

## SECTION 2

### DESIGN STANDARDS

#### 2.1 GENERAL

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

Critical environment lands and lands subject to hazardous conditions such as, but not limited to, land slides, mud flows, 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 these specifications depicts the basic design standards outlined in this section.

The design of subdivisions in relation to streets, blocks, lots, open spaces and other design factors shall be in harmony with the following design standards.

#### 2.1.1 SUBDIVISION DESIGN CHECKLIST CONCEPT PLAN

<input type="checkbox"/>	Show total area, acres and sq. ft.	<input type="checkbox"/>	Show impact on existing sewer system
<input type="checkbox"/>	Show total # of lots	<input type="checkbox"/>	Show scale
<input type="checkbox"/>	Show density	<input type="checkbox"/>	Show largest lot size
<input type="checkbox"/>	Conforms to Street Master Plan	<input type="checkbox"/>	Show smallest lot size
<input type="checkbox"/>	Show green space	<input type="checkbox"/>	Show average lot sizes
<input type="checkbox"/>	Show zoning that subdivision falls under	<input type="checkbox"/>	Make sure that lot sizes meet minimum requirements from zoning laws
<input type="checkbox"/>	Show surrounding land owners	<input type="checkbox"/>	Show existing and proposed streets
<input type="checkbox"/>	Show a minimum of two accesses to subdivision	<input type="checkbox"/>	Show existing and proposed utilities
<input type="checkbox"/>	Show existing ditches, utilities, all easements	<input type="checkbox"/>	Show vicinity map
<input type="checkbox"/>	Phasing	<input type="checkbox"/>	Show all water and drainage courses
<input type="checkbox"/>	How storm water will be handled	<input type="checkbox"/>	Show water shares to be turned over to Town
<input type="checkbox"/>	Show impact on existing water system	<input type="checkbox"/>	Review fee
		<input type="checkbox"/>	Name of subdivision

#### PRELIMINARY PLAN

<input type="checkbox"/>	Name of developer on plans	<input type="checkbox"/>	water
<input type="checkbox"/>	Name of designer on plans	<input type="checkbox"/>	Letter of approval for ditch treatments
<input type="checkbox"/>	Does subdivision conform to Town's general plan	<input type="checkbox"/>	Review fees paid
<input type="checkbox"/>	Show zoning on plans	<input type="checkbox"/>	Does form of subdivision plat meet State and local regulations
<input type="checkbox"/>	Letter of verification of water shares	<input type="checkbox"/>	Are range, township and section lines shown and properly labeled
<input type="checkbox"/>	Letter of assurance that water is potable		

- \_\_\_ Show date, scale, and north arrow
- \_\_\_ Show vicinity map of area within 1/2 mile radius on plat
- \_\_\_ Show existing contours on plat
- \_\_\_ Show subdivision boundary on plat
- \_\_\_ Show all existing street names, locations, and grades on plat
- \_\_\_ Show proposed street name, width, grades, typical cross section and street lights
- \_\_\_ Show all existing utilities and easements
- \_\_\_ Show proposed utilities and easements
- \_\_\_ Show mail box easements
- \_\_\_ Show proposed water mains, laterals, valves, fire hydrants, blow-off valves, and caps and blocks
- \_\_\_ Check water line grade and size
- \_\_\_ Show proposed sewer mains, grades, flow line elevations, and manholes
- \_\_\_ Show suggested surface drainage plans and provide calculations
- \_\_\_ Show property acreage, number of lots, lot dimensions, and lot areas
- \_\_\_ Make sure that subdivision name does not conflict with others
- \_\_\_ Show irrigation main, laterals, caps and blocks
- \_\_\_ Show soil information
- \_\_\_ Show depths of asphalt, roadbase, borrow

- \_\_\_ Show street grade (min. 0.4%, max. 8%)
- \_\_\_ 15' minimum radius corners
- \_\_\_ 600' max. cul-de-sac
- \_\_\_ Min. 100' VC
- \_\_\_ Blocks must be less than 1000'
- \_\_\_ Curb and gutter match existing roads
- \_\_\_ State Highway permit (if applicable)
- \_\_\_ Sewer meets master plan
- \_\_\_ Water meets master plan
- \_\_\_ Location of existing buildings and structures within 200' of subdivision
- \_\_\_ Location of significant natural features (streams, flood plains, wetlands). Include flood zone designation and map panel number for entire subdivision.
- \_\_\_ Show areas where ground water periodically arises to within 5' of surface ground (SCS maps) and areas covered by 100-year flood
- \_\_\_ Show street signs
- \_\_\_ Show a minimum of 2 subdivision monuments
- \_\_\_ Location of utilities on street typical
- \_\_\_ Check closure and accuracy of plat
- \_\_\_ Parking spaces if needed
- \_\_\_ Building envelopes if easement is on property/lot
- \_\_\_ Show utility conduits at street crossings (5 minimum)

FINAL PLAN

- \_\_\_ Correct all deficiencies from preliminary review
- \_\_\_ Final plat
- \_\_\_ Title report for land within subdivision boundary
- \_\_\_ Payment for final plat fees
- \_\_\_ Payment of recording fees
- \_\_\_ Lot addresses

- \_\_\_ Engineer's estimate
- \_\_\_ If along state highway, approval of UDOT and utility line agreements
- \_\_\_ Letter from irrigation company approving ditch improvements and sizes
- \_\_\_ Verification of water shares and potable water
- \_\_\_ State plane coordinates shown.

CONSTRUCTION PLAN

Sewer

- \_\_\_ Size
- \_\_\_ Location
- \_\_\_ Grade

- \_\_\_ Manhole locations and spacing less than 400 feet
- \_\_\_ Tie to existing facilities
- \_\_\_ Lateral locations

Water

- \_\_\_ Size
- \_\_\_ Location
- \_\_\_ Fire hydrant location and spacing less than 500 feet
- \_\_\_ Tie to existing facility
- \_\_\_ Blow off locations
- \_\_\_ Location of water valves
- \_\_\_ Cap and block dead ends
- \_\_\_ Lateral location

Streets

- \_\_\_ Grades meet minimum and maximum for roadway
- \_\_\_ Vertical curves at grade breaks of 1.0%
- \_\_\_ Vertical curve minimum 100 feet
- \_\_\_ Horizontal curves minimum 250 feet
- \_\_\_ Typical cross section showing pavement design, minimum of 3" asphalt, 6" base, possible granular borrow or changes from soils report
- \_\_\_ Street light locations
- \_\_\_ Curb and gutter elevations match existing elevations and proposed elevations
- \_\_\_ Street signing plan (intersection stop, yield, school, speed limit, etc.)

Storm Drainage

- \_\_\_ Calculations used to determine line size, retention ponds, and/or percolation rates
- \_\_\_ Storm drain catch basins and manholes
- \_\_\_ Minimum slope of improvements
- \_\_\_ Size of improvements
- \_\_\_ Maximum Distances between manholes

2.2 STREETS

A. All streets must conform to the currently approved major street plan map of the City of Cedar Hills General Plan.

B. The alignment and width of all through streets shall be preserved unless unusual topographical conditions make a modification advisable. Where the Planning Commission and/or City Council 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. Street widths are to be measured from lot line to lot line. The minimum width of streets unless otherwise expressly permitted by the City Council so measured shall be:

- (1) For rural streets 44.0 feet of right of way, 28.0 feet of pavement width.
- (2) For local streets, 56.0 feet of right of way, 34.0 feet of pavement width.
- (3) For minor collector streets, 66.0 feet of right of way, 44.0 feet of pavement width.

- (4) For major collector streets 74.0 feet of right of way, 52.0 feet of pavement width.

Note: Standard street sections are shown in the Standard Drawings of these Specifications.

D. 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 in diameter, measured to the back of the curb and gutter. Partial cul-de-sac bulbs are allowable where deemed appropriate by the Planning Commission. Surface water drainage into a cul-de-sac is not desirable, however, if surface water drainage is into the cul-de-sac due to the grade of the street, all necessary catch basins, storm drainage system appurtenances, and drainage easements shall be provided. Sumps collecting surface water in a cul-de-sac will not be accepted.

E. Streets shall intersect each other as near as possible at right angles. In no case shall the deviation from 90 degrees be more than +/- ten (10) degrees. Any deviations shall be approved by the City Engineer.

F. When streets intersect into another street, street offsets of more than ten (10) feet and less than 150 feet shall not be allowed except where specifically authorized by the City Engineer. Major streets such as through collectors, etc., may require 350 feet and more as determined by the City Engineer.

G. Street monuments shall be required as directed by City Engineer.

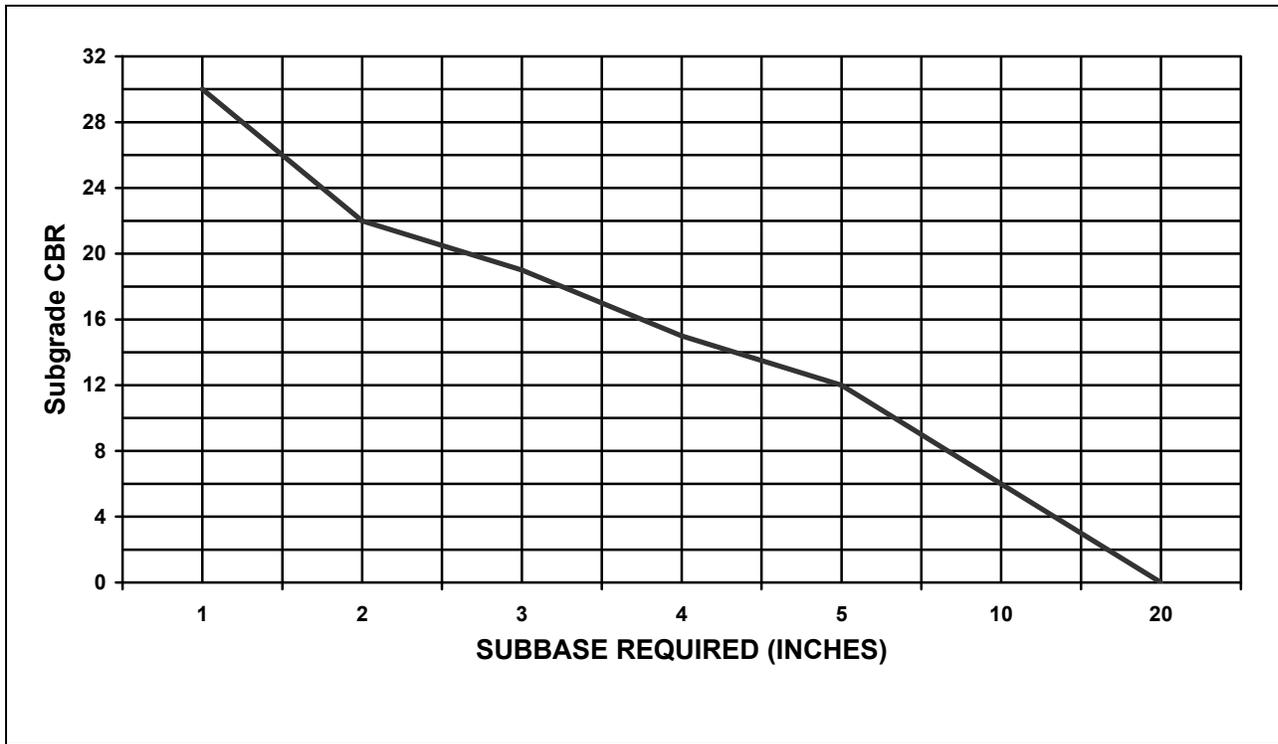
H. All arterial roads shall be designed by the City Engineer, or jurisdictional entity (UDOT, etc.), and shall incorporate the following: limited access control along roadway, widths as required based on projected traffic volumes, and road classification as defined by City street master plans.

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 thereto 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 and/or City Council.

J. Pavement design (asphalt, base and sub-base) shall conform to the requirements outlined in Figure 2-1 (page 2-3) or an alternate design by a Registered Engineer 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.

K. Postal easements shall be approved by the local postal entity and City Engineer.

FIGURE 2-1  
CITY OF CEDAR HILLS PAVEMENT DESIGN CHART



Notes and Requirements:

1. Sub-base curve based on:
  - a. Road Base CBR = 70.
  - b. Asphalt Marshall Stability = 1800.
  - c. Sub-base CBR (California Bearing Ratio) = 30.

2. Pavement Design

<u>Street</u>	<u>Sub-base</u>	<u>Road Base</u>	<u>Asphalt</u>	<u>Overlays</u>
Rural Street	Per chart	6"	3"	2"
Local Street	Per chart	6"	3"	2"
Minor Collector	Per chart	8"	3"	2"

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 saturated conditions) of the road subgrade is required for every 1,000 linear feet of road. More shall be required if subgrade conditions vary appreciably. After the subgrade 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 2 feet beyond edge of pavement.
6. Additional sub-base material shall be placed on all saturated unstable subgrades that must be stabilized.

L. Alignment Standards

In general, roadway design should conform to the latest edition of the AASHTO Policy on Geometric Design of Highways and Streets. Specific City standards are summarized below and are required unless specifically approved otherwise by the City Engineer and the Public Works Department.

VERTICAL ALIGNMENT CRITERIA

<b>Roadway Classification</b>	<b>Vertical Curve Length Min. (feet)</b>	<b>Design Speed (mph)</b>	<b>Maximum Grade (%)</b>
Major Collector	100*	25	7
Collector	100*	25	7
Local Street	100*	25	8
Rural Street	100*	25	8

\*Crest and sag vertical curves shall be controlled by "K value" appropriate to the design speed requirements of each roadway classification. The "K value" ranges depicted in Exhibits 3-76 and 3-79 of the AASHTO Policy on Geometric Design of Highways and Streets are preferred. Lower "K value" ranges may be utilized only as approved by the City Engineer.

All super-elevated roadways shall be designed in accordance to the current AASHTO Policy on Geometric Design of Highways and Streets and be approved by City Engineer.

Cedar Hills City Ordinance 3-4-2003B states that "No public street, common drive, or private street shall have a grade greater than eight (8) percent, except that the City Council may approve a grade of up to twelve (12) percent for "short stretches." This ordinance also states that "short stretches" shall be construed to mean a distance of less than 500 feet or 50 percent of any street segment.

Cedar Hills City Ordinance 3-4-2003B also states that "Cul-de-sacs or dead-end streets shall have a maximum grade of eight (8) percent and the bulb or turn-around portion at the end of the street segment shall have a maximum grade of four (4) percent."

If the difference between the grades of two intersecting vertical tangents of a street is greater than 0.5%, an appropriate vertical curve shall be placed between them.

Minimum grade on all roadways shall not be less than five/tenths of one percent (0.5%) unless approved otherwise by the City Engineer.

HORIZONTAL ALIGNMENT CRITERIA

Roadway Classification

<b>Primary Classification</b>	Min. Radius * (feet)	Max. Degree of Curvature (°)*	Design Speed (mph)
Major Collector	275'	20°50'	25
Minor Collector	275'	20°50'	25
Local Street	275'	20°50'	25
Rural Street	275'	20°50'	25

\*Super-elevation may be required. Appropriate super-elevation rates shall be selected as indicated within the latest edition of the AASHTO Policy on Geometric Design of Highways and Streets.

When street lines within a block deflect from each other at any one point more than five (5) degrees, there shall be a connecting curve. The radius of the curve at the centerline of the street shall be as per the table above.

Provide appropriate roadway transition taper lengths by adhering to the following formulas:

Length       $L = S \times W$  For speeds greater than 40 mph

$L = \frac{WS^2}{60}$  for speeds of 40 mph or less

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

M.      Maintain minimum intersection sight distance requirements per AASHTO Policy on Geometric Design of Highways and Streets unless approved otherwise by the City Engineer.

N.      Curbs at all intersections shall be rounded with curves meeting the following minimum requirements unless approved otherwise by the City. Property lines at street intersections shall be rounded with a 20-foot minimum curve. Curb radii for intersecting streets of different classifications shall be determined as shown on Standard Drawing no. 202. Curb radii for intersecting streets of the same classification shall be determined as shown below.

Roadway Classification	Curb Radius (feet) Measured at TBC (Minimum)
Major Collector	35
Minor Collector	30
Local Street	24
Rural Street	20

O. New streets shall use the coordinate and name form of street numbering. A street obviously a continuation of another already in existence should bear the same number and name.

P. All streets within the City limits will be required to be dedicated for public use except as called out otherwise in the City Code. A minimum of one half of the street plus ten (10) feet shall be platted and constructed 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.

Q. Protection strips, spite strips, or narrow strips of ground along a back lot line, between a fence, a sidewalk, and parallel or perpendicular to street right of way are not allowed.

R. Wheel Chair Ramps - Wheel chair ramps must be constructed at all street corners and other pedestrian crossings as shown in the Standard Details Section of these specifications.

S. Curb, gutter and sidewalks shall be installed on existing and proposed streets.

T. Catch basins as detailed in the Standard Details shall be provided where required for proper street drainage.

U. Driveways shall be offset from intersections as follows: preferred 200-foot offset, minimum 80-foot offset, from intersections to any driveway on either collector or arterial streets.

V. Utility casings shall be installed at each intersection for private utilities.

W. Additional roadway widening for left turn storage, acceleration/deceleration lanes, or intersection widening may be required in addition to standard roadway widths in areas as deemed necessary by the City Engineer and Planning Commission.

## 2.3 WATER SYSTEM

A. Every development requesting water service or required to install a culinary water service shall include service to ten (10) feet inside the property line or as indicated on Standard Drawing No. 406. If, in the opinion of the City Engineer, there is not sufficient main line pressure in the entire culinary water system to maintain 40 psi minimum during peak hourly and fire flow conditions, the development must be postponed until changes in the main system are constructed.

B. Culinary water mains shall be a minimum diameter of eight (8) inches unless a larger size is specified by the City to meet minimum health department or insurance services (fire) requirements. All lines must be looped (no dead ends) except by express approval of the City.

C. Used pipe and fittings shall not be installed for use within the culinary water system.

D. All culinary water pipe shall be separated from sewage systems as required by the Utah State Division of Drinking Water in accordance to Section 8.10.1.

E. Install approved blowoff valves at dead ends.

#### 2.4 FIRE HYDRANTS

A. Fire hydrants shall be installed as indicated on Standard Drawing No. 401 and 402. In general, fire hydrants shall not be farther than five hundred (500) feet apart along the street in normal residential areas and as much as three hundred (300) feet apart in high density areas as determined by the City. No dwelling unit shall be located farther than two hundred-fifty (250) feet from a fire hydrant measured along the curb and in to the dwelling. Additional fire hydrants may be required at the discretion of the City Fire Marshall and City Engineer due to specific building or density requirements.

B. Fire hydrants shall comply with national standard regulations and shall have a minimum five (5) inch barrel in residential areas and a minimum six (6) inch barrel in close proximity to public buildings.

C. Fire hydrants shall not be connected to any water main smaller than eight (8) inches in diameter.

D. See Standard Fire Hydrant Detail for additional information.

#### 2.5 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 and City design criteria. (See Section 9)

C. Sewer laterals to building lots shall be stubbed ten (10) feet inside the property line.

#### 2.6 DRAINAGE SYSTEM PLAN

The drainage plan shall include an analysis of potential drainage problems, along with a proposal indicating how the surface water will be disposed of. Detention basins may be required to alleviate the impact on existing drainage facilities. Said plan shall also include the projected quantity of waters anticipated for a ten-year storm (piping), 100-year storm (detention facilities), and 100-year storm (retention facilities). All drainage facilities shall be installed in conformance with approved City drainage plans.

The development shall include all necessary storm drainage appurtenances including collection boxes/basins, culverts, drain pipes, detention/retention basins, erosion control, energy dissipation structures, and drainage channels. In order to insure the safety of the occupants of a subdivision, the City may require the developer to cover or fence culverts, basins, and canals, at the discretion of the City Planning Commission and Council.

Drainage facilities other than detention and retention facilities shall be adequate for a design ten-year storm. Flood control facilities shall be designed for a 50-year storm.

Drainage basins (detention or retention) shall be designed for a 100 year storm (of all durations) using a City-approved Intensity Duration Frequency (IDF) curve. Drainage basins shall be designed to have a minimum of one-foot of freeboard, 3:1 slope (max.) with sod and tree covering and a sprinkler system, as approved. Detention basins shall be designed with a maximum discharge rate of 0.2 cfs/acre, or as otherwise dictated by the City Engineer. All drainage basins shall also include a spillway adequate to assure that minimum damage occurs as a result of basin overflow. All drainage basin calculations shall be compiled in the form of a report, and shall be stamped by a professional engineer, licensed in the State of Utah.

In areas where the highest water level in the ground is no closer than eight (8) feet to the ground surface and percolation rates are high, pre-treatment sumps may be used to dispose of surface waters. All pre-treatment manhole and storm water sumps shall be constructed to comply with applicable City Standards, and as indicated within standard drawing no. 506. All design data including percolation tests, etc., must be submitted with the drainage plans.

For single lots or small areas, the above may be waived so that sumps can be installed or drainage directed on to private property with a drainage easement.

Allowable use of streets for the initial storm runoff in terms of pavement encroachments is as follows:

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

Inlet grating maximum design capacity for a standard bicycle safe 18" x 36" grates is 3.0 cfs.

All drainage piping for surface (15-inch minimum size) and subsurface drainage (8-inch minimum size) shall have manholes at 400 foot spacing and at angle points. Minimum slopes shall be the same as required by the Utah State Division of Health for sanitary sewers and City design criteria. (See Section 9) Piping, testing, etc., shall comply with specific requirements as defined in the section of these specifications covering storm drainage requirements unless otherwise approved by the City Engineer.

## 2.7 STORM WATER TECHNICAL MANUAL

2.7.1 GENERAL The Storm Water Technical Manual contains requirements for land development and construction activities, as well as design criteria and guidelines for those performing such activities. It includes best management practices applicable to development and construction activities. It also includes the plan submittal requirements. The City Engineer has authority to modify the requirements of the Storm Water Technical Manual as needed to accomplish reasonable and effective storm water pollution prevention objectives.

### 2.7.2 REQUIREMENTS FOR PROPOSED DEVELOPMENTS

A. Incorporate best management practices (BMPs) into development design to limit quantity of runoff and preserve quality of runoff.

Storm water best management practices (BMPs) must be considered throughout the development process. PART 4, CONSTRUCTION AND POST CONSTRUCTION BEST MANAGEMENT PRACTICES of the Cedar Hills Storm Water Management Program contains fact sheets for BMPs whose use Cedar Hills City encourages. Section E.2, Storm Water Quality Criteria of this Storm Water Technical Manual identifies BMPs that are required on all Construction Site Storm Water Management Plans.

B. Prepare Construction Site Storm Water Management Plan

A Construction Site Storm Water Management Plan must be prepared and submitted with the development plans for approval. This requirement applies to all developments (except construction of a single family house, with associated on-site improvements). See section F of this chapter, CONSTRUCTION SITE STORM WATER MANAGEMENT PLAN CONTENTS for the required contents of the plan.

C. Provide financial guarantee that improvements contained in the Construction Site Storm Water Management Plan will be installed and maintained.

Financial guarantee must be posted with Cedar Hills City prior to beginning construction. In the case of a subdivision of land, this will be included in the bond that is

required for the cost of the subdivision improvements. In the case of site improvements, rather than a financial guarantee, non-monetary methods of enforcement already in place in Cedar Hills City (business licenses, utility services, building and occupancy permits) are available to encourage compliance with the improvements contained in the approved Construction Site Storm Water Management Plan.

At the time of development, the developer shall provide an estimate of the cost of the required improvements. The City will review the estimate and establish the dollar amount of the financial guarantee.

D. Prepare Post Construction Storm Water Management Plan

A Post Construction Storm Water Management Plan must be prepared and submitted with the development plans for approval. This requirement applies to all developments in which private improvements are constructed (other than construction of a single family house, with associated on-site improvements). See section G of this chapter, POST CONSTRUCTION STORM WATER MANAGEMENT PLAN CONTENTS for the required contents of the plan.

E. Obtain UPDES Permit (all sites having land disturbance area equal to or greater than 5 acres)

Developments having a disturbed area of 5 acres or more require a UPDES Storm Water General Permit for Construction activities from the Division of Water Quality of the Department of Environmental Quality of the State of Utah.

Obtaining the permit requires preparation of a Storm Water Pollution Prevention Plan (we would expect that the Construction Site Storm Water Management Plan previously described would suffice) and a Notice of Intent. The permit form is available on the Internet in PDF format at <http://www.deq.state.ut.us/eqwq/updes/swconst.pdf>. The developer must submit a copy of the Notice of Intent and proof of fee payment to the City before the site plan will be considered finalized.

Note that when a development of over 5 acres in size is phased, the permit is required for each phase, even if each phase is less than 5 acres in size.

2.7.3 REQUIREMENTS FOR CONSTRUCTION ACTIVITIES (OTHER THAN THOSE ASSOCIATED WITH INDIVIDUAL RESIDENTIAL STRUCTURES)

A. Provide instruction to construction site operators regarding the Construction Site Storm Water Management Plan

Prior to beginning work, developers and contractors must provide appropriate instruction to on-site construction supervisors and operators, regarding the requirements of the Construction Site Storm Water Management Plan. A copy of the approved plan

must be present at the construction site.

ii. Following Construction Site Storm Water Management Plan

The improvements shown in the approved Construction Site Storm Water Management Plan must be constructed as indicated in the plan. The appropriate activities outlined in the Construction Site Storm Water Management Plan must be performed prior to any other construction activities on the site. Cedar Hills City encourages modifications to the plan when needed to improve storm water management in light of site conditions. However, variations from the plan that reduce or eliminate elements of the plan must only be done with the approval of the Cedar Hills City Public Works Representative or City Engineer.

iii. Monitor effectiveness of the elements included in the Construction Site Storm Water Management Plan, and make improvements as necessary to achieve the plan objectives.

After initial implementation of the improvements outlined in the approved Construction Site Storm Water Management Plan, rainfall activity will provide opportunity to observe the effectiveness of the storm water management improvements. Those responsible for construction activities must monitor the in-place storm water management improvements to assess their effectiveness; they must then make adjustments to the improvements as needed to accomplish effective storm water management.

iv. Provide verification that improvements were constructed as approved

Following implementation of the improvements contained in the Construction Site Storm Water Management Plan, the preparer of the plan shall provide Cedar Hills City with a statement as to the condition of the improvements contained in the plan. The statement shall be made on a copy of the Construction Site Storm Water Management Plan document, and shall be signed.

If the improvements were constructed as approved, it shall include language verifying such. If the improvements were not constructed as approved, it shall state the differences, the reason for the differences, and provide an opinion as to the adequacy of the constructed improvements. This statement must be provided to Cedar Hills City at the time record drawings are submitted (in the case of public improvements) or prior to issuance of an occupancy permit (in the case of private site improvements)

2.7.4 REQUIREMENTS FOR CONSTRUCTION ACTIVITIES ASSOCIATED WITH INDIVIDUAL RESIDENTIAL STRUCTURES

A. Construction Site Storm Water Management Plan

While the Public Works Representative or City Engineer may require that a Construction Site Storm Water Management Plan be created on individual residential lots in special circumstances, generally no lot-specific plan is required.

B. Sediment Control on Small Construction Sites

The BMP fact sheet for Sediment Control on Small Construction Sites (SCSCS) is to be included as a part of the building permit. This BMP applies to construction and landscaping activities associated with individual residential structures, and shall be followed.

C. Owner or operator shall make adjustments to practices as needed to prevent storm water pollution

Sediment that is left in the street or on adjacent lots is evidence of inadequate sediment control. Where storm water pollution prevention measures are inadequate, or are not being properly followed, the Public Works Representative or City Engineer may refuse to perform inspections or shut down work on the project.

2.7.5 REQUIREMENTS FOR EXISTING DEVELOPMENTS

A. Following approved Post Construction Storm Water Management Plan

The owners of existing developments are responsible to maintain improvements and observe practices that were part of an approved Post Construction Storm Water Management Plan. Failure to adhere to the plan may result in failure of the City to renew business licenses, fines or other action as prescribed by Cedar Hills City Code.

B. Operator or owner makes adjustments to practices or improvements when necessary to achieve Post Construction Storm Water Management Plan objectives

Cedar Hills City encourages adjustments to the plan that enhance effective storm water management. However, significant reduction of practices contained in the plan is to be accomplished through formal modification of the plan and resubmission to the City Engineer for approval.

2.7.6 STORM WATER PERFORMANCE CRITERIA AND DESIGN GUIDELINES

The following storm drainage criteria and design guidelines apply to all storm drainage plans in Cedar Hills and shall be used in storm drainage calculations. The City Engineer has authority to modify the criteria and guidelines as needed to meet changing or unusual needs or conditions.

A. Contents of drainage system plan

1 The drainage plan shall include an analysis of potential drainage problems, along with a proposal indicating how the surface water will be disposed of. Detention basins may be required to alleviate the impact on existing drainage facilities. Said plan shall also include the projected quantity of waters anticipated for a ten-year storm (piping), 100-year storm (detention facilities), and 100-year storm (retention facilities). All drainage facilities shall be installed in conformance with approved City drainage plans.

2. The development shall include all necessary storm drainage appurtenances including collection boxes/basins, culverts, drain pipes, detention/retention basins, erosion control, energy dissipation structures, and drainage channels. In order to insure the safety of the occupants of a subdivision, the City may require the developer to cover or fence culverts, basins, and canals, at the discretion of the City Planning Commission and Council.

3. Design storm frequency

- A. Drainage facilities other than detention and retention facilities shall be adequate for a design ten-year storm
- B. Flood control facilities shall be designed for a 50-year storm
- C. Drainage basins (detention or retention) shall be designed for a 100-year storm (of all durations)

4. Drainage basin design

- A. Drainage basins shall be designed to have a minimum of one foot of freeboard, 3:1 slope (max.), and grass covering with a sprinkling system unless otherwise approved.
- B. Detention basins shall be designed with a maximum discharge rate of 0.2 cfs/acre, or as otherwise dictated by the City Engineer.
- C. All drainage basins shall include a spillway adequate to assure that minimum damage occurs as a result of basin overflow.
- D. All drainage basin calculations shall be compiled in the form of a report, and shall be stamped by a professional engineer, licensed in the State of Utah.

5. Drainage system design

- A. Maximum design capacity is 3.0 cfs for a standard bicycle safe 18" x 36" inlet grate.
- B. All surface drainage piping shall have a minimum diameter of 15-inches.
- C. All subsurface drainage piping shall have a minimum diameter of 8-inches.

- D. Manholes shall be installed at spacing no greater than 400 feet and at angle points in drainage and subsurface drainage piping.
- E. Minimum pipe slopes shall be the same as required by the Utah State Division of Health for sanitary sewers.
- F. Piping, testing, etc., shall comply with specific requirements as defined in the section of the specifications covering storm drainage requirements unless otherwise approved by the City Engineer.

6. Pretreatment facilities

- A. In areas where the highest water level in the ground is no closer than eight (8) feet to the ground surface and percolation rates are high, pre-treatment sumps may be used to dispose of surface waters.
- B. All pre-treatment manhole and storm water sumps shall be constructed to comply with applicable City Standards, and as indicated within standard drawing no. 506.
- C. All design data including percolation tests, etc., must be submitted with the drainage plan.
- D. For single lots or small areas, the above may be waived so that sumps can be installed or drainage directed on to private property with a drainage easement.

7. Storm water encroachment onto streets

Allowable use of streets for the initial storm water runoff in terms of pavement encroachment is as follows:

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

8. Intensity-Duration-Frequency (IDF) Curve

The Intensity Duration Frequency (IDF) curve shown below shall be used for storm drainage calculations in Cedar Hills City.

**ESTIMATED RETURN PERIODS FOR SHORT DURATION PRECIPITATION  
(inches)**

Station: Cedar Hills, UT  
Latitude: 40.4138 N

Elevation: 4963 feet  
Longitude: 111.7543 W

**Intensity (IN/HR)**

ARI*years	10 min.	15 min.	30 min.	1 Hr.	2 Hr.	3 Hr.	6 Hr.	12 Hr.	24 Hr.
2	1.5	1.24	0.83	0.52	0.32	0.25	0.16	0.1	0.06
5	2.06	1.7	1.15	0.71	0.42	0.31	0.2	0.13	0.08
10	2.57	2.12	1.43	0.88	0.51	0.37	0.23	0.14	0.09
25	3.39	2.8	1.89	1.17	0.66	0.47	0.28	0.17	0.1
50	4.13	3.42	2.3	1.42	0.8	0.55	0.32	0.19	0.11
100	5.02	4.14	2.79	1.73	0.95	0.65	0.36	0.22	0.12

9. Storm water quality criteria

A. Storm Water Treatment

Prior to discharging storm water; collected water must be treated in an attempt to prevent illicit discharges of sediment, oils, floatables and other pollutants.

B. Use of Best Management Practices

Cedar Hills City encourages the use of the BMP fact sheets included in PART 4, CONSTRUCTION AND POST CONSTRUCTION BEST MANAGEMENT PRACTICES. **The following BMPs are required to be a part of all Construction Site Storm Water Management Plans:**

* BMP Inspection & Maintenance	BMPIM
* Concrete Waste Management	CWM
* Dust Controls	DC
* Grading Practices	GP
* Portable Toilets	PT
* Vehicle and Equipment Fueling	VEF

There is no list of BMPs that is required on all Post Construction Storm Water Management Plans.

In addition to the required BMPs listed above, other BMPs from PART 4 that apply to a given development should be used. Cedar Hills City also encourages the use of practices in addition to those contained in the Cedar Hills Storm Water Management Program that may be suitable for a given development.

Engineering judgment must be used in selecting BMPs for a given development.

C. Prohibited Practices

The following practices are specifically prohibited:

- i. Soil or construction materials may not be piled in streets
- ii. Soil bridges over curb and gutter may not be constructed

2.7.7 CONSTRUCTION SITE STORM WATER MANAGEMENT PLAN CONTENTS

1. Purpose of the Construction Site Storm Water Management Plan

The purpose of the Construction Storm Water Management Plan is to control storm water runoff and reduce pollutants in storm water runoff during construction by accomplishing the following:

- A. Controlling soil erosion
- B. Controlling discharge of sediment into storm drainage facilities or off-site
- C. Prevent illicit discharges into on-site soils, into storm drainage facilities or off-site
- D. Prevent uncontrolled discharge of storm water to adjacent property
- E. Controlling construction waste
- F. Controlling dust

2. Contents of the Construction Site Storm Water Management Plan

The Construction Storm Water Management Plan is to be submitted with the site plans or improvement plans, and is to contain at least the following elements:

- A. Existing and proposed contours as shown on the grading plan
- B. Existing and proposed storm drainage improvements
- C. Best management practices to accomplish the purpose of the plan--show the following for each BMP specified, as applicable:
  - i. Location and extent of specified BMP
  - ii. Timing of implementation, possibly in terms of planting season or number of days following commencement of grading
  - iii. Duration of implementation
  - iv. Any information in addition to or different from that shown on the BMP fact sheet as necessary to employ the BMP on the site
  - v. BMP Fact sheets or other descriptive material for all specified BMPs
- D. Proposed re-vegetation—show the following:
  - i. Location and type of re-vegetation proposed
  - ii. Timing of re-vegetation, possibly in terms of planting season or number of days following commencement of grading

- E. Sequencing of construction activities and BMPs
- F. Name, address & telephone number of individual who has responsibility for implementation and maintenance of the plan.

## 2.7.8 POST CONSTRUCTION STORM WATER MANAGEMENT PLAN CONTENTS

### 1. Purpose of the Post Construction Storm Water Management Plan

The purpose of the Post Construction Storm Water Management Plan is to control storm water runoff and reduce pollutants in storm water runoff after construction is complete and the developed site is in operation. This is achieved by accomplishing the following:

- A. Controlling soil erosion
- B. Controlling discharge of sediment into storm drainage facilities or off-site
- C. Preventing illicit discharges into on-site soils, into storm drainage facilities or off-site

### 2. Contents of the Post Construction Storm Water Management Plan

The Post Construction Storm Water Management Plan is to be submitted with the site plans or improvement plans. It shall be contained on a plan sheet of its own, rather than being a part of another plan sheet, and is to contain at least the following:

- A. The site plan, including vicinity map, proposed contours, permanent storm drainage features, and landscaping.
- B. Best management practices to accomplish the purpose of the plan. Examples of appropriate BMPs may include those addressing operation and maintenance of storm drainage quality control facilities, operation and maintenance of storm water discharge control facilities, maintenance of landscaping, good housekeeping practices, etc.
- C. Show the following for each BMP specified:
  - i. Location and extent of specified BMPs, as appropriate
  - ii. Detailed schedule of execution for each specified BMP, in terms of starting time, duration, frequency, etc., as appropriate
  - iii. Any information in addition to or different from that shown on the BMP fact sheets as necessary to employ the BMPs on the site
- D. BMP fact sheets or other descriptive material for all specified BMPs. BMP fact sheets that are part of the Post Construction Storm Water Management Plan are to be on a separate sheet from those BMP fact sheets associated with the Construction Site Storm Water Management Plan.
- E. The following statement shall prominently appear on all Post Construction Storm Water Management Plans:

The holders of the business license at this site (or owner of the lot if there is no business license) are responsible to perpetually follow this Post Construction Storm Water Management Plan. Failure to follow the plan may result in the City refusing to renew business licenses or take other action against the property owner.

The objectives of the Plan are to:

1. Control soil erosion
2. Control discharge of sediment into storm drainage facilities or off-site
3. Prevent illicit discharges into on-site soils, into storm drainage facilities or offsite

If the objectives of the Plan are not being met, the site operator or owner shall make adjustments to the Plan as needed to accomplish its purposes.

Cedar Hills City encourages adjustments to the plan that enhance effective storm water management. However, significant reduction of practices contained in the plan is to be accomplished through formal modification of the plan and resubmission to the City Engineer.

#### 2.7.9 PROPOSED CONSTRUCTION AND POST CONSTRUCTION STORM WATER MANAGEMENT PLAN REVIEW PROCEDURES

The Construction Storm Water Management Plan and Post Construction Storm Water Management Plan will be submitted to Cedar Hills City with the development plans. They will be reviewed along with the development plans, with storm water quantity and quality benefits in mind. The review procedure will be the same as for subdivision improvement plans and site plans.

#### 2.7.10 CONCLUSION

Inasmuch as the construction and post construction related best management practices will generally be carried out by those in the private construction industry, they will be implemented as specified in specific construction site and post construction storm water management plans as development occurs. The BMPs found in PART 2, BMPs PERFORMED BY CEDAR HILLS CITY, cover Cedar Hills City's efforts to assure that the plans are followed.

Cedar Hills City's Storm Water Technical Manual satisfies, in part, two of the six

minimum control measures established by the Storm Water Phase II Rule: #4: Construction site storm water runoff control, and #5: Post-construction storm water management in new development and redevelopment.

## 2.8 SIGNS

Stop signs shall be posted at all exits of subdivision roads to City streets where warranted and/or required by the City Engineer for adequate traffic control. Other 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 published by the U.S. Department of Transportation. They shall be placed on a telspal post with a distance of seven (7) feet from bottom of sign to finished grade and the sleeve extending six (6) inches above finished grade. The stop signs and street signs shall be combined wherever possible. 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.

## 2.9 LOT CORNERS

All lot corners shall be marked with a rebar peg at least 5/8-inch in diameter and twenty-four inches in length with a plastic cap indicating license number of the registered land surveyor. All lot corners adjacent to street frontage shall be projected to curb and gutter and indicated by a recessed copper rivet with washer indicating license number of registered land surveyor or approved equivalent (see Standard Drawing No. 215). Corner markers must be installed prior to issuance of any building permits.

## 2.10 DEDICATIONS

All streets within and adjacent to a proposed subdivision must be dedicated, except as approved otherwise by the City Council.