CHAPTER I

INTRODUCTION

PURPOSE

The purpose of this report is to present a plan for basin-wide storm runoff management which provides for Sweet Home's future growth. Included in this plan are data and design criteria which provide for responsible solutions for individual developments. Secondarily, the study identifies specific existing problems and provides the design criteria (i.e. flows) for the solutions to these problems. Thirdly, it is to be a data base for the City's existing drainage. Fourthly, it is to be a flexible tool able to quickly analyze alternates to the Master Plan should they arise in the future.

SCOPE

The area of study is included within the proposed urban growth boundary plus all watershed outside the urban growth boundary which drains through the City of Sweet Home.

The prime objectives of this report are to:

1. Prepare topographic maps for all areas within the proposed urban growth boundary which are currently unmapped.
2. Survey and inventory existing pipes 18 inches and greater in diameter and open channels passing greater than 40 cfs.
3. Prepare a hydrologic soils map.
4. Prepare intensity - frequency - duration curves including the 10, 25, 50 and 100 year average return frequency rainfalls.
5. Recommend average return frequency rainfalls for the design of drainage facilities.

6. Calculate the runoff resulting from 10, 25 and 100 year rainfalls on existing land uses. Identify deficiencies.

7. Calculate the design flows based on land uses in the proposed Comprehensive Plan.

8. Develop solutions to existing problems.

9. Show the Proposed Master Drainage Plan and existing facilities on 1" - 100 topographic maps.

10. Prepare and submit to the City a report of the Proposed Master Drainage Plan including maps and calculations.

SOURCES OF INFORMATION

A topographic mosaic of a scale of one inch equals 300 feet was prepared from the City's existing topographic mapping which include orthophotographs made during the expansion of the sewage distribution system. U.S. Geological Survey maps with 40 foot contour intervals were utilized for watershed areas beyond the City's mapping.

Other sources of information included:

1. Army Corp of Engineers (now in the final phase of their Federal Insurance Agency Flood Plain Study of Wiley, Ames and Taylor Creeks).

2. Oregon State Highway Department construction drawings for U.S. 20 through Sweet Home.

3. U.S. National Oceanic and Atmospheric Administration, Maryland for precipitation records.

4. U.S. Environmental Protection Agency, Corvallis Research Laboratory for manuals and publications relating to the computer model "SWMM".

5. Soils Conservation Service, Tangent for soils data.

A bibliography of documents and reports which were reviewed and directly influenced this study is included at the end of this report.

GENERAL CONCEPTS

The following are basic concepts in storm drainage management:

1. Surface runoff is best left in its natural drainage course, i.e., natural engineering.
2. When dealing with large flows in open channels, the channel design should slow vs. speed up the water. Preferably, the channel should be shallow and wide vs. deep and narrow. ("Handbook of Hydraulic", King & Brater)
3. Detention storage close to the source is usually preferable to higher peak flows down stream. This approximates natural runoff.
4. Enclosed (pipe) systems for major drainage channels should be minimized. This keeps the major drainage pathways free of buildings, etc., thereby providing for overflow flood routing, and avoids the high cost of large pipe.

COMPUTER MODELING

The computer software considered for use included Forsgren-Perkins and Holquin and Associates, Inc. models employing the simple rational method of analysis, the Corps of Engineer's "STORM", the U.S. Geological Survey's "Distributed Routing Rainfall-Runoff Model" and the Environmental Protection Agency's, "Storm Water Management Model"

or "SWMM". The EPA "SWMM" was selected because: 1) it offered considerable flexibility in discretization of the basin, 2) it was introduced in 1972, and has been successfully used repeatedly since then, 3) it is supported with periodic updates and improvements by the EPA and its wide spread use suggests it may continue to be around for some time to come, and 4) it is well documented and there is a nearby EPA library at the EPA Corvallis Environmental Research Laboratory.

Prepared originally by several well known water resource consultants and the University of Florida under grant from the EPA, "SWMM" offers Sweet the following features:

1. Continuous simulation - actual precipitation as measured locally can be input and the model generated hydrographs (flows) can be compared against observed storm flows. This means that the model can be calibrated and verified versus the deterministic approach. Calibration and verification during this coming winter storm season is recommended.
2. Not only quantity, but quality as well can be modeled. Quality modeling was beyond the scope of this study but the majority of the groundwork for quality studies is now complete.
3. Numerous options are available. The model may be used to analyze and design specific site improvements.
4. It is available at very reasonable cost by time sharing at the Boeing Computer Service in Portland.
5. Once the model has been calibrated, operations of the basic quantity features of "SWMM" are relatively easy to learn. The City may use this "tool" itself.

METHODOLOGY

Utilizing the EPA "SWMM", all creeks, open channels and pipes under study were modeled with culverts removed. Design synthetic rainfalls were input and the cross sections of creeks, channels and pipes were selectively and gradually enlarged until the design storms could be passed through the City. To advance the model to 'full development', land use was revised in accordance with the Proposed Comprehensive Plan plus select changes were made in network flow routing to solve specific problems or anticipate future streets. The same synthetic design rainfalls were input and the conduits gradually enlarged until all these 'full development' flows were passed through the City. The existing culverts were systematically surveyed and their capacities calculated. Existing culvert capacities were then compared to the unrestricted design flows (both existing and 'full development') to determine their adequacy or inadequacy.

DEFINITIONS

Watershed	--	Total area which drains through any part of Sweet Home.
Basin	--	Area drained by any one natural creek, i.e. Wiley Creek Basin and Ames Creek Basin.
Sub-Basin	--	A portion of a basin, i.e., Taylor Creek is a sub-basin of Ames Creek Basin.
Subcatchment	--	A "SWMM" term for the smallest individual area modeled.
Pipes	--	Understood in this report to refer only to storm drainage pipes equal to or greater than 18 inches in diameter.