKS, CURBS, ETC.:

Prior to any removal of road surface, the surface shall be cut vertically along the lines forming the trench, in such a manner as to not cause damage to adjoining pavement, sidewalk, curb and gutter, driveway, etc. For removal of sidewalk, curb and gutter, vertical cuts shall be made in the concrete only at the next adjacent joint. The portion to be removed shall then be broken up in a manner that will not cause damage to the asphalt or concrete outside the limits of the cuts; however, any surface damaged by the Developer or their work shall be replaced at the Developer's expense. The Public Works inspector shall determine the extents or limits of adjacent damage requiring replacement.

Broken paving materials and debris shall be removed immediately from the site of the work. If 4-feet or less of asphalt is left between the edge of a trench and the lip of the curb (or edge of pavement if there is no curb) after removal, then the asphalt shall be removed to the lip of curb (or edge of road if there is no curb) to safeguard against differential settlement.

### 5b.04 MATERIALS:

Materials used for repair or replacement of surface improvements shall be equal to or better than the material removed:

A. Untreated Base Course. ~~Untreated base course shall comply with Utah Department of Transportation Standard Specifications, latest edition. The Developer shall take samples of the untreated base course on a random basis. All materials not meeting the tolerance requirements shall be removed from the project and replaced with specification material.~~Use and install Untreated Base Course material as defined in Division 5a.

B. Asphalt. ~~The asphalt surface shall be hot-rolled plant mix in accordance with the requirements of~~Use and install bituminous mix as defined in Division 5a.

C. Concrete. Concrete shall comply with section ~~02753 of the Utah Department of Transportation Standard Specifications.~~ Article 5c.03 below. Do not exceed 658 lbs of cementitious material without permission from Kaysville City Public Works Department.

~~C.~~D. Geotextile Fabrics and Geogrids. Geotextiles shall comply with Section 31 05 19 of the APWA Utah Chapter Manual of Standard Specifications. Geogrids and composites shall comply with Section 31 05 21 of the APWA Utah Chapter Manual of Standard Specifications.

**5b.05 RESTORING CONCRETE OR ASPHALT STREET SURFACES:**

Where trenches are in or cross asphalt or concrete surfaced roads, traffic lanes, driveways, parking areas, etc., the asphalt or concrete surface must be restored in accordance with the requirements of the excavation permit, including, but not limited to:

A. Before Excavation. All existing asphalt or concrete surfaces shall be saw cut or roto-milled to a square vertical edge before excavation.

B. Temporary Graded Surface. Until resurfacing can be done in paved areas a temporary untreated base course surface shall be placed deep enough to provide a minimum of 12-inches below the bottom of the asphalt surface and shall be brought flush with the top of the adjacent paved surface.

The untreated base shall be placed and properly compacted in the trench at the time it is backfilled. Excess material shall be removed from the premises immediately. The temporary untreated base course surface will be maintained as needed by the Developer until the asphalt is placed.

C. Preparation for Paving. The area over trenches to be resurfaced shall be graded and rolled with a roller weighing not less than 12-tons, until the subgrade is firm and unyielding. Mud or other soft or spongy material shall be removed and the void filled with untreated base course and rolled and tamped thoroughly in layers not exceeding 12-inches in thickness. Geotextile fabric or grid may be required to stabilize excessively yielding

areas. Sink holes in asphalt shall be cut out, excavated and replaced. Asphalt sinking of any kind will be cut out and replaced once the problem has been fixed. The edges of trenches which deteriorate or crumble prior to paving shall be removed and trimmed neatly before resurfacing.

Before any permanent resurfacing is placed, the Developer shall trim the existing paving to clean, straight lines as nearly parallel to the centerline of the trench as practicable.

Following backfill, the existing adjacent asphalt paving shall be cut back a minimum of an additional 18-inches beyond the previous cuts (T-Cut) for the excavation.

D. Asphalt Surface. The asphalt surface shall be restored by standard paving practices to a minimum thickness as indicated in Division 5a and on the standard drawings. Pavement over 3-inches shall be placed and rolled in two lifts. ~~The asphalt surface should be~~Place asphalt between 1/4-inch to 1/2-inch above the lip of curb and gutter. If the asphalt is more than 1/2-inch or less than 1/4-inch over the lip of the curb and gutter, an overlay to adjust the grade shall be required, as directed by the City Engineer.

Pavement restoration shall include ~~priming~~ tacking of pavement edges with ~~Type MC-70~~Cationic Emulsified Asphalt ~~bituminous material (tackifier)~~ meeting Section 32 12 13.13 of APWA Utah Chapter Manual of Standard Specifications diluted 2 parts concentrate to maximum 1 part water, and then placing rolled plant hot mix asphalt material to a level of 1/8-inch" to 1/4-inch above the adjacent pavement surfaces. Areas where there is unraveling of asphalt, asphalt will be removed and replaced.

**5b.06 CRACK FILLING/SEALING:**

When pavement crack repairs are needed, vegetative growth should be removed from cracks, edges, and joints. Cracks should be prepared by blowing them out and dry prior to being filled by crack sealant. Melting of sealant should be per manufacturer's guidelines. The pavement crack seal should be dry before applying asphalt coatings.

Crack seal material should be per UDOT Standards 02745, Section 2.3 HOT-POUR CRACK SEALANT FOR BITUMINOUS CONCRETE ~~or applicable current APWA standard 32.01.17 PAVEMENT CRACK SEAL~~. Crack seal placed prior to an asphalt coating shall be done a minimum of 1 week prior to all asphalt coating projects and finished with a flush/squeegee finish.~~.~~

**5b.07 ASPHALT COATINGS:**

Depending on various factors, including, but not limited to the age and condition of adjacent asphalt, project scheduling and traffic conditions, asphalt surfacing may require a preventative

maintenance coating, as determined and specified by the City Engineer. ~~Asphalt coatings consist of chip seals with type A chips and a fog coat, type II slurries and seal coats (type specified by the City Engineer).~~ All asphalt coatings (and their application) shall meet the applicable APWA Utah standards.

| Asphalt Coatings Schedule | |
|---|---|
| ***Street Category*** | ***Treatment*** |
| Cul-de-Sacs/Parking Lots/Local Streets | Slurry Type I |
| Significant Local Streets | Slurry Type II |
| Minor Collector | Slurry Type II |
| Major Collector | Slurry Type II |
| Arterial | Slurry Type II |
| *Note: sprayed applied treatments shall not be allowed.* | |

**5b.08 GRAVEL SURFACE:**

Where trenches are excavated through gravel-surfaced areas such as roads and shoulders, parking areas, unpaved driveways, etc., the gravel surface shall be restored and maintained as follows:

A. The gravel shall be placed deep enough to provide a minimum of six inches of material.

B. The gravel shall be placed in the trench at the time it is backfilled. The surface shall be maintained by blading, sprinkling, rolling, adding gravel, etc., to maintain a safe, uniform surface. Excess material shall be removed from the premises immediately.

C. Material for use on gravel surfaces shall be obtained from sound, tough, durable gravel or rock meeting the following requirements for grading:

| | |
|---|---|
| Passing 1-inch sieve | 100% |
| Passing 1/2-inch sieve | 79-91% |
| Passing No. 4 sieve | 49-61% |
| Passing No. 16 sieve | 27-35% |
| Passing No. 200 sieve | 7-11% |

**5b.09 MISCELLANEOUS IMPROVEMENTS:**

It shall be the Developer's responsibility to restore to their original condition all irrigation canals, levees, culverts, gates, fences, drainage ditches, and all such improvements which are cut or disturbed during construction. Topsoil in farming areas or along road edges shall be stored separate from subsoil during pipe trench excavation. Topsoil shall be replaced during backfill

operations as nearly as possible to its original condition, thereby assuring suitable soil for reseeding.

**5b.10 RESTORATION OF SURFACES:**

Unless otherwise directed, all street surfacing, curbs, gutters, sidewalks, driveways, or other hard surface that must be removed in the performance of the work shall be restored in kind by the Developer in accordance with the Specifications contained herein. Deviation of more than 1/4-inch between old and new work or within new construction shall be corrected. Such measurement shall be made from a 10-foot minimum length straight edge. Adjoining surfaces between old and new must be flush.

**5b.11 CLEANUP:**

At the completion of each area of work all equipment, barricades, and similar items shall be removed from the area. All excess material will be removed. Adjacent borrow pits and road shoulders disturbed or used for storage of excavating materials will be smoothed and returned to its original contour.

**5b.12 PAVEMENT MARKINGS:**

The Developer shall be responsible for restoration of pavement markings on all roadways. Restoration of pavement markings shall be provided for any removed or obliterated markings. The temporary markings shall conform to UDOT standards and specifications. Permanent pavement markings will then be replaced to conform to the ~~applicable local and state specifications with approval from the City Engineer or their Representative.~~current edition of APWA Utah Chapter Manual of Standard Specifications.

## DIVISION 5c PORTLAND CEMENT CONCRETE

### 5c.01 GENERAL:

The work shall consist of furnishing, forming, placing, finishing, and curing Portland cement concrete as required.

### 5c.02 MATERIALS:

A. Portland Cement shall be Type II, and shall comply with the Standard Specification for Portland Cement, ASTM C150.

If air-entraining cement is to be used, the Developer shall furnish the manufacturer's written statement giving the source, amount and brand name of the air-entraining addition.

Cement shall be stored in such a manner as to be protected from weather, dampness or other destructive agents. Cement that is partially hydrated or otherwise damaged will be rejected.

B. Aggregates shall conform to Tentative Specifications for Concrete Aggregates, ASTM C33 for the specified sizes. Aggregates that fail to meet any requirement may be accepted only when: (1) the specified alternate conditions of acceptance can be proved prior to the use of the aggregates on the job and within a period of time such that no work under the contract will be delayed by the requirements of such proof; or, (2) the specification for concrete expressly contains a provision of special mix requirements to compensate for the effects of the deficiencies.

The potential reactivity of aggregates with the alkalies in cement shall be evaluated by petrographic examination and, where applicable, the chemical method of test, ASTM C289, or by the results of previous tests or service records of concrete made from similar aggregates from the same source. The standards for evaluating potential reactivity shall be as described in ASTM Specification C-33, Appendix A1.

Aggregates indicated by any of the above to be potentially reactive shall not be used, except under one of the following conditions:

(1) Applicable test results of mortar bar tests, made according to ASTM C227, are available which indicate an expansion of less than 0.1% at six months in mortar bars made with cement containing not less than 0.8% alkalies expressed as sodium oxide; or
(2) Concrete made from similar aggregates from the same source has been demonstrated to be sound after 3-years or more of service under

conditions of exposure to moisture and weather similar to those anticipated for the concrete under these specifications.

Aggregates indicated to be potentially reactive, but within acceptable limits as determined by mortar bar test results or service records, shall be used only with "low alkali" cement, containing less than 0.6% alkalies expressed as sodium oxide.

Aggregate of each class and size shall be stored and handled by methods that prevent segregation of particle sizes or contamination by intermixing with other materials.

C. Water shall be cleaned and free from injurious amounts of oil, salt, acid, alkali, organic matter or other deleterious substances.

D. Air-entraining agent shall be used in all concrete exposed to the weather. The agent shall conform to ASTM C150 and C260, except that the relative durability factor in the freezing and thawing test shall be not less than 95.

E. Steel reinforcement shall be free from rust, oil, grease, paint or other deleterious matter.

Steel bars for concrete reinforcement requiring bends shall be deformed billet-steel bars conforming to ASTM A615, Grade 40 or Grade 60.

Straight steel bars shall be deformed bars conforming to one of the following specifications:

Deformed Billet-Steel Bars for Concrete Reinforcement (Grade 40 or Grade 60) - ASTM A615.

Rail-Steel Deformed Bars for Concrete Reinforcement (Grade 50 or Grade 60) - ASTM A616.

Axle-Steel Deformed Bars for Concrete Reinforcement (Grade 40 or Grade 60) - ASTM A617.

Fabricated Steel bar mats shall conform to the requirements of ASTM A184.

Welded steel wire fabric reinforcement shall conform to the requirements of ASTM A185.

Welded deformed steel wire fabric for concrete reinforcement shall conform to the requirements of ASTM A497.

Cold-drawn steel wire reinforcement shall conform to the requirements of ASTM A82.

Deformed steel wire for concrete reinforcement shall conform to the requirements of ASTM A496.

Gages, spacing and arrangement of wires in welded steel wire fabric shall be as defined in ACI Standard 315 of the American Concrete Institute for the specified style designations.

Steel reinforcement stored at the site of the work shall be stored above the ground surface on platforms, skids or other supports and shall be protected from mechanical injury and corrosion.

F. Water-reducing and set-retarding admixtures shall conform to the requirements of ASTM C494, except that resistance to freezing and thawing shall be determined in all cases, and the minimum relative durability factor shall be 95.

Admixtures shall be Type A, Water-Reducing or Type D, Water-Reducing and Retarding, as defined in ASTM C494.

When added, in the manner and amount recommended by the manufacturer, to the concrete used on the job, with no change in the cement content or proportions of the aggregates, admixtures shall have the following effects:

Type A or Type D: The water content at the required slump shall be at least 5% less with the admixture than without. The air content shall remain within the range specified, but shall not exceed 8% in any case.

Type D: The time of initial setting, determined as prescribed in ASTM C494, shall be from 1 to 3-hours longer with the admixture than without.

G. Curing compound for concrete shall meet the requirements of ASTM C309.

Unless otherwise specified, the compound shall be Type 2.

All curing compound shall be delivered to the site of the work in the original container bearing the name of the manufacturer and the brand name. The compound shall be stored in a manner to prevent damage to the containers and to protect water-emulsion types from freezing.

**5c.03 CLASS OF CONCRETE:**

For the purpose of practical identification, concrete has been divided into four classes: Class AA(AE), A(AE), B(AE) and C(AE). The specific use for each Class is identified in the Division in which the concrete is used. The symbol (AE) designates air-entrainment. Basic requirements for each class are as follows:

| Class of Concrete | Maximum Net Water Content (gallons/bag) | Minimum Cement Content (bags/cu. yd.) | Minimum 28-day Comp. Strength (psi) |
|---|---|---|---|
| AA(AE) | 5 | 6-1/2 | 4000 |
| A(AE) | 6 | 6 | 3500 |
| B(AE) | 7 | 5 | 2500 |
| C(AE) | 8 | 4 | 2000 |

**5c.04 COMPOSITION OF CONCRETE:**

A. Aggregates maximum size shall be not larger than 1/5th of the narrowest dimension between forms within which the concrete is to be cast, nor larger than 3/4th of the minimum clear spacing between reinforcing bars or between reinforcing bars and forms. For unreinforced concrete slabs, the maximum size of aggregates shall not be larger than 1/4th the slab thickness.

B. Water shall be added to the mix to produce concrete with the minimum practicable slump. The slump of mechanically vibrated concrete shall not exceed 4-inches. No concrete shall be placed with a slump in excess of 5-inches.

C. Air-Content for air-entrained concrete shall ~~comply with the following:~~be 6 +/- 1.5%.

~~Course Aggregate Size (in.) Air Content (%)~~

~~1-1/2 to 2-1/2 5 +/- 1~~
~~3/4 or 1 6 +/- 1~~
~~3/8 or 1/2 7 +/- 1~~

The air-entraining agent shall be added as liquid to the mixing water by means of mechanical equipment capable of accurate measurement and control.

D. Water reducing, set retarding admixtures shall not be used except with previous approval from the City Engineer and shall in such a case, conform to the standards of materials set forth in the specification.

**5c.05 DESIGN OF THE CONCRETE MIX:**

The proportions of the aggregates shall be such as to produce a concrete mixture that will work readily into the corners and angles of the forms and around reinforcement when ~~consolidated, but~~consolidated but will not segregate or exude free water during consolidation.

Prior to placement of concrete, the Developer shall furnish the City Engineer or Representative, for approval, a statement of the materials and mix proportions (including admixtures, if any) it intends to use. The statement shall include evidence satisfactory to the City Engineer or Representative that the materials and proportions will produce concrete conforming to this specification. The materials and proportions so stated shall constitute the "job mix." After the job mix has been reviewed for conformance to specification by the City Engineer, neither the source, character or grading of the aggregates nor the type or brand of cement or admixture shall be changed without prior notice to the City Engineer. If such changes are necessary, no concrete containing such new or altered materials shall be placed until the City Engineer has approved a revised job mix.

**5c.06 OBSERVATION AND TESTING:**

The City Engineer shall have free entry to the plant and equipment furnishing concrete under the contract. Proper facilities shall be provided for the City Engineer to observe the materials, equipment and processes and to obtain samples of the concrete. All tests and observations will be conducted so as not to interfere unnecessarily with manufacture and delivery of the concrete.

**5c.07 HANDLING AND MEASUREMENT OF MATERIALS:**

Materials shall be stockpiled and batched by methods that will prevent segregation or contamination of aggregates and insure accurate proportioning of the ingredients of the mix.

Except as otherwise provided in Division 8, cement and aggregates shall be measures as follows:

Cement shall be measured by weight or in bags of 94-pounds each. When cement is measured in bags, no fraction of a bag shall be used unless weighed.

Aggregates shall be measured by weight. Mix proportions shall be based on saturated, surface-dry weights. The batch weight of each aggregate shall be the required saturated, surface-dry weight plus the weight of surface moisture it contains.

Water shall be measured by weight, to an accuracy within one per cent of the total quantity of water required for the batch.

Admixtures shall be measured within a limit of accuracy of 3%.

**5c.08 MIXERS AND MIXING:**

Concrete shall be ~~uniform and thoroughly mixed when delivered to the work~~mixed at a UDOT-qualified Ready Mix Plant. Variations in slump of more than 1-inch within a batch will be considered evidence of inadequate mixing and shall be corrected by increasing mixing time or other means. For stationary mixers, the mixing time after all cement and aggregates are in the mixer drum shall be not less than 1-1/2-minutes. When concrete is mixed in a truck mixer, the number of revolutions of the drum or blades at mixing speed shall be not less than 70 or more than 100.

Unless otherwise specified, volumetric batching and continuous mixing at the construction site will be permitted if approved by City Engineer. The batching and mixing equipment shall conform to the requirements of ASTM C685 and shall be demonstrated prior to placement of concrete, by tests with the job mix, to produce concrete meeting the specified proportioning and uniformity requirements. Concrete made by this method shall be produced, inspected, and certified in conformance with Sections 6, 7, 8, 13, and 14 of ASTM C685.

No mixing water in excess of the amount called for by the job mix shall be added to the concrete during mixing or hauling or after arrival at the delivery point.

**5c.09 FORMS:**

Forms shall be of wood, plywood, steel or other approved material and shall be mortar tight. The forms and associated falsework shall be substantial and unyielding and shall be constructed so that the finished concrete will conform to the specified dimensions and contours. Form surfaces shall be smooth and free from holes, dents, sags or other irregularities. Forms shall be coated with a nonstaining form oil before being set into place.

Metal ties or anchorages within the forms shall be equipped with cones, she-bolts or other devices that permit their removal to a depth of at least 1-inch without injury to the concrete.

All edges that will be exposed to view when the structure is completed shall be chamfered by placing molding in the forms, unless finishing with molding tools.

**5c.10 PREPARATION OF FORMS AND SUBGRADE:**

Prior to placement of concrete the forms and subgrade shall be free of chips, sawdust, debris, water, ice, snow, extraneous oil, mortar, or other harmful substances or coatings. Any oil on the reinforcing steel or other surfaces required to be bonded to the concrete shall be removed. Rock surfaces shall be cleaned by air-water cutting, wet sandblasting or wire brush scrubbing, as necessary, and shall be wetted immediately prior to placement of concrete. Earth surfaces shall be firm and damp. Placement of concrete on mud, dried earth or uncompacted fill or frozen subgrade will not be permitted.

Unless otherwise specified, when concrete is to be placed over drain fill, the contact surface of the drain fill shall be covered with a layer of asphalt-impregnated building paper or polyvinyl sheeting prior to placement of the concrete. Forms for weepholes shall extend through this layer into the drain fill.

Items to be embedded in the concrete shall be positioned accurately and anchored firmly.

Weepholes in walls or slabs shall be formed with nonferrous materials.

**5c.11 CONVEYING:**

Concrete shall be delivered to the site and discharged into the forms within 1.5-hours after the introduction of the cement to the aggregates. In temperatures over 90° F or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall not exceed 60-minutes. The City Engineer may allow a longer time, provided the setting time of the concrete is increased a corresponding amount by the addition of an approved set-retarding admixture, in which case, the time increases to 1.5-hours. In any case, concrete shall be conveyed from the mixer to the forms as rapidly as practicable by methods that will prevent segregation of the aggregates or loss of mortar. Concrete shall not be dropped more than five feet vertically unless suitable equipment is used to prevent segregation.

**5c.12 PLACING:**

Concrete shall not be placed until the subgrade, forms and steel reinforcement have been inspected and approved. No concrete shall be placed except in the presence of the City Engineer or Representative. The Developer shall give 48-hour notice to the City Engineer or Representative each time it intends to place concrete. Such notice will give the City Engineer or Representative adequate time to inspect the subgrade, forms, steel reinforcement and other preparations for compliance with the specifications before concrete is delivered for placing.

The concrete shall be deposited as closely as possible to its final position in the forms and shall be worked into the corners and angles of the forms and around all reinforcements and embedded items in a manner to prevent segregation of aggregates or excessive laitance. Unless otherwise specified, slab concrete shall be placed to design thickness in one continuous layer. Formed concrete shall be placed in horizontal layers not more than 20-inches thick. Hoppers and chutes, pipes or "elephant trunks" shall be used as necessary to prevent splashing of mortar on the forms and reinforcing steel above the layers being placed.

Immediately after the concrete is placed in the forms, it shall be consolidated by spading, hand tramping or vibration as necessary to insure smooth surfaces and dense concrete. Each layer shall be consolidated to insure monolithic bond with the preceding layer. If the surface of a layer of concrete in place sets to the degree that it will not flow and merge with the succeeding layer when spaded or vibrated, the Developer shall discontinue placing concrete and shall make a construction joint according to the procedure specified.

If placing is discontinued when an incomplete horizontal layer is in place, the unfinished end of the layer shall be formed by a vertical bulkhead.

**5c.13 CONSTRUCTION JOINTS:**

Construction joints shall be made at the locations shown on the Drawings. If construction joints are needed which are not shown on the Drawings, they shall be placed in locations approved by the City Engineer or Representative.

Where a feather edge would be produced at a construction joint, as in the top surface of a sloping wall, an inset form shall be used so that the resulting edge thickness on either side of the joint is not less than 6-inches.

In walls and columns, as each lift is completed, the top surfaces shall be immediately and carefully protected from any condition that might adversely affect the hardening of the concrete.

Steel tying and form construction adjacent to concrete in place shall not be started until the concrete has cured at least 12-hours. Before new concrete is deposited on or against concrete that has hardened, the forms shall be retightened. New concrete shall not be placed until the hardening concrete has cured at least 12-hours.

Surfaces of construction joints shall be cleaned of all unsatisfactory concrete, laitance, coatings or debris by washing and scrubbing with a wire brush or wire broom or by other means approved by the City Engineer. The surfaces shall be kept moist for at least one hour prior to placement of the new concrete.

**5c.14 EXPANSION AND CONTRACTION JOINTS:**

Expansion and contraction joints shall be made only at locations shown on the drawings, but on flat work, shall be placed at least every 50-feet.

Exposed concrete edges at expansion and contraction joints shall be carefully tooled or chamfered, and the joints shall be free of mortar and concrete. Joint filler shall be left exposed for its full length with clean and true edges.

Preformed expansion joint filler shall be held firmly in the correct position as the concrete is placed.

When open joints are specified, they shall be constructed by the insertion and subsequent removal of a wooden strip, metal plate or other suitable template in such a manner that the corners of the concrete will not be chipped or broken. The edges of open joints shall be finished with an edging tool prior to removal of the joint strips.

**5c.15 WATERSTOPS:**

Waterstops shall be held firmly in the correct position as the concrete is placed. Joints in metal waterstops shall be soldered, brazed or welded. Joints in rubber or plastic waterstops shall be cemented, welded or vulcanized as recommended by the manufacturer.

**5c.16 REMOVAL OF FORMS:**

Forms shall not be removed without the approval of the City Engineer or Representative. Forms shall be removed in such a way as to prevent damage to the concrete. Supports shall be removed in a manner that will permit the concrete to take the stresses due to its own weight uniformly and gradually.

**5c.17 FINISHING FORMED SURFACES:**

Immediately after the removal of the forms:

A. All fins and irregular projections shall be removed from exposed surfaces.

B. On all surfaces, the holes produced by the removal of form ties, cone-bolts, and she-bolts shall be cleaned, wetted and filled with a dry-pack mortar consisting of one part Portland cement, three parts sand that will pass a No. 16 sieve, and water just sufficient to produce a consistency such that the filling is at the point of becoming rubbery when the material is solidly packed.

**5c.18 FINISHING UNFORMED SURFACES:**

All exposed surfaces on the concrete shall be accurately screeded to grade and then float finished, unless specified otherwise.

Concrete finishing will be performed under the supervision of an ACI Certified Flatword Finisher. Excessive floating or troweling of surfaces while the concrete is soft will not be permitted.

The addition of dry cement or water to the surface of the screeded concrete to expedite finishing will not be allowed.

Final surfaces will be finished with either random longitudinal tining (pavements) or light to medium transverse broom finish (exterior flatwork).

Joints and edges on unformed surfaces that will be exposed to view shall be chamfered or finished with molding tools.

**5c.19 CURING AND PROTECTION:**

Concrete shall be prevented from drying for a curing period of at least 7-days after it is placed. Exposed surfaces shall be kept continuously moist for the entire period, or until curing compound is applied as specified below. Moisture shall be maintained by sprinkling, flooding or fog spraying or by covering with continuously moistened canvas, cloth mats, straw, sand or other approved material. Wood forms (except plywood) left in place during the curing period shall be kept wet. Formed surfaces shall be thoroughly wetted immediately after forms are removed and shall be kept wet until patching and repairs are completed. Water or covering shall be applied in such a way that the concrete surface is not eroded or otherwise damaged. As soon as the concrete

has hardened sufficiently to prevent damage, the finished surface shall be protected for curing in one of the following ways:

A. Ponding of water on the surface or continuous sprinkling.

B. Application of absorptive mats such as 3-inches of cured hay, clean straw or fabric kept continuously wet (as approved by the City Engineer).

C. Application of 2-inches of moist earth or sand uniformly distributed on the surface and kept saturated by spraying with water.

D. Application of light colored waterproof plastic materials, conforming to "Specifications for Waterproof Sheet Materials for Curing Concrete" ASTM C171, placed and maintained in contact with the surface of the concrete.

E. Application of a curing compound, conforming to "Specifications for Liquid Membrane - Forming Compounds for Curing Concrete" ASTM C309. The compound shall be ~~light in color~~white pigmented and shall be applied in accordance with the manufacturer's recommendations immediately after any water sheen, which may develop after finishing, has disappeared from the concrete surface. Apply curing compound using a minimum of two applications in 90 degree different directions.

Curing compound shall not be applied to surfaces requiring bond to subsequently placed concrete, such as construction joints, shear plates, reinforcing steel and other embedded items. If the membrane is damaged during the curing period, the damaged area shall be resprayed at the rate of application specified above.

**5c.20 REMOVAL OR REPAIR:**

When concrete is honey combed, damaged or otherwise defective, the Developer shall remove and replace the structure or structural member containing the defective concrete or, where feasible, correct or repair the defective concrete. Prior to starting repair work the Developer shall obtain the Engineer's approval of its plan for affecting the repair. The Developer shall perform all repair work in the presence of the City Engineer or Representative.

**5c.21 CONCRETING IN COLD WEATHER:**

Concrete placement contractor shall submit a cold-weather placement plan in accordance with ACI 306. Concrete shall not be mixed nor placed when the daily minimum atmospheric temperature is less than 40°F unless facilities are provided to prevent the concrete from freezing. ~~The use of accelerators or antifreeze compounds will not be allowed.~~If air temperature is forecasted to fall below 32 deg F. within 14 days of placement, proceed as follows:
Provide cold weather protection (cover, insulation, heat, etc.)

A. Do not use chemical “anti-freeze” additives in the concrete. (NOTE: this does not apply to normal accelerators.)
B. Do not proceed with the placement of concrete until the temperature of all contact surfaces is 35 degrees F and ambient temperature is ascending.
C. Protect the concrete from freezing until a compressive strength of at least 90 percent of design strength has been achieved, determined by either:
   1) Maturity meter. Refer to AASHTO T 325, or.
   2) Field cured cylinders.
D. Adequately vent combustion-type heaters that produce carbon monoxide.
E. When applying external heat, maintain moist conditions to avoid excessive moisture loss from concrete.
F. When removing heat, limit drop in temperature of concrete surfaces to 20 degrees F during any 12-hour period until the surface temperature of the concrete reaches that of the atmosphere.

**5c.22 CONCRETING IN HOT WEATHER:**

Refer to ACI 305. If the rate of evaporation approaches 0.2 lb./ft^2/hr, ~~T~~the ~~Developer~~ concrete placement contractor shall apply effective means to maintain the temperature of the concrete below 90°F during mixing, conveying and placing.~~,~~ and to initiate precautions against plasting shrinkage cracking (i.e. dampening Subgrade and forms; placing concrete at the lowest possible temperature; erecting windbreaks and sunshades; fog sprays; use of evaporation retardants; or rescheduling time of placement).

**5c.23 ACCEPTANCE CRITERIA:**

The following criteria will be used to determine if the Developer has met City standards and proper construction of improvements has taken place:

A. Water Ways

Water ways should be five (5) feet wide. Road base depth is six (6) inches and compacted to a minimum of 96% maximum dry density. Reinforcement is typically 5 #4 bars, at 12” centers. If there is ponding of water ¼” or more, the ponding section, at least, will be replaced. The water way should be replaced if any irregularities are present (spalling, scratches, foot prints, writing, etc.). If cracks are 1/8” or larger, the water way will need to be replaced. If cracks are less than 1/8” wide, then the cracks should be ground and Polyurethane Joint Sealer (Sonoborn or Sika) used to fill, with temperatures between 40° and 100° F at time of placement. For temperatures outside this range, an extended warranty may be accepted for the effected section(s). A water way with more than one

crack or spider web cracking will need to be replaced. There will be no lifting of sinking water ways accepted.

B. Curb and Gutter

Curb and gutter width is 30-inches (See Standard Drawings). Road base depth is 6-inches and compacted to a minimum of 96% maximum dry density. If there is ponding of water 1/4-inch or more, the effected curb section(s) will be replaced. The curb will be replaced if any irregularities are present (spalling, scratches, foot prints, writing, etc.). If cracks are 1/8-inch or larger, the curb will need to be replaced. If cracks are less than 1/8-inch wide, the crack should be ground and use Polyurethane Joint Sealer (Sonoborn or Sika) to fill, with temperatures between 40° and 100° F at time of placement. For temperatures outside this range, an extended warranty may be accepted for the effected section(s). Curb with more than one crack or spider web cracking will be replaced. There will be no lifting of sinking curb accepted. Deflection test required before placement of concrete. Backfill curb and gutter no less than 2-inches below Top Back of Curb (TBC).

C. Sidewalk

Standard sidewalk width is 4-feet, unless noted on Drawings and approved by the City Engineer. Road base depth should be 4-inches, and 6-inches under sections located in driveways. Road base compaction should be a minimum of 96% maximum dry density. Sidewalk will be replaced if any irregularities are present (spalling, scratches, foot prints, writing, etc.). If cracks are 1/8-inch or larger, the sidewalk will need to be replaced. If cracks are less than 1/8-inch wide, they will be ground and Polyurethane Joint Sealer (Sonoborn or Sika) used to fill, with temperatures between 40° and 100° F at time of placement. For temperatures outside this range, an extended warranty may be accepted for the effected section(s). Sidewalk with more than one crack or spider web cracking will be replaced. There will be no lifting of sinking sidewalk accepted. Deflection test required before placement of concrete. Backfill sidewalk no less than 1-inch below top surface.

Sidewalk with horizontal separation of 1/8-inch or more from adjacent concrete will be replaced. If less than 1/8-inch, then it can be sawcut and Polyurethane Joint Sealer (Sonoborn or Sika) used to fill, with temperatures between 40° and 100° F at time of placement. For temperatures outside this range, an extended warranty may be accepted for the effected section(s). Sidewalk with vertical separation of 1/16-inch or more will be replaced. Any sections of sidewalk that have settled more than1/2-inch from grade will be removed and replaced. Where expansion joints are used, expansion material can not be more than 1/16-inch higher

than top of sidewalk or 1/16-inch lower. Standard sidewalks in driveways will need to be removed and replaced with 6-inches of road base and six 6-inches of concrete.

## DIVISION 5d REINFORCING STEEL

### 5d.01 GENERAL:

All reinforcing bars shall be grade 40. Wire fabric shall conform to ASTM A185.

Before supply of steel, all order lists and bending diagrams shall be provided by the Developer for approval of the City Engineer. The approval of such lists and diagrams shall in no way relieve the Developer of responsibility for the correctness of reinforcing supplied and all expenses incidental to revision of furnished reinforcing steel shall be carried by the Developer.

### 5d.02 FABRICATION AND PLACING REINFORCEMENT:

A. Fabrication: Reinforcement shall be cold bent to the shapes shown in accordance with ACI Standard Code, latest edition Chapter 7.

B. Clearances: All bars shall be of the size specified and shall be placed in the positions shown on the Drawings in such a manner as to be firmly held during the placing of the concrete. Where not otherwise indicated, the following minimum concrete cover shall be provided for reinforcement, as required by the ACI Standard Code, latest edition, Chapter 7.

C. Support: Bars shall be tied at all intersections except where the spacing is less than 12-inches when alternate intersections shall be tied. Distance from supports shall be by means of ties, hangers, or other approved supports. Metal chairs of approved design shall be used to hold reinforcement from contact with the forms. Metal chairs which are in contact with the exterior surface of the concrete shall be galvanized. Layers of bars or when placing concrete directly on a prepared subgrade, reinforcing shall be separated by precast mortar blocks or by other equally suitable devices. The use of pebbles, pieces of broken stone or brick, metal pipe and wooden blocks shall not be permitted. Reinforcement in any member shall be placed and then inspected and approved by the City Engineer or Representative before the placing of concrete begins. Concrete placed in violation of this provision may be rejected and removal required.

   If the fabric reinforcement is shipped in rolls, it shall be straightened into flat sheets before being placed.

D. Splicing: All splices shall be staggered so that splices in adjacent bars shall be not less than 4-feet apart, and shall conform to ACI Standard Code, latest edition, Chapter 12.

## DIVISION 6 FENCING

### 6.01 GENERAL:

All reinforcing bars shall be grade 40. Wire fabric shall conform to ASTM A185.

Before supply of steel, all order lists and bending diagrams shall be provided by the Developer for approval of the City Engineer. The approval of such lists and diagrams shall in no way relieve the Developer of responsibility for the correctness of reinforcing supplied and all expenses incidental to revision of furnished reinforcing steel shall be carried by the Developer.

Fencing 6-feet in height shall be installed at locations designated by the Planning Commission for the separation of non-compatible uses. Fences shall be chain link, including opaque privacy slats where required by the Planning Commission; solid board; or masonry. Chain link fence and gates shall be constructed as indicated on the Drawings and/or herein specified.

Type "D" Construction fencing may be required where conditions warrant the installation of a temporary fence. Where permanent fencing is required, the temporary fencing may be eliminated if the permanent fencing is installed prior to the start of other construction. The fence shall be protected against damage and, if damaged, it shall be repaired to the satisfaction of the City Engineer or Representative prior to final acceptance.

### 6.02 CHAIN LINK FENCE:

A. MATERIALS:

The chain link fence and gates shall be USS Cyclone-Type I, Anchor Post Products, Inc., or SS40-Type I, Allied Tube & Conduit, or equivalent. The components shall be as listed and specified below.

| | |
|---|---|
| Fabric | |
| Height | 6' - 0" |
| Mesh | 2-inch |
| Size Wire | 9-gauge |
| Coating | Zinc coating |
| Coating specifications | ASTM a-392-Class 1 |
| Tensile strength | 80,000 psi minimum |
| Top Rail | |
| Size | 1-5/8" OD - galvanized |
| Weight | 2.27 pounds per LF |

| | |
|---|---|
| Tension Wire<br>coil spring wire | 7-gauge galvanized |
| Line Posts | 4.10 pounds "H" section or 2-3/8" OD - 3.65-pounds per LF - galvanized |

Terminal, Corner, and Pull Posts

| | |
|---|---|
| Size | 2-7/8" OD round |
| Weight | 5.79 pounds per LF |

Except where shown differently on the Drawings, gate posts and concrete foundations for gate posts shall be as determined by the following schedule:

| Gate Leaf Width (feet) | O.D. Size (inches) | Weight (lb/ft) | Concrete Diameter (inch) | Foundation Depth (ft) |
|---|---|---|---|---|
| 0 to 6 | 2-7/8 | 5.79 | 12 | 4 |
| 6 to 13 | 4 | 9.11 | 18 | 3 |
| 13 to 18 | 6-5/8 | 18.97 | 18 | 4 |
| Over 18 | 8-5/8 | 24.7 | 18 | 4.5 |

All posts, rails, and appurtenances shall be hot-dipped zinc coated steel per ASTM A-120, A-121, or A-153, whichever is applicable. Pipe posts shall have tops which exclude moisture. Fence corner, pull, and gate posts shall be braced with the same material as top rail and trussed to line posts with 3/8-inch rods and tighteners.

The fabric shall be connected to the line posts with 6-gauge hot-dip galvanized wire clips every 14-inches, to terminal, corner, and gate posts by using 1/4-inch x 3/4-inch tension bars tied to posts every 14-inches with 11-gauge, 1-inch wide, hot-dip galvanized steel bands and 38-inch diameter bolts and nuts, and to tension wires with 11-gauge hog rings every 24-inches.

A 7-gauge, galvanized, coiled spring tension wire shall be installed along the bottom of the fence fabric.

B. CONSTRUCTION:

The chain link fence shall be located as indicated on the Drawings. Finished fence shall be plumb, taut, true to line and grade, and complete in all details. End, corner, slope, and gate posts shall be braced to the mid-point of the nearest line post or posts with horizontal braces used as

compression members and the said brace posts trussed from the brace back to the bottom of the end, corner, slope, or gate post with 3/8-inch steel truss rods with turnbuckles or other suitable tightening devices used as tension members.

Fence shall be installed with a top rail and a bottom tension wire. Top rail shall provide allowance for expansion and contraction due to temperature differential in the coupling devices.

The fabric shall be placed on the outward facing side of the posts and shall be installed so that the top edge projects over the top rail of the fence. The fabric shall be stretched taut and securely fastened to the posts, the top rail and the bottom tension wire. The tension wire shall be installed parallel to the line of the fabric.

The fence shall follow the general finished grade of the ground and shall have pull posts at all points where required to conform to a change in ground line. The distance between the bottom of the fence and the finished ground line shall not exceed 3-inches. The ground shall be graded before fence posts are located to permit the grade of the fence to remain constant over any local elevation or depressions in the ground line. The surplus dirt, concrete, etc. shall be cleaned up and the grade dressed up upon completion of the work. Fence posts shall be set in concrete foundations at least 3-feet into the ground and shall be spaced not over 10-feet apart. Concrete shall be a minimum of 10-inches in diameter for line posts and 12-inches in diameter for corners and gates. Exposed concrete fence post caps shall be finished off in a workmanlike manner. A minimum of 1-inch of concrete shall be above the finished grade and shall be sloped to drain away from the post.

C. SWING GATES:

Except as shown or specified, all chain link fence gates shall be swing gates. Gate frames shall be made of 1.9-inch galvanized pipe weighing 2.7-pounds per linear foot. Corner fittings shall be heavy pressed steel or malleable castings.

The corners of gate frames shall be fastened together and reinforced with a fitting designed for the purpose or by welding. All welds shall be ground smooth.

Chain link fence fabric shall be attached to the gate frame by the use of tension bars and tie wires as specified for fence construction, and suitable tension connectors spaced at approximately 16-inch intervals.

Gates shall be provided with a combination steel or malleable iron catch and locking attachment submitted to the City Engineer for review. Stops to hold gates open and a center rest with catch shall be provided where required.

**6.03 WOOD FENCE:**

A. MATERIALS:

(1) Slats – Redwood, cedar, combed spruce or other wood covering acceptable to the City Engineer.

(2) Bottom and Top Rail – Minimum 2-inch by 4-inch, 8-foot long cedar stud.

(3) Corner, Gate, End, or Line Posts – Minimum size 4-inch by 4-inch cedar wood post.

B. CONSTRUCTION:

All corner, gate, end, or line posts shall be set in concrete. The cedar posts shall be set true to line and grade with concrete bases at least 2-feet in depth. A minimum of 6-inches of concrete shall be provided below the bottom of each post. The minimum diameter for the concrete base for any post shall be 12-inches.

Posts shall be sound and free from decay, splits, multiple cracks, or any other defect which would weaken the posts or otherwise cause them to be structurally unsuitable for the purpose intended. The maximum distance between posts in any section shall not exceed 8-inches. The top and bottom railings shall be securely fastened to the posts with galvanized nails or other acceptable means. Changes in line of 30° or more shall be considered as corners.

Fence slats shall be placed on the roadway side of posts unless otherwise approved by City Engineer. The slats shall be placed approximately 1-inch above the ground and on a straight grade between posts by excavating the high points as required. Filling depressions will be permitted only upon approval of the City Engineer.

The slats shall be sound and free from all major decay or defects which would weaken or otherwise cause them to be unsuitable for fence slats. Fastening to top and bottom railings shall be done with two galvanized nails at both the top and bottom rail.

## 6.04 CONSTRUCTION FENCE SPECIFICATIONS – TYPE "D":

A. MATERIALS:

(1) The fabric shall be Class II wire mesh which conforms to ASTM Designation A-116, nominal 0.099-inch Farm Grade with standard 6-inch graduated spacing. The wire mesh shall have a Class 1 zinc coating. Polyethylene mesh fabric may be substituted when approved by the City Engineer.

(2) Corner, gate, end, or line posts shall be painted metal Tee, U or Y channel, Angular, or other approved shapes 6.5-feet in length.

B. CONSTRUCTION

Metal fence posts shall be spaced at a maximum of 16-feet. Post spacing measurements shall be made parallel to the ground slope. All posts shall be placed vertically. Metal posts may be installed by driving, if this can be done without damage to the post. Otherwise, they shall be installed to the specified depth (2.5-feet) in larger drilled or dug holes and backfilled and compacted.

Corner posts shall be brace in two directions. End and gate posts shall be braced in one direction. Wire mesh fabric shall be drawn tight enough to eliminate all sag without causing the "tension crimps" to fail to function.

Any high points along the ground surface which interfere with the placing of wire mesh shall be excavated to provide at least 2-inches of ground clearance. Every alternate lateral wire in the mesh fabric shall be fastened to each post by means of a clamp.

## 6.05 MASONRY FENCE:

Because of the variable nature of masonry fences, both with regards to materials desired and also with the condition of the foundation soils, no standard specification is given. The Developer, or others desiring to install the masonry fence, shall be responsible to submit engineered drawings for review. No masonry walls will be allowed until the plans have been reviewed and approved by the City Engineer.

## DIVISION 7 COMMUNICATION UTILITY SERVICES

### 7.01 SCOPE OF WORK:

This division defines and covers the requirements and responsibilities for the installation of City owned communication utility systems. For information regarding requirements for communication utility systems not owned by the City, please refer to the standard drawings and specifications of the applicable utility.

The underground conduit installed to provide communication service shall be furnished and installed by the Developer. In the event of a request for relocation of communication facilities, the associated costs shall be the responsibility of the requestor. All new communication utility systems shall be constructed underground, unless otherwise authorized by the City Engineer. No overhead communication lines will be allowed unless authorized by the Power Department Superintendent.

Developer shall furnish and install all communication facilities except for the following, which shall be completed by the Utility:

A. Pulling underground or overhead cable;

B. Installing communication cable terminations;

C. Setting of large communications pedestals which house Nodes, and Fiber Optic Equipment;

D. Installing communication connections and terminations;

E. All overhead facilities, including extension of risers as shown in the standard drawings.

### 7.02 ATTACHING TO EXISTING CITY FACILITIES PROHIBITED:

There shall be no installation on or connection to poles or other equipment owned by the City unless specifically authorized, in writing, by the City. Unauthorized, or incorrect, connections to or installations on City owned poles or equipment shall either be removed or corrected, as directed by the City Engineer.

**7.03 PERMITS AND INSPECTIONS:**

Service shall not be established until all necessary permits have been obtained and until the wiring installation has been inspected and approved by the City. The City reserves the right to inspect wiring and to refuse service to any installation that is, in the opinion of the City, unsafe or if the operation of the same may be detrimental to the service furnished to other Customers or the City.

**7.04 CONSTRUCTION DRAWINGS:**

Communication utility plan drawings must be approved by the City Engineer in order to be considered valid for construction and to be authorized to proceed with construction. Revisions, if needed, must also include the date the revision was approved.

**7.05 CONDUIT:**

All conduit shall be orange 4-way microduct SDR 11 HDPE pipe meeting ASTM-3035 specifications, unless otherwise directed by the City Engineer or their designee. All bends or sweeps in conduit must be made with manufactured parts and fittings; no deformations or alterations shall be allowed to conduit to make such bends or sweeps. The minimum radius for any bend or sweep in the conduit shall be 24-inches. The total number of bends in any conduit run shall not exceed 360°, unless otherwise authorized by the City Engineer.

All conduit shall be buried at a minimum depth of 24-inches and a maximum depth of 30-inches, unless otherwise approved by the City Engineer, and must have a 3- foot minimum separation from City Power. All conduit must maintain at least a 4- inch separation from all concrete and asphalt surfaces. Trenches may not be shared with City Power, unless otherwise approved by the City Power Superintendent.

**7.06 HANDHOLES, PULL BOXES AND OTHER ENCLOSURES:**

All handholes or pull boxes shall be polymer concrete or HDPE with lids inscribed with "KAYSVILLE FIBER", and must be level and installed in accordance with the Kaysville City standard drawings. Ground sleeves, pads, handholes, pull boxes and other enclosures shall be installed in such a manner as to avoid movement or settlement; any movement or settlement beyond 1/2-inch, or that adversely impacts the utility or its surroundings, shall require correction by the Developer.

The ends of conduits in handholes or pull boxes shall have bell ends, and enter the box vertically at +/-30°. Conduit ends shall be at least 2-inches above the bottom of the box, and at least 8-inches below the top of the box.

Ground rods shall be required and installed in boxes as called out in the Kaysville City standard drawings. Ground rods shall be 5/8-inch by 8-foot copper clad.

## 7.07 LOCATING WIRE, TAPE AND LABELS

All conduits shall have a 6-inch tape buried 12-inches above the conduit, reading: “CAUTION: FIBER OPTIC BURIED.” The end of each stubbed conduit, including service laterals, shall be marked to the surface according to the standard drawings.

All conduit shall require a tracer wire (12-gauge) for locating purposes placed on top of the pipe. Where splices are to be made, a water tight splice kit must be used. See the Kaysville City standard drawings for additional detail. All conduits shall have a pull string in the conduit securely tied off in each pad or enclosure.

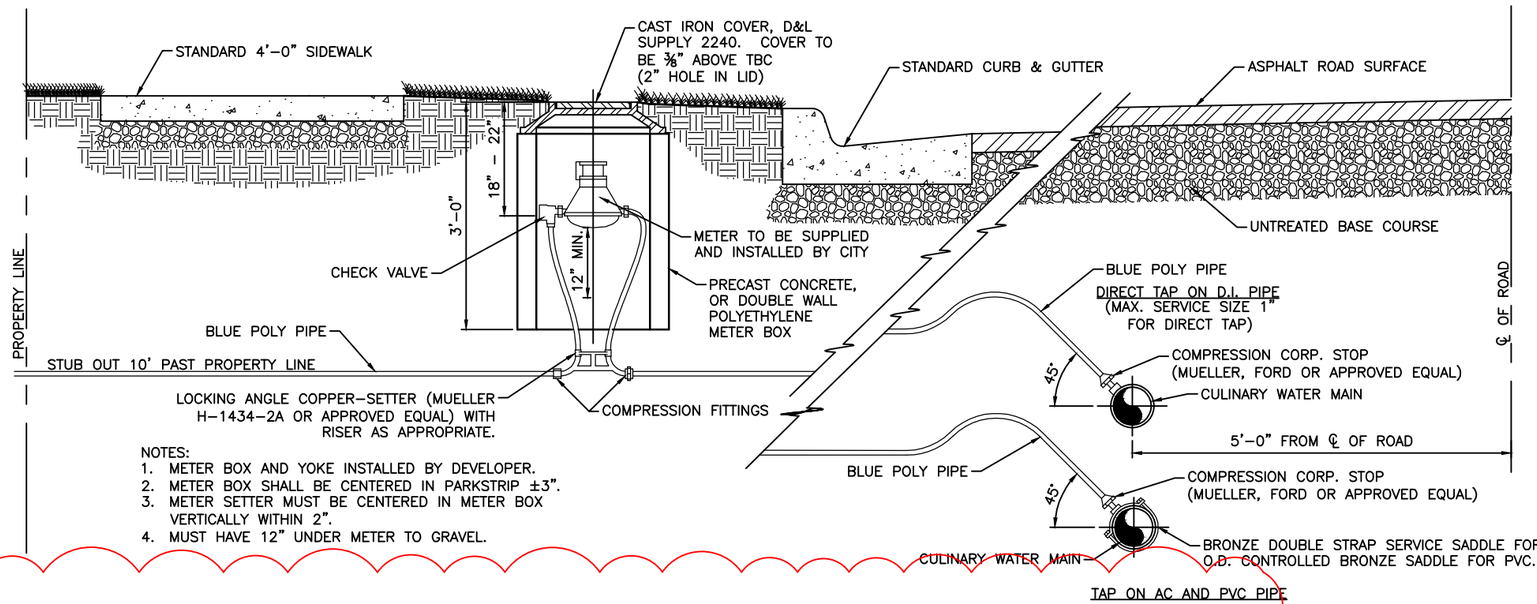
An imprinted, plastic label shall be securely taped to the end of each conduit run. The label shall indicate the location of where the run ends.

## 7.08 SERVICES

Service conduits shall be 1-inch PVC or approved equivalent having no bends greater than 90° shall be run from the site being served to a City handhole or pull box.

The City Engineer or their designee will determine the point of delivery for all developments and will decide if the multiple buildings, business and residential, or portions of buildings will be serviced using single or multiple distribution unit (MDU) enclosures.

EXHIBIT B

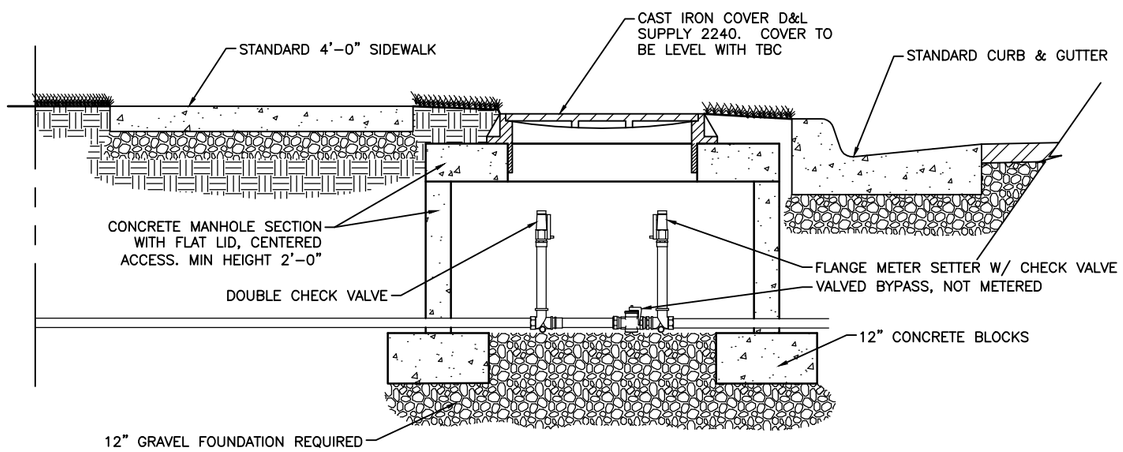



NOTES:
1. METER BOX AND YOKE INSTALLED BY DEVELOPER.
2. METER BOX SHALL BE CENTERED IN PARKSTRIP ±3".
3. METER SETTER MUST BE CENTERED IN METER BOX VERTICALLY WITHIN 2".
4. MUST HAVE 12" UNDER METER TO GRAVEL.

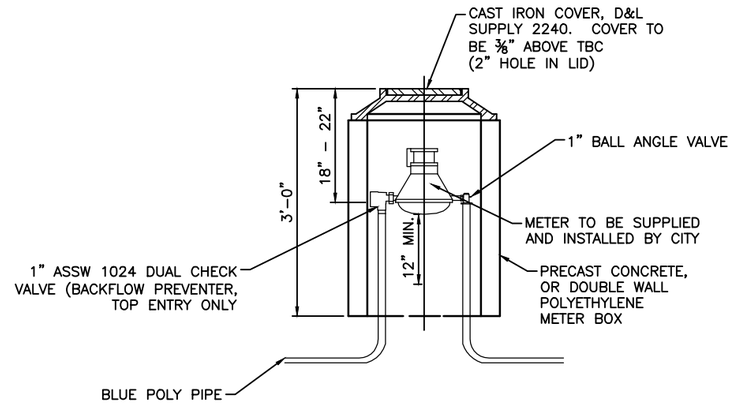
## KAYSVILLE CITY CORPORATION WATER SERVICE INFORMATION

| SERVICE SIZE | METER BOX SIZE | LID REQ'S | TYPE OF MATERIAL FOR METER BOX | WATER METER | CONNECTION TYPE | BYPASS | DIST. BETWEEN FLANGE |
|---|---|---|---|---|---|---|---|
| 3/4" | 18" DIA | D&L SUPPLY 2240 | CONCRETE, GALVANIZED, POLYETHYLENE | BY CITY | NPT | NO | --- |
| 1" | 24" DIA | FLAT 22.5" LID | CONCRETE, GALVANIZED, POLYETHYLENE | BY CITY | NPT | NO | --- |
| 1.5" | 48" DIA | 30" MH LID W/ 2" HOLE (RECESSED HOLE IF LOCATED WITHIN SIDEWALK, ROAD, OR APPROACH) | CONCRETE | BY CITY | FLANGE | 1" | * |
| 2" | 48" DIA | | CONCRETE | BY CITY | FLANGE | 1" | * |
| 3" | 60" DIA | | CONCRETE | BY CITY | FLANGE | 1" | * |
| 4" | 4'X6' BOX | | CONCRETE | BY CITY | FLANGE | 2" | * |
| *CONTACT KAYSVILLE CITY | | | | | | | |

3 TYPICAL WATER CONNECTION
SCALE: N.T.S.

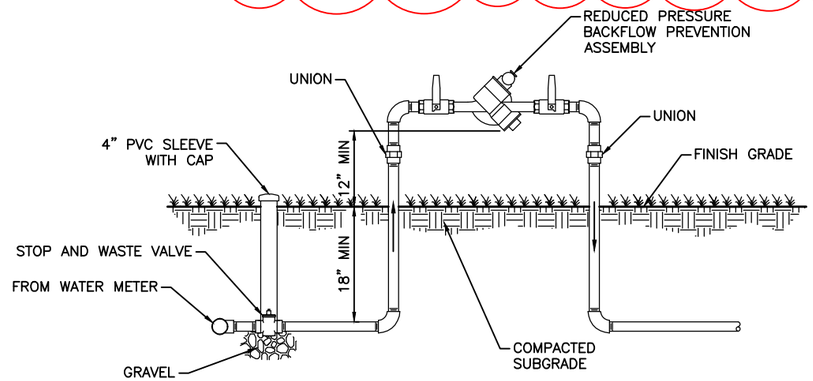



1 TYPICAL FLANGED METER SETTER WATER CONNECTION
SCALE: N.T.S.




NOTES:
1. METER BOX INSTALLED BY DEVELOPER.
2. METER BOX SHALL BE CENTERED IN PARKSTRIP ±3".
3. METER MUST BE CENTERED IN METER BOX VERTICALLY WITHIN 2".
4. MUST HAVE 12" UNDER METER TO GRAVEL.

1 ALTERNATE METER INSTALLATION FOR 1" OR SMALLER
SCALE: N.T.S.




NOTE:
ALL FITTINGS AND NIPPLES FROM POINT OF CONNECTION TO MAINLINE SHALL BE BRASS.

2 REDUCED PRESSURE BACKFLOW PREVENTION ASSEMBLY
SCALE: N.T.S.



| NO. | REVISION DESCRIPTION | BY | APR. | DATE |
|---|---|---|---|---|
| | | | | |

FILE:
PROJ. #:
PLOT DATE: 5/22/2025
LAST UPDATED: 5/22/2025
DRAWN BY: KEF
DESIGN BY:
CHECKED BY:

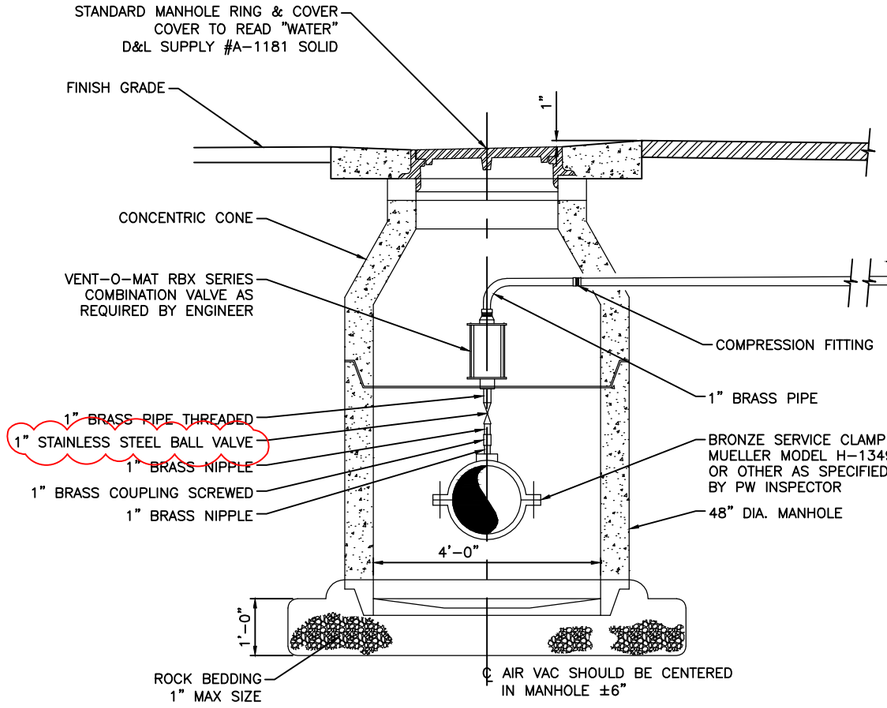
Kaysville City

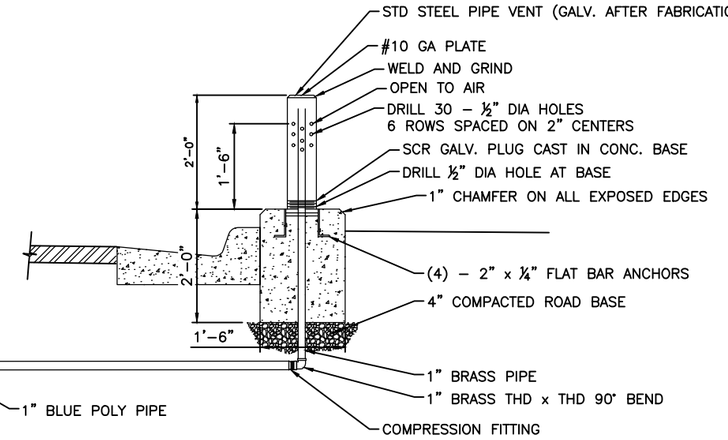
KAYSVILLE CITY CORPORATION
DEVELOPMENT STANDARDS

TYPICAL WATER SERVICE CONNECTION DETAILS

SHEET 4


Plot Date:5/22/2025 1:34 PM Plotted By: Dexter Fisher
Date Created:5/22/2025 K:\PUBLIC WORKS\CAD\STANDARDS\04-WATER SERVICE CONNECTION DETAILS.DWG



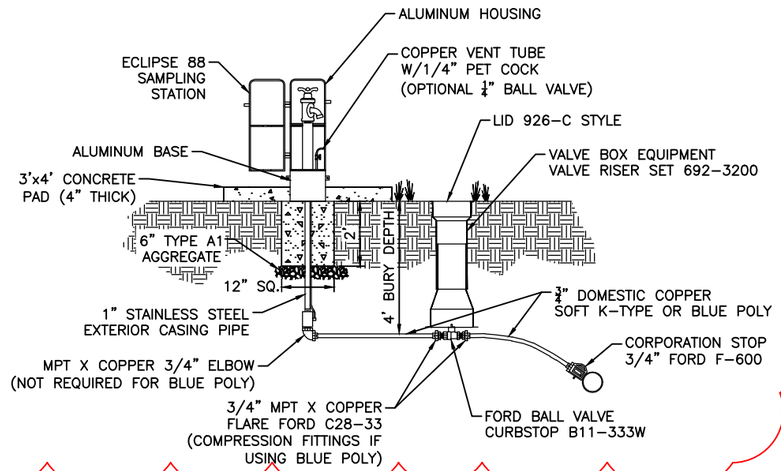




NOTE:
AIRVAC MUST BE VENTED TO PARKSTRIP.
LOCATE STANDPIPE AS DIRECTED BY ENGINEER IN THE PARKSTRIP (TYP).
USE 5" DIA PIPE FOR 1" AND 2" AIR VAC/AIR RELEASE.
USE 6" DIA PIPE FOR 2½"+ AIR VAC/AIR RELEASE.

## TYPICAL AIR RELEASE VALVE MANHOLE AND SPLASH BLOCK

SCALE: N.T.S.

## ECLIPSE NO. #88 SAMPLING STATION




## TYPICAL ECLIPSE SAMPLING STATION

SCALE: N.T.S.



| NO. | REVISION DESCRIPTION | BY | APR. | DATE |
|---|---|---|---|---|
| | | | | |

FILE:
PROJ. #:
PLOT DATE: 5/28/2025
LAST UPDATED: 5/28/2025
DRAWN BY: KEF
DESIGN BY:
CHECKED BY:

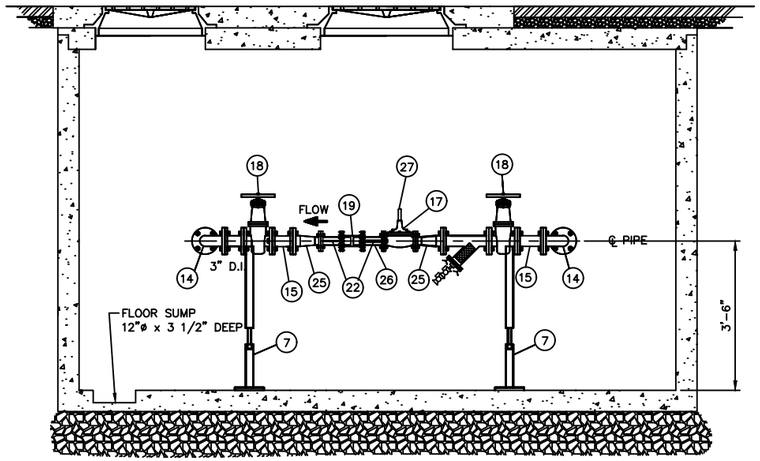
Kaysville City

# KAYSVILLE CITY CORPORATION DEVELOPMENT STANDARDS

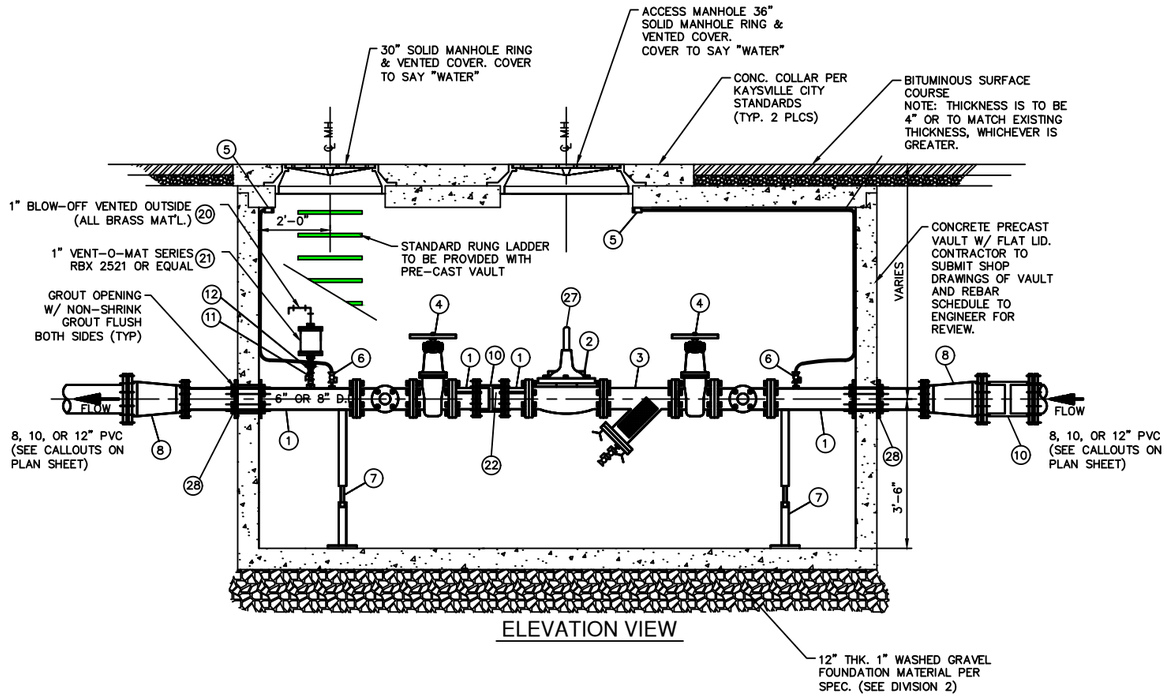
AIR RELEASE VALVE DETAILS

SHEET 6

Plot Date/5/28/2025, 4:20 PM Plotted By: Dieter Fisher
Date Created/5/28/2025 K:\PUBLIC WORKS\CAD\STANDARDS\06-AIR RELEASE, BLOWOFF VALVE DETAILS.DWG




3" BYPASS ELEVATION VIEW

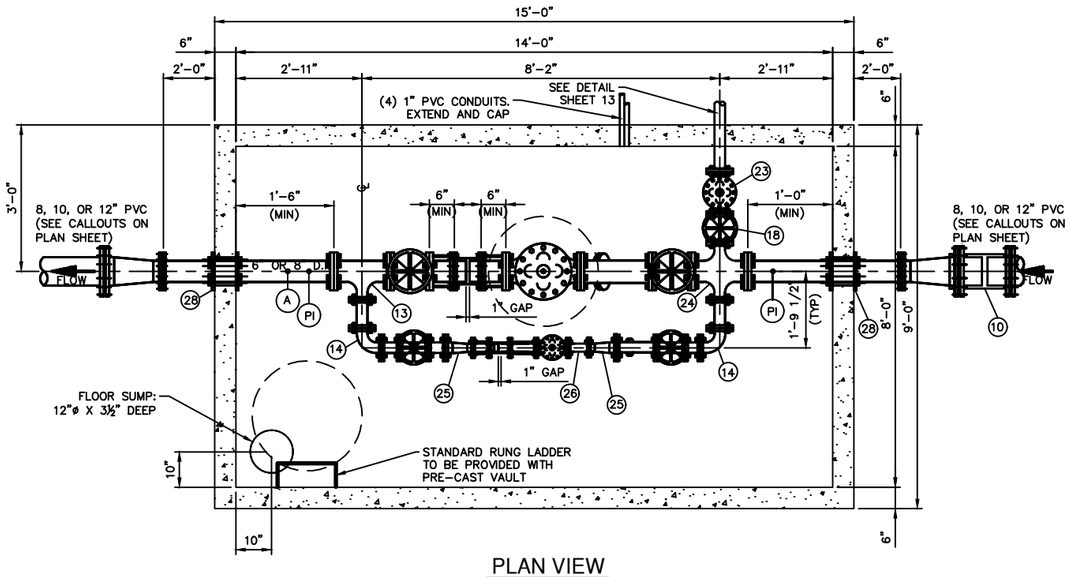



ELEVATION VIEW

## MATERIAL LIST

| MARK | DESCRIPTION | JOINT | SIZE IN INCHES | QUANTITY |
|---|---|---|---|---|
| 1 | DUCTILE IRON PIPE | FLxPE | 6" OR 8" | AS REQ'D. |
| 2 | PRESSURE REDUCING VALVE [CLA-VAL #90-01] | FL | 6" OR 8" | 1 |
| 3 | CAST IRON "Y" STRAINER - MUELLER STEAM SPECIALTY #752 WITH BALL VALVE & FAUCET/HOSE BIB TO FLUSH OUT SYSTEM | FL | 6" OR 8" | 1<br>1 |
| 4 | GATE VALVE | FLG | 6" OR 8" | 2 |
| 5 | ANCHOR FEMALE AIR HOSE QUICK CONNECT TO CEILING WITH ACCESS NEAR LID | SCR | – | 2 |
| 6 | STAINLESS BALL VALVE; CONNECT TO 1/4" AIR HOSE | SCR | 1" | 2 |
| 7 | PIPE SUPPORT | | N/A | 4 |
| 8 | DUCTILE IRON REDUCER | MJ/MJ | 8,10, OR 12" X 6, OR 8 | 2 |
| 9 | BOLTS, NUTS, GASKETS, FOLLOWERS | AS REQ'D. | PER PLANS | AS REQ'D. |
| 10 | SLEEVE | MJ/MJ | 6,8,10, OR 12" | 2 |
| 11 | STAINLESS BALL VALVE | SCR | 1" | 1 |
| 12 | UNION | SCR | 1" | 1 |
| 13 | REDUCING TEE | FL | 6" OR 8" X 3" | 1 |
| 14 | 90° ELBOW | FL | 3" | 2 |
| 15 | DUCTILE IRON PIPE | FLxPE | 3" | AS REQ'D. |
| 16 | CAST IRON "Y" STRAINER - MUELLER STEAM SPECIALTY #752 WITH BALL VALVE & FAUCET/HOSE BIB TO FLUSH OUT SYSTEM | FL | 3" | 1 |
| 17 | PRESSURE REDUCING VALVE [CLA-VAL #90-01] | FL | 2" | 1 |
| 18 | GATE VALVE | FLG | 3" | 3 |
| 19 | SLEEVE | MJ/MJ | 2" | 1 |
| 20 | BLOW-OFF (ALL BRASS MATERIAL) | | 1" | 1 |
| 21 | COMBINATION AIR VALVE, VENT-O-MAT SERIES RBX 2521 OR EQUAL | | 1" | 1 |
| 22 | RESTRAINING BOLT (TYP. 2 180° OFFSET) | | | 8 |
| 23 | PRESSURE RELIEF VALVE [CLA-VAL #50-01] | | 3" | 1 |
| 24 | REDUCING CROSS | | 6" OR 8" X 3" | 1 |
| 25 | DUCTILE IRON REDUCER | | 3" X 2" | 2 |
| 26 | DUCTILE IRON PIPE | | 2" | AS REQ'D |
| 27 | VALVE POSITION INDICATOR [CLA-VAL #X101] | | FIT A 2",6 OR 8" VALVE | 2 |
| 28 | MEGA LUG FOLLOWERS W/1/4" STEEL PLATES ON BOTH SIDES OF WALL | | 6"OR 8" | 4 |

TYPICAL NOTE: ALL SMALL PIPE FITTINGS AT INSTRUMENTS AND AIR-VAC, ETC. NEED TO BE BRASS OR BRONZE. BALLS VALVES NEED TO BE STAINLESS STEEL




PLAN VIEW



| NO. | REVISION DESCRIPTION | BY | APR. | DATE |
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FILE:
PROJ. #:
PLOT DATE: 5/22/2025
LAST UPDATED: 5/22/2025
DRAWN BY: KEF
DESIGN BY:
CHECKED BY:

Kaysville City

# KAYSVILLE CITY CORPORATION DEVELOPMENT STANDARDS

TYPICAL PRESSURE RELIEF VAVLE

SHEET 7

Plot Date:5/22/2025 2:14 PM Plotted By: Dexter Fisher
Date Created:5/22/2025 K:\PUBLIC WORKS\CAD\STANDARDS\07-PRESSURE RELIEF VALVE.DWG

Adopted by City Council June 2025

Public Works: 801-544-8112 City Utility Locator: 385-226-2053 Public Works Inspector: 801-589-8618

KAYSVILLE CITY PUBLIC WORKS
EXCAVATION, CROSSING OR ALTERATION (EXCAVATION) PERMIT

To be filled out by City
Permit #:_____
Issued by: _____

Bond Amount: _____
Maintenance Fee Amount: _____
Contractor (Applicant): _____ Contractor Phone: _____
Contractor Email: _____ Contractor License #: _____
Contractee (party for whom work is done): _____
Purpose of excavation, crossing or alteration: _____
_____
_____
Location/address: _____

Requirements and Provisions:

1. For, and in consideration of, the granting of permission to work within Kaysville City ("City") right of way ("ROW"), City owned property, or properties maintained by the City, the following requirements and provisions shall apply:
   A. The permit application shall be accompanied by a plan view of the work being done, including dimensions of excavations, and the permit must be reviewed and approved prior to any work commencing. All work is limited to what is shown and described therein, and will be done at no expense to the City. All work shall comply with City Ordinances, and standards, which can be found online at www.kaysville.gov.
   B. The permit applicant is the contractor performing the work. The contractee shall not act as the applicant, unless the contractee is performing the work for themselves. Applicants that have not worked in Kaysville City before must meet with the City locator prior to work commencing to ensure applicant understands all requirements of the permit.
   C. The applicant shall indemnify the City from all claims and costs arising from the applicant's (or their agent/representative) negligence. The applicant shall pay the necessary bond and fee amounts, in accordance with the Consolidated Fee Schedule.
   D. Cutting into asphalt less than 3-years old is prohibited. Exceptions in extreme cases may be considered. If approved, the Special Restoration Standard, as detailed in Ordinance 9-2-9, would apply to the restoration.
   E. For work commencing or finishing between October 15th and April 1st, bond amounts for any street cuts shall be double. Approval of cuts during this time are subject to factors such as weather, impacts to emergency response and the general public etc. Ambient temperatures must remain at or above 50° F for at least 2 hours before placement of Hot Mix Asphalt (HMA) and 2 hours after rolling/compaction. If HMA cannot be used, cold mix asphalt shall be used temporarily and maintained until it can be replaced.
   F. Pot-Holing must be done by hydroexcavation/vacuuming. Potholes in asphalt or concrete shall be made with the keyhole method by coring a minimum width of 6 inches and the void filled with flowable fill to the bottom of the asphalt. The original core shall be replaced with "Utilibond" or equivalent.
   G. Underground trenchless utility work within ROW shall only be performed via directional drilling. Pneumatic boring (IE- Hole Hog, missiles etc) shall not be allowed within ROW. All utilities (services, mains, laterals etc) that are being crossed by underground trenchless work shall first be potholed, visually identified, and the depths measured and recorded. If requested by the City, the applicant shall provide a detailed summary of the utility sizes and depths identified during the potholing. All utilities, regardless of method of installation, must be placed at a minimum depth of 12 inches.
   H. Traffic control plans are required for all detours, lane shifts or closures, and must be approved at least 24 hours before work starts. 24 hour notice is required for properties impacted by road closures or utility disruptions. Road closures, if approved, shall require hard closure barricades. Restricting traffic to 1 lane, will require the use of flaggers or signals. Work zones shall be sufficiently safeguarded with barricades and warning signs, and may require steel plates when personnel are not on site. Excavation sites not properly or safely maintained may be assessed a penalty of $500 per day. All closures must be approved by Public Works, and may be subject to a penalty of $500 per day.
   I. The applicant must provide notice to the Public Works Inspector before the start of work and also prior to backfilling. Except for bedding, all backfill shall be UTBC and be backfilled in 1-foot lifts and compacted to 96%, with compaction records provided to the City, upon request. UTBC will be installed to a minimum

depth of 12-inches within the travel and shoulder area of the road, and backfilled excavations must be maintained free of depressions or hazards. The applicant shall dispose of all spoils or debris generated. To safeguard persons and utilities, unusual or extreme conditions may result in additional requirements.

J. After backfill, the applicant shall T-cut an additional 18 inches outside all of the edges of the existing asphalt. Cut asphalt edges shall have tackifier applied, and the excavation repaved with at least 4-inches of PG 58-28 HMA, 1/2-inch aggregate, with no more than 15% RAP. All T-cuts must be inspected and approved before paving and asphalt plant tickets shall be provided, upon request.

K. Pavement must be replaced within 10 business days (from the date the excavation commences) or the applicant may be assessed a penalty of $500 per day. Except for the asphalt surface treatment, all other remaining work and restoration shall take place within 20 business days, (from the date the excavation commences) or the applicant may be assessed a penalty of $500 per day.

L. In accordance with Ordinance 9-3c-9, it is unlawful to place or stockpile any material on a public street (including curb and sidewalk) for more than 48-hours. No excavation spoils may be stockpiled on a Public Street, and any materials that are stockpiled within the ROW must not damage the surface, and must not violate any laws or regulations.

M. Interfaces between old and new asphalt/concrete shall be crack sealed, and inspected, before an asphalt surface treatment is applied to the repaved surface. Surface treatments shall extend 12-inches beyond asphalt cuts.

N. Any improvements, including (but not limited to) paint, landscaping or signage, effected by the work shall be re-established to their original condition.

O. The date of satisfactory completion will not be established until applicant has requested a final inspection. Defective, unsafe or non-compliant work shall be removed and/or replaced prior to satisfactory completion.

P. For 1 year after the date of satisfactory completion, the applicant shall be responsible to maintain the work site and assume sole liability for any injuries or damages caused by defects from the work. By the end of the 1 year period, the surface treatment must be applied to the repaved surface.

Q. The City will notify the applicant of items requiring repair or attention. In cases of emergency, or where safety of persons or property is otherwise compromised, the applicant must respond to requests for repair within 24-hours, and resolve said issue(s) within 4-business days of receiving the request. If the applicant fails to respond within this timeframe, a penalty of $500 per day may be assessed, and PW may cause the necessary repairs to be made at the applicant's expense.

R. The City may, at its discretion, stop work and/or draw on bond amounts to finish/repair work if issues regarding compliance or workmanship arise.

S. 1 year after satisfactory completion, the applicant shall request a final inspection of the excavation site. If the final inspection finds the site to be satisfactory, any remaining bond amounts shall be refunded. Defects found during the final inspection must be remedied prior to refunding the bond. Bond amounts used by the City are non-refundable. Penalties are non-refundable, and shall be deducted from the bond amount, if necessary.

T. If the applicant exhibits a pattern of failure to comply, or neglects to safeguard utilities, infrastructure or the general public, the City may use this as the basis for rejecting future applications from the applicant.

2. A copy of this permit must remain on site at all times during construction, and applicant must have someone present on site at all times that can communicate effectively with City staff.

I HEREBY ACKNOWLEDGE THAT I HAVE READ THESE INSTRUCTIONS AND PROVISIONS AND AGREE WITH ITS REQUIREMENTS, AND ASSUME ALL DUTIES AND OBLIGATIONS PROVIDED HEREIN.

Date: _____ Applicant (print): _____ Sign: _____

PW Inspector Approval: _____ Date: _____

City Locator Approval: _____ Date: _____

Additional comments/instructions from City: _____

_____

_____

_____

_____

_____

EXHIBIT D

Kaysville City

# DRAINAGE EVALUATION & DESIGN MANUAL 2025

# List of Tables

# 1. Purpose

The purpose of this manual is to provide some information concerning the review process, design standards, regulations, recommendations, and hydrologic/hydraulic methods for evaluating and designing both storm drain and drainage facilities in Kaysville City (City). All construction projects shall conform to requirements of this Manual, the City's Storm Water Management Program, the City's LID Manual, the City's ordinances, and the City's Construction Standards (Standards).

All drainage evaluation and design should be done by licensed engineers who are experienced in the field of drainage and runoff, and the "Standard of Care" for Professional Engineers should be considered throughout their work.

# 2. Drainage Submittal Requirements

## 2.1 Introduction

Site grading and drainage plans for parcels of any size shall be reviewed and approved as part of the development review process as detailed in Title's 9 and 19 of the City Ordinances. Developments can be categorized into one of the following development types:

1. Single residential lot
2. Minor development – Typically a single non-residential lot
3. Major development – Typically a multi-lot development

Depending on the size or complexity, a single non-residential lot development could be considered a major development. The City Engineer, shall ultimately determine the applicable drainage criteria to be used in the planning and design process.

## 2.2 Ground Water Report

In accordance with Title 19-6-3 item 2, a Groundwater Report is required for all development types. The Groundwater Report shall be performed by a reputable geotechnical engineering firm and certified by a licensed professional engineer. In general, a Groundwater Report consists of an excavation to observe soil conditions and to determine the existing static groundwater elevation. An acceptable Groundwater Report shall consist of the following:

1. Date of excavation observation; name of development applicant; property address; and subdivision name, plat, and lot number; etc.
2. General location of excavation, i.e. 20 feet from the west property line and 35 feet from the north property line.
3. Groundwater depth must be referenced from a permanent feature on the site, such as the sidewalk, curb, gutter, water valve, manhole lid, construction benchmark, etc. Do not reference the groundwater elevation from existing ground.
4. The excavation must extend to a minimum of 4 feet below the lowest level of the proposed structure.
5. Provide a description of soils encountered, thickness of soil layers, and evidence of seasonal groundwater fluctuations.
6. Provide specific recommendations that are pertinent to the site such as: fooling drains, waterproofing requirements, surface grading, locations of downspouts for roof drainage, etc.
7. If high water tables are an issue, a piezometer must be installed on site for long-term groundwater monitoring.

## 2.3 Grading and Drainage Plan Submittal requirements for Single Residential Lots

A lot Grading Plan shall be submitted to the City Engineer for single residential lot developments. In conjunction with Title 18-3-8 and 19-3-3 of City Ordinance, the proposed site plans must also include the following information:

**DRAWINGS**

1. How the development will address any subdivision or lot specific requirements. For example; geologic hazards, steep slopes or sensitive lands, high water table area, existing upstream and downstream drainage facility or other features, setbacks, etc.
2. Flow arrows that represent the intended flow patterns of finish grade
3. Elevations of the top of curb, flow line of gutter, building and driveway, as necessary, to depict intentions of grading.

## 2.4 Storm Drainage Report and Management Plan Submittal Requirements for Minor Developments

A Storm Drainage Report and Management Plan shall be submitted to the City Engineer for minor developments and shall be prepared by a professional civil engineer registered in the State of Utah. The submittal shall contain the following information:

**REPORT**

1. Description of the lot location (township, range, section, subdivision and lot).
2. General description of the property, area, existing site conditions including all existing onsite drainage facilities such as roads, culverts on natural waterways, ditches, canals, washes, drainage waterways from mountain drainages including ephemeral streams, swales, structures, storm drains, springs, detention and retention basins, and any proposed modifications to the same.
3. General description of off-site drainage features and characteristics upstream and downstream of the site and any known drainage problems and a plan to mitigate those problems. This shall include natural waterways from mountain drainages and a capacity analysis of any downstream storm drain pipes or open channels to confirm that those facilities have capacity to accept runoff from the proposed development
4. General description of the proposed storm water facilities that will be used to manage onsite and offsite runoff discharging onto the parcel. Description of debris/sedimentation facilities needed to manage offsite runoff.
5. General description of master planned drainage facilities on or adjacent to the lot and proposed drainage features and how the development and proposed drainage facilities conform to the storm water master plan.
6. Detailed runoff calculations for the design storm. See Section 3 for design criteria.
7. Describe if a FEMA floodplain is on or adjacent to the lot. It must be noted if there are plans to modify the ground surface (cut or fill) in a FEMA floodplain.
8. Provide the elevation of the lowest habitable floor space.

9. A list of all other applicable permits that may need to be obtained, including: Floodplain Permit, State Stream Alteration Permit, Davis County Flood Control Permit, Army Corps of Engineers Permit.
10. Statement that BMPs for Storm Water Pollution Prevention will be utilized to comply with the City LID requirements. Describe proposed LID practices that will be implemented for both water quality and runoff volume reduction in accordance with the City's LID requirements (see Section XXXX).
11. SWPPP Narrative.
12. Describe existing and proposed structures and any structures that may be demolished.

**DRAWINGS**

1. Scale, north arrow, legend, title block showing project name, date, preparers name, engineer's seal and signature on 11"x17" electronic format set up to print on 11"x17" or 22"x34" paper.
2. Existing and proposed property lines, rights-of-way and easements.
3. Existing and proposed topography (2-foot maximum contour interval) extending at least 50 feet beyond the lot boundaries.
4. Existing improvements on or within 15 feet of the property.
5. Existing drainage and irrigation facilities.
6. Location of required drainage easements.
7. Existing drainage patterns and runoff flow paths.
8. Design details of proposed storm drain facilities, including storm drain inlets, outfalls, and connections to existing storm drain facilities. Include separate maintenance and monitoring plan for any proposed storm water detention, retention, or water quality facilities including debris/sediment basins.
9. FEMA floodway and floodplain boundaries and elevations.
10. Proposed drainage patterns and runoff flow paths.
11. Location of any proposed storm water management facilities including: storm drain pipes, inlets, manholes, cleanouts, swales, channels, retention and detention facilities, and debris/sediment basins.
12. Other relevant drainage features.
13. Show existing and proposed structures and indicate structures that may be demolished.
14. Locations of proposed storm water BMPs.
15. Locations of runoff volume reduction facilities to meet requirements outlined in the City's LID manual.

## 2.5 Storm Drainage Report and Management Plan Submittal Requirements for Major Developments

A Storm Drainage Report and Management Plan shall be submitted to the City Engineer for major developments and shall be prepared by a professional civil engineer registered in the State of Utah. The submittal shall contain the following information:

**REPORT**

1. Title page showing project name, date, preparer's name, seal and signature.
2. Description of the development, including location (township, range, section, subdivision and lot).
3. 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. Description of off-site drainage features and characteristics upstream and downstream of the site and any known drainage problems and plan to mitigate problems. Description of debris/sedimentation facilities needed to manage offsite runoff.
5. 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 3 for design criteria and Section 4 for approved rainfall-runoff computation methods.
6. Description of master planned drainage facilities on or adjacent to the development and how the development and proposed drainage facilities conform to the storm water master plan.
7. Description of existing downstream facilities that will receive storm water runoff from the development and appropriate analyses and discussion to determine if those facilities have capacity available to receive runoff from the site. Include calculations.
8. Description of other drainage studies that affect the site.
9. Description of FEMA floodway and floodplain boundaries and associated elevations on or adjacent to the property.
10. Design calculations to support inlet spacing and sizing of storm water conveyance facilities. Include a description of drainage facility design computations. See Section 3 for facility design criteria.
11. Describe how development activities will comply with applicable City and Davis County flood control requirements and FEMA requirements, if applicable.
12. Identify any needed drainage easements or rights-of-way.
13. Preliminary drawings of proposed drainage facilities that also show existing storm drain facilities on or adjacent to the site.
14. Summary of design runoff computations. See Section 4 for approved rainfall-runoff computation methods.
15. Provide the elevation of the lowest habitable floor space. A separate groundwater report will be required to recommend an appropriate elevation for structures in some areas (see Section 2.2).
16. Appendices showing all applicable reference information.
17. A list of all other applicable permits that may need to be obtained, including: Grading Permit, Floodplain Permit and/or Stream Alteration Permit.
18. Conclusions and statements that indicate that proposed improvements associated with the development will comply with City drainage requirements that proposed storm drain facilities will be effective, and that the computations were performed using the current standard of care. See Section 3 for design criteria.
19. Provide a Storm Water Pollution Prevention Plan that identifies appropriate BMPs.

20. SWPPP Narrative (see Kaysville City Code).
21. Describe existing and proposed structures and any structures that may be demolished.
22. Describe proposed LID practices that will be implemented for both water quality and runoff volume reduction in accordance with the City's LID manual.
23. Summary of hydraulic calculations for sizing culverts and all other hydraulic features.

**DRAWINGS**

1. Drawings shall be submitted in electronic format set up to be printed on 11"x17" or 22"x34" paper.
2. Existing and proposed property lines.
3. Existing and proposed topography (2-foot maximum contour interval) extending at least 100 feet beyond the site.
4. Existing and proposed streets, easements, and rights-of-way.
5. Existing drainage and irrigation facilities.
6. FEMA floodway and floodplain boundaries and elevations, if applicable.
7. Required setbacks for structures from the center line of stream channels, if applicable.
8. Drainage basin boundaries and subbasin boundaries on a topographical map.
9. Existing drainage patterns and runoff flow paths.
10. Proposed drainage patterns and runoff flow paths.
11. Location and size of proposed storm water management facilities including: storm drain pipes, inlets, manholes, cleanouts, swales, channels, retention and detention basins, and debris/sediment basins.
12. Include spot elevations of proposed grade, flow line and top, back of curb.
13. Design details of proposed storm drain facilities, including storm drain inlets. Include separate maintenance and monitoring plan for any proposed storm water detention, retention, or water quality facility.
14. Design details of proposed improvements to existing irrigation facilities and any facilities to be used to manage high groundwater conditions on the site.
15. Location of required drainage easements.
16. Hydraulic grade line on a pipeline profile drawing showing backwater affects from receiving streams and full detention/retention basins.
17. Other relevant drainage features.
18. Scale, north arrow, legend, title block showing project name, date, preparers name, seal and signature.
19. Show existing and proposed structures and indicate structures that may be demolished.
20. Show proposed land to be disturbed (show "do not disturb" line).
21. Show sensitive lands (i.e. steep slopes, shallow groundwater, wetlands, water bodies).
22. Locations of proposed storm water BMPs.

23. Locations of runoff volume reduction facilities to meet requirements outlined in the City's LID manual.

## 2.6 Utah Pollutant Discharge Elimination System (UPDES) Permits and Storm Water Pollution Prevention Plans (SWPPP)

In accordance with Title 9-3b of the City Ordinance's, all projects that involve land disturbance of 1 acre or more, or are part of a common plan of development that is 1 acre or more, or that are determined by the Storm Water Official to have an elevated hazard potential shall be required to obtain a UPDES Permit from the State, which includes submitting a SWPPP to the City's Storm Water Official. See City Code for approved Best Management Practices (BMPs) and additional information regarding the SWPPP.

## 2.7 Floodplain Permit

A Floodplain Development Permit must be obtained from the City for all developments that are located within a floodplain, as defined on the current FEMA Flood Insurance Rate Map. The permit application must address activities that may include but are not limited to: modifying the existing ground in or near the floodplain (i.e. cutting or filling), adding a culvert or bridge in the floodplain, or constructing a structure or fence in the floodplain. See Appendix G for permit application.

# 3. Design Criteria for Storm Drain Facilities

The proper design of storm drain facilities is critical to the performance of the facilities during runoff events. The purpose of this section is to provide approved design criteria for projects within the City, and design engineers should follow these criteria unless otherwise directed by the City Engineer.

## 3.1 Objectives

Proper management of storm water runoff is essential to fulfill Kaysville City's grading and drainage objectives, which are:

1. Reduce the risk of flood damage, including life and property, from storm water runoff events.
2. Minimize the increase of storm water runoff from new developments into existing City facilities.
3. Reduce soil erosion and sedimentation from development and construction projects.
4. Adequately design and construct storm drainage facilities that minimize maintenance requirements and meet industry standards of care.
5. Minimize pollutants in storm water runoff.
6. Utilize LID to replicate pre-development hydrology through infiltration, evaporation, and detention of runoff close to its source.

## 3.2 General

1. Consider the flood history of the area and the effect that the proposed development will have on existing and proposed drainage features for all hydrologic analyses.
2. Maintain and mimic natural drainage characteristics and patterns to the maximum extent practicable.
3. Account for all offsite drainage, including from mountain watersheds. Design for the safe conveyance of storm water from offsite drainages through new and existing storm drain facilities. Design new storm drain facilities to avoid plugging of manholes or conduits/pipes. See 3.14 Mountain Drainages.
4. Verify that existing or proposed downstream storm drain facilities have adequate capacity to convey stormwater in accordance with the complete requirements in Section 3 of this manual.

## 3.3 Conduits

**Design Flow –** Storm drain pipelines shall be designed to convey the computed design storm runoff (see Section 4.1 for design storm parameters) under full pipe capacity, but with no surcharging. Backwater from receiving streams and full detention/retention basins shall be accounted for in the design.

**Minimum Pipe Size –** The minimum allowable pipe diameter is 18 inches for mainline storm drain pipes and 15 inches for laterals to inlets.

**Pipe Material** – Storm drain pipelines material shall be reinforced concrete. Other materials may be approved on a case-by-case basis by the City Engineer.

**Minimum Cover** – Minimum 2 feet of cover, unless otherwise approved by the City Engineer.

**Pipe Slope / Velocity** – The velocity of storm water discharge is controlled by the slope of the pipe. The pipeline minimum slope shall be designed such that the flow velocity of the design discharge is greater than 3.0 feet per second. Design flow velocities greater than 28 feet per second should be avoided. Pipes that are designed to operate under supercritical flow conditions shall account for hydraulic jumps and energy dissipation. Pipes upstream of hydraulic jumps should be vented to prevent flow surges. Pipe sizes are not allowed to decrease in the downstream direction without use of a diversion or a stormwater detention facility.

**Location –** City owned storm drain pipelines shall be located within the street right-of-way (ROW) in accordance with current City Standards or in a dedicated easement. Privately owned storm drain pipelines or drainage facilities may be located on private property, but must still meet City Standards, and shall also obtain a Storm Water Maintenance Agreement.

## 3.4 Manholes (see standard drawings for additional details)

**Location –** A manhole or cleanout structure shall be located at the upstream end of a storm drain conduit and at all changes in pipe size, horizontal alignment, slope, and material of the storm drain. City owned manholes shall be located within the pavement and ROW, unless otherwise directed by the City Engineer. The edge of the concrete collar must either be located at least 3 feet away from the edge of asphalt or gutter to allow for paving between the manhole and edge of pavement, or the collar must be poured adjacent to (but separate from) the curb.

**Spacing** – Unless otherwise approved by the City Engineer, the maximum horizontal distance between manholes is 400 feet.

**Size** – The minimum manhole size is 48-inches in diameter and shall be sized to meet manufactures recommendations based on pipe penetration size and configuration.

**Configuration –** Either cast-in-place or precast concrete manhole structures or cleanouts can be used as junction structures. These structures shall have formed concrete troughs that match the diameter of the inlet and outlet pipes to reduce hydraulic losses. The troughs should be formed at least to the springline of the outlet pipe. For mainline pipes that are 48-inches in diameter or larger, a precast tee manhole may be used as a cleanout structure if approved by the City Engineer.

## 3.5 Inlets (see standard drawings for additional details)

**Location –** Storm drain catch basins or inlets shall generally be located on both sides of the street and in road sag locations (See Section 3.6 for Road Sags).

**Configuration** – All inlets shall have a curb-back opening and bicycle safe grate with a 12-inch minimum sump depth.

**Road Sags –** At a minimum, double inlets space four feet apart shall be installed in City-approved road sag locations (See Section 3.6 for Road Sags).

**Spacing** – Inlet spacing and configuration shall be designed to meet the design spread requirements from the FHA Urban Drainage Design Manual as shown in Table 3-1. As a general rule, inlets shall be installed at intervals not to exceed 400 feet. Inlet spacing shall be addressed and documented during the design phase and shall account for longitudinal road slope.

**Table 3-1**
**Allowable Gutter Spread for Design of Streets**

| Street Classification | Design Frequency | Design Gutter Spread |
|---|---|---|
| High Volume | | |
| < 45 MPH | 10-Year | Shoulder plus 3 feet |
| > 45 MPH | 10-Year | Shoulder |
| Sag Point | 50-Year | Shoulder plus 3 feet |
| Collector | | |
| < 45 MPH | 10-Year | ½ Driving Lane |
| > 45 MPH | 10-Year | Shoulder |
| Sag Point | 10-Year | ½ Driving Lane |
| Local Streets | | |
| Low ADT | 5-Year | ½ Driving Lane |
| High ADT | 10-Year | ½ Driving Lane |
| Sag Point | 10-Year | ½ Driving Lane |

## 3.6 Hydraulic Capacity of Streets

**Design Spread –** Storm drain facilities in streets shall be designed to meet the design gutter spread indicated in section 3.5.

**100-Year Flow Conveyance –** Streets shall be designed to safely convey runoff from a 100-year design storm (see Section 4.1 for design storm parameters) to adequate downstream conveyance facilities. The 100-year design storm runoff in streets should be contained within street right-of-way. Provisions shall be made, such as flood easements, to allow runoff within the street to enter downstream detention basins, to allow runoff to be conveyed out of road sags or other similar situations.

**Cul-De-Sacs and Dead-End Streets –** Downhill-sloping cul-de-sacs and dead ends will not be allowed unless specifically approved by the City Engineer. If they are allowed, means to safely convey runoff from extreme storm events across the site must be provided with appropriate drainage easements.

**Tee Intersections –** Special consideration, such as higher curbs, additional inlets or flood easements, shall be given to downhill tee intersections to ensure that flooding will not occur outside of the right-of-way during a major storm event.

**Road Sags** – Sags in roadways will not be allowed unless specifically approved by the City Engineer. If a road sag is absolutely necessary, it will be required to obtain a drainage easement and to construct

drainage system improvements that will provide safe drainage and minimum flow conveyance of runoff associated with the 50-year design storm. Depending on the site and potential impacts to property or infrastructure, the City Engineer may require that capacities of the storm drain catch basins and conveyance pipeline be sized to safely convey runoff from a 100-year design storm.

## 3.7 Outlet Structures from Closed Conduit to Open System

**Location –** An outlet structure shall be installed on the downstream end of all closed conduits at the point where the storm water will be discharged into an open channel.

**Grating** – The outlet structure shall have vertical bars only with an opening spacing of 4 inches and shall be hinged at the top.

**Riprap Design –** Rock riprap shall be installed downstream of outlet structures based on discharge velocity and receiving stream. The minimum thickness of riprap shall be 1.5 X $D_{50}$. Riprap design calculations shall be submitted to the City Engineer for review.

## 3.8 Open Channels

The use of open channels to convey storm water runoff must be approved by the City Engineer. If the use of an open channel is approved, the open channel shall be designed to meeting the following criteria:

**Velocity –** Open channel design shall be dictated by the maximum permissible velocity of the channel material/lining. Table 3-2 shows the maximum permissible velocity for the most common channel material/lining.

**Table 3-2**
**Maximum Permissible Mean Channel Velocities**
**(From the Clark County Hydrologic Criteria and Drainage Design Manual)**

| Material/Lining | Maximum Permissible Mean Channel Velocity (feet per second) |
|---|---|
| Natural and Improved Unlined Channels | |
| Fine Sand, Colloidal | 1.5 |
| Fine Gravel | 2.5 |
| Coarse Gravel, Noncolloidal | 4.0 |
| Cobbles | 5.0 |
| Fully Lined Channels | |
| Unreinforced Vegetation | 5.0 |
| Loose Riprap | 10.0 |
| Grouted Riprap | 15.0 |

**Longitudinal Channel Slope –** Channel slope is dictated by maximum permissible velocity requirements. Where the natural topography is steeper than desirable, drop structures shall be utilized to limit design velocities.

**Easements –** Any necessary easements or agreements shall be finalized and recorded prior to approval.

**Channel Cross Section** – Channels shall be constructed with a trapezoidal shape. Unless otherwise approved, channel side slopes shall not be designed steeper than 3 horizontal to 1 vertical (3H:1V).

**Maintenance** – Channels shall be designed to be low maintenance and to minimize erosion potential. All open channels shall be accessible by vehicles/equipment for maintenance.

**Freeboard** – The open channel shall have a minimum of 1 foot of freeboard above the design flow water surface elevations.

**Depth** – Unless otherwise approved, the maximum allowable design depth of flow is 4 feet.

**Bottom Width –** Unless otherwise approved, the minimum bottom width shall be 4 feet.

**Low Flow Channel –** All grass lined channels shall be constructed with a low flow channel. The low flow channel shall be lined with concrete, or other material approved by the City Engineer.

**Levees –** Levees or berms along the channel will only be allowed to meet freeboard requirements. Levees or berms shall not be designed to impound storm water.

**Channel Transitions and Bends** – All channel transitions and horizontal bends in the alignment shall be designed to be gradual enough so as to not induce erosion or have adequate bank stabilization measures installed.

**Other Agency Permits** – Most of the major open channels, streams and natural drainages are under the jurisdiction of various other agencies. If a planned development proposes to modify or connect to Davis County controlled items, a Davis County Flood Control Permit must be obtained by the Owner. If any construction work is performed within 30 feet of an open channel or stream for which the State of Utah has jurisdiction, a State Stream Alteration Permit must be obtained by the Owner. If a proposed development impacts a jurisdictional wetland, the Owner must obtain a permit from the U.S. Army Corps of Engineers prior to disturbing any wetlands. Contact the Division of Water Rights office (phone 801-538-7240) and Davis County Public Works (801-444-2230) to find out if your proposed project will require permits. Be aware that there is a fee and review period associated with the applications.

## 3.9 Detention Basins

All detention basins serving a development shall be designed according to the criteria listed below. Design criteria for regional detention basins, or detention facilities that receive storm water runoff from multiple developments, shall be defined by the City Engineer on a case-by-case basis.

**Release Rate –** The post-construction release rate shall be equal to or less than the preconstruction discharge. Under no circumstances shall the post-development discharge be greater than 0.2 cfs per acre for a 100-year design storm.

**Volume –** Detention basins shall be sized to detain the 10-year cloudburst design storm as well as a 50-year 24-hour storm event to meet the release rate requirement. The volume requirements shall not be reduced based on evaporation or infiltration due to percolation.

**Freeboard** – A minimum of 1 foot of freeboard for the 10-year cloudburst design storm as well as a 50-year 24-hour storm event shall be provided.

**Emergency Spillway/Outlet –** An outlet shall be designed to safely discharge runoff during the 100-year storm event.

**Detention Time –** The detention time should be as short as possible; typically limited to a maximum of 18 hours.

**Water Depth –** The maximum water depth shall not exceed 3 feet for a detention basin in a residential area and 1 foot for a commercial/industrial area, including parking lots.

**Side Slope –** Detention basin side slopes shall be 3H:1V or flatter unless otherwise approved.

**Inlet Design –** A concrete apron must be installed at entrance and exit structures to minimize erosion and accommodate maintenance.

**Outlet Design –** All detention basins 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 and to protect the public. The orifice restriction should be designed to minimize clogging from debris.

**Dewatering –** Detention basins shall include provisions for a concrete low flow channel and/or a perforated pipe under-drain system to ensure positive dewatering of the basin.

**Location –** Detention basins should be located in a manner to minimize their impact on the site and to ensure public safety. Detention basins shall be located at least 40 feet from any structure with a foundation. All detention basins shall have vehicular access for maintenance. All public detention basins shall be accessible from a public ROW or a dedicated easement.

**Ownership and Maintenance –** Unless the detention facility is owned by the City, the property owner or home-owners association shall own and maintain the detention facility including landscaping. No alterations to the pond shall be permitted without the approval of the City Engineer. Means of vehicular access to the outlet structure and the bottom of the facility shall be provided.

**Landscape** – All facilities shall be landscaped in accordance with City Standards.

**Groundwater –** Detention Basins will not be allowed in areas with high groundwater as determined by the City Engineer. See Section 3.13for development in sensitive lands. As a general rule, the bottom of a storm water detention facility shall be at least 4 feet above the seasonal high water table.

## 3.10 Retention Basins

Regional retention facilities are discouraged unless it can be shown that there are no feasible outlets to discharge water to storm water conveyance systems. Section 3.1.1 of the City's LID manual touches

extensively on retention basins. Retention facilities for onsite drainage must be designed to meet the criteria in the City's LID Manual, the MS4 Permit and the following minimum criteria:

**Volume –** Retention basins shall be sized to retain onsite runoff from the 80$^{th}$ percentile storm and the 100-year 24 hour storm event. The City's 80$^{th}$ percentile storm depth is identified in section 2.2.6 of the City's LID manual.

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

**Emergency Outlet or Spillway –** An emergency outlet shall be designed to safely discharge the peak runoff from storm events that exceed the 100-year design storm.

**Retention Time –** The retention basin shall be designed to drain completely within 48 hours of the end of the storm event. Retention time must be addressed during the design process and retention parameters must be approved by the City Engineer.

**Water Depth –** The maximum water depth shall not exceed 3 feet for a retention basin in a residential area and 1 foot for a commercial/industrial area, including parking lots.

**Side Slope –** Retention basin side slope shall be 3H:1V or flatter unless otherwise approved.

**Location –** Retention basins should be located so as to minimize their impact on the site and to maximize public safety. Retention basins shall be located at least 30 feet from any structure with a foundation. All retention basins shall have vehicular access for maintenance. All public retention basins shall be accessible from a public ROW or a dedicated easement.

**Ownership and Maintenance –** Unless the detention facility is owned by the City, the property owner or home-owners association shall own and maintain the retention facility, including landscaping. No alterations to the pond shall be permitted without the approval of the City Engineer. Means of vehicular access to the facility shall be provided.

**Landscape** – All facilities shall be landscaped in accordance with City Standards.

**Groundwater –** Retention Basins will not be allowed in areas of high groundwater as determined by the City Engineer. See Section 3.12 for development in sensitive lands.

## 3.11 Storm Drain Sumps (see standard drawings for additional details)

A storm drain sump is a facility that allows storm water runoff to percolate into the ground. The use of storm drain sumps must be approved by the City Engineer. If the use of a storm drain sump is approved, it must meet the requirements within section 3.1 of the City's LID manual following criteria:

**Groundwater –** The bottom of the storm drain sump is four feet above the estimated spring-time ground water elevation. Storm drain sumps will not be allowed in areas with high groundwater, including, but not limited to, areas of high groundwater as determined by the City Engineer. See Section 3.13 for development is sensitive lands.

**Pretreatment –** The storm drain sump is fitted with a storm water pre-treatment device, located in a separate inlet structure.

**Filter Fabric –** The storm drain sump must be wrapped in filter fabric.

**Percolation rate** –The design percolation rate must be based on a site-specific analysis.

**Location –** Storm drain sumps may not be located in the following areas:

- Within 100 feet of a culinary water well
- Within 100 feet of a surface water feature
- Within 25 feet of a structure foundation
- Areas prone to landslides
- Areas containing soils with very slow percolation rates
- Over fill material

**State Inventory** – Inventory form must be completed by the Owner and sent to the State of Utah and Kaysville City. The form can be downloaded from:

www.waterquality.utah.gov/UIC/UICForms/ClassVFrms/StormWaterEntirePkg.pdf

## 3.12 Culverts

Culverts are conduits that convey runoff from an open channel in a closed conduit under a road or parcel.

**General –** Culverts shall be sized to convey the computed design storm runoff (see Section 4.1 for design storm parameters) without runoff overtopping the road or leaving the channel. The minimum allowable culvert diameter is 24 inches.

**Design Load –** The existing and future street design shall be used to develop the design load and minimum cover. HL-93 loading shall be used if no other loading information is available.

**Headwall –** Improvements shall be installed at entrance and exit structures to minimize erosion and accommodate maintenance. Culverts that are 36 inches in diameter or larger, or that exceed an area of 7 square feet, shall have a headwall with wing walls.

**Debris –** 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.

**Headwater – Size the culvert such that the headwater at the culvert inlet:**

- **Is no more than 2 feet above the top inside of pipe or box**
- **Is no less than 1 foot below the edge of the paved roadway surface**

**Backwater** – Backwater surface computations upstream of culverts shall be performed and shown to be non-damaging to upstream properties. If the culvert is on a stream mapped by FEMA, provide a letter of No-Rise or a CLOMR, as directed by the City.

**Configuration –** Culverts shall be designed to have a single opening. Multiple side-by-side culverts are susceptible to clogging.

## 3.13 Sensitive Lands

Requirements for construction of developments on sensitive lands are highlighted below. Sensitive lands are defined as lands that include steep slopes, wetlands, shallow water table, or floodplains.

**Hillside Development Standards** – Land having a slope greater than 8% is defined as "steep slope", and a geologic study report shall be submitted for development on lands steeper than 8%. No development will be permitted on land where the slope is steeper than 30%.

**Shallow Water Table and Wetland Area Development Standards** – The areas of shallow water table are determined by the City Engineer.

**Floodplain Development Standards** – Development located in or near floodplains shall meet the requirements of the National Flood Insurance Program and conform to Title 8-5-15 of the City Ordinance's. For all developments that cover over 5 acres or have 50 or more lots, a developer shall perform a study to estimate the 100-year flood elevations if those elevations are not defined on the FEMA Flood Insurance Rate Map. Construction of habitable structures will not be allowed in the 100-year special flood hazard area unless all criteria for the National Flood Insurance Program and Title 8-5-15 of City Code have been satisfied.

## 3.14 Mountain Drainages

Requirements for developments that are adjacent to a mountain drainage or historically has received storm runoff or snowmelt runoff from mountain drainages are provided below.

- If runoff from a mountain watershed is to be diverted and conveyed in a piped storm drain system, sediment and debris removal shall be required upstream of the piped system. The City Engineer shall determine the distinction between a culvert and a piped system.
- If a trash rack or screen is used for debris removal it shall be designed for a minimum of 50 percent plugging and shall allow for easy removal of debris by maintenance personnel. Provide adequate access for equipment to maintain sediment/debris facilities. Vertical slats are preferred for ease of maintenance, with slat spacing no closer than 4 inches. Rack sizing should be at least 10 to 15 times the area of the inlet pipe. Rack or screen angle should be between 2H:1V and 1H:1V. Rack efficacy is decreased if water is able to flow around the sides of the rack.
- If a new development will be located within one hundred feet of a major drainage channel under the jurisdiction of Davis County, it shall comply with all Davis County Flood Control requirements and be approved by Davis County.

# 4. Hydrologic Analysis

## 4.1 Design Storm

**Rainfall Depth and Intensity –** Rainfall depth and intensity shall be obtained from the National Weather Service's Precipitation Frequency Data Server (http://hdsc.nws.noaa.gov/hdsc/pfds/sa/ut_pfds.html) using the annual maximum time series option. Appendix B contains depth-duration-frequency and intensity-duration-frequency tables for various areas of the City.

**Distribution and Duration –**A 3-hour synthetic storm duration shall be used to masterplan large areas and for large developments and to design detention and retention basins.

The 3-, 6-, and 24-hour synthetic storm durations shall be used to evaluate and design storm drain storage facilities (i.e. detention and retention basins). The maximum peak volume from these three storm durations shall be used to evaluate and design the storage facility.

Storm distributions for the 3-, 6-, and 24-hour storms are provided in Appendix C.

**Frequency –** Storm drain facilities shall be designed to include major and minor conveyance facilities and storage. Minor system facilities generally include storm drain pipes and detention basins. Minor system facilities shall be designed to collect and convey storm water runoff from a storm with a return frequency of 10 years.

Major system facilities generally include streets, retention basins, streams, and culverts. Major system facilities shall be designed to collect and convey storm water runoff from a storm with a return frequency of 100 years.

## 4.2 Drainage Basin Characterization

**Soil Classification –** Soil classification shall be estimated from site specific analysis or from a soil survey, such as the NRCS Web Soil Survey (WSS). This map, and its associated data can be found at https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

**Land Use –** Existing land use shall be obtained from site survey or analysis of current aerial photography. Future land use shall be estimated based on proposed development or from the City General Plan if future development plans are unknown.

**Physical Parameters –** Physical parameters such as drainage basin area, length and slope shall be obtained using a current topographic map and existing storm drain facilities.

## 4.3 Runoff Computational Methods

**Acceptable Methods –** There are three acceptable standard methods for estimating the peak runoff: the Rational Method, TR-55 and HEC-HMS, as described below. TR-55 and HEC-HMS can also be used to estimate runoff volume for storage facility sizing. See Section 3 for design criteria.

Other methods for estimating peak runoff and runoff volume must first be approved by the Public Works Director, or his/her designee. Table 4-1 indicates the applicable total drainage area for each modeling approach.

**Table 4-1**
**Drainage Models and Applicable Total Drainage Area**

| Drainage Model | Maximum Drainage Area |
|---|---|
| Rational Method | < 200 Acres |
| TR-55 | < 2000 Acres for Urban Areas |
| HEC-HMS | Any |

**Rational Method**

i. **Runoff Equation –** Q = CiA where,
**Q –** Instantaneous Peak Runoff
**C –** Runoff Coefficient (see Table 4.2)
**i –** Intensity (inches/hour)
**A –** Area (acres)

ii. **Time of Concentration –** Time of concentration shall be calculated using the method found in SCS Technical Release 55 (SCS, 1986). Appendix E contains a sample worksheet (Worksheet 3) from that publication, which can be used to calculate the time of concentration. The minimum allowable time of concentration to be used in runoff calculations shall be 10 minutes.

iii. **Rainfall Intensity –** The rainfall intensity shall be selected from the intensify-duration-frequency curve in Appendix B. The duration is assumed to equal the time of concentration. The design storm frequency can be obtained from Section 4.1.

iv. **Runoff Coefficient –** Table 4-2 shall be used to estimate runoff coefficients when using the Rational Formula.

Table 4-2
Rational Method Runoff Coefficients[1]

| Type of Drainage Area | Runoff Coefficient, C* |
|---|---|
| Business: | |
| Downtown areas | 0.70 – 0.95 |
| Neighborhood areas | 0.50 – 0.70 |
| Residential: | |
| Single-family areas | 0.30 - 0.50 |
| Multi-units, detached | 0.40 - 0.60 |
| Multi-units, attached | 0.60 – 0.75 |
| Suburban | 0.25 – 0.40 |
| Apartment dwelling areas | 0.50 – 0.70 |
| Industrial: | |
| Light areas | 0.50 – 0.80 |
| Heavy areas | 0.60 – 0.90 |
| Parks, cemeteries | 0.10 - 0.25 |
| Playgrounds | 0.20 – 0.35 |

| Type of Drainage Area | Runoff Coefficient, C* |
|---|---|
| Railroad yard areas | 0.20 – 0.35 |
| Unimproved areas | 0.10 – 0.30 |
| Lawns, sandy soil: | |
| Flat, 2% | 0.05 - 0.10 |
| Average, 2 – 7% | 0.10 – 0.15 |
| Steep, 7% | 0.15 – 0.20 |
| Lawns, heavy soil: | |
| Flat, 2% | 0.13 – 0.17 |
| Average, 2 – 7% | 0.18 – 0.22 |
| Steep, 7% | 0.25 – 0.35 |
| Pavement: | |
| Asphaltic and Concrete | 0.70 – 0.95 |
| Brick | 0.75 – 0.85 |
| Roofs | 0.75 – 0.95 |

*Higher values are usually appropriate for steeply sloped areas and longer return periods because infiltration and other losses have a proportionally smaller effect on runoff in these cases.

v. **Runoff Computations.** Runoff computations for directly connected impervious areas shall be performed separately from areas that have pervious surfaces.

## SCS TR-55

- The 24-hour SCS Type II storm distribution shall be used (see Appendix C) if the TR-55 method is used.
- The storm depths shall be selected from the depth-duration-frequency curve in Appendix B (see Section 4.1).
- Table 2-2a-d in TR-55 shall be used to estimate the runoff Curve Number (CN). Table 2-2a-d and associated information is located in Appendix E. See below for note regarding modeling impervious area.

**Note:** A composite SCS curve number may be used to estimate runoff from areas with only pervious surfaces. These composite curve numbers represent all of the different soil groups and land use combinations (such as lawn and xeriscaping) within the subbasin for the PERVIOUS areas only. When modeling a developed subbasin to estimate storm water runoff, the pervious and impervious areas must be modelled using separate subbasins. Some methods, including TR-55, suggest that a composite can be selected that will account for impervious area. However, those

methods tend to underestimate the runoff potential for the impervious areas and should not be used.

TR-55 Worksheet 3: Time of Concentration, and TR-55 Worksheet 4: Graphical Peak Discharge Method, are included in Appendix E.

## HEC-HMS

There are four main input categories in HEC-HMS which are: design storm, loss method, transform method and routing method. The design storms shall be obtained using the procedure described below. For the loss, transform and routing methods, there are multiple options within HEC-RAS than can be used. Below is a description of the preferred method. Other methods may be allowed, but must first be approved by the Public Works Director, or his/her designee.

**v.** **Design Storm –** The design storm shall be developed in accordance with Section 4.1

**vi.** **Loss Method –** The SCS Curve Number loss method shall be used. The primary input parameter for this method is the Curve Number. As described below, for developed areas, the percent impervious is also entered. The initial abstraction is typically left blank. The program will calculate the initial abstraction based on the Curve Number using the equation documented in TR-55.

**vii.** **Curve Number –** Table2-2a-d in TR-55 shall be used to estimate the pervious runoff Curve Number (CN). Table 2-2a-d and associated information is located in Appendix E. The categories most often used to estimate the pervious CN are highlighted.

**viii.** **Soil Classification –** In order to estimate the CN, the hydrologic soil group classification for the drainage basin must be determined. The hydrologic soil group shall be obtained from the NRCS SSURGO dataset. SSURGO data can be obtained from the Soil Data Mart (http://soildatamart.nrcs.usda.gov/). A figure showing the hydrologic soil groups for Kaysville City is contained in Appendix D.

**ix.** **Modeling Impervious Areas –** The directly connected impervious area (DCIA) should be used when modeling developed areas. The DCIA should be measured from aerials for existing developments, or should be obtained from the design plans for a proposed development.

**x.** **Transform Method –** The SCS Unit Hydrograph transform method shall be used. This method requires the input of a single variable: lag time.

**a.** **Lag Time for Natural Watersheds –** The Corps of Engineers version of Snyder's equation shall be used to calculate the lag time for natural watersheds (USBR, 1989) as shown below:

1. $$\text{Lag Time} = C_t \left(\frac{LL_{ca}}{S^{0.5}}\right)^{0.33}$$

Where:

$C_t$ = Constant between 1.3 and 2.2. 1.6 is typical for the Kaysville City area
L = Length, in miles, of the longest watercourse
$L_{ca}$ = Length, in miles, along L to the centred of the drainage basin
S = Overall drainage basin slope, in feet/mile.

**b. Lag Time of Urban Areas -** The lag time for small urban areas is assumed to be equal the time of concentration. Appendix E contains a sample worksheet (Worksheet 3) from TR-55 that can be used to calculate the time of concentration.

**i. Routing Method -** The Muskingum-Cunge method shall be used for routing runoff hydrographs. This method uses "reaches" to connect subbasins. Examples of reaches in the real world include open channels and pipes. The method requires that the follow parameters be input:

**Length –** Total length of the reach element.

**Slope –** Average slope for the entire reach.

**Invert –** Optional. Typically not used.

**Cross Section Shape** – Multiple cross sections are available to select from. Depending on the cross section chosen, additional information is required (i.e. diameter, side slope).

**Manning's "n" –** Average value for the entire reach. Typical values for Manning's "n" used for storm drain conveyance facilities area shown in Table 4-3.

Table 4-3
Values of Manning's Coefficient (n) for Channels and Pipes

| Conduit Material | Manning's n* |
|---|---|
| Plastic pipe | 0.011 – 0.015 |
| Steel/cast iron pipe | 0.012 – 0.015 |
| Concrete pipe | 0.013 – 0.015 |
| Corrugated metal pipe | 0.012 – 0.026 |
| Concrete-lined channel | 0.013 – 0.020 |
| Excavated or Dredge Channels | |
| Earth channel – straight and uniform | 0.020 – 0.030 |
| Earth channel – winding, fairly uniform | 0.025 – 0.040 |
| Rock | 0.030 – 0.045 |
| Unmaintained | 0.050 – 0.140 |
| Natural Channel | |
| Fairly regular section | 0.030 – 0.070 |
| Irregular section with pools | 0.040 – 0.100 |

* Lower values are usually for well-constructed and maintained (smoother) pipes and channels.

## Other Models

Other computer programs can be used to model the rainfall-runoff process that use similar hydrologic modeling methods, but care should be taken to make sure modeling methods are used correctly. Examples of similar programs include StormCAD, SWMM-5 and StormNET. The City Engineer must approve the use of all computer programs and methods that are not described above.

## 4.4 Model Calibration

Peak runoff records are typically not available for local drainage studies. However, an effort should be made to ensure that rainfall runoff analysis results for local drainage studies are consistent and compatible with the City's Storm Drain Master Plan and other pertinent local drainage studies.

It should be noted that the term "calibration" in this context refers to the process of adjusting parameters to achieve results consistent with available reference information, rather than adjusting for actual stream flow observations from the study area. Multiple hydrologic methods should be evaluated and compared to identify reasonable runoff computation results.

These methods may include the Rational Formula, the SCS Curve Number Method, the SCS Pervious CN Method, and the Constant and Initial Loss Method. Regional regression equations may also be used to evaluate results depending on the basin size.

**Calibration for Natural Watersheds**

Results from hydrologic models should be compared to:

- Actual flow records for modeled drainage channels
- Stream flow records from hydrologically similar drainages in the vicinity of the study
- Regional stream flow data (in the event that stream flow records for the local area are not available).

**Calibration for Urban Areas**

For small urban (developed) areas, the USGS published regression equations that can be used to "calibrate" hydrologic models (see Peak-flow Characteristics of Small Urban Drainages Along the Wasatch Front, Utah). The range of basin characteristics used to develop the regression equations are shown in Table 4-4.

**Table 4-4**
**Range of Basin Characteristics Used To Develop Regression Equations for Small Urban Drainages**

| Basin Characteristic | Unit | Range in Values |
|---|---|---|
| Drainage Area (DA) | $mi^2$ | 0.085 – 0.87 |
| Basin Slope (BS) | Percent | 0.3 – 15 |
| Effective Impervious Area (EIA) | Percent | 22 – 57 |

The equations shown in Table 4-5 are only applicable to drainage basins that meet the range of values shown above.

**Table 4-5**
**Regression Equations for Peak Flows For Small Urban Drainages**

| Design Storm Recurrence Interval (Years) | Equations | Average Standard Error of Estimate (Percent) |
|---|---|---|
| 10 | $Q_{10} = 0.575\ DA^{0.285}\ BS^{0.410}\ EIA^{1.29}$ | 32 |
| 25 | $Q_{25} = 66.1\ DA^{0.093}\ BS^{0.243}$ | 33 |
| 100 | $Q_{100} = 120\ DA^{0.158}\ BS^{0.194}$ | 29 |

The unit peak runoff varies depending on slope and the drainage basin percent impervious. In general, the 10-year event for small urban drainages should be between 0.3 cfs/acre and 1.0 cfs/acre. Modification to input parameters should be considered if simulated runoff results are not within this range.

# 5. References


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EXHIBIT E

HALES ENGINEERING
innovative transportation solutions

# KAYSVILLE CITY

## CROSSWALK POLICY

OCTOBER 10, 2024

Kaysville City

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## INTRODUCTION

In recent years, there has been a push for transportation infrastructure to accommodate all users. In improving toward greater walkability, safe street crossings are needed to provide infrastructure that will better facilitate active transportation.

The purpose of this policy is to provide a framework for identification of where crosswalks should be placed as well as to aid in determining what enhancements should be applied to a crosswalk to make it safer.

If you have any questions or concerns or would like a crosswalk to be evaluated, please contact Kaysville City at 801.546.1241.

## DEFINITIONS

- **Average Daily Traffic (ADT):** The average 24-hour two-way volume, being the total vehicle volume during a stated period divided by the number of days in that period.
- **Controlled:** When a given approach to an intersection has a traffic control device (including a stop or yield sign or a traffic signal). If a minor street at an intersection has a stop sign and the major street is uncontrolled, the minor street approach(es) is considered controlled and the major street approaches are considered uncontrolled.
- **Crosswalk:** A designated part of a roadway for pedestrians to cross, extending from either edge of the roadway. Crosswalks are typically indicated by pavement markings, which might be supplemented by contrasting pavement texture, style, or color.
- **Curb Extension:** Also known as bulb-outs or neckdowns, these extend the sidewalk or curb line out into the parking lane, which reduces the effective street width and helps reduce the crossing distance and pedestrian exposure time to traffic.
- **Median:** The area between two roadways of a divided highway measured from edge of traveled way to edge of traveled way. The median excludes turn lanes or pockets.
- **Pedestrian Hybrid Beacon:** A special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk.
- **Pedestrian Refuge Island:** A raised island or median of sufficient width that is placed in the center area of a street or highway which can serve as a place of refuge for pedestrians who are attempting to cross at a midblock or intersection location. These allow pedestrians to find an adequate gap in one direction of traffic at a time to make a desired crossing maneuver.
- **Rectangular Rapid Flashing Beacons:** Devices with lights that flash with an alternating high frequency when activated to enhance conspicuity of pedestrians at the crossing to drivers.

- **Manual on Uniform Traffic Control Devices (MUTCD):** The federal document that defines standards for traffic signage, pavement markings, and traffic signals. Utah has its own supplement to the MUTCD.

## DATA COLLECTION REQUIREMENTS

The following data shall be collected when evaluating whether a crosswalk should be installed:

- Number of pedestrians crossing the road, including children, elderly, and disabled on a typical weekday (typically a Tuesday, Wednesday, or Thursday) from 7:00 a.m. to 7:00 p.m. Avoid collecting data on days with poor weather.
- Daily vehicle volumes (ADT)
- Posted speed limit of the crossing roadway that is being evaluated
- Roadway geometry, including the number of lanes
- Sight distance
- The presence of any pedestrian generators, including, but not limited to, transit centers, parks, hospitals, libraries, and senior centers
- Crash data within 250' of the study area, noting severe crashes and pedestrian-related crashes for the five most recent complete years

## INTERSECTION TRAFFIC CONTROL DEVICES

The placement of stop or yield signs should be determined by the available intersection sight distance on each approach. Chapter 9.5 of AASHTO's A policy on Geometric Design of Highways and Streets (Green Book) contains the required sight distances for uncontrolled, stop controlled, and yield controlled intersections. Refer to the following cases to determine appropriate sight distance for each of the different traffic control devices:

Case A – Intersections with no control

Case B – Intersections with stop control on the minor road

Case C – Intersections with yield control on the minor road

Case E – Intersections with all way stop control

At stop-controlled intersections, stop signs should be placed on the right-hand side of the approaches with the lower traffic volumes. All-way stop controls should only be placed at intersections where volume warrants are met as outlined in the Utah MUTCD.

## CRITERIA FOR WARRANTING A PEDESTRIAN CROSSWALK

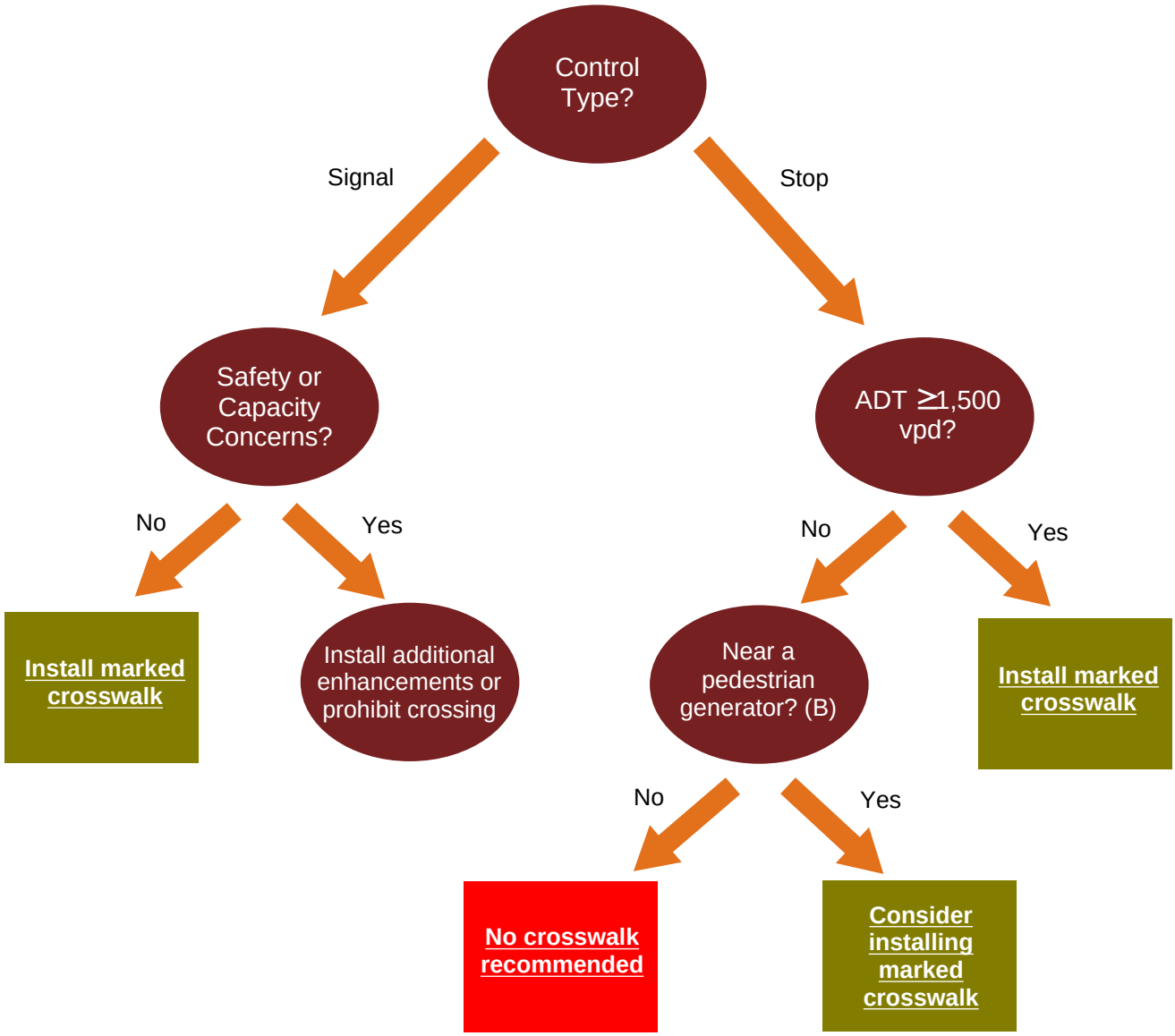
To determine whether a crosswalk is warranted, the flowchart outlined in Figure 1 shall be followed. This flowchart outlines the process for both controlled and uncontrolled locations and includes such criteria as pedestrian volumes, vehicular traffic, spacing between other crosswalks, pedestrian generators, sight distance, and safety concerns.

If there is a pattern of pedestrian-related crashes, a crosswalk should be considered with appropriate safety enhancements. If a crosswalk is not appropriate based on engineering judgement, alternative safety measures shall be implemented.

If the criteria are not met for an existing crosswalk, the existing crosswalk may be removed.

A school crossing is separate from a standard pedestrian crossing. When implementing school crosswalks, Part 7 of the Utah MUTCD shall be followed.

# Figure 1a. Pedestrian Crossing Flowchart for a Controlled Intersection Approach




**A. Minimum Pedestrian Volume Criteria:**
- 20 peds per hour in any one hour, or
- Average of 18 peds per hour in any two hours, or
- Average of 15 peds per hour in any three hours

* Schoolchildren, elderly, or disable peds count as double

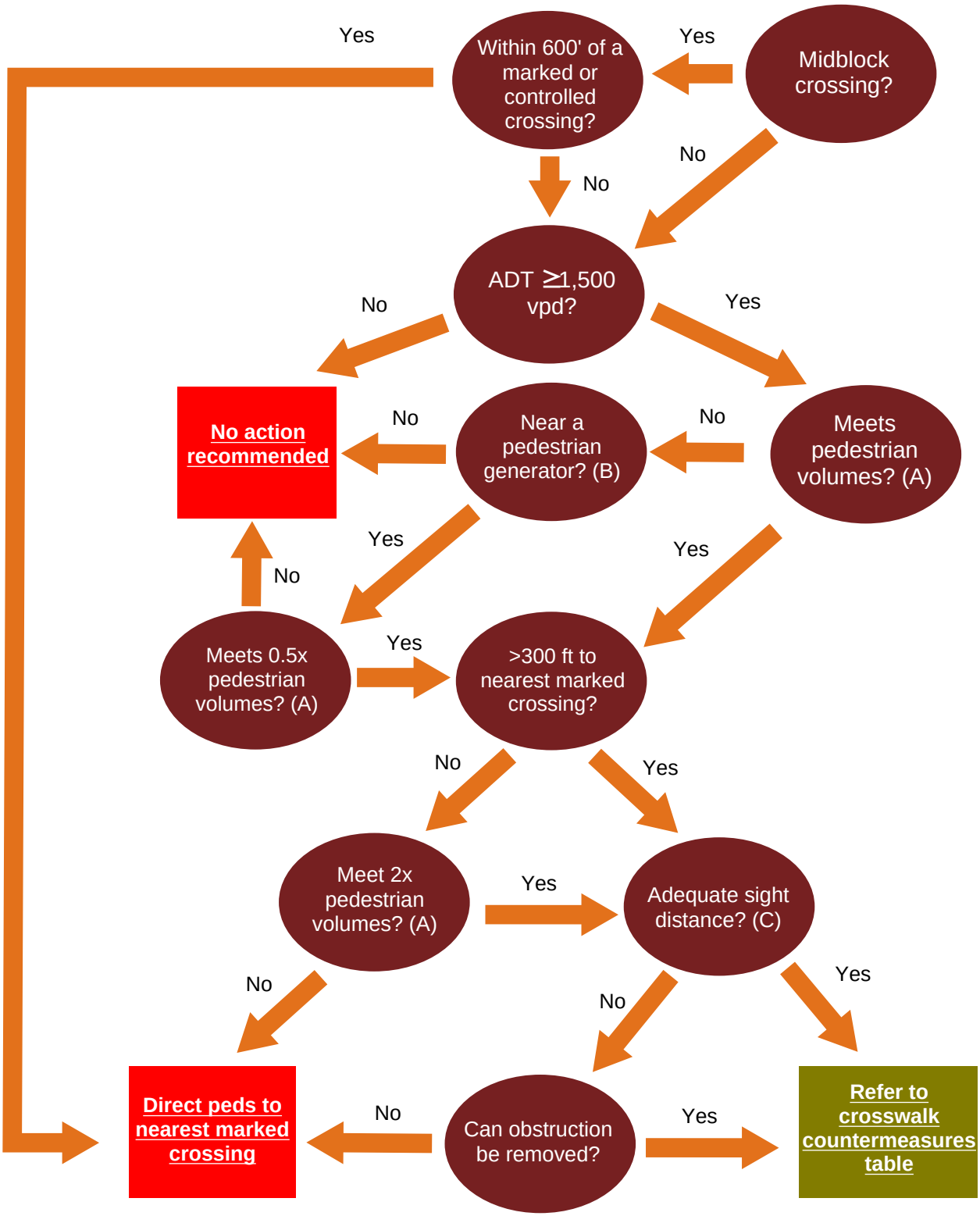
**B. Types of Generators:**
Include (but are not limited to) Transit Centers, Parks, Hospitals, Libraries, and Senior Centers

**C. Sight Distance Criteria:**
Sight distance is based on 85th percentile speed using current edition of AASHTO Green Book

Note: If a pattern of pedestrian-related crashes exists, a crosswalk should be considered with appropriate safety enhancements. If a crosswalk is not appropriate based on engineering judgment, alternative safety measures shall be implemented.

Kaysville City

# Figure 1b. Pedestrian Crossing Flowchart for an Uncontrolled Approach




**A. Minimum Pedestrian Volume Criteria:**
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Include (but are not limited to) Transit Centers, Parks, Hospitals, Libraries, and Senior Centers

**C. Sight Distance Criteria:**
Sight distance is based on 85th percentile speed using current edition of AASHTO Green Book

Note: If a pattern of pedestrian-related crashes exists, a crosswalk should be considered with appropriate safety enhancements. If a crosswalk is not appropriate based on engineering judgment, alternative safety measures shall be implemented.

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## CROSSWALK SPACING

Except where pedestrian volumes meet at least double the pedestrian volume criteria, crosswalks shall be placed at a minimum spacing of 300 feet for crossings located at intersections and 600 feet for midblock.

## PEDESTRIAN SAFETY ENHANCEMENTS

In some cases a marked crosswalk alone may be insufficient. In these circumstances, additional countermeasures may be needed to improve the safety or visibility of pedestrians crossing a crosswalk. Contained in Table 1 are some guidelines for when specific enhancements may be used. These guidelines are based on a document published by the Federal Highway Administration (FHWA) titled *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations* and have been modified slightly.

These guidelines should be applied with engineering judgment as the suitability of each enhancement will vary from location to location. The countermeasures are listed below:

1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crosswalk warning signs
2. Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
3. In-Street Pedestrian crossing sign
4. Curb Extension
5. Pedestrian refuge island
6. Rectangular Rapid-Flashing Beacon (RRFB)
7. Pedestrian Hybrid Beacon

**Table 1: Crosswalk Countermeasures**

| Roadway Configuration | Posted Speed Limit and AADT | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Vehicle AADT < 9,000 | | | Vehicle AADT 9,000 - 15,000 | | | Vehicle AADT > 15,000 | | |
| | ≤25 mph | 30 mph | ≥35 mph | ≤25 mph | 30 mph | ≥35 mph | ≤25 mph | 30 mph | ≥35 mph |
| **2 lanes** (1 lane in each direction) | ◎ 3 4 5 | ◎ 4 5 6 7 | ◎ 4 5 ⑥ ⑦ | ◎ 3 4 5 | ◎ 4 5 6 7 | ◎ 4 5 ⑥ ⑦ | ◎ 3 4 5 6 7 | ◎ 4 5 6 7 | ◎ 4 5 ⑦ |
| **3 lanes with raised median** (1 lane in each direction) | ◎ ◎ 3 4 | ◎ ◎ 4 6 7 | ◎ ◎ 4 ⑥ ⑦ | ◎ 2 3 4 6 7 | ◎ ◎ 4 ⑥ ⑦ | ◎ ◎ 4 ⑥ ⑦ | ◎ ◎ 3 4 6 7 | ◎ ◎ 4 ⑥ ⑦ | ◎ ◎ 4 ⑦ |
| **3 lanes w/o raised median** (1 lane in each direction with a two-way left-turn lane) | ◎ 2 3 4 5 6 7 | ◎ ◎ 4 5 6 7 | ◎ ◎ 4 5 ⑦ | ◎ 2 3 4 5 6 7 | ◎ ◎ 4 5 ⑥ ⑦ | ◎ ◎ 4 5 ⑦ | ◎ ◎ 3 4 5 6 7 | ◎ ◎ 4 5 ⑦ | ◎ ◎ 4 5 ⑦ |
| **4+ lanes with raised median** (2 or more lanes in each direction) | ◎ ◎ 4 6 7 | ◎ ◎ 4 6 7 | ◎ ◎ 4 ⑦ | ◎ ◎ 4 6 7 | ◎ ◎ 4 ⑥ 7 | ◎ ◎ 4 ⑦ | ◎ ◎ 4 ⑥ ⑦ | ◎ ◎ 4 ⑦ | ◎ ◎ 4 ⑦ |
| **4+ lanes w/o raised median** (2 or more lanes in each direction) | ◎ ◎ 4 5 6 7 | ◎ ◎ 4 5 6 7 | ◎ ◎ 4 ⑤ ⑦ | ◎ ◎ 4 ⑤ 6 7 | ◎ ◎ 4 ⑤ ⑥ ⑦ | ◎ ◎ 4 ⑤ ⑦ | ◎ ◎ 4 ⑤ ⑥ ⑦ | ◎ ◎ 4 ⑤ ⑦ | ◎ ◎ 4 ⑤ ⑦ |

\# Signifies that the countermeasure is a candidate treatment at a
◯ Signifies that the countermeasure should always be considered, but not mandated or required
◎ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified
The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

## CROSSWALK SIGNAGE

Crosswalk signage shall follow the guidance outlined in the latest Utah MUTCD. W11-2 shall be the standard sign at non-school crosswalks and S1-1 shall be the standard sign at school crosswalks. These signs are shown in Figure 2.

W11-2 S1-1

**Figure 2: Standard crosswalk signage**

When applicable based on the crosswalk countermeasures guidance, advance warning signs and in-street pedestrian crossing signs may be placed in addition to the standard signage.