SECTION 11

Drainage System Standards

11.1 Introduction

The City of McMinnville has developed a comprehensive and detailed set of storm drainage policies and construction standards. The focus is primarily towards the construction of public storm drainage facilities and for the coordination of private drainage systems with public systems to ensure the functionality of both small and large drainage systems within the City and its Urban Growth Area.

The City's storm drainage policies and construction standards are intended to be interpreted broadly in their application. Where an instance is not addressed specifically by these standards, it is intended that the "spirit" of these standards and policies be used as guidance is responding to that particular issue in order to achieve and maintain the drainage goals and objectives presented in Section 1 of this master plan.

On the other hand, it is not the objective of these policies and standards to limit the creative efforts of individuals, design professionals, or developers where alternative solutions may provide a better answer to a specific problem area. Such solutions are intended to be reviewed within the framework of the drainage goals of this master plan, with respect to the intended objective of these guidelines, and within the bounds of good engineering judgment. Suggested deviations from the construction standards will be at the discretion of the City Engineer.

Generally speaking, it is incumbent upon the designer to ensure that no damage upstream or downstream of a new facility is caused by the design of the facility or the changed drainage patterns from the development it drains. When combined with an imperative to protect human health, safety, and property, these principles remain the foundation of design criteria. This is borne out in more detailed requirements for selecting design events, calculating design flows, selecting materials, following construction methods, practicing site management and erosion control, and implementing post-construction maintenance.

11.2 Integration of Water Quantity and Quality Control

In recent years, a movement has developed toward integration of water quantity and quality control into a unified approach to reduce the impact of development. This change has resulted in a number of common design practices, frequently called best management practices (BMPs), and changes to design criteria used throughout the state and nationally. The newer criteria tend to emphasize managing flows over a much wider range than previously considered strictly for flood control. The newer approaches also tend to emphasize volume control through onsite retention and infiltration as primary methods of stormwater management. Because of the presence of tight soils and clays in the majority of McMinnville, infiltration is not considered a viable approach here.

11.3 Regulatory Framework

As McMinnville moves toward TMDL management planning, regulators may begin looking for evidence that the City is incorporating some of these practices as appropriate and in step with others in the region. Fully integrating these approaches in the City standards would require a significant public process to communicate the need and goals and may have significant implications for City staff, the development community, and the public. It is important that changes to City standards to address water quality will, in fact, help the City comply with regulatory requirements. For that reason, it is best to wait until regulatory requirements are instituted and the specifics are known and explicitly articulated.

For purposes of this master plan update, recommendations are made to help put the City in a good position to address changes to water quality control requirements and address some areas of quantity control where industry standards have changed since 1991.

As mentioned above, more stringent water quality requirements often result in controls to total runoff volume and in some cases peak flow from developed areas. In general, these criteria will tend to reduce peak flows relative to typical management-by-conveyance options. This can have the effect of reducing or eliminating needed downstream public improvements by pushing for management of stormwater within private developments. This possible public benefit will not be considered for this update, but might be an important part of any discussion about implementing more stringent water quality standards (and who pays for them) in the future.

The City will want to carefully consider the extent to which volume control from future water quality facilities can safely be accounted for in design of public conveyance systems now. This is currently an emerging and experimental area of stormwater design. It is recommended that the City prudently ignore these potential flow reduction impacts until specific requirements and design standards are implemented that would allow for more accurate quantification of benefits.

NOTE: The responsibility for compliance with other federal, state, and local regulations, particularly with respect to wetlands regulations and other development requirements, remains with the developer. Nothing within this drainage master plan should be construed to supplant this basic responsibility.

11.4 Summary of Revisions

11.4.1 General

1991 Plan: The 1991 master plan includes a section describing drainage system standards. This document provides stormwater design guidance for the City for public improvements and private development.

Current Update: The City may wish to split the information contained in the document into three locations: a Citywide stormwater ordinance, the master plan, and a storm drainage design manual. In this way, the ordinance language can integrate more fully with land use, environmental, and flood control requirements and reference the current master plan and design manual. The focus of the master plan would be to outline how the City should

manage its surface water, describe the capital improvements plan, and detail schedules and budgets for financing. The design manual can be more dynamic, and can be modified regularly (as needed) to address design changes or regulatory requirements that may arrive in a way that requires timely response. If this is done, one document, usually the ordinance must be given explicit supremacy to address discrepancies that may arise.

Some model ordinance language has been included in an Appendix D. Not all of the elements are applicable to McMinnville. Other sources, such as Oregon Association of Clean Water Agencies (ACWA), also have model ordinances that can be adapted.

Consistent with this approach, the specific design and construction standards have been shifted to Appendix E of this plan, allowing them to be easily extracted as a separate draft design manual.

11.4.2 Design Event Selection

1991 Plan: The design event is used to establish the peak runoff rate that the facility will be designed to accommodate. Standards allow for use of events from 5-year return interval to 100-year return interval. Event determination is based on land use, structure or crossing type, and size of upstream watershed. In general, piped systems are designed for 5- to 25-year events and natural and manmade channel systems are designed for 25- to 100-year events.

Current Update: The City standards are as follows: 100-year design event for systems within a designated FEMA flood hazard area; 50-year event for sag curves or culvert crossings of major arterial roadways, emergency routes, or ODOT highways; 25-year event for arterial roadways, manmade channels, and natural open drainage-ways; and 10-year event for all other drainage facilities, public or private.

11.4.3 Hydrology Calculations

Hydrologic calculations are used for design and investigation of three separate but related elements of the drainage system: conveyance, water quality treatment, and detention. These systems are often addressed with different hydrologic calculations specific to the needs of the design.

1991 Plan: The plan uses the NRCS TR-55 method for calculating runoff from sub-basins. Within each sub-basin, a non-linear curve relating percent of drainage area to percent of sub-basin flow is used. The design standards require the master plan document be used to develop design flows for conveyance either from directly reported values or from use of the curve relationship for specific areas of interest. In effect, the design standard does not require an engineer to develop independent peak runoff flows for drainage conveyance facilities.

Detention facilities are designed with an equation provided to relate existing and proposed peak flows, calculated using the Rational Method (for areas less than 20 acres) or the TR-55 method described above (areas greater than 20 acres), to a required detention storage volume.

Water quality facilities are designed using a Rational Method calculation.

Current Update: The recommended hydrology methods are summarized in Table 11-1. If using TR-55, the designer should use the same soil parameters reported in the master plan to maintain consistency. For areas required by the updated plan to have detention storage, the detention storage must be determined using SBUH or TR-55.

TABLE 11-1
Summary of Recommended Hydrology Methods
City of McMinnville Storm Drainage Master Plan

Basin Characteristics	Design Procedure
Less than 100 acres	Rational Method
Between 100 and 300 acres	Rational Method or SBUH/TR-55
Greater than 300 acres*	SBUH/TR-55

* Reported flow from master plan may be used for delineated basins greater than 300 acres, if land use and routing assumptions have been reviewed and updated.

To ensure uniform evaluation of stormwater facilities, the master plan should include references to, or preferably copies of published tables indicating curve numbers and runoff coefficients to be used for design.

11.4.4 Conveyance and Flood Control Design

1991 Plan: Minimum pipe size of 12 inches is required. Minimum pipe slope is required to maintain 3 feet/second velocity when flowing full. Minimum of 36 inches of cover is required for publicly owned pipe under most conditions. Materials and construction details reference American Public Works Association (APWA) standard specifications and drawings.

Culverts assume a 1 percent slope and are to be placed 6 to 12 inches above the creek bottom profile.

Current Update: Revise culvert design criteria to reflect need to provide fish passage in all locations unless a waiver is provided (per Oregon Revised Statutes 635-412-0025) or programmatic approval has been obtained. When fish passage is required, reference Oregon Department of Fish and Wildlife guidance and the applicable design criteria.

11.4.5 Natural Channels

1991 Plan: Natural channels should be preserved to the maximum extent practicable. Crossings should be limited. Fill and debris should not be placed without approval of the City Engineer.

Current Update: In-water impacts may have special permit requirements that apply for floodplain or environmental regulations. These permits may require approval from other authorities, such as Army Corps of Engineers, Oregon Department of State Lands, or others. These may also include long-term maintenance requirements for flood storage, etc.

Current Update: Outlet pipes to natural channels from piped drainage systems should be set near ordinary high water to the extent practicable to reduce erosion.

11.4.6 Detention Storage Requirements and Calculations (for Flow Reduction and Channel Stability)

1991 Plan: Detention is required only within reported basins (N-30L1 and N-50), along West Cozine Creek, multi-family developments greater than 10 acres, and in commercial and industrial areas with significant impervious area increases. Detention requirements should produce a 10-year developed flow equal or less than 10-year pre-developed flow.

Current Update: Revised required detention areas by sub-basin.

11.4.7 Sediment and Erosion Control

1991 Plan: Up to 1 ton/acre of sediment is allowed to leave a construction site per year. Detail of required measures is provided.

Current Update: Removed reference to allowable sediment loss. Refer designers to potential need to acquire an NPDES 1200-C permit from DEQ for disturbed sites greater than 1 acre in size. No visible or measurable erosion is allowed to leave the site.

11.4.8 Landscaping, Operations, and Maintenance

Current Plan: Requires development of vegetation plans for detention and water quality facilities.

Current Update: Requires preparation of an Operations and Maintenance Manual for water quality and detention facilities. Include site map with labeled access points and easements, procedures, and frequency of activities. Include a copy of an agreement indicating who is responsible for implementing the plan.

11.4.9 Submittal Requirements and Approval Process

1991 Plan: Submittal requirements are dispersed throughout the guidance document.

Current Update: Recommend development of template checklists for ensuring uniform and complete stormwater design submittals. This will provide transparency for design professionals and ease and consistency for staff reviewers. Placeholder established in Appendix E for future development.