

SECTION 4: DESIGN REQUIREMENTS

Section 4 outlines design criteria that will be required by developments and developers engineer. All submitted plans shall meet at a minimum the criteria provided and use the highest engineering practices. Developers engineer will be required to use design criteria unless otherwise specified by City Engineer.

4.01 Street Design

The standards outlined in this section can be supplemented by AASHTO, *A Policy on Geometric Design of Highways and Streets*. In cases of conflict, a determination shall be made by the City Engineer.

- 4.01.01 The vertical alignment shall be such as to minimize grade breaks along the centerline and curb lines. Allowable grade breaks shall not exceed 1% for local streets and minor collectors, and 0.5% for major collectors and arterials. Eliminate grade breaks in excess of the above criteria by means of a vertical curve of seventy feet (70') minimum for local streets and three hundred feet (300') for major arterials. All vertical curve lengths shall be dependant upon three factors: (1) Design speed, (2) algebraic differences in grades and (3) a design constant (k).
- 4.01.02 Minimum slope allowed is 0.4% (applies to all gutter grades).
- 4.01.03 Maximum longitudinal slope along centerline shall be 8% on arterial public streets; 10% on local and collector streets, unless justification is submitted and approval is granted for a steeper slope. All slopes steeper than 8% shall be designed in a curvilinear alignment in order to convey traffic from steep slopes in a safe and efficient manner.
- 4.01.04 Intersecting street angles may vary between 85 and 95 degrees.
- 4.01.05 Roadway structural section shall be determined by the Developer's soil test engineer. A soils investigation shall be submitted that includes:
 - 1. Soil borings along roadway centerline and other areas (as may be needed).
 - 2. Analysis on the overall bearing capacity of the soil.
 - 3. Recommendation for structural street cross section.
 - 4. Recommendation as to the requirements for land drains to adequately collect groundwater which could adversely affect development.
 - 5. Cut and fill slope requirements.
 - 6. Compaction requirements.
- 4.01.06 Curve data is required for all centerline and curb line curves and also for all curb returns within intersections.
- 4.01.07 Minimum centerline radius of 200' is required on all collector and higher classification streets. Local streets shall be designed with a minimum centerline radius of 100' unless otherwise waived by the City Engineer to provide a means for traffic calming. No angle points shall be allowed along centerlines except as allowed within intersections.

- 4.01.08 Minimum centerline radius for collectors and arterials shall be based on the design speed but in no case shall be less than a 200' radius.
- 4.01.09 Minimum tangent between curves with a length of twice the right-of-way width is required along the centerline of all public roads.
- 4.01.10 Temporary turnarounds shall be required on all streets which shall be extended in the future and which exceed 150 lineal feet from the centerline intersections of the closest intersecting street. Additional right-of-ways or easements necessary to construct and maintain the temporary turnaround are also required.
- 4.01.11 If possible the horizontal alignment should be straight through the intersections, but where horizontal curves cannot be avoided, the following should be observed:
 - 1. Use a curve of sufficient radius to provide adequate sight distance and minimize the need for superelevation. Under no condition should the curve radius be less than that required for the street classification.
 - 2. Do not begin or end a curve within an intersection
 - 3. Eliminate angle points in excess of 2 degrees on major or secondary roads by use of a large radius curve.
 - 4. Angle points up to 5 degrees are permissible at the intersection of two local streets.
 - 5. Curve radii and superelevation should consider the design speed for the given road.
- 4.01.12 Back of curb radii for various street intersections is shown in the table below:

| | | Right of Way Width (feet) | | | |
|---------------------------|-----|---------------------------|----|----|-----|
| | | 60 | 66 | 80 | 106 |
| Right of Way Width (feet) | 60 | 25 | 25 | 30 | 30 |
| | 66 | 25 | 30 | 30 | 30 |
| | 80 | 30 | 30 | 40 | 40 |
| | 106 | 30 | 30 | 40 | 40 |

- 4.01.13 Street Arrangement. The arrangement of streets in new developments shall make provision for the continuation of the existing streets in adjoining areas (or their proper protection where adjoining land is not subdivided, insofar as such may be deemed necessary for public use by the Herriman City Planning Commission). The street arrangement shall not cause unnecessary hardship to owners of adjoining property when they plat their own land and seek to provide convenient access to it.
 - 1. Major Streets. Arterial and collector streets shall conform to the width designated on the *Plan No. RD-01A* wherever a development falls in an area for which a Master Street Plan has been adopted. For areas where the street plan has not been completed at the time the preliminary plan is submitted to the Planning Commission, arterial or collector streets shall be provided as required by the Planning Commission.
 - 2. Local Streets. Local Streets shall have a minimum right-of-way width of 60 feet with a 66 foot right-of-way required for streets that will have

greater use as determined by the City Engineer. Cul-de-Sacs, permanent dead end streets and other local streets which provide a small loop without intersecting other streets shall also have a minimum right-of-way of 60 feet. On steep slopes an exception may be granted, however before consideration is allowed a slope analysis shall be completed. If the slope analysis shows that 50% of the lots are covered at the half way line with a cut or fill, using the 60 foot right of way and grading back to existing ground at a 3:1 slope, a lesser right of way may be reviewed and shall be approved by the City Engineer.

3. Minor Terminal Streets. Cul-de-sacs shall not be longer than 600 feet from the centerline of the adjoining street to the center of the cul-de-sac.
4. Turning Area. Where a street longer than 150 feet is designed to remain only temporarily as a dead-end street, an adequate turning area shall be provided as follows:
 - a. Dead end streets of length greater than 150 feet shall be required to have an all-weather surface turn-around with a minimum outside radius of forty-five (45) feet in residential areas and sixty (60) feet in commercial and industrial areas at the closed end.
 - b. Temporary ends of street in phased development must provide the width and all-weather surfaces but may omit curb and gutter on a turnaround.
 - c. A Temporary Turnaround Easement shall be required on the final dedication plat denoting the diameter of the turnaround as temporary until the road is extended at a future date. The dedication of the temporary turn-around must be signed by the property owner on which the turn-around is located. See *Standard Plan No. RD-03* for more information on cul-de-sacs and temporary turnarounds.
5. Intersections. The intersection of more than two streets at one point shall not be allowed. Where such occur, roundabouts or traffic circles may be appropriate. Streets shall intersect at a 90 degree angle, or as near to a right angle as practicable, but not to exceed 5 degree deviation. See *Standard Plan No. RD-02* for more information on intersection.
6. Standard Street Sections. All proposed streets, whether public or private, shall conform to the City Street Cross Section Standards as adopted by the City(See *Standard Plan No. RD-01A and RD-01B*).
7. Street Grades. Street grades over a sustained length shall not exceed the following percentages: on arterial public streets, 8%; on local and collector streets, 10%. In no event shall the street grades exceed those indicated, except where the topography makes it impracticable to keep within such grade, and where evidence, which is satisfactory to the City Engineer, is given that a lower grade is not possible. Street grades near intersections shall be designed for adequate stopping and starting by adjusting grades on both sides of the intersection. Grades of all streets

shall be a minimum of 0.4% unless specifically authorized by the City Engineer. The cross slope of the street cross section is defined on the Standard Drawings. The maximum difference in curb elevations shall not exceed 1 foot, and then only with the approval of the City Engineer.

8. Alleys. Alleys shall have a minimum width of 20 feet. Alleys may be required in the rear of business lots, but will not be accepted in residential blocks.
9. Landings. A landing is defined as the area between the through street roadway and the point at which the side street grade begins to exceed 3%. The required minimum lengths of the landings are as follows:

| | |
|----------------|----------|
| Minor arterial | 200 feet |
| Collector | 100 feet |
| Local street | 50 feet |
| Cul-de-sac | 25 feet |
10. Bridges. Design and construction of new bridges, whether essential for the overall circulation plan of the city or required only to serve a development, shall be approved in advance by the City. For bridges identified as essential structures to the City, the City may participate financially, and in the case of a bridge required to serve only a development, the developer shall pay the total cost of construction. The developer shall comply with all the conditions imposed by the City relative to the bridge location, design and construction. All bridge design shall be performed by a professional engineer as per applicable State laws.
11. Extra capacity improvements. Where developments install public improvements which benefit other properties and which exceed the minimum size required of his/her development, the Developer may enter into a pay back agreement with Herriman City. Protection or holding strips are no longer acceptable. Protection strips may be allowed only at the discretion of the Mayor, after recommendation of the Planning Commission, and in accordance with all city ordinances. An agreement, approved by the City Attorney, between the developer and Herriman City shall be executed. The duration of said agreement shall not exceed 10 years. The developer has a 10-year period in which to receive reimbursement from the affected properties. After expiration of the 10-year period or payment by adjacent property owner of the applicable consideration, the agreement shall be considered fulfilled. All property owned by the Developer shall be included on both the preliminary and final plan.
12. Names and Numbers. Names of new streets shall not duplicate existing or platted street names unless a new street is a continuation of, or in the alignment with, the existing or platted street. House number shall be assigned in accordance with the house numbering system now 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 or are not easily aligned by their curved nature. Following approval of

street names by the county, all street names and house numbers shall be reviewed and approved by the City. No lot address shall end in a zero or five, this designation is given to streets.

13. Street Grading and Surfacing. All public streets shall be graded and surfaced in accordance with the standards and specifications of Herriman City.
14. Driveway Approaches. All driveway approaches shall meet the specifications in the table below:

| | Residential Driveways | Commercial/Industrial Driveways |
|--------------------------------------|--|--|
| Minimum Width | 10 feet | 24 feet |
| Maximum Width | 35 feet or 50% of lot frontage whichever is less | 36 feet |
| Minimum Concrete Thickness | 6 inches | 8 inches |
| Minimum Base Course Thickness | 6 inches | 8 inches |

15. Driveway Location. Driveways for all uses, except single-family homes, shall not be closer than eight feet (8') to an adjacent interior property line and shall be set back a minimum of eighty feet (80') from the intersection of two (2) arterial streets and fifty feet (50') from any other street classification intersection.
16. Driveway Offsets. All single family residential driveways shall be offset from other driveways by no less than twice the flare width as per APWA Standard Plans. All others shall have a minimum separation as shown in the table and figure below.

| FUNCTIONAL CLASSIFICATION | MINIMUM DRIVEWAY SPACING (feet) | | |
|--|---|----------------------|---------------------|
| | UPSTREAM AND DOWNSTREAM | OPPOSING UPSTREAM | OPPOSING DOWNSTREAM |
| ARTERIAL/FREEWAY INTERCHANGE AREAS | STATE OF UTAH HIGHWAY ACCESS MANAGEMENT STANDARDS APPLY | | |
| MAJOR COLLECTOR | 200 | 175 | 125 |
| MINOR COLLECTOR | 150 | 125 | 125 |
| LOCAL | SEE DRIVEWAY OFFSETS | SEE DRIVEWAY OFFSETS | 125 |
| NOTES: | | | |
| <ol style="list-style-type: none"> AS DETERMINED BY THE CITY ENGINEER, ENGINEERING JUDGMENT SHALL OVERRIDE THE RECOMMENDED DIMENSIONS SET FORTH IN THIS TABLE IF WARRANTED BY SPECIFIC TRAFFIC CONDITIONS. DRIVEWAY SPACING IS MEASURED AS SHOWN IN FIGURE 1. CORNER CLEARANCE REQUIREMENTS FOR ACCESS POINTS SHOULD MEET OR EXCEED THE MINIMUM DRIVEWAY SPACING REQUIREMENTS. FOR CORNER PROPERTIES, ACCESS TO PUBLIC STREETS SHOULD BE PROVIDED FROM THE LESSER (LOWEST FUNCTIONAL CLASSIFICATION) STREET. DRIVEWAYS IN RIGHT-TURN LANE TRANSITION AREAS SHOULD BE DISCOURAGED. | | | |
| | | | |
| FIGURE 1: MEASUREMENTS FOR MINIMUM ACCESS SPACING STANDARDS | | | |

- Common Driveways. Driveways along the property lines may be installed for common use of both adjacent properties only upon approval by the City Engineer and guaranteed by a recorded access agreement. Such driveway width shall be limited to the maximum allowable individual driveway width. Common driveway width may be extended by up to 10' for Commercial and Industrial zones.
- Slopes. All cut and fill slopes shall be at a maximum 3:1 unless otherwise justified by a detailed soils investigation and approved by the City Engineer.
- Street Trees or Shrubs. Street trees or shrubs are required along all streets within Herriman City. Tree and shrub varieties shall be approved by Herriman City. Spacing shall provide for at least one tree per lot with typical spacing of 40 feet on center. Shrub spacing shall be

as directed by Herriman City. All landscaping shall be provided with a pressurized irrigation system and shall be connected to the adjacent lot's water system. Upon completion of the 18-month warranty period the street trees or shrubs become property of Herriman City. The adjacent property owner is required to maintain the trees or shrubs according to applicable City ordinances.

20. **Monuments.** Permanent survey monuments shall be accurately set and established at the intersections of centerlines of streets within the development and intersections with centerlines of existing streets and the beginning and ends of curves on centerlines or points of interest or tangents. All permanent survey monuments shall remain in place, or be reset at the Developer's expense, when approved by the City Engineer. Monuments shall be of a type specified in the 2002 or current edition of the APWA. Plans, and all development plans shall be tied to a section corner or monument of record, as established by the Salt Lake County Surveyor.
21. **Sidewalk Ramps.** All sidewalk ramps shall be constructed to comply to a minimum standard as established by: The Americans with Disabilities Act (ADA), Americans with Disabilities Accessibility Guidelines (ADAAG), U.S. Federal Highway Administration, and the Manual on Uniform Traffic Control Devices (MUTCD). Current APWA Plan No. 235 and 236 will be used as a minimum guide for design of sidewalk ramps and construction inspection with the following exceptions:
 - a. **Detectable Warnings:** Detectable Warnings are to be installed to provide a distinctive surface of truncated domes detectable by cane or underfoot to alert people with vision impairment of the transition to vehicular ways. Truncated dome panels shall be installed at minimum of 4'-0" wide and a minimum depth of 2'-0". The panel shall be located so that the edge nearest the curb line (front of curb) or potential hazard is 6 to 8 inches from the curb line. All installed panels shall be a pewter, or dark gray color.
 - b. **Detailed Design:** At the discretion of the City, each sidewalk ramp may require detail engineering design. When areas throughout the City appear to be difficult to comply with ADAAG and may be difficult for the contractor to achieve construction requirements, the City will require engineering design to be performed and submitted to the City for ramp approval.
22. **Asphalt Design.** All developments shall submit a geotechnical report for each project to design the asphalt thickness. A minimum standard of 4 inches of asphalt on 8 inches of road base shall be used. All asphalt shall be designed in accordance with the Herriman City mix design.
23. **Concrete Chip and Crack Standard.**
 - a. A section for sidewalk, curb and gutter is defined by existing joints. A sidewalk ramp is considered a section.

- b. All concrete sidewalk, sidewalk ramps, and curb and gutter shall be removed and reconstructed if two or more cracks extend across the entire structure in any direction within a section.
- c. All concrete sidewalk, sidewalk ramps, and curb and gutter shall be repaired for chips larger than ¾” in diameter. If more than five chips occur within one section of concrete entire section shall be replaced.
- d. All concrete sidewalk, sidewalk ramps, and curb and gutter shall be removed and reconstructed if a chip larger than ¾” in diameter is in the structure and a crack originates from the chip.
- e. All concrete sidewalk, sidewalk ramps, and curb and gutter shall be ground and caulked if a crack is displaced and the displacement is less than 3/16” vertically or horizontally.
- f. All concrete sidewalk, sidewalk ramps, and curb and gutter shall be removed and reconstructed if a crack is displaced more than 3/16” vertically or horizontally.
- g. All concrete sidewalk, sidewalk ramps, and curb and gutter shall be removed and reconstructed if spalling over ¼” deep has occurred over two square feet within a section of concrete.
- h. All winter repairs shall be bonded for, if needed, to insure the integrity of the repair.
- i. All requirements are guidelines for inspection. Inspectors may require additional repair/replacement if, in their opinion additional measures are required.
- j. All reconstructed sidewalk ramps shall be installed according to section 4.01.13.21 of the Herriman City Standards.

4.01.14 **Street Lighting.** The developer shall show street light locations on all residential, commercial, and industrial development plats (see street lighting layout detail RD-07 to RD-11).

- 1. Residential street lights shall be placed on alternating sides of the street at a minimum of 175 feet with a maximum of 225 feet for roads having less than 80 feet of right-of-way. On trail and open spaces all lights shall be spaced at a minimum of 400 feet and design shall be approved by the parks department. Commercial street light shall be place at 125 feet maximum for roads having greater than or equal to 80 feet of right-of-way. Additionally, one street light shall be required at each road intersection and at each cul-de-sac. Street lights should be placed at lot line boundaries to avoid unnecessary obstruction along the property frontage. Occasionally, the case may require a street light to be placed at a location other than at the property boundary; for example, this may occur on a lot with an unusually long frontage. The City Engineer may require additional or fewer street lights at his discretion. Additional street lights may be required in locations where safety hazards or special traffic needs exist; examples include locations such as half block intersections, bending roadways, parking lot entrances and exits, busy intersections, bridges and busy private or commercial driveways.

2. The developer shall install all infrastructure required to construct the street lights system. The developer shall pay a fee for street lights. This fee is only for the cost of the material of the street light. All other infrastructure needed to power the street lighting system as shown on the development plat shall be the developer's responsibility. Trenching shall be to the depth, width and standards specified by Herriman City.
3. The Developer shall be assessed a street lighting fee which shall be used by Herriman City to purchase the pole, the head, and the base.
4. Herriman City shall purchase the materials with the fee and shall order the street lights after the preconstruction conference and store the material at the City storage location. It is the developer's responsibility to contact the City and pick up the materials for the street lights and install as required by the improvement plans. Components of the street lighting system shall be in compliance with the standards, specifications and styles currently adopted by Herriman City for use in the municipal right-of-way.
5. The objective of street lighting systems in Herriman City is to provide street lighting which is adequate for the safe flow of night time vehicular and pedestrian traffic on dedicated public streets. A level of street lighting shall be provided which contributes to economic growth, a sense of community identity, a reduction in street crime, and a feeling of security among the citizens.
6. Proposed amendments to street lighting policies shall be reviewed by the Herriman City Planning Commission and the City Engineer and agreement reached on their adoption.
7. Residential Street Lights Standards.
 - a. All residential street lights shall be wired with minimum 8 gauge copper wire direct burial cable and run to the closest power source.
 - b. If powers source is across street direct burial cable shall be install inside conduit.
 - c. All cable shall be installed from pole to a Carson L 1419-12 or approved equal light duty box located within two (2) feet of nearest power source.
 - d. All boxes shall have wire crimped and heat fused covering with a In-Line Water tight one-pole LEB and LEC Fuseholder on the Hot lead.
 - e. If more than 4 light in series or through a recreational area use commercial street light standards.
8. Commercial Street Lights.
 - a. All commercial lights shall be wired with minimum 6 gauge copper wire direct burial cable inside a minimum of 1-1/2" schedule 40 PVC conduit 24" deep.
 - b. All commercial street lights systems shall be a four wire 240 Volt 100 amp system with a power meter enclosed Stainless Steel NEMA 4X Strong Box. If sprinkler box is available same box may be used.

- c. No more than 6 street lights shall be daisy chained together with a 240 Volt 30 amp breaker.
- d. All splices shall be wire crimped and heat fused with covering and terminated in a junction box Carson L 1419-12 or approved equal.
- e. Any junction within 150' of any intersection shall be Carson H 1324 or approved equal.
- f. All junction boxes between street light and system shall use a Multi-Seal RAB 350 Series connector for all hot phases of power.
- g. All lights installed along right of ways of 106' or large shall be equipped with Pole-Safe Model 4075 or approved equal breakaway support system.
- h. All poles shall be wired with a 120 volt plug in receptacle.

4.01.15

On Site Lighting. The provisions of this section shall apply to all outdoor artificial illuminating devices, outdoor fixtures, lamps and other devices, permanent or portable, used for illumination or advertisement.

1. Such devices shall include, but are not limited to search, spot, or flood lights, and other fixtures to illuminate structures and facilities such as:
 - a. Buildings and structures.
 - b. Recreational areas.
 - c. Parking lots.
 - d. Landscape areas.
 - e. Billboards and other signs (advertising or other).
 - f. Lighting for gas station canopies and other similar uses.
 - g. General areas and yards (including security lighting and lighting for the convenience of customers, patrons, visitors, and so forth).
2. Every outdoor light source shall be so operated that it does not emit a beam or intense glare beyond the property boundary. Such lighting shall be operated in a way that it is directed away from and shielded from any adjacent property and shall not detract from driver visibility on adjacent streets. Compliance is achieved with fixture shielding, directional control designed into the fixture, fixture location, fixture height, fixture aim, or a combination of these factors.
3. All exterior illuminating devices, except those devices exempt from this section, shall be fully or partially shielded as required.
4. Lamp types for outdoor use in commercial areas shall be high pressure sodium, metal halide only. The initial output, as defined by the manufacturer, is the value to be considered. For determining compliance with this ordinance, the light emitted from outdoor light fixtures is to be included in the total output as follows:
 - a. Outdoor light fixtures installed on poles (such as parking lot luminaries) and light fixtures installed on the sides of buildings or other structures, when not shielded from above by the structure itself as defined in paragraphs below, shall be included in the total light output.
 - b. Outdoor light fixtures installed under canopies, building overhangs, or roof eaves where the center of the lamp or luminaire

- is located at least five feet but less than ten feet from the nearest edge of the canopy or overhang shall be included in the total outdoor light output.
- c. Outdoor light fixtures located under the canopy and ten or more feet from the nearest edge of a canopy, building overhang, or eave are to be included in the total outdoor light output as though they produced only 1/10th of the lamps initial rated lumen output.
5. Total outdoor light output (excluding streetlights used for illumination of public right-of-way) of any commercial development project in Herriman City shall not exceed 2.5-foot candles with a maximum to minimum ratio of 4 to 1 over the entire project. Commercial projects must utilize semi cutoff with top shields or cutoff type fixtures.
 6. The following requirements shall apply to canopies:
 - a. All luminaries mounted on the under surface of service station canopies shall be fully shielded and utilize flat glass or acrylic covers.
 - b. The total light output shall not exceed 5 foot-candles averaged under the footprint of said canopy at finished grade. Luminaires mounted on the lower surface of the canopy and auxiliary lighting within signage or panels over the pumps shall be included in the above.
 7. The provisions of this section are not intended to prevent the use of any material or method of installation that is not specifically prohibited by this section, if any such alternate has been approved by review of the Herriman City Engineer. The Herriman City Engineer may approve any such alternate as long as the proposed design, material or method provides equivalence to those specific requirements of this section or is otherwise satisfactory and complies with the intent of this section.
 8. All outdoor illuminating devices shall be installed in conformance with the provisions of this section as well as with all other provisions of the Herriman City Zoning Code and the Building Codes, as these are later amended and as applicable.
 9. Where exterior lighting is installed on property outside the public right-of-way, lighting shall be so arranged as to reflect the light away from adjoining premises; exterior lighting shall not create a nuisance for adjacent property owners or inhabitants. Furthermore, lighting shall be arranged so as to not create a traffic hazard.
 10. Exterior lighting may be provided by a freestanding fixture in the yard space between buildings or structures and the public right-of-way or attached to the wall of a building or structure where the distance from the wall to the public right-of-way is not more than 30 feet.
 11. Style of the lighting fixtures and the locations of the fixtures shall be approved by the Herriman City Planning and Zoning Commission.
 12. Each off street parking area on residential structures may be illuminated for safety by installing lighting fixtures which emit light at least equivalent to that of one 100-watt incandescent bulb per 100 feet

in all directions. All lighting shall be shielded so as not to shine into surrounding residences.

4.01.16 **Street Signs.** Street signs placed within Herriman shall be installed according to the stipulation listed below.

1. The Developer shall be assessed a sign fee which may be used by Herriman City to purchase materials, equipment and labor necessary to install street, regulatory and warning signs for the development.
2. Herriman City will purchase the materials, equipment and labor required to install the necessary street, regulatory and warning signs as directed by the Herriman City Engineer. Components of the signs will be in accordance with the standards, specifications and styles currently adopted by Herriman City for use in the municipal right-of-way. Specifically, signs will be installed by Herriman City in accordance with current MUTCD standards and the specifications set forth in APWA Sections 02891 and 02892.
3. The Developer shall install all information signs and traffic control devices required in the development. All signs and traffic control devices shall be designed and installed according to the latest editions of the Manual on Uniform Traffic Control Devices (MUTCD) and APWA Section 02891. The Developer shall pay all installation, material, equipment and labor costs associated with installation of the signs and traffic control devices. At the discretion of the Herriman City Engineer, the City may provide and install signs and traffic control devices in place of the Developer; in this case, the Developer shall reimburse Herriman City for all costs incurred for material, labor, equipment and installation. Sign and traffic control device costs shall be included in the bond for improvements of the development and will not be released until either installed by the developer or until payment for costs incurred by Herriman City has been made.

4.02 Traffic Impact Study Guidelines

A traffic impact study may be required on developments that generate 100 or more new peak hour trips or as determined by the City Engineer. The guidelines for all traffic impact studies conducted within Herriman City are discussed below.

4.02.01 **Introduction.** New land developments, expansions of existing developments, and proposed changes in developments (redevelopments) can have a significant impact on the transportation system if there is not adequate planning and consideration of necessary improvements. To ensure that Herriman City can accommodate a proposed development, a Traffic Impact Study (TIS) is required to analyze relevant impact issues. The purpose of this document is to establish uniform guidelines for when a TIS is required and how the study is to be conducted, based on criteria established by the *Institute of Transportation Engineers (ITE)*.

- 4.02.02 **General Requirements.** A TIS is a specialized study of the impacts that a certain development will have on the surrounding transportation system. The study will analyze all transportation modes, but is specifically concerned with the generation, distribution, and assignment of traffic to and from the proposed development. The impact analysis area will generally be larger than the immediate site. A TIS shall be required for all developments which generate 100 or more new peak hour trips or which will have a significant impact on the City's transportation system as determined by the City Engineer. Further, the TIS shall follow the Report Outline provided herein and shall bear the stamp of a Civil or Traffic Engineer registered in the State of Utah. It will be critical for the Engineer performing the study to regularly consult and coordinate with the City Engineer. At least one meeting between the City Engineer and the Engineer who performed the study will be required to review traffic impacts. Additional meetings will be required at the City Engineer's discretion. The developer will be responsible for hiring the engineer to perform the TIS.
- 4.02.03 **Existing Background Information.** The Developer's Engineer needs to obtain weekday A.M. and P.M. peak hour traffic counts at key locations in the vicinity of the proposed project. These counts need to show turning volumes as well as through [movement](#). Turning movement counts may be required during other periods ([e.g. Saturday Peak Hour](#)) as directed by the City. The traffic volumes can either be obtained by traffic recorders (i.e., manual, pneumatic) or by using existing traffic counts which are not more than one year old. Traffic volumes for some areas can be obtained from Herriman City. Requests for volumes should be coordinated through the City Engineer. When directed by the City, the traffic volumes for the analysis hours should then be adjusted for the peak season, in cases where seasonal traffic data is available. Herriman City requires that the TIS contain a table including the A.M. and P.M. peak hours at all intersections and accesses which are included in the study area. Data regarding roadway and intersection geometrics, and traffic control devices should also be collected within the study area and provided in the TIS.
- 4.02.04 **Non-Site Traffic Forecast.** When the [existing](#) peak hour traffic has been identified and developed, then the future year background traffic volumes can be developed. This traffic is the non-site traffic which consists of the existing [ADT](#) and the generated traffic of all other existing developments in the area. There are many different methods for calculating the background traffic. One method is to use [travel demand](#) models of the area. A notable model is provided by the Wasatch Front Regional Council. Another method available is to use growth rates or trends. Growth projections for future years must be based on documented historical data for the study area. The method which is chosen by the consultant to develop the background traffic needs to be approved by the City Engineer. In addition to the existing traffic growth projections, it may also be required to add in the potential traffic increases due to other developments. These developments consist of the planned and anticipated developments which are in the area. In

addition, some assumptions for development of other vacant lands in the vicinity of the project need to be identified and included in the total background non-site traffic. This additional traffic is important in areas where developmental growth may not be represented sufficiently in the traditional growth trends. The City Engineer should be consulted to determine requirements for assessing other development in the TIS report.

4.02.05 **Site Traffic Generation.** The latest edition of ITE's *Trip Generation Manual* should be used for selecting trip generation rates. Other rates may be used with the approval of the City in cases where *Trip Generation* does not include trip rates for a specific land use category, or includes only limited data, or where local trip rates have been shown to differ from the ITE rates. Site traffic should be generated for daily, A.M., and P.M. peak hour periods. Internal Capture and pass-by trip reductions may be allowed in some cases, but the final assumption for trip reductions and any other adjustments must be reviewed and accepted by the City Engineer. A trip generation table should be prepared by phase showing proposed land use, trip rates, and vehicle trips for daily and peak hour periods and appropriate traffic volume adjustments, if applicable.

4.02.06 **Site Generated Traffic Distribution and Assignment.** The project generated traffic needs to be assigned and distributed onto the existing street network in order to accurately analyze the effects of the proposed development or land use change. Any of the distribution and assignment methods recognized by ITE are acceptable. A Trip Distribution diagram is required in the TIS report.

Trip assignments can be developed with computer models or by manual calculations. All assignment assumptions must be agreed to by the City Engineer and reflect the distribution pattern developed.

4.02.07 **Traffic Flow Diagrams.** All intersections which are in the study area, and all accesses to the proposed development or land use change require a traffic flow diagram. Diagrams showing generated trips, background traffic, and the combined volumes of both background and generated traffic are necessary for each intersection/access for each analysis year. This includes both through movements as well as turning volumes.

4.02.08 **Impact Analysis Area.** The study area needs to include all streets which serve the proposed development or land use change. In general, any links that will experience a directional increase of 25 vehicles in the peak hour should be included in the study. However, the City Engineer may enlarge or reduce the study area based on project type, size, or other special conditions.

4.02.09 **Time Period, Study Horizon Years, and Traffic Scenarios.** Both the A.M and P.M. peak hour periods must be analyzed with and without the addition of each proposed project phase. The study horizon should include the current year (to model existing conditions), year(s) of completion of a major phase or build-out, and a future date of 5 to 10 years beyond build-out. Both a build and a no-build alternative should be analyzed for each year. The current year only needs the no-build analysis. Further, an

analysis of the proposed project with TIS mitigation measures should be made when a level-of-service (LOS) E is encountered from existing (and/or future) plus project traffic at any location within the study area. If LOS D occurs, it must be identified and may require mitigation as determined by the City Engineer. Moreover, the improvements assumed by the traffic engineer for analysis must be approved by the City Engineer. The City Engineer must also approve of all traffic scenarios that will be analyzed before a TIS can be submitted and may dictate which horizon years are appropriate for study. The table below is a list of study horizons that should be used determined by project type and size.

| Analysis Category | Development Characteristic | Sudy Horizons | Minimum Study Area |
|-------------------|--|--|--|
| I | Small Development 100-499 peak hour trips | 1. Opening Year 2. 5 years after Opening | 1. Site Access Drives 2. Adjacent signal controlled intersections within 1/4 mile and/or major street intersections without control and driveways within 500 feet |
| II | Moderate Development 500-999 peak hour trips | 1. Opening Year 2. 5 years after Opening | 1. Site Access Drives 2. All signal controlled intersections within 1/2 mile and/or major streey intersections without signal control and major driveways within 1/2 mile |
| III | Large Development 1,000 - 1,500 peak hour trips | 1. Opening Year 2. 5 years after Opening | 1. Site Access Drives 2. All signal controlled intersections within 1 mile and/or major streey intersections without signal control and major driveways within 1 mile |
| IV | Regional Development >1,500 peak hour Trips | 1. Opening Year 2. 5 years after Opening 3. 20 years after Opening | 1. Site Access Drives 2. All signal controlled intersections within 1 mile and/or major streey intersections without signal control and major driveways within 1 mile |

- 4.02.10 **Analysis Topics.** The following items require analysis:
1. LOS for all Intersections and Access Points for Each Analysis.
 2. LOS for Critical Links for Each Analysis Year.
 3. Left-Turn Warrants.
 4. Signal Warrants.
 5. Weaving and Merge Analysis.
 6. Sight Distance.
 7. Queue Length Analysis.
 8. Impacts to Other Transportation Modes (bicycle, pedestrian, and transit).
 9. Signal Progression.
 10. Acceleration/Deceleration Lanes.

11. Transportation Demand Management (TDM) Measures.
12. Any Mitigation Measures Suggested by the Consultant.
13. Geometrics (must meet current Transportation Master Plan Standards or Those Approved by the City).
14. Air Quality.
15. Internal Circulation and Stacking.
16. Driveway Conflicts.

4.02.11

Analysis Guidelines. Level of service (LOS) shall be computed for signalized and unsignalized intersections in accordance with the latest edition of the *Highway Capacity Manual*. The intersection LOS should be calculated for each of the following conditions (if applicable):

1. LOS for All Intersections and Access Points for Each Analysis Year.
2. Existing AM/PM Peak Hour Traffic Volumes (diagram required).
3. Existing AM/PM Peak Hour Traffic Volumes Including Site Generated Traffic (diagram required).
4. Future Peak Hour Traffic Volumes Without Site Traffic (diagram required).
5. LOS Results for Each Traffic Volume Scenario (table required).

The LOS table should include LOS results for AM and PM peak periods. The table shall show LOS conditions with corresponding vehicle delays for signalized intersections, and LOS conditions for the critical movements at unsignalized intersections. For signalized intersections, the LOS conditions and average vehicle delay shall be provided for each approach and the intersection as a whole.

As previously stated, if the new development is scheduled to be completed in phases, the TIS must, if directed by the City, include an LOS analysis for each separate development phase in addition to the TIS for each horizon year. The incremental increases in site traffic from each phase should be included in the LOS analysis for each preceding year of development completion. A figure will be required for each horizon year of phased development.

Where an intersection, segment, or approach LOS of E occurs, it should be mitigated to LOS D or better. If LOS D occurs, it must be identified and may require mitigation as determined by the City Engineer. The results of these mitigated analyses should also be shown in a table for comparison purposes.

Copies of all calculations and analysis results are required to be submitted as an appendix to the TIS report. This is to include all capacity analyses and all warrants analyses for each study year.

4.02.12

Site and Off-Site Improvements. A detailed vicinity map and a proposed site plan for the development are also required in the study. The site plan or TIS should include schematic drawings and show the following:

1. All access locations to the site (include dimensions, and cross section).
2. All impacted intersections in the study area.
3. Any existing or proposed signals and appropriate timing information.

4. Proposed highway or local street improvements (e.g. alignment, added lanes, and cross section).
5. Bicycle, pedestrian and public transit considerations and plans.
6. Site circulation patterns and parking.
7. All proposed improvements must be checked for conformance with land use and access control requirements.

4.02.13 **Recommendations and Conclusions.** This section of the study report will be where the engineer’s recommendations for mitigation measures will be detailed. A summarized version should be located in the executive summary section of the report. The mitigation measures should be addressed individually. Their efforts to improve the impacts of the development or land use action need to be explained and illustrated. An example is how the addition of a traffic signal at an access location will improve the level of service for the access while not hindering traffic progression.

4.02.14 **Herriman City Review and Conceptual Approval of the TIS Report.** City staff must review and approve the contents and conclusions of the TIS report. Three copies of the report must be submitted to the Herriman City Engineer. Regular contact and consultation with City staff throughout the process is recommended to resolve issues early and save costly engineering and time delays later on. Refer to the report format for a suggested TIS outline.

4.02.15 **Report Format.** The following outline is a guide for preparation of the Traffic Impact Study report. Some studies will be easily documented using this outline. However, additional sections may be warranted because of specific issues or results of the study. Likewise, inapplicable sections listed in the outline may be omitted from the report.

- I INTRODUCTION AND SUMMARY
 - A. Purpose of Report and Study Objectives
 - B. Executive Summary
 1. Site Location and Study Area
 2. Development Description
 3. Principal Findings
 4. Conclusions / Recommendations
 5. Recommendations
- II PROPOSED DEVELOPMENT
 - A. Off-site Development
 - B. Description of On-Site Development
 1. Land Use and Intensity
 2. Location (Vicinity Map)
 3. Site Plan and access Locations
 4. Zoning
 5. Development Phasing and Timing

III STUDY AREA CONDITIONS

- A. Study Area
 - 1. Area of Significant Traffic Impact
 - 2. Influence Area
- B. Study Area Land Use
 - 1. Existing Land Use and Zoning
 - 2. Anticipated Future Development
- C. Site Accessibility
 - 1. Existing and Future Area Roadway System
 - 2. Traffic Volumes and Conditions
 - 3. Access Geometrics
 - 4. Other as applicable
- IV ANALYSIS OF EXISTING CONDITIONS
 - A. Physical Characteristics
 - 1. Roadway Characteristics
 - 2. Traffic Control Devices
 - 3. Pedestrian/Bicycle Facilities
 - B. Traffic Volumes
 - 1. Daily, Morning, Afternoon, and Saturday Peak Periods (as applicable)
 - C. Level of Service
 - 1. Morning, Afternoon, and Saturday Peak Hour (as applicable)
 - D. Safety
- V PROJECTED TRAFFIC
 - A. Site Traffic (Each Horizon Year)
 - 1. Trip Generation
 - 2. Mode Split
 - 3. Pass-by Traffic (if applicable)
 - 4. Internal Capture (if applicable)
 - 5. Trip Distribution
 - 6. Trip Assignment
 - B. Non-Site Traffic Forecasting (Each Horizon Year)
 - 1. Projections of Non-Site (Background) Traffic (methodology shall receive prior approval of City)
 - C. Total Traffic (Each Horizon Year)
- VI TRAFFIC AND IMPROVEMENT ANALYSIS
 - A. Site Access
 - B. Capacity and Level of Service Analysis
 - 1. Without Project (for each horizon year including any programmed improvements)
 - 2. With Project (for each horizon year, including any programmed improvements)
 - C. Roadway Improvements
 - 1. Improvements Programmed to Accommodate Non-site (Background) Traffic
 - 2. Additional Alternative Improvements to Accommodate

- Site Traffic
- D. Traffic Safety
 - 1. Sight Distance
 - 2. Acceleration/Deceleration Lanes, Left-Turn Lanes
 - 3. Adequacy of Location and Design of Driveway Access
- E. Pedestrian Considerations
- F. Speed Considerations
- G. Traffic Control Needs
- H. Traffic Signal Needs (base plus each year, in five-year horizon)
- I. Site Circulation and Parking
- VII FINDINGS
 - A. Site Accessibility
 - B. Traffic Impacts
 - C. Need for Improvements
 - D. Compliance with Applicable Local Codes
- VIII RECOMMENDATIONS/CONCLUSIONS
 - A. Site Access/Circulation Plan
 - B. Roadway Improvements
 - 1. On-Site
 - 2. Off-Site
 - 3. Phasing (as applicable)
 - C. Other
- IX APPENDICES
 - A. Existing Traffic Volume Summary
 - B. Trip Generation/Trip Distribution Analysis
 - C. Capacity Analyses Worksheets
 - D. Traffic Signal Needs Studies
- X FIGURES AND TABLES
 - A. The following items shall be documented in the text or Appendices
 - 1. Site Location
 - 2. Site Plan
 - 3. Existing Transportation System
 - 4. Existing AM/PM Peak Hour Turning Volumes
 - 5. Estimated Site Traffic Generation
 - 6. Directional Distribution of Site Traffic
 - 7. Site Traffic
 - 8. Non-Site Traffic
 - 9. Total Future Traffic
 - 10. Projected Levels of Service
 - 11. Recommended Improvements
- XI DESIGN STANDARD REFERENCE
 - A. Design in accordance with current Herriman City Standards.
 - B. Conduct capacity analysis in accordance with the latest edition of the *Highway Capacity Manual*.
 - C. Use the Herriman Transportation Master Plan as a guide for

- street classification and general transportation goals.
- D. Conduct signal warrant analysis in accordance with the latest edition of the *Manual of Uniform Traffic Control Devices* (MUTCD).
- E. Use the State of Utah Access Management Standards, Wasatch Front Regional Council's *Access Management Techniques for Local Governments* and AASHTO's *A Policy on Geometric Design of Highways and Streets, 2001* as additional guides for access management policy.

4.03 Storm Drain Design

All storm drain systems shall be designed to the requirements listed below.

- 4.03.01 Storm drain systems shall be designed to handle the governing storm event. Pipe systems shall be designed to convey the 10-year frequency storm. The 100-year storm shall be routed by streets or other facilities in the development. Detention ponds shall be designed to meter flow out of the development at a maximum rate of 0.2 cfs/ac based on the governing storm event. Retention ponds shall be allowed on a case by case basis, as approved by the City Engineer. Retention ponds, if allowed, shall be designed to hold the 24-hour duration, 100-year frequency storm event. All ponds shall be designed with a minimum of one foot of free board. The intensities for Herriman are in the table below (TRC 1999).

| Time (min.) | 10-year (in.) | 100-year(in) |
|-------------|---------------|--------------|
| 15 | 0.55 | 0.89 |
| 30 | 0.70 | 1.24 |
| 60 | 0.88 | 1.46 |
| 360 | 1.37 | 1.90 |
| 720 | 1.64 | 2.32 |
| 1440 | 1.86 | 2.57 |

- 4.03.02 Storm drain pipe material shall be class III RCP.
- 4.03.03 HDPE pipe may be considered in areas outside of the municipal Right-of-Way for sizes 18” and smaller in diameter.
- 4.03.04 Storm Drain manhole spacing shall be 400 feet maximum.
- 4.03.05 Pipe size shall be determined by required capacity but in no instance shall the mainline size be less than 18” diameter.
- 4.03.06 Storm Drain manholes shall be 4’ diameter for in-line manholes where grade changes occur. 5’ diameter manholes are required when deflection angle is greater than or equal to 45 degrees, when the manhole is a junction manhole of three or more lines, for pipe whose inside diameter is 12” or greater, or when the cover above invert elevations is 14 feet or greater. All manholes shall be constructed with steps for maintenance access.

- 4.03.07 Detention facilities are required for all development and shall be sized to detain the additional storm water generated due to development of the property beyond the undeveloped condition. Detention/retention basins shall be either on a separate lot which complies with the Herriman City Zoning Ordinance or when approved by the City Engineer or within an easement dedicated to Herriman City which is part of a legal lot.
- 4.03.08 Detention basins shall be either on a separate lot which complies with the Herriman City Zoning Ordinance or when approved by the City Engineer within an easement dedicated to Herriman City which is part of a legal lot.
- 4.03.09 Detention facilities shall have a metered outlet flow equivalent to or less than the normal undeveloped flow. An optional method is to assume 0.2 cfs/acre as an outlet flow. The developer shall provide calculations showing which condition governs.
- 4.03.10 Detention basins shall be designed to provide the following:
1. Side slopes of 3:1 maximum.
 2. All weather vehicular maintenance access around the entire basin (min 10 foot width).
 3. Heavy Truck (40,000 lbs.) access around the entire basin (min 10 foot width).
 4. Heavy Truck (40,000 lbs.) access to the inlet and outlet structures shall be constructed of asphalt/base or concrete/base.
 5. Lot shall provide normal frontage requirements.
 6. No flag lots shall be used for detention facilities.
 7. Flow through design which eliminates “wet basin” in a detention basin.
 8. Pressurized irrigation system and landscaping shall be compatible with the surrounding area. Irrigation system shall comply with Herriman City’s standards.
 9. Cross slope within basin shall provide adequate drainage. Under no circumstances shall the slope be less than 1% across any portion of the basin.
 10. All detention lots or easements shall be properly surveyed and corners permanently marked prior to acceptance of improvements.
 11. If possible, detention basins for multiple areas or phases in a development shall be combined.
 12. The Herriman City Parks Department may require additional grading or different slopes, planting or layout of detention basins to make better use of the space or for more efficient long-term maintenance of the basin.
- 4.03.11 Storm water design and construction methods must adequately address potential problems which may arise during construction or by design so as not to pollute, erode, deposit sediment, or cause any other degradation to existing natural conditions.
- 4.03.12 All storm water installation shall comply with the City’s Storm Water Master Plan.
- 4.03.13 Should the installation of a storm water system require easements to

- Herriman City, the developer of such system shall convey such easements by deed to Herriman City.
- 4.03.14 Clearance between other utilities shall be at least 18 inches. Closer tolerances require reinforcement concrete cradle or other acceptable separation. Reinforcements shall be as per the current specifications.
- 4.03.15 All runoff shall be detained in a public detention facility prior to outlet into any major water course. Private facilities may be allowed only upon approval of the City Engineer. The developments required to provide such facilities include all those with a total land area in excess of 30,000 square feet, plus any others of lesser area which would produce runoff, as determined by the City Engineer, that could cause flooding problems or add to already existing flooding problems.
- 4.03.16 All detention facilities must be designed to safely and reliably accommodate an emergency overflow that safely conveys flood waters to a nearby street or other acceptable facility.
- 4.03.17 The use of pumps to drain detention facilities will not be allowed.
- 4.03.18 Should easements be necessary for the installation and maintenance of public storm drain systems, such easements shall be provided at no cost to the City and shall be a minimum of 20 feet in width with the storm drain line centered within the easement. Larger easements widths may be required depending on pipe size, pipe depth, etc. The easement shall state that no buildings, utilities, or structures shall be erected or constructed within such easements as to interfere with the activities necessary to properly access and maintain or replace such lines or storm drain structure.
- 4.03.19 All storm drain manholes are required to have legal and physical access. Physical access shall consist of an all-weather surface sufficient to provide for the needs of all routine maintenance and repair equipment.
- 4.03.20 All detention ponds shall be landscaped and irrigated according to Herriman City Standards.
- 4.03.21 All storm drain pipe shall be video taped with a copy submitted to Herriman City. Inspector shall verify video inspections prior to system substantial bond release. Herriman City public works inspector shall be present during video inspection.

4.04 Grading and Drainage Design

Grading and drainage shall be designed according to the requirements listed below.

- 4.04.01 Fill slopes shall be no steeper than 3 horizontal to 1 vertical (3:1), or as determined by a soils engineer. All fills shall be compacted to a minimum of 95 percent of maximum density.
- 4.04.02 Cut slopes shall be no steeper than 3 horizontal to 1 vertical (3:1), or as determined by a soils engineer.
- 4.04.03 An Erosion Control plan must be incorporated into the project to minimize soil erosion and to avoid sedimentation into the City storm system.
- 4.04.04 All public streets shall be maintained, free of dust and mud caused by

- grading or construction operations.
- 4.04.05 Compaction tests are required on all engineered fill as and other locations which will be load bearing. All testing shall comply with the specification of Herriman City.
 - 4.04.06 All building pads at rough grade shall have a 1% slope from the pad towards the street or designed drainage outlet.
 - 4.04.07 Test holes shall be dug at a location which represents the development site adequately to determine the depth of the groundwater table. A preliminary soils investigation and groundwater report shall be submitted to the City Engineer. If the City Engineer determines that groundwater is a problem, a lateral to each lot for footing or foundation drains, shall be installed to city specifications. All land drains must be tied into approved storm drain facilities.
 - 4.04.08 Dust shall be controlled during all phases of construction either by means of a water truck or other approved method.
 - 4.04.09 The minimum finished slope of any designed grade shall be 1% for soil, asphalt or gravel and 0.40% for concrete.
 - 4.04.10 Subsurface drainage systems shall be of adequate capacity to intercept and convey the drainage so as not to detrimentally affect adjacent properties or public infrastructure.
 - 4.04.11 Subsurface drainage manhole spacing shall be 400 feet maximum.
 - 4.04.12 Subsurface drainage design and construction methods must adequately address potential problems which may arise during construction or by design so as not to pollute, erode, deposit sediment, or cause any other degradation to existing natural condition.
 - 4.04.13 All subsurface drainage installation shall comply with the City's Specifications.
 - 4.04.14 Should the installation of a subsurface drainage system require easements the developer of such system shall obtain and convey such easements by deed to Herriman City.
 - 4.04.15 Clearance between other utilities shall be at least 18 inches. Closer tolerances may require concrete reinforcement or other acceptable separation.

4.05 Erosion Control Design

An erosion control plan shall be submitted and approved for all developments. The requirements for erosion control plans shall follow the requirements listed below.

- 4.05.01 Projects disturbing 1 acre or more must file a Notice of Intent with the Utah Division of Water Quality prior to construction. A copy of the erosion control plan must be kept on site until construction is complete.
- 4.05.02 An Erosion Control plan must be incorporated into projects to minimize soil erosion and to avoid sedimentation into the City storm sewer system, onto adjacent properties or into natural drainage courses.
- 4.05.03 Erosion control devices shall consist of one or more of the following: check

- dams, sand bags, hay bales, desilting basins, silt fences, berms, dikes, contour grading, or other approved devices.
- 4.05.04 Erosion control devices shall be modified as needed as the project progresses, and plans of these changes shall be submitted for approval.
 - 4.05.05 All public streets and storm drain facilities shall be maintained free of mud and debris caused by grading or construction operations.
 - 4.05.06 Graded areas adjacent to fill slopes located at the site perimeter must drain away from the top of the slope at the conclusion of each working day.
 - 4.05.07 All loose soil and debris which may create a potential hazard to offsite property shall be fully protected onsite to prevent any damage or be removed from the site as directed by the Inspector.
 - 4.05.08 Desilting basins or excavated pits are required prior to discharge into any private or public street, into any City, State, or County storm system, onto adjacent properties or into natural drainage course.
 - 4.05.09 Desilting basins may not be removed or made inoperable without the approval of the Inspector.
 - 4.05.10 All silt and debris shall be removed from all devices within 24 hours after each storm event.
 - 4.05.11 All utilities must be protected to prevent damage due to erosion. Should damage occur, it shall be the responsibility of the developer to repair such damage at no cost to such utility and within a reasonable period.
 - 4.05.12 Erosion control devices shown on the approved plan may be removed when approved by the Inspector if the grading operation has progressed to the point where they are no longer required.
 - 4.05.13 Provide any additional information required by the State to receive the UPDES permit.
 - 4.05.14 File for and receive approval for the UPDES permit.

4.06 Culinary Water System Design

Culinary water systems shall be designed according to the following requirements listed below.

- 4.06.01 Standard centerline alignment within the public right-of-way shall be 10 foot north or 10 foot west of the centerline.
- 4.06.02 Polyvinyl Chloride Pipe (PVC) C900 or C909 may be used for buried sizes 10 inches and smaller. Ductile iron pipe PC- 350 or CL-52 shall be used for all pipes 12 inches and larger. All fittings and valves 4 inches and larger shall be ductile iron and must meet the requirements of NSF 61 and ANSI/AWWA C-153.
- 4.06.03 All new ductile iron pipes shall be wrapped and fittings shall be greased, with poly tape and wrapped with an 8 mil Poly Wrap to minimize corrosion.
- 4.06.04 Valves shall be located in all intersections and shall **equal** the number of legs of the fitting.
- 4.06.05 Fire Hydrant spacing shall not exceed 300 feet in areas of multi-family dwellings, and in commercial and industrial use areas. In widely spaced

- single family dwelling use areas hydrant spacing shall not exceed 500 feet.
- 4.06.06 Minimum mainline diameter shall be 8 inches. System demand requirements will dictate actual size requirements.
- 4.06.07 Service line shall be constructed of IPS polyethylene pipe. Minimum size shall be 1 inch diameter for residential connections. Location of water service shall generally be located 10 to 15 feet from either property line of the lot served. No meter box shall be allowed in any driveway, driveway flare, or sidewalk. Location of service line shall be clearly marked into the face of the adjacent curb. Location of extended service lateral towards building shall be located via a 2 x 4 with a blue colored end visibly extended above adjacent surface. Locator wire shall be ran with each service.
- 4.06.08 Minimum cover required shall be 48 inches.
- 4.06.09 Minimum pressure allowed to each individual service shall not drop below 40 PSI under peak day demands
- 4.06.10 Should the installation of a water system require easements to Herriman City, the developer of such system shall convey such easements by deed to Herriman City.
- 4.06.11 All other utilities crossing the water main shall do so at as close to a right angle as possible.
- 4.06.12 Perpendicular or skewed crossings between other utilities and water mains shall have clearance of at least 24 inches. Closer tolerances require a steel casing in combinations with no mechanical joints of either utility within 10 feet horizontally of the crossing or additional separation. Reinforcement shall be as per the current specifications.
- 4.06.13 Cover over utilities and between railroad tracks or roadways shall be sufficient to adequately protect such utilities from potential loading of track or roadway either during construction or final finished surface. Should cover be insufficient to adequately protect utility, encasement or casings shall be provided to protect affected utility. All casing shall be twice the size of the pipe with thinsulators installed per manufactures guidelines.
- 4.06.14 Should easements be necessary for the installation and maintenance of public culinary water systems such easements shall be a minimum of 20 feet in width with the water line centered within the easement. No buildings, utilities, or structures shall be erected or constructed within such easements as to interfere with the activities necessary to properly access and maintain or replace such lines or water structures.
- 4.06.15 Appropriate backflow prevention devices shall be installed on service laterals to protect the municipal water system from low level (non-health) and/or high level (health) contamination through cross connections. Specifically, the laws, regulations and conditions set forth in Federal Public Law 99-339, Utah Code Section 19-4-112, Utah Public Drinking Water Rules Section R309-102-5, Occupation Safety and Health Rules and Regulations Part 1910-Subpart J Section 1910.41 and the current International Plumbing Code shall be adhered to for the cross connection control program of each consumer of the municipal water system. All

backflow prevention assemblies shall be in-line serviceable, in-line testable and have certification through third party certifying agencies. See the Herriman City cross connection control ordinance for additional details.

- 4.06.16 All pressure reducing stations shall be underground packaged stations factory built, factory delivered, with all necessary internal piping, valves and other necessary appurtenances as shown in the Herriman City pressure reducing stations detail. The underground pressure reducing station shall be complete when delivered and will not require internal contractor construction except to install the power service through the service conduit provided for that purpose. The underground pressure reducing station shall be manufactured by Engineered Fluid, Inc. (EFI), or Hydec. Herriman City has predetermined the make and model of each internal component which shall be included in the pressure reducing station. The size of the pressure reducing station shall be determined by the size of the water lines connecting to the station and flow demands of those lines, which will be determined by Herriman City.
- 4.06.17 All developers are required to install a sampling station for every 80 lots or one per development for developments smaller than 80 lots.
- 4.06.18 Where deadend mains occur, they shall be provided with a fire hydrant if flow and pressure are sufficient or with an approved flushing hydrant or blow-off for flushing purposes. Flushing devices shall be sized to provide flows of which will give a velocity of at least 2.5 feet-per-second in the water main being flushed. No flushing device shall be directly connected to any sewer.
- 4.06.19 All blowoffs and flushing hydrants shall be premanufactured.
- 4.06.20 All Valves 8" and smaller shall be gate valves, valves 10" and larger shall be butterfly valves. All valves 4 inches and larger shall be ductile iron and must meet the requirements of NSF 61 and ANSI/AWWA C-153. Gate valves shall be used 8" valves and smaller shall be gate valves.
- 4.06.21 Valves shall be spaced no further than 1000'.
- 4.06.22 All control valves shall be CLA-VAL brand valves.
- 4.06.23 All butterfly valves shall be rated for 250 psi.
- 4.06.24 All Tapping sleeves shall be stainless steel Smith-Blair 664 or JCM432 tapping sleeves.
- 4.06.25 All valves for fire hydrants shall be located in the street flanged off of the tee.
- 4.06.26 All water lines shall have a 3" magnetic warning tape installed in the trench approximately 12" above the pipe.
- 4.06.27 All concrete vaults shall be constructed as per APWA Plan No. 505 with the following additions.
1. Victaulic couplings shall be used on all piping between isolation gate valves for case of maintenance; placement shall be approved by the City Engineer.
 2. All vaults shall be equipped with two 120 VAC commercial grade receptacles with water tight covers, a 100 watt incandescent vapor tight light fixture with protective cage, a fractional HP hermetically sealed

exhaust fan sized to remove total air volume 30 times per hour, and all conduit shall be rigid galvanized steel. The fan and light switches shall be located within arms reach of the entrance. A 100 Amp service panel shall be provided.

3. All vaults shall be equipped with intake and exhaust vents. The vents shall be located at opposite ends of the vault with the intake terminating 12 inches from the floor and the exhaust terminating a minimum of 4 feet from the floor.
4. All isolation valves located inside vaults shall be hand operated with a wheel. Valve box shall not be poured in the lid as shown as APWA Plan 523,525,527, and 529.
5. All water meter vaults shall be equipped with an additional 15" removable water meter lid with a 2" knockout. The 15" lid shall be poured in the vault lid and set at the finished grade. The 15" lid will be used with the radio read meters.
6. All water meter vaults larger than 3" shall be designed and submitted to Herriman City for review. General vault requirements are established by these standards and the APWA Manual. It is recommended that preliminary discussions take place with the City Engineer prior to design.
7. All 1 ½" and 2" meter vaults shall be 5' x 5' x 5'6" and shall have a 30" ring and lid, 15" ring and lid and stairs.
8. All pipe and valves need to be epoxy painted inside and outside with in the PRV vault.

4.07 Irrigation and Planting of Parks and Streetscapes

The following standards and specifications are established as minimum requirements for landscape architects, contractors and developers in the preparation and installation of Irrigation and Landscape Projects within Herriman City. For the purpose of this chapter, the Developer and Contractor are considered one and the same.

4.07.01 **Latest Industry Standards and Practices.** The requirements herein are set in two major areas: irrigation systems and planting. These are set as minimum standards. These standards are not intended to limit the installation but are intended as an absolute minimum. The City is willing to clarify any questions that you may have on these specifications and standards. The Parks Division will not design or engineer the project.

1. Parks Division must receive a set of detailed plans to be approved by the Parks Division before construction is started. The plans need to include p.s.i., flow rates, head spacing, and controller location including the power source, and plant locations where applicable. Due to high winds in the area, manufacturer's maximum head spacing to be set according to manufacturer's specifications, reduced by 25%. Site layout may require tighter spacing. Developer shall ensure that all areas receive double coverage at a minimum.

2. As specified in this chapter, closing in of un-inspected work will require reopening or re-exposing of items to be inspected at the contractor's expense. Trees or plants that do not meet the planting specifications will require replacement, at the contractors own expense. Any changes must be applied for in writing and approved in writing prior to any installation.
- 4.07.02 **Submittals.** Operation and maintenance manuals and an "As Built" set of plans must be submitted to the Parks Division before inspection and approval can be considered complete.
 - 4.07.03 **Streetscape Size Location.** Streetscapes and Parks shall be constructed to the sizes, grades and locations as stated in the plans approved by the city and stated herein.
 - 4.07.04 **Construction Specifications.** The landscaping project shall include, but is not limited to, the furnishing, installing and testing of irrigation mains (150 PSI for one hour), tying into the main water line, running service to site, back flow prevention device and furnishing and installing of water meter(s), flow meters sprinkler heads, bubblers, gate valves, control valves, automatic valves, automatic controllers, field wiring, topsoil, turf, trees, shrubs, and any metered electrical connection to provide an irrigation system that meets or exceeds best construction practices. The removal and/or restoration of existing improvements, excavation and backfill, and all other work shall be in accordance with the Herriman City Public Improvement Standards, Specifications and Plans.
 - 4.07.05 **Competence.** All Irrigation work shall be supervised full-time by a competent, qualified supervisor.
 - 4.07.06 **Liability.** The Contractor shall adequately protect the work, adjacent property, and the public, and shall be responsible for any damage, injury, or loss due to acts or neglect by the Contractor or the Developer.
 - 4.07.07 **Signs, Fences, Barricades.** The Contractor shall, at all times during construction, maintain safe pedestrian walk ways around all areas of construction. This may require the appropriate signage, fences, barricades or other approved devices as required by the Public Works Department or Parks Division.
 - 4.07.08 **Inspections.** All Contractors are required to follow an inspection schedule as per Herriman City Public Improvement Standards, Specifications, and Plans. Should any of the work be covered or completed before inspections and test, the Contractor shall uncover the work at their own expense. All hard surfaces shall be cleared of construction debris.
 - 4.07.09 **Ordinances and Regulations.** The Local, Municipal and State law, rules and regulations are to be used when designing and installing landscapes, irrigation and plant material. They are to be used as a minimum standard and carried out by the Contractor, Developer and Landscape Architect. However, these City Specifications will take precedence over the Local, Municipal and State laws when they describe materials, workmanship or construction of higher standards.
 - 4.07.10 **Permits & Fees.** All permits and fees shall be the Developer's

responsibility.

- 4.07.11 **Bonding and Inspection.** The sprinkler system and landscape planting shall be bonded as part of the entire development project. Bond releases shall be handled through the Engineering Division. The Parks Division shall sign off the release in the above areas only for 75% and 25% bond release and only when all requirements contained herein have been met.
- 4.07.12 **System Pressure.** The sprinkler irrigation system is designed for actual system pressures unless otherwise specified and is schematic only, with the intent to convey full coverage of the lawn and planting areas affected. The system must also provide the manufacturer's recommended minimum operating pressure or greater to every head while maintaining sufficient pressure to overcome the losses due to friction in the piping, fittings and all other equipment.
- 4.07.13 **Materials.** Any material that is called out in these specifications by name and/or number shall be used for the purpose of uniformity and quality control. No substitution shall be permitted without written approval by the Parks Division.
- 4.07.14 **Inspections and Procedures.** All irrigation inspections shall follow the requirements listed below.
1. An approved set of plans and up to date redlines are required for all inspections.
 2. Due to Utah having a limited growing season no inspections will be performed from October 31 through March 31, unless conditions permit and at the Park Division's discretion.
 3. The Developer shall set up an inspection schedule with the Parks Division. Prior to each inspection date, the Contractor shall give twenty-four (24) hours notice to the Parks Division. There shall be a minimum of five (5) inspections. The Developer may not proceed to the next phase of construction until the previous phase has been inspected and approved. In the event that the Developer requests inspection of work and said work is substantially incomplete, the Contractor shall be responsible for all re-inspection fees. The inspections are as follows:

| | |
|---------------------------------------|---|
| First inspection | Subgrade, trench, painting and staking. |
| Second inspection | Pipe sizing, trench depths and redlines. |
| Third inspection | Final irrigation, coverage test, with final grade pre-planting. |
| Fourth inspection | Punch list development for 75% bond release. |
| Fifth inspection | Final release and water pressure test. |
| Additional inspection | May be required. |

4. After installing the irrigation main line, the Contractor shall schedule the first inspection from the Parks Division.
5. The Developer shall maintain the property for a period of [eighteen](#) months following the 75 percent bond release. During this warranty period the Contractor is responsible for all aspects of maintenance including, but not limited to, mowing, fertilizing, irrigation scheduling and repair, play system maintenance and all safety inspections.
6. At the end of the twelve month warranty period, a 5th inspection shall be scheduled by the Contractor. If at that point the project is still deemed satisfactory, the City shall assume the maintenance of the property. Developer shall repair or replace (at his expense) any irrigation or plant material deemed unsatisfactory prior to final release. The fifth inspection may be delayed if vegetation is not properly established and thriving. Developer will continue to maintain until such time that the vegetation is established and thriving. Then, the fifth inspection shall be scheduled. The Developer shall obtain written approval from the Parks Division stating that the City has officially assumed maintenance and that all work has been completed according to City Standards before final bond release will occur.
7. As Built: The Landscape Architect/Contractor shall furnish the Parks Division with preliminary plan sets for review, showing all irrigation and landscaping work required. After initial review by the City, the Landscape Architect shall make all noted corrections as discussed with the staff. The Landscape Architect shall submit final plan sets to be signed and approved by the Parks Division along with an electronic copy in AutoCAD format (see Section 2 for acceptable format). Upon completion of the installation, the Contractor/Developer shall submit the as-built to the Parks Division. The Parks Division shall receive the corrected set of as-built plans prior to accepting the project for final

release.

8. Fifth Inspection shall not occur prior to one full growing season of the system (at least one year from satisfactory fourth inspection). This period shall include startup and shut down of system with City Parks personnel.

4.08 Irrigation System Design

Irrigation systems shall be designed according to the following requirements.

4.08.01 Excavation and Backfill.

1. Site shall be ripped or tilled at a minimum depth of 12”, prior to installation of irrigation system.
2. Trenches - General. Trenches for irrigation pipe (plastic, brass, and/or ductile iron) sprinkler lines shall be excavated either by hand or machine and shall be a sufficient width to permit proper handling and installation of the pipe and fittings. The backfill shall be thoroughly compacted and leveled off with the adjacent soil level. Selected fill dirt or sand shall be used if soil conditions are rocky or obstructive. Trenching depth shall be two (2) inches below normal trench depth to allow for proper bedding.
 - a. Where trenching is done in established lawn, care will be taken to keep the trenches only as wide as is necessary to accomplish the work. The trenches shall be backfilled as specified above and then 4-inches of topsoil will be placed to bring the trench up to existing grade so that sod can be laid. The new sod shall be first grade sod of standard width and shall be laid along the trenches so as to match the existing sod. No small pieces of sod shall be used and only standard lengths shall be accepted. No sod from the construction site shall be used unless otherwise specified.
3. Trenches – Depth. Pipe depth for all plastic pipes shall be 18-24 inches on main lines and 12-18 inches on lateral lines with the appropriate fill as specified above.
4. Backfill Composition Rock Free: Fill dirt or sand shall be used as bedding up to four (4) inches above the pipe. The remainder of the backfill shall contain no lumps or rocks larger than two (2) inches in diameter. The top six (6) inches of backfill shall be free of rocks more than one inch in diameter.
 - a. No backfilling of trenches shall be done until the system has been inspected for proper trench depths, installation of equipment, control wire and location of heads by the City.
 - b. Before trenches are backfilled, the Contractor must show the City the redlined “as-built” drawing he has been keeping on the site, showing that changes and corresponding dimensions have been recorded where changes have been made.
 - c. Backfill under and around the lines to the center line of the pipe

shall be placed in maximum layers of 10-inches and thoroughly compacted.

- d. Special care shall be taken to assure complete compaction under the haunches of the pipe. Backfill compaction under the haunches of the pipe shall be compacted to the original density. Compaction requirements above the pipe shall be the same as for surrounding areas.
 - e. All trenches shall be backfilled then saturated with water sufficiently to insure no settling of the surface after lawn is planted or sod is replaced.
4. Excavation Under Hard Surfacing. Any excavation in or under the roadway, curb, gutter and /or sidewalk shall conform to the Herriman City Standards, Specifications, and plans.
 5. Trenchless Installation. Pulling or plowing is not allowed.

4.08.02

Pipe, Tubing and Fittings.

1. General Requirements. Plastic pipe shall be extruded from PVC 1120-1220 compound and should be labeled. All PVC pipe shall be Schedule 40. Three inch or greater use CL 200 with Parks approval.
2. Description. This specification covers requirements for Schedule 40 P.V.C. pipe and fittings made from Type 1 Polyvinyl Chloride.
3. Materials. Pipe and fittings shall be manufactured from a P.V.C. compound which meets the requirements of Type 1, Grade 1 Polyvinyl Chloride, as outlined in ASTM D-1684. A Type 1, Grade 1 compound is characterized as having the highest requirements for mechanical properties and chemical resistance. P.V.C. Type 1, Grade 1 pipe compound shall have a 2000 P.S.I. design stress at 74 degrees F., which is listed by the Plastic Pipe Institute (PPI). Materials from which pipe and fittings are manufactured, shall have been tested and approved for conveying potable water by the National Sanitation Foundation Testing Laboratory (NSF).
4. Pipe. All pipe used on the project for the sprinkler irrigation system shall conform to the requirements of ASTM D-1685.
5. Fittings. All fittings used on the project for the sprinkler irrigation system shall conform to the requirements of ASTM D-2466.
6. Piping Under Paving. All piping under paving shall be installed in Schedule 40 PVC sleeves. Sleeves shall be installed under all hardscape surfaces. All sleeves shall be twice the size (diameter) of supply pipe. Piping under paving shall be installed by jacking, boring or hydraulic driving. Cutting or breaking of sidewalks and/or concrete work is not permitted unless no other alternative is possible. Piping shall be located so that a minimum of pipe shall be located under paving.
7. Plastic Pipe Fittings and Connections. All plastic pipe fittings shall be suitable for either a solvent weld or a screw on connection. Fittings shall be Lasco, Dura, or Spears Factory assembled fittings or approved equivalent. All fittings shall be Schedule 40 PVC, except for gasketed Ductile Iron push on 2" plus. All PVC slip joints shall be primed with

Weldon P-70 or approved equal prior to being glued. Glue shall be a Weldon 711, gray heavy bodied fast seal or approved equivalent and should follow the manufacturer's requirement as per size, weather, age, etc. Burrs at cut ends shall be removed prior to installation to guarantee a smooth unobstructed flow of water.

8. Pipe Sleeves. Pipe sleeves shall be required under all new concrete or other new paving. The size of the sleeve shall be at least 2-inches (I.D.) larger than the pipes or wires required for the sprinkler system. Wires shall be sleeved separately within their own sleeve. All pipe sleeves shall be P.V.C. Schedule 40 pipe.
9. Installation of Plastic Pipe. Plastic pipe shall be installed in a manner so as to provide for expansion and contractions as recommended by the manufacturer. Plastic pipe shall be cut with a hand saw or hack saw with the assistance of a squared-in sawing vice, or with an approved PVC pipe cutter, in a manner as to insure a square cut. Burrs at cut ends shall be removed prior to installation to necessitate a smooth unobstructed water flow. Pipe shall be "snaked" in the trench to allow for expansion and contraction.
10. Thrust Blocks. Thrust blocks are needed wherever the main line:
 - a. Changes any direction at tees, angles, and crosses vertical and horizontal.
 - b. Changes size at reducers.
 - c. Stops at a dead-end.
 - d. Valves at which thrust develops when closed.
11. Thrust blocks shall rest against undisturbed original earth in the direction of the thrust. The size and type of thrust block depends on pressure, pipe size, kind of soil, and type of fitting.
12. Upward Thrusts at Fittings. Where a fitting is used to make a vertical bend, use a bar anchor to anchor the fitting to a thrust block braced against undisturbed soil. The thrust block should have enough resistance to withstand upward and outward thrusts at the fitting.
13. Flushing and Testing. After the irrigation pipes have been installed, but before the bubblers or heads are installed, the control valves shall be opened to flush the system. The sprinkler main lines shall then be pressure tested before backfilling. The water pressure test shall be for a period of not less than one hour, and shall prove there are no signs of leakage or loss of pressure at 150 psi.
 - a. The point of connection must be flushed and tested for leaks prior to back filling.
 - b. The mainline must be flushed prior to the installation of station/control valves.
 - c. The lateral lines must be flushed prior to the installation of sprinkler heads, drip lines, etc.

4.08.03 **Bubblers, Heads, Gate Valves, Drain Valves and Quick Couplers.** All valves must have a threaded union (see detail). All automatic irrigation valves will have one (1) shut-off/isolation gate valve per sprinkler valve

located upstream from the control valve. All products must be approved in writing prior to installation. This is done for standardization purposes and inventory control.

1. Sprinkler Heads. All sprinkler heads shall be set to grade and perpendicular to the finished grade, unless otherwise specified. Heads adjacent to curbs and walks shall be two inches away from the curb or walkway. All nozzles shall be tightened and adjusted for the proper radius, arc, and flow rate (g.p.m.).

| Acceptable Heads: | | |
|--------------------------|---------------------|--------------------|
| | Manufacturer | Model |
| Rotors | Rainbird | Falcon |
| | Rainbird | 5000+ |
| | Hunter | I20 |
| | Hunter | I40 |
| Spray | Rainbird | 1804 SAM-PRS |
| Bubbler | Rainbird | (commercial grade) |
| | Hunter | (commercial grade) |
| | Toro | (commercial grade) |

SPECIAL NOTE: EXTREME CARE SHALL BE TAKEN IN THE LAYOUT AND INSTALLATION OF HEADS.

2. Isolation Gate Valves. All gate valves shall be resilient-wedge having a square key with a non rising stem with rubber “O” rings and be rated for 200 psi water, oil, gas. (i.e., Milwaukee series 105 gate valve or approved equivalent). Stems shall be of cold rolled, solid bronze, high tensile strength. Valve shall be high strength cast iron, fully encapsulated urethane rubber wedge. Gate valves shall be hydrostatically pressure tested for 400 P.S.I. shall be designated for a working pressure of 200 P.S.I., and shall be American made for water application. All gate valves shall be installed within valve boxes. Six (6) inch or twelve (12) inch extensions shall be added, when necessary, to bring the valve boxes level with finish grade. Unless otherwise shown or specified, valves on the main line sized 2" and larger shall have flanged end connections. Valves 1-1/2" and smaller shall have threaded end connections i.e., non-rising stem. Buried valves shall have 2" square operating nuts. No handles or wheels will be permitted. Valves inside structures shall have wheel handles. Unions shall be installed on each side of all valves except flanged valves. Each valve shall contain a resilient wedge urethane rubber seat.
The **Contractor** shall provide adequate material for the connection of valves to the system, i.e., adapters, flanges, nuts, bolts, gaskets, etc.
3. Manual Drain Valves. Manual drain valves shall be required at all low points in the main lines. See plans, notes, and details.
 - a. All manual drains shall be Ford B11333 series or Mueller B20283 heavy duty brass, ball valves.

- b. The location of each manual drain shall be shown on the "as built" drawing with dimensions from the nearest permanent fixture, such as a building corner, etc.
 - c. Each manual drain valve will be accessed by a 2 inch P.V.C. Schedule 40 pipe sleeve, capped by a Weathermatic 906L locking valve cap with a RLK-1 key, no approved equals, enclosed within a 10" round Brooks Bolt down box - top of drain sleeve to be 3" - 6" below lids of Brooks Box.
 - d. Each manual drain shall empty into a gravel sump, a minimum of 18 inches by 18 inches by 12 inches deep. The gravel shall be washed 3/4 inch rock. No pea gravel will be allowed.
4. Automatic Drain Valves. Automatic drain valves shall not be used.
 5. Quick Coupling Valves. A quick coupling valve shall be installed on all main lines immediately after the backflow prevention device. In addition, a quick coupling valve shall be installed at every valve box or valve box cluster. All quick coupler valves shall be Rainbird #44LRC and installed in a ten-inch round valve box. Each valve shall also be teed off the supply line with at least 24 inches of galvanized iron pipe and all fittings from that point up shall be galvanized iron. A Ford B11444 series or Mueller B20284 heavy duty manual ball valve shall be installed upstream from each quick coupler or group of quick couplers on one supply line for water shut-off and maintenance. Access ball valve shall be a 2" PVC sleeve-capped by a Weathermatic 906L cap, within a 10" round Brooks Box (no substitutions).
 6. Manifold Gate Valve. Milwaukee brand or approved American-made brass valve with non-rising stem (line sized).
 7. Quick Coupling Valve Keys. All quick coupling valve keys shall be Rainbird 44K and shall have a hose swivel attached to the key. At least one valve key and one cap lock key shall be turned over to the Parks Division at completion of the project.
 8. Sprinkler Risers. All rotor pop-up sprinklers shall be installed with double swing joint. Spray pop-up sprinkler heads shall have a double swing joint riser, constructed of funny pipe, barbed fittings and Marlex street ells on the head side (see IR-12).
 9. Heads. All heads used on this project shall be as specified in the materials listed on the plans.
 - a. All heads shall be installed above grade so as to minimize washing of the topsoil and seed during the landscaping establishment period, except those which border paving or flat work of any kind. These heads shall be installed at the finished grade of the adjacent paving or flat work.
 - b. Heads installed in existing sod shall be set at the grade of the soil.
 - c. All rotary pop-up heads shall be installed at final grade on double swing joints. See detailed drawings. All swing joints must drain by gravity back to the supply lines.
 - d. All pop-up, shrub spray, lawn spray, bubbler and strip spray heads

- shall be installed as shown in the details.
 - e. All pipes, lines, and risers shall be flushed thoroughly with water before installation of any heads. All debris and rocks found at that time shall be removed from the area as soon as possible.
 - f. Heads shall be spaced at a minimum of 2" from all sidewalks, curbs or hard surfaces.
10. Bubblers. Bubblers shall be provided at each tree within turf areas. At no time shall bubblers run on the same control valve as sprays or rotors. Bubblers shall be placed on the uphill side of the tree.
 11. Prior to final acceptance of the project, **all heads** shall be raised or lowered to final lawn or planting grade or as specified by the City.

4.08.04 **Irrigation Controller and Control Valve**

The controller shall be a Rain Master Evolution DX2 Controller with a T-option (lightning arrestor). The controller shall be enclosed in a Stainless Steel V.I.T. Products INC Strong Box SD-12DSS/ SD-24DSS or Approved Equal with a retrofit panel or an Evolution DX2 locking vandal proof stainless steel box as determined by the Parks Department. All controllers shall be on the Herriman City UHF frequency and shall allow DTMF tone operation for sprinkler controls. Battery / solar operated controllers shall not be allowed. All controllers shall be mounted on a stable wall or a formed concrete based pedestal mount.

1. The Contractor/Developer is responsible for a 110 volt electrical service. This service must be metered. This connection shall be inspected and approved by the City Division of Building and Safety. All 110 wires shall be in a conduit and buried at least 24 inches deep. All local, State and National Codes shall take precedence in the furnishing and connecting of 110-volt electrical service to the controller.
2. It shall be the Contractor's responsibility to install and supply a GFCI protected plugged outlet, junction box or separate breaker to furnish power to a new controller. Surge protection shall also be provided at the incoming power and low voltage power side grounding as per national electrical code. Bond ground rods when more than one is used.
3. The Contractor shall be required to provide conduit, wiring, and all materials along with the labor necessary to make the controller operational and in compliance with adopted electrical codes.
4. When an existing controller is used for part of a new sprinkler irrigation system, the **Contractor** shall coordinate the setting, wiring, use, and all maintenance operations pertaining thereto, with the City park maintenance personnel.
5. Box must be keyed to City standard key system.
6. Wiring. All wiring shall be in accordance with the following:
 - a. National Electric Code.
 - b. International Building Code.
 - c. Recommendations by the Parks Division and/or the Division of Building and Safety.

- d. All wiring to be continuous.
 - e. If splices are necessary, they are to be housed in a minimum ten-inch round valve box with a "3M DBR or DBY" dry splice or approved equivalent with 6' extra coiled in a box.
 - f. All wiring under pavement or asphalt shall be in conduit.
 - g. It shall be the Landscape Architect's or Contractor's responsibility to call out any conflict between the above listed codes.
7. All irrigation control wire shall bear approval as U.L. type of underground feeder and each conductor shall be of electrical conductivity grade copper in accordance with ASTM-30. All control wire shall be specifically designed for direct burial use. Control wire shall be #14 solid core UF. A minimum loop of 24 inches shall be coiled and left at each valve, at each splice, and at each controller and 36 inches at each corner for expansion and/or servicing of the wire. All wire, crossing water, attached to bridges, going under paving, or where conditions require protection, shall be housed in conduit or sleeves, all out of ground conduits shall be rigid metal conduit. All buried conduit and fittings shall be electrical P.V.C. conduit.
 8. Multiple wires in the same trenches shall be banded together at 10 foot intervals for protection. Where wires pass under paved areas, Schedule 40 P.V.C. sleeves shall be installed prior to installation of the paving, if possible, and prior to installation of the wires. Sleeves shall be sized as follows: 1-11 wires in 1-1/4 inch pipe; 12-15 wires in 1-1/2 inch pipe; etc.
 9. Electric Remote-Control Valves. Valves shall be installed as specified on drawings and approved by the Parks Division. Remote-control valves shall be installed in a valve box (i.e., Carson Brooks Standard model 1419-12 or approved equivalent, Note: this is the minimum size). There shall be no more than one valve per box and the valve must be positioned so the top of the valve can be removed without removing the valve box. All valve boxes must be installed at a finish grade. All valves must be installed with a threaded union on the downstream side of the valve. All valves will have one (1) shut-off isolation ball valve per sprinkler station installed up stream of the station valve. The station valve and the isolation ball valve must be installed in the same valve box with adequate room for service.
 - a. Control valves shall be installed as specified by the plans. Each valve shall be brass globe diaphragm and electrically activated. Control valve shall be a Rainbird GB-PRS. No valve shall be installed more than 12 inches below finished grade. All pipe on the control valve manifolds shall be Schedule 80 P.V.C. pipe. See the detailed drawing in the section following.
 10. Contractor shall install a Rain Master DX-Flow sensing circuit board.
 11. Contractor shall install a Rain Master DX-Radio-Kit.
 12. Contractor shall install a Rain Master DX-ANT-DISC low profile antenna.

13. Contractor shall install [Netafim](#) Master Valves on all main lines [at the point of connection](#). Locations shall be determined by the Parks Department.
14. Contractor shall install Rain Master FS Flow Sensors on all main lines [at the point of connection](#). Location shall be determined by the Parks Department. Flow sensor shall be one size smaller than mainline. [On mainlines 1 1/4" and smaller, the flow sensor remains the same size.](#) Mainlines 1.5" and larger a plastic flow sensor is required.
15. Contractor shall install Rain Master EV-CAB-SEN sensor cable.
16. Contractor shall install a 5/8" x 8' grounding rod, with a No. 6 bare copper wire to the controller.

4.08.05 **Connection and Cross Connection Control.**

1. Connection Fee. The Contractor/Developer shall pay the appropriate water connection fee for the water meter, prior to any construction.
2. Connection to Mainline. The Developer/Contractor shall be responsible for installing the tap to the City water main. This includes all applicable labor, materials, road cuts and road cut permits. Prior to making a connection, the Developer/Contractor must have written approval for the landscape water connection by the Engineering Division.
3. General Requirements. To ensure compliance with the regulations of the State of Utah, which prohibits unprotected cross connections between the public water supply and any unapproved source or connection, the City requires the installation of approved backflow prevention devices. The backflow prevention device is to be installed by the Contractor/Developer at his expense. The degree of hazard and the type of backflow prevention device required to abate the cross-connection shall be determined by the developer's engineer and reviewed and approved by the City. Maintenance, testing, and repair of the devices shall be as designated in the City's cross connection control ordinance.
4. Backflow Prevention Requirements, Inspections and Tests. Back flow prevention devices shall be selected from a list of approved devices set forth by the City Water Department. Reduced Pressure Assemblies (RP) shall be the only accepted styles of back flow prevention devices. This selection shall then be approved by the City Water Department prior to installation. Each device shall be installed in compliance with the current International Plumbing Code and Utah Department of Environmental Quality Division of Drinking Water regulations. Each device shall be tested within ten (10) days of installation and at least once yearly thereafter by a back flow technician licensed by the State of Utah. The location of each device shall be reported to the City Water Department and City Parks Division in writing within ten (10) days of installation. Refer to the cross connection control ordinance for additional details.
5. Backflow Prevention Location. Location of the installation of the back

flow prevention device shall be approved by Herriman City prior to installation.

6. Reduced Pressure Assembly (RP) (see standard details)
 - a. The assembly shall be protected from freezing and vandalism.
 - b. The bottom of the RP assembly shall be a minimum of 12 inches above the ground.
 - c. The body of the RP shall be a minimum of 12 inches from any walls, ceilings, or encumbrances and shall be readily accessible for testing, repair, and maintenance.
 - d. RPs shall not be installed in a pit
 - e. RPs shall not be installed in a vault.
 - f. The relief valve on the RP shall not be directly connected to any waste disposal line, such as sanitary sewer, storm drains, or vents.
 - g. The RP shall be maintained as an assembly.
 - h. The RP shall be installed in a horizontal position only.
 - i. All outlets on potentially contaminated systems shall be posted (use properly colored pipe- purple is common):

DANGER - UNSAFE WATER

4.09 Landscape Design

All irrigation work shall be inspected and approved by the parks division. Prior to beginning any landscaping work in this section, approval shall be obtained by the developer and/or contractor in writing from the parks division.

- 4.09.01 **Coverage Test.** Proper irrigation of the landscape should be performed prior to placement of sod, seeding or hydro seeding to bring up moisture content.
- 4.09.02 **Scope of Work.** The work consists of furnishing all equipment, labor and materials necessary for the planting of areas indicated on the plans. Plant totals on the plant list shall be consistent with the illustrated quantities on the plans. The Parks Division shall approve all sizes and quantities.
- 4.09.03 **Drawings and Specifications.**
 1. Ordinances and Regulations. All local, Municipal and State laws and rules and regulations governing or relating to any portion of this work are to be incorporated into and made a part of all plans and specifications and their provisions shall be carried out by the Landscape Architect and Contractors. Anything contained in these specifications shall not be construed to conflict with any of the ordinances and regulations of the City; however, these specifications take precedence over the requirement of said rules and regulations when they describe materials, workmanship or construction of a higher standard or larger size.

2. Bonding and Inspection. The sprinkler system and landscape planting will be bonded as part of the entire development project. Bond releases will be handled through the Engineering Division. The City will sign **off release(s) in the above areas only for 75%, 15% or 10% bond release.**
3. Materials. Whenever any material is specified by name and/or number, such specifications shall be deemed to be used for the purpose of facilitation of a description of the materials and establishing quality. **No substitution will be permitted unless approved by the Parks Department.**
4. In the event of any changes in plant locations or variety, the contractor shall clearly notify the Parks Division. The changes shall be indicated by the signature of the Contractor and an authorized City Official on all sets of plans.

4.09.04 **Obstructions Below Ground.** Blue Stakes 801-208-2100

1. Prior to excavation for planting or the placing of stakes, the contractor shall locate all electrical cables, conduits and other utilities so that proper precautions may be taken. In the event of a conflict between utilities and plant locations, promptly notify the Parks Division. Failure to follow this procedure places the responsibility and expense upon the contractor for making any and all repairs.
2. Remove rock, road base, or other underground obstructions, except utility lines, to a minimum of a one foot depth to permit proper installation of lawns and planting.

4.09.05 **Spacing.** When plant material is organized in rows, all plants shall be equally spaced. Where plants are placed in a meandering fashion, unequal spacing is required. Ground cover will be planted at the spacing indicated for each individual plant (a maximum distance of 8" on center).

1. Plants To Be Furnished. The Developer shall furnish plants as listed on the drawings and specified in this book. Street tree species shall be mixed to allow biological diversity to prevent possible spread of disease or infestation among like species. All quantities and sizes shall be as follows:
 - a. All shrubs shall be a minimum 5-gallon size unless prior approval is obtained from the Parks Division. Before any approval will be given, the variety, size and spacing must be given in writing.
 - b. All trees shall be a minimum of 2" caliper, measured at 6 inches above the root ball. Any variation requires written approval from the Parks Division. The location of all trees shall be approved by the Parks Division prior to installation.
 - c. The developer shall pay the cost of installation of parkway trees. Parkway trees shall be installed on all designated streets.
 - d. All plants delivered to the site must be first class representatives of their species or varieties. They must be free from disfiguration, with well-developed branch systems and vigorous, fibrous root systems. Plants not conforming to these requirements must be

removed, whether in place or not, and replaced with acceptable plant material.

- e. All plant material must meet the specifications of Federal, State and County laws requiring inspection for plant disease and insect infestation. Tag all plants with the name and the size of the plants in accordance with Standard of Practice recommended by the American Association of Nurserymen. Final determination of plant species or variety will be made by the Parks Division.
- f. Root conditions of plants furnished in containers may be determined by the Parks Division. The selection of plants shall be made by the Landscape Architect with the final approval by the Parks Division. Any plant deemed unsuitable will not be accepted by the City and must be replaced at the Contractor's expense.

4.09.06 **Substitutions.** No substitutions for the indicated plant materials will be permitted unless approved in advance by the Parks Division. Any substitutions shall be at least the same quality and size as to that specified on the plans. All substitute plant materials shall conform to the requirements of these specifications.

4.09.07 **Finish Grading and Soil Preparation.** Finish grading shall consist of the following:

- 1. Planting areas shall conform to the uniform grade by floating or hand raking, with soil containing 1" minus rock.
- 2. It shall be the responsibility of the landscape contractor to ensure proper drainage. Grading shall facilitate the natural runoff of water. Low spots and pockets must be graded to drain properly.
- 3. Finish grade of all lawn areas shall be flush with adjacent hard surfaces. To ensure proper final grading, adjust soil grade for planting. This may require allowance for differing sod thickness, etc. Roll all lawn areas with a water-filled roller to obtain uniform compaction and level surfaces (50 pounds minimum weight). Slope of grade must have a 1% fall from a structure.
- 4. Minimum soil preparation shall consist of the following:
 - a. Soil amendment shall be an organic wood base product, 70% from 0 to 1/8".
 - b. Upon completion of grading, soil shall be roto-tilled to a depth of 6", removing all rocks and debris (if soil condition requires it, the City may require import of up to 6" of screened sandy loam topsoil). Soil shall be prepared with the following, mixed thoroughly in all planting areas:
 - i. Three (3) cubic yards per 1,000 square feet of organic wood base product.
 - ii. Five (5) pounds per 1,000 square feet of 16-16-8 fertilizer with 2% iron.

4.09.08 **Chemical Weed Control.**

- 1. Pre-emergent chemical of Treflan, Surflan, Enide or other approved product shall be applied at manufacturer's recommended rates and only

as directed by the Parks Department.

4.09.09

Planting.

1. Prepare lawn areas as specified under soil preparation. Slope all areas to drain according to the Architect's drawings and Planning Department's and Parks Department's approval.
2. Rake these areas as specified under soil preparation, until the surface areas are smooth and of uniformly fine texture immediately prior to planting the turf, remove all rock from area.
3. Seeding. After areas have been approved for seeding, sow seed mixture at the rate of 10 pounds per 1,000 square feet of area. Seeding shall be done by hydro-mulching process, including Agriform fertilizer or equivalent at the rate of 1 pound actual nitrogen per 1,000 square feet and 1,500 pounds cellulose fiber (dyed green) per acre.
4. Seed mixtures shall be approved by the Parks Department. Seed shall bear this season's certification of weight, purity and germination from a reputable seed company.
5. Watering. After hydro-mulching, thoroughly water seeded areas with a fine spray. Red-seeded lawns and turf areas that do not show prompt germination at ten (10) day intervals until an acceptable stand of grass is assured.
6. Fertilizer. Two weeks after germination, commercial fertilizer (16-16-8) shall be applied at the rate of four (4) pounds per 1,000 square feet.

4.09.10

Sod.

1. Prepare lawn areas as specified under soil preparation. Slope all areas to drain according to the Architect's drawings that have been approved by the Planning Division and Parks Division.
2. Immediately prior to planting the turf, rake the lawn areas as specified under soil preparation until the surfaces are smooth and of uniformly fine texture, remove all rock from area.
3. Finish grade of all sod areas will be such that after the sod is installed, the finish grade will level with the sidewalk or adjacent pavement areas.
4. Lay sod with staggered seams. Sod shall be kept moist during installation.
5. After sod has been laid, water the soil, then roll sod with a water roller filled with 50 pound minimum weight to level sod and ensure positive contact with soil. Begin required irrigation immediately following rolling.

4.09.11

Ground Cover.

1. Prepare ground cover areas as specified under soil preparation; including commercial fertilizer 6/10 lb of active ingredient with micronutrients, 100% slow release nitrogen. (14-14-14) at the rate of 4 pounds per 1,000 square feet, not less than 1 day prior to planting.
2. Spacing of ground cover shall be no greater than 8" on center.

4.09.12

Trees and Shrubs.

1. Plant to their normal depth and water in thoroughly. Prepare planting

- holes and stake the trees as shown in the LP-01.
2. The spacing and species of trees shall conform to the Streetscapes/Park Master Plan ordinance.
 3. Location. Trees shall be kept not less than:
 - a. Thirty (30) feet back of beginning of curb returns at any street intersection.
 - b. Twenty (20) feet from lamp standards and power poles.
 - c. Ten (10) feet from fire hydrants.
 - d. Five (5) feet from service walks and driveways.
 - e. Five (5) feet from water meters.
 - f. When planting trees next to school signals use the current *Manual on Uniform Traffic Control Devices*, Section 7D-13, Table VII-1. The table is as follows:

| 85 Percentile Speed (mph) | Minimum Visibility Distance (ft) |
|------------------------------|-------------------------------------|
| 20 | 175 |
| 25 | 215 |
| 30 | 270 |
| 35 | 325 |
| 40 | 390 |
| 45 | 460 |
| 50 | 540 |
| 55 | 625 |
| 60 | 715 |

Table VII-1

- g. All containers, etc., shall be removed from trees and shrubs prior to planting. All B & B stock shall have the bailing twine removed and burlap folded down below ground level. Care must be given to not disturb the root zone.
 - h. Any trees or shrubs planted too deep will not be accepted. Root flair should be at finish grade (see LP-01).
 - i. Tree guards are required at the base of the trunk on all trees planted.
 - j. All trees installed in turf areas must have a three foot diameter tree well with two inches of decorative bark.
- 4.09.13 **Weed Barrier.** A commercial strength weed barrier fabric must be installed in all landscaped areas without sod. Examples of weeds requiring weed barriers are: under mulch, wood chips, around trees in tree grates, etc. Exceptions must be approved in writing by the City.
- 4.09.14 **Staking.** Staking shall only be performed if necessary: top heavy, tipping out, etc. (See LP-01)
- 4.09.15 **Tree Grates.** Where tree grates are required.

1. The tree grate must be iron or ductile iron.
2. The tree grate must be a 5' square and not penetrate the sidewalk or curb.
3. The openings between bars must be 3/8" or less for pedestrian safety.
4. The opening provided for the tree must be between 12" and 16" in diameter. To accommodate tree growth, openings must be easily expandable without losing their structural integrity.
5. Tree grates must be painted a flat black with a commercial grade coating.
6. A commercial strength weed barrier fabric must be installed underneath the tree grate. When installing fabric, leave a 12" diameter hole for the tree.

4.09.16 **Maintenance.** Plant maintenance work shall consist of watering, weeding, caring for plants, edging and mowing the lawn, fertilizing, and performing the following plant establishment work:

1. The entire project shall be satisfactorily maintained throughout the twelve month warranty period. The maintenance period will begin after written approval of the Parks Division.
2. The lawn and turf shall be completely irrigated until the Parks Division has given approval of the project to the City Engineer and the Developer. Irrigation shall be applied to all lawn areas by means of the sprinkling system, and the areas shall be kept moist, but not wet, until the first cutting of grass. After first mowing, irrigate lawn to maintain a thriving condition.
3. Lawns shall be kept green and vigorously growing at all times.
4. An application of fertilizer, shall be applied as directed on the 35th. And the 60th day, and then every 45 days thereafter until it is approved by the Parks Division.
5. At completion of the maintenance period, all areas including sidewalks and gutters shall be clean and free of debris and weeds. All plant materials shall be live, healthy, free of infestations or weeds, and be of acceptable growth until the 100% bond release. The contractor shall obtain a written release from the Parks Division before ending maintenance obligations.
6. Corrections & Replacements shall be done immediately prior to start of maintenance period.

4.09.17 **Herriman City Approved Tree and Shrub list.** The trees and shrubs listed below shall comply with the following areas.

1. Park Strip Trees. The following trees are allowed in all park strips.
 - a. Acer platanoides 'Columnar' (Columnar maple)
 - b. Celtis occidentalis (Hackberry, Common, Prairie Pride, Chicagoland)
 - c. Corylus collurna (Turkish Hazel)
 - d. Fraxinus mandschurica (Manchurian ash)
 - e. Ginkgo biloba (Maidenhair tree, any hybrid variety)
 - f. Pyrus calleryana 'Chanticleer/Cleveland' (Flowering Pear)

- g. *Pyrus calleryana* ‘Capital’ (Capital flowering pear)
 - h. *Quercus bicolor* (Swamp White Oak)
 - i. *Tilia cordata* (Littleleaf Linden)
2. Open Space Large Trees. The following are large sized open space trees.
 - a. *Acer platanoides* (Norway maple, Emerald Queen, Cleveland, Emerald Lustre, Parkway, Deborah, Fairview)
 - b. *Fraxinus Americana* (White ash; Autumn Purple, Autumn Applause)
 - c. *Fraxinus pennsylvanica* (Green ash; Marshall Seedless, Summit, Patmore, Bergeson, Cimmeron)
 - d. *Gleditsia tricanthos* (Honeylocust; Imperial, Skyline, Shademaster)
 - e. *Platanus acerifolia* (Sycamore/London plane tree)
 - f. *Pyrus calleryana* (Flowering pear; Aristocrat, Bradford, Redspire, Stonehill, Trinity)
 - g. *Quercus robur* (English oak; Skymaster)
 - h. *Quercus robur fastigiata* (Columnar English oak)
 - i. *Quercus rubra* (Red oak)
 - j. *Tilia Americana* (American Linden; Redmond)
 - k. *Ulmus x hybrids* (Hybrid Elms; Allee, Prospector, Accolade, Frontier, Homestead, Pioneer)
 - l. *Zekova serrata* (Zelkova, Green Vase, Village Green)
 3. Open Space Medium Trees. The following are medium sized open space trees.
 - a. *Craetagus crus-galli* (Thornless cockspur hawthorn)
 - b. *Craetagus lavalleyi* ‘Carrierei’ (Carriere hawthorn)
 - c. *Malus Spring Snow* (the only crab that is truly fruitless)
 4. Open Space Small Trees. The following are small sized open space trees.
 - a. *Cercis Canadensis* (Eastern redbud; also Forest Pansy)
 - b. *Malus Golden Raindrops* (Golden Raindrops flowering pear)
 - c. *Malus Centurion*
 - d. *Malus Donald Wyman*
 - e. *Malus Indian Magic*
 - f. *Malus Prairie Fire*
 - g. *Malus Snowdrift*
 - h. *Malus Red Baron*
 5. Conifers/Evergreens. The following Conifers/Evergreens may be planted in open spaces.
 - a. *Abies concolor* (White fir)
 - b. *Cedrus atlantica glauca* (Blue atlas cedar)
 - c. *Pinus lucodermis* ‘Heldrechii’ (Dwarf Austrian Pine)
 - d. *Pinus nigra* (Austrian pine)
 - e. Vanerwolf Pine
 6. Prohibited trees. The following are prohibited within all of Herriman City.

- a. Acer negundo (Box Elder tree)
- b. Acer saccharinum (Silver Maple)
- c. Eleagnus angustifolia (Russian olive)
- d. Morus alba (Fruitless Mulberry)
- e. Populus species (including cottonwoods and aspen)
- f. Prunus cerasifera (Flowering plum)
- g. Robinia (All species of Robinia)
- h. Salix species (including all trees in the willow family)
- i. Sophora japonica (Japanese pagoda)
- j. Koelreteria paniculata (Goldenrain tree)
- k. All species of Birch
- l. All species of Poplar
- m. All variety of bearing fruit or nut trees
- n. Balm of Gilead
- o. Catalpa
- p. Chinese Date
- q. Gambe Oak
- r. Kentucky Coffee tree
- s. May Day tree
- t. Saskatoon Service berry
- u. Siberian Elm
- v. Silk tree
- w. Black Locust

4.09.18 **Stamped Concrete.** In some areas the City may require stamped concrete in the park strip. These areas shall have diamond shaped tree wells along the roadway.

4.10 Playground Equipment Specifications.

Playground equipment shall comply with all requirements listed below.

4.10.01 **ASTM, ADA, CPSC.** All Playground equipment must comply with standards of the American Society for Testing and Materials (ASTM), the Consumer Product Safety Commission (CPSC) and Americans with Disabilities Act (ADA). This must include adequate safety surfacing and transfer points or ramps to an appropriate number of elevated play components.

4.10.02 **Playground Equipment.** All playgrounds equipment shall be Game Time or Miracle Recreation equipment manufacture's. Playground equipment should meet the following specifications:

1. Posts. Steel posts shall be constructed of 5" tube with 5" round end caps mechanically fastened to the top end. After fabrications, all posts and end caps shall be PVC coated.
2. Decks. All decks shall be PCV coated punched steel. All deck-to-post connections shall be made beneath deck with no exposed fasteners on deck perimeter.

3. Slides, Tubes, Roofs, and Panels. All slides, tubes, roofs and panels shall be constructed of colored rotationally molded plastic. Any legs, clamps and handholds shall be PVC coated.
4. Standard Steps. Standard steps shall have 9" rise by 9" tread. ADA steps shall have 6" rise by 18" treads. The stair assemblies shall be PVC coated. Deck enclosures, spoked and open handrail enclosures, sleeves and clamps shall be PVC coated.

4.10.03 **Surfaces.** All playground equipment must be installed over an acceptable impact absorbing surfacing material. It is the responsibility of the playground designer, installer and operator to ensure that the size, type and depth of impact absorbing material used complies with the U.S. Consumer Product Safety Commission "Handbook for Public Playground Safety" (CPSC Handbook). This impact absorbing material must cover the entire "Use Zone" area to a depth appropriate for the height of the play equipment. The "Use Zone" is an area under each piece of play equipment. Acceptable impact absorbing surfacing materials include unitary safety surfacing such as pour-in-place rubber or rubber tiles, and natural loose fill materials such as bark nuggets, wood mulch, and wood chips. 12" of compacted wood chips and 6" of pea gravel separated by a non plastic weed fabric shall be placed under all "Use Zones".

4.10.04 **Use Zones.** Use zones are the areas under each piece of play equipment that must be covered with an acceptable impact absorbing surfacing material. The specific size of these use zones depend upon the type of play equipment as follows:

1. Regular Swings. The use zone must extend at least two (2) times the pivot point height to both the front and rear of the top rail. The use zone must extend at least six (6) feet out at each end from the swing frame.
2. Tire Swings. The use zone must extend at least six (6) feet plus the length of the suspension members in all directions. The use zone must also extend six (6) feet out at each end from the swing frame legs.
3. Slides. The use zone must extend at least six (6) feet in all directions from the perimeter of the slide. Also, in front slide exit measuring from the point where the slide slope is reduced to 5 degrees, the use zone must extend a total of four (4) feet plus the height of the platform.
4. All other play equipment. The use zone must extend at least six (6) feet in all directions from the perimeter of the play equipment.

4.10.05 **Playground Areas.** All playground areas shall have a 5' sidewalk around playground with a modified (20" tall, reinforced) APWA Plan # 209 Type Q curb. All playgrounds shall be ADA accessible.

4.11 Park Equipment Specifications

The park equipment installed within Herriman City shall conform with the requirements listed below.

- 4.11.01 **Benches.** All benches shall [have the legs cemented in](#) to an ADA accessible concrete pad. [The finished height of the seat of the bench shall be 17”](#). The bench shall be powder coated or PVC coated metal that allows water to pass through without pooling.
- 4.11.02 **Tables.** All tables shall [have the legs cemented in](#) to an ADA accessible concrete pad. All tables shall be powder coated or PVC coated metal that does not allow the accumulation of water to affect the integrity of the table.
- 4.11.03 **Pavilions.** All pavilions shall be ADA accessible.
- 4.11.04 **Gazebos:** All parks equipped with playground equipment shall have a gazebo. All gazebos shall be at a minimum 16’ x 16’ as manufactured by RCP Shelters, AS-16-06. Color shall be approved by the City. All gazebos shall be ADA accessible. Gazebos shall be equipped with two tables and [legs of tables shall cemented in to a cement pad](#).
- 4.11.05 **Drinking Fountains:** Drinking fountains are required on all parks that have public parking. All drinking fountains shall be ADA accessible.
- 4.11.06 **Restrooms:** All restrooms shall be ADA accessible.
- 4.11.07 **Concessions:** All concession stands shall be ADA accessible.
- 4.11.08 **Submittals:** Three copies of all installation, maintenance booklets, and warranty information shall be provided to Herriman City prior to bond release.
- 4.11.09 **Park Signs:** [All parks, tennis courts, trails, detention or retention ponds shall have a sign with Herriman City logo. The sign shall have all information regulated by Herriman City. For exact details of sign please contact the parks department.](#)

4.12 Easements and Agreements.

All required easements and agreements shall follow the requirements listed below.

- 4.12.01 Easements for culinary water, sewer, power, irrigation water, storm water drainage, wetlands, and/or other utilities or purposes shall be provided by the Developer and designated on the improvement plans and final plat or separate document as required to accommodate the utility systems in the development. Where natural drainage channels, interceptor systems, or flood hazard or sensitive area overlay zones cross the development, the developer must obtain the necessary permits to modify such drainage facilities, and designate the channels, systems, or flood hazard zones, and any associated restrictions, on the plat as well as provide the necessary easement dedication.
- 4.12.02 Easements and area descriptions shall be of sufficient width to completely identify and provide for access and maintenance of the utility or identified restricted area.
- 4.12.03 Easements to be dedicated to Herriman City which are not shown and described on the dedication plat shall be submitted to the City Engineer on forms provided by the City. Said easements shall include, by attachment, a

drawing of the easement being dedicated and a complete legal description of the easement.

- 4.12.04 Under no circumstance shall permits be issued or construction allowed without the proper easements in place to accomplish the work.
- 4.12.05 Should easements become necessary to cross abutting private property to permit drainage or utility access of the development, it shall be the responsibility of the developer to acquire such easements at no cost to the City.
- 4.12.06 Both legal and physical accesses are required to all manholes, cleanouts, valves, or other structures requiring periodic maintenance. Physical access shall consist of all weather surfaces sufficient to allow of all routine maintenance and repair equipment.

4.13 Surveying/Staking

All survey and staking within a development shall be conducted according to the following requirements.

- 4.13.01 All surveying, both horizontal and vertical, shall be tied to two Herriman City Monumentation, using State Plane Coordinates, Utah Central Zone, NAD 83 US Survey foot.
- 4.13.02 Stakes set for the construction of inlet boxes, manholes or other structure shall include a minimum of at least two stakes to adequately locate and align structure.
- 4.13.03 Back lot corners shall be marked with a metal pipe or rod driven into the ground, and projected front lot corners shall be identified with permanent brass markers in the sidewalk or back of the curb. The brass markers shall be a minimum diameter of 1.17 inches. The appropriate lot number shall be stamped into the marker divided by a vertical line centered on the property line, example H23|H24. The markers shall be countersunk into the concrete.
- 4.13.04 All lot corners must be in place prior to the issuance of building permits and after the completion of all development improvements.
- 4.13.05 It shall be the responsibility of the lot owner to ensure that all lot corners are in place prior to the final inspection. The City is not responsible to replace survey stakes or markers.
- 4.13.06 Care must be taken to not disturb, remove, or alter any existing monumentation found, recorded, or otherwise encountered during the development of property.
- 4.13.07 New monumentation is required in all new developments and shall include all intersections, PI's and/or PC's, PT's. All monuments shall be Salt Lake County monuments, see Salt Lake County for current requirements.
- 4.13.08 Monumentation of all water services, sewer services, gas services, and power services shall be marked with brass markers of a minimum diameter of 1.17 inches. The markers shall be located in the top back of curb. The appropriate utility shall be stamped on the marker (WATER, SEWER, GAS, and POWER).

- 4.13.09 All monumentation installed for the subdivision, removed or disturbed during construction shall be at the expense of the developer.

4.14 Vinyl Fence Specification (Privacy and 4-rail fencing)

The following requirements are the general specifications for vinyl fencing.

- 4.14.01 General requirements for materials, workmanship and installation of rigid polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) compound privacy fencing within the municipal right-of-way are as follows:
1. Vinyl fence shall be either 4 rails (5'), solid privacy (6') or semi private (6').
 2. All vinyl products shall meet or exceed minimum standards and tolerances set forth by ASTM for length, nominal thickness, heat shrinkage, weathering, color, chalking, profile, impact resistance, warp or bow, etc. Specifically refer to ASTM D 1784-99a, 'Standard Specification for Rigid Poly Vinyl Chloride (PVC) Compounds and Chlorinated Poly Vinyl Chloride (CPVC) Compounds'
 3. All vinyl components shall be covered by a non-prorated limited lifetime manufacturer warranty.
 4. All hardware and fasteners shall be galvanized or stainless steel. Manufacturer produced hardware and fasteners shall be used where possible.
 5. All fencing shall be installed by mechanics skilled and experienced in erecting fences of the particular type to be installed and shall be in accordance with Herriman City specifications.
 6. All installed vinyl fencing shall be designed and constructed to withstand 90 mph wind loads as determined by the Uniform Building Code.
 7. Color and style of the fencing shall be as dictated by the Herriman City Planning Commission or other designated authority. Alignment of the installed fence and fence components, both plan and profile, shall be in straight lines so far as conditions of the site permit.
 8. The installer shall leave the fence construction area free from excess dirt, rubble, concrete, scraps, debris, packaging or other waste directly resulting from the fence construction activities.
 9. Where recommendations of the manufacturer are more stringent or conservative than Herriman City specifications, the recommendations of the manufacturer shall be followed.
 10. The fence shall be placed in the alignment specified in the development plat and/or plans.
- 4.14.02 Specific requirements for materials, workmanship and installation of vinyl fence posts are as follows:

1. Post dimensions shall be 5.0 inches square (outside dimension) with minimum wall thickness of 0.17 inches (heavy wall). Posts may have pre-formed holes for rails.
2. Post spacing shall be no greater than 6.0 feet on center.
3. Post holes shall be a minimum 12.0 inches diameter by 36.0 inches depth. In all cases, the embedment depth of the posts shall be minimum 36.0 inches below finished grade. Posts shall be aligned and plumbed and post holes shall be filled with concrete to within 3.0 inches of finished grade. Concrete post mix shall be allowed to cure a minimum of one week before rails and slats are installed.
4. All posts shall be reinforced with #4 bar and concrete or steel sleeves. Where #4 bar and concrete is used, place two #4 bars at diagonal corners of the post and fill the post with concrete from the bottom of the post to a level 24.0 inches above the finished ground surface. All gate posts and end posts shall be reinforced with #4 bars and concrete to a level the full height of the post. Where steel sleeves are used, the sleeves shall of a type recommended by the manufacturer and shall extend the full height of the post.
5. All concrete used for reinforcing and setting fence posts shall be Class 2000 by APWA standards and specifications. All concrete shall be pre-mixed and wet-set.
6. Vinyl caps of the style designated by the Herriman City Planning Commission or other designated authority shall be installed on all fence posts. Fasten post caps on every post according to manufacturer recommendations.

4.14.03 Specific requirements for materials, workmanship and installation of vinyl fence rails are as follows:

1. Rail dimensions shall be 1.5 inches by 5.5 inches ribbed with a minimum wall thickness of 0.09 inches. Wherever possible, rails shall span two post spacing (12 feet). Rail joints in adjacent vertical rail levels shall be staggered horizontally in the fence posts.
2. The bottom rail of a standard vinyl privacy fence should be located approximately 2.0 inches above the finished grade elevation. The bottom rail of a standard vinyl 4 rail fence should be located approximately 9.0 inches above the finished grade elevation. Adjacent vertical rails of standard vinyl 4 rail fences should be placed approximately 9.0 inches between.
3. Top and bottom rails of standard vinyl privacy fence shall be reinforced with galvanized, stainless steel or other corrosion resistant metal per manufacturer recommendations.
4. Fasten all rails according to manufacturer specifications.

4.14.04 Specific requirements for materials, workmanship and installation of vinyl privacy fence slats are as follows:

1. Slat dimensions shall be 6.0 inches by 0.875 inches ribbed with a minimum wall thickness of 0.06 inches.
2. All slats shall be “tongue and groove” style.

3. Fasten slats according to manufacturer specifications.
- 4.14.05 Specific requirements for materials, workmanship and installation of vinyl gates are as follows:
1. Gate style should match the fencing style.
 2. Vinyl gates shall be installed according to manufacturer recommendations using all necessary hardware to make them self closing and self latching.
 3. Gates less than or equal to 4 feet in width may be all vinyl construction and shall be purchased pre-assembled from the fencing manufacturer where available. Where special gate widths are necessary due to site constraints, gates smaller than 4 feet in width shall be assembled using gate kits or instructions provided by the manufacturer. Two standard 4 foot gates may be used to create an opening up to 8 feet wide.
 4. Vinyl gates wider than 4 feet shall be reinforced with a suitable material and configuration or otherwise constructed to enable them to span the desired distance without sagging or ceasing to swing properly or otherwise become structurally or functionally unsound. In most instances, a steel or aluminum frame with a vinyl gate façade or a steel or aluminum gate powder coated to match the vinyl fence color is preferable. Consult the manufacturer for recommendation on construction of gates wider than 4 feet.

4.15 Precast Concrete Fence Specifications

The following requirements are the general specifications for precast concrete fencing.

- 4.15.01 General requirements for materials, workmanship and installation of concrete fencing, including panels, posts, footings, site work and other appurtenances, within the municipal right-of-way are as follows:
1. All concrete products shall meet or exceed applicable minimum standards and tolerances set forth by ASTM for strength, hardness, deformation, durability, etc. Similarly, other products, such as curing compounds, stains, reinforcement, fasteners, grout, hardware, etc., used in the manufacturing, production, construction and/or installation of concrete fences shall meet or exceed applicable minimum standards and tolerances set forth by ASTM.
 2. The work shall be performed in accordance with all applicable federal, state and local safety laws and regulations, including the Occupational Health and Safety Act of 1970 as amended (OSHA). Responsibility for awareness and observation of any recommended practices or regulations concerning the handling, placement, or installation of construction materials shall be that of the Developer.
 3. If requested by the City, the Developer shall provide drawings and details stamped by an engineer licensed in the State of Utah which adequately describe the precast fencing elements including:
 - a. shape and dimension of precast components,

- b. size, quantity and details of the reinforcing steel,
 - c. quantity, size and type of connection hardware,
 - d. size and location of drain openings, and
 - e. size, type and details of necessary lifting mechanisms.
4. If requested by the City, the Developer shall provide design calculations stamped by an engineer licensed in the State of Utah which include a summary of all design parameters including material types, strength values, allowable stresses, assumed loads, load combinations, etc.
 5. If requested by the City, the Developer shall provide a copy of a soils report prepared by an engineer licensed in the State of Utah for the project.
 6. APWA Section 03400 Precast Concrete shall apply, where applicable, to Work provided under this section.
 7. Where recommendations of the manufacturer or design engineer are more stringent or conservative than Herriman City specifications, the more conservative specifications shall be followed.
 8. All installed concrete fencing shall be designed and constructed to withstand 90 mph wind loads as designated by the Uniform Building Code.
 9. Color and style of the concrete fence shall be as dictated by the Herriman City Planning Commission or other designated authority.
 10. The fence shall be constructed in the alignment specified in the development plat and/or plans.
 11. Alignment of the installed fence and fence components, both plan and profile, shall be in straight lines so far as conditions of the site permit. Posts and panels shall be installed plumb.
 12. All fencing shall be installed by mechanics skilled and experienced in erecting fences of the particular type to be installed and shall be in accordance with Herriman City specifications.
 13. The Developer shall leave the fence construction area free from excess dirt, rubble, concrete, scraps, debris, packaging or other waste directly or indirectly resulting from the fence construction activities.
 14. Herriman City reserves the right to require the Developer, at the Developer's expense, to perform all tests necessary to ensure that the materials used in the fence or its installation conform to the standards and specifications given in this manual.

4.15.02 Specific requirements for materials, workmanship and installation of precast concrete fence posts and post caps are as follows:

1. Post centers shall be spaced 12.0 feet apart.
2. Post dimensions shall be 6.0 feet high by 20.0 inches square (outside dimension) and shall have a hollow center to facilitate attaching the post to the footings by a dowel and grout connection.
3. Posts shall be reinforced with one vertical #5 bar in each corner of the post and six #3 horizontal tie bars spaced evenly (12.0 inches on center) up the vertical height of the post. Reinforcement shall conform to

specifications given in APWA Section 03200. Ensure that 1.25 inches of cover is maintained at all points on the post.

4. Glass fiber may be used as secondary reinforcement in all concrete components of the fence. Fiber reinforcement shall conform to the specifications given in APWA Section 03200.
5. All concrete used for posts shall be Class 4000 per APWA Section 03304 standards and specifications.
6. The method of post attachment to the concrete footing shall be by embedding two #4 dowels placed near the center of the footing which extend from at least 1.0 foot down into the footing to at least 3.0 feet up into the hollow center of the post. The hollow center of the post shall then be grouted full to secure the bond between the footing and the post. Other mechanical means of attachment, when accompanied by engineering calculations and drawings demonstrating the structural integrity of the connection under applicable design loads, may be used.
7. Posts shall have the same finish and texture on all exposed sides.

4.15.03 Specific requirements for materials, workmanship and installation of precast concrete fence panels and panel caps are as follows:

1. Panels shall be 6.0 feet high. The thickness of the panel shall be no less than 4.0 inches. The length of the panels shall be such that the panels can be placed between and connected mechanically to the posts which are spaced on 12.0 foot centers.
2. Where used, panel caps shall have typical dimensions of 8.0 inches wide with a minimum thickness of 3.0 inches. The length of the panel cap shall be appropriate to cover the length of the panel.
3. Panels shall be reinforced with #3 bars placed 12.0 inches on center each way to within 1.5 inches from the panel edges. Equivalent welded steel wire fabric at the front and back of the panel may be substituted for the #3 bar configuration. Either type of reinforcement shall conform to the specifications set forth in APWA Section 03200. Ensure that 1.5 inches of cover is maintained.
4. Panel caps shall be reinforced by two #4 bars spaced 2.5 inches on either side of the centerline of the cap. Reinforcement shall conform to specifications given in APWA Section 03200. Ensure that 1.5 inches of cover is maintained.
5. Glass fiber may be used as secondary reinforcement in all concrete components of the fence. Fiber reinforcement shall conform to the specifications given in APWA Section 03200.
6. All concrete used for panels and caps shall be Class 4000 per APWA Section 03304 standards and specifications.
7. Panels shall have the same finish and texture on both sides.
8. The gap between the bottom edge of the lower panel and top of finish grade shall be 2.0 inches minimum and 4.0 inches maximum.

4.15.04 Specific requirements for materials, workmanship and installation of footings for precast concrete fence are as follows:

1. Footing centers shall be spaced 12.0 feet apart.

2. Footings shall be a minimum 24.0 inches square by 42.0 inches deep. In all cases, the embedment depth of the footing shall be minimum 42.0 inches below finished grade.
3. Reinforcement in the footings shall be by one vertical #5 bar in each corner of the footing with five #3 horizontal tie bars spaced 6.0 inches on center from the top of the footing and one #3 horizontal tie bar placed 4.0 inches from the bottom of the footing. Additional reinforcement may be required as specified by the manufacturer's design calculations. Ensure that 3.0 inches of cover is maintained.
4. All concrete used for footings shall be Class 3000 per APWA Section 03304 standards and specifications. All concrete for footings shall be pre-mixed and wet-set.
5. Where a precast concrete fence post shares the same footing as a gate post of some other material, the size of the footing shall be increased to accommodate both posts.
6. Freshly poured concrete shall be tamped with a steel rod or vibrated with a mechanical vibrator until the concrete is thoroughly consolidated and without void.
7. Excavations for footings shall be to undisturbed soil or to the depth noted on the engineered drawings. Leave the bottom bearing surface clean and smooth. If footing excavations are made deeper than intended, concrete shall be used for fill.

4.16 Secondary Water System

This section provides general guidance for the City's secondary water system. Items may be added, replaced or eliminated as deemed necessary by the City. Additional information may also be required.

4.16.01 Policies.

1. The distribution system shall be designed to maintain a minimum of 40 psi at all points of connection, under all conditions of flow, but especially during peak instantaneous flow conditions.
2. There shall be no physical connections, public or private, which would result in cross connections to any potable water main from secondary water mains. No connections shall be made to any sewer, storm drain, or appurtenances thereto, which could permit the passage of any wastewater or polluted water into the secondary supply.

4.16.02 Secondary Water Design

1. **Minimum Line Size.** The minimum line size serving cul-de-sacs or linear looped streets shall be 4 inch, when serving less than eight lots. The minimum line size serving cul-de-sacs or linear looped streets shall be 6 inch, when not more than 12 homes/units are connected to the main. The minimum line size in all other conditions shall be 8 inch. Actual flows must be modeled to ensure that minimum sizes are

adequate for normal flow requirements as well as when some looping lines are out of service. Sizes are subject to engineering review.

2. Water Line Placement.
 - a. All secondary water distribution mains within residential subdivisions shall be placed in the park strip area.
 - b. Secondary water mains shall be laid at least ten feet horizontally from any existing or proposed sewer line.
 - c. Secondary water mains shall not be installed at side or rear property lines. All lines will be installed within a Public Right of Way.
 - d. Magnetic Locator **Wire** Required. All pipes shall include a 3-inch wide magnetic locator tape installed in the pipeline trench approximately 12 inches above the pipe.
 - e. Service laterals shall typically be run one for every two lots, and shall be 1 ½ inch diameter ips polyethylene pipe. Where single service lines run under the street (long side), the services shall be 1 ½ inch diameter ips polyethylene pipe. Short side services shall be 1" diameter ips polyethylene pipe.
3. Cover Requirements. All water lines and appurtenances shall have a minimum cover of 36 inches.
4. Pipe Material.
 - a. Polyvinyl Chloride Pipe (PVC) C900 may be used for buried sizes 8 inches and smaller. Ductile iron pipe PC – 350 or CL-52 shall be used for all pipe 10 inches and larger. All fittings and valves 4 inches and larger shall be ductile iron and must meet the requirements of NSF 61 and ANSI/AWWA C-153.
 - b. All PVC pipe shall be Purple and all ductile iron shall have AWWA C105 purple polyethylene wrap.
5. Slope water pipe and position drains at low points.
6. Locate air release stations at the end of cul-de-sacs, on all dead end pipes, high points within the system and as directed by the City Engineer.
7. Connection to existing pipe line shall be made as such times and within the time limits as directed by the city.

4.16.03

Valves.

1. Valves. Manufacturer's name and pressure rating marked on valve body. Valves 8" and smaller shall be gate valves, valves 10" and larger shall be butterfly valves.
2. Gate Valves Up To 3 Inches.
 - a. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends, and hand wheel.
 - b. Product: Powell U.S. Bronze Gate Valves or accepted equal.
 - c. Substitutions: See Section 01600 – Product Requirements
3. Gate Valves 3 Inches and Over

- a. AWWA C500, iron body, bronze trim, non-rising stem with square nut, single wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.
 - b. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, mechanical joint or flanged ends as indicated, and cast iron valve box.
 - c. Product: Mueller Gate Valve or Resilient Seat Gate Valve with appropriate type Tyler 564A Cast Iron Valve Box, or accepted equal
4. Ball Valves Up To 2 Inches.
 - a. PVC body, PTFE seat seal, PVC ball and ABS handle.
 - b. Product: To be approved by Herriman City.
 5. Swing Check Valves from 2 inches to 24 inches.
 - a. AWWA C508, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.
 - b. Product: Mueller Swing-Type Check Valve, or accepted equal.
 6. Butterfly Valves From 2 Inches to 24 Inches.
 - a. AWWA C504, iron body, bronze disc, resilient replacement seat, mechanical joint or flanged ends as indicated, manual worm gear operator, and cast iron valve ox where required.
 - b. Underground manual operators shall be totally enclosed, factory grease packed and sealed, bronze worm gear operators with self-locking gearing; stops shall be provided to prevent over travel of valve disc.
 - c. Valve operator shall be geared to close valves slowly. Number of turns to close valve from full open position shall be: 32 for 10-inch and smaller valves, 52 for 12-inch thru 16 inch valves, and 76 for 18-inch through 24-inch valves. Closing times for larger valves shall be accepted by the Engineer.
 - d. Product: Mueller “Linesal III” Butterfly Valve with appropriate type Tyler 564A Cast Iron Valve Box, or accepted equal.
 7. Corporation Stops. shall be type for connecting to copper or polyethylene pipe; Mueller No. H-15000, or accepted equal, for up to 2-inch service line
 8. Air Release Valves. shall be combination air release valves; APCO Combination Air Release Valves, or acceptable equal, of size indicated on the drawings.
 9. Stop & Waste. Mueller-MUH 10288-010 or Ford b11-4445 SWM . (see drawing SW-01)
 10. Valve Box lid shall be triangular and marked irrigation
 - a. Product: Olympic VBU-8500 D&L M-9009

4.16.04 **Location of Isolation Valves.**

1. Placed at the entrance to a cul-de-sac.
2. Placed at intervals not to exceed 800 feet in residential areas and 500 feet in commercial areas.
3. Placed at intersections on all branches of the system.

4. Placed within 10 feet of the upstream and downstream ends of an augured or trenched casing.
5. If valves are located in an undeveloped area, a vertical valve marker will be required.
6. Valves shall be placed in clusters where possible, and at property lines and point of curves.

4.16.05 **Accessories.**

1. Service Clamps: shall be bronze, double-strap type; Mueller No. H-16000, or acceptable equal, for up to 2-inch service lines.
2. Meter Nut: All brass conforms to AWWA standard C800 and shall be able to connect directly to the PVC ball valve and the Neptune T-10 positive displacement meter.
 - a. Product: Straight Meter Coupling

4.16.06 **Preparation.**

1. Cut pipe ends square, ream pipe ends to full pipe diameter, remove burrs.
2. Remove scale and dirt on inside and outside before assembly.
3. Prepare pipe connections to equipment with flanges or mechanical joints.

4.16.07 **Service Connections.**

1. Service lines shall be installed at uniform grades and alignments; and shall be free of low spots or adverse grades.
2. Service lines shall be cleaned, flushed and tested in accordance with applicable requirements of these specifications.

4.16.08 **Field Quality Control**

1. Refer to Herriman City’s Development Standards Section 5-1 Commissioning of Water Pipelines.

4.17 Environmental Site Assessment

In 2001 the Environmental Protection Agency issued a record of decision regarding the environmental mitigation that occurred in Herriman under an Emergency Response Action. Certain properties were tested and found high levels of lead and arsenic. As properties develop some properties that have been tested shall follow a procedure for clean up prior to development of the property. The City has information on areas that have or are suspected to have lead and arsenic contamination. The clean up levels can be seen in the list below for each specific type of use:

| <u>Area Types</u> | <u>Lead (ppm)</u> | <u>Arsenic (ppm)</u> |
|-------------------------------------|---------------------|----------------------|
| <u>Residential</u> | <u>1,600</u> | <u>100</u> |
| <u>Commercial (Except Day Care)</u> | <u>1,500-4,000</u> | <u>250-850</u> |
| <u>Industrial</u> | <u>1,500-4,000</u> | <u>250-850</u> |
| <u>Recreation / Open Space</u> | <u>3,000-10,000</u> | <u>250-300</u> |
| <u>Agricultural</u> | <u>10,000</u> | <u>300</u> |

In 2001 the Environmental protection Agency tested numerous properties and the levels found were documented and are on file at the City. Some properties were not tested and

may be required to conduct test to determine the properties individual lead and arsenic levels. In some areas additional testing may be required to determine depths of lead and arsenic levels. If it is determined that lead and arsenic levels are present or suspected the developer shall submit a remediation plan see section 4.17.01 for plan requirements. After the remediation plan is reviewed and approved by the City a preconstruction meeting shall be held and then the site may be remediated. The developer shall be responsible for all quality control and assurance that the site is cleaned to appropriate levels. After cleanup is complete a final report shall be submitted to the City stating how cleanup was initiated and any additional information found during the remediation process see section 4.17.02 for Final Report requirements.

4.17.01 **Remediation Plan.** The remediation plan shall be reviewed by the City. All plans shall discuss what levels are present on property and how the site will be remediated and what precautions and sampling will be conducted to ensure property is cleaned to the appropriate levels. The remediation plan shall show at a minimum:

1. Site Location
2. Site History and Previous Investigations
3. Proposed Use
4. Cleanup Goals
5. Site Health and Safety
6. Site Security
7. Work Plan / Removal Procedures
8. Air Monitoring and Dust Control
9. Storm Water Pollution and Prevention Plan
10. Confirmation Sampling
11. Post Remedial Management
12. Quality Assurance Plan

4.17.02 Final Remediation Report. After remediation efforts have been completed the developer shall submit a report outlining the remediation process. This report shall show the following at a minimum:

1. Results
2. Methods
3. Deviation form plan