

**SUPPLEMENTAL GUIDE
TO STORM WATER MANAGEMENT
FOR DEVELOPMENT AND CONSTRUCTION**

(Appendix A - Storm Water Management Plan)

January 2012

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ATTACHMENTS:

Forms

Storm Water Approval Checklist
SWPPP Review Criteria/Checklist
Construction Storm Water Inspection Form (Utah DWQ)
Maintenance Agreement (Draft)

Best Management Practices

Construction Activities BMPs
Post Construction Activities BMPs

Construction Standard Details for Storm Water Management

Stabilized Entrance	Construction Washout
Silt Fence	Ditch Rock Check Dam
Swale/Berm	Inlet Protection

SECTION 1

DESIGN METHODS AND CONSIDERATIONS

1.1 HYDROLOGIC CRITERIA

The hydrologic criteria used for storm drain facility planning and design shall generally follow the hydrologic criteria recommended by Weber County. These criteria are presented in *Storm Drainage Hydrologic & Hydraulic Criteria Manual* (Hansen, Allen & Luce, 2002), herein after referred to as the Weber County Manual. The following discussion summarizes the hydrologic criteria from the Weber County Manual.

Drainage Design Frequency

Selecting the drainage design frequency is dependent upon dividing the storm drainage facilities into an initial storm drainage collection system and a major storm drainage collection system. The initial system and major system are described in the *Urban Storm Drainage Criteria Manual* (Urban Drainage and Flood Control District, Denver, Colorado, June 2001) as follows:

"Every urban area has two separate and distinct drainage systems, whether or not they are actually planned for and designed. One is the initial system, and the other is the major system. To provide for an orderly urban growth, reduce costs to future generations, and obviate loss of life and major property damage, both systems must be planned and properly engineered."

The initial storm drainage system is the facilities which provide protection against regularly recurring damage from storm runoff. Initial drainage system components include the street curb and gutter or drainage swells, and storm drain pipe systems. The initial system should be designed to safely convey the 10-year storm event without significantly restricting pedestrian or vehicle traffic. In streets with curb and gutter, the design standard is that the curb is not overtopped by runoff from the 10-year storm event.

The major storm drainage system is the facilities that protect people and structures during a major storm. Major storm drainage facilities may include streets (including overtopping of the curb onto the lawn area), large conduits, open channels, and regional detention basins. The major system should generally be designed for the 100-year event with the objective of preventing major damage to homes and buildings and to prevent loss of life. This does not mean that storm drains (which are considered part of the initial storm drainage system) should be designed for the 100-year

event. It means that the combination of storm drains and channelized surface flow, which may include using part of the grassed frontage area of a home as part of a 100-year channel, should be designed to accommodate the 100-year event thereby preventing damage to homes. In Roy City, the major storm drainage system includes sloughs, detention basins, and conveyance facilities across canals.

Design Rainstorm

Storm water facilities shall be designed using a design rainfall distribution appropriate for conditions and design methodology. Critical runoff events from urban areas along the Wasatch Front are caused by cloudburst type storms which are characterized by short periods of high intensity rainfall. The Weber County Manual presents a 3-hour synthetic storm distribution that incorporates the high intensity rainfall burst typical of storms along the Wasatch Front. The rainfall distribution from the Weber County Manual is recommended for storm drain modeling and design. Design flowrates based upon the rationale method will be calculated using a storm duration determined by calculated time of concentration.

Design storm precipitation depths for Roy City were developed using the NOAA Atlas methodology as recommended in the Weber County Manual. Design rainfall depths are presented in the following table.

DESIGN RAINFALL DEPTHS

Return Period (Yrs)	Storm Duration				
	1 hr	2 hr	3 hr	6 hr	24 hr
2	0.58	0.71	0.78	1.00	1.48
10	0.95	1.11	1.23	1.43	2.18
100	1.50	1.71	1.84	2.18	3.17

Rainfall depths for shorter durations are available from the NOAA website. Site specific precipitation depths, as obtained from the NOAA website, are an acceptable alternative to the design rainfall depths listed in the above table.

1.2 SUMMARY OF STORM DRAIN FACILITIES DESIGN CRITERIA

Storm drainage facilities must be designed to safely convey runoff from the project site and from upstream tributary areas. Storm drainage facilities shall be designed based upon the storm return periods and criteria as given in the following table.

RETURN PERIODS

Description	Return Period	Specific Facilities
Initial System	10-Year	Curb & gutter, drainage swells, inlets, storm drain pipes
Major System	100-Year	Commercial and regional detention basins, large pipes, channels,
Temporary Facilities	2-Year*	Detention, berms, and drainage channels for construction sites

* A higher design standard may be required by the City Engineer if exceeding the temporary facility capacity could damage neighboring property, threaten public safety, or cause significant negative impacts to water quality.

1.3 DETENTION BASIN REQUIREMENTS AND DESIGN CRITERIA

Detention basins are required for the following: 1) commercial development; 2) institutional or other development with large impervious areas; 3) residential development in areas without adequate regional detention facilities; and 4) any development where the downstream storm drain system is inadequate, as determined by the City Engineer. Detention basins shall be designed to contain the 100-year storm event with a peak release rate of 0.2 cfs per tributary acre. Detention basins shall be designed with an emergency overflow designed to safely spill to the downstream major storm drain system without damaging property or threatening public safety.

1.4 ANALYSIS METHODS

Storm water runoff flowrates and volumes shall be calculated using methodology acceptable to the City Engineer. Storm water modeling is required for large basins (greater than 30 acres) and for complex drainage systems with multiple detention basins. The rational method can be used for smaller basins with single detention basins for the same tributary area. The following analysis methodologies are recommended:

- Storm drainage system modeling - HEC- HMS Flood Hydrograph Package
- Runoff from Urban Areas - Kinematic Wave
- Runoff from Agricultural or undeveloped areas - SCS Unit Hydrograph
- Small Urban Basins - Rationale Method

1.5 WATER QUALITY AND BEST MANAGEMENT PRACTICES (BMPs)

The Utah Division of Water Quality mandates consideration of water quality impacts as part of the storm water facility design process. Developers/project designers are required to consider and to select appropriate permanent BMPs (post construction BMPs) to minimize negative impacts of the development on water quality. Post Construction BMPs that should be considered by the developer are attached. The developer must identify which BMPs are selected and indicate the justification for the selection. Submitted design calculations should document the BMP selection process. Storm drain calculations should include the following water quality information:

- Expected pollutants
- Considered BMPs
- Selected BMPs
- A discussion of how the selected BMPs will improve water quality, or why BMPs are not feasible for the project

1.6 CALCULATION SUBMITTAL REQUIREMENTS

Runoff calculations by a licensed professional engineer shall be submitted to the City Engineer for review and approval. At a minimum, calculations shall include the following:

- Identification of the methodology and procedure
- Design storm depths/intensities
- Runoff flowrate calculations for all pipes and other key points in the system
- Required detention volume calculations with outlet hydraulics
- Calculated hydraulic capacities of pipes, ditches, channels, and structures (when appropriate)
- Calculated design detention volumes to the high water mark
- Storm water quality information and discussions as indicated above

1.7 ENVIRONMENTAL COMPLIANCE

Project design and construction must comply with Federal and State laws pertaining to threatened or endangered species, historic properties, and wetlands. Where applicable, documentation of compliance to these laws shall be submitted to Roy City for review and verification.

Threatened and Endangered Species

As of January 12, 2012, the Utah Department of Natural Resources has identified the following threatened and endangered species as potentially being located in Weber County:

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status</u>
Ute Ladies'-Tresses	<i>Spiranthes diluvialis</i>	Threatened
June Sucker	<i>Chasmistes liorus</i>	Endangered
Greater Sage-grouse	<i>Centrocercus urophasianus</i>	Candidate
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Candidate
Gray Wolf	<i>Canis lupus</i>	Endangered

Developers should review the U.S. Fish and Wildlife Service web site for more extensive listings of threaten and endangered species and habitat descriptions. If habitat for the listed species is identified on the project site, then documentation of compliance with the Endangered Species Act should be submitted. Contact the local office of the U.S. Fish and Wildlife Service at 801-975-3330 for consultation under the Endangered Species Act.

Historic Properties

If historic properties are suspected in the project area, the developer will be required evaluate the site and receive concurrence from the appropriate State or Federal agency.

Wetlands

If known or suspected wetlands will be disturbed by the project, the developer will be required to delineate the wetlands, receive concurrence from the Army Corps of Engineers, and obtain the appropriate permit.

SECTION 2

CONSTRUCTION STORM WATER MANAGEMENT

2.1 GENERAL REQUIREMENTS

All construction projects regardless of size or extent are required to comply with Roy City Public Works Standards and appropriate construction BMPs (see attached). BMPs for construction should be selected and designed according the attached BMP list. Variations from Roy City Public Works Standards and approved BMPs require approval by the City Engineer. Construction details associated with the BMPs are attached.

Projects that disturb 1 acre or more (or are part of a common plan that disturbs 1 acre or more) are required to obtain a Storm Water Construction Activities Permits from both Roy City and the Utah Division of Water Quality prior to beginning of construction activities. After receiving plan approval and prior to any construction activities, a preconstruction meeting will be held with the developer and contractor. A checklist outlining key tasks in the process for construction storm water approval is attached. The completed checklist must be completed prior to the preconstruction conference.

2.2 SWPPP REQUIREMENTS

All construction projects that disturb 1 acre or more or are part of common plan that disturbs 1 acre or more shall prepare a storm water pollution prevention plan (SWPPP) that meets Utah Division of Water Quality requirements. SWPPP information, guidelines, and a template are available from the Utah Department of Water Quality website:

<http://www.waterquality.utah.gov/UPDES/stormwatercon.htm>

A SWPPP review checklist, summarizing the major required elements, is attached. The contractor is required to keep an updated copy the SWPPP at the construction site available for public review and inspection.

2.3 CONSTRUCTION INSPECTIONS

The contractor and developer are required comply with Utah Division of Water Quality inspection and record keeping requirements. In addition, Roy City will inspect the construction site for compliance with the Roy City Public Works Standards, approved design drawings, SWPPP requirements, and BMP installation and maintenance requirements. A copy of the Construction Storm Water Inspection Form is attached.

2.4 NOTICE OF TERMINATION PROCEDURES

The Notice of Termination formally brings to a close the Construction Activities Permit which allows the discharge stormwater from construction sites. The Construction Activities permit is issued by the Utah Division of Water Quality and as such the State of Utah is the entity that grants a termination to that permit. The permit can only be terminated after construction is complete and the site is stabilized, or if a new Construction Activities Permit for the site is obtained by another permittee.

When a construction site is nearing completion and the permittee is desirous of terminating their permit with the State of Utah for discharging water associated with construction activities, the contractor or developer can initiate the process to submit a notice of termination. The following steps should be taken:

1. The contractor's SWPPP coordinator for the project notifies the city storm water inspector that they are ready for final inspection.
2. The city storm water inspector visits the site to determine if the site has reached final stabilization as determined by the UPDES Storm Water General Permit for Construction Activities. The city storm water inspector also checks to see if all temporary BMPs have been removed.
3. If there is work still to be completed, the remaining work or deficiencies are described by the city storm water inspector in the additional Comments and Corrective Actions for SWPPP Compliance section of the State's UPDES Storm Water Inspection Evaluation Form for SWPPP Compliance (inspection form). A copy of the completed inspection form will be provided to the SWPPP coordinator.
4. When the city storm water inspector is satisfied that all requirements have been met, the city storm water inspector uses the State's inspection form and completes the Notice of Termination (NOT) Inspection section of that form and sends a copy to the State for their records.
5. The permittee submits the completed NOT form to the Division of Water Quality.
6. The city storm water inspector or designated individual will make required notifications to the Division of Water Quality regarding the site and permit status. Once the State has received confirmation that the site meets all the requirements the Notice of Termination is granted.

SECTION 3

POST CONSTRUCTION STORM WATER MANAGEMENT

3.1 MAINTENANCE AGREEMENTS

Maintenance of storm water facilities and BMPs is required so these facilities continue to function as intended. Maintenance can include repairing or replacing damaged structures, cleaning, and restoring vegetation or other erosion control measures. Maintenance responsibilities for storm water facilities and BMPs on private property will be defined by a maintenance agreement between Roy City and the property owner. A draft maintenance agreement, that can be modified as necessary to fit site specific requirements, is attached.

3.2 INSPECTION AUTHORITY AND ENFORCEMENT PROCEDURES

Roy City will conduct periodic inspections of storm water facilities and BMPs on private property. If deficiencies are found, the responsible party will be notified and corrective actions by the responsible party will be required. If corrective actions are not completed in a timely manner (as defined by the maintenance agreement or City ordinance), then Roy City may complete the corrective actions and bill the responsible party for the cost of the work. Fines or other penalties may also apply as allowed by the maintenance agreement or City ordinance.

FORMS

BEST MANAGEMENT PRACTICES

**CONSTRUCTION
STANDARD DETAILS FOR
STORM WATER MANAGEMENT**