

CHAPTER 2

DESIGN STANDARDS

SECTION 2.01 GENERAL

Preservation of terrain: The design and construction of subdivisions shall preserve, insofar as it is possible, the natural terrain, natural drainage, existing topsoil, trees and vegetation.

Critical lands: Critical environment lands and lands subject to hazardous conditions such as land slides, mudflows, ground subsidence, shallow water table, and floods shall be identified and shall not be subdivided until the hazards have been eliminated or evidence submitted that said hazards will be eliminated by the development and construction plans. The Standard Details Section of the Specifications depicts the basic design standards outlined in this section.

Design Standards: The design of the preliminary and final plans to the subdivision in relation to streets, blocks, lots, open spaces and other design factors shall be in harmony with the following design standards.

SECTION 2.02 STREETS

- A. All streets in and adjacent to the subdivision must conform to the major street master plan of the city.
- B. The alignment and width of all through streets shall be preserved unless unusual topographical conditions make a modification advisable. Where the Planning Commission determines that it is desirable to provide for street access to adjoining property in order to provide for an orderly development of a street system, proposed streets shall be extended by dedication to the boundary of such property.
- C. Where a large subdivision abuts upon a major thoroughfare, the Commission may require marginal access streets to be included in the street plan.
- D. Street width is to be measured from lot line to lot lines. The minimum width of streets according to the Lehi City Master Transportation Plan, unless otherwise expressly permitted by the City Council, shall be measured as follows:

<u>Street Type</u>	<u>Right-of-way (min.)</u>	<u>Asphalt Width (min.)</u>
Local Streets	56'	34'
Minor collector streets	60' – 66'	38' – 44'
Major collector streets	70'	48'
Minor arterial streets	74'	52'
Major arterial streets	80'	58'
Principal arterial streets	106' +	81' +

Standard street sections are shown in the Standard Details Section.

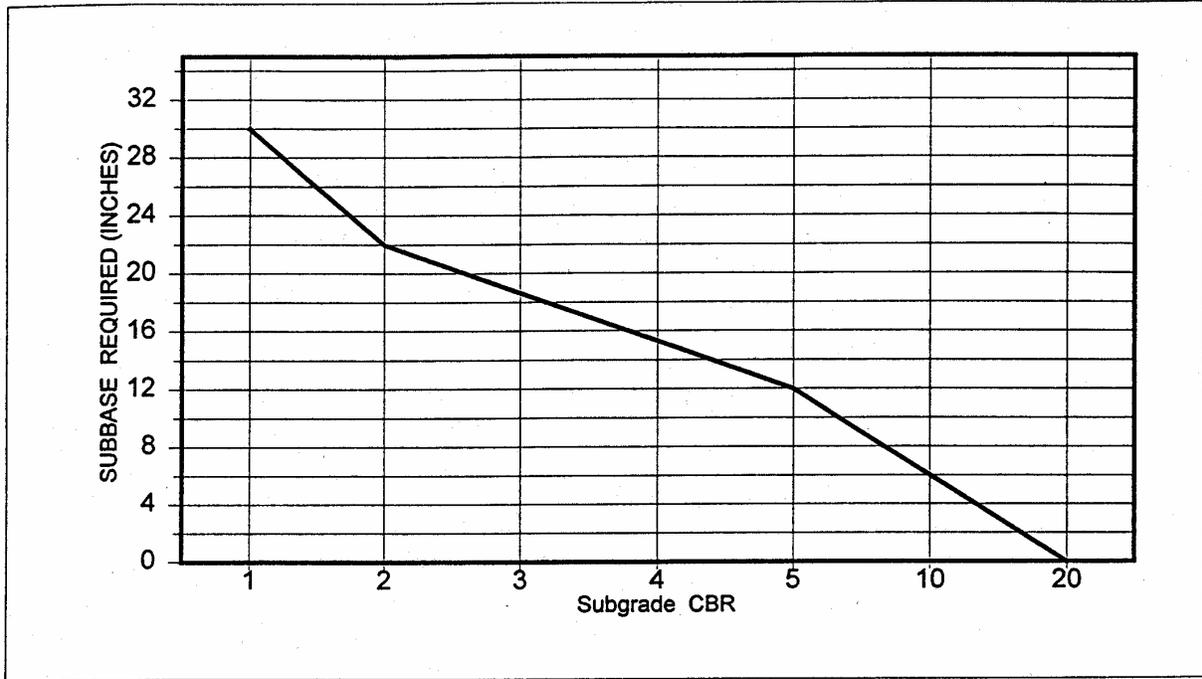
- E. Cul-de-sacs (dead-end streets designed to be permanently closed to through traffic) shall be not longer than four hundred (400) feet to the beginning of the turnaround. Each cul-de-sac must be terminated by a turnaround of not less than one hundred (100) feet diameter, measured to the lip of curb lines. Partial cul-de-sac bulbs are allowable where deemed appropriate by the Planning Commission and/or City Council. If surface water drainage is into the turnaround, due to the grade of the street, necessary catch basins and drainage easements shall be provided. Temporary cul-de-sacs shall be as shown in the attached Design Drawings.
- F. Streets shall intersect each other as near as possible at right angles. In no case shall the deviation from 90 degrees be more than +/- 15 degrees.
- G. Street centerline offsets of less than one hundred and fifty (150) feet shall not be allowed except where specifically authorized by the City Engineer and then in no case less than one half of the paved portion of the street. Major streets such as through collectors, etc. may require a street centerline offset of three hundred and fifty (350) feet and more as determined by the City Engineer.
- H. All arterial roads shall be as approved or designed by the City Engineer and shall incorporate the following; limited access control along roadway restricting front facing lots, without City Council variance, widths as required based on projected traffic volumes and road classification in the Master Plan.
- I. All subdivisions shall abut on and have access to at least one hard surfaced public street and as a minimum, allowance for one or more future accesses as developments adjacent hereto proceed. If the development exceeds 50 equivalent residential units, the second access must be incorporated in the subdivision unless otherwise approved by the Planning Commission.
- J. Pavement design (asphalt, base and sub-base) shall conform to the requirements outlined in Figure 2-1 or an alternate design by a Registered Geotechnical Engineer, licensed within the State of Utah, as approved by the City Engineer. Certification from suppliers as to the CBR and AASHTO designations for base and sub-base materials will be required prior to any road construction. Asphalt suppliers shall also certify as to their materials Marshall Stability values, gradation, and oil.

SECTION 2.03 STREET ALIGNMENT STANDARDS

General Roadway Design: In general, roadway design should conform to the latest edition of the AASHTO policy on geometric design of highway and streets. Specific City standards are summarized below and are required unless specifically approved otherwise by the Lehi City Engineer and the Lehi City Council.

A. Pavement Design Criteria

FIGURE 2-1
LEHI CITY PAVEMENT DESIGN CHART



1. Sub-base curve based on:
 - a. ADTs on page 16 of the Lehi City Master Transportation Plan. (The City may require a higher traffic volume based on a developer's projected needs.)
 - b. Road Base CBR = 70.
 - c. Asphalt Marshall Stability = 1800.
 - d. Sub-base CBR (California Bearing Ratio) = 30.

2. Pavement Design:

<u>Street</u>	<u>Sub-base</u>	<u>Road Base</u>	<u>Initial Asphalt</u>	<u>Future Overlays</u>
Local Street	Per chart	6"	3"	
Minor Collector	Per chart	6"	3"	2"
Major Collector	Per chart	6"	3"	2 ½"
Minor Arterial	Per chart	6"	3"	3 ½"
Arterials			By Design	

3. Road base shall not be saturated by groundwater or ponding water. This may require that the road base be above the natural ground surface.
4. One CBR analysis (tested under 96 hour saturated conditions) of the road sub grade is required for every 1,000 linear feet of road. More shall be required if sub grade

conditions vary appreciably. After the sub grade is cut, the City may require additional CBRs due to material changes.

5. Sub-base materials shall at a minimum conform to AASHTO designation A-1-a and extend 3 feet beyond edge of pavement or 1 foot back of top back of curb.
6. Additional sub-base material shall be place on all saturated unstable sub grades that must be stabilized.
7. Field conditions and/or city road construction and/or operation may dictate a higher sub-base thickness.
8. At the discretion of City Engineer, the sub-base thickness determined through adherence to Section 2.03 may be substituted with a sub-base thickness provided by a Registered Geotechnical Engineer licensed within the State of Utah.

B. Vertical Alignment Criteria:

Roadway Classification	Vertical Curve Length Min. (feet)	Design Speed (mph)	Maximum Grade (%)
Principal Arterial	*	50	6
Minor Arterial	*	40	8
Major Collector	*	35	8
Minor Collector	*	30	10
Local (3% max. grade change)	50	25	12
Local (6% max. grade change)	100	25	12
Local (6% +)	*	25	12

1. Crest and sag vertical curves shall be controlled by “K value” as shown in the latest edition of AASHTO “A Policy on Geometric Design of Highways and Streets” appropriate to the design speed requirements of each roadway classification.
2. If the difference between the grades of two intersecting vertical tangents of a street is greater than 1.0%, an appropriate vertical curve shall be placed between them.
3. Minimum grade on all roadways shall not be less than four/tenths of 1 percent (0.4%) unless approved otherwise by the City Engineer.
4. Minimum grades within parking lot areas should be 2.0%. Maximum grades within parking lot areas should be 6.0%

C. Horizontal Alignment Criteria

1. Roadway Classification

Primary Classification	Min. Radius * (feet) (Road Centerline)	Design Speed (mph)
Principal Arterial	1200'	50
Minor Arterial	825'	40
Major Collector	625'	35
Minor Collector	425'	30
Local	275'	25
Local (with calming curves)	60 – 100'	10-15
Local (with calming right angle turn)	See Standard Details	

*Super elevation may be required.

2. When street center lines within a block deflect from each other at any one point more than 5 degrees, there shall be a connecting curve.

3. Provide appropriate roadway transition taper lengths by adhering to the following formulas:
 Length $L = S \times W$ for speeds greater than 40 mph
 $L = \frac{WS^2}{2}$ for speeds of 40 mph or less than 60

Where: L = Minimum length of transition in feet
 S = Design speed in miles per hour
 W = Width of transition in feet

3. Maintain minimum intersection sight distance requirements (including landscape canopies) per Lehi City Development Code.

4. Curbs at all intersections shall be rounded with curves meeting the following requirements unless approved otherwise by the City. Property lines at street intersections shall be rounded with a curve large enough to accommodate the following curb radii plus applicable walks, planters, trails, and set backs.

Roadway Classification	Curb Radius (feet) Measured at TBC
Principal Arterial	45
Major & Minor Arterial	40
Major Collector	35
Minor Collector	30
Local Road	24

SECTION 2.04 GENERAL STREET DESIGN STANDARDS

- A. New streets shall use the coordinate form of street numbering. A street which is obviously a continuation of another existing street should bear the same number and name. All streets that are parallel to the City's coordinate system (running east-west or north-south) shall be numbered streets. Those streets which are not parallel to the coordinate system shall be named and also have a coordinate number indicating the location. Street signs erected to show the name of a street shall also include the correct street coordinates.
- B. All streets within the City limits will be required to be dedicated for public use except as called out otherwise in City Code. A minimum of one half of the street plus 13 feet shall be platted and constructed (10 feet pavement & 3 foot shoulder) within the subdivision unless otherwise approved and/or required by the City Engineer and Planning Commission. The Planning Commission may require off-street parking areas within the retail center of a new subdivision and specify requirements for maintenance of the same. Where natural or scenic features and/or historic community assets exist, such locations are to be safeguarded either by dedication to a public or private agency by the subdivider.
- C. Where subdivision streets parallel contiguous property of other owners, the subdivider may not retain a protection strip.
- D. Wheel chair ramps must be constructed at all street corners and other pedestrian crossings as shown in the Standard Details Section of these specifications.
- E. Curb, gutter and sidewalks as detailed in the Standard Details shall be installed on existing and proposed streets by the subdivider as required by the subdivision type. No bridging with soil will be permitted on curb, gutter, and sidewalk unless appropriate drainage and erosion control features are implemented as approved by Lehi City Road Superintendent or Designee.
- F. Catch basins as detailed in the Standard Details shall be provided where required for proper street drainage.
- G. Driveway approaches meeting the minimum criteria as detailed in the Standard Details shall be cut in for all driveways after initial curb placement. Maintain spacing from the intersection centerline to any driveway as follows: Local = 60 feet; Collector = 80 feet, Arterials = 100 feet unless approved otherwise by Lehi City. Drive approach (which includes the sidewalk and planter-strip section) construction standards vary dependant on lot frontage (see Standard Details for requirements).
- H. Traffic studies may be required by the DRC, Planning Commission or City Council to better understand the development needs and impacts.
- I. Traffic calming may/should be used as applicable as approved by the DRC, Planning Commission and Council.

SECTION 2.05 FENCING AND LANDSCAPING STANDARDS FOR ARTERIAL AND/OR OTHER STREETS AS APPLICABLE

The purpose of these standards is to reduce street congestion, maintain property values, and enhance the image of Lehi City and the character of its major corridors, which serve as primary access into and through the City. In some instances these standards may not be completely feasible due to existing improvements and right-of-way widths. Where such circumstances exist, these standards shall apply to the fullest extent possible; however the City Council may modify these standards as necessary on a case-by-case basis.

- A. Residential Development. Where residential developments are adjacent to an arterial or street that prohibits individual residential lot access or any other instance where double frontage lots are proposed, the following standards shall apply.
 - 1. Fencing. The developer shall install a continuous decorative fence six (6) feet in height along the rear property line and side property line (where applicable) of double frontage lots which abut upon the adjacent arterial or collector street. Upon installation and acceptance of the fence by the City, individual property owners that abut the fence shall assume full ownership and responsibility for its maintenance, and repair. The following standards shall apply to the decorative fence:
 - a. The fence shall be constructed of wrought iron, stone, brick, decorative concrete simulating stone or brick, or other quality materials deemed comparable by the Planning Commission. Masonry fences shall be treated with a durable non-porous anti-graffiti sealant on the street side of the fence.
 - b. The fence shall include masonry columns spaced at thirty to forty (30-40) foot intervals along the fence to provide visual relief. Other techniques such as capping, inlays, and variations in materials may also be used to increase shadow patterns and otherwise provide visual relief.
 - c. Concrete mow strips shall be placed at the base of the fence or the sidewalk and shall extend underneath the fence to prevent weeds from growing and protruding under the fence into the public right of way.
 - d. The height of the fence shall be reduced to three (3) feet within the required intersection sight triangles as defined within Section 12 of the Development Code.
 - e. There shall be no openings or gates in the fence for access to the street right-of-way from the rear yard or side yard of any lot that abuts upon the adjacent arterial or collector street.
 - f. Required fencing shall be installed before a temporary or final occupancy permit is granted for any lot in the subdivision that borders the fence.
 - 2. Park Strip. Curb, gutter and sidewalk shall be installed along arterial, collector, or limited-access streets to specifications contained within these standards and the Standard Details. Park strip treatments shall be approved on a case-by-case basis for each proposed development. In general, the park strip area shall be filled in with

decorative pavers, decorative stamped concrete, or weed barrier fabric with decorative rock as approved by the City Engineer, or DRC and Planning Commission. One (1) 2.5-inch caliper canopy tree per thirty to forty (30-40) feet shall be installed within the park strip area with an approved metal grate (except in decorative rock planters) around the base of the tree (type of tree to be approved by Lehi City Parks Manager). Tree grates shall be provided with an interior hole diameter 1.5 times the anticipated mature tree diameter. An adequate drip irrigation system shall be installed to specifications approved by the Lehi Parks Department. Tree grates may be eliminated around trees, as may be required/approved by the Lehi Parks Department.

3. PUD & Planned Community Projects. For Planned Unit Developments and Planned Communities, the area between the property line/ROW line and the required decorative fence shall be enlarged and landscaped as part of the required open space. The enlarged parkway area will be counted towards meeting the minimum open space requirement and shall include decorative fencing, street tree plantings and other applicable improvements required in this section. The landscaped area may also include shrubs, rocks, flowerbeds and ground cover. Maintenance of the landscaped parkway shall be insured by the developer/owner by means of a property management agency or by establishing a private association or corporation responsible for such maintenance, which shall levy the cost thereof as an assessment on the property owners within the PUD. Sidewalks may be meandered within the parkway if an appropriate maintenance easement is established.

B. Commercial Development. Where commercial developments are adjacent to an arterial or Collector Street, the following standards shall apply.

1. Applicability. These standards shall take effect when building permits are required in the following situations:
 - a. All new construction on vacant parcels;
 - b. Any substantial modification to an existing site or structure in which the estimated construction cost exceeds \$50,000.
2. Street Improvements. Curb, gutter and sidewalk shall be installed along the street to specifications contained within these standards. Sidewalks should be meandered through the landscaped buffer area where possible. Sidewalks shall be six (6) foot wide where the sidewalk is placed against the curb and five (5) foot if the sidewalk is meandered. For meandering sidewalks, all points of the sidewalk shall be placed a minimum of five (5) feet from the back of curb. When the required improvements are within a State highway right-of-way, the developer shall comply with UDOT requirements.
3. Landscaped Buffer. All commercial properties with frontage on an arterial or collector street shall provide a landscaped buffer area along the entire frontage between the back of curb and any parking area (not including vehicular access drives), structure or fence on the site. No parking or outside storage shall be allowed

within the landscape buffer. The landscaped buffer shall include the following improvements:

- a. Sidewalk.
 - b. Grass or other approved landscaping.
 - c. One (1) 2.5 inch caliper canopy tree per 50 feet (type of tree to be approved by Lehi City Parks Department). Trees shall not be located within the required clear view area at street intersection (as defined within Section 12 of the Development Code).
 - d. Bermed areas.
 - e. Sprinkling system and water connections sufficient to maintain landscaping in all park strip areas to specifications contained in Section 10 of these standards.
 - f. The Planning Commission may allow a portion of the landscaped buffer area to be filled in with brick pavers or stamped concrete instead of landscaping; however one (1) 2.5 inch caliper canopy tree per 50 feet shall be provided with an approved metal grate around the base of the tree with an adequate irrigation system as approved by the Parks Department.
4. Entrances. The entranceways to a commercial development shall be bordered by planter areas with numerous shrubs, rocks and ground cover (suggested planter area size is twenty (20) feet x fifteen (15) feet). Such entranceway planter areas shall conform to the required clear view area at street intersection (as defined within Section 12 of the Development Code).
5. Exceptions. For development or redevelopment in existing commercial areas where it is infeasible to achieve the above-specified requirements (i.e. downtown Main Street), street improvements shall be reviewed on a case-by-case basis. The Zoning Administrator, DRC, and/ or Planning Commission may require planter boxes, street trees within metal grates, street furniture, or other streetscape amenities in lieu of the above specified requirements.
6. Maintenance. All landscaping shall be perpetually maintained by the owner(s).

SECTION 2.06 BLOCKS

- A. The length of blocks shall not exceed one thousand (1000) feet in length except as approved otherwise by the Planning Commission.
- B. A dedicated walkway through the block may be required where access is necessary to a point designated by the Planning Commission and/or City Council. Such walkways shall be a minimum of six (6) feet in width but may be required to be wider where determined necessary by the Planning Commission. The subdivider shall surface the full width of the walkway with a portland cement concrete surface, install a chain link fence or its approved equal four (4) feet high on each side of the full length of each walkway and provide barriers at each walkway entrance to restrict vehicles wider than three (3) feet.

- C. The width of blocks generally shall be sufficient to allow two (2) tiers of lots.
- D. Business and industrial blocks shall be designed specifically for such purposes with adequate space set aside for off street parking and delivery facilities.

SECTION 2.07 LOT REQUIREMENTS

- A. All lots shown on the subdivision plat must conform to the minimum requirements of the applicable zoning ordinance. The size and shape of the lots shall be such as the Planning Commission deems appropriate for the type of building development contemplated.
- B. Double frontage lots shall be prohibited except where unusual topography makes it impossible to meet this requirement or where it is necessary to back lots on a non-access street.
- C. All remnants of lots below minimum size left over after the subdividing of a larger tract must be added to adjacent lots or fit within accessible open space rather than allowed to remain as unusable parcels.
- D. All lots shall face upon a street, and as nearly as possible the lot side line shall run at right angles to the street or to the tangent of a curving street.
- E. All subdivided lots platted with Lehi City will receive only one (1) culinary water service connection, one (1) pressurized irrigation connection, one (1) sanitary sewer connection, and one (1) storm drain connection (where available) unless specifically authorized by the City Council, City Engineer, and the City Water Superintendent. All platted lots with revised lot lines, or re-platted lots, will be required to physically remove or relocate the culinary water, secondary water and storm sewer/sub drain connections as needed to provide only one (1) set of laterals per lot (Lehi City Water Department staff will remove culinary water meter prior to abandoning or removing culinary services). All above-noted utility connections removed shall be terminated at the main line unless otherwise authorized by the Lehi City Water and Wastewater Department. Utility connections removed, relocated or terminated will require inspections and verification from Lehi City Water and Wastewater Department. All removals, changes or inspections required for connections as noted above will be at the developer's expense.

SECTION 2.08 EASEMENTS

General utility easements are defined in the Lehi City Development Code. Special easements for storm drains, sewer lines, water mains, canals, etc., shall not be less than 20 feet wide, except for unusual circumstances as approved by the City Engineer. Easements of greater width may be required where deemed necessary by the City Engineer. The entire easement shall be on one side of the property line unless approved otherwise by the City Engineer. Access along the easement shall be as approved by the DRC as shown in the Lehi City Standard Drawings.

SECTION 2.09 WATER SYSTEMS

- A. Every development requesting water service or required to install a culinary and/or a pressure irrigation water service shall include both services to the property line. If, in the opinion of the City Water Superintendant, there is not sufficient main line pressures in the culinary and pressure irrigation water system to maintain 20 psi minimum during peak hourly plus fire flow conditions, the development must be postponed until changes in the main system are constructed.
- B. Pressure irrigation and culinary water mains shall be a minimum diameter of eight (8) inches and six (6) inches (reduced sizes may be used as approved by the City Engineer) respectively unless a larger size is specified by the City to meet minimum health department or Insurance Services (fire) requirements. All lines in smaller developments must be looped (no dead ends) except by express approval of the City. All lines in larger developments must be looped (no dead ends) for lines serving 50 or less existing and proposed equivalent residential units except by express approval of the City Engineer.
- C. Used pipe shall not be installed for either water system.
- D. All culinary water pipe shall be separated from sewage systems as required in Section 8.
- E. Install a 4 inch blow off (for 8 inch and smaller pipe) or 6 inch blow off (for 10 inch and larger pipe) on dead ends and/or one thousand (1000) foot spacing (as per the City's design detail).
- F. A post indicator valve (See Standard Detail) shall be installed on each fire sprinkler system. Fire sprinkler lines shall be connected to culinary water lines.
- G. All fire lines supporting fire sprinklered buildings shall be a minimum of 4 inches in diameter and shall be connected to the culinary water main with a hot tap connection.

SECTION 2.10 FIRE HYDRANTS

- A. Fire hydrants shall, where practicable, be installed between the curb and sidewalk a minimum of eighteen (18) inches from the back of the curb at locations determined by the Fire Chief. Fire hydrants shall not be farther than five hundred (500) feet apart along the street in normal residential areas and as close as two hundred (200) feet apart in high density and commercial areas as determined by the Fire Chief. No dwelling unit shall be located farther than two hundred-fifty (250) feet from a fire hydrant measured along the curb and into the unit. Outlets shall be eighteen (18) inches above finished grade, walk, curb or road. Hydrants shall face the street. Additional fire hydrants may be required at the discretion of the City Fire Chief and City Engineer due to specific building or density requirements.
- B. Fire hydrants shall comply with national standard regulations and shall have a minimum six (6) inch barrel in close proximity to public buildings.

- C. Fire hydrants should not be connected to any water main smaller than six (6) inches inside diameter. Fire hydrants should not be connected to a dead end main line smaller than eight (8) inches inside diameter. Fire hydrants must be connected to the pressure irrigation system unless approved otherwise.
- D. Non-looped or dead-end fire lines with a hydrant shall have a minimum pipe size of 8 inches.
- E. Contractor shall install four (4) foot wide by four (4) foot wide by six (6) inch thick concrete pad around each fire hydrant as per Standard Details.
- F. All new hydrants shall be inspected, tested and verified by an onsite City inspector prior to acceptance by Lehi City.
- G. No other utility or object shall be installed within three (3) feet of the outermost portion of a hydrant.

SECTION 2.11 SEWAGE SYSTEM

- A. No development will be allowed to connect to the main system if the piping in that area is incapable of carrying the projected sewage flows until major system changes are constructed.
- B. Sewer mains shall be a minimum of eight (8) inches in diameter and designed in accordance with Utah State Division of Health Standards. (The minimum pipe size requirement based on a velocity of 2 feet per second is 8 inch=0.33% 10 inch=0.25% 12 inch=0.20% 15 inch=0.15% 18 inch=0.12% 21 inch=0.10%). Finished road surface to the top of the sewer pipe should not be less than 5.5 feet to allow proper depth and clearance to culinary water lines.
- C. The flow channel through manholes should be made to conform in shape and slope to that of the sewers.
- D. All sewer mains and laterals must be inspected in place before backfilling is accomplished.
- E. Main line sewer lift stations are not allowed unless recommended by DRC and approved by the Lehi City Council.
- F. All sewer laterals shall be a 2% grade (minimum) into property line unless approved otherwise by the City Inspector.
- G. Grease traps on businesses, etc., shall be installed in accordance with Timpanogas Special Service District's latest requirements. Grease Trap sizing calculations shall be provided by Developer's Engineer.

SECTION 2.12 DRAINAGE SYSTEM PLAN

- A. The drainage plan shall be stamped and signed by a Registered Professional Engineer licensed within the State of Utah and shall include an analysis of potential drainage problems, along with a proposal indicating how all surface water will be conveyed. Detention facilities will be required on all developments to alleviate the impact on existing drainage facilities, except as otherwise approved by the City Engineer. Drainage plans shall also include the projected quantity of waters anticipated for a 10-year storm (piping), 100-year storm (detention facilities). Subdivisions with one or two lots may not be required to provide runoff data, if so directed by the DRC. Retention facilities are not allowed unless recommended by DRC and approved by the City Council. After construction, detention and retention facilities may not be altered or removed without authorization of the City Engineer and the City Council.
- B. The development shall include necessary culverts, drain pipes, basins, and drainage channels. In order to insure the safety of the occupants of a subdivision, the Planning Commission may require the developer to cover or fence culverts, basins and canals, etc.
- C. Down-sloping driveways off of public streets will not be allowed unless otherwise authorized by the City Engineer.
- D. Drainage facilities other than detention shall be adequately designed for a 10-year storm. Flood control facilities such as Dry Creek, Mini Creek and the Waste Ditch, etc., shall be designed for a 50-year storm.
- E. Sumps ***ARE NOT ALLOWED*** unless they are:
 - 1. Recommended by the DRC
 - 2. Approved by the Lehi City Council
 - 3. The highest water level in the ground is no closer than 8 feet to the ground surface
 - 4. Percolation rates are higher than 20 minutes per inch.

All sumps must be designed for the 100-year storm and an auxiliary excess drainage system should be provided. All design data including 10-foot soil log, percolation tests, etc., must be submitted with the drainage plans.
- F. All development discharges shall be limited to a maximum of 0.2 cfs/acre (or as noted on the current Storm Water Drainage Master Plan) with the utilization of on-site detention except as approved otherwise by the City Engineer. If detention is not possible or recommended by the DRC, the Developer shall oversize the discharge piping or pay a fee in lieu of detention as determined by the City Engineer.

G. Drainage Basin Facility Design

1. All drainage basin facilities shall be designed as follows:
 - a. Basins shall be designed for a 100 year storm and have a minimum of 1 foot freeboard. Basin drainage calculations shall not provide an allowance for seepage losses. Due to site or area conditions an impervious lining may be required on these facilities.
 - b. Standard design of a drainage basin facility shall include a basin which properly drains towards the basin outlet and a subterranean piping system beneath the detention facility with a bubble-up/collection box(s) to permit overflows of storm water to enter the detention facility. Bubble-up/collection box(s) shall be located such that they are easily accessible by maintenance staff, even when the detention pond is at design capacity. Drainage basin facilities should also include a spillway to assure that minimum damage occurs as a result of detention pond overflow.
 - b. Maximum water depths and side slopes within drainage basin facilities shall be as follows: 18 inch water depth = 3:1 side slopes, 24 inch water depth = 4:1 side slopes, 30 inch water depth = 5:1 side slopes. Basin water depth shall not exceed 30 inches unless specifically recommended by DRC & approved by the City Council. If water depths exceeding 30 inches are approved, a 5 foot chain link fence shall be installed around the facility and the 1 foot freeboard requirement may be increased to as much as 3 feet.
 - c. Each drainage basin shall be covered with a combination of grass and xeriscape with a sprinkler system, unless otherwise approved. No trees shall be planted along the banks of a drainage basin.
 - d. Drainage basin berms should have a minimum width of 3 feet for smaller basins and 12 feet for larger basins as approved by the City Engineer. Side slopes along the outside of drainage berms shall be a minimum of 3:1, unless otherwise approved by the City Engineer.
 - e. Drainage basins within parking lots should have a minimum of 1 foot freeboard and be limited to a water depth of 18 inches, unless otherwise approved.
2. Detention discharges may be limited through the use of orifice plating or small discharge pipes. Orifice plates should be installed within public right-of-way. Orifice plate discharges should be designed to reduce clogging and allow for easy maintenance during storm events. Small discharge pipes may also be used in lieu of orifice plates (if approved by the City Engineer), provided that pipe lengths are kept to below 40 feet. A BMP “snout” may be required by City staff to meet storm water quality requirements, but orifice plates shall not be designed beneath “snout” hoods unless otherwise authorized by the City Engineer.
3. For single lots or small areas, the above may be waived so that drainage can be directed on to private property with a drainage easement (with written approval of the property owner).

- H. Allowable use of streets for initial storm runoff in terms of pavement encroachment is as follows:

<u>Street Classification</u>	<u>Maximum Encroachment</u>
Local	No curb over-topping. Flow may spread to crown of street.
Collector	No curb over-topping. Flow spread must leave at least one lane in each direction free of water.
Arterial	No curb over-topping. Flow spread must leave at least one lane in each direction free of water.

- I. Inlet grating maximum design capacity for a standard bicycle safe 1 foot x 4 foot grate is 3.0 cfs.
- J. All drainage piping for surface (12 inch minimum size) and subsurface drainage (8 inch minimum size) shall have manholes at a maximum spacing of 400 feet, unless otherwise approved by the City Engineer. Minimum slopes shall be the same as required by the Utah State Division of Health for sanitary sewers (roughness coefficient consistent with their criteria is $n= 0.013$).
- K. Devices such as snouts/oil & water separators, etc., may be required by the City to reduce downstream contamination, especially on business applications.

SECTION 2.13 BEST MANAGEMENT PRACTICES

These standards apply to all land development and construction activities as defined within the Lehi Development Code. The purpose of these standards is to minimize the introduction of pollutants into the storm drainage system, provide a means to monitor and control discharges into the storm drain system, and to comply with the State and Federal laws and regulations regarding these discharges. The Public Works Director or City Engineer has the authority to modify the requirements of the Best Management Practices (BMPs) as needed to accomplish reasonable and effective storm water pollution prevention objectives.

- A. Requirements for proposed developments one (1) acre or larger are as follows:
 1. Incorporate Best Management Practices (BMPs) into development design to limit quantity of runoff and preserve quality of runoff.
 2. Prepare Storm Water Pollution Prevention Plan.
 3. Provide financial guarantee that improvements contained in the Storm Water Pollution Prevention Plan will be installed and maintained.

4. Provide instruction to construction site operators regarding implementation of the Storm Water Pollution Prevention Plan.
 5. Monitor effectiveness of the elements included in the Storm Water Pollution Prevention Plan, and make improvements as necessary to achieve the plan objectives.
 6. Provide verification that improvements were constructed as approved.
 7. Prepare Post Construction Storm Water Pollution Prevention Plan.
 8. Obtain UPDES Permit.
- B. Requirements for construction activities associated with existing developments are as follows:
1. Submit and obtain approval of a Post Construction Storm Water Pollution Prevention Plan.
 2. Operator or owner shall make adjustments to practices or improvements when necessary to achieve Post Construction Storm Water Pollution Prevention Plan objectives.

SECTION 2.14 SIGNS

- A. Stop signs shall be posted at all exits of subdivision roads to city streets where warranted under the MUTCD and/or required by the City for adequate traffic control. Slow, railroad, etc., signs may be required as applicable. Street signs shall be posted at all intersections. Design and installation shall comply with the standards as set forth in the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD) published by the U.S. Dept. of Transportation. Materials shall comply with Utah State Highway Department requirements. In no case shall any traffic control device be installed which does not meet applicable engineering warrants or which does not meet applicable minimum standards.

SECTION 2.15 LOT CORNERS

- A. All lot corners shall be marked with an approved type of metal peg at least 5/8 inches in diameter and twenty-four inches in length. All lot corners adjacent to street frontage shall be projected to curb and gutter and indicated by a copper rivet. Corner markers must be installed prior to issuance of any building permits.
- B. Brass cap monuments set in concrete will be required for all exterior boundary angle points (minimum 3 monuments on curves) for all subdivisions containing more than 3 lots.

SECTION 2.16 DEDICATIONS

- A. All streets within and adjacent to a proposed development must be dedicated in conformance with Lehi Road Master Plan except as otherwise allowed within the Lehi City Development Code and approved by the City Engineer and City Council.
- B. Where natural or scenic features and/or historic community assets exist, such locations are to be safeguarded either by dedication to a public or private agency by the subdivider.

SECTION 2.17 TRAILS

These standards apply to all trail corridors required by the Lehi City General Plan. Trails shall be constructed within all proposed projects where they are indicated on the General Plan Land Use Map, and shall be installed by the developer as part of the required public improvements for the development unless otherwise recommended by the Planning Commission and approved by the City Council. In addition to these minimum standards, the City Engineer will be guided by and may impose any necessary additional standards contained in the current AASHTO Guide for the development of Bicycle Facilities or the Utah Valley Non-Motorized Transportation System Manual.

- A. Required trails shall be grade separated, paved, multiple-use pathways (except the Bonneville Shoreline Trail, which is not paved), and users shall be non-motorized and may include but are not limited to: bicyclists, roller skaters, wheelchair users, pedestrians, and in some areas equestrian riders.
- B. Trails are to be constructed of bituminous pavement no less than two and one half (2 1/2) inches thick and a base course of no less than six (6) inches thick or concrete no less than four (4) inches thick.
- C. Minimum trail width shall be ten (10) feet, with a two (2) foot shoulder/clear zone on each side unless otherwise approved by the City Engineer due to physical constraints within the designated trail area. Sharp grade transitions, trees, signs and other fixed objects within the shoulder/clear zone shall not be permitted.
- D. If the trail is designated for equestrian use in addition to other users, an additional six (6) foot equestrian area shall be provided using existing stabilized dirt, gravel or other approved surface and an appropriate sub-surface that will allow for drainage as necessary.
- E. A minimum vertical clearance of ten (10) feet shall be maintained from the equestrian trail surface.
- F. Trails shall be located within a permanent right of way (or as approved otherwise by the City Engineer) that allows for the construction, operation, maintenance, repair and/or replacement of the pathway. Minimum width shall be twenty (20) feet unless otherwise approved by the City Engineer due to physical or other constraints within the designated trail area.

- G. Trails are to be located with a minimum offset from any road surface of twelve (12) feet. Lesser distances may be allowed when approaching intersections of streets to provide a safe alignment for crossing at the intersection or where the trail must be routed along a roadway.
- H. Trails will generally follow the longitudinal slope of the existing ground, with adjustments in grade provided for intersecting streets or drives.
- I. A minimum vertical clearance of eight (8) feet shall be maintained from the trail surface.
- J. Limits of disturbance shall be implemented to minimize construction impacts. Construction limits shall be as small as practical to construct the trail. Significant vegetation and its root zone shall be considered when locating the trail and establishing construction limits.
- K. Methods shall be employed to protect areas adjacent to the trail from impacts both during and after construction, including the construction of any necessary swales or culverts to prevent erosion. Swales or culverts shall be installed at all locations where the normal cross slope will not allow for adequate drainage.
- L. Retaining walls shall be installed where necessary for safety, to prevent erosion of cut or fill slopes, to reduce cut and fill slopes, or to minimize disturbance on environmentally or aesthetically sensitive sites. Depending on height of retaining walls, a physical barrier, such as dense shrubbery, railing or an approved safety fence may need to be provided to protect trail users.
- M. Existing significant vegetation should be preserved wherever possible and indigenous materials used for retaining walls, bridges, and barriers.
- N. Removable bollards and barriers shall be installed at trailheads to control access of motor vehicle traffic and to direct and/or protect trail uses from steep or hazardous areas along the trail.
- O. The placement of any necessary bridges will be required as needed.
- P. Signs shall be installed at all trail entrances/trailheads and at all intersections with roadways according to the standards for bicycle and shared use paths contained in the latest edition of the Manual of Uniform Traffic Control Devices or as otherwise required by the Planning Commission and City Council.

SECTION 2.18 EXCEPTIONS

Exceptions may be made to avoid hardship. Whenever the tract to be subdivided is, in the opinion of the City Council, of such unusual shape or size or is surrounded by such development or unusual conditions, that the strict application of the requirements contained herein would result in real difficulties and substantial hardships or injustices, the City Council may vary such requirements so

that the subdivider is allowed to develop his property in a reasonable manner, but so, at the time, the public welfare and interest of the City and surrounding areas are protected and the general intent and spirit of these standards is preserved.

SECTION 2.19 SHARING COST OF IMPROVEMENTS

A. Cost of improvements, which are required under the provisions of these regulations, as well as the cost of other improvements, which the developer may install, shall be shared between the developer and the City, according to the following schedule:

<u>Facility</u>	<u>Developer</u>	<u>City</u>
1. Road right-of-way "on-site" and "off-site"	100% up to 56 feet in width (unless Development's specific traffic requirements mandate additional.)	Balance of right of way (raw value price, prior to development).
2. Grading and drainage of streets and "on-site"	100%	0%
3. Grading and drainage of streets "off-site"	100%	0%
4. Bridges and Culverts	100% for all local and collector streets	Special negotiations with City on work performed on arterial streets.
5. Street paving	100% for all streets up to 34 feet of pavement width (unless the Development's specific traffic requirements mandate additional.)	Balance of pavement installed.
6. Curb and gutter	100%	0%
7. Sidewalk	100%	0%
8. Street Signs	100%	0%
9. Traffic Signs	100%	0%

10. Culinary & Pressure Irrigation Water Systems	100%	0%*
11. Sewer System	100%	0%*
12. Street Lighting	100%	0%
13. Electrical Utilities	100%	0%*
14. Canal and Flood channel	100%	0%*
15. Parks/Trails	As recommended by the City Engineer and approved by the City Council	As recommended by the City Engineer and approved by the City Council
16. Survey Markers /Monuments	100%	0%
17. Water Rights	100%	0%
18. Grading lots and reseeded cut and fill slope	100%	0%
19. Soils, Concrete, etc. testing	100%	0%
20. Utility relocations	100%	0%
21. All other required improvements	100%	0%

* Should Lehi City determine that a larger size than that required for the proposed Development is expedient for future growth, Lehi City may consider paying the increased costs associated with the extra sizing. The City's portion shall not exceed the multiplier listed below times the material cost increase for the oversizing unless otherwise approved by the City Engineer. This is intended to be a reimbursement to the developer. The Developer must provide the documentation including the supplier's material cost differential (at the time of purchase).

**Culinary & Pressurized Irrigation Pipe and Valve
Over sizing Multipliers**

Size Changes	Material Cost Multiplier
2"	1.15
4"	1.20
6"	1.25
8"	1.30
10"	1.35
12"	1.40
14"	1.45
16" & up	1.50

- (Plus an additional 7.5% for water lines to cover all fittings, etc., except valves.)

**Sewer, Storm and Irrigation Drainage Pipe Over
sizing Multipliers**

Size Changes	Material Cost Multiplier
2"	1.150
3"	1.175
4"	1.200
5"	1.225
6"	1.250
7"	1.275
8"	1.300
9"	1.325
10"	1.350
12"	1.400
15"	1.475
16" & up	1.500

Construction in Dry Areas

- Plus an additional 5.0% for sewer, storm and irrigation drainage appurtenances and the removal and disposal of excess material.

Construction in Wet Areas

- Plus an additional 15.0% for sewer, storm and irrigation drainage appurtenances, removal and disposal of excess material, import of select backfill, dewatering and stabilization, etc. (as indicated within the soils report and/or through comparable installations in the area).

Concrete Manhole and Box Over sizing Multipliers

Size Changes	Material Cost Multiplier
12"	1.15
24"	1.20
36"	1.25
48"	1.30

Construction in Dry Areas

- Plus an additional 5.0% for concrete manhole and box construction & appurtenances and the removal and disposal of excess material.

Construction in Wet Areas

- Plus an additional 15.0% for concrete manhole and box construction & appurtenances, removal and disposal of excess material, import of select backfill, dewatering and stabilization, etc. (as indicated within the soils report and/or through comparable installations in the area).