City of Newberg

Drainage Master Plan Update

September 2001

NEWBERG DRAINAGE MASTER PLAN UPDATE

SEPTEMBER 2001

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Thomas/Wright, Inc.
Newberg Drainage Master Plan Update

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Executive Summary

Chapter One
EXECUTIVE SUMMARY

1.1 LOCATION

The City of Newberg is located in eastern Yamhill County, Oregon, along U.S. Highway 99. The City is approximately 13 miles northeast of McMinnville, the County seat, and approximately 23 miles southwest of Portland (Figure 3-1).

Three major creeks drain the study area including Chehalem Creek, Hess Creek and Spring Brook. The watersheds for these creeks extend beyond the boundaries of the Urban Growth Boundary (UGB). Hence, the hydrologic study area of 3,984 acres extends beyond the boundaries of the UGB to include watershed uplands that drain into the City (Figure 3-2). The drainage system of the City of Newberg consists of open channels, with culverts and underground storm sewer in developed portions of the City (Figure 4-1).

1.2 PROJECT OBJECTIVES

Objectives for this project include:

- Identify projects to solve existing problems of flooding, ponding, and inadequate storm drainage throughout the City of Newberg.
- Guide extension of the storm drainage system to serve future growth.
- Estimate costs and relative priority for recommended improvement projects.
- Identify stormwater quality and detention policy issues.

1.3 SCOPE OF WORK

The focus of the study effort was on those areas of the Chehalem Creek, Hess Creek, and Spring Brook watersheds that are located within the City of Newberg's UGB. The project scope of work calls for evaluating the hydrology, conveyance systems, and hydraulics within these watersheds to determine needed structural and nonstructural controls for safely conveying stormwater runoff.

The project includes the following elements:

- Conduct an assessment of known drainage and erosion problems through working meetings with public works and maintenance staff.
- Assess the current status of the City's mapping and facilities inventory for use in developing drainage system models.
- Work with City GIS staff to research and fill data gaps in the City's storm drainage system mapping and facilities inventory.

- Develop computer models for hydrologic and hydraulic analysis for each of the three watersheds within the City's UGB.

- Determine existing stormwater system capacity and future capacity requirements under zoned land use conditions.

- Estimate CIP costs and develop a phasing plan to assist the City with implementation.

- Review water quality issues as they relate to the Endangered Species Act, Total Maximum Daily Loads, and NPDES Phase II.

- Review the issues related to development of a stormwater detention ordinance.

- Document the analysis and CIP plan in a drainage master plan report.

1.4 DRAINAGE SYSTEM ANALYSIS RESULTS

Hydrologic/hydraulic computer models were created for the three major drainage basins using the XP-SWMM model. The Runoff Module calculated runoff hydrographs from each subcatchment based on the watershed characteristics. The Extran Module routed flows through the storm sewer infrastructure.

Hydrologic modeling runs were performed on each basin for both existing and future land use conditions during 2-, 5-, 10-, 25-, and 100- year return frequency 24-hour duration design storm events, for a total of ten runs for each basin. Hydraulic modeling was performed on each basin for the 10-year, 24-hour design storm to assess the performance of the current storm drainage system under existing and future hydrologic conditions.

The results of the hydrologic and hydraulic analyses are presented in Appendices C and D. The hydraulic capacity of 25 percent of the existing major pipes or culverts is insufficient to convey the runoff generated during a 10-year, 24-hour storm event under future land use conditions as shown in Appendix D.

Appendix E presents the recommended pipe diameters that will convey the 10-year, 24-hour storm without surcharging or flooding of the conveyance system. As a check, the recommended pipe sizes were modeled hydraulically to ensure that the upgraded system would not flood during a 25-year, 24-hour storm event, although surcharge may occur during the larger 25-year storm.

1.5 CAPITAL IMPROVEMENT PROJECT RECOMMENDATIONS

As summarized in Table 5-1, a total of 50 projects located throughout the City of Newberg are included in the Capital Improvement Plan. The total estimated cost for completing these construction projects is about $7.3 million in Year 2001 dollars. The CIP locations are shown on the maps in Appendix F.

Implementation of the recommended CIP program is proposed to occur over a 20-year period. Each of the projects was assigned an implementation priority as outlined in Section 5.2. The priority ranking roughly represents the 5-year period in which the project is recommended for construction. However, it is recommended that the City review the CIP plan on an annual basis to determine which projects to implement each year.

1.6 STORMWATER QUALITY AND DETENTION POLICY ISSUES

As a result of steelhead and chinook salmon being listed as a threatened species in the Willamette River under the Endangered Species Act, the City of Newberg needs to evaluate their stormwater practices to determine whether the City has the potential to affect the listed species. In addition, the Willamette Basin TMDLs of temperature, bacteria, mercury, and fish skeletal deformities may affect the City of Newberg. DEQ is expected to complete its report by the end of 2003. The City of Newberg is on the list of cities to be evaluated for inclusion in the NPDES Phase II. If Newberg is included in Phase II, it will be required to develop, implement, and enforce a stormwater management program.

Since there are a multitude of policy issues that should be considered prior to developing an ordinance relating to stormwater quality and detention, it is recommended that the City of Newberg hold one or more meetings to discuss the issues. The costs and benefits must be weighed and a policy format must be chosen that will meet the needs of Newberg. A logical first meeting would be between the City's public works and engineering staff and its consulting engineers. Such a meeting can determine if the City of Newberg will have stormwater quality and/or detention requirements and provide a rough outline of the significant elements of the City's policy. Additional meetings may be required to develop the initial policy, notify the public regarding the proposed regulations, and obtain public input to ensure community endorsement.

Chapter Two

Introduction

Chapter Two
INTRODUCTION

2.1 AUTHORIZATION

In response to existing stormwater problems and the pressures of new land development and associated stormwater impacts in the Hess Creek, Chehalem Creek, and Spring Brook watersheds, the City of Newberg selected Thomas/Wright, Inc. (T/WI) to prepare an updated drainage master plan. A contract for planning services was authorized in September 1996.

2.2 PROJECT OBJECTIVES

Objectives for this project include:

- Identify projects to solve existing problems of flooding, ponding, and inadequate storm drainage throughout the City of Newberg.
- Guide extension of the storm drainage system to serve future growth.
- Estimate costs and relative priority for recommended improvement projects.
- Identify stormwater quality and detention policy issues.

2.3 SCOPE OF WORK

The focus of the study effort was on those areas of the Chehalem Creek, Hess Creek, and Spring Brook watersheds that are located within the City of Newberg's Urban Growth Boundary (UGB). The project scope of work calls for evaluating the hydrology, conveyance systems, and hydraulics within these watersheds to determine needed structural and nonstructural controls for safely conveying stormwater runoff.

The project includes the following elements:

- Conduct an assessment of known drainage and erosion problems through working meetings with public works and maintenance staff.
- Assess the current status of the City's mapping and facilities inventory for use in developing drainage system models.
- Work with City GIS staff to research and fill data gaps in the City's storm drainage system mapping and facilities inventory.
- Develop computer models for hydrologic and hydraulic analysis for each of the three watersheds within the City's UGB.

- Determine existing stormwater system capacity and future capacity requirements under zoned land use conditions.
- Estimate CIP costs and develop a phasing plan to assist the City with implementation.
- Review water quality issues as they relate to the Endangered Species Act, Total Maximum Daily Loads, and NPDES Phase II.
- Review the issues related to development of a stormwater detention ordinance.
- Document the analysis and CIP plan in a drainage master plan report.

Chapter Three

Study Area

Chapter Three
STUDY AREA

3.1 LOCATION

The City of Newberg is located in eastern Yamhill County, Oregon, along U.S. Highway 99. The City is approximately 13 miles northeast of McMinnville, the county seat, and approximately 23 miles southwest of Portland (Figure 3-1). The detailed study area for the Newberg Drainage Master Plan is the area within the City's Urban Growth Boundary (UGB) which is approximately 3,984 acres.

Three major creeks drain the study area including Chehalem Creek, Hess Creek and Spring Brook. The watersheds for these creeks extend beyond the boundaries of the UGB. Hence, the hydrologic study area extends beyond the boundaries of the UGB to include watershed uplands that drain into the City (Figure 3-2).

3.2 TOPOGRAPHY

The City is sited on an elevated terrace on the north side of the Willamette River. The terrace is relatively flat with slopes ranging from 0 to 3 percent within much of the UGB. Surface slope ranges are shown in Figure 3-3. The terrace is flanked to the north and west by the Chehalem Mountains, and to the east by Parrett Mountain. These mountains are the upper topographic divides (i.e. drainage divide) for the Chehalem Creek, Hess Creek, and Spring Brook watersheds.

Chehalem Creek flows generally southeasterly from its headwaters in the Chehalem Mountains approximately nine miles northwest of the City. Chehalem Creek flows along the southwestern corporate limits of the city to its confluence with the Willamette River. Elevations in the Chehalem Creek watershed range from approximately 120 feet near the City to approximately 600 feet in the Chehalem Mountains.

Hess Creek also originates in the Chehalem Mountains about 2.5 miles north of the Central Business District. Hess Creek flows southerly, through the middle of the City before joining Spring Brook south of the City. Elevations in the Hess Creek watershed range from approximately 100 feet in the City to approximately 1,150 feet at the upper edges of the watershed.

Spring Brook originates in the Chehalem Mountains about 2.5 miles north and northeast of the Central Business District. Spring Brook flows in a southerly direction through the eastern portion of the UGB. Elevations in the Spring Brook watershed range from approximately 120 feet in the eastern portion of the UGB to approximately 1,100 feet in the upper watershed.

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LOCATION MAP

Figure 3-1

City of Newberg

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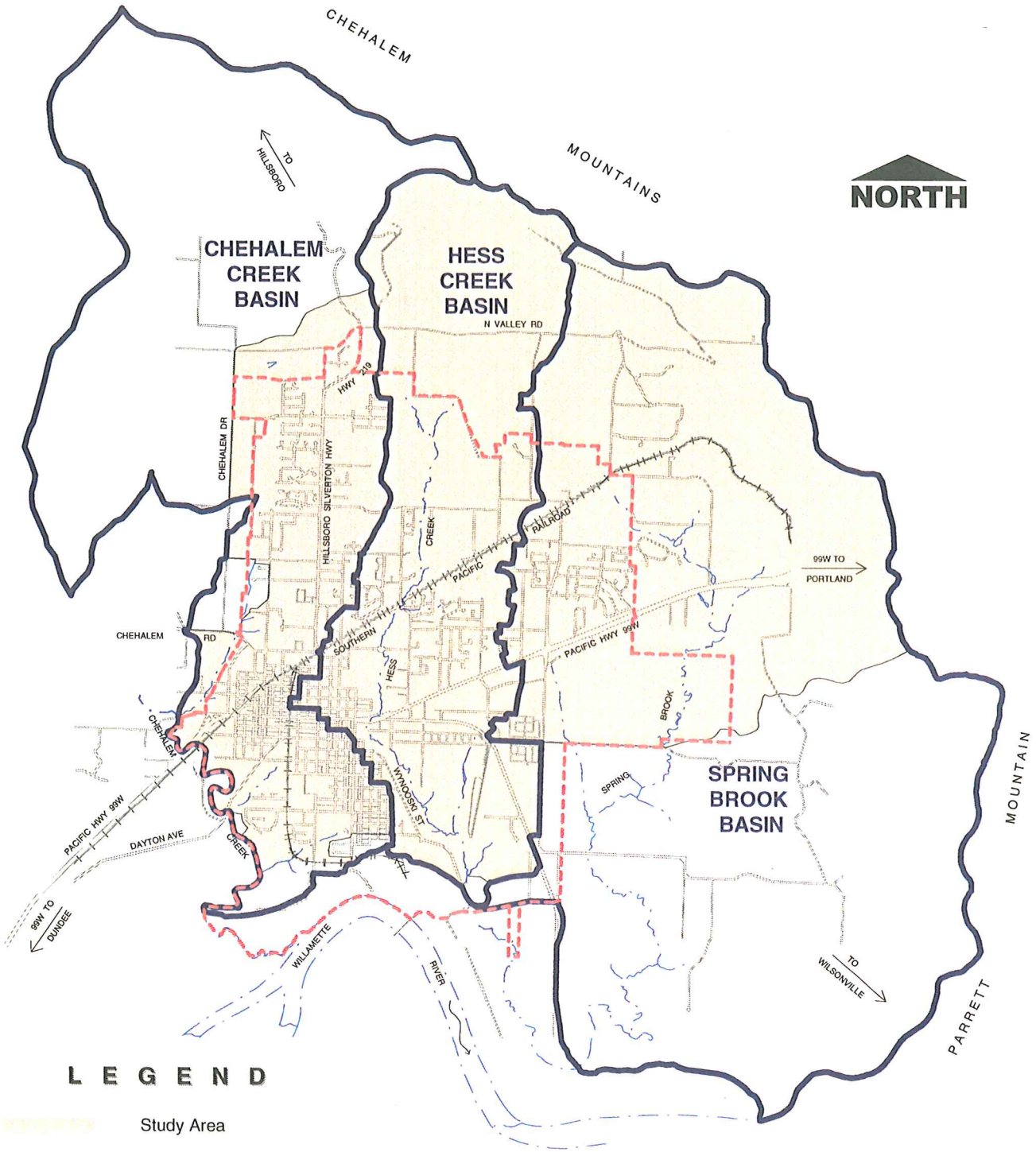

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STUDY AREA

Figure 3-2

City of Newberg

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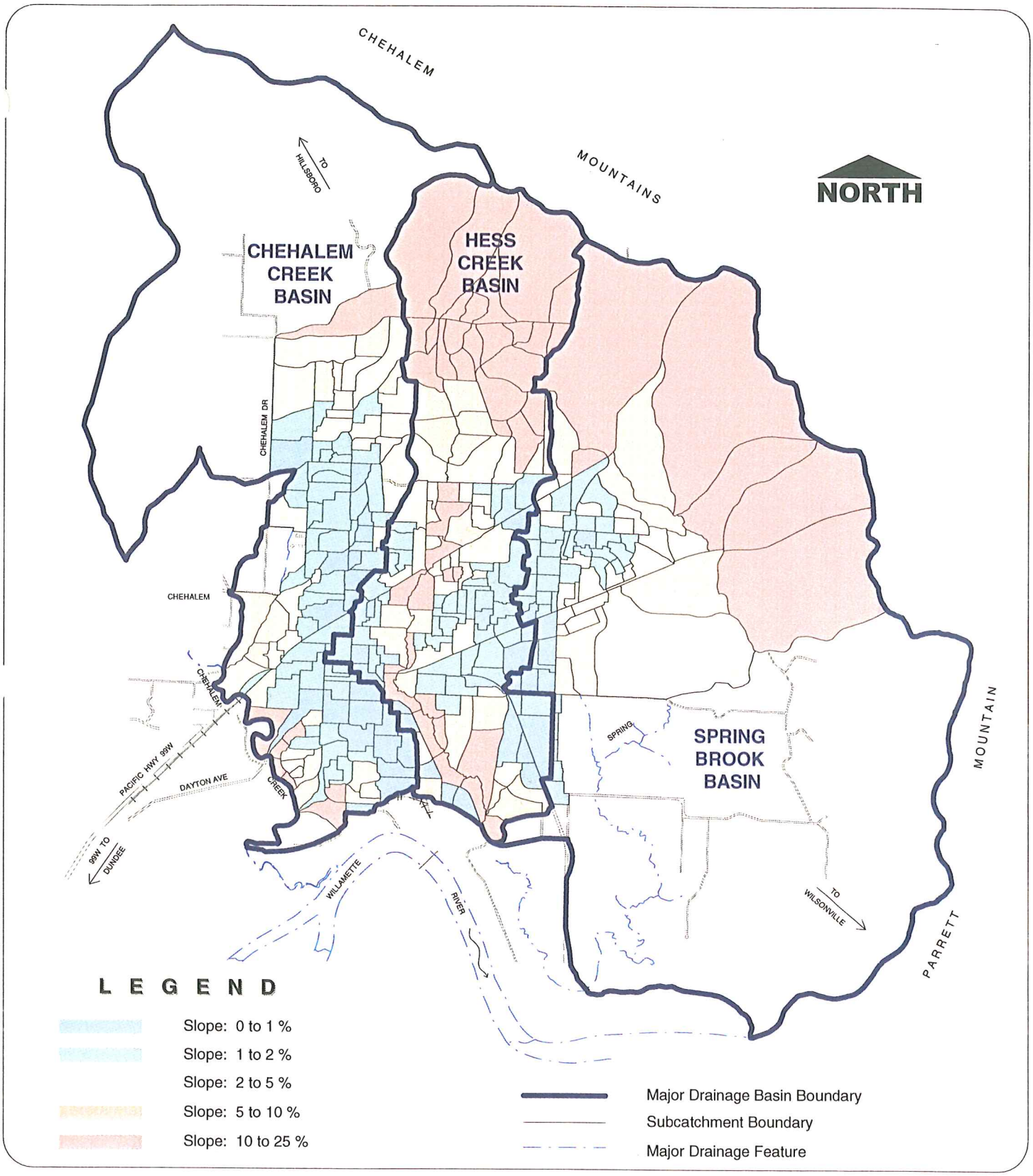

NEWBERG DRAINAGE MASTER PLAN UPDATE

SLOPE MAP

Figure 3-3

City of Newberg

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3.3 SOILS

The USDA Soil Conservation Service has mapped the soils for Yamhill County. The most prevalent soils underlying the City are Aloha and Woodburn series silt loams. The Aloha series consists of somewhat poorly drained, nearly level soils that formed in old alluvium of the upper Willamette River terrace. Elevations range from about 150 feet to 200 feet. The Woodburn series is the most prevalent soil in the northwest corner of the City. The Woodburn series consists of moderately well drained silt loams on nearly level to moderate slopes, with elevations ranging from 150 feet to 250 feet.

3.4 VEGETATION

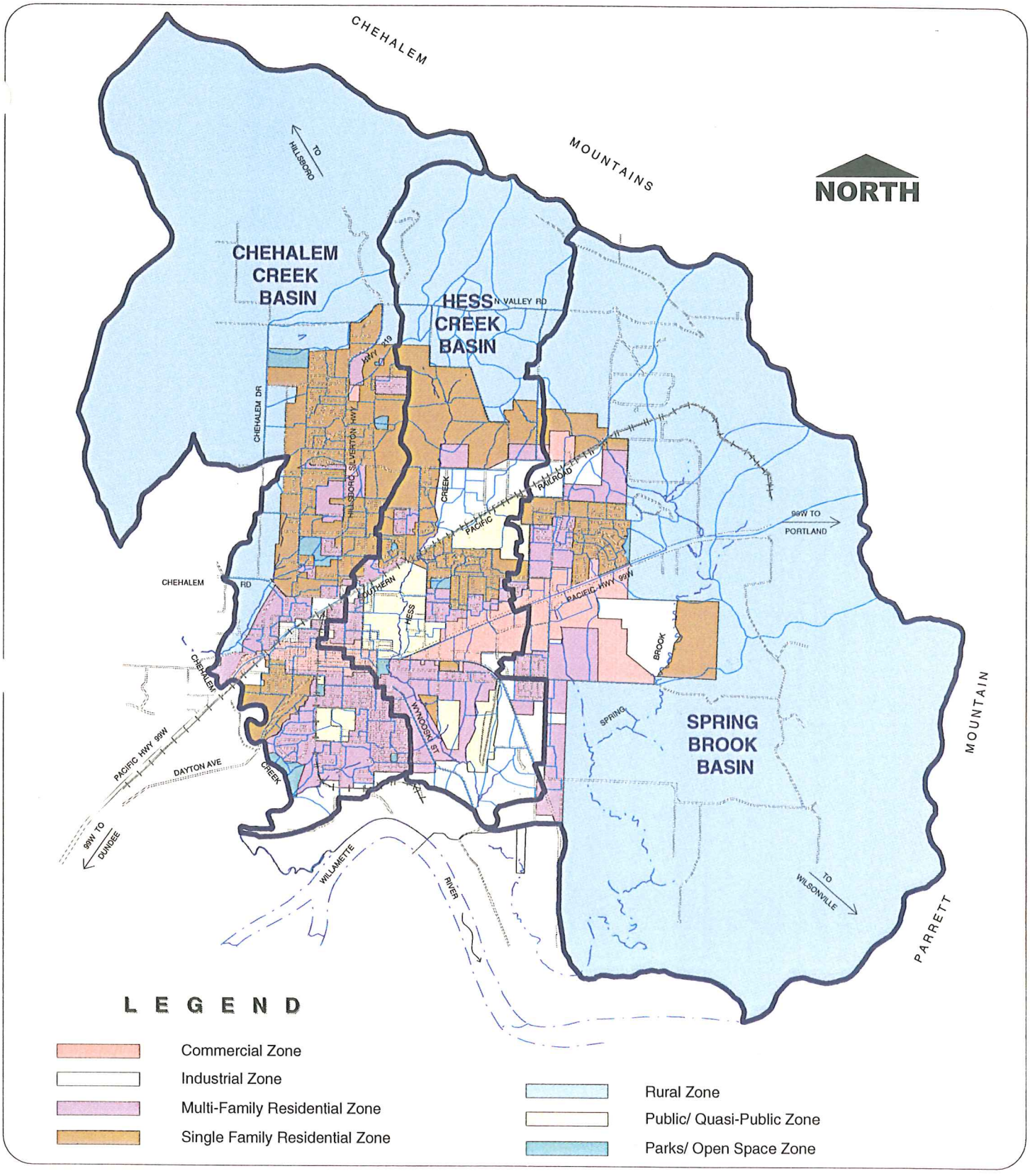
In undeveloped areas (i.e., not cultivated or urbanized), the vegetation is primarily grass, Oregon white oak, and Douglas fir. Cultivated areas, which mostly correspond to Aloha series silt loams, are planted with vegetable and berry crops, orchards, small grains, hay, and pasture.

3.5 CLIMATE AND RAINFALL

The climate in the Willamette Valley is a modified marine climate characterized by four mild seasons. The climate of the City is typical of the Willamette Valley with mild, wet winters and warm, dry summers. The average annual air temperature is 53 degrees Fahrenheit (F). Air temperatures range from an average July maximum of 81 degrees F to an average January minimum of 32 degrees F. The average annual precipitation is about 40 inches. Snowfall is infrequent and seldom stays on the ground for more than a few days. About 75 percent of the annual rainfall occurs in the winter months from November through March in the form of frontal storm systems. Flooding in the City is typically caused by intense rainfall from massive winter storms moving inland from the Pacific Ocean. The largest historic floods have occurred between December and February.

3.6 LAND USE AND GROWTH

The nearly flat to moderately sloping terrain within the City's UGB has facilitated development for residential, commercial, and industrial uses. During the past decade, the City has experienced constant growth and currently has a population of about 18,064 residents. Planning projections from the City of Newberg Comprehensive Plan anticipate a population of 38,312 residents in the Year 2020. Land-use zones for the area within the UGB are shown in Figure 3-4.



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LAND USE MAP

Figure 3-4

City of Newberg

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CHAPTER FOUR

Overview of Technical Evaluations

Chapter Four
OVERVIEW OF TECHNICAL EVALUATIONS

4.1 FACILITIES MAPPING AND INVENTORY

The drainage system of the City of Newberg consists of open channels, with culverts and underground storm sewer in developed portions of the City. The City of Newberg provided mapping services and facilities inventory data which were utilized for this study. Figure 4-1 provides a general overview of the system and study area and the maps in Appendix F shows the drainage elements in more detail. Appendix D tabulates the existing characteristics of the drainage system including length of pipe or channel, diameter, slope, and invert elevations.

4.2 PROBLEM AREAS

Many localized areas have been identified for their susceptibility to flooding during rainfall events. Localized flooding is caused by deficiencies within the existing facilities (e.g., undersized storm sewer), maintenance problems (e.g., trashracks or inlets that frequently clog with debris), and failing facilities (e.g., rusted collapsed culvert). Specific problems are summarized in Appendix B.

4.3 COMPUTER MODEL SELECTION

The 1986 Newberg Drainage Master Plan was prepared based on evaluations of existing deficiencies and alternatives using one of the first personal computer versions of the U.S. Environmental Protection Agency's Storm Water Management Model (SWMM). The original models could not be updated, because the model schematics were lost when the City's storage facility was destroyed by fire. The City elected to develop SWMM models of the storm water collection system. The SWMM model is well suited to simulate the physical conditions encountered in Newberg. Two modules of the SWMM model utilized for analysis of the hydraulic performance of the storm drainage system include:

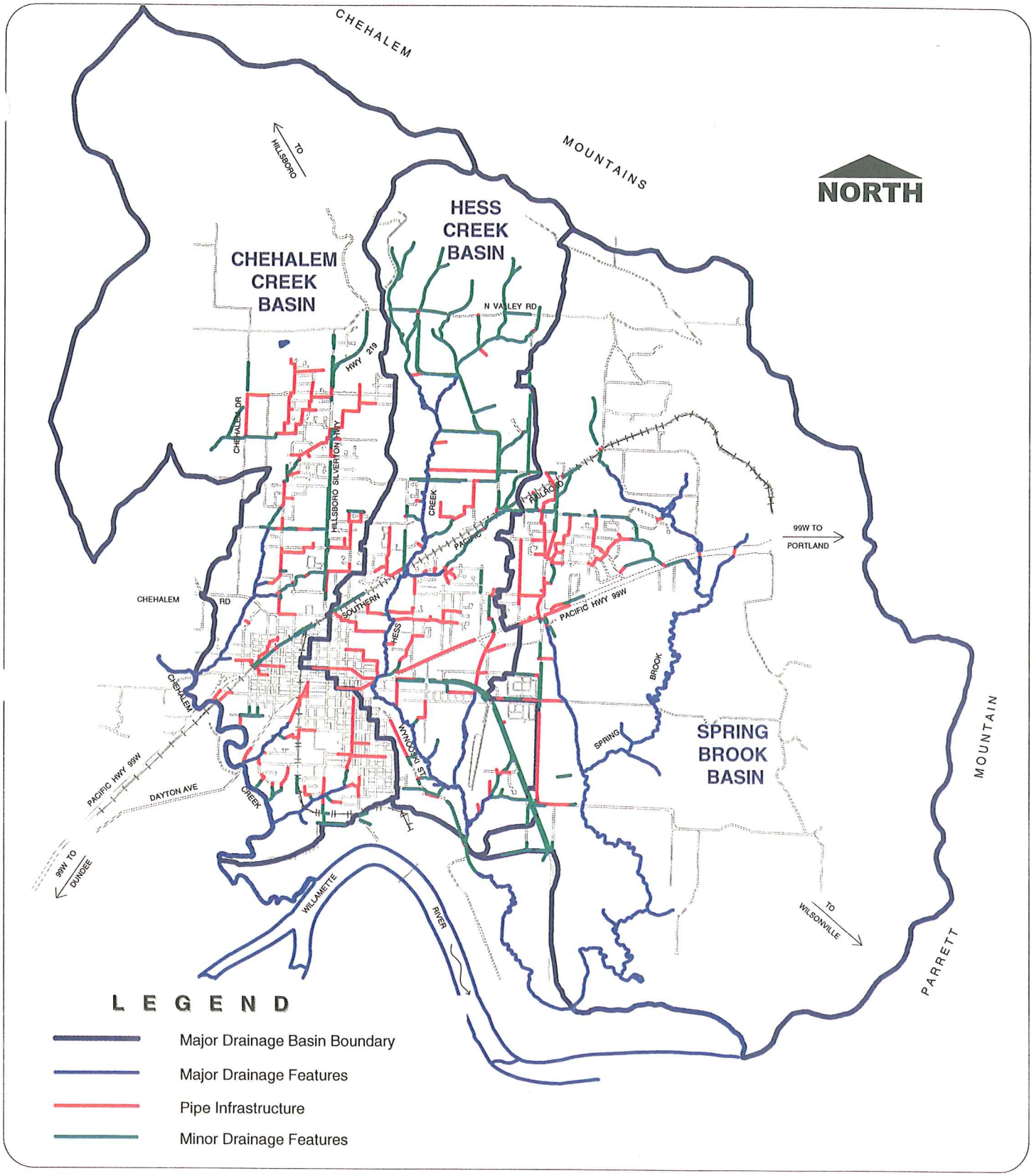
- The Runoff Module generates surface runoff, i.e., hydrographs, from a synthetic design storm, using watershed characteristics such as soil types, land use, and topography.

- The Extran Module dynamically routes the inflow hydrographs from the Runoff Module through open channels, closed conduits, storage basins, and other hydraulic structures, while accounting for backwater and system storage.

T/WI developed the models using XP-SWMM (Version 5.1), a proprietary version of the SWMM model that has a timesaving graphical user interface.

4.4 HYDROLOGIC ANALYSIS

Using the XP-SWMM model, the study area conditions were evaluated to determine the amount of runoff generated from storm events of multiple frequencies for both existing and future land



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DRAINAGE SYSTEM

Figure 4-1

City of Newberg

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development conditions. The following components are critical and controlling factors in determining the quantity and timing of runoff from the study area watershed.

4.4.1 Rainfall Analysis

The design storm events used in this analysis were derived from the regional National Oceanic and Atmospheric Administration (NOAA) Atlas for the return frequencies of 2-, 5-, 10-, 25-, and 100-year return frequency for a 24-hour maximum rainfall event. The various rainfall depths for Newberg were interpolated from these maps and summarized in Table 4-1. The rainfall distribution over the 24-hour period is based on the SCS Type 1A rainfall distribution (Table 4-2 and Figure 4-2), which is the standard for developing synthetic storms in the Pacific Northwest region.

Table 4-1
Newberg Drainage Master Plan Update
City of Newberg Design Storms

Storm Event Frequency	Rainfall Depth (inches)
2-year, 24-hour storm	2.5
5-year, 24-hour storm	3.0
10-year, 24-hour storm	3.5
25-year, 24-hour storm	4.0
100-year, 24-hour storm	4.5

4.4.2 Basin Boundaries

The 3,984-acre study area was divided into basins, subbasins, and subcatchments using available mapping and aerial photography. Areas were delineated into unique runoff catchments based upon topographic slope, land use, and drainage to a specific outlet.

A. Basins

Stormwater is generated from the three major drainage basins as shown in Figure 2-1: the Chehalem Creek Basin, the Hess Creek Basin, and the Spring Brook Basin. The major drainage basins are 4,000; 2,300; and 5,800 acres in size, respectively.

B. Subbasins

The major drainage basins are divided into minor subbasins approximately 100 to 200 acres in size (Figure 4-3). Each of the subbasins drains to a major collector channel or pipe. The subbasins are named with a letter denoting the Basin in which they are found and a number value beginning at the downstream end and ascend to the upstream end of the basin. For example, a subbasin located in the middle of the Hess Creek Basin is named H/6.

Figure 4-2
Newberg Drainage Master Plan Update
SCS Type 1A Hyetograph
24-Hour Design Storm

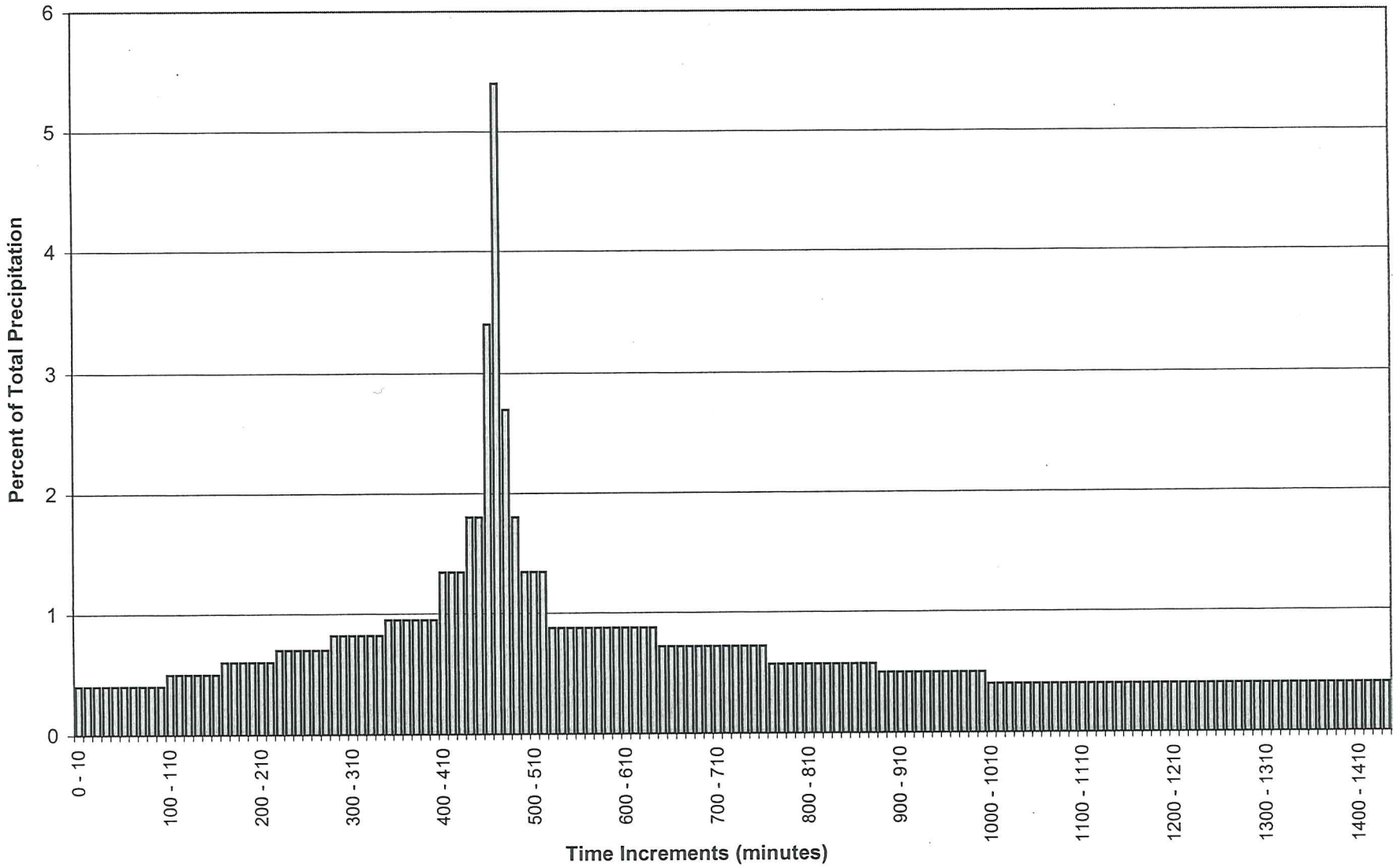
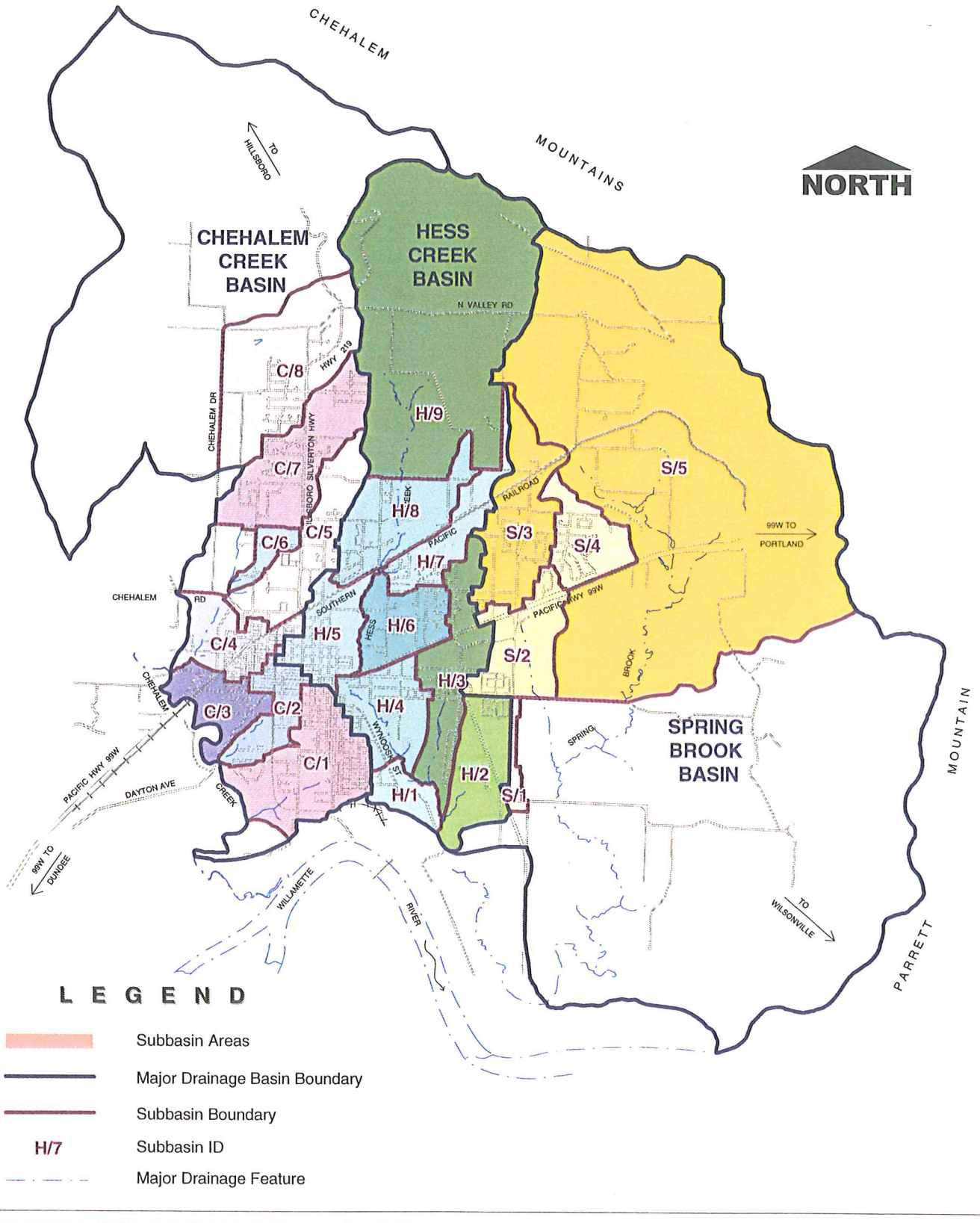


Table 4-2
Newberg Drainage Master Plan Update
SCS Type 1A
24-Hour Design Storm Hyetograph Values

TEN-MINUTE INTERVAL	PERCENT RAINFALL	CUMULATIVE PERCENT RAINFALL
0 - 10	0.40	0.40
10 - 20	0.40	0.80
20 - 30	0.40	1.20
30 - 40	0.40	1.60
40 - 50	0.40	2.00
50 - 60	0.40	2.40
60 - 70	0.40	2.80
70 - 80	0.40	3.20
80 - 90	0.40	3.60
90 - 100	0.40	4.00
100 - 110	0.50	4.50
110 - 120	0.50	5.00
120 - 130	0.50	5.50
130 - 140	0.50	6.00
140 - 150	0.50	6.50
150 - 160	0.50	7.00
160 - 170	0.60	7.60
170 - 180	0.60	8.20
180 - 190	0.60	8.80
190 - 200	0.60	9.40
200 - 210	0.60	10.00
210 - 220	0.60	10.60
220 - 230	0.70	11.30
230 - 240	0.70	12.00
240 - 250	0.70	12.70
250 - 260	0.70	13.40
260 - 270	0.70	14.10
270 - 280	0.70	14.80
280 - 290	0.82	15.62
290 - 300	0.82	16.44
300 - 310	0.82	17.26
310 - 320	0.82	18.08
320 - 330	0.82	18.90
330 - 340	0.82	19.72
340 - 350	0.95	20.67
350 - 360	0.95	21.62
360 - 370	0.95	22.57
370 - 380	0.95	23.52
380 - 390	0.95	24.47
390 - 400	0.95	25.42
400 - 410	1.34	26.76
410 - 420	1.34	28.10
420 - 430	1.34	29.44
430 - 440	1.80	31.24
440 - 450	1.80	33.04
450 - 460	3.40	36.44
460 - 470	5.40	41.84
470 - 480	2.70	44.54
480 - 490	1.80	46.34
490 - 500	1.34	47.68
500 - 510	1.34	49.02
510 - 520	1.34	50.36
520 - 530	0.88	51.24
530 - 540	0.88	52.12
540 - 550	0.88	53.00
550 - 560	0.88	53.88
560 - 570	0.88	54.76
570 - 580	0.88	55.64
580 - 590	0.88	56.52
590 - 600	0.88	57.40
600 - 610	0.88	58.28
610 - 620	0.88	59.16
620 - 630	0.88	60.04
630 - 640	0.88	60.92
640 - 650	0.72	61.64
650 - 660	0.72	62.36
660 - 670	0.72	63.08
670 - 680	0.72	63.80
680 - 690	0.72	64.52
690 - 700	0.72	65.24
700 - 710	0.72	65.96
710 - 720	0.72	66.68
720 - 730	0.72	67.40
730 - 740	0.72	68.12
740 - 750	0.72	68.84
750 - 760	0.72	69.56
760 - 770	0.57	70.13
770 - 780	0.57	70.70
780 - 790	0.57	71.27
790 - 800	0.57	71.84
800 - 810	0.57	72.41
810 - 820	0.57	72.98
820 - 830	0.57	73.55
830 - 840	0.57	74.12
840 - 850	0.57	74.69
850 - 860	0.57	75.26
860 - 870	0.57	75.83
870 - 880	0.57	76.40
880 - 890	0.50	76.90
890 - 900	0.50	77.40
900 - 910	0.50	77.90
910 - 920	0.50	78.40
920 - 930	0.50	78.90
930 - 940	0.50	79.40
940 - 950	0.50	79.90
950 - 960	0.50	80.40
960 - 970	0.50	80.90
970 - 980	0.50	81.40
980 - 990	0.50	81.90
990 - 1000	0.50	82.40
1000 - 1010	0.40	82.80
1010 - 1020	0.40	83.20
1020 - 1030	0.40	83.60
1030 - 1040	0.40	84.00
1040 - 1050	0.40	84.40
1050 - 1060	0.40	84.80
1060 - 1070	0.40	85.20
1070 - 1080	0.40	85.60
1080 - 1090	0.40	86.00
1090 - 1100	0.40	86.40
1100 - 1110	0.40	86.80
1110 - 1120	0.40	87.20
1120 - 1130	0.40	87.60
1130 - 1140	0.40	88.00
1140 - 1150	0.40	88.40
1150 - 1160	0.40	88.80
1160 - 1170	0.40	89.20
1170 - 1180	0.40	89.60
1180 - 1190	0.40	90.00
1190 - 1200	0.40	90.40
1200 - 1210	0.40	90.80
1210 - 1220	0.40	91.20
1220 - 1230	0.40	91.60
1230 - 1240	0.40	92.00
1240 - 1250	0.40	92.40
1250 - 1260	0.40	92.80
1260 - 1270	0.40	93.20
1270 - 1280	0.40	93.60
1280 - 1290	0.40	94.00
1290 - 1300	0.40	94.40
1300 - 1310	0.40	94.80
1310 - 1320	0.40	95.20
1320 - 1330	0.40	95.60
1330 - 1340	0.40	96.00
1340 - 1350	0.40	96.40
1350 - 1360	0.40	96.80
1360 - 1370	0.40	97.20
1370 - 1380	0.40	97.60
1380 - 1390	0.40	98.00
1390 - 1400	0.40	98.40
1400 - 1410	0.40	98.80
1410 - 1420	0.40	99.20
1420 - 1430	0.40	99.60
1430 - 1440	0.40	100.00

Source: King County, Surface Water Design Manual



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SUBBASINS

Figure 4-3

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C. Subcatchments

Each subbasin is further subdivided into subcatchments averaging approximately 10 acres in size (Figure 4-4). The subcatchments are named with four digits, i.e. 6250. Runoff parameters, as described below, were determined for each subcatchment to enable the calculation of runoff quantities and timing from the areas.

4.4.3 Catchment Geometry

The geometry of a watershed, specifically basin width and slope, greatly impacts the time it takes for rainfall to traverse the basin's overland flow planes. For example, water flowing off a long, narrow catchment will take a longer time to reach the downstream end of a catchment than water flowing off a short, wide catchment. Steep slopes will increase water velocities and funnel stormwater downstream much more quickly than would occur on low slopes. The timing of the runoff, or the time to peak, determines the peak flow discharge and shape of the runoff hydrograph that enters the storm drainage conveyance system. The average width and slope for each subcatchment was measured from topographic maps and are shown in Appendix C.

4.4.4 Soil Permeability/Infiltration

Soil characteristics directly influence the volume and rate of runoff infiltrating into the soil profile. Soil types are classified into hydrologic groups: A, B, C, or D. The hydrologic soil group classification indicates the infiltration characteristics of the soil including permeability, capillary suction, and initial moisture deficit. Table 4-3 outlines the typical parameter values associated with each soil group. In general, Group A soils exhibit high infiltration rates, whereas, Group D soils exhibit very low infiltration rates. Soil Groups B and C have moderate infiltration rates. The City of Newberg soils are primarily comprised of Hydrologic Soil Group C as shown in Figure 4-5.

The areas of each of soil type were determined for each subcatchment and an entire subcatchment was modeled as having a single soil type based on the majority of soil type within the subcatchment. Most subcatchments had only one soil type within its boundaries, however, a few subcatchments were estimated to be composed of 50% Group C and 50% Group D resulting in a mixed group (C/D) with unique parameters that were interpolated from Groups C and D.

Table 4-3
Newberg Drainage Master Plan Update
Soil Infiltration Parameters

Hydrologic Soil Group	Soil Texture	Infiltration Rate (in/hr)	Capillary Suction Head (in)	Soil Wilting Point (in)
A	Sand	0.30	4	0.34
B	Sandy Loam	0.15	8	0.33
C	Silt Loam	0.05	10	0.24
C/D	Silt Loam/Clay	0.04	8.5	0.22
D	Clay	0.03	7	0.21

Source: XP-SWMM Manual

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SUBCATCHMENTS

Figure 4-4

City of Newberg

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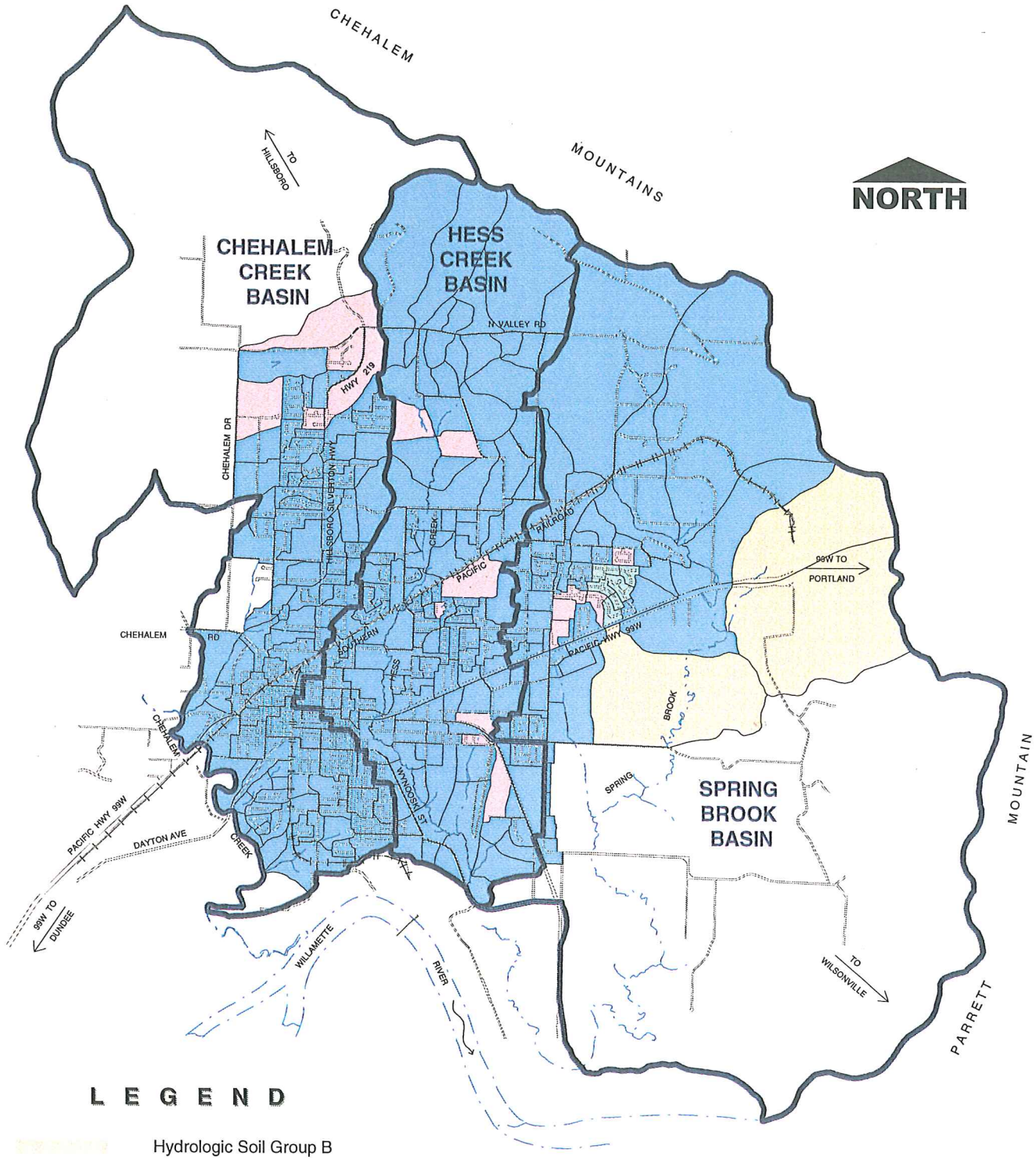

NEWBERG DRAINAGE MASTER PLAN UPDATE

SOILS MAP

Figure 4-5

City of Newberg

THOMAS / WRIGHT, INC.
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4.4.5 Impervious Area

Urbanization or land development affects stormwater runoff by covering naturally pervious soil material with impervious pavements and buildings. Because water cannot infiltrate through the hardened surfaces, impervious area generates greater volumes of runoff water during storm events.

The percent impervious area is an area-weighted average value determined by applying values based on land use. Table 4-4 presents typical percent impervious values associated with land uses found in the City of Newberg. The area of each land use within a subcatchment was measured from City zoning maps (Figure 3-4). Under existing conditions, undeveloped land area was calculated through use of the City's 1996 Vacant Lands Survey and 1996 aerial photography coverage. For future conditions, full development of each zoning unit within the UGB was assumed.

Table 4-4
Newberg Drainage Master Plan Update
Percent Impervious Area per Land Use Type

Land Use	Description	% Impervious Area
SFR	Single-Family Residential	35
MFR	Multi-Family Residential	60
COM	Commercial	75
IND	Industrial	70
RURAL	Rural (undeveloped)	5
PQP	Public / Quasi-Public (schools, cemeteries, etc)	20
POS	Parks/Open Spaces (parks, farms, forest, etc.)	10

Source: Modified from Table 4-5, Technical Memorandum (City of Portland)

4.4.6 Surface Roughness

The roughness of a runoff surface provides friction to slow runoff and allow water to infiltrate into the soil. However, the relatively smooth surfaces of impervious areas allow runoff to flow faster and concentrate water more quickly resulting in higher peak flows and potential for increased erosion of the natural creeks and roadside ditches. Table 4-5 presents estimated surface roughness coefficients, i.e. Manning's "n" values, for both pervious and impervious overland flow. Manning's roughness coefficient values for overland flow are not dependent on soil type. For this analysis of overland flow hydrology, an average roughness value of 0.014 was utilized for impervious areas and a conservative roughness value of 0.20 was used for pervious areas.

Table 4-5
Newberg Drainage Master Plan Update
Manning's Roughness Coefficient Values for Overland Flow

Surface Type/ Ground Cover	Manning's "n" Value
Smooth asphalt	0.012
Asphalt or concrete paving	0.014
Packed clay	0.03
Light turf	0.20
Dense turf	0.35
Dense shrubbery and forest litter	0.40

Source: XP-SWMM Manual (Crawford and Linsley, 1966)

Concrete or asphalt	0.011
Bare sand	0.01
Graveled surface	0.02
Bare clay-loam (eroded)	0.02
Range (natural)	0.13
Bluegrass sod	0.45
Short grass prairie	0.15
Bermuda grass	0.41

Source: XP-SWMM Manual (Engman, 1986)

4.5 HYDRAULIC ANALYSIS

Within the XP-SWMM model, the drainage system is depicted as a series of conduits, or links, that are connected at junctions, or nodes. Links and nodes have well-defined properties which, taken together, permit representation of the entire pipe network. The drainage network used in the model was defined from the City's system maps, databases, and from field reconnaissance and surveys. The Extran module of SWMM uses this link-node network to describe the physical model and thereby the mathematical solution of the gradually varied unsteady flow equations that form the solution method.

4.5.1 Model Links

Links encompass many types of linear conveyance elements within the drainage system, for example, subsurface pipes, open channels, culverts, ditches, and street gutters. Consecutive links that possess the same characteristics and orientation were combined into a single link to simplify the model. Links are typically assigned sequential numbers from the downstream to the upstream end of the model. The link numbers are preceded by the letter "L".

Conduit invert elevations were taken from the City's database, as-built development plans, or field surveys. In cases where no data was available, invert elevations were either calculated from pipe slopes, interpolated from known elevations, or input as having one foot of cover above a daylighting outfall.

Closed conduits were modeled as circular pipes or rectangular box sections as appropriate. Ditches were modeled as open channels with a regular trapezoidal cross-sectional area. Natural channels were modeled as irregular cross-sectional areas defined by field survey data or contour map measurements. Table 4-6 presents the various Manning's roughness values used to compute frictional energy losses for each link based on material and channel type.

Table 4-6
Newberg Drainage Master Plan Update
Manning's Roughness Coefficient Values for Conduits

Conduit Material		Manning's "n" Value
OPEN CHANNELS		
	Earthen channel, no vegetation	0.025
	Earthen channel, with short grass	0.030
	Earthen channel, with dense aquatic vegetation	0.035
	Riparian channel, with clear bottom	0.050
	Concrete lined channel	0.013
	Gunite lined channel	0.020
	Rock rip-rap lined channel	0.035
PIPES		
	Concrete pipe	0.013
	Corrugated metal pipe (CMP)	0.024

Source: XP-SWMM Manual (Crawford and Linsley, 1966)

4.5.2 Model Nodes

Nodes include manholes or other point junctions where link characteristics transition, such as slope breaks, change in conduit cross-sectional area or material. Runoff nodes are points in the system where runoff generated from subcatchments is entered into the drainage infrastructure. Inflows such as the runoff hydrographs and outflows such as weir diversions, pumps and flooding occur at the nodes. Nodes typically have the same designation as the connected downstream conduit. Manholes are all assumed to be standard 48" diameter. An outfall node is located at the end of the conduit that discharges to a receiving water body or where the modeled portion of the drainage system ends.

The ground elevation of a node is the physical top of the node. A node surcharges when the stormwater rises above the level of the top of the conveyance element and ponds within the node. Once the water surface elevation exceeds the ground elevation, surcharge becomes flooding. Flooding denotes that stormwater exits the conveyance system via the manhole or junction and potentially causes damage to homes or roadways.

4.6 DRAINAGE SYSTEM ANALYSIS RESULTS

Hydrologic/hydraulic computer models were created for the three major drainage basins using the XP-SWMM model. The Runoff Module calculated runoff hydrographs from each subcatchment based on the watershed characteristics. The Extran Module routed flows through the storm sewer infrastructure.

Hydrologic modeling runs were performed on each basin for both existing and future land use conditions during 2-, 5-, 10-, 25-, and 100- year return frequency 24-hour duration design storm events, for a total of ten runs for each basin. Hydraulic modeling was performed on each basin for the 10-year, 24-hour design storm to assess the performance of the current storm drainage system under existing and future hydrologic conditions.

The results of the hydrologic and hydraulic analyses are presented in Appendices C and D. The hydraulic capacity of 25 percent of the existing major pipes or culverts is insufficient to convey the runoff generated during a 10-year, 24-hour storm event under future land use conditions as shown in Appendix D.

Appendix E presents the recommended pipe diameters that will convey the 10-year, 24-hour storm without surcharging or flooding of the conveyance system. As a check, the recommended pipe sizes were modeled hydraulically to ensure that the upgraded system would not flood during a 25-year, 24-hour storm event, although surcharge may occur during the larger 25-year storm.

Flow checks were performed at model nodes to verify flow continuity and pipe flow charts were used to verify modeled pipe flow. Model results were also verified by comparing problem areas identified in Appendix B with the model results.

CHAPTER FIVE

Capital Improvement Program

Chapter Five
CAPITAL IMPROVEMENT PROGRAM

5.1 PROGRAM DESCRIPTION

The City's goal is to develop its drainage infrastructure to a level that satisfies existing needs and accommodates future development in balance with available resources. The types of projects considered in this alternatives evaluation include:

- Replacing under-capacity storm drains
- Replacing under-capacity road culverts
- Replacing damaged structures that no longer function as designed
- Preserving natural drainages and floodplains

Fifty Capital Improvement Projects (CIPs) are considered for inclusion in the Capital Improvements Plan. These projects are intended to enable the storm sewer system to effectively convey the 10-year, 24-hour design storm under ultimate land-use conditions. These improvement projects include 16 culverts and 117 segments of storm sewer. The alternatives analysis evaluates the prioritization and cost estimate for replacing these under-capacity culverts and pipe segments.

Each project was evaluated to determine the appropriate size and features needed to handle the design flows. Appendix E itemizes the existing pipe characteristics, the recommended replacement pipe size, and the design capacity of each upsized pipe segment. The CIPs are grouped into projects based on connectivity and proximity. Each project is composed of one to fourteen pipe segments. The location and description of each project group is shown in Table 5-1, including the lineal feet of pipe, the estimated cost of the project, and the project priority.

5.2 DEVELOPMENT OF PROJECT COST ESTIMATES

Construction cost estimates were prepared for each of the CIPs. These planning level cost estimates were based on prices listed in the 1998 Means Site Work & Landscape Cost Data guide, corrected using a location factor for Portland, Oregon, and adjusted for inflation to reflect Year 2001 dollars. All costs are estimates of probable costs and do not reflect changes that could include increasing labor costs, material, and phased construction dates. Construction costs include a 20 percent contingency. Technical services and administration costs were estimated as 30 percent of construction costs, and permitting costs, where necessary, were estimated as 10 percent of construction costs. Technical services and administration includes engineering design, contract documentation, project management, construction administration, and construction inspection. Permitting costs may apply to projects with the following attributes: the project lies within an Oregon Department of Transportation (ODOT) right-of-way or a railroad (RR) right-of-way, the project discharges into or along a water body, and/or the project is located on private property. Easement acquisition costs are not included in this cost estimate.

Capital Improvement Projects

TABLE 5-1

Newberg Drainage Master Plan Update

Project Number	Link(s)	Location	Project Description	Total Length of Pipe Replaced (ft)	Estimated Project Cost Design & Construction (2001 Dollars)	Project Priority
HESS CREEK BASIN						
H1	4218-4225	Wynooski St, south of 11th St	Replace three existing pipes with 265'L of 18"D pipe and 99'L of 21"D pipe.	364	$75,900	11-15
H2	4370	Hwy 219, north of 9th St	Replace existing 66' long 18"D culvert with a 30"D culvert.	66	$35,000	6-10
H3	4390	Hwy 219, south of 2nd St	Replace existing 93' long 12" pipe with a 21" pipe.	93	$26,900	11-15
H4	5030 - 5050	Wynooski St, 7th St to 5th St	Replace three existing pipes with 1318'L of 18"D pipe.	1,318	$257,900	6-10
H5	5110 - 5115	Church St & Hwy 99W	Replace three existing pipes with 1485'L of 18"D pipe.	1,485	$271,200	6-10
H6	5233 - 5235	2nd St, between Center St and Edwards St	Replace three existing pipes with 469'L of 15"D pipe.	1,318	$84,900	11-15
H7	5284 - 5285	Hancock St, between School St and Meridian St	Replace two existing pipes with 922'L of 18"D and 94'L of 21"D pipe.	1,016	$230,000	16-20
H8	5314 - 5320	Sherman St, between Carlton Way and Meridian St	Replace three existing pipes with 756'L of 18"D pipe and 856'L of 15"D pipe.	1,612	$329,000	1-5
H9	5430	Portland Rd, west of Elliott St	Replace existing 286' long 12"D pipe with an 18"D pipe.	286	$56,400	11-15
H10	5564 - 5585	Vermillion St, between Center St and the RR	Replace eight existing pipes with 209lf of 18"D pipe and 886lf of 24"D pipe. Replace one existing culvert with 62lf of 24"D culvert.	1,157	$252,300	1-5
H11	5645 - 5656	Sitka St & Oak Dr	Replace three existing pipes with 282'L of 18"D pipe and 347'L of 21"D pipe.	629	$121,700	11-15
H12	5709 - 5710	Fulton St, east of Center St	Replace two existing pipes with 305'L of 12"D pipe.	305	$55,100	11-15
H13	5960 - 5964	Aspen Way & RR	Replace two existing pipes with 210'L of 24"D pipe.	210	$48,900	6-10
H14	6021	Villa Rd Culvert	Replace existing 55' long 30"D culvert with a 60"D culvert.	110	$66,900	6-10
H15	6215 - 6270	West of Herman St	Replace eight existing pipes with 604'L of 24"D pipe; and 1122'L of 30"D pipe.	1,726	$498,700	6-10

Capital Improvement Projects

TABLE 5-1

Newberg Drainage Master Plan Update

Project Number	Link(s)	Location	Project Description	Total Length of Pipe Replaced (ft)	Estimated Project Cost Design & Construction (2001 Dollars)	Project Priority
HESS CREEK BASIN (continued)						
H16	6555	Aspen Way, north of Mountainview Rd	Replace existing 39' long 12"D culvert with a 24"D culvert.	39	$14,900	6-10
H17	6980	Bell Rd, east of Zimri Dr	Replace existing 44' long 12"D culvert with a 21"D culvert.	44	$15,900	6-10
			Hess Creek Basin Total		**$2,441,600**	
CHEHALEM CREEK BASIN						
C1	1131 - 1140	College St, south of Andrew St	Replace two existing culverts with 130'L x 48"D culverts.	130	$92,900	6-10
C2	1162 - 1164	River St, south of 10th St	Replace three existing pipes with 320'L of 18"D pipe; 284'L of 21"D pipe; and 223'L of 24"D pipe.	827	$182,700	11-15
C3	1180 - 1194	9th St and Center St	Install 352lf of new 30"D pipe. Replace thirteen existing pipes with 1771lf of 18"D pipe; 377lf of 24"D pipe; 69lf of 30"D pipe; 1038lf of 36"D pipe.	3,607	$906,700	11-15
C4	1450 - 1451	5th St, west of Blaine St	Replace two existing pipes with 629'L of 24"D pipe.	629	$151,300	1-5
C5	1464 - 1470	West of Blaine St, north of 8th St	Replace four existing pipes with 502'L of 24"D pipe and three pipes with 755'L of 18"D pipe.	1,257	$249,500	16-20
C6	1709	Along eastside of Hwy 99, south of 3rd St	Replace existing 313' long 8"D pipe with a 24"D pipe.	313	$52,900	16-20
C7	1719 - 1720	Hwy 99 , south of 3rd St	Replace two existing pipes with 405'L of 24"D pipe	405	$79,800	16-20
C8	2011 - 2044	West of Morton St, south of Sheridan St	Replace six existing pipes w/ 403lf of 18" pipe; 106lf of 24" pipe; 98lf of 30" pipe; and 434lf of 36" pipe. Replace culvert with 58' L of 24"D culvert.	870	$314,900	1-5
C9	2070	RR box culvert at Main St	Replace existing 168' long 12"D pipe with an 18"D pipe.	168	$42,900	1-5
C10	2223 - 2226	East of Main St, north of Illinois St	Replace four existing pipes with 515'L of 18"D pipe and 516'L of 24"D pipe.	1,031	$321,600	16-20

Capital Improvement Projects

TABLE 5-1

Newberg Drainage Master Plan Update

Project Number	Link(s)	Location	Project Description	Total Length of Pipe Replaced (ft)	Estimated Project Cost Design & Construction (2001 Dollars)	Project Priority
CHEHALEM CREEK BASIN (continued)						
C11	2236	West of Hwy 219, north of Mission Dr	Replace existing 155' long 24"D pipe with a 30"D pipe.	155	$46,200	1-5
C12	2275 - 2276	Center St, north of Pioneer Ln	Replace two existing pipes with 91'L of 24"D pipe and 104'L of 30"D pipe.	195	$54,000	1-5
C13	2280	Along Crestview Dr, west of Meridian St	Replace existing 64' long 12"D pipe with a 24"D pipe.	64	$34,800	6-10
C14	2509 - 2509N	Columbia Dr, west of Main St	Replace 12"D culvert with 35'L of 42"D pipe and install a parallel 24"D pipe.	70	$79,700	6-10
C15	2512	Columbia Dr, west of Main St	Replace existing 229' long 18"D pipe with a 24"D pipe.	229	$49,700	16-20
C16	2620	Park Ct, west of Donald Ln	Replace existing 51' long 27"D pipe with a 36"D pipe.	51	$38,900	6-10
C17	3010	Crater Ln, south of Foothills Dr	Replace existing 26' long 18"D culvert with a 36"D culvert.	26	$30,800	1-5
C18	3114 - 3115	Myrtlewood Ct, south of Edgewood Dr.	Replace two existing pipes with 426'L of 36"D pipe.	426	$146,900	16-20
C19	3130	Sunset Dr to Quail Dr	Replace existing 265' long 30"D pipe with a 36"D pipe.	265	$74,500	16-20
C20	3145	Along Hwy 219, north of Foothills Dr	Replace existing 240' long 18"D pipe with a 36"D pipe.	240	$84,900	16-20
C21	3148	Along Morris St, south of Foothills Dr	Replace existing 7' long 18"D pipe with a 30"D pipe.	7	$10,300	16-20
C22	3400 - 3410	South of Foothills Dr, west of Jones St	Replace three existing pipes with 329'L of 24"D pipe.	329	$100,200	16-20
			Chehalem Basin Total		**$3,146,100**	

Capital Improvement Projects

Newberg Drainage Master Plan Update

TABLE 5-1

Project Number	Link(s)	Location	Project Description	Total Length of Pipe Replaced (ft)	Estimated Project Cost Design & Construction (2001 Dollars)	Project Priority
SPRING BROOK BASIN						
S1	8185	Springbrook Rd and Hancock St	Replace existing 179' long 8"D pipe with a 15"D pipe.	179	$33,300	16-20
S2	8270 - 8275	North side of 99W, east of Springbrook Rd	Replace two existing pipes with 258'L of 18"D pipe and 164'L of 24"D pipe .	422	$90,100	16-20
S3	8334	West of Springbrook Rd, north of 99W	Replace existing 441' long 36"D culvert with an 48"D culvert.	441	$191,800	1-5
S4	8505 - 8520	Aquarius Blvd, west of Coffey Ln	Replace three existing pipes with 331'L of 18"D pipe and 230'L of 36"D pipe.	561	$145,900	1-5
S5	8545 - 8560	Vittoria Way, between Coffey Ln and Springbrook St	Replace three existing pipes with 515'L of 18" pipe and 510'L of 21"D pipe.	1,025	$220,800	16-20
S6	8625 - 8640	Springbrook Way, between Aquarius Blvd and Douglas St	Replace two existing pipes with 509'L of 36"D pipe.	509	$150,800	1-5
S7	8667 - 8735	Springbrook Rd. between Mountainview Dr and Crestview Dr	Replace six existing pipes with 807' of 18"D pipe; 252'L x 24"D; and 1022'L of 30"D pipe. Replace one existing culvert with 38'L of 36"D culvert.	2,119	$452,500	1-5
S8	8720	RR, east of Springbrook Rd	Replace existing 39' long 12"D culvert with a 24"D culvert.	39	$15,700	6-10
S9	9140	99W, east of Klimek Ln	Replace existing 143' long 24"D culvert with a 36"D culvert.	143	$74,700	6-10
S10	9235 - 9255	Libra St, between Vittoria Wy and Crestview Dr	Replace four existing pipes with 1502' of 24"D pipe.	1,502	$324,000	11-15
S11	9290	Aquarius Blvd, east of Libra St	Replace existing 125' long 8"D pipe with an 18"D pipe.	125	$30,300	16-20

Spring Brook Basin Total $1,729,900

Total Estimated Cost of All Projects $7,317,600

Appendix G presents Project Summary Sheets for each CIP. For projects consisting of more than one pipe segment, Pipe Worksheets for each pipe segment within the project are included to show the itemized costs. A summary of the estimated costs is shown on Table 5-1.

Unit costs used for installation of storm drain pipeline and culverts account for sawcutting existing asphalt, excavation of existing piping, placement of new pipeline, bedding and backfill, construction of manholes, restoration of surface features, and upstream and downstream channel protection, where necessary. Costs for excavation and manhole construction vary based on depth of installation. Unit costs are presented in Table 5-2.

5.3 PROJECT EVALUATION CRITERIA

Table 5-3 presents the City's priorities for construction of CIPs for the storm drainage master plan. Six criteria were used to evaluate and rate individual projects and alternative capital improvement programs for the three major basins. The criteria have been scored, and the projects sorted by total score. In general, the higher the score, the higher the priority is to construct the project.

A. Pipe Size and Flow Increase

Comparisons were made between the diameter of the existing structure and the proposed replacement, and the hydraulic capacity of the existing facility and the peak flow for the 24-hour 10-year storm. The relative increase in diameter and flow were assigned values of high, medium, and low.

B. Flood Hazard

Maps were reviewed to evaluate the potential for flooding moderately to heavily used streets, such as Highway 99W, Springbrook Road, and College Street. The relative severity of the consequences of potential flooding at a site was assigned values of high, medium, and low.

C. City Priority

City engineering and maintenance personnel identified certain projects to be of high priority.

D. Reported Problem

The number of times the City had received a citizen report on a specific problem was considered in assigning priorities to projects.

E. Structural Damage

Projects to replace damaged components of the major drainage system that no longer function as designed (e.g., rusted or crushed pipes) were assigned a high priority.

F. Project Location

The project priorities were adjusted to factor in location upstream/downstream of other CIPs.

Unit Costs

Newberg Drainage Master Plan Update

TABLE 5-2

Description		Unit	Unit Cost
GENERAL REQUIREMENTS			
Mobilization/demobilization (project <$30,000)		ea	7% of construction cost
Mobilization/demobilization (project >$30,000)		ea	5% of construction cost
Erosion control measures		acre	1.4% of construction cost
Traffic control		lf	$5 *
SITE WORK			
Clear and grub brush		acre	$5,200
Saw cutting, asphalt		lf	$3
Remove pipe		lf	$8 *
EARTHWORKS			
Trench excavation & backfill			
Up to 18" pipe diameter,	to 6' depth	lf	$15 *
	to 12' depth	lf	$38 *
	to 20' depth	lf	$65 *
Up to 30" pipe diameter,	to 6' depth	lf	$19 *
	to 12' depth	lf	$45 *
	to 20' depth	lf	$85 *
Up to 48" pipe diameter,	to 6' depth	lf	$24 *
	to 12' depth	lf	$55 *
	to 20' depth	lf	$110 *
STRUCTURAL WORKS			
Reinforced concrete pipe			
Class 3	12" diameter	lf	$23
including bedding	15" diameter	lf	$29
& pipe zone	18" diameter	lf	$35
	24" diameter	lf	$49
	30" diameter	lf	$72
	36" diameter	lf	$98
	48" diameter	lf	$134
	60" diameter	lf	$180
Manholes			
	6' deep	each	$2,300
	10' deep	each	$3,700
	14' deep	each	$5,800
Culvert headwalls			
Cast in place concrete	30" diameter	each	$2,100
with wing walls	36" diameter	each	$2,600
	42" diameter	each	$3,100
	48" diameter	each	$3,600
Rip-rap slope protection, 18" thick, not grouted		sy	$78
SURFACE RESTORATION			
Asphalt pavement (4") including base		lf	$25 *
Sidewalk		sf	$5
Concrete curb		lf	$12
Revegetation		acre	$22,000
OTHER			
Contingencies		ea	20% of construction cost
Permitting		ea	10% of construction cost
Technical services and administration		ea	30% of construction cost

Costing information is from "RSMeans® Site Work & Landscape Cost Data", 2000

Unit costs have been adjusted to reflect 2001 dollars for Portland, Oregon.

* indicates modifications of costing values per professional engineering judgement of Thomas/Wright, Inc.

CIP Ranking Matrix

Newberg Drainage Master Plan Update

TABLE 5-3

Project Number	Location	Other CIP's located upstream	Known Problem	Potential Property Damage	Potential Roadway Overtopping	Model Predicts Existing Problem	Project Score	Estimated Project Cost (2001 Dollars)
CONSTRUCT DURING YEARS 1 - 5								
H10	Vermillion St, between Center St and the RR	None	4	4	4	4	16	$252,300
C8	West of Morton St, south of Sheridan St	C9	4	4	4	4	16	$314,900
S3	West of Springbrook Rd, north of 99W	S4-S8	0	0	4	4	8	$191,800
S4	Aquarius Blvd, west of Coffey Ln	S5-S8	0	0	0	4	4	$145,900
S6	Springbrook Way, between Aquarius Blvd and Douglas St	S7-S8	0	0	0	4	4	$150,800
S7	Springbrook Rd. between Mountainview Dr and Crestview Dr	None	4	4	4	4	16	$452,500
C4	5th St, west of Blaine St	None	4	4	0	4	12	$151,300
C9	RR box culvert at Main St	None	4	0	4	4	12	$42,900
C17	Crater Ln, south of Foothills Dr	C18-C22	4	0	4	4	12	$30,800
C11	West of Hwy 219, north of Mission Dr	C12-C13	4	0	0	0	4	$46,200
C12	Center St, north of Pioneer Ln	None	4	4	0	4	12	$54,000
							Subtotal	**$1,833,400**
CONSTRUCT DURING YEARS 6 - 10								
H2	Hwy 219, north of 9th St	H3	0	0	4	4	8	$35,000
H4	Wynooski St, 7th St to 5th St	None	4	0	0	4	8	$257,900
H5	Church St & Hwy 99W	None	4	0	0	4	8	$271,200

CIP Ranking Matrix

Newberg Drainage Master Plan Update

TABLE 5-3

Project Number	Location	Other CIP's located upstream	Known Problem	Potential Property Damage	Potential Roadway Overtopping	Model Predicts Existing Problem	Project Score	Estimated Project Cost (2001 Dollars)
CONSTRUCT DURING YEARS 6 - 10 (continued)								
H8	Sherman St, between Carlton Way and Meridian St	None	4	0	0	4	8	$329,000
H13	Aspen Way & RR	None	4	0	0	4	8	$48,900
H14	Villa Rd Culvert	H15-H17	0	0	4	4	8	$66,900
H15	West of Herman St	None	4	0	0	4	8	$498,700
H16	Aspen Way, north of Mountainview Rd	None	0	0	4	4	8	$14,900
H17	Bell Rd, east of Zimri Dr	None	0	0	4	4	8	$15,900
C1	College St, south of Andrew St	C2-C3	0	0	4	4	8	$92,900
C13	Along Crestview Dr, west of Meridian St	None	4	0	0	4	8	$34,800
C14	Columbia Dr, west of Main St	C16	0	0	4	4	8	$79,700
C16	Park Ct, west of Donald Ln	None	0	0	4	4	8	$38,900
S8	RR, east of Springbrook Rd	None	0	0	4	4	8	$15,700
S9	99W, east of Klimek Ln	S10-S11	0	0	4	4	8	$74,700
							Subtotal	**$1,875,100**

CIP Ranking Matrix

Newberg Drainage Master Plan Update

TABLE 5-3

Project Number	Location	Other CIP's located upstream	Known Problem	Potential Property Damage	Potential Roadway Overtopping	Model Predicts Existing Problem	Project Score	Estimated Project Cost (2001 Dollars)
CONSTRUCT DURING YEARS 11 - 15								
S10	Libra St, between Vittoria Wy and Crestview Dr	None	4	0	0	4	8	$324,000
H11	Sitka St & Oak Dr	None	0	4	0	4	8	$121,700
H12	Fulton St, east of Center St	None	0	4	0	4	8	$55,100
C2	River St, south of 10th St	None	0	4	0	4	8	$182,700
C3	9th St and Center St	None	0	4	0	4	8	$906,700
H1	Wynooski St, south of 11th St	None	0	0	0	4	4	$75,900
H3	Hwy 219, south of 2nd St	None	0	0	0	4	4	$26,900
H6	2nd St, between Center St and Edwards St	None	0	0	0	4	4	$84,900
							Subtotal	**$1,777,900**
CONSTRUCT DURING YEARS 16 - 20								
H7	Hancock St, between School St and Meridian St	None	0	0	0	4	4	$230,000
H9	Portland Rd, west of Elliott St	None	0	0	0	4	4	$56,400
C5	West of Blaine St, north of 8th St	None	0	0	0	4	4	$249,500
C6	Along eastside of Hwy 99, south of 3rd St	None	0	0	0	4	4	$52,900
C7	Hwy 99 , south of 3rd St	None	0	0	0	4	4	$79,800
C10	East of Main St, north of Illinois St	None	0	0	0	4	4	$321,600

CIP Ranking Matrix

Newberg Drainage Master Plan Update

TABLE 5-3

Project Number	Location	Other CIP's located upstream	Known Problem	Potential Property Damage	Potential Roadway Overtopping	Model Predicts Existing Problem	Project Score	Estimated Project Cost (2001 Dollars)
CONSTRUCT DURING YEARS 16 - 20 (continued)								
C15	Columbia Dr, west of Main St	None	0	0	0	4	4	$49,700
C18	Myrtlewood Ct, south of Edgewood Dr.	C19-C21	0	0	0	4	4	$146,900
C19	Sunset Dr to Quail Dr	C20-C21	0	0	0	4	4	$74,500
C20	Along Hwy 219, north of Foothills Dr	None	0	0	0	4	4	$84,900
C22	South of Foothills Dr, west of Jones St	None	0	0	0	4	4	$100,200
S1	Springbrook Rd and Hancock St	None	0	0	0	4	4	$33,300
S2	North side of 99W, east of Springbrook Rd	None	0	0	0	4	4	$90,100
S11	Aquarius Blvd, east of Libra St	None	0	0	0	4	4	$30,300
C21	Along Morris St, south of Foothills Dr	None	0	0	0	0	0	$10,300
S5	Vittoria Way, between Coffey Ln and Springbrook St	None	0	0	0	0	0	$220,800
							Subtotal	**$1,831,200**

TOTAL $7,317,600

5.4 PROGRAM SCHEDULE

The recommended capital improvement program is proposed to be implemented over a 20-year period. The projects were assigned a priority for implementation of high, medium, or low. Based on the prioritization as described in Section 5.3, each project was assigned to a five-year implementation period for years 1-5, years 6-10, years 11-15, and years 16-20. The number of projects assigned to each implementation period was adjusted to result in each 5-year implementation period having about the same cost (in Year 2001 dollars).

5.5 CIP RECOMMENDATIONS

As summarized in Table 5-1, a total of 50 projects located throughout the City of Newberg are included in the Capital Improvement Plan. The total estimated cost for completing these construction projects is about $7.3 million in Year 2001 dollars. The CIP locations are shown on the maps in Appendix F.

Implementation of the recommended CIP program is proposed to occur over a 20-year period. Each of the projects was assigned an implementation priority as outlined in Section 5.4. The priority ranking roughly represents the 5-year period in which the project is recommended for construction. However, it is recommended that the City review the CIP plan on an annual basis to determine which projects to implement each year.

CHAPTER SIX

Stormwater Quality and Detention

Chapter Six
STORMWATER QUALITY AND DETENTION

6.1 STORMWATER QUALITY

6.1.1 Introduction

Two Federal laws that will have an impact on stormwater quality within the City of Newberg are the Endangered Species Act (ESA) and the Clean Water Act. The ESA is intended to protect species that are endangered or threatened. The Clean Water Act focuses mostly on water quality and requires States to undertake specific activities to protect the quality of their rivers, streams, lakes and estuaries.

In June 2000, the National Marine Fisheries Services (NMFS) adopted a rule prohibiting the "take" of 14 groups of salmon and steelhead listed as threatened under the ESA. The ESA defines "take" as " harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." The 4(d) rule describes 13 "limits on the take prohibition" that, if followed, would preclude prosecution for take even if the listed species was harmed inadvertently. There are two types of limits described in the rule. The first type includes specific programs NMFS has already reviewed and determined will minimize harm to threatened fish. The second type includes general categories of programs that NMFS may evaluate in the future and sets out criteria for obtaining approval of the programs.

Section 303(d) of the Clean Water Act requires the State of Oregon to develop a list of water bodies that do not meet standards and submit an updated list to the Environmental Protection (EPA) every two years. For those water bodies on the 303(d) list, the Oregon Department of Environmental Quality (DEQ) is required to calculate pollution load limits, known as Total Maximum Daily Loads (TMDLs), for each pollutant entering a water body. A TMDL is the total amount of a pollutant from all sources that can enter a specific water body without violating the water quality standards. EPA must approve the TMDLs. For the City of Newberg, the water body of concern is the Willamette River.

In 1987, amendments to the Clean Water Act required EPA to address discharges from a municipality's separate storm sewer system (MS4). The result of this requirement is Phase I of the National Pollutant Discharge Elimination System (NPDES) storm water program. Phase I required NPDES permits for "industrial" activities, construction activities disturbing five or more acres, and large municipal (municipalities with a population of 100,000 or greater) storm sewer systems.

On December 8, 1999, the Storm Water Phase II Final Rule was published in the Federal Registrar. One of the requirements in the Phase II final rule is that DEQ must determine a set of criteria and evaluate all jurisdictions with populations between 10,000 and 50,000 and a density of 1,000 persons per square mile or greater for inclusion in the Phase II rule.

6.1.2 The Endangered Species Act

There are two species of fish that are listed as threatened that will have an impact on the City of Newberg. These are all naturally spawned populations of winter-run steelhead in the Willamette River and its tributaries above Willamette Falls upstream to, and including, the Calapooia River and all naturally spawned populations of spring-run Chinook salmon in the Willamette River, and its tributaries, above Willamette Falls.

As a result of the listed species, the City of Newberg needs to evaluate their stormwater practices to determine whether the City has the potential to affect the listed species. NFMS has a matrix of pathways and indicators and an assessment checklist the City can use in its evaluation. If any of the City's activities, including Municipal, Residential, Commercial, and Industrial Development and Redevelopment (MRCI) activities performed by others, impact hydrology, riparian areas, instream habitat, bank stability, and/or water quality, the City will need to address what modifications need to be made to alleviate the impact(s). Limit No. 12 in the 4(d) rule states that stormwater management programs must require development activities to avoid impairing water quality and quantity. The City's program must preserve and enhance stream flow patterns so that they are as close as possible to the historic peak flows, base flows, durations, volumes, and velocities.

6.1.3 Willamette Basin TMDLs

The Willamette Basin TMDLs may affect the City of Newberg. DEQ is scheduled to complete its report by the end of 2003. The pollutants of concern are temperature, bacteria, and mercury. A fourth TMDL is fish skeletal deformities (biological criteria).

DEQ will develop a model for water temperature. However, a DEQ staff member's initial investigation in the Tualatin Basin indicated that stormwater runoff was not a cause of temperature exceedance. One potential impact of the temperature TMDL is that retention/detention ponds may have to be shaded.

DEQ's modeling for bacteria will be similar to the modeling performed for the Tualatin Basin. In the Tualatin Basin, DEQ did identify that stormwater was a problem with respect to bacteria. One source of bacteria in stormwater is in parks that have an off leash area for dogs and other pets where the area is located near a stream.

DEQ has not identified the source of mercury but indicated that it appears to be largely the result of past mining activities.

The highest incidence of skeletal deformities in fish was observed in fish collected within the Newberg Pool. The Newberg Pool is a stretch of the Willamette River extending from Willamette Falls upstream to approximately River Mile 55. (Chehalem Creek enters the Willamette at River Mile 50.8). The cause of these deformities is unknown and DEQ is planning further studies.

6.1.4 NPDES Phase II

The City of Newberg is on the list of cities to be evaluated for inclusion in the NPDES Phase II. DEQ needs to develop evaluation criteria and then evaluate the cities on the list. At the earliest, a decision as to whether Newberg is included in Phase II will be made at the end of 2002. However, if DEQ decides that the evaluation will be based on a watershed approach, then a decision will not be made until the end of 2003 when the Willamette Basin TMDL final report is scheduled to be completed. If Newberg is included in Phase II, it will have 180 days from the date DEQ makes its decision to apply to DEQ for NPDES permit coverage. At this time, DEQ does not know if a general or individual permit will be required.

If Newberg is included in Phase II, it will be required to develop, implement, and enforce a stormwater management program. The program must include at a minimum the following six control measures:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Runoff Control
- Pollution Prevention/Good Housekeeping

Newberg will need to identify its selection of Best Management Practices and measurable goals for each minimum control measure in the permit application.

6.2 STORMWATER DETENTION

6.2.1 Background

Stormwater detention is a relatively new requirement for land development in the Willamette Valley. Whereas it is a common requirement of municipal development codes today, ten years ago it was rarely required. It is widely accepted that the addition of roofs and pavements by new development causes water to runoff a developed site rather than percolate into the soil. It has therefore also been widely accepted that developments should be required to retain stormwater and discharge it at a slower rate.

A. General Regulations

The rate at which stormwater is permitted to be discharged varies significantly between municipalities. The least constraining policy defines a storm frequency and duration and requires that the runoff from a developed site be no greater than the runoff would have been for the same storm prior to development. The definition of design storms varies from a storm of 1-hour duration and 2-year frequency to a storm of 24-hour duration and 100-year frequency.

Some jurisdictions have more restrictive standards that require the storm runoff from the developed property during a 25-year storm to be no greater than the runoff would have been for a 10-year storm

prior to development. Another more restrictive requirement of some jurisdictions specifies that the stormwater discharge from developed property shall be no greater than the discharge from the property prior to development for storms of several frequencies, or for storms of all frequencies. Conformance with this regulation requires multiple controlled outlets from the detention facility, or a facility with large enough detention capacity and a small enough outlet to meet the control requirement of the most demanding storm.

The primary benefit of stormwater detention is the reduction in the intensity of stormwater flows that must be carried by downstream pipes and channels. A secondary benefit is an improvement in water quality that is achieved by solids settling during detention. Detention systems can also be constructed such that floating pollutants such as oils can be trapped and removed from the system. These treatment benefits can only be realized if the systems are periodically cleaned and the pollutants are removed.

B. Cost/Benefit Considerations

While the fact that there are benefits from stormwater detention is obvious, the magnitude and the uniformity of these benefits have not been well analyzed. The true costs of stormwater detention policies that require on-site detention have also not been analyzed. Just as the benefits of stormwater detention vary from property to property, so does the cost of stormwater detention. There is no correlation between benefit of detention and cost of detention for an individual property.

C. Public vs. Private Facilities

As with most utilities, storm drainage detention is most cost-effective when it is provided by a common community system rather than individual smaller systems located on private properties. This economic principle applies to the costs of both operations and maintenance. For rural and some sparsely developed suburban areas this is not an undue burden. For some properties it is possible to integrate surface water systems with landscaping and other amenities for a pleasing and cost-effective system. These systems are the exception, however, and most urban properties are ill suited to detain or treat surface waters.

D. Maintenance Considerations

The maintenance and operation of stormwater detention systems is a significant burden that is usually not given sufficient consideration when drainage policies are developed. King County, Washington was the leader in the Northwest in requiring stormwater detention systems, and it is now realizing that the maintenance of detention system requires a very large public expenditure. For systems that serve large commercial developments such as shopping centers and apartments, the cost of operation and maintenance can be transferred to the property owner. Even with the transfer of maintenance responsibility, however, the public agency can incur significant monitoring and enforcement costs.

E. Design Constraints

An important requirement for a functional detention system is the availability of a storm drain or receiving channel that is well below the property being served. As a rule of thumb, a stormwater detention structure must allow for a minimum four foot elevation difference between the entrance and exit points of the structure to provide adequate storage. Thus, properly designed detention sites may not be feasible in sections of Newberg that are limited by low slopes. Detention could well be counterproductive for a property near the downstream end of a drainage system. In this case, it would be better to discharge flow from a downstream property immediately, before the conveyance system has been loaded with flow from upstream properties. This anomaly can be recognized and accommodated by identifying zones where detention is desirable and zones where it is not.

In general, the Willamette Valley has two characteristics that make stormwater detention systems less effective than in other parts of the country. First, the Willamette Valley experiences storms of longer duration and lesser intensity than other areas. The quick intense summer storm that can be so easily dampened by a detention system is not typical here. A second, and less appreciated, fact is that Willamette Valley soils do not readily percolate runoff. As mentioned in Section 3.4.3 of this report, soils in Newberg percolate stormwater at rates below 0.15 inches per hour. When this percolation rate is compared to rainfall rates of 2.5 to 4.5 inches per hour it should be apparent that in Newberg the difference between runoff from undeveloped pervious soils and new roofs and pavement is not as great as many believe.

Initially, stormwater detention in the Northwest was achieved with surface storage ponds. In some cases these were integrated into the landscaping and served as an amenity, but most ponds turned out to be unsightly holes in the earth. Since public safety is a consideration, most ponds must be secured by a chainlink fence, and a gravel road around the pond is usually required for maintenance. These two elements, combined with the unnatural shape of most ponds, make most storage ponds aesthetically displeasing.

F. Alternative Technologies

An alternative to storage in surface ponds that is growing in popularity is storage in large underground pipes. Obviously the cost of this type of storage is very sensitive to the cost of the pipes, but currently the cost of corrugated metal pipe and the cost of high-density polyethylene (HDPE) pipe are low enough to make this storage system competitive. Underground pipe storage requires far less land be taken out of service than surface pond storage. Pipe storage is also preferable in respect to maintenance, public safety, and appearance.

6.2.2 Policy Issues

Since there are a multitude of policy issues that should be considered prior to developing an ordinance relating to stormwater detention, it is recommended that the City of Newberg hold one or more meetings to discuss the issues surrounding stormwater detention. The costs and benefits of stormwater detention must be weighed and a detention policy format must be chosen that will meet the needs of Newberg. A logical first meeting would be between the City's public works and engineering staff and its consulting engineers. Such a meeting can determine if the City of Newberg

will have a stormwater detention requirement and provide a rough outline of the significant elements of the City's policy. Additional meetings may be required to develop the initial policy, notify the public regarding the proposed regulations, and obtain public input to ensure community endorsement.

6.2.3 Recommendations

With consideration for the issues described above, this report offers the following recommendations and guidelines related to stormwater detention:

1. With all affected parties in the City of Newberg, conduct in-depth discussions on the costs and benefits of stormwater detention.

2. Assess and review opportunities for stormwater detention in public parks and open spaces.

3. Through the Design Review process encourage developers to utilize landscaping plans that help detain stormwater runoff.

4. If the City of Newberg concludes that stormwater detention should be a condition of development, the following guidelines should apply:

   A. Detention shall be required for the partition of any parcel of one acre or more.

   B. The City of Newberg will accept ownership and maintenance responsibilities for all detention facilities that are constructed as part of a land partition.

   C. Detention shall be required for all properties that are one acre or larger and that install impervious surfaces including roofs and pavement of 15,000 square feet or more.

   D. Detention facilities shall be designed such that the stormwater runoff from the developed parcel shall be no greater than the runoff from the parcel prior to development for a storm of 10-year frequency and 24-hour duration.

APPENDIX A

References

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APPENDIX B

Problem Areas

Note: This summary is based on 10/3/96 meeting with Newberg City staff and review of 1986 Master Plan.
Type Designation: O-Observed Flooding, M-Maintenance, F-Future Problem, N/A-Problem solved or other issue

PROBLEM AREAS

Newberg Drainage Master Plan Update

APPENDIX B

Item	Subbasin	TYPE	Location	Facility/Site Description	Problem/Opportunity Description	Jurisdiction	Frequency	Property Damage	Recommended Project
1, 7, 8	S/3	O	Springbrook St. @ Adec property (North of Crestview Dr.)	Private storm drains under Springbrook St. across Adex property to Crestview Dr.	Flooding west of Springbrook St. caused by undersized piping. 1986 Plan proposed to route flows west to existing ditch along Crestview Dr. Proposed solution won't work, as flow would not be able to cross a topographic high point leading to ditch.	PRIVATE	OFTEN	NO	S7
2	S/4	O	Crestview Dr. @ Libra St.	Ditch inlet on north side of Crestview Dr.	Flooding from clogged drain.	CITY, COUNTY, ADEC	OFTEN	NO	S10
3	S/4	O	Crestview Dr. @ Birdhaven Loop (Oxberg Lakes Estates)	Private system of culverts & ditches at Oxberg Lakes Estates.	Lack of engineered drainage system. Existing shallow ditch and culverts discharge to downstream property.	CITY	ALWAYS	UNKNOWN	
4	S/4	O	Coffey Lane @ Leo Lane	Inlet and storm drains.	Flooding from undersized downstream system. Inlet clogs with silt.	CITY	OFTEN	YES	
5, 6	S/4	M	Spring Meadow Park near Vittoria Way & Aquarius Blvd	Catch basin located in Spring Meadow Park.	Catch basin clogs causing local ponding in park and discharge across private property.	CITY	OFTEN	UNKNOWN	
9	S/2	F	150 acre area southeast of Hwy 99 and Springbrook St	150 acre undeveloped area, zoned commercial/industrial.	Currently, not a problem. However, as area develops runoff volume/peak discharge will increase.	DEVELOPER	N/A	NO	
10	S/2	O	Fernwood Rd - 800 ft east of Springbrook St	Culvert under Fernwood Rd.	Flooding upstream of Fernwood Road caused by undersized culvert. Deep cut expensive to replace.	COUNTY	OFTEN	UNKNOWN	
11	S/2	O	Second St & Elliot Rd	Open ditch in very flat area.	Flooding and standing water. Open ditch lacks capacity to carry flow.	COUNTY	OFTEN	NO	
12	S/2	O	Fernwood Rd - 3500 ft east of Springbrook St	Culvert under Fernwood Rd.	Flooding upstream of Fernwood Road caused by undersized culvert. Deep cut expensive to replace.	COUNTY	OFTEN	UNKNOWN	
13	H/3	O	Haworth Rd east of Elliot Rd.	The Newberg school property located on the north side of Haworth Road drains to the south via several culverts under Haworth Rd.	Flooding on school property to a depth of4 ft caused by clogged culverts and under-sized downstream system.	SCHOOL	OFTEN	NO	
14	H/3	O	Southeast of Haworth Rd. and Elliot Rd.	South of Haworth Rd, storm drain daylights into shallow ditch near apartment complex.	Ditch lacks capacity to convey flows and backs up. Complaints of stagnant water and odors.	CITY	OFTEN	N/A	
15	H/3	O	Hwy 99, 400 ft east of Elliot Rd.	Open ditch north of Hwy 99 enters the piped system under Hwy 99.	Flooding due to undersized system downstream. Previous developer backed out due to high cost of improving system under Hwy 99.	STATE	OFTEN	NO	
16	H/7	O	Aspen Way & Crestview Dr	Culvert at stream crossing.	Flooding of orchard caused by undersized inlet & culvert. Orchard generates sheet flow like a parking lot.	CITY	OFTEN	NO	H13

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PROBLEM AREAS

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Item	Subbasin	TYPE	Location	Facility/Site Description	Problem/Opportunity Description	Jurisdiction	Frequency	Property Damage	Recommended Project
17	H/8	O	Villa Rd & Carol Ann Drive	Culvert under Villa Rd.	Flooding caused by undersized culvert and clogged stream. Stream/ravine south of Carol Ann Dr is clogged due to siltation and overgrowth.	CITY	SELDOM	NO	H14
18	H/4	O	Third St & Church St	Storm drain along Church St. New interceptor just installed.	Flooding caused by undersized older system. New interceptor may correct problem.	CITY	OFTEN	UNKNOWN	H15
19	H/4	O	North of 11th St @ Wynooski St	4-1/2 ft deep ditch with culverts at driveway crossings	Flooding caused by undersized system.	CITY	UNKNOWN	UNKNOWN	H1
20	H/4	O	4th St & Wynooski St	Temporary asphalt curb diverts water along the street to a catch basin.	Unknown	CITY	UNKNOWN	UNKNOWN	
21	H/4	O	8th St & Wynooski St	Field on west side of Wynooski St drains to ditch.	Flooding caused by undersized ditch. Line on west side of Wynooski crosses private property without an easement.	CITY	UNKNOWN	UNKNOWN	H4
22	H/5	M	George Fox College	Clay tile line extends from North St. under the college track and outfalls to Hess Creek.	Flooding caused by fractured tile line backing up .	CITY	OFTEN	UNKNOWN	
23	H/5	M	Carlton Way & Hancock St	Line extends east from the end of Hancock St. to the outfall at Hess Creek. Outfall extends from the top of bank with large drop to creek.	Creek bank is severely eroded due to high velocity discharge from the outfall.	CITY	N/A	NONE	H8
24	H/5	O	Vermillion St & Edwards St & Willamette Pacific Railroad	10-inch diameter, 1-foot section drain tile takes drainage from railroad right-of-way across private property.	Flooding caused by undersized line. No easement for line across private property	CITY	OFTEN	UNKNOWN	H10
25	H/5	O	Meridian St & Willamette Pacific Railroad	Ditch along north side of railroad right-of-way drains a flat area. The ditch discharges to a culvert under the railroad tracks.	Flooding caused by undersized ditch, culvert, and manhole.	CITY, WPRR	OFTEN	UNKNOWN	
26	C/1	M	River St between 10th St and 11th St	Catch basin and 1-foot section tile pipe.	Flooding caused by fractured/failing pipe and silt clogged catch basin.	CITY	OFTEN	UNKNOWN	C2
27	C/1	N/A	9th St. & Blaine St	City replaced/extended pipe south to Hess Creek. Replaced bubbler inlets with pelican inlets.	This problem has been fixed.	N/A	N/A	N/A	
28	C/1	O	9th St & Blaine St	Culvert and inlet on school property.	Flooding SE corner of school property for up to 2 days at a time. Caused by undersized inlet. School lacks adequate drainage facilities.	SCHOOL	OFTEN	NO	
29	C/2	O	Downtown	Bubbler system design. Water enters catch basins on high side of street, crosses under the street through clay tile, bubbles up from catch basin into street, and flows along low side of street in the gutter.	Flooding caused by lack of a good storm drainage system with trunk lines.	CITY	OFTEN	UNKNOWN	

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PROBLEM AREAS

Newberg Drainage Master Plan Update

APPENDIX B

Item	Subbasin	TYPE	Location	Facility/Site Description	Problem/Opportunity Description	Jurisdiction	Frequency	Property Damage	Recommended Project
30	C/2	M	5th St @ Hess Creek	Storm drain outfall to Hess Creek.	25-foot deep outfall (CMP) is rusted out.	CITY	N/A	NO	C4
31	C/2	M	West end of 9th St	Outfall to line along 9th Street located above 30 ft cliff.	Outfall is scoured.	CITY	N/A	NO	
32, 33	C/2	O	Dayton Ave south of 5th St	Drainage is along road and sidewalks. Sidewalks are lower than the road. City is replacing bubbler inlets with pelican inlets.	Flooding caused by lack of drainage system and clogged inlets.	CITY	OFTEN	YES	
34	C/3	O	5th St @ Harrison St	5th St is a gravel road with ditch to convey drainage. Most drainage is via surface flow. Culvert under Harrison St.	Flooding caused by lack of drainage facilities and plugged culvert.	CITY	OFTEN	UNKNOWN	
35	C/3	M	Hwy 99 bridge over Chehalem Creek	Drainage on bridge consists of holes drilled through the edge of the bridge deck	Ponding on bridge caused by clogged drain holes.	STATE	OFTEN	NO	
36	C/4	O	1st St & Grant St	Storm drain line with bubbler inlets.	Flooding caused by undersized piping and clogged bubbler inlets.	CITY	OFTEN	UNKNOWN	C8
37	C/4	O	Willamette Pacific Railroad @ Washington St.	Railroad right-of-way drainage system crosses Washington St via a box culvert	Flooding caused by undersized box culvert.	WPR	OFTEN	UNKNOWN	
38, 39	C/4	O	Willamette Pacific Railroad @ Main Street	Railroad right-of-way drainage system crosses Main St via a box culvert	Flooding caused by undersized box culvert.	WPR	OFTEN	UNKNOWN	C9
40, 41	C/4	O	East of Morton St to Harrison St (about 400 ft. north of 1st Street)	Several lines of mixed-material converge at Harrison St and run west across undeveloped private property. Line west of Harrison St is mix of pipe types.	Flooding caused by undersized pipe converging at Harrison St and line west of Harrison St is crushed.	CITY	OFTEN	UNKNOWN	C8
42	H/8	O	Hoskins St north of Pennington Dr	Road drainage flows to low point on Hoskins St. Bubbler inlets on both sides of the road discharge to a dry well behind the sidewalk.	Flooding field east of Hoskins St due to inadequate capacity of dry well.	CITY	OFTEN	NO	
43	H/9	F	North of Mountainview Dr, west of Aspen Way at Hess Creek	150 acre undeveloped area zoned for residential and industrial land use. Property owned by Adec.	Currently, not a problem. However, as area develops runoff volume/peak discharge will increase.	CITY	N/A	NO	
44	H/8	O	Mountainview Drive from Aspen way to Hess Creek	Ditch-interceptor on north side of Mountainview Dr. conveys flow west to Hess Creek.	Flooding caused by undersized ditch. Adec recently constructed a second parallel ditch which may alleviate the problem.	COUNTY	OFTEN	NO	H15
45 - 47	C/5	O	North of Crestview Lane and east of College St	Large undeveloped area drains into City system.	Flooding caused by undersized pipes and clogged inlets.	CITY	OFTEN	YES	
48	C/5	O	Aldercrest Dr between College St and Meridian St	Low area drained by City system.	Flooding caused by undersized downstream system.	CITY	OFTEN	YES	

Note: This summary is based on 10/3/96 meeting with Newberg City staff and review of 1986 Master Plan.
Type Designation: O-Observed Flooding, M-Maintenance, F-Future Problem, N/A-Problem solved or other issue

PROBLEM AREAS

Newberg Drainage Master Plan Update

APPENDIX B

Item	Subbasin	TYPE	Location	Facility/Site Description	Problem/Opportunity Description	Jurisdiction	Frequency	Property Damage	Recommended Project
49, 53	C/5	O	College St (from Foothills Dr south to Willamette Pacific Railroad)	Drainage facilities consist of paved streets, ditches, and culverts (i.e., no pipes/curbs).Some areas have no drainage facilities.	Flooding caused by lack of adequate system and blocked culverts.	CITY	OFTEN	UNKNOWN	C7
50	C/6	O	Main St. (between Columbia Dr. and Nicholas Way)	Drainage facilities consist of paved streets, pipes, and inlets. Buildings are lower than the street.	Flooding caused by undersized system. During 1996 flood, Main St was sandbagged to protect properties which are lower than the street, and water crossed watershed divide from Columbia St.	CITY	OFTEN	UNKNOWN	
51	C/6	O	Southeast of Main St and Nicholas Way	Very deep mixed-material line outfalls to tributary of Chehalem Creek.	Flooding caused by undersized downstream system. No easements across private property.	CITY	UNKNOWN	UNKNOWN	
52	C/5	O	End of Green Valley Dr	Line from end of Green Valley Dr to Mountainview Dr.	Flooding caused by undersized downstream system. No easements across private property.	COUNTY	UNKNOWN	UNKNOWN	
54	C/7	O	Columbia Dr (between Main St & College St)	Ditches along north side of Columbia Dr convey runoff to the west	Currently there is not a problem. However, the ditches are temporary and will incur a future cost to upgrade.	CITY	N/A	N/A	
55	C/6	O	West end of Pinehurst Ct	Culvert with grated inlet.	Flooding caused by clogged inlet and culvert just at capacity.	CITY	OFTEN	UNKNOWN	
56	C/7	N/A	Edgewood Dr & College St	New pond located just east of College St at Edgewood Dr drains large area of new development. Pond designed to match down-stream capacity for 10- and 25-year flows.	Not a problem. Add pond to existing model.	CITY	N/A	N/A	
57	C/7	O	Main St & Mountainview Dr	Section of ditch connects upstream and down-stream pipes.	Flooding caused by lack of capacity in ditch. Solution in 1986 plan will not work.	CITY	UNKNOWN	UNKNOWN	
58	C/8	N/A	College St, between Sunset Ct & Quail Dr	Area northeast of Henry Dr and College St.	This is a correction to the model. The drainage for this area was not correctly delineated in the 1986 plan. Hence, proposed solution will not work.	CITY	UNKNOWN	UNKNOWN	
59	C/8	O	Crater Lane (about 1300 ft south of Foothills Dr)	Culvert conveys flows from ditch on east side of Crater Ln to ditch on west side.	Flooding caused by undersized culvert.	CITY	UNKNOWN	NO	C17
60	S/3	O	Dogwood St & Springbrook Way	Storm drain line in low area.	Flooding from undersized downstream system. Ditch silts and lacks capacity to carry flow.	CITY	SELDOM	YES	S6
61	H/3	O	Hancock St, east of Elliott	Unimproved ditch draining back of trailer park empties into catch basin.	Ditch silts and lacks capacity to carry flow creating potential to flood trailer park.	CITY	OCCASIONAL	YES	
62	C/8	O	Chehalem Dr (about 1300 ft south of Foothills Dr)	Culvert conveys flows from ditch on east side of Chehalem Dr to ditch on west side.	Flooding caused by undersized culvert.	COUNTY	UNKNOWN	NO	

APPENDIX C

Hydrologic Analysis Results

Bold values indicate subcatchments with a change in Percent Impervious from existing to future conditions.

Subcatchment Hydrologic Parameters							Peak Subcatchment Flows																	
							EXISTING CONDITIONS											FUTURE CONDITIONS										
								Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)						Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)				
Subbasin Name/No.	Subcatchment No.	Runoff Inlet Node No.	Area (acres)	Width (ft)	Slope (%)	SCS Soil Group	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year
C/1	1102	1112	19.5	205	1.5	" C"	58	5.5	6.8	8.3	9.9	11.7	0.28	0.35	0.43	0.51	0.60	58	5.5	6.8	8.3	9.9	11.7	0.28	0.35	0.43	0.51	0.60
C/1	1103	1119	17.8	225	10.5	" C"	69	7.8	9.6	11.7	14.1	16.8	0.44	0.54	0.65	0.79	0.94	69	7.8	9.6	11.7	14.1	16.8	0.44	0.54	0.65	0.79	0.94
C/1	1104	1123	7.9	417	2.0	" C"	60	3.4	4.2	5.1	6.3	7.7	0.43	0.53	0.65	0.80	0.97	60	3.4	4.2	5.1	6.3	7.7	0.43	0.53	0.65	0.80	0.97
C/1	1105	1134	7.8	123	3.4	" C"	56	2.7	3.3	4.0	4.9	5.8	0.34	0.42	0.52	0.62	0.74	56	2.7	3.3	4.0	4.9	5.8	0.34	0.42	0.52	0.62	0.74
C/1	1106	1143	8.8	223	2.0	" C"	60	3.3	4.1	5.0	6.1	7.2	0.38	0.47	0.57	0.69	0.82	60	3.3	4.1	5.0	6.1	7.2	0.38	0.47	0.57	0.69	0.82
C/1	1107	1160	15.0	161	7.3	" C"	43	4.2	5.2	6.3	7.7	9.2	0.28	0.35	0.42	0.51	0.61	**52**	**4.8**	**6.0**	**7.3**	**8.8**	**10.5**	**0.32**	**0.40**	**0.49**	**0.59**	**0.70**
C/1	1108	1163	16.0	577	0.9	" C"	64	6.3	7.8	9.5	11.5	13.6	0.39	0.49	0.59	0.72	0.85	64	6.3	7.8	9.5	11.5	13.6	0.39	0.49	0.59	0.72	0.85
C/1	1109	1151	7.0	210	2.8	" C"	60	2.8	3.5	4.2	5.2	6.2	0.41	0.50	0.61	0.74	0.89	60	2.8	3.5	4.2	5.2	6.2	0.41	0.50	0.61	0.74	0.89
C/1	1110	1162	13.1	219	0.9	" C"	55	3.8	4.7	5.7	6.8	8.0	0.29	0.36	0.43	0.52	0.61	55	3.8	4.7	5.7	6.8	8.0	0.29	0.36	0.43	0.52	0.61
C/1	1111	1194	18.4	285	0.8	" C"	36	3.8	4.7	5.7	6.8	8.1	0.20	0.25	0.31	0.37	0.44	36	3.8	4.7	5.7	6.8	8.1	0.20	0.25	0.31	0.37	0.44
C/1	1112	1183	15.4	192	1.0	" C"	60	4.4	5.5	6.6	7.9	9.4	0.28	0.35	0.43	0.51	0.61	60	4.4	5.5	6.6	7.9	9.4	0.28	0.35	0.43	0.51	0.61
C/1	1113	1190	12.9	274	1.0	" C"	60	4.3	5.3	6.4	7.7	9.2	0.33	0.41	0.50	0.60	0.71	60	4.3	5.3	6.4	7.7	9.2	0.33	0.41	0.50	0.60	0.71
C/1	1114	1191	20.1	214	1.0	" C"	60	5.5	6.8	8.3	9.9	11.6	0.27	0.34	0.41	0.49	0.58	60	5.5	6.8	8.3	9.9	11.6	0.27	0.34	0.41	0.49	0.58
C/1	1115	1193	14.1	283	0.9	" C"	64	4.8	5.9	7.2	8.7	10.2	0.34	0.42	0.51	0.61	0.72	64	4.8	5.9	7.2	8.7	10.2	0.34	0.42	0.51	0.61	0.72
C/1	1116	1185	15.0	216	0.8	" C"	60	4.3	5.4	6.5	7.8	9.2	0.29	0.36	0.44	0.52	0.61	60	4.3	5.4	6.5	7.8	9.2	0.29	0.36	0.44	0.52	0.61
C/1	1150	1180	7.9	284	1.9	" C"	55	3.0	3.7	4.5	5.5	6.6	0.38	0.46	0.57	0.69	0.83	55	3.0	3.7	4.5	5.5	6.6	0.38	0.46	0.57	0.69	0.83
C/1	1155	1120	7.8	158	18.0	" C"	27	1.7	2.0	2.6	3.5	4.5	0.21	0.26	0.33	0.44	0.58	27	1.7	2.0	2.6	3.5	4.5	0.21	0.26	0.33	0.44	0.58
C/1	1160	1136	6.5	153	0.9	" C"	10	0.5	0.6	0.8	1.0	1.3	0.08	0.09	0.12	0.15	0.20	**70**	**2.5**	**3.1**	**3.7**	**4.4**	**5.2**	**0.38**	**0.47**	**0.57**	**0.68**	**0.80**
C/1	1201	1200	3.5	67	19.1	" C"	10	0.3	0.4	0.5	0.8	1.2	0.08	0.10	0.14	0.23	0.34	10	0.3	0.4	0.5	0.8	1.2	0.08	0.10	0.14	0.23	0.34
C/1	1202	1212	2.9	269	2.9	" C"	55	1.2	1.5	1.9	2.5	3.1	0.43	0.53	0.67	0.86	1.07	55	1.2	1.5	1.9	2.5	3.1	0.43	0.53	0.67	0.86	1.07
C/1	1203	1221	11.9	172	2.3	" C"	52	3.6	4.5	5.4	6.5	7.8	0.30	0.38	0.46	0.55	0.65	52	3.6	4.5	5.4	6.5	7.8	0.30	0.38	0.46	0.55	0.65
C/1	1204	1100	12.2	205	6.7	" C"	29	2.7	3.2	4.0	5.0	6.3	0.22	0.27	0.33	0.41	0.51	29	2.7	3.2	4.0	5.0	6.3	0.22	0.27	0.33	0.41	0.51
C/1	1301	1300	4.9	89	17.7	" C"	31	1.2	1.4	1.8	2.4	3.0	0.24	0.29	0.37	0.48	0.62	31	1.2	1.4	1.8	2.4	3.0	0.24	0.29	0.37	0.48	0.62
C/1	1302	1320	5.3	420	2.6	" C"	60	2.4	3.0	3.7	4.7	5.7	0.46	0.56	0.70	0.89	1.09	60	2.4	3.0	3.7	4.7	5.7	0.46	0.56	0.70	0.89	1.09
C/2	1401	1416	5.0	131	12.9	" C"	45	1.7	2.1	2.6	3.3	4.2	0.34	0.42	0.52	0.67	0.83	45	1.7	2.1	2.6	3.3	4.2	0.34	0.42	0.52	0.67	0.83
C/2	1402	1419	7.3	191	2.1	" C"	60	2.8	3.4	4.2	5.1	6.1	0.38	0.47	0.58	0.70	0.83	60	2.8	3.4	4.2	5.1	6.1	0.38	0.47	0.58	0.70	0.83
C/2	1403	1422	8.6	3115	1.5	" C"	60	4.2	5.1	7.0	9.3	11.2	0.49	0.60	0.82	1.08	1.30	60	4.2	5.1	7.0	9.3	11.2	0.49	0.60	0.82	1.08	1.30
C/2	1404	1420	6.5	163	15.0	" C"	45	2.3	2.8	3.5	4.4	5.5	0.35	0.43	0.53	0.68	0.85	45	2.3	2.8	3.5	4.4	5.5	0.35	0.43	0.53	0.68	0.85
C/2	1405	1431	3.9	150	2.0	" C"	59	1.6	2.0	2.4	2.9	3.5	0.41	0.50	0.61	0.75	0.90	59	1.6	2.0	2.4	2.9	3.5	0.41	0.50	0.61	0.75	0.90
C/2	1406	1467	9.8	216	1.2	" C"	25	1.7	2.1	2.6	3.2	3.9	0.18	0.22	0.26	0.32	0.40	25	1.7	2.1	2.6	3.2	3.9	0.18	0.22	0.26	0.32	0.40
C/2	1407	1470	17.0	186	0.9	" C"	48	3.9	4.9	5.9	7.1	8.4	0.23	0.29	0.35	0.42	0.49	48	3.9	4.9	5.9	7.1	8.4	0.23	0.29	0.35	0.42	0.49
C/2	1408	1453	9.9	331	1.5	" C"	64	4.1	5.0	6.1	7.4	8.8	0.41	0.51	0.62	0.75	0.89	64	4.1	5.0	6.1	7.4	8.8	0.41	0.51	0.62	0.75	0.89
C/2	1409	1454	9.5	109	1.3	" C"	75	3.2	4.0	4.8	5.8	6.8	0.34	0.42	0.51	0.61	0.72	75	3.2	4.0	4.8	5.8	6.8	0.34	0.42	0.51	0.61	0.72
C/2	1410	1461	4.2	99	1.2	" C"	75	1.7	2.2	2.6	3.1	3.7	0.41	0.51	0.62	0.75	0.88	75	1.7	2.2	2.6	3.1	3.7	0.41	0.51	0.62	0.75	0.88
C/2	1411	1452	16.9	268	1.5	" C"	70	6.1	7.6	9.3	11.1	13.1	0.36	0.45	0.55	0.66	0.77	70	6.1	7.6	9.3	11.1	13.1	0.36	0.45	0.55	0.66	0.77
C/2	1412	1430	6.4	227	6.8	" C"	51	2.5	3.0	3.8	4.8	5.9	0.39	0.48	0.59	0.74	0.92	51	2.5	3.0	3.8	4.8	5.9	0.39	0.48	0.59	0.74	0.92
C/3	1501	1510	23.2	456	0.6	" C"	38	5.0	6.2	7.6	9.1	10.9	0.22	0.27	0.33	0.39	0.47	38	5.0	6.2	7.6	9.1	10.9	0.22	0.27	0.33	0.39	0.47
C/3	1601	1600	24.4	136	13.4	" C"	27	4.3	5.3	6.5	7.9	9.6	0.18	0.22	0.27	0.33	0.39	27	4.3	5.3	6.5	7.9	9.6	0.18	0.22	0.27	0.33	0.39
C/3	1602	1605	22.1	783	1.4	" C"	40	6.2	7.6	9.4	11.5	14.1	0.28	0.35	0.42	0.52	0.64	40	6.2	7.6	9.4	11.5	14.1	0.28	0.35	0.42	0.52	0.64
C/3	1701	1710	15.4	391	2.1	" C"	61	6.0	7.3	9.0	10.8	12.9	0.39	0.48	0.58	0.70	0.84	61	6.0	7.3	9.0	10.8	12.9	0.39	0.48	0.58	0.70	0.84
C/3	1702	1718	5.4	98	1.4	" C"	75	2.1	2.6	3.2	3.8	4.5	0.39	0.49	0.59	0.71	0.83	75	2.1	2.6	3.2	3.8	4.5	0.39	0.49	0.59	0.71	0.83
C/3	1801	1720	24.9	194	4.2	" C"	54	7.1	8.8	10.7	12.9	15.2	0.29	0.35	0.43	0.52	0.61	**56**	**7.2**	**9.0**	**10.9**	**13.1**	**15.5**	**0.29**	**0.36**	**0.44**	**0.53**	**0.62**
C/4	2001	2010	10.7	411	6.9	" C"	32	2.8	3.4	4.3	5.7	7.4	0.26	0.31	0.40	0.53	0.69	32	2.8	3.4	4.3	5.7	7.4	0.26	0.31	0.40	0.53	0.69
C/4	2002	2038	8.7	170	3.4	" C"	65	3.5	4.3	5.3	6.4	7.6	0.40	0.50	0.61	0.73	0.87	65	3.5	4.3	5.3	6.4	7.6	0.40	0.50	0.61	0.73	0.87
C/4	2003	2036	15.0	136	1.6	" C"	68	4.5	5.6	6.8	8.2	9.6	0.30	0.38	0.46	0.55	0.64	68	4.5	5.6	6.8	8.2	9.6	0.30	0.38	0.46	0.55	0.64
C/4	2004	2031	11.2	326	1.5	" C"	69	4.7	5.8	7.0	8.5	10.1	0.42	0.52	0.63	0.76	0.90	69	4.7	5.8	7.0	8.5	10.1	0.42	0.52	0.63	0.76	0.90
C/4	2005	2041	8.9	255	1.5	" C"	61	3.4	4.2	5.1	6.2	7.4	0.38	0.47	0.57	0.69	0.83	61	3.4	4.2	5.1	6.2	7.4	0.38	0.47	0.57	0.69	0.83
C/4	2008	2070	18.1	204	1.2	" C"	64	5.4	6.7	8.1	9.7	11.4	0.30	0.37	0.45	0.54	0.63	64	5.4	6.7	8.1	9.7	11.4	0.30	0.37	0.45	0.54	0.63

Bold values indicate subcatchments with a change in Percent Impervious from existing to future conditions.

Subcatchment Hydrologic Parameters							Peak Subcatchment Flows																	
							EXISTING CONDITIONS											FUTURE CONDITIONS										
								Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)						Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)				
Subbasin Name/No.	Subcatchment No.	Runoff Inlet Node No.	Area (acres)	Width (ft)	Slope (%)	SCS Soil Group	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year
C/4	2010	2020	7.0	202	4.8	" C"	62	3.1	3.7	4.6	5.6	6.8	0.44	0.54	0.66	0.80	0.97	62	3.1	3.7	4.6	5.6	6.8	0.44	0.54	0.66	0.80	0.97
C/4	2101	2008	38.9	271	8.0	" C"	23	6.0	7.3	9.0	11.0	13.4	0.15	0.19	0.23	0.28	0.34	23	6.0	7.3	9.0	11.0	13.4	0.15	0.19	0.23	0.28	0.34
C/4	2102	2152	22.3	287	5.1	" C"	49	6.9	8.5	10.3	12.5	15.0	0.31	0.38	0.46	0.56	0.67	49	6.9	8.5	10.3	12.5	15.0	0.31	0.38	0.46	0.56	0.67
C/5	2201	2153	17.1	256	3.8	" C"	44	4.8	6.0	7.3	8.9	10.6	0.28	0.35	0.43	0.52	0.62	44	4.8	6.0	7.3	8.9	10.6	0.28	0.35	0.43	0.52	0.62
C/5	2202	2222	11.4	390	1.7	" C"	35	2.9	3.5	4.4	5.4	6.7	0.25	0.31	0.38	0.48	0.59	35	2.9	3.5	4.4	5.4	6.7	0.25	0.31	0.38	0.48	0.59
C/5	2203	2226	18.3	299	0.9	" C"	59	5.5	6.8	8.3	9.9	11.7	0.30	0.37	0.45	0.54	0.64	59	5.5	6.8	8.3	9.9	11.7	0.30	0.37	0.45	0.54	0.64
C/5	2204	2231	2.6	93	2.4	" C"	40	0.8	0.9	1.1	1.4	1.7	0.29	0.36	0.44	0.55	0.68	40	0.8	0.9	1.1	1.4	1.7	0.29	0.36	0.44	0.55	0.68
C/5	2205	2230	15.4	173	1.4	" C"	33	2.9	3.6	4.4	5.3	6.3	0.19	0.23	0.28	0.34	0.41	33	2.9	3.6	4.4	5.3	6.3	0.19	0.23	0.28	0.34	0.41
C/5	2206	2260	10.1	142	0.7	" C"	36	2.0	2.5	3.0	3.6	4.3	0.20	0.24	0.29	0.35	0.42	36	2.0	2.5	3.0	3.6	4.3	0.20	0.24	0.29	0.35	0.42
C/5	2207	2253	4.8	80	0.8	" C"	35	1.0	1.2	1.5	1.8	2.1	0.20	0.25	0.31	0.37	0.44	35	1.0	1.2	1.5	1.8	2.1	0.20	0.25	0.31	0.37	0.44
C/5	2208	2262	13.7	141	2.0	" C"	36	2.8	3.5	4.3	5.2	6.1	0.21	0.26	0.31	0.37	0.45	36	2.8	3.5	4.3	5.2	6.1	0.21	0.26	0.31	0.37	0.45
C/5	2209	2252	7.0	231	0.8	" C"	49	2.2	2.7	3.3	4.0	4.8	0.31	0.38	0.47	0.57	0.68	49	2.2	2.7	3.3	4.0	4.8	0.31	0.38	0.47	0.57	0.68
C/5	2210	2270	4.8	60	1.5	" C"	35	1.0	1.2	1.5	1.8	2.1	0.21	0.25	0.31	0.37	0.44	35	1.0	1.2	1.5	1.8	2.1	0.21	0.25	0.31	0.37	0.44
C/5	2211	2271	7.4	5358	4.8	" C"	35	2.1	2.8	5.6	8.2	9.7	0.29	0.38	0.76	1.11	1.32	35	2.1	2.8	5.6	8.2	9.7	0.29	0.38	0.76	1.11	1.32
C/5	2212	2276	42.6	4478	2.9	" C"	10	3.5	4.4	7.7	13.9	21.9	0.08	0.10	0.18	0.33	0.51	**35**	**12.0**	**14.7**	**19.7**	**27.3**	**36.1**	**0.28**	**0.34**	**0.46**	**0.64**	**0.85**
C/5	2213	2279	6.7	103	1.0	" C"	35	1.4	1.7	2.1	2.5	3.0	0.20	0.25	0.31	0.37	0.44	35	1.4	1.7	2.1	2.5	3.0	0.20	0.25	0.31	0.37	0.44
C/5	2214	2273	5.2	249	0.7	" C"	32	1.2	1.5	1.8	2.2	2.8	0.23	0.28	0.34	0.43	0.53	32	1.2	1.5	1.8	2.2	2.8	0.23	0.28	0.34	0.43	0.53
C/5	2215	2275	17.4	531	2.0	" C"	15	2.1	2.6	3.3	4.4	5.7	0.12	0.15	0.19	0.25	0.33	**35**	**4.4**	**5.4**	**6.6**	**8.2**	**10.1**	**0.25**	**0.31**	**0.38**	**0.47**	**0.58**
C/5	2216	2254	3.8	71	1.7	" C"	35	0.9	1.1	1.3	1.6	1.9	0.23	0.28	0.34	0.42	0.50	35	0.9	1.1	1.3	1.6	1.9	0.23	0.28	0.34	0.42	0.50
C/5	2217	2274	6.3	170	1.9	" C"	35	1.6	1.9	2.3	2.9	3.5	0.25	0.30	0.37	0.46	0.56	35	1.6	1.9	2.3	2.9	3.5	0.25	0.30	0.37	0.46	0.56
C/5	2220	2237	12.1	98	1.0	" C"	44	2.4	3.0	3.7	4.4	5.2	0.20	0.25	0.31	0.36	0.43	44	2.4	3.0	3.7	4.4	5.2	0.20	0.25	0.31	0.36	0.43
C/6	2301	2310	9.1	215	1.8	" C"	36	2.2	2.7	3.3	4.1	4.9	0.24	0.30	0.37	0.45	0.55	36	2.2	2.7	3.3	4.1	4.9	0.24	0.30	0.37	0.45	0.55
C/6	2302	2335	10.0	165	1.3	" C"	15	1.1	1.3	1.6	2.0	2.5	0.11	0.13	0.16	0.20	0.25	15	1.1	1.3	1.6	2.0	2.5	0.11	0.13	0.16	0.20	0.25
C/6	2303	2348	14.6	273	1.3	" C"	31	2.9	3.6	4.4	5.3	6.4	0.20	0.25	0.30	0.37	0.44	**35**	**3.2**	**4.0**	**4.9**	**5.9**	**7.1**	**0.22**	**0.27**	**0.33**	**0.40**	**0.48**
C/6	2304	2350	8.3	151	1.1	" C"	34	1.8	2.2	2.6	3.2	3.8	0.21	0.26	0.32	0.39	0.46	34	1.8	2.2	2.6	3.2	3.8	0.21	0.26	0.32	0.39	0.46
C/7	2500	2590	10.6	396	1.1	" C"	32	2.5	3.0	3.7	4.6	5.7	0.23	0.28	0.35	0.43	0.53	**35**	**2.6**	**3.2**	**4.0**	**4.9**	**6.0**	**0.25**	**0.30**	**0.37**	**0.46**	**0.57**
C/7	2501	2510	9.1	136	1.9	" C"	30	1.8	2.2	2.6	3.2	3.9	0.19	0.24	0.29	0.35	0.42	**35**	**2.0**	**2.5**	**3.0**	**3.7**	**4.4**	**0.22**	**0.27**	**0.33**	**0.40**	**0.48**
C/7	2502	2509	24.1	372	2.2	" C"	19	3.3	4.0	4.9	6.1	7.5	0.13	0.17	0.20	0.25	0.31	19	3.3	4.0	4.9	6.1	7.5	0.13	0.17	0.20	0.25	0.31
C/7	2503	2513	7.6	127	1.6	" C"	35	1.7	2.1	2.5	3.1	3.7	0.22	0.27	0.33	0.40	0.48	35	1.7	2.1	2.5	3.1	3.7	0.22	0.27	0.33	0.40	0.48
C/7	2504	2504	25.1	182	1.3	" C"	43	5.0	6.3	7.6	9.1	10.7	0.20	0.25	0.30	0.36	0.43	**46**	**5.3**	**6.6**	**8.0**	**9.5**	**11.2**	**0.21**	**0.26**	**0.32**	**0.38**	**0.45**
C/7	2506	2508	11.3	140	1.3	" C"	13	1.1	1.3	1.6	2.0	2.4	0.09	0.12	0.14	0.18	0.22	**60**	**3.3**	**4.1**	**5.0**	**6.0**	**7.1**	**0.29**	**0.37**	**0.45**	**0.53**	**0.63**
C/7	2507	2515	10.0	153	0.8	" C"	35	2.0	2.5	3.0	3.6	4.3	0.20	0.25	0.30	0.36	0.43	35	2.0	2.5	3.0	3.6	4.3	0.20	0.25	0.30	0.36	0.43
C/7	2521	2525	15.9	133	1.7	" C"	35	3.0	3.7	4.5	5.4	6.4	0.19	0.23	0.28	0.34	0.40	35	3.0	3.7	4.5	5.4	6.4	0.19	0.23	0.28	0.34	0.40
C/7	2601	2602	9.3	148	1.3	" C"	45	2.4	3.0	3.6	4.4	5.2	0.26	0.32	0.39	0.47	0.56	45	2.4	3.0	3.6	4.4	5.2	0.26	0.32	0.39	0.47	0.56
C/7	2602	2610	11.8	143	1.4	" C"	35	2.4	2.9	3.6	4.3	5.1	0.20	0.25	0.30	0.37	0.44	35	2.4	2.9	3.6	4.3	5.1	0.20	0.25	0.30	0.37	0.44
C/7	2603	2631	6.3	124	1.5	" C"	35	1.4	1.8	2.2	2.6	3.2	0.23	0.28	0.34	0.42	0.50	35	1.4	1.8	2.2	2.6	3.2	0.23	0.28	0.34	0.42	0.50
C/7	2604	2641	4.2	242	1.4	" C"	35	1.1	1.4	1.7	2.2	2.7	0.27	0.33	0.41	0.52	0.65	35	1.1	1.4	1.7	2.2	2.7	0.27	0.33	0.41	0.52	0.65
C/7	2605	2652	8.8	224	1.4	" C"	35	2.1	2.6	3.1	3.8	4.7	0.24	0.29	0.36	0.44	0.53	35	2.1	2.6	3.1	3.8	4.7	0.24	0.29	0.36	0.44	0.53
C/7	2607	2675	10.9	120	1.6	" C"	35	2.2	2.7	3.3	4.0	4.7	0.20	0.25	0.30	0.36	0.43	35	2.2	2.7	3.3	4.0	4.7	0.20	0.25	0.30	0.36	0.43
C/7	2608	2686	18.1	329	3.5	" C"	6	0.8	1.0	1.4	2.1	3.0	0.05	0.06	0.08	0.11	0.17	**46**	**5.5**	**6.8**	**8.3**	**10.1**	**12.1**	**0.30**	**0.37**	**0.46**	**0.56**	**0.67**
C/7	2650	2640	3.7	108	1.3	" C"	35	0.9	1.1	1.3	1.7	2.0	0.24	0.30	0.36	0.45	0.55	35	0.9	1.1	1.3	1.7	2.0	0.24	0.30	0.36	0.45	0.55
C/7	2655	2677	7.7	280	2.4	" C"	14	0.9	1.1	1.4	1.9	2.6	0.11	0.14	0.18	0.25	0.34	**30**	**1.8**	**2.1**	**2.7**	**3.4**	**4.3**	**0.23**	**0.28**	**0.34**	**0.44**	**0.55**
C/7	2660	2672	6.1	108	3.8	" C"	24	1.1	1.3	1.6	2.1	2.6	0.18	0.22	0.27	0.34	0.42	**35**	**1.5**	**1.8**	**2.2**	**2.7**	**3.3**	**0.24**	**0.30**	**0.37**	**0.45**	**0.55**
C/7	2665	2664	14.2	123	2.2	" C"	35	2.8	3.4	4.2	5.0	6.0	0.20	0.24	0.30	0.36	0.42	35	2.8	3.4	4.2	5.0	6.0	0.20	0.24	0.30	0.36	0.42
C/7	2670	2682	14.0	156	1.2	" C"	35	2.7	3.4	4.1	4.9	5.8	0.19	0.24	0.29	0.35	0.42	35	2.7	3.4	4.1	4.9	5.8	0.19	0.24	0.29	0.35	0.42
C/7	2675	2705	23.7	100	4.3	" C"	48	5.2	6.5	7.9	9.4	11.1	0.22	0.27	0.33	0.40	0.47	48	5.2	6.5	7.9	9.4	11.1	0.22	0.27	0.33	0.40	0.47
C/7	2680	2700	10.4	4733	6.8	" C"	5	0.4	1.7	4.2	8.5	11.6	0.04	0.16	0.40	0.81	1.11	**42**	**3.6**	**4.5**	**8.0**	**11.5**	**13.7**	**0.34**	**0.44**	**0.77**	**1.10**	**1.32**

Bold values indicate subcatchments with a change in Percent Impervious from existing to future conditions.

Subcatchment Hydrologic Parameters							Peak Subcatchment Flows																	
							EXISTING CONDITIONS											FUTURE CONDITIONS										
								Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)						Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)				
Subbasin Name/No.	Subcatchment No.	Runoff Inlet Node No.	Area (acres)	Width (ft)	Slope (%)	SCS Soil Group	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year
C/8	3001	3011	30.0	482	0.9	" C"	7	1.7	2.1	2.6	3.4	4.3	0.06	0.07	0.09	0.11	0.14	**21**	**4.1**	**5.1**	**6.2**	**7.6**	**9.2**	**0.14**	**0.17**	**0.21**	**0.25**	**0.31**
C/8	3002	3116	16.6	145	3.4	" C"	35	3.4	4.3	5.2	6.3	7.5	0.21	0.26	0.31	0.38	0.45	35	3.4	4.3	5.2	6.3	7.5	0.21	0.26	0.31	0.38	0.45
C/8	3003	3121	5.2	174	2.8	" C"	35	1.4	1.7	2.1	2.6	3.2	0.26	0.32	0.40	0.50	0.62	35	1.4	1.7	2.1	2.6	3.2	0.26	0.32	0.40	0.50	0.62
C/8	3004	3140	9.1	106	3.4	" C/D"	35	2.0	2.5	3.2	3.9	4.8	0.22	0.28	0.35	0.43	0.52	35	2.0	2.5	3.2	3.9	4.8	0.22	0.28	0.35	0.43	0.52
C/8	3005	3508	16.4	160	3.9	" C"	33	3.4	4.2	5.1	6.2	7.5	0.21	0.26	0.31	0.38	0.45	33	3.4	4.2	5.1	6.2	7.5	0.21	0.26	0.31	0.38	0.45
C/8	3006	3145	45.0	828	3.8	" C/D"	8	3.0	4.1	6.1	8.9	12.3	0.07	0.09	0.13	0.20	0.27	**35**	**11.0**	**13.9**	**17.7**	**22.4**	**27.5**	**0.25**	**0.31**	**0.39**	**0.50**	**0.61**
C/8	3007	3146	22.9	259	6.0	" C/D"	32	5.0	6.4	8.0	10.1	12.3	0.22	0.28	0.35	0.44	0.54	**35**	**5.4**	**6.8**	**8.5**	**10.6**	**13.0**	**0.23**	**0.29**	**0.37**	**0.46**	**0.56**
C/8	3008	3210	8.8	133	1.8	" C"	35	1.9	2.4	2.9	3.5	4.2	0.22	0.27	0.33	0.40	0.48	35	1.9	2.4	2.9	3.5	4.2	0.22	0.27	0.33	0.40	0.48
C/8	3009	3500	17.7	169	5.5	" C"	33	3.8	4.7	5.7	6.9	8.3	0.21	0.26	0.32	0.39	0.47	**35**	**4.0**	**4.9**	**6.0**	**7.2**	**8.7**	**0.22**	**0.28**	**0.34**	**0.41**	**0.49**
C/8	3010	3170	5.8	254	5.2	" C"	33	1.5	1.9	2.4	3.2	4.1	0.26	0.32	0.41	0.54	0.70	33	1.5	1.9	2.4	3.2	4.1	0.26	0.32	0.41	0.54	0.70
C/8	3011	3010	25.7	231	1.1	" C"	21	3.1	3.9	4.7	5.7	6.8	0.12	0.15	0.18	0.22	0.26	**35**	**4.6**	**5.7**	**7.0**	**8.4**	**9.9**	**0.18**	**0.22**	**0.27**	**0.32**	**0.38**
C/8	3012	3025	47.4	360	2.5	" C/D"	32	8.5	10.7	13.2	16.1	19.3	0.18	0.22	0.28	0.34	0.41	**35**	**9.1**	**11.5**	**14.2**	**17.3**	**20.6**	**0.19**	**0.24**	**0.30**	**0.36**	**0.44**
C/8	3013	3045	51.7	433	4.6	" C"	5	2.1	2.5	3.3	4.5	6.1	0.04	0.05	0.06	0.09	0.12	5	2.1	2.5	3.3	4.5	6.1	0.04	0.05	0.06	0.09	0.12
C/8	3014	3060	70.9	7725	11.1	" C/D"	5	4.3	13.1	27.5	45.4	60.6	0.06	0.18	0.39	0.64	0.85	5	4.3	13.1	27.5	45.4	60.6	0.06	0.18	0.39	0.64	0.85
H/1	4050	4002	11.9	218	1.0	" C"	70	4.2	5.3	6.4	7.7	9.0	0.36	0.44	0.54	0.64	0.76	70	4.2	5.3	6.4	7.7	9.0	0.36	0.44	0.54	0.64	0.76
H/1	4100	4100	13.0	171	14.1	" C"	20	2.0	2.5	3.1	4.1	5.3	0.16	0.19	0.24	0.31	0.41	**70**	**6.0**	**7.3**	**8.9**	**10.8**	**12.9**	**0.46**	**0.56**	**0.69**	**0.83**	**0.99**
H/1	4210	4250	13.1	115	15.1	" C"	41	3.5	4.3	5.3	6.4	7.7	0.27	0.33	0.40	0.49	0.59	**60**	**4.7**	**5.8**	**7.1**	**8.5**	**10.1**	**0.36**	**0.44**	**0.54**	**0.65**	**0.77**
H/1	4220	4215	6.9	244	0.7	" C"	70	2.8	3.5	4.2	5.0	6.0	0.41	0.50	0.61	0.74	0.87	70	2.8	3.5	4.2	5.0	6.0	0.41	0.50	0.61	0.74	0.87
H/1	4230	4225	12.6	503	8.0	" C"	66	6.3	7.6	9.5	11.7	14.2	0.49	0.60	0.75	0.93	1.12	66	6.3	7.6	9.5	11.7	14.2	0.49	0.60	0.75	0.93	1.12
H/1	4260	4265	7.8	129	1.0	" C"	60	2.4	3.0	3.6	4.4	5.2	0.31	0.38	0.47	0.56	0.66	60	2.4	3.0	3.6	4.4	5.2	0.31	0.38	0.47	0.56	0.66
H/2	4300	4300	24.2	423	5.4	" C"	70	10.6	13.1	15.9	19.2	22.9	0.44	0.54	0.66	0.80	0.95	70	10.6	13.1	15.9	19.2	22.9	0.44	0.54	0.66	0.80	0.95
H/2	4301	4000	11.8	198	11.4	" C"	70	5.5	6.8	8.3	10.1	12.0	0.47	0.58	0.71	0.86	1.02	70	5.5	6.8	8.3	10.1	12.0	0.47	0.58	0.71	0.86	1.02
H/2	4310	4310	5.5	97	7.3	" C"	10	0.4	0.5	0.7	1.0	1.4	0.08	0.10	0.13	0.19	0.26	10	0.4	0.5	0.7	1.0	1.4	0.08	0.10	0.13	0.19	0.26
H/2	4320	4320	15.6	131	5.4	" C"	27	2.8	3.4	4.2	5.1	6.2	0.18	0.22	0.27	0.33	0.39	**68**	**5.6**	**6.9**	**8.4**	**10.1**	**11.9**	**0.36**	**0.44**	**0.54**	**0.64**	**0.76**
H/2	4330	4330	11.7	193	4.4	" C"	40	3.2	3.9	4.7	5.8	7.0	0.27	0.33	0.41	0.50	0.60	**70**	**4.9**	**6.1**	**7.4**	**8.9**	**10.6**	**0.42**	**0.52**	**0.64**	**0.77**	**0.91**
H/2	4340	4340	24.0	421	0.8	" C/D"	20	3.2	4.0	5.1	6.4	7.8	0.13	0.17	0.21	0.27	0.33	**40**	**5.5**	**6.9**	**8.5**	**10.4**	**12.4**	**0.23**	**0.29**	**0.35**	**0.43**	**0.52**
H/2	4350	4355	7.6	139	0.9	" C"	20	1.0	1.3	1.5	1.9	2.3	0.14	0.17	0.20	0.25	0.31	**70**	**2.7**	**3.3**	**4.0**	**4.8**	**5.7**	**0.35**	**0.44**	**0.53**	**0.63**	**0.75**
H/2	4360	4350	11.3	138	1.0	" C"	70	3.6	4.4	5.4	6.4	7.6	0.31	0.39	0.48	0.57	0.67	70	3.6	4.4	5.4	6.4	7.6	0.31	0.39	0.48	0.57	0.67
H/2	4370	4370	34.3	327	0.7	" C"	68	9.3	11.5	14.0	16.7	19.5	0.27	0.34	0.41	0.49	0.57	68	9.3	11.5	14.0	16.7	19.5	0.27	0.34	0.41	0.49	0.57
H/2	4380	4380	5.0	153	1.3	" C"	70	2.1	2.6	3.2	3.8	4.5	0.42	0.52	0.64	0.77	0.91	70	2.1	2.6	3.2	3.8	4.5	0.42	0.52	0.64	0.77	0.91
H/2	4390	4390	17.0	1359	1.4	" C"	60	7.6	9.3	11.5	14.3	17.4	0.45	0.55	0.68	0.84	1.02	60	7.6	9.3	11.5	14.3	17.4	0.45	0.55	0.68	0.84	1.02
H/3	4500	4200	46.7	243	11.9	" C"	20	6.4	7.9	9.6	11.8	14.4	0.14	0.17	0.21	0.25	0.31	**36**	**10.1**	**12.5**	**15.3**	**18.4**	**22.0**	**0.22**	**0.27**	**0.33**	**0.39**	**0.47**
H/3	4520	4515	26.5	511	5.1	" C"	35	6.7	8.2	10.1	12.6	15.5	0.25	0.31	0.38	0.48	0.58	**44**	**8.1**	**10.0**	**12.3**	**15.0**	**18.3**	**0.31**	**0.38**	**0.46**	**0.57**	**0.69**
H/3	4530	4530	5.9	262	2.7	" C/D"	60	2.6	3.2	4.1	5.1	6.1	0.43	0.55	0.70	0.87	1.04	60	2.6	3.2	4.1	5.1	6.1	0.43	0.55	0.70	0.87	1.04
H/3	4540	4545	7.8	58	1.0	" C"	60	1.9	2.4	2.9	3.4	4.0	0.24	0.30	0.37	0.44	0.51	60	1.9	2.4	2.9	3.4	4.0	0.24	0.30	0.37	0.44	0.51
H/3	4550	4555	9.4	165	1.1	" C"	70	3.4	4.2	5.1	6.1	7.2	0.36	0.44	0.54	0.64	0.76	70	3.4	4.2	5.1	6.1	7.2	0.36	0.44	0.54	0.64	0.76
H/3	4560	4565	11.0	146	1.1	" C/D"	70	3.6	4.5	5.5	6.7	7.9	0.33	0.41	0.51	0.61	0.72	70	3.6	4.5	5.5	6.7	7.9	0.33	0.41	0.51	0.61	0.72
H/3	4570	4575	17.1	177	1.2	" C"	70	5.2	6.5	8.0	9.5	11.1	0.31	0.38	0.47	0.56	0.65	70	5.2	6.5	8.0	9.5	11.1	0.31	0.38	0.47	0.56	0.65
H/3	4580	4580	19.2	354	0.8	" C"	70	6.6	8.3	10.0	12.0	14.1	0.34	0.43	0.52	0.62	0.73	70	6.6	8.3	10.0	12.0	14.1	0.34	0.43	0.52	0.62	0.73
H/3	4590	4595	7.9	119	1.5	" C"	45	2.0	2.5	3.1	3.7	4.4	0.26	0.32	0.39	0.47	0.56	**73**	**2.9**	**3.6**	**4.4**	**5.2**	**6.1**	**0.37**	**0.46**	**0.55**	**0.66**	**0.78**
H/3	4600	4600	6.0	132	1.0	" C"	75	2.4	2.9	3.6	4.3	5.1	0.39	0.49	0.59	0.71	0.84	75	2.4	2.9	3.6	4.3	5.1	0.39	0.49	0.59	0.71	0.84
H/3	4620	4625	9.0	163	1.5	" C"	73	3.5	4.3	5.3	6.3	7.4	0.39	0.48	0.58	0.70	0.82	73	3.5	4.3	5.3	6.3	7.4	0.39	0.48	0.58	0.70	0.82
H/3	4640	4643	10.3	132	1.4	" C"	51	2.8	3.5	4.2	5.0	6.0	0.27	0.33	0.41	0.49	0.58	51	2.8	3.5	4.2	5.0	6.0	0.27	0.33	0.41	0.49	0.58
H/3	4660	4665	14.3	129	1.1	" C"	38	2.7	3.4	4.1	4.9	5.8	0.19	0.24	0.29	0.34	0.41	38	2.7	3.4	4.1	4.9	5.8	0.19	0.24	0.29	0.34	0.41
H/3	4670	4670	24.3	3307	1.3	" C"	26	5.2	6.3	8.6	12.4	17.0	0.21	0.26	0.36	0.51	0.70	26	5.2	6.3	8.6	12.4	17.0	0.21	0.26	0.36	0.51	0.70
H/4	5000	5000	32.0	553	5.1	" C"	20	4.7	5.8	7.1	9.0	11.2	0.15	0.18	0.22	0.28	0.35	20	4.7	5.8	7.1	9.0	11.2	0.15	0.18	0.22	0.28	0.35

Bold values indicate subcatchments with a change in Percent Impervious from existing to future conditions.

Subcatchment Hydrologic Parameters							Peak Subcatchment Flows																	
							EXISTING CONDITIONS											FUTURE CONDITIONS										
								Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)						Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)				
Subbasin Name/No.	Subcatchment No.	Runoff Inlet Node No.	Area (acres)	Width (ft)	Slope (%)	SCS Soil Group	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year
H/4	5010	5010	8.1	143	16.0	" C"	20	1.3	1.6	2.0	2.8	3.7	0.16	0.19	0.25	0.34	0.46	**25**	**1.6**	**1.9**	**2.5**	3.3	4.2	**0.20**	**0.24**	**0.30**	**0.40**	**0.52**
H/4	5020	5025	14.7	142	13.5	" C"	45	4.4	5.4	6.6	8.0	9.7	0.30	0.37	0.45	0.55	0.66	45	4.4	5.4	6.6	8.0	9.7	0.30	0.37	0.45	0.55	0.66
H/4	5030	5030	8.4	210	2.1	" C"	60	3.2	3.9	4.8	5.8	6.9	0.38	0.47	0.57	0.69	0.82	60	3.2	3.9	4.8	5.8	6.9	0.38	0.47	0.57	0.69	0.82
H/4	5040	5040	7.3	142	0.9	" C"	60	2.3	2.9	3.5	4.2	5.0	0.32	0.40	0.48	0.58	0.68	60	2.3	2.9	3.5	4.2	5.0	0.32	0.40	0.48	0.58	0.68
H/4	5050	5050	4.9	230	0.8	" C"	60	1.9	2.4	2.9	3.5	4.2	0.39	0.48	0.59	0.71	0.85	60	1.9	2.4	2.9	3.5	4.2	0.39	0.48	0.59	0.71	0.85
H/4	5060	5060	10.4	153	11.6	" C"	48	3.5	4.3	5.3	6.5	7.9	0.33	0.41	0.50	0.62	0.75	48	3.5	4.3	5.3	6.5	7.9	0.33	0.41	0.50	0.62	0.75
H/4	5070	5075	10.7	220	1.5	" C"	60	3.7	4.6	5.6	6.7	8.0	0.35	0.43	0.52	0.63	0.75	60	3.7	4.6	5.6	6.7	8.0	0.35	0.43	0.52	0.63	0.75
H/4	5080	5085	11.8	134	1.2	" C"	51	3.0	3.7	4.5	5.4	6.4	0.25	0.31	0.38	0.46	0.54	51	3.0	3.7	4.5	5.4	6.4	0.25	0.31	0.38	0.46	0.54
H/4	5100	5110	14.0	205	1.1	" C"	61	4.3	5.3	6.5	7.8	9.1	0.31	0.38	0.46	0.55	0.65	61	4.3	5.3	6.5	7.8	9.1	0.31	0.38	0.46	0.55	0.65
H/4	5110	5115	15.1	205	1.1	" C"	75	5.2	6.5	7.9	9.4	11.1	0.35	0.43	0.52	0.63	0.74	75	5.2	6.5	7.9	9.4	11.1	0.35	0.43	0.52	0.63	0.74
H/4	5200	5100	15.1	279	13.6	" C"	34	3.6	4.5	5.5	6.8	8.3	0.24	0.30	0.36	0.45	0.55	34	3.6	4.5	5.5	6.8	8.3	0.24	0.30	0.36	0.45	0.55
H/4	5210	5200	10.8	184	6.0	" C"	57	4.0	5.0	6.1	7.4	8.9	0.37	0.46	0.56	0.68	0.82	**61**	**4.3**	**5.3**	**6.4**	**7.8**	**9.3**	**0.39**	**0.49**	**0.59**	**0.72**	**0.86**
H/5	5230	5235	9.6	128	0.8	" C"	74	3.1	3.9	4.7	5.6	6.6	0.32	0.40	0.49	0.59	0.69	74	3.1	3.9	4.7	5.6	6.6	0.32	0.40	0.49	0.59	0.69
H/5	5250	5254	3.7	85	10.4	" C"	31	0.9	1.1	1.4	1.8	2.3	0.24	0.29	0.37	0.48	0.62	**42**	**1.2**	**1.4**	**1.8**	**2.3**	**2.8**	**0.32**	**0.39**	**0.48**	**0.61**	**0.76**
H/5	5260	5255	2.7	431	1.0	" C"	75	1.5	1.9	2.3	2.9	3.4	0.58	0.70	0.88	1.08	1.28	75	1.5	1.9	2.3	2.9	3.4	0.58	0.70	0.88	1.08	1.28
H/5	5270	5265	6.3	150	1.1	" C"	64	2.3	2.9	3.5	4.2	4.9	0.37	0.45	0.55	0.66	0.78	64	2.3	2.9	3.5	4.2	4.9	0.37	0.45	0.55	0.66	0.78
H/5	5280	5275	7.9	211	1.0	" C"	66	3.0	3.7	4.5	5.4	6.4	0.38	0.47	0.57	0.68	0.81	66	3.0	3.7	4.5	5.4	6.4	0.38	0.47	0.57	0.68	0.81
H/5	5290	5285	14.1	282	1.5	" C"	60	4.8	6.0	7.3	8.8	10.4	0.34	0.42	0.52	0.62	0.74	60	4.8	6.0	7.3	8.8	10.4	0.34	0.42	0.52	0.62	0.74
H/5	5310	5315	6.3	170	1.0	" C"	60	2.2	2.8	3.4	4.1	4.8	0.35	0.44	0.53	0.64	0.76	60	2.2	2.8	3.4	4.1	4.8	0.35	0.44	0.53	0.64	0.76
H/5	5320	5320	9.3	195	1.5	" C"	60	3.2	4.0	4.9	5.9	7.0	0.35	0.43	0.53	0.63	0.75	60	3.2	4.0	4.9	5.9	7.0	0.35	0.43	0.53	0.63	0.75
H/5	5500	5500	22.1	235	8.4	" C"	23	3.6	4.4	5.4	6.8	8.4	0.16	0.20	0.25	0.31	0.38	23	3.6	4.4	5.4	6.8	8.4	0.16	0.20	0.25	0.31	0.38
H/5	5550	5550	16.2	142	6.6	" C"	28	3.0	3.7	4.5	5.5	6.7	0.19	0.23	0.28	0.34	0.41	28	3.0	3.7	4.5	5.5	6.7	0.19	0.23	0.28	0.34	0.41
H/5	5560	5555	6.3	140	1.1	" C"	60	2.2	2.7	3.2	3.9	4.6	0.34	0.42	0.51	0.62	0.73	60	2.2	2.7	3.2	3.9	4.6	0.34	0.42	0.51	0.62	0.73
H/5	5570	5565	3.3	348	0.8	" C"	62	1.5	1.8	2.3	2.8	3.4	0.46	0.56	0.69	0.86	1.05	62	1.5	1.8	2.3	2.8	3.4	0.46	0.56	0.69	0.86	1.05
H/5	5580	5575	8.6	207	1.0	" C"	66	3.2	3.9	4.8	5.7	6.8	0.37	0.46	0.55	0.67	0.79	66	3.2	3.9	4.8	5.7	6.8	0.37	0.46	0.55	0.67	0.79
H/5	5590	5590	12.7	213	1.2	" C"	54	3.8	4.7	5.7	6.8	8.1	0.30	0.37	0.45	0.54	0.64	54	3.8	4.7	5.7	6.8	8.1	0.30	0.37	0.45	0.54	0.64
H/5	5700	5740	14.7	209	11.3	" C"	23	2.6	3.1	3.9	5.0	6.4	0.17	0.21	0.27	0.34	0.44	**27**	**3.0**	**3.7**	**4.6**	**5.8**	**7.3**	**0.21**	**0.25**	**0.31**	**0.40**	**0.50**
H/5	5710	5710	2.8	718	1.5	" C"	60	1.3	1.6	2.2	2.8	3.5	0.48	0.59	0.78	1.03	1.25	60	1.3	1.6	2.2	2.8	3.5	0.48	0.59	0.78	1.03	1.25
H/6	5410	5405	15.7	114	3.1	" C"	75	5.3	6.6	8.0	9.5	11.2	0.33	0.42	0.51	0.60	0.71	75	5.3	6.6	8.0	9.5	11.2	0.33	0.42	0.51	0.60	0.71
H/6	5420	5420	14.2	259	2.4	" C"	67	5.5	6.8	8.3	9.9	11.8	0.39	0.48	0.58	0.70	0.83	67	5.5	6.8	8.3	9.9	11.8	0.39	0.48	0.58	0.70	0.83
H/6	5430	5430	6.9	198	2.0	" C"	75	3.2	3.9	4.8	5.8	6.8	0.46	0.57	0.69	0.84	0.99	75	3.2	3.9	4.8	5.8	6.8	0.46	0.57	0.69	0.84	0.99
H/6	5450	5445	6.6	116	2.0	" C"	68	2.5	3.1	3.8	4.5	5.4	0.38	0.47	0.57	0.68	0.81	68	2.5	3.1	3.8	4.5	5.4	0.38	0.47	0.57	0.68	0.81
H/6	5460	5455	4.1	120	1.6	" C"	60	1.6	1.9	2.3	2.8	3.4	0.38	0.47	0.57	0.69	0.83	60	1.6	1.9	2.3	2.8	3.4	0.38	0.47	0.57	0.69	0.83
H/6	5470	5465	7.0	237	1.8	" C"	60	2.8	3.4	4.2	5.1	6.1	0.40	0.49	0.60	0.72	0.87	60	2.8	3.4	4.2	5.1	6.1	0.40	0.49	0.60	0.72	0.87
H/6	5505	5400	6.2	103	16.2	" C"	20	1.0	1.2	1.5	2.1	2.8	0.16	0.19	0.25	0.34	0.45	**40**	**1.8**	**2.3**	**2.8**	**3.5**	**4.4**	**0.30**	**0.36**	**0.45**	**0.57**	**0.71**
H/6	5510	5510	4.7	499	1.9	" C"	70	2.5	3.1	3.8	4.8	5.7	0.54	0.65	0.82	1.02	1.22	70	2.5	3.1	3.8	4.8	5.7	0.54	0.65	0.82	1.02	1.22
H/6	5600	5600	12.3	168	7.8	" C"	40	3.4	4.2	5.1	6.3	7.7	0.28	0.34	0.42	0.51	0.63	**47**	**3.9**	**4.8**	**5.8**	**7.1**	**8.5**	**0.31**	**0.39**	**0.47**	**0.58**	**0.69**
H/6	5620	5620	5.2	83	1.3	" C"	51	1.5	1.8	2.2	2.6	3.1	0.28	0.35	0.42	0.51	0.60	51	1.5	1.8	2.2	2.6	3.1	0.28	0.35	0.42	0.51	0.60
H/6	5630	5630	6.6	2409	1.1	" C"	42	2.3	2.8	4.0	5.8	7.4	0.34	0.42	0.61	0.87	1.12	42	2.3	2.8	4.0	5.8	7.4	0.34	0.42	0.61	0.87	1.12
H/6	5640	5640	7.1	279	1.0	" C"	58	2.7	3.3	4.0	4.9	5.8	0.38	0.46	0.57	0.69	0.82	58	2.7	3.3	4.0	4.9	5.8	0.38	0.46	0.57	0.69	0.82
H/6	5650	5645	5.1	218	2.0	" C"	35	1.4	1.6	2.1	2.6	3.2	0.26	0.32	0.40	0.50	0.63	35	1.4	1.6	2.1	2.6	3.2	0.26	0.32	0.40	0.50	0.63
H/6	5660	5655	9.0	211	1.8	" C"	35	2.1	2.6	3.2	4.0	4.8	0.24	0.29	0.36	0.44	0.54	35	2.1	2.6	3.2	4.0	4.8	0.24	0.29	0.36	0.44	0.54
H/6	5670	5670	8.4	203	2.0	" C"	36	2.1	2.6	3.2	3.9	4.8	0.25	0.31	0.38	0.46	0.56	36	2.1	2.6	3.2	3.9	4.8	0.25	0.31	0.38	0.46	0.56
H/6	5720	5720	17.9	188	10.7	" C"	22	3.0	3.6	4.5	5.6	7.0	0.17	0.20	0.25	0.31	0.39	**25**	**3.3**	**4.0**	**4.9**	**6.1**	**7.6**	**0.18**	**0.22**	**0.28**	**0.34**	**0.42**
H/6	5730	5730	3.3	1794	2.0	" C"	37	1.0	1.3	2.1	3.2	4.0	0.30	0.38	0.65	0.98	1.23	**48**	**1.3**	**1.6**	**2.5**	**3.5**	**4.3**	**0.40**	**0.49**	**0.76**	**1.07**	**1.30**
H/7	5800	5805	3.6	122	10.0	" C"	35	1.0	1.2	1.6	2.1	2.7	0.28	0.34	0.43	0.57	0.73	35	1.0	1.2	1.6	2.1	2.7	0.28	0.34	0.43	0.57	0.73
H/7	5810	5810	8.4	169	3.1	" C"	34	2.0	2.4	3.0	3.7	4.5	0.24	0.29	0.36	0.44	0.54	34	2.0	2.4	3.0	3.7	4.5	0.24	0.29	0.36	0.44	0.54
H/7	5820	5820	3.2	145	16.0	" C"	35	0.9	1.1	1.5	2.1	2.7	0.28	0.34	0.46	0.64	0.85	35	0.9	1.1	1.5	2.1	2.7	0.28	0.34	0.46	0.64	0.85

Bold values indicate subcatchments with a change in Percent Impervious from existing to future conditions.

Subcatchment Hydrologic Parameters							Peak Subcatchment Flows																	
							EXISTING CONDITIONS										FUTURE CONDITIONS									
								Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)						Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)				
Subbasin Name/No.	Subcatchment No.	Runoff Inlet Node No.	Area (acres)	Width (ft)	Slope (%)	SCS Soil Group	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year
H/7	5830	5830	2.9	242	4.2	" C"	35	0.8	1.0	1.3	1.9	2.4	0.28	0.34	0.46	0.63	0.84	35	0.8	1.0	1.3	1.9	2.4	0.28	0.34	0.46	0.63	0.84
H/7	5840	5845	2.9	123	12.5	" C/D"	35	0.8	1.1	1.6	2.1	2.7	0.28	0.38	0.54	0.74	0.93	35	0.8	1.1	1.6	2.1	2.7	0.28	0.38	0.54	0.74	0.93
H/7	5850	5840	3.3	2082	2.1	" C"	35	1.0	1.2	2.2	3.3	4.2	0.29	0.36	0.65	1.00	1.24	35	1.0	1.2	2.2	3.3	4.2	0.29	0.36	0.65	1.00	1.24
H/7	5860	5865	5.2	100	5.5	" C"	35	1.3	1.6	2.0	2.5	3.1	0.25	0.31	0.38	0.48	0.59	35	1.3	1.6	2.0	2.5	3.1	0.25	0.31	0.38	0.48	0.59
H/7	5870	5880	4.3	1521	1.9	" C"	35	1.2	1.5	2.4	3.7	4.8	0.29	0.35	0.56	0.85	1.11	35	1.2	1.5	2.4	3.7	4.8	0.29	0.35	0.56	0.85	1.11
H/7	5880	5890	2.8	417	3.6	" C"	35	0.8	1.0	1.4	2.0	2.7	0.28	0.35	0.50	0.73	0.97	35	0.8	1.0	1.4	2.0	2.7	0.28	0.35	0.50	0.73	0.97
H/7	5890	5895	4.3	282	1.9	" C"	35	1.2	1.4	1.8	2.4	3.0	0.27	0.33	0.42	0.55	0.70	35	1.2	1.4	1.8	2.4	3.0	0.27	0.33	0.42	0.55	0.70
H/7	5900	5925	34.9	461	3.0	" C/D"	20	5.0	6.3	8.1	10.3	12.9	0.14	0.18	0.23	0.30	0.37	20	5.0	6.3	8.1	10.3	12.9	0.14	0.18	0.23	0.30	0.37
H/7	5930	5935	12.3	161	1.0	" C"	27	2.0	2.5	3.0	3.6	4.3	0.16	0.20	0.24	0.29	0.35	27	2.0	2.5	3.0	3.6	4.3	0.16	0.20	0.24	0.29	0.35
H/7	5950	5960	12.8	156	1.3	" C"	70	4.2	5.2	6.3	7.6	8.9	0.33	0.41	0.50	0.59	0.70	70	4.2	5.2	6.3	7.6	8.9	0.33	0.41	0.50	0.59	0.70
H/7	5970	5965	17.7	160	1.4	" C"	70	5.3	6.7	8.1	9.7	11.3	0.30	0.38	0.46	0.54	0.64	70	5.3	6.7	8.1	9.7	11.3	0.30	0.38	0.46	0.54	0.64
H/7	5980	5980	12.8	101	7.1	" C"	24	2.1	2.6	3.1	3.8	4.7	0.16	0.20	0.25	0.30	0.37	**35**	**2.8**	**3.5**	**4.3**	**5.2**	**6.2**	**0.22**	**0.27**	**0.33**	**0.40**	**0.48**
H/8	6000	6025	12.1	180	16.5	" C"	31	2.8	3.4	4.2	5.3	6.7	0.23	0.28	0.35	0.44	0.55	**40**	**3.5**	**4.3**	**5.3**	**6.5**	**8.0**	**0.29**	**0.35**	**0.44**	**0.54**	**0.67**
H/8	6010	6010	13.1	143	4.0	" C"	40	3.2	4.0	4.9	5.9	7.0	0.25	0.30	0.37	0.45	0.53	40	3.2	4.0	4.9	5.9	7.0	0.25	0.30	0.37	0.45	0.53
H/8	6040	6040	4.5	184	4.1	" C"	35	1.2	1.5	1.9	2.4	3.1	0.27	0.33	0.42	0.54	0.69	35	1.2	1.5	1.9	2.4	3.1	0.27	0.33	0.42	0.54	0.69
H/8	6100	6100	9.1	133	2.3	" C"	48	2.6	3.2	3.9	4.7	5.6	0.28	0.35	0.43	0.52	0.61	48	2.6	3.2	3.9	4.7	5.6	0.28	0.35	0.43	0.52	0.61
H/8	6110	6110	7.5	151	1.7	" C"	33	1.6	2.0	2.5	3.0	3.7	0.22	0.27	0.33	0.41	0.49	33	1.6	2.0	2.5	3.0	3.7	0.22	0.27	0.33	0.41	0.49
H/8	6120	6120	6.1	134	1.5	" C"	35	1.4	1.7	2.1	2.6	3.1	0.23	0.29	0.35	0.43	0.52	35	1.4	1.7	2.1	2.6	3.1	0.23	0.29	0.35	0.43	0.52
H/8	6130	6130	11.8	145	1.5	" C"	46	2.9	3.6	4.4	5.3	6.3	0.25	0.31	0.37	0.45	0.53	46	2.9	3.6	4.4	5.3	6.3	0.25	0.31	0.37	0.45	0.53
H/8	6140	6140	6.6	99	1.6	" C"	46	1.7	2.2	2.6	3.2	3.8	0.26	0.33	0.40	0.48	0.57	46	1.7	2.2	2.6	3.2	3.8	0.26	0.33	0.40	0.48	0.57
H/8	6200	6200	21.3	393	8.6	" C"	65	9.3	11.4	14.0	17.0	20.3	0.44	0.54	0.66	0.80	0.96	**70**	**9.9**	**12.2**	**14.9**	**18.1**	**21.5**	**0.47**	**0.57**	**0.70**	**0.85**	**1.01**
H/8	6210	6225	9.3	153	4.2	" C"	70	3.9	4.8	5.9	7.1	8.4	0.42	0.52	0.63	0.76	0.90	70	3.9	4.8	5.9	7.1	8.4	0.42	0.52	0.63	0.76	0.90
H/8	6220	6220	6.2	4510	3.4	" C"	70	3.5	4.4	6.3	7.7	8.8	0.57	0.71	1.02	1.25	1.42	70	3.5	4.4	6.3	7.7	8.8	0.57	0.71	1.02	1.25	1.42
H/8	6240	6255	6.7	561	3.2	" C"	70	3.6	4.4	5.5	6.8	8.2	0.54	0.66	0.82	1.02	1.22	70	3.6	4.4	5.5	6.8	8.2	0.54	0.66	0.82	1.02	1.22
H/8	6250	6254	9.3	168	2.0	" C"	70	3.6	4.5	5.5	6.6	7.8	0.39	0.48	0.59	0.71	0.84	70	3.6	4.5	5.5	6.6	7.8	0.39	0.48	0.59	0.71	0.84
H/8	6260	6270	4.9	299	1.8	" C"	70	2.5	3.0	3.7	4.5	5.4	0.50	0.61	0.75	0.92	1.10	70	2.5	3.0	3.7	4.5	5.4	0.50	0.61	0.75	0.92	1.10
H/8	6270	6275	18.9	305	3.5	" C"	5	0.8	0.9	1.3	1.9	2.9	0.04	0.05	0.07	0.10	0.15	**43**	**5.3**	**6.6**	**8.0**	**9.7**	**11.7**	**0.28**	**0.35**	**0.42**	**0.51**	**0.62**
H/8	6300	6300	19.5	325	10.2	" C"	47	6.4	7.8	9.6	11.7	14.2	0.33	0.40	0.49	0.60	0.73	47	6.4	7.8	9.6	11.7	14.2	0.33	0.40	0.49	0.60	0.73
H/8	6310	6320	4.6	88	6.0	" C"	35	1.2	1.4	1.8	2.2	2.7	0.26	0.31	0.39	0.48	0.59	35	1.2	1.4	1.8	2.2	2.7	0.26	0.31	0.39	0.48	0.59
H/8	6320	6325	25.8	412	3.0	" C"	22	4.1	5.0	6.1	7.6	9.5	0.16	0.19	0.24	0.30	0.37	**35**	**6.0**	**7.4**	**9.1**	**11.1**	**13.4**	**0.23**	**0.29**	**0.35**	**0.43**	**0.52**
H/8	6350	6370	10.1	288	14.0	" C"	35	2.8	3.4	4.4	5.8	7.4	0.28	0.34	0.43	0.57	0.73	35	2.8	3.4	4.4	5.8	7.4	0.28	0.34	0.43	0.57	0.73
H/8	6360	6360	5.5	495	2.1	" C"	35	1.5	1.9	2.4	3.3	4.3	0.28	0.34	0.44	0.59	0.77	35	1.5	1.9	2.4	3.3	4.3	0.28	0.34	0.44	0.59	0.77
H/9	6510	6500	29.3	417	4.1	" C"	5	1.2	1.4	2.0	2.9	4.4	0.04	0.05	0.07	0.10	0.15	**35**	**6.9**	**8.5**	**10.4**	**12.7**	**15.4**	**0.24**	**0.29**	**0.35**	**0.43**	**0.52**
H/9	6540	6555	27.4	166	10.6	" C"	9	1.8	2.2	2.8	3.6	4.7	0.07	0.08	0.10	0.13	0.17	**35**	**6.0**	**7.4**	**9.0**	**10.9**	**13.0**	**0.22**	**0.27**	**0.33**	**0.40**	**0.47**
H/9	6550	6545	9.2	647	5.5	" C"	5	0.4	0.6	1.3	2.6	4.0	0.04	0.06	0.15	0.28	0.44	**52**	**3.8**	**4.6**	**5.9**	**7.7**	**9.6**	**0.41**	**0.50**	**0.64**	**0.83**	**1.04**
H/9	6570	6580	19.2	335	14.0	" C"	5	0.8	1.0	1.7	3.0	4.7	0.04	0.05	0.09	0.16	0.24	**35**	**5.1**	**6.2**	**7.8**	**9.9**	**12.4**	**0.27**	**0.32**	**0.40**	**0.51**	**0.64**
H/9	6600	6605	17.1	312	6.7	" C"	5	0.7	0.9	1.3	2.2	3.4	0.04	0.05	0.08	0.13	0.20	**31**	**4.0**	**4.9**	**6.0**	**7.5**	**9.4**	**0.23**	**0.28**	**0.35**	**0.44**	**0.55**
H/9	6610	6600	31.7	390	6.7	" C"	5	1.3	1.6	2.2	3.3	5.0	0.04	0.05	0.07	0.10	0.16	**32**	**7.1**	**8.7**	**10.6**	**13.1**	**16.0**	**0.22**	**0.27**	**0.34**	**0.41**	**0.50**
H/9	6620	6620	19.4	233	8.1	" C/D"	5	0.8	1.1	1.9	3.0	4.3	0.04	0.06	0.10	0.16	0.22	**33**	**4.5**	**5.7**	**7.3**	**9.2**	**11.3**	**0.23**	**0.29**	**0.37**	**0.47**	**0.58**
H/9	6630	6630	6.2	78	21.0	" C"	5	0.3	0.3	0.5	0.9	1.4	0.04	0.05	0.08	0.15	0.22	**35**	**1.6**	**2.0**	**2.5**	**3.1**	**3.9**	**0.26**	**0.32**	**0.40**	**0.50**	**0.62**
H/9	6700	6705	25.8	535	7.2	" C/D"	5	1.1	1.7	3.4	5.3	7.8	0.04	0.07	0.13	0.21	0.30	**32**	**6.3**	**8.0**	**10.5**	**13.7**	**17.1**	**0.24**	**0.31**	**0.41**	**0.53**	**0.66**
H/9	6720	6720	27.5	331	14.0	" C"	5	1.1	1.4	2.0	3.5	5.4	0.04	0.05	0.07	0.13	0.19	**32**	**6.5**	**7.9**	**9.8**	**12.2**	**15.1**	**0.24**	**0.29**	**0.36**	**0.44**	**0.55**
H/9	6730	6730	16.3	111	11.5	" C"	5	0.7	0.8	1.1	1.5	2.1	0.04	0.05	0.07	0.09	0.13	**35**	**3.7**	**4.5**	**5.5**	**6.7**	**8.1**	**0.23**	**0.28**	**0.34**	**0.41**	**0.50**
H/9	6740	6745	17.1	294	12.9	" C"	5	0.7	0.9	1.5	2.6	4.0	0.04	0.05	0.09	0.15	0.23	**29**	**3.8**	**4.7**	**5.9**	**7.5**	**9.6**	**0.22**	**0.27**	**0.34**	**0.44**	**0.56**
H/9	6760	6760	177.6	933	21.1	" C"	5	7.2	8.7	11.7	16.8	23.9	0.04	0.05	0.07	0.09	0.13	5	7.2	8.7	11.7	16.8	23.9	0.04	0.05	0.07	0.09	0.13
H/9	6770	6765	7.4	131	11.0	" C"	5	0.3	0.4	0.6	1.1	1.7	0.04	0.05	0.08	0.15	0.23	**31**	**1.8**	**2.1**	**2.7**	**3.4**	**4.3**	**0.24**	**0.29**	**0.36**	**0.46**	**0.57**
H/9	6780	6780	10.2	357	20.0	" C"	5	0.4	0.6	1.4	2.7	4.3	0.04	0.06	0.14	0.27	0.42	5	0.4	0.6	1.4	2.7	4.3	0.04	0.06	0.14	0.27	0.42
H/9	6790	6790	115.7	1068	21.0	" C"	5	4.7	5.8	8.5	14.2	21.7	0.04	0.05	0.07	0.12	0.19	5	4.7	5.8	8.5	14.2	21.7	0.04	0.05	0.07	0.12	0.19
H/9	6800	6800	27.3	312	8.4	" C"	5	1.1	1.4	1.9	2.9	4.4	0.04	0.05	0.07	0.11	0.16	**31**	**6.0**	**7.4**	**9.1**	**11.2**	**13.7**	**0.22**	**0.27**	**0.33**	**0.41**	**0.50**

Bold values indicate subcatchments with a change in Percent Impervious from existing to future conditions.

Subcatchment Hydrologic Parameters							Peak Subcatchment Flows																	
							EXISTING CONDITIONS											FUTURE CONDITIONS										
								Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)						Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)				
Subbasin Name/No.	Subcatchment No.	Runoff Inlet Node No.	Area (acres)	Width (ft)	Slope (%)	SCS Soil Group	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year
H/9	6820	6815	38.3	336	17.0	" C"	5	1.6	1.9	2.7	4.3	6.6	0.04	0.05	0.07	0.11	0.17	**32**	**8.8**	**10.8**	**13.2**	**16.4**	**20.1**	**0.23**	**0.28**	**0.35**	**0.43**	**0.52**
H/9	6830	6830	14.2	170	13.0	" C"	5	0.6	0.7	1.0	1.8	2.7	0.04	0.05	0.07	0.12	0.19	**35**	**3.6**	**4.4**	**5.4**	**6.7**	**8.2**	**0.25**	**0.31**	**0.38**	**0.47**	**0.58**
H/9	6840	6825	13.6	225	13.6	" C"	5	0.6	0.7	1.2	2.1	3.2	0.04	0.05	0.09	0.15	0.23	**31**	**3.2**	**3.9**	**4.9**	**6.2**	**7.8**	**0.23**	**0.29**	**0.36**	**0.46**	**0.58**
H/9	6850	6840	15.9	239	15.3	" C"	5	0.6	0.8	1.3	2.4	3.6	0.04	0.05	0.08	0.15	0.23	**35**	**4.2**	**5.1**	**6.3**	**8.0**	**10.0**	**0.26**	**0.32**	**0.40**	**0.50**	**0.63**
H/9	6860	6855	13.2	379	22.0	" C"	5	0.5	0.7	1.7	3.2	5.1	0.04	0.06	0.13	0.24	0.39	5	0.5	0.7	1.7	3.2	5.1	0.04	0.06	0.13	0.24	0.39
H/9	6900	6901	44.9	791	12.6	" C"	5	1.8	2.3	3.9	6.9	10.6	0.04	0.05	0.09	0.15	0.24	**32**	**11.1**	**13.5**	**16.8**	**21.5**	**27.1**	**0.25**	**0.30**	**0.38**	**0.48**	**0.60**
H/9	6910	6900	22.7	225	16.0	" C"	5	0.9	1.1	1.6	2.7	4.1	0.04	0.05	0.07	0.12	0.18	**32**	**5.3**	**6.5**	**8.0**	**9.9**	**12.2**	**0.23**	**0.29**	**0.35**	**0.44**	**0.54**
H/9	6920	6920	31.9	970	12.5	" C"	5	1.3	1.6	3.7	6.8	10.8	0.04	0.05	0.12	0.21	0.34	5	1.3	1.6	3.7	6.8	10.8	0.04	0.05	0.12	0.21	0.34
H/9	6930	6930	10.5	257	25.1	" C"	5	0.4	0.6	1.3	2.4	3.9	0.04	0.05	0.12	0.23	0.37	**27**	**2.3**	**2.8**	**3.7**	**5.1**	**6.9**	**0.22**	**0.27**	**0.35**	**0.49**	**0.66**
H/9	6940	6945	182.3	1351	22.3	" C"	5	7.4	9.1	12.8	19.9	30.6	0.04	0.05	0.07	0.11	0.17	5	7.4	9.1	12.8	19.9	30.6	0.04	0.05	0.07	0.11	0.17
H/9	6950	6950	17.5	274	13.9	" C"	5	0.7	0.9	1.4	2.6	4.0	0.04	0.05	0.08	0.15	0.23	**31**	**4.1**	**5.0**	**6.2**	**7.9**	**10.0**	**0.23**	**0.29**	**0.36**	**0.45**	**0.57**
H/9	6970	6965	11.2	540	10.3	" C"	5	0.5	0.7	1.6	3.0	4.7	0.04	0.06	0.14	0.27	0.42	**31**	**2.8**	**3.4**	**4.6**	**6.4**	**8.5**	**0.25**	**0.30**	**0.41**	**0.57**	**0.76**
H/9	6980	6980	27.5	2248	21.0	" C"	5	1.1	2.5	6.5	12.1	19.1	0.04	0.09	0.24	0.44	0.70	5	1.1	2.5	6.5	12.1	19.1	0.04	0.09	0.24	0.44	0.70
H/9	6500	6510	40.2	309	4.4	" C"	5	1.6	1.9	2.5	3.4	4.6	0.04	0.05	0.06	0.08	0.11	**37**	**8.6**	**10.7**	**13.0**	**15.7**	**18.7**	**0.21**	**0.27**	**0.32**	**0.39**	**0.46**
S/1	8020	8012	11.3	123	0.8	" C"	30	1.8	2.2	2.7	3.3	3.9	0.16	0.20	0.24	0.29	0.34	**63**	**3.1**	**3.8**	**4.6**	**5.5**	**6.5**	**0.27**	**0.34**	**0.41**	**0.49**	**0.58**
S/1	8030	8014	5.4	89	1.2	" C"	60	1.7	2.1	2.6	3.1	3.7	0.32	0.39	0.48	0.57	0.68	60	1.7	2.1	2.6	3.1	3.7	0.32	0.39	0.48	0.57	0.68
S/1	8040	8016	2.9	62	0.4	" C"	35	0.6	0.7	0.9	1.0	1.2	0.20	0.25	0.30	0.36	0.43	**60**	**0.9**	**1.1**	**1.3**	**1.5**	**1.8**	**0.29**	**0.36**	**0.44**	**0.53**	**0.62**
S/1	8050	8017	3.7	126	0.4	" C"	50	1.1	1.3	1.6	2.0	2.3	0.29	0.36	0.44	0.53	0.63	50	1.1	1.3	1.6	2.0	2.3	0.29	0.36	0.44	0.53	0.63
S/1	8060	8019	3.7	155	0.6	" C"	60	1.4	1.7	2.1	2.5	3.0	0.37	0.46	0.56	0.67	0.80	60	1.4	1.7	2.1	2.5	3.0	0.37	0.46	0.56	0.67	0.80
S/2	8000	8210	51.2	466	5.1	" C"	20	7.2	8.8	10.8	13.3	16.3	0.14	0.17	0.21	0.26	0.32	**69**	**18.6**	**23.1**	**28.1**	**33.6**	**39.7**	**0.36**	**0.45**	**0.55**	**0.66**	**0.77**
S/2	8130	8130	15.6	104	8.0	" C"	35	3.4	4.2	5.1	6.1	7.3	0.22	0.27	0.32	0.39	0.47	**60**	**5.0**	**6.2**	**7.6**	**9.1**	**10.7**	**0.32**	**0.40**	**0.48**	**0.58**	**0.69**
S/2	8140	8150	9.7	169	0.9	" C"	60	3.0	3.7	4.5	5.4	6.4	0.31	0.38	0.47	0.56	0.66	60	3.0	3.7	4.5	5.4	6.4	0.31	0.38	0.47	0.56	0.66
S/2	8150	8160	9.9	444	0.7	" C"	60	3.8	4.7	5.7	6.9	8.2	0.38	0.47	0.57	0.70	0.83	60	3.8	4.7	5.7	6.9	8.2	0.38	0.47	0.57	0.70	0.83
S/2	8160	8165	6.4	173	0.8	" C"	70	2.5	3.1	3.7	4.5	5.3	0.39	0.48	0.58	0.70	0.82	70	2.5	3.1	3.7	4.5	5.3	0.39	0.48	0.58	0.70	0.82
S/2	8180	8185	6.6	155	1.0	" C"	32	1.4	1.7	2.1	2.5	3.1	0.21	0.26	0.31	0.38	0.46	**70**	**2.5**	**3.1**	**3.8**	**4.6**	**5.4**	**0.38**	**0.47**	**0.57**	**0.69**	**0.81**
S/2	8220	8220	11.3	292	1.0	" C"	70	4.4	5.5	6.7	8.0	9.5	0.39	0.49	0.59	0.71	0.84	70	4.4	5.5	6.7	8.0	9.5	0.39	0.49	0.59	0.71	0.84
S/2	8230	8235	2.8	167	9.1	" C"	20	0.5	0.6	0.8	1.3	1.8	0.16	0.20	0.29	0.45	0.65	**75**	**1.7**	**2.0**	**2.5**	**3.1**	**3.7**	**0.58**	**0.71**	**0.88**	**1.10**	**1.30**
S/2	8240	8240	11.2	195	2.8	" C"	75	4.8	5.9	7.2	8.6	10.2	0.43	0.53	0.64	0.77	0.91	75	4.8	5.9	7.2	8.6	10.2	0.43	0.53	0.64	0.77	0.91
S/2	8250	8245	5.5	79	4.5	" C"	75	2.4	2.9	3.6	4.3	5.0	0.43	0.53	0.65	0.78	0.92	75	2.4	2.9	3.6	4.3	5.0	0.43	0.53	0.65	0.78	0.92
S/2	8260	8260	10.1	111	3.3	" C"	75	3.9	4.8	5.8	7.0	8.2	0.38	0.48	0.58	0.69	0.82	75	3.9	4.8	5.8	7.0	8.2	0.38	0.48	0.58	0.69	0.82
S/2	8270	8270	3.8	61	2.3	" C"	75	1.5	1.9	2.3	2.8	3.3	0.40	0.50	0.61	0.73	0.86	75	1.5	1.9	2.3	2.8	3.3	0.40	0.50	0.61	0.73	0.86
S/2	8280	8275	14.9	506	2.3	" C"	44	4.7	5.8	7.1	8.8	10.8	0.32	0.39	0.48	0.59	0.72	44	4.7	5.8	7.1	8.8	10.8	0.32	0.39	0.48	0.59	0.72
S/2	8300	8300	11.8	157	1.0	" C"	70	3.8	4.7	5.8	6.9	8.1	0.32	0.40	0.49	0.59	0.69	70	3.8	4.7	5.8	6.9	8.1	0.32	0.40	0.49	0.59	0.69
S/2	8320	8320	3.9	293	1.5	" C"	75	2.1	2.6	3.2	3.9	4.6	0.54	0.66	0.81	0.99	1.18	75	2.1	2.6	3.2	3.9	4.6	0.54	0.66	0.81	0.99	1.18
S/2	8325	8325	6.5	229	1.0	" C"	75	2.9	3.6	4.4	5.3	6.2	0.45	0.55	0.67	0.81	0.96	75	2.9	3.6	4.4	5.3	6.2	0.45	0.55	0.67	0.81	0.96
S/3	8330	8330	2.8	68	1.8	" C"	75	1.2	1.5	1.8	2.2	2.6	0.44	0.54	0.66	0.79	0.93	75	1.2	1.5	1.8	2.2	2.6	0.44	0.54	0.66	0.79	0.93
S/3	8340	8335	4.9	134	2.0	" C"	75	2.2	2.8	3.3	4.0	4.8	0.46	0.57	0.69	0.83	0.98	75	2.2	2.8	3.3	4.0	4.8	0.46	0.57	0.69	0.83	0.98
S/3	8350	8345	7.6	204	1.3	" C"	35	1.8	2.2	2.7	3.3	4.0	0.24	0.29	0.36	0.44	0.53	35	1.8	2.2	2.7	3.3	4.0	0.24	0.29	0.36	0.44	0.53
S/3	8355	8355	6.1	127	1.1	" C"	60	2.0	2.5	3.1	3.7	4.4	0.33	0.41	0.50	0.60	0.72	60	2.0	2.5	3.1	3.7	4.4	0.33	0.41	0.50	0.60	0.72
S/3	8370	8375	9.8	169	1.7	" C"	30	2.0	2.4	3.0	3.6	4.4	0.20	0.25	0.30	0.37	0.44	30	2.0	2.4	3.0	3.6	4.4	0.20	0.25	0.30	0.37	0.44
S/3	8400	8400	8.1	114	2.2	" C/D"	75	3.2	4.0	4.9	5.9	7.0	0.39	0.49	0.60	0.72	0.85	75	3.2	4.0	4.9	5.9	7.0	0.39	0.49	0.60	0.72	0.85
S/3	8410	8410	8.9	543	2.0	" C"	60	3.9	4.8	5.9	7.3	8.9	0.44	0.54	0.67	0.83	1.00	60	3.9	4.8	5.9	7.3	8.9	0.44	0.54	0.67	0.83	1.00
S/3	8420	8420	10.0	5460	1.5	" C"	60	4.9	6.0	8.6	11.4	13.5	0.49	0.60	0.86	1.14	1.35	60	4.9	6.0	8.6	11.4	13.5	0.49	0.60	0.86	1.14	1.35
S/3	8430	8425	9.4	178	1.9	" C/D"	28	1.8	2.3	2.9	3.6	4.5	0.19	0.24	0.31	0.39	0.48	**60**	**3.3**	**4.1**	**5.1**	**6.2**	**7.5**	**0.35**	**0.44**	**0.55**	**0.67**	**0.79**
S/3	8500	8510	6.9	158	2.7	" C/D"	48	2.2	2.8	3.5	4.3	5.2	0.32	0.40	0.51	0.63	0.76	48	2.2	2.8	3.5	4.3	5.2	0.32	0.40	0.51	0.63	0.76
S/3	8520	8530	5.1	91	2.0	" C"	60	1.8	2.2	2.7	3.2	3.8	0.35	0.43	0.52	0.63	0.75	60	1.8	2.2	2.7	3.2	3.8	0.35	0.43	0.52	0.63	0.75
S/3	8540	8540	3.4	150	1.0	" C"	42	1.0	1.2	1.5	1.9	2.3	0.30	0.37	0.45	0.55	0.67	42	1.0	1.2	1.5	1.9	2.3	0.30	0.37	0.45	0.55	0.67
S/3	8550	8550	7.9	139	1.0	" C"	43	1.9	2.4	2.9	3.5	4.2	0.25	0.30	0.37	0.45	0.53	43	1.9	2.4	2.9	3.5	4.2	0.25	0.30	0.37	0.45	0.53

Bold values indicate subcatchments with a change in Percent Impervious from existing to future conditions.

Subcatchment Hydrologic Parameters							Peak Subcatchment Flows																	
							EXISTING CONDITIONS										FUTURE CONDITIONS									
								Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)						Storm Peak Flow (cfs)					Peak Unit Discharge Flow (cfs/acre)				
Subbasin Name/No.	Subcatchment No.	Runoff Inlet Node No.	Area (acres)	Width (ft)	Slope (%)	SCS Soil Group	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year	Percent Imperv. (%)	2 year	5 year	10 year	25 year	100 year	2 year	5 year	10 year	25 year	100 year
S/3	8560	8560	6.8	323	1.2	" C"	20	1.1	1.3	1.6	2.2	2.8	0.16	0.19	0.24	0.32	0.41	**35**	**1.8**	**2.1**	**2.7**	**3.3**	**4.1**	**0.26**	**0.32**	**0.39**	**0.49**	**0.61**
S/3	8570	8570	7.8	350	3.5	" C"	20	1.2	1.5	2.0	2.8	3.8	0.16	0.20	0.26	0.36	0.48	**60**	**3.4**	**4.2**	**5.2**	**6.4**	**7.8**	**0.44**	**0.54**	**0.66**	**0.82**	**1.00**
S/3	8600	8605	3.0	51	1.1	" C"	60	1.0	1.2	1.4	1.7	2.0	0.32	0.39	0.48	0.57	0.68	60	1.0	1.2	1.4	1.7	2.0	0.32	0.39	0.48	0.57	0.68
S/3	8610	8615	5.5	137	1.8	" C"	38	1.4	1.8	2.2	2.6	3.2	0.26	0.32	0.39	0.48	0.58	38	1.4	1.8	2.2	2.6	3.2	0.26	0.32	0.39	0.48	0.58
S/3	8630	8630	7.4	159	1.2	" C"	60	2.5	3.1	3.8	4.6	5.4	0.34	0.42	0.51	0.62	0.73	60	2.5	3.1	3.8	4.6	5.4	0.34	0.42	0.51	0.62	0.73
S/3	8650	8650	8.5	148	1.8	" C"	42	2.2	2.7	3.3	4.0	4.8	0.26	0.32	0.39	0.47	0.57	42	2.2	2.7	3.3	4.0	4.8	0.26	0.32	0.39	0.47	0.57
S/3	8660	8660	9.2	153	2.1	" C"	35	2.1	2.6	3.1	3.8	4.6	0.23	0.28	0.34	0.42	0.50	35	2.1	2.6	3.1	3.8	4.6	0.23	0.28	0.34	0.42	0.50
S/3	8670	8670	11.6	114	1.2	" C"	70	3.5	4.4	5.3	6.3	7.4	0.30	0.38	0.46	0.55	0.64	70	3.5	4.4	5.3	6.3	7.4	0.30	0.38	0.46	0.55	0.64
S/3	8680	8675	4.9	143	2.4	" C"	20	0.8	0.9	1.2	1.5	1.9	0.15	0.19	0.24	0.31	0.40	**70**	**2.2**	**2.7**	**3.3**	**4.0**	**4.8**	**0.45**	**0.55**	**0.67**	**0.81**	**0.97**
S/3	8690	8690	8.5	506	2.2	" C"	20	1.4	1.7	2.2	3.1	4.2	0.16	0.20	0.26	0.36	0.49	**70**	**4.3**	**5.2**	**6.4**	**7.9**	**9.5**	**0.51**	**0.62**	**0.76**	**0.94**	**1.12**
S/3	8700	8705	16.7	183	1.3	" C"	23	2.4	2.9	3.5	4.3	5.1	0.14	0.17	0.21	0.26	0.31	**70**	**5.3**	**6.6**	**8.0**	**9.6**	**11.2**	**0.32**	**0.40**	**0.48**	**0.57**	**0.67**
S/3	8720	8720	14.5	5030	11.6	" C"	19	2.3	3.2	7.9	13.6	17.4	0.16	0.22	0.54	0.93	1.20	19	2.3	3.2	7.9	13.6	17.4	0.16	0.22	0.54	0.93	1.20
S/3	8730	8725	3.6	145	3.2	" C"	18	0.5	0.6	0.8	1.1	1.6	0.14	0.18	0.23	0.32	0.43	18	0.5	0.6	0.8	1.1	1.6	0.14	0.18	0.23	0.32	0.43
S/3	8740	8735	36.6	2585	9.9	" C"	9	2.8	3.6	7.0	13.1	20.8	0.08	0.10	0.19	0.36	0.57	9	2.8	3.6	7.0	13.1	20.8	0.08	0.10	0.19	0.36	0.57
S/3	8360	8360	10.9	212	1.4	" C"	27	2.0	2.4	3.0	3.7	4.4	0.18	0.22	0.27	0.33	0.41	27	2.0	2.4	3.0	3.7	4.4	0.18	0.22	0.27	0.33	0.41
S/4	9150	9165	21.9	332	3.0	" C"	7	1.3	1.6	2.0	2.8	3.8	0.06	0.07	0.09	0.13	0.17	7	1.3	1.6	2.0	2.8	3.8	0.06	0.07	0.09	0.13	0.17
S/4	9160	9155	15.4	209	4.2	" C"	11	1.4	1.7	2.1	2.8	3.6	0.09	0.11	0.14	0.18	0.24	11	1.4	1.7	2.1	2.8	3.6	0.09	0.11	0.14	0.18	0.24
S/4	9170	9185	12.0	170	3.0	" C"	10	0.9	1.1	1.4	1.9	2.5	0.08	0.09	0.12	0.16	0.21	**48**	**3.5**	**4.3**	**5.2**	**6.3**	**7.5**	**0.29**	**0.36**	**0.44**	**0.53**	**0.63**
S/4	9190	9170	3.7	527	6.0	" C"	35	1.1	1.3	1.9	2.8	3.8	0.29	0.35	0.52	0.77	1.02	35	1.1	1.3	1.9	2.8	3.8	0.29	0.35	0.52	0.77	1.02
S/4	9200	9210	6.0	124	2.0	" D"	35	1.4	1.9	2.5	3.1	3.8	0.24	0.32	0.41	0.52	0.63	35	1.4	1.9	2.5	3.1	3.8	0.24	0.32	0.41	0.52	0.63
S/4	9210	9205	7.4	200	3.5	" C/D"	35	1.9	2.4	3.1	4.0	5.0	0.26	0.33	0.43	0.55	0.68	35	1.9	2.4	3.1	4.0	5.0	0.26	0.33	0.43	0.55	0.68
S/4	9220	9225	8.5	106	1.8	" D"	35	1.8	2.3	3.0	3.7	4.4	0.21	0.28	0.35	0.43	0.52	35	1.8	2.3	3.0	3.7	4.4	0.21	0.28	0.35	0.43	0.52
S/4	9230	9235	7.1	211	1.9	" D"	35	1.8	2.5	3.3	4.1	5.0	0.26	0.35	0.46	0.58	0.70	35	1.8	2.5	3.3	4.1	5.0	0.26	0.35	0.46	0.58	0.70
S/4	9240	9245	7.2	148	1.8	" C"	35	1.7	2.1	2.5	3.1	3.8	0.23	0.29	0.35	0.43	0.52	35	1.7	2.1	2.5	3.1	3.8	0.23	0.29	0.35	0.43	0.52
S/4	9250	9255	18.3	1052	1.4	" C"	20	2.9	3.5	4.6	6.2	8.2	0.16	0.19	0.25	0.34	0.45	**65**	**8.3**	**10.2**	**12.5**	**15.3**	**18.4**	**0.46**	**0.56**	**0.69**	**0.84**	**1.01**
S/4	9260	9265	5.6	140	2.0	" D"	35	1.4	1.9	2.4	3.1	3.8	0.25	0.34	0.44	0.55	0.67	35	1.4	1.9	2.4	3.1	3.8	0.25	0.34	0.44	0.55	0.67
S/4	9270	9260	3.2	133	2.0	" D"	35	0.9	1.2	1.6	2.0	2.5	0.27	0.38	0.51	0.65	0.79	35	0.9	1.2	1.6	2.0	2.5	0.27	0.38	0.51	0.65	0.79
S/4	9280	9290	7.8	222	1.9	" C/D"	47	2.5	3.1	4.0	4.9	6.0	0.32	0.40	0.51	0.63	0.76	47	2.5	3.1	4.0	4.9	6.0	0.32	0.40	0.51	0.63	0.76
S/4	9290	9285	6.7	217	2.1	" D"	35	1.8	2.4	3.2	4.1	4.9	0.26	0.36	0.47	0.60	0.73	35	1.8	2.4	3.2	4.1	4.9	0.26	0.36	0.47	0.60	0.73
S/5	9000	9030	301.1	1173	5.0	" B"	14	27.2	33.6	40.0	46.5	53.1	0.09	0.11	0.13	0.15	0.18	**47**	**64.6**	**80.5**	**96.9**	**113.7**	**130.8**	**0.21**	**0.27**	**0.32**	**0.38**	**0.43**
S/5	9005	9075	113.1	662	7.0	" C"	8	7.3	8.9	11.1	14.2	18.1	0.06	0.08	0.10	0.13	0.16	**13**	**10.3**	**12.6**	**15.5**	**19.3**	**23.9**	**0.09**	**0.11**	**0.14**	**0.17**	**0.21**
S/5	9010	9060	381.7	4800	14.0	" B"	5	15.6	18.7	21.8	24.9	28.0	0.04	0.05	0.06	0.07	0.07	5	15.6	18.7	21.8	24.9	28.0	0.04	0.05	0.06	0.07	0.07
S/5	9020	9070	219.6	2318	14.1	" B"	5	8.9	10.7	12.5	14.3	16.1	0.04	0.05	0.06	0.07	0.07	5	8.9	10.7	12.5	14.3	16.1	0.04	0.05	0.06	0.07	0.07
S/5	9030	9135	20.9	400	4.3	" C"	5	0.9	1.0	1.5	2.5	3.8	0.04	0.05	0.07	0.12	0.18	5	0.9	1.0	1.5	2.5	3.8	0.04	0.05	0.07	0.12	0.18
S/5	9040	9085	133.5	1616	13.5	" C"	5	5.4	6.7	9.9	16.9	25.8	0.04	0.05	0.07	0.13	0.19	5	5.4	6.7	9.9	16.9	25.8	0.04	0.05	0.07	0.13	0.19
S/5	9050	9110	511.1	3656	20.5	" C"	5	20.7	25.3	35.4	53.5	81.9	0.04	0.05	0.07	0.10	0.16	5	20.7	25.3	35.4	53.5	81.9	0.04	0.05	0.07	0.10	0.16
S/5	9060	9115	116.1	785	5.1	" C"	5	4.6	5.6	7.2	9.6	13.0	0.04	0.05	0.06	0.08	0.11	**11**	**9.3**	**11.4**	**14.0**	**17.6**	**22.0**	**0.08**	**0.10**	**0.12**	**0.15**	**0.19**
S/5	9070	9104	47.4	294	8.0	" C"	22	7.0	8.7	10.6	12.9	15.7	0.15	0.18	0.22	0.27	0.33	22	7.0	8.7	10.6	12.9	15.7	0.15	0.18	0.22	0.27	0.33
S/5	9080	9125	418.6	3940	16.0	" C"	5	17.0	20.8	29.9	47.8	73.5	0.04	0.05	0.07	0.11	0.18	**7**	**22.7**	**27.7**	**37.9**	**55.7**	**80.3**	**0.05**	**0.07**	**0.09**	**0.13**	**0.19**

APPENDIX D

Hydraulic Analysis Results

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
HESS CREEK BASIN															
L996	H/CREEK	998	996	STREAM	0.025	380	0	100.00	99.00	0.3	N/A	252	330	L996	
L998	H/CREEK	4000	998	STREAM	0.05	225	0	101.00	100.00	0.4	N/A	256	340	L998	
L1000	H/CREEK	4100	4000	STREAM	0.05	943	0	103.00	101.00	0.2	N/A	242	322	L1000	
L1002	H/CREEK	4200	4100	STREAM	0.05	517	0	105.00	103.00	0.4	N/A	245	325	L1002	
L1004	H/CREEK	4205	4200	STREAM	0.05	527	0	105.30	105.00	0.1	N/A	207	290	L1004	
L1006	H/CREEK	4250	4205	STREAM	0.05	440	0	109.00	105.30	0.8	N/A	206	290	L1006	
L1008	H/CREEK	5000	4250	STREAM	0.05	812	0	111.50	109.00	0.3	N/A	206	289	L1008	
L1010	H/CREEK	5010	5000	STREAM	0.05	343	0	112.50	111.50	0.3	N/A	208	289	L1010	
L1012	H/CREEK	5060	5010	STREAM	0.05	969	0	117.00	112.50	0.5	N/A	200	282	L1012	
L1014	H/CREEK	5100	5060	STREAM	0.05	961	0	120.50	117.00	0.4	N/A	193	277	L1014	
L1016	H/CREEK	5200	5100	STREAM	0.05	781	0	125.00	120.50	0.6	N/A	187	271	L1016	
L1018	H/CREEK	5225	5200	STREAM	0.05	657	0	127.00	125.00	0.3	N/A	188	270	L1018	
L1020	H/CREEK	5400	5300	STREAM	0.05	261	0	129.00	128.00	0.4	N/A	170	255	L1020	
L1022	H/CREEK	5500	5400	STREAM	0.05	1023	0	136.00	129.00	0.7	N/A	150	240	L1022	
L1024	H/CREEK	5550	5500	STREAM	0.05	422	0	137.00	136.00	0.2	N/A	146	237	L1024	
L1026	H/CREEK	5600	5550	STREAM	0.05	409	0	139.00	137.00	0.5	N/A	133	226	L1026	
L1028	H/CREEK	5700	5600	STREAM	0.05	236	0	139.30	139.00	0.1	N/A	120	214	L1028	
L1032	H/CREEK	5740	5720	STREAM	0.05	575	0	147.00	140.40	1.1	N/A	116	207	L1032	
L1034	H/CREEK	5750	5740	STREAM	0.05	857	0	151.50	147.00	0.5	N/A	117	208	L1034	
L1036	H/CREEK	6000	5750	STREAM	0.05	118	0	151.80	151.50	0.3	N/A	86.3	176	L1036	
L1038	H/CREEK	6025	6020	STREAM	0.05	159	0	154.50	153.50	0.6	N/A	84.9	173	L1038	
L1040	H/CREEK	6035	6025	STREAM	0.05	858	0	162.00	154.50	0.9	N/A	79.4	163	L1040	
L1042	H/CREEK	6200	6035	STREAM	0.05	205	0	164.50	162.00	1.2	N/A	78.8	162	L1042	
L1044	H/CREEK	6300	6200	STREAM	0.05	461	0	165.50	164.50	0.2	N/A	69.4	141	L1044	
L1046	H/CREEK	6310	6300	STREAM	0.05	277	0	167.00	165.50	0.5	N/A	67.0	138	L1046	
L1048	H/CREEK	6350	6310	STREAM	0.05	616	0	169.00	167.00	0.3	N/A	64.8	125	L1048	
L1050	H/CREEK	6370	6350	STREAM	0.05	440	0	172.00	169.00	0.7	N/A	64.1	123	L1050	
L1052	H/CREEK	6400	6370	STREAM	0.05	299	0	177.00	172.00	1.7	N/A	63.0	121	L1052	
L1054	H/CREEK	6510	6500	STREAM	0.05	416	0	180.50	178.70	0.4	N/A	61.6	115	L1054	
L1056	H/CREEK	6600	6510	STREAM	0.05	956	0	190.00	180.50	1.0	N/A	56.8	92.3	L1056	
L1058	H/CREEK	6620	6600	STREAM	0.05	484	0	196.00	190.00	1.2	N/A	54.2	85.7	L1058	
L1060	H/CREEK	6700	6620	STREAM	0.05	586	0	203.50	196.00	1.3	N/A	52.0	80.5	L1060	
L1062	H/CREEK	6705	6700	STREAM	0.05	338	0	229.50	203.50	7.7	N/A	21.9	26.5	L1062	
L1064	H/CREEK	1064	6705	STREAM	0.05	823	0	229.60	229.50	0.0	N/A	19.5	23.0	L1064	
L1066	H/CREEK	6720	1064	STREAM	0.05	889	0	250.00	229.60	2.3	N/A	20.2	25.7	L1066	
L1068	H/CREEK	6739	6720	STREAM	0.05	55	0	252.00	250.00	3.6	N/A	18.1	19.4	L1068	
L1070	H/CREEK	6800	6700	STREAM	0.05	814	0	218.00	203.50	1.8	N/A	32.6	62.4	L1070	
L1072	H/CREEK	6810	6800	STREAM	0.05	602	0	240.00	218.00	3.7	N/A	31.0	56.5	L1072	
L4001	H/1	4001	996	PIPE	0.013	156	24	100.00	99.00	0.6	18	5.4	5.8	L4001	
L4002	H/1	4002	4001	DITCH	0.025	1371	36	101.00	100.00	0.1	39	5.6	5.7	L4002	
L4208	H/1	4208	4205	DITCH	0.025	91	24	120.00	105.30	16.2	78	13.4	13.4	L4208	

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
HESS CREEK BASIN (continued)															
L4210	H/1	4210	4208	DITCH	0.025	232	24	160.00	120.00	17.2	138	13.4	13.4	L4210	
L4215	H/1	4215	4210	PIPE	0.013	50	18	160.50	160.00	1.0	10	13.4	13.4	L4215	
L4218	H/1	4218	4215	PIPE	0.013	130	12	162.05	160.75	1.0	3.6	9.3	9.3	L4218	1
L4220	H/1	4220	4218	PIPE	0.013	99	12	162.65	162.05	0.6	2.8	9.4	9.4	L4220	1
L4225	H/1	4225	4220	PIPE	0.013	135	12	164.00	162.65	1.0	3.6	9.4	9.5	L4225	1
L4260	H/1	4260	4250	DITCH	0.025	426	24	158.00	109.00	11.5	113	3.6	3.6	L4260	
L4265	H/1	4265	4260	PIPE	0.013	110	12	164.00	158.50	5.0	8.0	3.6	3.7	L4265	
L4300	H/2	4300	4000	STREAM	0.05	589	0	107.00	101.00	1.0	N/A	53.1	68.5	L4300	
L4310	H/2	4310	4300	DUMMY	0.04	100	36	108.00	107.00	1.0	22	0.6	0.7	L4310	
L4320	H/2	4320	4300	STREAM	0.05	650	0	120.00	107.00	2.0	N/A	41.1	56.9	L4320	
L4330	H/2	4330	4320	DUMMY	0.04	100	36	121.00	120.00	1.0	22	4.6	7.0	L4330	
L4334	H/2	4335	4320	DITCH	0.025	692	24	141.00	120.00	3.0	85	37.8	53.0	L4334	
L4335	H/2	4339	4335	PIPE	0.013	89	24	147.73	142.81	5.5	53	5.1	8.5	L4335	
L4340	H/2	4340	4339	PIPE	0.013	69	24	151.41	147.73	5.4	52	5.1	8.5	L4340	
L4350	H/2	4350	4345	PIPE	0.013	236	18	150.84	144.70	2.6	17	5.4	5.4	L4350	
L4354	H/2	4345	4335	CULVERT	0.02	99	30	143.41	141.33	2.1	39	33.6	36.1	L4354	
L4355	H/2	4355	4345	CULVERT	0.02	90	42	147.33	143.75	4.0	130	28.3	30.8	L4355	
L4365	H/2	4365	4355	DITCH	0.025	410	24	164.00	147.33	4.1	67	27.1	27.1	L4365	
L4370	H/2	4370	4365	CULVERT	0.02	66	18	165.00	164.00	1.5	8.4	27.1	27.1	L4370	2
L4375	H/2	4375	4370	DITCH	0.025	863	24	169.70	165.00	0.5	25	13.4	13.4	L4375	
L4380	H/2	4380	4375	DITCH	0.025	424	24	172.00	169.70	0.5	24	14.4	14.4	L4380	
L4390	H/2	4390	4380	PIPE	0.013	93	12	174.00	173.00	1.1	3.7	11.4	11.5	L4390	3
L4526	H/3	4510	4200	STREAM	0.05	1671	0	146.80	105.00	2.5	N/A	54.3	56.4	L4526	
L4527	H/3	4515	4510	STREAM	0.05	420	0	145.90	145.80	0.0	N/A	56.8	59.1	L4527	
L4529	H/3	4525	4515	STREAM	0.05	741	0	169.40	146.90	3.0	N/A	58.3	59.9	L4529	
L4530	H/3	4530	4525	CULVERT	0.02	45	72	164.60	164.40	0.4	89	58.6	59.9	L4530	
L4540	H/3	4540	4530	STREAM	0.05	260	0	170.20	164.60	2.2	N/A	57.2	58.4	L4540	
L4545A	H/3	4545	4540	CULVERT	0.02	49	24	170.50	170.20	0.6	12	11.2	11.5	L4545A	
L4545B	H/3	4545	4540	CULVERT	0.02	49	24	170.50	170.20	0.6	12	11.2	11.5	L4545B	
L4545C	H/3	4545	4540	CULVERT	0.02	49	24	170.50	170.20	0.6	12	11.2	11.5	L4545C	
L4545D	H/3	4545	4540	CULVERT	0.02	49	24	170.50	170.20	0.6	12	11.2	11.5	L4545D	
L4545E	H/3	4545	4540	CULVERT	0.02	49	24	170.50	170.20	0.6	12	11.2	11.5	L4545E	
L4551	H/3	4551	4545	PIPE	0.013	327	15	171.54	170.50	0.3	3.6	4.0	4.0	L4551	
L4552	H/3	4552	4551	PIPE	0.013	427	15	172.96	171.54	0.3	3.7	4.0	4.0	L4552	
L4553	H/3	4553	4552	PIPE	0.013	91	15	173.26	172.96	0.3	3.7	4.0	4.0	L4553	
L4554	H/3	4554	4553	DITCH	0.025	348	24	176.50	173.26	0.9	47	5.0	5.0	L4554	
L4555	H/3	4555	4554	PIPE	0.013	52	18	177.69	176.50	2.3	17	5.1	5.1	L4555	
L4560	H/3	4560	4545	PIPE	0.013	101	42	171.50	170.70	0.8	89	49.6	50.9	L4560	
L4565	H/3	4565	4560	PIPE	0.013	81	48	173.00	171.56	1.8	192	49.6	50.9	L4565	
L4575	H/3	4575	4565	PIPE	0.013	415	42	174.74	173.13	0.4	63	44.3	45.6	L4575	
L4580	H/3	4580	4575	PIPE	0.013	276	27	179.45	177.00	0.9	29	10.0	10.0	L4580	

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
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HESS CREEK BASIN (continued)															
L4590	H/3	4590	4575	PIPE	0.013	443	36	180.31	175.20	1.2	72	27.1	28.4	L4590	
L4595	H/3	4595	4590	PIPE	0.013	310	30	185.80	180.81	1.6	52	27.1	28.4	L4595	
L4597	H/3	4597	4595	PIPE	0.013	85	18	187.80	186.85	1.1	11	3.6	3.6	L4597	
L4598	H/3	4598	4597	PIPE	0.013	111	18	188.91	188.00	0.8	9.5	3.6	3.6	L4598	
L4599	H/3	4599	4598	PIPE	0.013	235	18	190.63	188.91	0.7	9.0	3.6	3.6	L4599	
L4600	H/3	4600	4599	PIPE	0.013	210	18	192.35	190.63	0.8	9.5	3.6	3.6	L4600	
L4615	H/3	4615	4595	PIPE	0.013	566	30	194.00	187.80	1.1	43	20.9	20.9	L4615	
L4620	H/3	4620	4615	PIPE	0.013	30	24	198.00	197.00	3.4	41	21.0	21.0	L4620	
L4625	H/3	4625	4620	PIPE	0.013	91	24	201.50	200.50	1.1	24	21.0	21.0	L4625	
L4634	H/3	4634	4625	DITCH	0.025	370	36	204.00	201.80	0.6	87	16.1	16.1	L4634	
L4635	H/3	4635	4634	PIPE	0.013	19	24	204.40	204.00	2.1	33	16.1	16.1	L4635	
L4643	H/3	4643	4635	PIPE	0.013	112	24	204.90	204.40	0.4	15	16.1	16.1	L4643	
L4644	H/3	4644	4643	PIPE	0.013	52	24	205.14	204.90	0.5	15	12.1	12.1	L4644	
L4645	H/3	4645	4644	PIPE	0.013	49	24	205.36	205.14	0.4	15	12.1	12.1	L4645	
L4655	H/3	4655	4645	DITCH	0.025	298	24	209.90	207.90	0.7	27	12.1	12.1	L4655	
L4665	H/3	4665	4655	DITCH	0.025	284	24	211.80	209.90	0.7	27	12.5	12.5	L4665	
L4668	H/3	4668	4665	PIPE	0.013	87	18	212.42	211.80	0.7	8.9	8.5	8.5	L4668	
L4669	H/3	4669	4668	PIPE	0.013	29	18	212.62	212.42	0.7	8.8	8.5	8.6	L4669	
L4670	H/3	4670	4669	PIPE	0.013	161	18	213.50	212.62	0.5	7.8	8.6	8.6	L4670	
L5025	H/4	5025	5010	DITCH	0.025	259	24	150.00	112.50	14.5	127	29.5	29.5	L5025	
L5030	H/4	5030	5025	PIPE	0.013	65	15	153.00	152.00	1.5	8.0	10.6	10.6	L5030	4
L5040	H/4	5040	5030	PIPE	0.013	635	10	163.00	153.50	1.5	2.7	6.1	6.1	L5040	4
L5050	H/4	5050	5040	PIPE	0.013	618	10	164.00	163.00	0.2	0.9	2.8	2.8	L5050	4
L5070	H/4	5070	5060	DITCH	0.025	175	24	145.00	117.00	16.0	133	18.9	19.3	L5070	
L5073	H/4	5072	5070	PIPE	0.013	58	15	152.48	146.42	10.4	21	9.7	9.7	L5073	
L5074	H/4	5073	5072	PIPE	0.013	41	15	153.52	152.92	1.4	7.8	9.7	9.7	L5074	
L5075	H/4	5074	5073	PIPE	0.013	192	15	156.60	153.72	1.5	7.9	9.7	9.7	L5075	
L5080	H/4	5075	5074	PIPE	0.013	22	15	157.30	156.80	2.3	9.8	9.8	9.8	L5080	
L5082	H/4	5082	5075	PIPE	0.013	366	12	164.52	157.80	1.8	4.8	4.5	4.5	L5082	
L5085	H/4	5085	5082	PIPE	0.013	134	12	166.02	164.72	1.0	3.5	4.5	4.5	L5085	
L5110	H/4	5110	5100	PIPE	0.013	545	12	162.40	139.00	4.3	7.4	13.9	13.9	L5110	5
L5112	H/4	5112	5110	PIPE	0.013	347	12	164.65	162.41	0.6	0.6	7.7	7.7	L5112	5
L5115	H/4	5115	5112	PIPE	0.013	593	12	168.50	164.65	0.6	3.6	7.9	7.9	L5115	5
L5208	H/8	6208	6200	DITCH	0.025	282	24	172.00	164.50	2.7	54	29.0	32.7	L5208	
L5229	H/5	5230	5229	PIPE	0.013	27	12	167.64	167.50	0.5	2.6	4.1	4.1	L5229	
L5230	H/5	5229	5225	PIPE	0.013	507	18	167.40	127.40	7.9	22	4.1	4.1	L5230	
L5231	H/5	5231	5230	PIPE	0.013	228	12	168.87	167.64	0.5	2.6	4.1	4.1	L5231	
L5232	H/5	5232	5231	PIPE	0.013	21	12	168.98	168.87	0.5	2.6	4.2	4.2	L5232	
L5233	H/5	5233	5232	PIPE	0.013	248	12	170.31	168.98	0.5	2.6	4.3	4.3	L5233	6
L5234	H/5	5234	5233	PIPE	0.013	12	12	170.37	170.31	0.5	2.6	4.4	4.4	L5234	6
L5235	H/5	5235	5234	PIPE	0.013	209	12	171.50	170.37	0.5	2.6	4.6	4.6	L5235	6

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
HESS CREEK BASIN (continued)															
L5254	H/5	5254	5300	DUMMY	0.04	10	36	128.10	128.00	1.0	22	17.5	17.9	L5254	
L5255	H/5	5255	5254	PIPE	0.013	430	18	157.50	128.50	6.7	27	16.3	16.3	L5255	
L5264	H/5	5264	5255	PIPE	0.013	363	18	164.33	158.00	1.7	14	14.2	14.2	L5264	
L5265	H/5	5265	5264	PIPE	0.013	95	18	166.60	164.33	2.4	16	14.3	14.3	L5265	
L5275	H/5	5275	5265	PIPE	0.013	173	15	168.07	167.00	0.6	5.1	10.9	10.9	L5275	
L5284	H/5	5284	5275	PIPE	0.013	922	15	174.70	168.07	0.7	5.5	6.8	6.8	L5284	7
L5285	H/5	5285	5284	PIPE	0.013	94	15	175.00	174.70	0.3	3.6	7.2	7.2	L5285	7
L5300	H/CREEK	5300	5225	CULVERT	0.02	203	72	128.00	127.00	0.5	246	185	267	L5300	
L5313	H/5	5313	5300	PIPE	0.013	196	12	163.00	128.50	17.6	12	7.5	7.5	L5313	
L5314	H/5	5314	5313	PIPE	0.013	305	12	166.96	163.00	1.3	4.1	7.5	7.5	L5314	8
L5315	H/5	5315	5314	PIPE	0.013	451	12	171.60	166.96	1.0	3.6	7.5	7.5	L5315	8
L5320	H/5	5320	5315	PIPE	0.013	856	12	176.30	172.00	0.5	2.5	4.4	4.4	L5320	8
L5405	H/6	5405	5400	DITCH	0.025	309	24	140.00	129.00	3.6	63	30.0	30.0	L5405	
L5413	H/6	5413	5405	PIPE	0.013	116	21	152.00	141.00	9.5	49	12.7	12.7	L5413	
L5414	H/6	5414	5413	PIPE	0.013	220	21	169.90	152.50	7.9	45	12.7	12.7	L5414	
L5415	H/6	5415	5414	PIPE	0.013	202	21	173.10	170.00	1.5	20	12.7	12.7	L5415	
L5416	H/6	5416	5415	PIPE	0.013	291	21	176.36	173.15	1.1	17	12.7	12.7	L5416	
L5417	H/6	5417	5416	PIPE	0.013	270	21	178.96	176.40	0.9	15	12.7	12.7	L5417	
L5418	H/6	5418	5417	PIPE	0.013	257	21	183.00	179.21	1.5	19	12.7	12.7	L5418	
L5419	H/6	5419	5418	PIPE	0.013	259	18	188.90	183.25	2.2	16	12.7	12.7	L5419	
L5420	H/6	5420	5419	PIPE	0.013	271	18	192.32	188.90	1.3	12	12.8	12.8	L5420	
L5428	H/6	5428	5420	PIPE	0.013	251	15	197.40	192.47	2.0	9.1	5.2	5.2	L5428	
L5429	H/6	5429	5428	PIPE	0.013	291	15	200.05	197.50	0.9	6.0	4.7	4.7	L5429	
L5430	H/6	5430	5429	PIPE	0.013	286	12	201.50	200.30	0.4	2.3	4.7	4.7	L5430	9
L5439	H/6	5439	5405	PIPE	0.013	67	18	153.00	141.00	17.9	44	10.0	10.0	L5439	
L5440	H/6	5440	5439	DITCH	0.025	210	24	160.00	153.00	3.3	61	10.0	10.0	L5440	
L5445	H/6	5445	5440	PIPE	0.013	601	18	177.67	161.00	2.8	17	10.0	10.0	L5445	
L5454	H/6	5454	5445	PIPE	0.013	161	18	180.53	177.67	1.8	14	6.3	6.3	L5454	
L5455	H/6	5455	5454	PIPE	0.013	37	18	181.30	180.53	2.1	15	6.3	6.3	L5455	
L5463	H/6	5463	5455	PIPE	0.013	172	18	184.00	181.50	1.5	13	4.1	4.1	L5463	
L5464	H/6	5464	5463	PIPE	0.013	13	15	184.30	184.00	2.2	9.7	4.1	4.1	L5464	
L5465	H/6	5465	5464	PIPE	0.013	308	15	185.80	184.30	0.5	4.5	4.1	4.1	L5465	
L5510	H/6	5510	5500	PIPE	0.013	241	10	176.00	138.00	15.8	8.6	3.8	3.8	L5510	
L5554	H/5	5554	5550	PIPE	0.013	532	18	165.00	139.00	4.9	18	14.0	14.0	L5554	
L5555	H/5	5555	5554	PIPE	0.013	412	18	185.00	165.00	4.9	23	14.0	14.0	L5555	
L5564	H/5	5564	5555	PIPE	0.013	277	12	185.51	185.00	0.2	1.5	11.1	11.1	L5564	10
L5565	H/5	5565	5564	PIPE	0.013	265	12	186.00	185.51	0.2	1.5	11.2	11.2	L5565	10
L5573	H/5	5573	5565	PIPE	0.013	40	12	186.10	186.00	0.2	1.8	9.5	9.5	L5573	10
L5574	H/5	5574	5573	PIPE	0.013	116	12	186.35	186.10	0.2	1.7	9.5	9.5	L5574	10
L5575	H/5	5575	5574	PIPE	0.013	69	12	186.50	186.35	0.2	1.7	9.5	9.5	L5575	10
L5582	H/5	5582	5575	PIPE	0.013	114	12	187.00	186.50	0.4	2.4	5.3	5.3	L5582	10

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
HESS CREEK BASIN (continued)															
L5583	H/5	5583	5582	PIPE	0.013	95	12	187.40	187.00	0.4	2.3	5.3	5.3	L5583	10
L5584	H/5	5584	5583	PIPE	0.013	119	12	187.50	187.40	0.1	1.0	5.3	5.3	L5584	10
L5585	H/5	5585	5584	CULVERT	0.024	62	12	188.00	187.50	0.8	1.7	5.3	5.3	L5585	10
L5589	H/5	5589	5585	DITCH	0.025	446	36	190.00	188.00	0.4	76	5.5	5.5	L5589	
L5590	H/5	5590	5589	PIPE	0.013	72	18	191.00	190.00	1.4	12	5.7	5.7	L5590	
L5620	H/6	5619	5600	PIPE	0.013	39	18	160.00	139.00	53.2	77	17.6	24.2	L5620	
L5621	H/6	5621	5619	PIPE	0.013	310	18	180.71	160.00	6.7	27	17.6	17.6	L5621	
L5622	H/6	5622	5621	PIPE	0.013	224	27	182.64	180.71	0.9	29	17.7	17.7	L5622	
L5623	H/6	5623	5622	PIPE	0.013	35	24	183.03	182.64	1.1	24	17.7	17.7	L5623	
L5624	H/6	5624	5623	PIPE	0.013	384	24	187.18	183.03	1.1	24	17.6	17.6	L5624	
L5625	H/6	5620	5624	PIPE	0.013	146	24	189.00	187.31	1.2	24	17.6	17.6	L5625	
L5626	H/6	5626	5620	PIPE	0.013	19	24	189.50	189.00	2.7	37	12.0	12.0	L5626	
L5630	H/6	5630	5620	PIPE	0.013	112	12	190.00	189.00	0.9	3.4	4.0	4.0	L5630	
L5635	H/6	5635	5626	PIPE	0.013	393	24	195.46	189.50	1.5	28	11.9	11.9	L5635	
L5640	H/6	5639	5635	PIPE	0.013	286	21	197.00	195.46	0.5	12	3.9	3.9	L5640	
L5641	H/6	5640	5639	PIPE	0.013	167	15	200.49	197.00	2.1	9.3	4.0	4.0	L5641	
L5645	H/6	5645	5635	PIPE	0.013	347	12	197.00	195.50	0.4	2.3	8.1	8.1	L5645	11
L5655	H/6	5654	5645	PIPE	0.013	252	12	198.20	197.00	0.5	2.5	6.3	6.3	L5655	11
L5656	H/6	5655	5654	PIPE	0.013	30	12	198.50	198.20	1.0	3.6	6.3	6.3	L5656	11
L5657	H/6	5657	5655	PIPE	0.013	127	21	199.10	198.50	0.5	11	3.2	3.2	L5657	
L5665	H/6	5665	5657	PIPE	0.013	28	21	199.50	199.20	1.1	16	3.2	3.2	L5665	
L5666	H/6	5670	5665	PIPE	0.013	100	21	203.19	199.80	3.4	29	3.2	3.2	L5666	
L5705	H/5	5705	5700	DITCH	0.025	116	24	162.00	139.30	19.6	147	2.1	10.4	L5705	
L5708	H/5	5708	5705	PIPE	0.013	501	10	186.00	162.00	4.8	4.7	2.1	2.1	L5708	
L5709	H/5	5709	5708	PIPE	0.013	248	8	187.50	186.50	0.4	0.8	2.1	2.1	L5709	12
L5710	H/5	5710	5709	PIPE	0.013	57	6	189.50	187.50	3.5	1.1	2.2	2.2	L5710	12
L5720	H/CREEK	5720	5700	CULVERT	0.024	232	78	140.40	139.30	0.5	195	119	210	L5720	
L5725	H/6	5725	5720	DUMMY	0.04	100	36	183.80	140.40	43.4	143	1.8	2.1	L5725	
L5728	H/6	5728	5725	PIPE	0.013	380	10	190.30	183.80	1.7	2.8	1.8	2.1	L5728	
L5729	H/6	5729	5728	PIPE	0.013	172	10	194.70	190.30	2.6	3.5	2.1	2.5	L5729	
L5730	H/6	5730	5729	PIPE	0.013	26	8	194.70	194.60	0.4	1.4	2.1	2.5	L5730	
L5805	H/7	5805	5750	STREAM	0.05	326	0	163.00	151.50	3.5	N/A	37.1	57.2	L5805	
L5809	H/7	5809	5805	PIPE	0.013	107	12	190.50	178.00	11.7	13	2.7	2.7	L5809	
L5810	H/7	5810	5809	PIPE	0.013	399	12	195.00	190.50	1.1	3.8	2.7	2.7	L5810	
L5820	H/7	5820	5805	STREAM	0.05	292	0	168.00	163.00	1.7	N/A	34.1	34.9	L5820	
L5829	H/7	5829	5820	PIPE	0.013	60	12	187.00	168.00	31.7	20	2.9	2.9	L5829	
L5830	H/7	5830	5829	PIPE	0.013	68	12	191.68	188.00	5.4	8.3	1.3	1.3	L5830	
L5835	H/7	5835	5820	STREAM	0.05	289	0	175.60	168.00	2.6	N/A	32.8	33.3	L5835	
L5838	H/7	5838	5835	PIPE	0.013	29	12	185.00	176.00	31.2	20	2.2	2.2	L5838	
L5839	H/7	5839	5838	PIPE	0.013	165	12	201.50	185.60	9.6	11	2.2	2.2	L5839	
L5840	H/7	5840	5839	PIPE	0.013	35	12	201.60	201.50	0.3	1.9	2.2	2.2	L5840	

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
HESS CREEK BASIN (continued)															
L5845	H/7	5845	5835	CULVERT	0.024	76	48	176.50	175.60	1.2	85	31.3	31.9	L5845	
L5855	H/7	5855	5845	STREAM	0.05	267	0	185.00	176.50	3.2	N/A	30.4	30.9	L5855	
L5860	H/7	5860	5855	CULVERT	0.024	66	36	190.00	185.00	7.6	100	30.4	31.0	L5860	
L5865	H/7	5865	5860	PIPE	0.013	159	15	193.00	190.00	1.9	8.9	7.5	7.5	L5865	
L5875	H/7	5875	5865	PIPE	0.013	92	15	197.70	195.50	2.4	10	2.4	2.4	L5875	
L5879	H/7	5879	5875	PIPE	0.013	29	12	199.00	197.70	4.5	7.5	2.4	2.4	L5879	
L5880	H/7	5880	5879	PIPE	0.013	259	12	211.00	199.00	4.6	7.7	2.4	2.4	L5880	
L5885	H/7	5885	5865	PIPE	0.013	83	15	197.45	195.50	2.3	9.9	3.2	3.2	L5885	
L5888	H/7	5888	5885	PIPE	0.013	130	12	204.80	198.00	5.2	8.1	1.4	1.4	L5888	
L5889	H/7	5889	5888	PIPE	0.013	50	12	208.00	205.00	5.9	8.7	1.4	1.4	L5889	
L5890	H/7	5890	5889	PIPE	0.013	120	12	209.00	208.00	0.8	3.3	1.4	1.4	L5890	
L5895	H/7	5895	5885	PIPE	0.013	97	12	204.00	197.45	6.8	9.3	1.8	1.8	L5895	
L5909	H/7	5909	5860	CULVERT	0.024	31	36	190.90	190.00	2.9	62	25.0	25.6	L5909	
L5910	H/7	5910	5909	CULVERT	0.024	101	36	194.00	190.90	3.1	63	25.0	25.6	L5910	
L5925	H/7	5925	5910	DITCH	0.025	1566	36	226.00	194.00	2.0	119	25.2	25.8	L5925	
L5930	H/7	5930	5925	PIPE	0.013	138	24	228.00	226.00	1.5	27	18.5	19.1	L5930	
L5935	H/7	5935	5930	DITCH	0.025	142	36	228.40	228.00	0.3	44	18.5	19.1	L5935	
L5945	H/7	5945	5935	PIPE	0.013	62	24	228.80	228.40	0.6	18	16.1	16.7	L5945	
L5955	H/7	5955	5954	DITCH	0.025	339	24	231.20	229.00	0.6	67	16.1	16.7	L5955	
L5960	H/7	5960	5955	PIPE	0.013	53	12	233.00	231.20	3.4	6.6	16.1	16.7	L5960	13
L5964	H/7	5964	5960	PIPE	0.013	157	12	233.50	233.00	0.3	2.0	10.2	10.9	L5964	13
L5965	H/7	5965	5964	PIPE	0.013	68	18	234.00	233.50	0.7	9.0	10.2	10.9	L5965	
L5975	H/7	5975	5965	DITCH	0.025	1482	24	259.00	234.00	1.7	43	2.8	3.9	L5975	
L5980	H/7	5980	5975	CULVERT	0.02	40	18	260.00	259.00	2.5	11	3.1	4.3	L5980	
L6004	H/8	6004	6000	DITCH	0.025	125	24	157.20	152.00	4.2	68	8.2	8.2	L6004	
L6005	H/8	6005	6004	DITCH	0.025	485	24	185.66	157.20	5.9	81	4.8	4.8	L6005	
L6010	H/8	6010	6005	PIPE	0.013	36	12	186.19	185.66	1.5	4.3	4.9	4.9	L6010	
L6020	H/CREEK	6020	6000	CULVERT	0.024	55	60	152.40	151.80	1.1	147	57.0	98.1	L6020	
L6021	H/CREEK	6020	6000	CULVERT	0.024	55	30	153.20	153.00	0.4	13	27.9	75.4	L6021	14
L6039	H/8	6039	6035	PIPE	0.013	56	12	163.00	162.00	1.8	4.8	2.1	2.8	L6039	
L6040	H/8	6040	6039	PIPE	0.013	126	12	185.07	163.10	17.5	15	3.5	4.4	L6040	
L6097	H/8	6097	6025	PIPE	0.013	67	21	157.20	154.90	3.4	29	14.8	14.8	L6097	
L6098	H/8	6098	6097	PIPE	0.013	207	21	169.99	157.20	6.2	39	14.9	14.9	L6098	
L6099	H/8	6099	6098	PIPE	0.013	272	24	173.83	169.99	1.4	27	14.9	14.9	L6099	
L6100	H/8	6100	6099	PIPE	0.013	149	21	177.80	174.70	2.1	23	14.9	14.9	L6100	
L6109	H/8	6109	6100	PIPE	0.013	35	24	178.10	177.90	0.6	17	11.2	11.2	L6109	
L6110	H/8	6110	6109	PIPE	0.013	212	21	184.56	178.10	3.1	28	11.2	11.2	L6110	
L6118	H/8	6118	6110	PIPE	0.013	18	21	187.84	184.56	18.1	67	2.1	2.1	L6118	
L6119	H/8	6119	6118	PIPE	0.013	115	21	188.50	187.84	0.6	12	2.1	2.1	L6119	
L6120	H/8	6120	6119	PIPE	0.013	282	18	190.00	188.50	0.5	7.7	2.1	2.1	L6120	
L6123	H/8	6123	6110	PIPE	0.013	301	18	189.18	185.00	1.4	12	6.8	6.8	L6123	

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
HESS CREEK BASIN (continued)															
L6124	H/8	6124	6123	PIPE	0.013	94	21	189.90	189.28	0.7	13	6.8	6.8	L6124	
L6125	H/8	6125	6124	PIPE	0.013	114	21	191.80	190.00	1.6	20	6.8	6.8	L6125	
L6129	H/8	6129	6125	PIPE	0.013	17	15	192.24	192.08	0.9	6.3	6.8	6.8	L6129	
L6130	H/8	6130	6129	PIPE	0.013	80	15	193.00	192.24	1.0	6.3	6.8	6.8	L6130	
L6139	H/8	6139	6130	PIPE	0.013	241	15	197.40	194.00	1.4	7.7	2.6	2.6	L6139	
L6140	H/8	6140	6139	PIPE	0.013	396	15	199.87	197.65	0.6	4.8	2.6	2.6	L6140	
L6209	H/8	6209	6208	DITCH	0.025	647	24	202.00	172.00	4.6	72	26.2	33.8	L6209	
L6210	H/8	6210	6209	DITCH	0.025	251	24	210.00	202.00	3.2	59	26.4	32.6	L6210	
L6215	H/8	6215	6210	PIPE	0.013	44	18	214.00	212.00	4.5	22	26.4	32.6	L6215	15
L6219	H/8	6219	6215	PIPE	0.013	485	15	219.00	215.00	0.8	5.9	5.9	5.9	L6219	
L6220	H/8	6220	6219	PIPE	0.013	447	15	224.00	219.50	1.0	6.5	6.1	6.1	L6220	
L6225	H/8	6225	6215	PIPE	0.013	146	18	219.00	214.50	3.1	18	20.6	26.8	L6225	15
L6239	H/8	6239	6225	PIPE	0.013	184	18	222.40	219.00	1.9	14	15.0	21.3	L6239	15
L6240	H/8	6240	6239	PIPE	0.013	46	18	223.00	222.40	1.3	12	15.0	21.2	L6240	15
L6245	H/8	6245	6240	PIPE	0.013	225	15	224.00	223.00	0.4	4.3	15.0	21.2	L6245	15
L6254	H/8	6254	6245	PIPE	0.013	261	15	226.00	224.50	0.6	4.9	15.0	21.2	L6254	15
L6255	H/8	6255	6254	PIPE	0.013	184	15	227.50	226.00	0.8	5.8	9.6	15.8	L6255	15
L6270	H/8	6270	6255	PIPE	0.013	636	15	229.00	228.10	0.1	2.4	4.5	10.9	L6270	15
L6275	H/8	6275	6270	PIPE	0.013	192	18	230.00	229.00	0.5	7.6	1.3	7.9	L6275	
L6320	H/8	6320	6310	DITCH	0.025	512	24	191.10	167.00	4.7	250	6.1	61.9	L6320	
L6325	H/8	6325	6320	CULVERT	0.02	58	18	192.00	191.10	1.5	8.5	6.1	9.1	L6325	
L6355	H/8	6355	6350	DITCH	0.025	69	24	176.00	169.00	10.2	106	2.4	7.2	L6355	
L6360	H/8	6360	6355	PIPE	0.013	171	12	195.22	176.00	11.2	12	2.4	2.4	L6360	
L6500	H/CREEK	6500	6400	CULVERT	0.024	88	60	178.70	177.30	1.6	178	63.3	121.0	L6500	
L6530	H/9	6530	6510	PIPE	0.013	2186	18	256.00	181.00	3.4	19	4.6	20.1	L6530	
L6540	H/9	6540	6530	PIPE	0.013	43	18	258.00	257.00	2.3	16	1.3	5.6	L6540	
L6545	H/9	6545	6540	DITCH	0.025	521	24	260.00	258.00	0.4	21	1.3	5.6	L6545	
L6550	H/9	6550	6530	DITCH	0.025	536	36	264.00	257.00	1.3	95	3.8	15.6	L6550	
L6555	H/9	6555	6550	CULVERT	0.02	39	12	264.50	264.00	1.3	2.6	4.1	15.9	L6555	16
L6575	H/9	6575	6555	DITCH	0.025	935	24	310.00	265.00	4.8	73	1.7	7.6	L6575	
L6580	H/9	6580	6575	PIPE	0.013	48	15	312.00	311.00	2.1	9.4	1.7	7.8	L6580	
L6605	H/9	6605	6600	DUMMY	0.04	100	36	191.00	190.00	1.0	8.7	1.2	5.9	L6605	
L6625	H/9	6625	6620	DITCH	0.025	1176	24	280.00	196.00	7.1	89	0.5	2.3	L6625	
L6630	H/9	6630	6625	PIPE	0.013	57	12	283.00	281.00	3.5	6.7	0.5	2.5	L6630	
L6729	H/9	6729	6720	PIPE	0.013	182	15	256.60	255.00	0.9	6.1	1.0	5.4	L6729	
L6730	H/9	6730	6729	PIPE	0.013	216	15	273.00	256.60	7.6	18	1.1	5.5	L6730	
L6740	H/9	6740	6739	STREAM	0.05	855	0	294.00	250.00	5.1	N/A	20.0	25.6	L6740	
L6745	H/9	6745	6740	DITCH	0.025	430	24	304.90	294.00	2.5	268	12.1	16.2	L6745	
L6755	H/9	6755	6745	STREAM	0.05	836	0	344.20	304.90	4.7	N/A	11.2	11.2	L6755	
L6760	H/9	6760	6755	CULVERT	0.02	49	18	348.30	346.20	4.3	14	11.7	11.7	L6760	
L6764	H/9	6764	6740	STREAM	0.05	760	0	355.60	294.00	8.1	N/A	9.7	11.7	L6764	

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
HESS CREEK BASIN (continued)															
L6765	H/9	6765	6764	DITCH	0.025	40	24	357.00	355.60	3.5	75	9.8	11.6	L6765	
L6775	H/9	6775	6765	STREAM	0.05	273	0	388.00	357.00	11.4	N/A	9.2	9.2	L6775	
L6780	H/9	6780	6775	CULVERT	0.02	164	18	398.00	387.00	6.7	18	9.2	9.3	L6780	
L6790	H/9	6790	6780	DITCH	0.025	837	24	560.00	398.00	19.3	146	8.3	8.3	L6790	
L6815	H/CREEK	6815	6810	PIPE	0.013	87	36	244.00	240.00	4.6	143	31.0	56.6	L6815	
L6825	H/9	6825	6815	DITCH	0.025	218	36	252.00	244.00	3.7	160	28.0	44.1	L6825	
L6830	H/9	6830	6815	DITCH	0.025	605	24	252.00	244.00	1.3	38	1.0	5.2	L6830	
L6840	H/9	6840	6825	STREAM	0.05	991	0	313.00	252.00	6.2	N/A	3.0	6.6	L6840	
L6850	H/9	6850	6840	STREAM	0.05	936	0	434.00	313.00	12.9	N/A	1.7	1.7	L6850	
L6855	H/9	6855	6850	CULVERT	0.02	46	12	436.50	434.00	5.4	5.4	1.7	1.7	L6855	
L6900	H/9	6900	6825	STREAM	0.05	963	0	286.00	252.00	3.5	N/A	24.3	38.2	L6900	
L6901	H/9	6901	6900	DUMMY	0.04	100	36	287.00	286.00	1.0	30	3.9	16.7	L6901	
L6915	H/9	6915	6900	STREAM	0.05	965	0	436.00	286.00	15.6	N/A	3.7	3.7	L6915	
L6920	H/9	6920	6915	CULVERT	0.02	46	24	441.00	436.00	10.9	48	3.7	3.7	L6920	
L6930	H/9	6930	6900	STREAM	0.05	599	0	312.00	286.00	4.3	N/A	16.0	19.8	L6930	
L6940	H/9	6940	6930	STREAM	0.05	831	0	453.20	312.00	17.0	N/A	12.2	12.2	L6940	
L6945	H/9	6945	6940	CULVERT	0.024	61	18	462.00	460.00	3.3	10	12.8	12.8	L6945	
L6950	H/9	6950	6930	STREAM	0.05	1109	0	420.00	312.00	9.7	N/A	9.1	14.3	L6950	
L6960	H/9	6960	6950	STREAM	0.05	245	0	450.00	420.00	12.2	N/A	7.9	9.5	L6960	
L6965	H/9	6965	6960	PIPE	0.013	84	24	458.00	450.00	9.6	70	7.9	9.5	L6965	
L6975	H/9	6975	6965	DITCH	0.025	412	24	502.10	458.00	10.7	109	6.5	6.5	L6975	
L6980	H/9	6980	6975	CULVERT	0.02	44	12	503.00	502.10	2.0	3.3	6.5	6.5	L6980	17
OUTFALL	H/CREEK										298	253	339	OUTFALL	

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
CHEHALEM CREEK BASIN															
L1112	C/1	1112	1119	DITCH	0.025	494	24	155.00	104.00	10.3	107	8.2	8.2	L1112	
L1119	C/1	1119	1100	STREAM	0.05	905	0	104.00	72.00	3.5	N/A	86.5	88.9	L1119	
L1120	C/1	1120	1119	STREAM	0.05	568	0	118.00	104.00	2.5	N/A	73.7	76.1	L1120	
L1121	C/1	1121	1120	DITCH	0.025	108	24	154.32	118.00	33.8	193	4.2	4.2	L1121	
L1122	C/1	1122	1121	PIPE	0.013	213	15	157.50	154.32	1.5	7.9	4.2	4.2	L1122	
L1123	C/1	1123	1122	PIPE	0.013	249	12	160.44	157.50	1.2	3.9	4.2	4.2	L1123	
L1130	C/1	1130	1120	STREAM	0.05	322	0	121.00	118.00	0.9	N/A	68.3	70.7	L1130	
L1131	C/1	1131	1130	CULVERT	0.02	43	24	121.28	121.00	0.7	12	64.4	66.8	L1131	1
L1132	C/1	1132	1131	PIPE	0.013	6	12	121.29	121.28	0.2	1.4	4.4	6.0	L1132	
L1133	C/1	1133	1132	PIPE	0.013	109	12	122.71	121.29	1.3	4.1	4.5	6.0	L1133	
L1134	C/1	1134	1133	PIPE	0.013	170	12	129.54	122.71	4.0	7.1	4.5	6.0	L1134	
L1135	C/1	1135	1134	DITCH	0.025	242	24	162.50	129.54	13.6	123	0.7	3.6	L1135	
L1136	C/1	1136	1135	DITCH	0.025	286	24	162.90	162.50	0.1	12	0.7	3.6	L1136	
L1140	C/1	1140	1131	CULVERT	0.02	87	24	121.50	121.28	0.3	7.4	60.9	60.9	L1140	1
L1141	C/1	1141	1130	PIPE	0.013	89	12	128.19	121.00	8.0	10	5.0	5.0	L1141	
L1142	C/1	1142	1141	PIPE	0.013	258	12	151.80	128.19	9.1	11	5.0	5.0	L1142	
L1143	C/1	1143	1142	PIPE	0.013	242	12	159.00	151.80	3.0	6.1	5.0	5.0	L1143	
L1149	C/1	1149	1140	DITCH	0.025	236	24	153.00	121.50	13.3	121	4.2	4.2	L1149	
L1150	C/1	1150	1149	PIPE	0.013	53	15	157.00	153.00	7.6	18	4.2	4.2	L1150	
L1151	C/1	1151	1150	PIPE	0.013	275	15	159.65	157.00	1.0	6.3	4.2	4.2	L1151	
L1160	C/1	1160	1140	STREAM	0.05	690	0	130.00	121.50	1.2	N/A	58.1	58.7	L1160	
L1161	C/1	1161	1160	PIPE	0.013	186	21	158.80	130.00	15.5	62	20.1	20.1	L1161	
L1162	C/1	1162	1164	PIPE	0.013	320	10	162.00	161.00	0.3	1.2	5.3	5.3	L1162	2
L1163	C/1	1163	1164	PIPE	0.013	284	10	162.00	161.00	0.4	1.3	8.6	8.6	L1163	2
L1164	C/1	1164	1161	PIPE	0.013	223	18	161.00	158.80	1.0	10	13.1	13.1	L1164	2
L1170	C/1	1170	1160	DITCH	0.025	456	24	150.00	130.00	4.4	70	68.9	68.9	L1170	
L1180	C/1	1180	1170	PIPE	0.013	91	18	157.00	150.00	7.7	26	41.1	41.1	L1180	3
L1181	C/1	1181	1180	PIPE	0.013	352	21	157.30	157.00	0.1	11	12.9	12.9	L1181	3
L1182	C/1	1182	1181	PIPE	0.013	69	15	162.00	160.00	2.9	11	12.5	12.5	L1182	3
L1183	C/1	1183	1182	PIPE	0.013	511	15	162.20	162.00	0.0	1.3	12.5	12.5	L1183	3
L1184	C/1	1184	1183	PIPE	0.013	245	15	163.10	162.20	0.4	3.9	6.2	6.2	L1184	3
L1185	C/1	1185	1184	PIPE	0.013	258	15	164.50	163.10	0.5	4.8	6.2	6.2	L1185	3
L1186	C/1	1186	1181	PIPE	0.013	71	18	157.40	157.30	0.1	3.9	25.1	25.1	L1186	3
L1187	C/1	1187	1186	PIPE	0.013	55	18	157.50	157.40	0.2	4.5	20.1	20.1	L1187	3
L1188	C/1	1188	1187	PIPE	0.013	310	18	157.92	157.50	0.1	3.9	20.1	20.1	L1188	3
L1189	C/1	1189	1188	PIPE	0.013	260	12	158.70	157.92	0.3	2.0	5.6	5.6	L1189	3
L1190	C/1	1190	1189	PIPE	0.013	265	12	159.50	158.70	0.3	2.0	5.6	5.6	L1190	3
L1191	C/1	1191	1188	PIPE	0.013	377	18	162.00	157.92	1.1	11	14.7	14.7	L1191	3
L1192	C/1	1192	1191	PIPE	0.013	706	18	164.50	162.00	0.4	6.2	6.6	6.6	L1192	
L1193	C/1	1193	1192	PIPE	0.013	320	12	166.00	164.50	0.5	2.4	7.1	7.1	L1193	3
L1194	C/1	1194	1186	PIPE	0.013	423	10	159.50	157.40	0.5	1.5	5.2	5.2	L1194	3

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
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CHEHALEM CREEK BASIN (continued)															
L1210	C/1	1210	1200	DITCH	0.025	232	24	110.00	82.00	12.1	116	6.3	6.3	L1210	
L1211	C/1	1211	1210	DITCH	0.025	298	24	146.50	110.00	12.3	117	1.9	1.9	L1211	
L1212	C/1	1212	1211	PIPE	0.013	119	12	146.92	146.50	0.4	2.1	1.9	1.9	L1212	
L1219	C/1	1219	1220	PIPE	0.013	121	12	144.10	143.72	0.3	2.0	4.8	4.8	L1219	
L1220	C/1	1220	1210	DITCH	0.025	437	24	143.72	110.00	7.7	92	4.7	4.7	L1220	
L1221	C/1	1221	1219	PIPE	0.013	555	12	154.00	144.10	1.8	4.8	4.8	4.8	L1221	
L1310	C/1	1310	1300	DITCH	0.025	331	24	146.00	82.50	19.2	146	3.6	3.6	L1310	
L1320	C/1	1320	1310	PIPE	0.013	274	12	150.10	146.00	1.5	4.4	3.7	3.7	L1320	
L1417	C/2	1417	1416	STREAM	0.05	548	0	107.00	92.80	2.6	N/A	37.7	38.0	L1417	
L1418	C/2	1418	1417	PIPE	0.013	142	15	151.40	107.00	31.4	36	8.8	8.8	L1418	
L1419	C/2	1419	1418	PIPE	0.013	50	15	151.50	151.40	0.2	2.9	4.2	4.2	L1419	
L1420	C/2	1420	1417	STREAM	0.05	189	0	112.00	107.00	2.6	N/A	33.9	34.2	L1420	
L1422	C/2	1422	1420	PIPE	0.013	56	12	144.00	112.00	57.6	27	9.7	9.9	L1422	
L1430	C/2	1430	1420	STREAM	0.05	832	0	130.00	112.00	2.2	N/A	28.4	28.4	L1430	
L1431	C/2	1431	1430	DITCH	0.025	217	24	150.00	130.00	9.2	101	10.3	10.3	L1431	
L1440	C/2	1440	1430	STREAM	0.05	472	0	145.00	130.00	3.2	N/A	17.2	17.2	L1440	
L1450	C/2	1450	1440	PIPE	0.013	546	18	156.00	145.00	2.0	12	17.3	17.3	L1450	4
L1451	C/2	1451	1450	PIPE	0.013	83	18	156.00	152.00	4.8	23	15.1	15.1	L1451	4
L1452	C/2	1452	1451	PIPE	0.013	298	18	158.00	156.00	0.7	8.6	15.1	15.1	L1452	
L1453	C/2	1453	1452	PIPE	0.013	226	18	162.00	158.00	1.8	14	8.5	8.5	L1453	
L1454	C/2	1454	1453	PIPE	0.013	310	18	167.00	162.00	1.6	13	5.7	5.7	L1454	
L1460	C/2	1460	1450	PIPE	0.013	758	18	159.00	152.00	0.9	10	2.5	2.5	L1460	
L1461	C/2	1461	1460	PIPE	0.013	65	18	160.00	159.00	1.5	13	2.6	2.6	L1461	
L1464	C/2	1464	1431	PIPE	0.013	228	12	158.10	150.00	3.5	6.7	8.1	8.1	L1464	5
L1465	C/2	1465	1464	PIPE	0.013	98	12	160.87	158.10	2.8	6.0	8.1	8.1	L1465	5
L1466	C/2	1466	1465	PIPE	0.013	137	12	161.50	160.87	0.5	2.4	8.1	8.1	L1466	5
L1467	C/2	1467	1466	PIPE	0.013	39	12	162.33	161.50	2.1	5.2	8.1	8.1	L1467	5
L1468	C/2	1468	1467	PIPE	0.013	248	8	164.32	162.33	0.8	1.1	5.9	5.9	L1468	5
L1469	C/2	1469	1468	PIPE	0.013	250	8	165.57	164.32	0.5	0.9	5.9	5.9	L1469	5
L1470	C/2	1470	1469	PIPE	0.013	257	8	166.40	165.57	0.3	0.7	5.9	5.9	L1470	5
L1510	C/3	1510	1416	PIPE	0.013	509	12	140.00	92.80	9.3	11	7.5	7.5	L1510	
L1605	C/3	1605	1600	PIPE	0.013	331	12	149.00	93.00	16.9	15	9.3	9.3	L1605	
L1709	C/3	1709	1708	PIPE	0.013	313	12	153.98	151.48	0.8	3.2	6.4	6.4	L1709	6
L1710	C/3	1710	1709	PIPE	0.013	128	12	155.00	153.98	0.8	3.2	6.4	6.4	L1710	
L1719	C/3	1719	1718	PIPE	0.013	102	12	151.00	132.00	18.7	15	10.7	10.9	L1719	7
L1720	C/3	1720	1719	PIPE	0.013	303	12	154.00	151.00	1.0	3.5	10.7	10.9	L1720	7
L2010	C/4	2010	2008	STREAM	0.05	307	0	130.00	109.00	6.8	N/A	34.4	34.4	L2010	
L2011	C/4	2011	2010	PIPE	0.013	171	15	155.00	130.00	14.6	25	31.5	31.5	L2011	8
L2012	C/4	2012	2011	PIPE	0.013	88	15	155.50	155.00	0.6	4.9	31.5	31.5	L2012	8
L2014	C/4	2014	2013	PIPE	0.013	98	12	156.65	155.66	1.0	2.5	28.2	28.2	L2014	8
L2020	C/4	2013	2012	PIPE	0.013	175	15	155.66	155.50	0.1	3.9	31.6	31.6	L2020	8

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
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CHEHALEM CREEK BASIN (continued)															
L2021	C/4	2020	2013	PIPE	0.013	81	15	159.00	155.66	4.1	12	5.2	5.2	L2021	
L2025	C/4	2025	2014	PIPE	0.013	106	12	161.00	156.65	4.1	7.2	27.8	27.8	L2025	8
L2030	C/4	2030	2025	CULVERT	0.02	58	18	162.00	161.00	1.7	9.0	19.1	19.1	L2030	8
L2032	C/4	2032	2030	PIPE	0.013	116	18	163.70	162.00	1.5	13	5.7	5.7	L2032	
L2033	C/4	2033	2032	PIPE	0.013	18	18	164.00	163.70	1.7	14	5.7	5.7	L2033	
L2034	C/4	2034	2033	PIPE	0.013	249	18	168.00	164.00	1.6	13	5.7	5.7	L2034	
L2035	C/4	2035	2034	PIPE	0.013	250	15	175.00	168.00	2.8	11	5.7	5.7	L2035	
L2036	C/4	2036	2035	PIPE	0.013	266	12	180.00	175.00	1.9	4.9	5.7	5.7	L2036	
L2037	C/4	2037	2025	DITCH	0.025	198	24	163.97	161.00	1.5	41	9.4	9.4	L2037	
L2038	C/4	2038	2037	PIPE	0.013	153	18	166.27	163.97	1.5	13	9.4	9.4	L2038	
L2039	C/4	2039	2038	PIPE	0.013	447	12	172.98	166.27	1.5	4.4	4.6	4.6	L2039	
L2040	C/4	2040	2039	PIPE	0.013	286	12	174.00	172.98	0.4	2.1	4.6	4.6	L2040	
L2041	C/4	2041	2040	PIPE	0.013	275	12	179.00	174.00	1.8	4.8	4.6	4.6	L2041	
L2042	C/4	2042	2030	PIPE	0.013	67	12	162.33	162.00	0.5	2.5	6.0	6.0	L2042	
L2043	C/4	2043	2042	PIPE	0.013	92	12	162.80	162.33	0.5	2.5	6.0	6.0	L2043	
L2044	C/4	2031	2043	PIPE	0.013	403	12	168.00	162.80	1.3	4.0	6.0	6.0	L2044	8
L2060	C/4	2060	2030	DITCH	0.025	763	24	175.00	162.00	1.7	43	7.9	7.9	L2060	
L2070	C/4	2070	2060	CULVERT	0.013	168	12	176.00	175.00	0.6	2.7	8.0	8.0	L2070	9
L2151	C/4	2151	2150	PIPE	0.013	88	0	160.00	120.00	45.2	152	10.3	10.3	L2151	
L2152	C/4	2152	2151	PIPE	0.013	37	0	160.50	160.00	1.4	26	10.3	10.3	L2152	
L2210	C/5	2210	2153	STREAM	0.05	692	0	148.00	132.00	2.3	N/A	47.8	56.4	L2210	
L2220	C/5	2219	2210	PIPE	0.013	127	30	152.34	148.00	3.4	76	38.9	47.4	L2220	
L2221	C/5	2221	2210	PIPE	0.013	129	0	154.00	148.00	4.7	49	12.0	13.7	L2221	
L2222	C/5	2222	2221	DITCH	0.025	87	24	159.27	154.00	6.1	82	12.0	12.0	L2222	
L2223	C/5	2223	2222	PIPE	0.013	41	12	167.15	159.27	19.1	16	8.2	8.2	L2223	10
L2224	C/5	2224	2223	PIPE	0.013	450	12	171.20	167.15	0.9	3.4	8.2	8.2	L2224	10
L2225	C/5	2225	2224	PIPE	0.013	25	12	171.50	171.20	1.2	3.9	8.2	8.2	L2225	10
L2226	C/5	2226	2225	PIPE	0.013	515	12	177.80	171.50	1.2	3.9	8.3	8.3	L2226	10
L2229	C/5	2229	2219	PIPE	0.013	44	30	153.84	152.34	3.4	76	38.9	47.4	L2229	
L2230	C/5	2230	2229	DITCH	0.025	569	24	167.50	153.84	2.4	231	39.0	47.5	L2230	
L2231	C/5	2231	2230	PIPE	0.013	79	12	168.30	167.50	1.0	3.6	1.1	1.1	L2231	
L2235	C/5	2235	2230	DITCH	0.025	432	24	172.38	167.50	1.1	125	34.8	43.4	L2235	
L2236	C/5	2236	2235	PIPE	0.013	155	0	176.38	172.38	2.6	36	34.9	43.4	L2236	11
L2237	C/5	2237	2236	DITCH	0.025	185	24	180.52	176.38	2.2	117	34.8	43.4	L2237	
L2240	C/5	2250	2237	DITCH	0.025	352	24	184.50	180.52	1.1	101	31.4	39.9	L2240	
L2251	C/5	2251	2260	PIPE	0.013	119	18	185.50	185.00	0.4	6.8	2.9	2.9	L2251	
L2252	C/5	2252	2251	PIPE	0.013	571	12	188.00	185.50	0.4	2.4	2.9	2.9	L2252	
L2253	C/5	2253	2250	PIPE	0.013	399	30	185.00	184.50	0.1	15	22.0	30.7	L2253	
L2254	C/5	2254	2253	DITCH	0.025	250	24	187.00	185.00	0.8	129	22.5	31.6	L2254	
L2255	C/5	2255	2254	PIPE	0.013	59	30	187.50	187.00	0.8	38	21.6	35.9	L2255	
L2256	C/5	2256	2255	DITCH	0.025	36	24	188.00	187.50	1.4	39	21.6	36.3	L2256	

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
CHEHALEM CREEK BASIN (continued)															
L2260	C/5	2260	2250	PIPE	0.013	67	18	185.00	184.50	0.7	9	9.7	9.7	L2260	
L2261	C/5	2261	2260	PIPE	0.013	687	21	187.90	185.00	0.4	10	4.1	4.1	L2261	
L2262	C/5	2262	2261	PIPE	0.013	244	18	188.80	187.90	0.4	6.4	4.3	4.3	L2262	
L2270	C/5	2270	2256	PIPE	0.013	65	30	188.70	188.00	1.1	43	21.6	36.4	L2270	
L2271	C/5	2271	2270	PIPE	0.013	680	36	192.00	188.70	0.5	46	18.5	33.2	L2271	
L2272	C/5	2272	2271	PIPE	0.013	835	30	192.85	192.00	0.1	13	14.1	28.2	L2272	
L2273	C/5	2273	2280	PIPE	0.013	238	12	203.00	193.00	4.2	7.3	3.5	3.5	L2273	
L2274	C/5	2274	2272	PIPE	0.013	312	30	202.75	201.10	0.5	30	12.5	26.6	L2274	
L2275	C/5	2275	2277	PIPE	0.013	104	18	205.33	204.55	0.8	9.1	10.5	24.5	L2275	12
L2276	C/5	2276	2275	PIPE	0.013	91	18	206.50	205.33	1.3	12	7.3	18.3	L2276	12
L2277	C/5	2277	2274	PIPE	0.013	201	24	204.55	202.75	0.9	21	10.4	24.5	L2277	
L2278	C/5	2278	2270	PIPE	0.013	511	12	190.14	188.70	0.3	1.9	1.9	2.0	L2278	
L2279	C/5	2279	2278	PIPE	0.013	286	12	193.00	190.14	1.0	3.6	2.1	2.2	L2279	
L2280	C/5	2280	2272	PIPE	0.013	64	12	193.00	192.85	0.2	1.7	11.0	11.0	L2280	13
L2310	C/6	2310	2309	STREAM	0.05	380	0	150.00	135.00	3.9	N/A	9.4	9.6	L2310	
L2318	C/6	2318	2310	PIPE	0.013	164	18	154.80	150.00	2.9	18	6.7	6.9	L2318	
L2319	C/6	2319	2318	PIPE	0.013	281	18	164.10	154.80	3.3	19	6.7	6.9	L2319	
L2320	C/6	2320	2319	PIPE	0.013	67	18	167.62	164.10	5.2	24	6.7	6.9	L2320	
L2330	C/6	2330	2320	PIPE	0.013	119	18	168.70	167.62	0.9	10	6.7	6.9	L2330	
L2335	C/6	2335	2330	PIPE	0.013	292	18	169.00	168.70	0.1	3.4	6.7	6.9	L2335	
L2340	C/6	2340	2335	PIPE	0.013	310	18	171.80	169.00	0.9	10	5.2	5.4	L2340	
L2342	C/6	2342	2340	PIPE	0.013	401	15	178.10	171.80	1.6	8.1	3.1	3.3	L2342	
L2344	C/6	2344	2342	PIPE	0.013	297	12	186.00	178.10	2.7	5.8	3.1	3.3	L2344	
L2345	C/6	2345	2344	PIPE	0.013	112	12	186.52	186.00	0.5	2.4	3.1	3.3	L2345	
L2346	C/6	2346	2345	PIPE	0.013	38	12	186.69	186.52	0.5	2.4	3.1	3.3	L2346	
L2347	C/6	2347	2346	PIPE	0.013	284	12	187.99	186.69	0.5	2.4	3.1	3.3	L2347	
L2348	C/6	2348	2347	PIPE	0.013	135	12	188.34	187.99	0.3	1.8	3.1	3.3	L2348	
L2350	C/6	2350	2340	PIPE	0.013	114	12	179.00	171.80	6.3	8.9	2.6	2.6	L2350	
L2498	C/CREEK	2498	2497	PIPE	0.013	68	42	157.00	154.00	4.4	211	56.5	65.5	L2498	
L2499	C/CREEK	2499	2498	PIPE	0.013	106	42	162.90	157.00	5.5	237	56.6	65.5	L2499	
L2500	C/CREEK	2500	2499	STREAM	0.05	559	0	171.10	162.90	1.5	N/A	56.8	65.5	L2500	
L2501	C/7	2501	2512	PIPE	0.013	51	18	181.10	181.00	0.2	4.6	10.1	12.7	L2501	
L2502	C/7	2502	2501	DITCH	0.025	381	24	184.00	181.10	0.8	29	10.6	15.8	L2502	
L2503	C/7	2503	2502	PIPE	0.013	35	18	184.50	184.00	1.4	13	10.6	14.7	L2503	
L2504	C/7	2504	2503	PIPE	0.013	201	36	194.30	184.50	4.9	147	10.6	14.5	L2504	
L2505	C/7	2505	2504	PIPE	0.013	254	30	196.00	194.30	0.7	34	3.4	6.9	L2505	
L2506	C/7	2506	2505	PIPE	0.013	27	18	196.30	196.00	1.1	11	3.4	6.9	L2506	
L2507	C/7	2507	2506	DITCH	0.025	431	24	201.00	196.30	1.1	35	3.4	6.9	L2507	
L2508	C/7	2508	2507	DITCH	0.025	293	24	217.00	201.00	5.5	78	3.4	6.9	L2508	
L2509	C/7	2509	2500	CULVERT	0.02	35	24	171.40	171.10	0.9	14	26.8	27.5	L2509	14
L2510	C/7	2510	2509	DITCH	0.025	706	24	180.80	171.40	1.3	38	42.4	49.7	L2510	

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
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CHEHALEM CREEK BASIN (continued)															
L2511	C/7	2511	2500	DITCH	0.025	190	24	179.30	171.10	4.3	69	17.2	19.8	L2511	
L2512	C/7	2512	2511	PIPE	0.013	229	18	181.00	179.30	0.7	9.1	11.9	14.1	L2512	15
L2513	C/7	2513	2512	PIPE	0.013	331	12	185.00	181.00	1.2	3.9	2.7	2.7	L2513	
L2514	C/7	2514	2508	PIPE	0.013	53	18	217.53	217.00	1.0	10	2.4	2.4	L2514	
L2515	C/7	2515	2514	DITCH	0.025	1235	24	218.00	217.53	0.0	6.5	2.5	2.5	L2515	
L2520	C/7	2520	2510	PIPE	0.013	157	36	184.65	180.80	2.4	104	40.8	47.8	L2520	
L2522	C/7	2522	2520	PIPE	0.013	193	36	185.81	184.65	0.6	52	40.8	47.8	L2522	
L2525	C/7	2525	2522	PIPE	0.013	276	12	190.30	186.72	1.3	4.1	4.3	4.4	L2525	
L2590	C/7	2590	2522	PIPE	0.013	421	36	189.10	185.81	0.8	59	37.1	44.4	L2590	
L2595	C/7	2595	2590	PIPE	0.013	108	36	189.97	189.10	0.8	60	34.9	42.2	L2595	
L2596	C/7	2596	2595	PIPE	0.013	28	36	190.19	189.97	0.8	59	34.9	42.2	L2596	
L2599	C/7	2600	2596	DITCH	0.025	167	24	195.50	190.19	3.2	59	34.9	42.2	L2599	
L2600A	C/7	2603	2600	CULVERT	0.02	89	30	195.90	195.50	0.5	18	32.2	39.7	L2600A	
L2601	C/7	2601	2600	PIPE	0.013	39	15	196.17	195.50	1.7	8.4	3.5	3.5	L2601	
L2602	C/7	2602	2601	PIPE	0.013	341	12	208.90	196.17	3.7	6.9	3.6	3.6	L2602	
L2610	C/7	2610	2603	DITCH	0.025	365	24	196.60	195.90	0.2	15	32.3	39.9	L2610	
L2620	C/7	2620	2610	CULVERT	0.02	51	27	197.00	196.60	0.8	18	31.0	38.2	L2620	16
L2630	C/7	2630	2620	DITCH	0.025	133	24	201.00	197.00	3.0	58	32.4	38.7	L2630	
L2631	C/7	2631	2635	PIPE	0.013	262	15	204.07	202.00	0.8	5.7	2.1	2.1	L2631	
L2632	C/7	2632	2630	PIPE	0.013	26	48	201.10	201.00	0.4	89	31.0	39.8	L2632	
L2635	C/7	2635	2632	PIPE	0.013	149	48	202.00	201.10	0.6	112	30.6	41.1	L2635	
L2640	C/7	2640	2635	PIPE	0.013	90	36	204.76	202.00	3.1	117	28.8	39.5	L2640	
L2641	C/7	2641	2645	PIPE	0.013	170	15	207.51	206.49	0.6	5.0	1.7	1.7	L2641	
L2645	C/7	2645	2640	PIPE	0.013	138	36	206.49	204.76	1.3	75	27.8	38.5	L2645	
L2650	C/7	2650	2645	PIPE	0.013	251	30	208.96	206.49	1.0	41	26.7	37.2	L2650	
L2652	C/7	2652	2650	PIPE	0.013	295	30	212.50	208.96	1.2	45	26.7	37.2	L2652	
L2655	C/7	2655	2652	PIPE	0.013	174	30	214.80	212.50	1.3	47	24.2	34.7	L2655	
L2660	C/7	2660	2655	PIPE	0.013	152	27	216.00	214.80	0.8	28	24.2	34.7	L2660	
L2661	C/7	2661	2665	PIPE	0.013	271	24	218.04	216.43	0.6	17	19.0	27.8	L2661	
L2662	C/7	2662	2661	PIPE	0.013	119	24	218.94	218.04	0.8	20	19.0	27.8	L2662	
L2663	C/7	2663	2662	PIPE	0.013	50	36	219.52	218.94	1.2	72	19.0	27.8	L2663	
L2664	C/7	2664	2663	PIPE	0.013	28	36	219.71	219.52	0.7	54	19.1	27.8	L2664	
L2665	C/7	2665	2660	PIPE	0.013	85	24	216.43	216.00	0.5	16	24.2	34.7	L2665	
L2666	C/7	2666	2665	PIPE	0.013	15	18	218.50	216.43	14.2	40	5.9	7.6	L2666	
L2667	C/7	2667	2664	PIPE	0.013	215	36	221.32	219.71	0.8	58	15.6	24.1	L2667	
L2670	C/7	2670	2666	PIPE	0.013	63	18	219.80	218.50	2.1	15	5.9	7.7	L2670	
L2671	C/7	2671	2670	DITCH	0.025	33	24	220.86	219.80	3.2	60	5.9	7.7	L2671	
L2672	C/7	2672	2671	PIPE	0.013	40	18	221.03	220.86	0.4	6.8	5.9	7.7	L2672	
L2673	C/7	2673	2672	DITCH	0.025	226	24	221.40	221.04	0.2	13	3.2	3.2	L2673	
L2674	C/7	2674	2673	PIPE	0.013	265	18	221.88	221.40	0.2	4.5	3.2	3.2	L2674	
L2675	C/7	2675	2674	PIPE	0.013	128	15	227.00	221.88	4.0	13	3.3	3.3	L2675	

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CHEHALEM CREEK BASIN (continued)															
L2676	C/7	2676	2672	DITCH	0.025	82	24	224.00	221.30	3.3	60	1.4	2.6	L2676	
L2677	C/7	2677	2676	PIPE	0.013	183	12	226.40	224.00	1.3	4.1	1.4	2.6	L2677	
L2680	C/7	2680	2667	PIPE	0.013	49	36	226.00	221.32	9.5	206	15.6	24.2	L2680	
L2681	C/7	2681	2680	PIPE	0.013	288	36	226.92	226.00	0.3	38	15.6	24.8	L2681	
L2682	C/7	2682	2681	PIPE	0.013	178	36	229.62	226.92	1.5	82	15.6	24.2	L2682	
L2685	C/7	2685	2682	PIPE	0.013	251	27	230.90	228.62	0.9	30	11.9	20.4	L2685	
L2686	C/7	2686	2685	PIPE	0.013	244	27	233.05	230.90	0.9	29	11.9	20.4	L2686	
L2690	C/7	2690	2686	PIPE	0.013	261	24	235.10	233.05	0.8	20	10.9	13.0	L2690	
L2691	C/7	2691	2690	PIPE	0.013	128	18	239.10	235.10	3.1	19	3.5	5.4	L2691	
L2692	C/7	2692	2691	PIPE	0.013	122	18	240.85	239.10	1.4	13	3.5	5.4	L2692	
L2693	C/7	2693	2692	PIPE	0.013	111	18	242.92	240.85	1.9	14	3.5	5.4	L2693	
L2694	C/7	2694	2693	PIPE	0.013	62	12	245.63	242.92	4.3	7.4	3.5	5.4	L2694	
L2700	C/7	2700	2694	PIPE	0.013	154	12	246.80	245.63	0.8	3.1	3.5	5.4	L2700	
L2704	C/7	2704	2690	PIPE	0.013	249	21	244.47	235.10	3.8	31	7.9	7.9	L2704	
L2705	C/7	2705	2704	PIPE	0.013	261	18	250.85	244.47	2.4	16	7.9	7.9	L2705	
L3009	C/8	3010	3005	DITCH	0.025	633	24	194.80	185.90	1.4	39	64.4	73.3	L3009	
L3010	C/8	3011	3010	CULVERT	0.02	26	18	195.50	194.80	2.7	11	61.0	69.1	L3010	17
L3018	C/8	3018	3005	PIPE	0.013	27	36	186.20	185.90	1.1	71	24.8	24.8	L3018	
L3019	C/8	3019	3018	PIPE	0.013	302	36	187.80	186.20	0.5	49	13.1	13.4	L3019	
L3020	C/8	3020	3019	PIPE	0.013	490	36	193.34	187.80	1.1	71	13.0	14.0	L3020	
L3021	C/8	3021	3020	PIPE	0.013	487	36	195.78	193.34	0.5	47	13.1	14.1	L3021	
L3022	C/8	3022	3021	PIPE	0.013	177	36	196.66	195.78	0.5	47	13.1	14.1	L3022	
L3023	C/8	3023	3022	PIPE	0.013	211	36	197.70	196.66	0.5	47	13.2	14.2	L3023	
L3024	C/8	3024	3023	PIPE	0.013	90	27	197.50	197.00	0.6	23	13.2	14.1	L3024	
L3025	C/8	3025	3024	PIPE	0.013	169	27	198.13	197.50	0.4	19	13.2	14.1	L3025	
L3050	C/8	3050	3011	DITCH	0.025	362	24	200.10	195.50	1.3	38	59.6	65.7	L3050	
L3060	C/8	3060	3146	DITCH	0.025	269	24	268.00	267.00	0.4	66	27.4	27.4	L3060	
L3100	C/8	3100	3050	PIPE	0.013	243	36	202.00	200.10	0.8	59	60.4	67.7	L3100	
L3105	C/8	3105	3100	PIPE	0.013	336	24	209.55	202.00	2.2	34	12.8	16.5	L3105	
L3110	C/8	3110	3105	PIPE	0.013	128	24	215.00	209.55	4.3	47	12.8	15.0	L3110	
L3113	C/8	3113	3100	PIPE	0.013	224	36	203.86	202.00	0.8	61	47.8	55.4	L3113	
L3114	C/8	3114	3113	PIPE	0.013	135	30	205.02	203.86	0.9	38	47.9	55.5	L3114	18
L3115	C/8	3115	3114	PIPE	0.013	291	30	207.38	205.02	0.8	37	48.0	55.8	L3115	18
L3116	C/8	3116	3115	PIPE	0.013	155	30	209.37	207.38	1.3	46	47.9	56.1	L3116	
L3117	C/8	3117	3116	PIPE	0.013	201	30	210.37	209.37	0.5	29	43.6	51.9	L3117	
L3118	C/8	3118	3117	PIPE	0.013	126	30	213.40	210.37	2.4	64	43.6	51.9	L3118	
L3119	C/8	3119	3118	PIPE	0.013	130	30	214.31	213.40	0.7	34	43.6	51.9	L3119	
L3120	C/8	3120	3119	PIPE	0.013	207	30	219.77	214.31	2.6	67	43.6	52.0	L3120	
L3121	C/8	3121	3120	PIPE	0.013	207	15	220.64	219.77	0.4	4.2	2.0	2.0	L3121	
L3130	C/8	3138	3120	PIPE	0.013	265	27	222.95	219.77	1.2	34	42.1	52.6	L3130	19
L3139	C/8	3139	3138	PIPE	0.013	55	30	223.50	222.95	1.0	41	42.1	53.5	L3139	

L3000 36 37 89.2 93.1

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
CHEHALEM CREEK BASIN (continued)															
L3140	C/8	3140	3139	PIPE	0.013	141	30	224.32	223.50	0.6	31	39.6	50.0	L3140	
L3141	C/8	3141	3140	PIPE	0.013	160	27	232.43	224.32	5.1	70	38.1	49.4	L3141	
L3142	C/8	3142	3141	PIPE	0.013	129	24	237.38	232.43	3.8	44	38.1	49.0	L3142	
L3143	C/8	3143	3142	PIPE	0.013	331	24	253.00	237.38	4.7	49	38.1	47.9	L3143	
L3144	C/8	3144	3143	PIPE	0.013	108	27	254.50	253.00	1.4	37	38.1	47.9	L3144	
L3145	C/8	3145	3144	PIPE	0.013	240	18	257.04	254.50	1.1	11	38.1	47.9	L3145	20
L3146	C/8	3146	3145	DITCH	0.025	904	24	267.00	257.04	1.1	82	33.4	33.8	L3146	
L3148	C/8	3148	3140	PIPE	0.013	7	18	224.40	224.32	1.1	3.5	1.9	3.8	L3148	21
L3150	C/8	3150	3148	PIPE	0.013	140	18	225.55	224.40	0.8	9.5	2.1	2.7	L3150	
L3169	C/8	3169	3150	PIPE	0.013	65	12	227.03	225.55	2.3	5.4	2.3	2.8	L3169	
L3170	C/8	3170	3169	PIPE	0.013	241	10	240.32	227.03	5.5	5.1	2.3	2.7	L3170	
L3200	C/8	3205	3110	PIPE	0.013	435	24	215.40	215.00	0.1	6.9	12.8	13.6	L3200	
L3210	C/8	3210	3205	PIPE	0.013	110	15	216.60	215.40	1.1	6.8	2.9	2.9	L3210	
L3300	C/8	3300	3205	PIPE	0.013	224	21	215.70	215.40	0.1	5.8	10.5	11.0	L3300	
L3400	C/8	3400	3300	PIPE	0.013	170	18	216.90	215.70	0.7	8.8	10.5	11.0	L3400	22
L3405	C/8	3405	3400	PIPE	0.013	50	18	217.30	216.90	0.8	9.4	10.5	11.0	L3405	22
L3410	C/8	3410	3405	PIPE	0.013	109	18	218.40	217.30	1.0	11	10.5	11.0	L3410	22
L3415	C/8	3415	3410	PIPE	0.013	98	18	219.40	218.40	1.0	11	10.8	11.0	L3415	
L3420	C/8	3420	3415	PIPE	0.013	246	54	222.80	219.40	1.4	231	11.8	12.1	L3420	
L3500	C/8	3500	3420	PIPE	0.013	248	36	236.00	222.80	5.3	154	11.8	12.1	L3500	
L3502	C/8	3502	3500	PIPE	0.013	113	12	245.50	236.00	8.4	10	6.3	6.4	L3502	
L3504	C/8	3504	3502	PIPE	0.013	422	12	258.10	245.50	3.0	6.2	3.6	3.6	L3504	
L3506	C/8	3506	3504	PIPE	0.013	158	12	259.10	258.10	0.6	2.8	3.6	3.6	L3506	
L3508	C/8	3508	3506	PIPE	0.013	313	12	261.00	259.10	0.6	2.8	3.6	3.6	L3508	
L3510	C/8	3510	3502	PIPE	0.013	119	12	250.50	245.50	4.2	7.3	3.2	3.2	L3510	
L3512	1.00	3512	3510	PIPE	0.013	112	12	253.30	250.50	2.5	5.6	3.2	3.2	L3512	
L3514	C/8	3514	3512	PIPE	0.013	129	12	255.30	253.30	1.5	4.4	3.2	3.2	L3514	
L3516	C/8	3045	3514	PIPE	0.013	116	12	259.68	255.30	3.8	6.9	3.3	3.3	L3516	

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
SPRING BROOK BASIN															
L8010	S/1 OUT	8010	8005	DITCH	0.025	136	24	154.00	110.00	32.4	189	8.1	10.3	L8010	
L8011	S/1 OUT	8011	8010	PIPE	0.013	501	21	156.95	155.00	0.4	9.9	8.1	10.3	L8011	
L8012	S/1	8012	8011	PIPE	0.013	503	21	158.20	156.95	0.2	7.9	8.1	10.5	L8012	
L8013	S/1	8013	8012	PIPE	0.013	356	21	159.08	158.20	0.2	7.9	5.9	6.2	L8013	
L8014	S/1	8014	8013	PIPE	0.013	376	18	160.30	159.37	0.2	5.2	5.9	6.2	L8014	
L8015	S/1	8015	8014	PIPE	0.013	176	18	160.75	160.30	0.3	5.3	3.8	4.2	L8015	
L8016	S/1	8016	8015	PIPE	0.013	476	18	162.42	160.75	0.4	6.2	3.8	4.2	L8016	
L8017	S/1	8017	8016	PIPE	0.013	499	15	163.98	162.73	0.3	3.2	3.0	3.0	L8017	
L8018	S/1	8018	8017	PIPE	0.013	499	15	165.23	163.98	0.3	3.2	1.7	1.8	L8018	
L8019	S/1	8019	8018	PIPE	0.013	424	12	166.55	165.48	0.3	1.8	1.7	1.8	L8019	
L8120	S/2	8120	8110	PIPE	0.024	95	48	138.80	137.80	1.1	80	105	149	L8120	
L8125	S/2	8125	8120	DITCH	0.025	67	24	159.00	138.80	30.2	183	19.3	24.0	L8125	
L8130	S/2	8130	8125	PIPE	0.013	662	24	173.00	160.00	2.0	32	19.5	24.0	L8130	
L8132	S/2	8132	8130	CULVERT	0.024	37	12	174.00	173.00	2.7	3.2	1.7	3.2	L8132	
L8135	S/2	8135	8130	PIPE	0.013	69	24	174.30	173.00	1.9	31	13.4	13.4	L8135	
L8137	S/2	8137	8135	PIPE	0.013	26	12	175.00	174.30	2.7	5.8	13.4	13.4	L8137	
L8140	S/2	8140	8132	CULVERT	0.024	43	12	175.00	174.00	2.4	3.0	1.7	3.3	L8140	
L8150	S/2	8150	8137	PIPE	0.013	526	24	178.00	175.00	0.6	17	13.4	13.4	L8150	
L8160	S/2	8160	8150	DITCH	0.025	484	24	179.71	178.00	0.4	20	9.2	9.2	L8160	
L8165	S/2	8165	8160	PIPE	0.013	213	15	180.40	179.71	0.3	3.7	3.7	3.7	L8165	
L8175	S/2	8175	8140	PIPE	0.013	632	24	179.50	175.50	0.6	18	1.7	3.7	L8175	
L8180	S/2	8180	8175	PIPE	0.013	99	12	180.75	179.90	0.9	3.3	1.8	3.7	L8180	
L8185	S/2	8185	8180	PIPE	0.013	179	8	182.33	181.00	0.7	1.1	2.1	3.7	L8185	1
L8210	S/2	8210	8120	STREAM	0.05	1394	0	158.00	138.80	1.4	N/A	91.9	131	L8210	
L8220	S/2	8220	8210	PIPE	0.013	402	12	185.00	165.00	5.0	7.9	6.6	6.6	L8220	
L8235	S/2	8235	8210	STREAM	0.05	1011	0	176.00	158.00	1.8	N/A	79.7	107	L8235	
L8240	S/2	8240	8235	PIPE	0.013	96	18	182.50	178.00	4.7	23	7.2	7.2	L8240	
L8245	S/2	8245	8235	CULVERT	0.02	120	60	180.00	176.00	3.3	309	73.0	99.0	L8245	
L8255	S/2	8255	8245	PIPE	0.013	90	30	190.42	188.95	1.6	52	11.4	14.4	L8255	
L8256	S/2	8256	8255	PIPE	0.013	246	27	194.81	190.42	1.8	41	11.4	14.4	L8256	
L8258	S/2	8258	8256	PIPE	0.013	162	24	197.62	195.01	1.6	29	5.6	5.6	L8258	
L8260	S/2	8260	8258	PIPE	0.013	408	24	201.43	197.72	0.9	22	5.6	5.6	L8260	
L8265	S/2	8265	8256	PIPE	0.013	99	18	197.83	194.81	3.1	18	5.9	9.2	L8265	
L8270	S/2	8270	8265	PIPE	0.013	164	12	198.42	197.83	0.4	2.1	5.9	9.2	L8270	2
L8275	S/2	8275	8270	PIPE	0.013	258	12	203.31	198.42	1.9	4.9	7.0	7.0	L8275	2
L8300	S/2	8300	8245	PIPE	0.013	148	42	182.36	182.00	0.2	50	60.0	85.0	L8300	
L8310	S/2	8310	8300	PIPE	0.013	65	36	183.61	182.36	1.9	93	54.5	78.0	L8310	
L8312	S/2	8312	8310	PIPE	0.013	95	16	193.65	189.75	4.1	15	7.0	7.0	L8312	
L8315	S/2	8315	8312	PIPE	0.013	148	16	197.50	193.65	2.6	12	7.0	7.0	L8315	
L8320	S/2	8320	8315	PIPE	0.013	88	12	200.00	197.50	2.9	6.0	3.2	3.2	L8320	
L8325	S/2	8325	8315	PIPE	0.013	380	12	201.60	197.50	1.1	3.7	3.9	4.1	L8325	

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
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SPRING BROOK BASIN (continued)															
L8330	S/3	8330	8310	CULVERT	0.024	121	36	185.00	183.60	1.2	39	48.0	71.0	L8330	
L8332	S/3	8332	8330	PIPE	0.013	117	36	186.37	185.77	0.5	48	46.2	70.0	L8332	
L8334	S/3	8334	8332	CULVERT	0.024	441	36	188.60	186.44	0.5	25	47.0	70.0	L8334	3
L8335	S/3	8335	8334	PIPE	0.013	377	24	197.00	189.00	2.1	33	13.9	14.0	L8335	
L8345	S/3	8345	8335	PIPE	0.013	342	24	203.84	197.00	2.0	32	10.7	11.0	L8345	
L8355	S/3	8355	8345	PIPE	0.013	255	15	206.93	203.84	1.2	7.1	3.1	3.1	L8355	
L8360	S/3	8360	8345	PIPE	0.013	775	18	208.50	203.84	0.6	8.1	5.5	5.5	L8360	
L8365	S/3	8365	8360	PIPE	0.013	485	18	218.94	208.50	2.2	15	2.9	2.9	L8365	
L8375	S/3	8375	8365	PIPE	0.013	456	15	227.00	218.94	1.8	8.6	2.9	2.9	L8375	
L8400	S/3	8400	8334	PIPE	0.013	65	42	190.20	189.10	1.7	131	48.4	81.0	L8400	
L8410	S/3	8410	8412	PIPE	0.013	91	12	194.50	194.00	0.6	2.6	5.9	5.9	L8410	
L8412	S/3	8412	8400	PIPE	0.013	149	42	194.00	190.50	2.3	154	44.0	76.0	L8412	
L8415	S/3	8415	8412	PIPE	0.013	240	42	199.50	194.00	2.3	152	41.0	72.0	L8415	
L8420	S/3	8420	8415	PIPE	0.013	159	12	204.50	199.50	3.1	6.3	6.9	8.5	L8420	
L8425	S/3	8425	8415	PIPE	0.013	222	42	202.00	199.50	1.1	107	38.5	66.0	L8425	
L8500	S/3	8500	8425	DITCH	0.025	544	24	206.00	202.00	0.7	29	37.1	61.0	L8500	
L8505	S/3	8505	8500	PIPE	0.013	85	24	206.55	206.00	0.6	18	37.1	62.0	L8505	4
L8510	S/3	8510	8505	PIPE	0.013	331	10	209.68	206.60	0.9	2.1	2.5	3.4	L8510	4
L8520	S/3	8520	8505	PIPE	0.013	145	24	208.30	206.60	1.2	25	36.1	59.0	L8520	4
L8530	S/3	8530	8520	PIPE	0.013	220	21	209.79	208.50	0.6	12	9.0	13.5	L8530	
L8535	S/3	8535	8530	PIPE	0.013	180	12	213.00	209.79	1.8	4.8	1.7	1.7	L8535	
L8540	S/3	8540	8535	PIPE	0.013	61	12	213.50	213.00	0.8	3.2	1.7	1.7	L8540	
L8545	S/3	8545	8530	PIPE	0.013	339	15	213.55	210.00	1.0	6.6	5.2	9.9	L8545	5
L8550	S/3	8550	8545	PIPE	0.013	171	15	217.58	214.14	2.0	9.2	5.6	10.0	L8550	5
L8560	S/3	8560	8550	PIPE	0.013	515	12	224.00	217.63	1.2	4.0	2.4	7.2	L8560	5
L8570	S/3	8570	8560	PIPE	0.013	487	12	234.00	225.00	1.8	4.8	1.8	4.8	L8570	
L8600	S/3	8600	8520	PIPE	0.013	378	60	209.30	206.50	0.7	120	30.2	46.0	L8600	
L8605	S/3	8605	8600	PIPE	0.013	281	12	211.00	209.20	0.6	2.8	3.5	3.5	L8605	
L8615	S/3	8615	8605	PIPE	0.013	602	12	223.00	211.00	2.0	5.0	2.8	2.8	L8615	
L8620	S/3	8620	8600	PIPE	0.013	68	36	210.80	210.20	0.9	63	28.4	42.8	L8620	
L8625	S/3	8625	8620	PIPE	0.013	68	27	211.40	211.00	0.6	24	28.4	43.0	L8625	6
L8627	S/3	8627	8625	PIPE	0.013	61	15	213.03	212.20	1.4	7.5	3.8	3.8	L8627	
L8630	S/3	8630	8627	PIPE	0.013	236	15	218.54	213.33	2.2	9.6	3.8	3.8	L8630	
L8640	S/3	8640	8625	PIPE	0.013	441	27	215.20	211.60	0.8	28	26.7	39.0	L8640	6
L8645	S/3	8645	8640	PIPE	0.013	32	30	216.25	215.70	1.7	54	26.7	40.0	L8645	
L8650	S/3	8650	8645	PIPE	0.013	361	21	222.05	216.25	1.6	20	3.3	3.3	L8650	
L8652	S/3	8652	8645	PIPE	0.013	285	30	217.26	216.25	0.4	24	24.6	36.0	L8652	
L8655	S/3	8655	8652	PIPE	0.013	248	27	220.03	217.51	1.0	31	24.4	36.0	L8655	
L8660	S/3	8660	8655	PIPE	0.013	92	27	220.75	220.03	0.8	27	24.4	36.0	L8660	
L8665	S/3	8665	8660	PIPE	0.013	117	24	222.94	221.05	1.6	29	22.3	34.0	L8665	
L8667	S/3	8667	8665	PIPE	0.013	257	21	226.07	223.04	1.2	17	22.3	34.0	L8667	7

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
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SPRING BROOK BASIN (continued)															
L8670	S/3	8670	8667	CULVERT	0.02	38	21	228.80	228.55	0.7	8.3	22.3	34.0	L8670	7
L8675	S/3	8675	8670	PIPE	0.013	252	12	233.00	229.00	1.6	4.5	3.2	9.4	L8675	7
L8685	S/3	8685	8675	DITCH	0.025	410	24	241.50	234.00	1.8	45	2.1	6.1	L8685	
L8690	S/3	8690	8685	CULVERT	0.02	54	24	242.00	241.50	0.9	14	2.2	6.4	L8690	
L8700	S/3	8700	8670	PIPE	0.013	709	21	235.00	229.00	0.8	15	14.2	21.0	L8700	7
L8705	S/3	8705	8700	PIPE	0.013	56	21	235.50	235.00	0.9	15	9.5	14.0	L8705	7
L8710	S/3	8710	8705	DITCH	0.025	868	24	243.00	236.00	0.8	30	6.5	6.5	L8710	
L8715	S/3	8715	8710	DITCH	0.025	219	24	245.00	243.00	0.9	32	7.6	7.6	L8715	
L8720	S/3	8720	8715	CULVERT	0.02	39	12	246.00	245.60	1.0	2.3	7.8	7.8	L8720	8
L8725	S/3	8725	8700	PIPE	0.013	490	12	244.00	235.00	1.8	4.8	5.4	7.4	L8725	8
L8735	S/3	8735	8725	PIPE	0.013	317	12	252.00	245.00	2.2	5.3	6.9	6.9	L8735	8
L9000	S/5	9010	9000	CULVERT	0.02	73	70	117.10	115.90	1.6	327	109	167	L9000	
L9020	S/5	9020	9010	STREAM	0.05	1101	0	119.00	117.10	0.2	N/A	109	167	L9020	
L9030	S/5	9030	9020	STREAM	0.05	2390	0	127.00	119.00	0.3	N/A	111	171	L9030	
L9040	S/5	9040	9030	STREAM	0.05	2024	0	135.00	127.00	0.4	N/A	103	117	L9040	
L9045	S/5	9045	9040	STREAM	0.05	841	0	137.00	135.00	0.2	N/A	104	122	L9045	
L9050	S/5	9050	9045	STREAM	0.05	744	0	139.00	137.00	0.3	N/A	104	122	L9050	
L9060	S/5	9060	9050	STREAM	0.05	1554	0	143.00	139.00	0.3	N/A	26.0	26.0	L9060	
L9070	S/5	9070	9060	CULVERT	0.02	306	48	143.40	143.20	0.1	24	12.2	12.2	L9070	
L9075	S/5	9075	9050	STREAM	0.05	1133	0	150.00	139.00	1.0	N/A	93.9	116	L9075	
L9077	S/5	9075	9050	STREAM	0.05	532	0	151.00	150.00	0.2	N/A	67.5	74.0	L9077	
L9080	S/5	9085	9080	CULVERT	0.02	185	48	152.70	151.00	0.9	89	67.5	74.0	L9080	
L9100	S/5	9100	9085	STREAM	0.05	1547	0	177.00	152.70	1.6	N/A	59.6	67.7	L9100	
L9102	S/5	9102	9100	DITCH	0.025	60	24	185.00	177.80	11.9	115	10.6	10.6	L9102	
L9104	S/5	9104	9102	PIPE	0.013	170	18	210.00	186.00	14.1	39	10.6	10.6	L9104	
L9110	S/5	9110	9100	STREAM	0.05	1155	0	197.00	177.00	1.7	N/A	32.3	32.3	L9110	
L9115	S/5	9115	9100	STREAM	0.05	2539	0	224.00	177.00	1.9	N/A	29.0	41.1	L9115	
L9120	S/5	9120	9115	STREAM	0.025	683	0	260.20	224.00	5.3	N/A	29.0	36.0	L9120	
L9122	S/5	9122	9120	CULVERT	0.02	31	36	263.40	260.20	10.5	140	29.9	37.9	L9122	
L9125	S/5	9125	9122	CULVERT	0.02	39	36	267.00	265.20	4.6	93	29.9	37.9	L9125	
L9134	S/5	9135	9075	LAKE	0	532	0	168.00	150.00	3.4	42	28.0	44.0	L9134	
L9135	S/5	9140	9135	DITCH	0.025	513	24	173.00	168.00	1.0	33	25.5	44.0	L9135	
L9140	S/4	9150	9140	CULVERT	0.02	143	24	174.80	174.20	0.4	9.5	31.0	44.0	L9140	9
L9155	S/4	9155	9150	DITCH	0.025	238	24	185.00	175.00	4.2	68	31.0	44.0	L9155	
L9165	S/4	9165	9155	DITCH	0.025	911	24	202.00	185.00	1.9	45	3.6	3.6	L9165	
L9170	S/4	9170	9165	PIPE	0.013	226	8	214.00	202.00	5.3	2.8	1.9	1.9	L9170	
L9180	S/4	9180	9155	DITCH	0.025	905	24	205.00	185.00	2.2	49	26.9	39.0	L9180	
L9182	S/4	9182	9180	DITCH	0.025	772	24	230.00	205.00	3.2	60	1.4	5.0	L9182	
L9185	S/4	9185	9182	PIPE	0.013	44	12	231.00	230.00	2.3	5.4	1.4	5.2	L9185	
L9200	S/4	9200	9180	DITCH	0.025	182	24	209.16	205.00	2.3	50	23.9	35.0	L9200	
L9202	S/4	9202	9200	PIPE	0.013	313	36	209.56	209.16	0.1	24	23.8	35.0	L9202	

Conveyance Element Hydraulic Parameters												Model Results 10-Year Storm Peak Discharge (cfs)		Conduit Id	CIP Number
Conduit Id	Subbasin Name/No.	Up/From Node No.	Down/To Node No.	Type	Roughness Coeff.	Length (ft)	Size (depth) (in)	Up/From Invert Elev. (ft)	Down/To Invert Elev. (ft)	Slope (%)	Existing Capacity (cfs)	Existing Land Use	Future Land Use		
SPRING BROOK BASIN (continued)															
L9205	S/4	9205	9202	PIPE	0.013	183	12	218.73	216.03	1.5	4.3	3.1	3.1	L9205	
L9210	S/4	9210	9202	PIPE	0.013	211	36	210.16	209.61	0.3	34	21.2	32.0	L9210	
L9220	S/4	9220	9210	PIPE	0.013	321	36	211.50	210.21	0.4	42	18.9	30.0	L9220	
L9225	S/4	9225	9220	PIPE	0.013	176	27	212.09	211.55	0.3	17	18.9	30.0	L9225	
L9235	S/4	9235	9225	PIPE	0.013	486	15	215.79	212.14	0.8	5.6	6.9	17.0	L9235	10
L9245	S/4	9245	9235	PIPE	0.013	553	12	222.46	215.84	1.2	3.9	5.9	14.4	L9245	10
L9250	S/4	9250	9245	PIPE	0.013	57	12	222.67	222.46	0.4	2.2	4.0	12.2	L9250	10
L9255	S/4	9255	9250	PIPE	0.013	406	12	232.75	222.67	2.5	5.6	4.5	12.4	L9255	10
L9260	S/4	9260	9225	PIPE	0.013	252	24	212.77	212.14	0.2	11	9.4	11.0	L9260	
L9265	S/4	9265	9260	PIPE	0.013	124	21	213.12	212.82	0.2	7.8	8.0	9.4	L9265	
L9285	S/4	9285	9265	PIPE	0.013	256	18	213.81	213.17	0.3	5.3	5.9	7.0	L9285	
L9290	S/4	9290	9285	PIPE	0.013	125	8	215.42	213.91	1.2	1.3	4.0	4.0	L9290	11

APPENDIX E

Alternatives Analysis Results

Group	Existing Conduit Hydraulic Parameters								Upsize Conduit	Alternative Analysis Results			Comments
										Design Criteria	No Surcharge No Flooding		
	Conduit Id	Drainage System Map No.	Subbasin Name/No.	Location Description	Type	Rough -ness Coeff.	Length (ft)	Slope (%)	Existing Design Capacity (cfs)	Exist ⇒ New Diameter (in)	New Design Capacity (cfs)	Future Peak Flow 10 year (cfs)	Problem Area (see Table 3)	
1	L4218	2	H/1	West side of Wynooski St, south of 11th St	PIPE	0.013	130	1.0	3.6	12 ⇒ 18	11.0	9.3		
	L4220	2	H/1	West side of Wynooski St, south of 11th St	PIPE	0.013	99	0.6	2.8	12 ⇒ 21	12.0	9.4		
	L4225	2	H/1	West side of Wynooski St, south of 11th St	PIPE	0.013	135	1.0	3.6	12 ⇒ 18	11.0	9.5		
2	L4370	3	H/2	Across Hwy 219, north of 9th St	CULVERT	0.02	66	1.5	8.4	18 ⇒ 30	33.0	27.1		
3	L4390	5	H/2	East side of Hwy 219, south of 2nd St	PIPE	0.013	93	1.1	3.7	12 ⇒ 21	16.0	11.5		
4	L5030	4	H/4	Across Wynooski St, south of 7th Ave	PIPE	0.013	65	1.5	8.0	15 ⇒ 18	13.0	10.6	21	
	L5040	4	H/4	Wynooski St, north of 7th Ave	PIPE	0.013	635	1.5	2.7	10 ⇒ 18	13.0	6.1	20,11	
	L5050	4	H/4	Wynooski St, south of 5th Ave	PIPE	0.013	618	0.2	0.9	10 ⇒ 18	4.2	2.8	20,11	
5	L5110	4	H/4	Church St and 3rd St	PIPE	0.013	545	4.3	7.4	12 ⇒ 18	22.0	13.9	18	
	L5112	4	H/4	Church St, north of 2nd St	PIPE	0.013	347	0.6	2.9	12 ⇒ 18	8.4	7.7		
	L5115	4	H/4	Hwy 219, west of Everest St	PIPE	0.013	593	0.6	2.9	12 ⇒ 18	8.5	7.9		
6	L5233	4	H/5	2nd St, between Meridian and Center St	PIPE	0.013	248	0.5	2.6	12 ⇒ 15	4.7	4.3		
	L5234	4	H/5	2nd St and Meridian St	PIPE	0.013	12	0.5	2.6	12 ⇒ 15	4.7	4.4		
	L5235	4	H/5	2nd St, between Edwards and Meridian St	PIPE	0.013	209	0.5	2.6	12 ⇒ 15	4.7	4.6		
7	L5284	6	H/5	Hancock St, between School and Meridian St	PIPE	0.013	922	0.7	5.5	15 ⇒ 18	8.9	6.8		
	L5285	6	H/5	Hancock St, west of School St	PIPE	0.013	94	0.3	3.6	15 ⇒ 21	8.9	7.2		
8	L5314	7	H/5	Carlton Way	PIPE	0.013	305	1.3	4.1	12 ⇒ 18	12.0	7.5	23	
	L5315	7	H/5	Sheridan St, between River and Carlton Way	PIPE	0.013	451	1.0	3.6	12 ⇒ 18	11.0	7.5		
	L5320	6	H/5	Sherman St, between Meridian and River St	PIPE	0.013	856	0.5	2.5	12 ⇒ 15	4.6	4.4		
9	L5430	8	H/6	Portland Rd, west of Elliott Ave	PIPE	0.013	286	0.4	2.3	12 ⇒ 18	6.8	4.7		
10	L5564	6	H/5	Center St, south of Vermillion St	PIPE	0.013	277	0.2	1.5	12 ⇒ 24	9.6	11.1		Slopes are flat and <2ft min. cover, allowed 1.5 ft of surcharge.
	L5565	6	H/5	Across Vermillion St, east of Meridian St	PIPE	0.013	265	0.2	1.5	12 ⇒ 24	9.7	11.2		Slopes are flat and <2ft min. cover, allowed 1.5 ft of surcharge.
	L5573	6	H/5	Vermillin St, across Meridian St	PIPE	0.013	40	0.2	1.8	12 ⇒ 24	11.0	9.5		
	L5574	6	H/5	Vermillin St, west of Meridian St	PIPE	0.013	116	0.2	1.7	12 ⇒ 24	11.0	9.5		
	L5575	6	H/5	Vermillin St, east of Edwards St	PIPE	0.013	69	0.2	1.7	12 ⇒ 24	11.0	9.5		
	L5582	6	H/5	North of Vermillin St, west of Meridian St	PIPE	0.013	114	0.4	2.4	12 ⇒ 18	6.9	5.3		
	L5583	6	H/5	North of Vermillin St, west of Meridian St	PIPE	0.013	95	0.4	2.3	12 ⇒ 18	6.8	5.3		
	L5584	6	H/5	South of RR, east of College St	PIPE	0.013	119	0.1	1.0	12 ⇒ 24	6.6	5.3	24	
	L5585	6	H/5	Across RR, east of College St	CULVERT	0.024	62	0.8	1.7	12 ⇒ 24	11.0	5.3	24	

Group	Existing Conduit Hydraulic Parameters									Upsize Conduit	Alternative Analysis Results			Comments
											Design Criteria	No Surcharge No Flooding		
	Conduit Id	Drainage System Map No.	Subbasin Name/No.	Location Description	Type	Rough-ness Coeff.	Length (ft)	Slope (%)	Existing Design Capacity (cfs)	Exist ⇒ New Diameter (in)	New Design Capacity (cfs)	Future Peak Flow 10 year (cfs)	Problem Area (see Table 3)	
11	L5645	7	H/6	Sitka St, north of Oak Dr	PIPE	0.013	347	0.4	2.3	12 ⇒ 21	10.0	8.1		
	L5655	7	H/6	North of Oak St, Sitka to Hulet St	PIPE	0.013	252	0.5	2.5	12 ⇒ 18	7.2	6.3		
	L5656	7	H/6	Across Hulet, north of Sitka St	PIPE	0.013	30	1.0	3.6	12 ⇒ 18	11.0	6.3		
12	L5709	7	H/5	Across Fulton St, east of Center St	PIPE	0.013	248	0.4	0.8	8 ⇒ 12	2.3	2.1		
	L5710	7	H/5	East end of Cherry St	PIPE	0.013	57	3.5	1.1	6 ⇒ 12	6.7	2.2		
13	L5960	12	H/7	Across RR, south of Crestview Dr	PIPE	0.013	53	3.4	6.6	12 ⇒ 24	42.0	16.7	16	Backwatered by the downstream ditch.
	L5964	12	H/7	South of Aspen Way	PIPE	0.013	157	0.3	2.0	12 ⇒ 24	13.0	10.9	16	
14	L6021	9	H/CREEK	Villa Rd Culvert	CULVERT	0.024	55	0.4	13.0	30 ⇒ 60	85.0	75.4		
15	L6215	11	H/8	West of Herman St	PIPE	0.013	44	4.5	22.0	18 ⇒ 24	48.0	32.6		
	L6225	11	H/8	West of Herman St	PIPE	0.013	146	3.1	18.0	18 ⇒ 24	40.0	26.8		
	L6239	11	H/8	West of Herman St	PIPE	0.013	184	1.9	14.0	18 ⇒ 24	31.0	21.3		
	L6240	11	H/8	West of Herman St	PIPE	0.013	46	1.3	12.0	18 ⇒ 24	26.0	21.2		
	L6245	11	H/8	West of Herman St	PIPE	0.013	225	0.4	4.3	15 ⇒ 30	27.0	21.2		
	L6254	11	H/8	West of Herman St	PIPE	0.013	261	0.6	4.9	15 ⇒ 30	31.0	21.2		
	L6255	11	H/8	Herman St	PIPE	0.013	184	0.8	5.8	15 ⇒ 24	20.0	15.8		
	L6270	11	H/8	Herman St, south of Mountainview Rd	PIPE	0.013	636	0.1	2.4	15 ⇒ 30	12.0	10.9	44	
16	L6555	12	H/9	Across Aspen Way, north of Mountainview Rd	CULVERT	0.02	39	1.3	2.6	12 ⇒ 24	17.0	15.9		
17	L6980	16	H/9	Bell Rd, east of Zimri Dr	CULVERT	0.02	44	2.0	3.3	12 ⇒ 21	15.0	6.5		
1	L1131	2	C/1	West of College St, south of Andrew St	CULVERT	0.02	43	0.7	12.0	24 ⇒ 48	75.0	66.8		
	L1140	2	C/1	Across College St, south of Andrew St	CULVERT	0.02	87	0.3	7.4	24 ⇒ 48	47.0	60.9		Pass 10 yr flow with X ft surcharge.
2	L1162	2	C/1	Along River St, south of 10th St	PIPE	0.013	320	0.3	1.2	10 ⇒ 18	5.9	5.3		
	L1163	2	C/1	Along River St, south of 11th St	PIPE	0.013	284	0.4	1.3	10 ⇒ 21	9.4	8.6		
	L1164	2	C/1	Cul-de-sac 11th St	PIPE	0.013	223	1.0	10.0	18 ⇒ 24	22.0	13.1		
3	L1180	2	C/1	South of 9th St and west of Center St	PIPE	0.013	91	7.7	26.0	18 ⇒ 36	165.0	41.1		
	L1181N	2	C/1	New pipe along Center St, from 8th to 9th St	PIPE	0.013	352	0.1	-	0 ⇒ 30	26.0	25.0		New additional pipe along street rather than upsizing L1181.
	L1182	4	C/1	Across Center St, south of 8th St	PIPE	0.013	69	2.9	11.0	15 ⇒ 30	70.0	12.5		
	L1183	4	C/1	Along 8th St, between Center and Chehalem St	PIPE	0.013	511	0.0	1.3	15 ⇒ 36	13.0	12.5		
	L1184	4	C/1	Along 8th St, between Chehalem and Willamette St	PIPE	0.013	245	0.4	3.9	15 ⇒ 18	6.4	6.2		

Group	Existing Conduit Hydraulic Parameters									Upsize Conduit	Alternative Analysis Results			
											Design Criteria	No Surcharge No Flooding		
	Conduit Id	Drainage System Map No.	Subbasin Name/No.	Location Description	Type	Rough -ness Coeff.	Length (ft)	Slope (%)	Existing Design Capacity (cfs)	Exist ⇒ New Diameter (in)	New Design Capacity (cfs)	Future Peak Flow 10 year (cfs)	Problem Area (see Table 3)	Comments
3 CONT	L1185	4	C/1	Along 8th St, Willamette and Columbia St	PIPE	0.013	258	0.5	4.8	15 ⇒ 18	7.7	6.2		
	L1186	4	C/1	Along Center St, south of 8th St	PIPE	0.013	71	0.1	3.9	18 ⇒ 36	25.0	25.1		Pass 10 yr flow with less than 1 ft surcharge.
	L1187	4	C/1	Along Center St, north of 8th St	PIPE	0.013	55	0.2	4.5	18 ⇒ 36	29.0	20.1		
	L1188	4	C/1	Along Center St, between 7th and 8th St	PIPE	0.013	310	0.1	3.9	18 ⇒ 36	25.0	20.1		
	L1189	4	C/1	Along 7th St, between Center and River St	PIPE	0.013	260	0.3	2.0	12 ⇒ 18	5.8	5.6		
	L1190	4	C/1	Along 7th St, between River and Chehalem St	PIPE	0.013	265	0.3	2.0	12 ⇒ 18	5.8	5.6		
	L1191	4	C/1	Along Center St, between 6th and 7th St	PIPE	0.013	377	1.1	11.0	18 ⇒ 24	24.0	14.7		
	L1193	4	C/1	Along Center St, between 3rd and 4th St	PIPE	0.013	320	0.5	2.4	12 ⇒ 18	7.2	7.1		
	L1194	4	C/1	Along 8th St, west of Center St	PIPE	0.013	423	0.5	1.5	10 ⇒ 18	7.4	5.2		
4	L1450	3	C/2	Across 5th St, west of Blaine St	PIPE	0.013	546	2.0	12.0	18 ⇒ 24	26.0	17.3	29/30	
	L1451	4	C/2	Across Blaine St, north of 5th St	PIPE	0.013	83	4.8	23.0	18 ⇒ 24	50.0	15.1		
5	L1464	3	C/2	West of Blaine St, north of 8th St	PIPE	0.013	228	3.5	6.7	12 ⇒ 24	43.0	8.1		
	L1465	3	C/2	West of Blaine St, north of 8th St	PIPE	0.013	98	2.8	6.0	12 ⇒ 24	38.0	8.1		
	L1466	4	C/2	West of Blaine St, north of 8th St	PIPE	0.013	137	0.5	2.4	12 ⇒ 24	15.0	8.1		
	L1467	4	C/2	West of Blaine St, north of 8th St	PIPE	0.013	39	2.1	5.2	12 ⇒ 24	33.0	8.1		
	L1468	4	C/2	Along Blaine St, south of 6th St	PIPE	0.013	248	0.8	1.1	8 ⇒ 18	9.4	5.9		
	L1469	4	C/2	Along 6th St, between Blaine and Howard St	PIPE	0.013	250	0.5	0.9	8 ⇒ 18	7.4	5.9		
	L1470	4	C/2	Along 6th St, between Howard and School St	PIPE	0.013	257	0.3	0.7	8 ⇒ 18	6.0	5.9		
6	L1709	3	C/3	Along eastside of HWY 99, south of 3rd St	PIPE	0.013	313	0.8	3.2	12 ⇒ 24	20.0	6.4		
7	L1719	3	C/3	Along westside of HWY 99, south of 3rd St	PIPE	0.013	102	18.7	15.0	12 ⇒ 24	98.0	10.9		Replace both L1719 and L1720 with 24" pipes.
	L1720	3	C/3	Along westside of HWY 99, south of 3rd St	PIPE	0.013	303	1.0	3.5	12 ⇒ 24	23.0	10.9		
8	L2011	5	C/4	West of Morton St, south of Sheridan St	PIPE	0.013	171	14.6	25.0	15 ⇒ 36	255.0	31.5	41	
	L2012	5	C/4	Across Morton St, south of Sheridan St	PIPE	0.013	88	0.6	4.9	15 ⇒ 36	40.0	31.5	41	
	L2014	5	C/4	Across Harrison St, north of Hancock St	PIPE	0.013	98	1.0	2.5	12 ⇒ 30	29.0	28.2		
	L2020	5	C/4	South of Sheridan between Morton and Harrison St	PIPE	0.013	175	0.1	3.9	15 ⇒ 36	32.0	31.6		
	L2025	5	C/4	Across Hancock, east of Harrison St	PIPE	0.013	106	4.1	7.2	12 ⇒ 24	46.0	27.8		
	L2030	5	C/4	Across RR and Hancock St	CULVERT	0.02	58	1.7	9.0	18 ⇒ 24	19.0	19.1		Minimal surcharge allowed.
	L2044	5	C/4	Along First St, between Lincoln and Grant St	PIPE	0.013	403	1.3	4.0	12 ⇒ 18	12.0	6.0	36	
9	L2070	6	C/4	RR box culvert at Main St	PIPE	0.013	168	0.6	2.7	12 ⇒ 18	8.1	8.0	39	

Group	Existing Conduit Hydraulic Parameters								Upsize Conduit	Alternative Analysis Results			Comments
										Design Criteria	No Surcharge No Flooding		
	Conduit Id	Drainage System Map No.	Subbasin Name/No.	Location Description	Type	Rough-ness Coeff.	Length (ft)	Slope (%)	Existing Design Capacity (cfs)	Exist ⇒ New Diameter (in)	New Design Capacity (cfs)	Future Peak Flow 10 year (cfs)	Problem Area (see Table 3)	
10	L2223	6	C/5	East of Main St, north of Illinois St	PIPE	0.013	41	19.1	16.0	12 ⇒ 24	99.0	8.2		Existing downstream system consists of ditches and 24" pipe.
	L2224	6	C/5	Along Main St, north of Illinois St	PIPE	0.013	450	0.9	3.4	12 ⇒ 24	21.0	8.2		
	L2225	6	C/5	Across Illinois St, east of Main St	PIPE	0.013	25	1.2	3.9	12 ⇒ 24	25.0	8.2		
	L2226	6	C/5	Along Illinois St, between Main and Washington St	PIPE	0.013	515	1.2	3.9	12 ⇒ 18	12.0	8.3		
11	L2236	7	C/5	West of HWY 219, north of Mission Dr	PIPE	0.013	155	2.6	36.0	24 ⇒ 30	66.0	43.4	49	
12	L2275	10	C/5	North of Pioneer Ln	PIPE	0.013	104	0.8	9.1	18 ⇒ 30	27.0	24.5	45	
	L2276	10	C/5	North of Pioneer Ln	PIPE	0.013	91	1.3	12.0	18 ⇒ 24	26.0	18.3	45	
13	L2280	8	C/5	Along Crestview Dr, west of Meridian St	PIPE	0.013	64	0.2	1.7	12 ⇒ 24	11.0	11.0	47	
14	L2509	7	C/7	Across Columbia Dr, west of Main St	CULVERT	0.02	35	0.9	14.0	24 ⇒ 42	61.0	27.5		
	L2509N	7	C/7	New parallel pipe across Columbia Dr	CULVERT	0.02	35	0.9	-	0 ⇒ 36	58.0	24.6		Additional parallel pipe.
15	L2512	7	C/7	Along Columbia Dr, west of Main St	PIPE	0.013	229	0.7	9.1	18 ⇒ 24	19.0	14.1		
16	L2620	9	C/7	Across cul-de-sac, west of Donald Ln	CULVERT	0.02	51	0.8	18.0	27 ⇒ 36	38.0	38.2		
17	L3010	9	C/8	Across Crater Ln, south of Foothills Dr	CULVERT	0.02	26	2.7	11.0	18 ⇒ 36	72.0	69.1	59	
18	L3114	11	C/8	Along Myrtlewood Ct	PIPE	0.013	135	0.9	38.0	30 ⇒ 36	62.0	55.5		
	L3115	11	C/8	Edgewood to Myrtlewood Ct	PIPE	0.013	291	0.8	37.0	30 ⇒ 36	60.0	55.8		
19	L3130	11	C/8	Sunset Dr to Quail Dr	PIPE	0.013	265	1.2	34.0	27 ⇒ 36	58.0	52.6		
20	L3145	12	C/8	Along Chehalem Terrace Rd, north of Foothills Dr	PIPE	0.013	240	1.1	11.0	18 ⇒ 36	69.0	47.9		
21	L3148	11	C/8	Along Morris St, south of Foothills Dr	PIPE	0.013	7	1.1	3.5	18 ⇒ 30	13.0	3.8		
22	L3400	11	C/8	West of Sunset Dr, south of Foothills Dr	PIPE	0.013	170	0.7	8.8	18 ⇒ 24	19.0	11.0		
	L3405	11	C/8	North of Sunset Dr to Foothills Dr	PIPE	0.013	50	0.8	9.4	18 ⇒ 24	20.0	11.0		
	L3410	11	C/8	North of Sunset Dr to Foothills Dr	PIPE	0.013	109	1.0	11.0	18 ⇒ 24	23.0	11.0		
1	L8185	2	S/2	West of Springbrook Rd, north of Fernwood Rd	PIPE	0.013	179	0.7	1.1	8 ⇒ 15	5.6	3.7		
2	L8270	4	S/2	North side of 99W, east of Springbrook Rd	PIPE	0.013	164	0.4	2.1	12 ⇒ 24	14.0	9.2		
	L8275	4	S/2	North side of 99W, east of Springbrook Rd	PIPE	0.013	258	1.9	4.9	12 ⇒ 18	14.0	7.0		
3	L8334	4	S/3	West of Springbrook Rd, north of 99W	CULVERT	0.024	441	0.5	25.0	36 ⇒ 48	54.0	70.0		Surcharge allowed in upstream channel.
4	L8505	7	S/3	South of Aquarius Blvd	PIPE	0.013	85	0.6	18.0	24 ⇒ 36	54.0	62.0		Surcharge allowed in downstream channel.
	L8510	7	S/3	Along Aquarius Blvd	PIPE	0.013	331	0.9	2.1	10 ⇒ 18	10.0	3.4		
	L8520	7	S/3	North of Aquarius Blvd	PIPE	0.013	145	1.2	25.0	24 ⇒ 36	72.0	59.0		

Group	Existing Conduit Hydraulic Parameters									Upsize Conduit	Alternative Analysis Results			Comments
											Design Criteria	No Surcharge No Flooding		
	Conduit Id	Drainage System Map No.	Subbasin Name/No.	Location Description	Type	Rough -ness Coeff.	Length (ft)	Slope (%)	Existing Design Capacity (cfs)	Exist ⇒ New Diameter (in)	New Design Capacity (cfs)	Future Peak Flow 10 year (cfs)	Problem Area (see Table 3)	
5	L8545	7	S/3	Across Vittoria Blvd	PIPE	0.013	339	1.0	6.6	15 ⇒ 21	16.0	9.9		
	L8550	7	S/3	Along Vittoria Blvd	PIPE	0.013	171	2.0	9.2	15 ⇒ 21	22.0	10.0		
	L8560	7	S/3	Along Coffey Ln	PIPE	0.013	515	1.2	4.0	12 ⇒ 18	12.0	7.2		
6	L8625	7	S/3	Along east side of Springbrook Way, north of Aquarius	PIPE	0.013	68	0.6	24.0	27 ⇒ 36	51.0	43.0	60	
	L8640	7	S/3	Along east side of Springbrook Way, north of Cedar St	PIPE	0.013	441	0.8	28.0	27 ⇒ 36	60.0	39.0	60	
7	L8667	7	S/3	South of Crestview Dr, west of Springbrook Rd	PIPE	0.013	257	1.2	17.0	21 ⇒ 30	34.0	34.0	1 & 8	Minimal surcharge allowed.
	L8670	7	S/3	Across Crestview Dr, west of Springbrook Rd	CULVERT	0.02	38	0.7	8.3	21 ⇒ 33	28.0	34.0	1 & 8	Minimal surcharge allowed.
	L8675	7	S/3	North of Crestview Dr, west of Springbrook Rd	PIPE	0.013	252	1.6	4.5	12 ⇒ 24	28.0	9.4		
	L8700	7	S/3	North of Crestview Dr, west of Springbrook Rd	PIPE	0.013	709	0.8	15.0	21 ⇒ 30	28.0	21.0		
	L8705	10	S/3	Across Springbrook Rd, north of Crestview Dr	PIPE	0.013	56	0.9	15.0	21 ⇒ 30	29.0	14.0		
8	L8720	10	S/3	Across RR, east of Springbrook Rd	CULVERT	0.02	39	1.0	2.3	12 ⇒ 24	15.0	7.8		
	L8725	10	S/3	West of Springbrook Rd, across RR	PIPE	0.013	490	1.8	4.8	12 ⇒ 18	14.0	7.4		
	L8735	10	S/3	Across Mountainview Dr, west of RR	PIPE	0.013	317	2.2	5.3	12 ⇒ 18	16.0	6.9		
9	L9140	8	S/4	Across 99W, east of Klimer Ln	CULVERT	0.02	143	0.4	9.5	24 ⇒ 36	28.0	44.0		Surcharge allowed in upstream and downstream channels.
10	L9235	8	S/4	Across Vittoria Wy, west of Meadow Ln	PIPE	0.013	486	0.8	5.6	15 ⇒ 24	20.0	17.0	2	
	L9245	8	S/4	Along Libra St, north of Vittoria Wy	PIPE	0.013	553	1.2	3.9	12 ⇒ 24	25.0	14.4	2	
	L9250	8	S/4	Along Heater St	PIPE	0.013	57	0.4	2.2	12 ⇒ 24	14.0	12.2	2	
	L9255	8	S/4	Along Libra St, north of Heater St	PIPE	0.013	406	2.5	5.6	12 ⇒ 24	36.0	12.4	2	
11	L9290	7	S/4	Along Aquarius Blvd, east of Libra St	PIPE	0.013	125	1.2	1.3	8 ⇒ 18	12.0	4.0		

APPENDIX F

Project Location Maps

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
Engineers Planners

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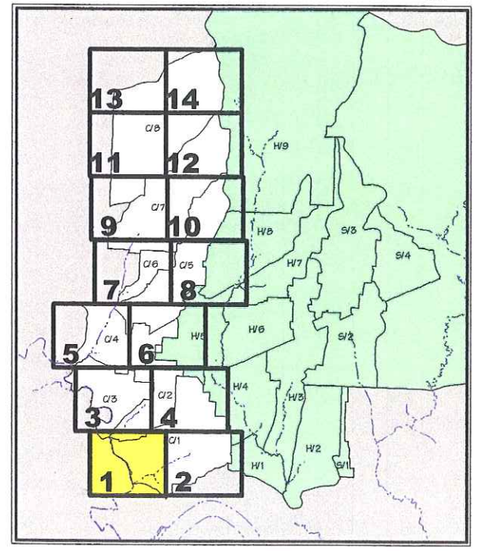
- Streams, Ditches
- Modeled Nodes
- Storm Sewer Manholes
- Catch Basins
- 4600 Modeled Subcatchment
- H4 Grouped Project #

250 0 250 Feet

N



EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin

MAP 1

City of Newberg, OR

STEVENSON RD.
9th
CHARLES PL.
CHARLES
FRONTIER LN.
10th
SCHOOL ST.
JAMES ST.
MICHELLE CT.
ANDREW ST.
RIVER RD.
1401
1402
1301
1302
1202
1203
1102
1104
1201
1204
1155
1103
1510
1420
1417
1418
1419
1416
1320
1221
1310
1212
1211
1220
1112
1122
1121
1130
1300
1210
1200
1120
1119

NEWBERG DRAINAGE MASTER PLAN 2001

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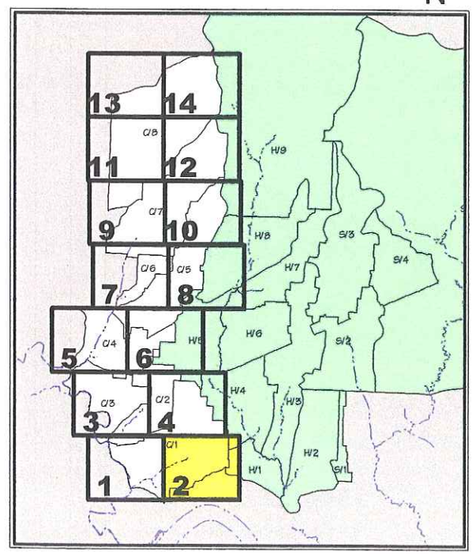

EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin

City of Newberg

MAP 2

NEWBERG DRAINAGE MASTER PLAN 2001

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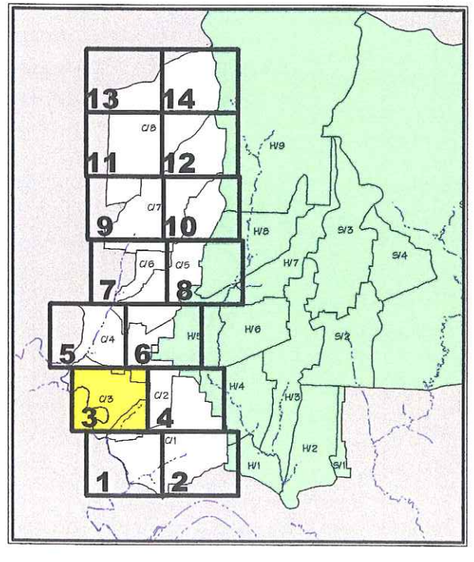

EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin

MAP 3

City of Newberg

NEWBERG DRAINAGE MASTER PLAN 2001

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250 0 250 Feet

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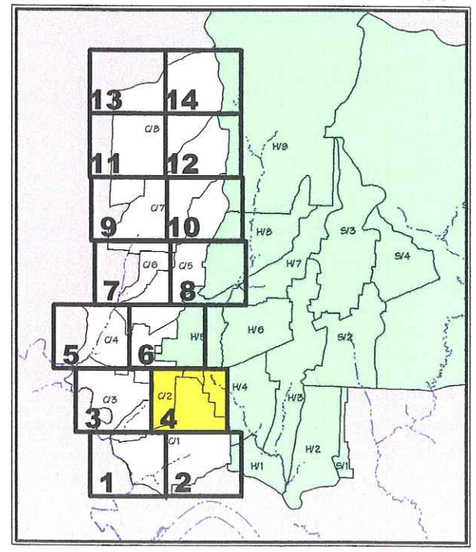

EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin
MAP 4

City of Newberg

NEWBERG DRAINAGE MASTER PLAN 2001

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250 0 250 Feet

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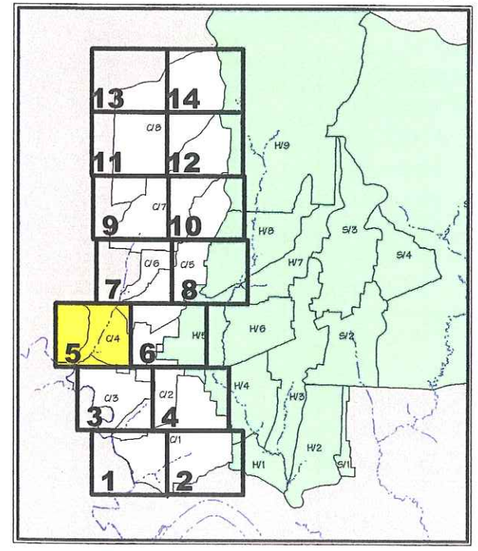

EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin
MAP 5

City of Newberg

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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250 0 250 Feet

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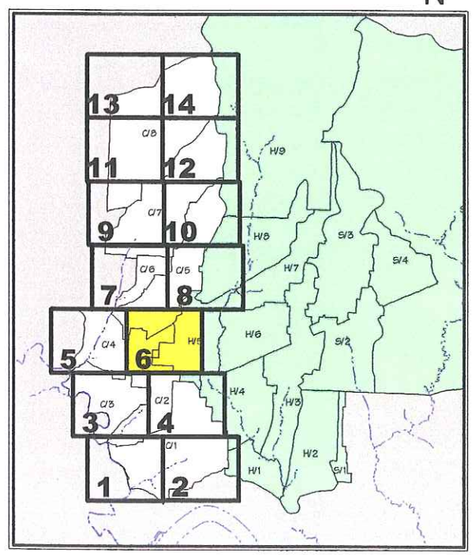

EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin

City of Newberg

MAP 6

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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250 0 250 Feet

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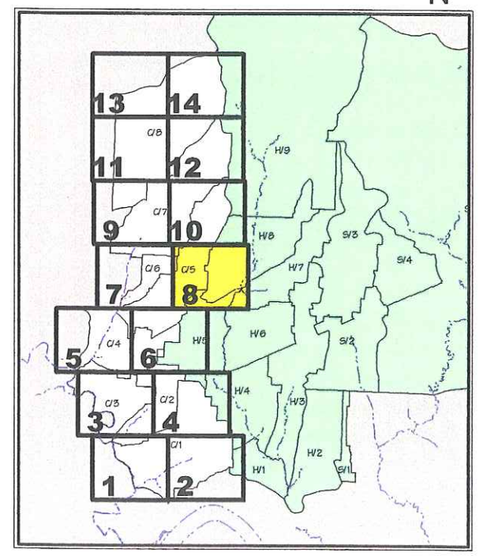

EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin

City of Newberg

MAP 8

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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250 0 250 Feet

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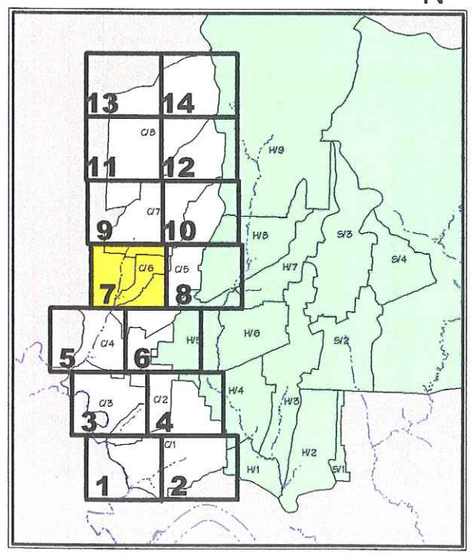

EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin
MAP 7

City of Newberg

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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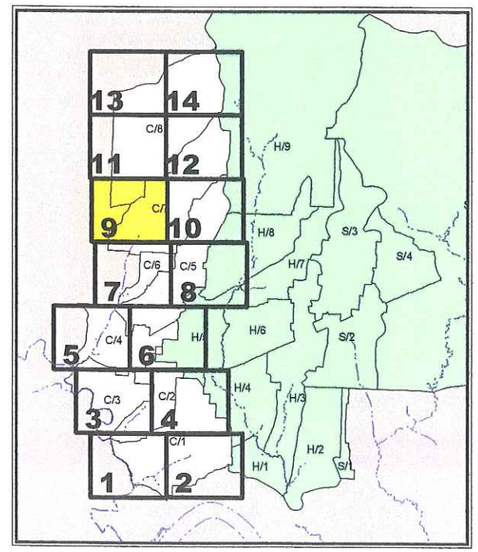
250 0 250 Feet

N



EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin

City of Newberg

MAP 9

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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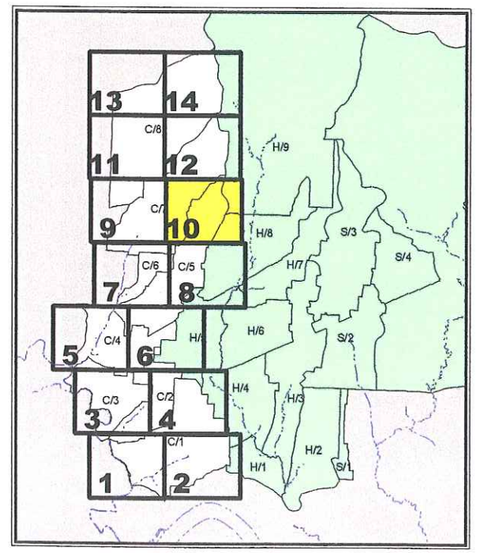
250 0 250 Feet

N



EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin

MAP 10

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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250 0 250 Feet

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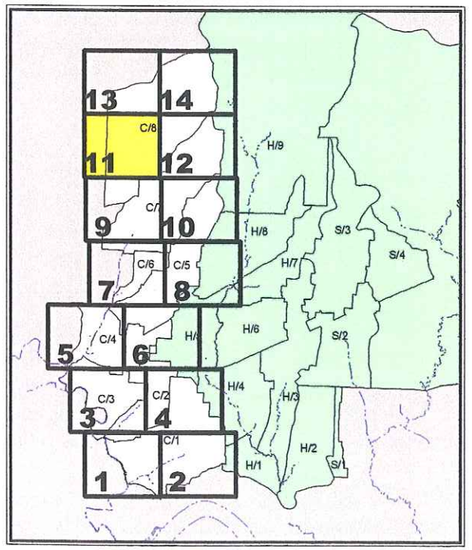

EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin

City of Newberg

MAP 11

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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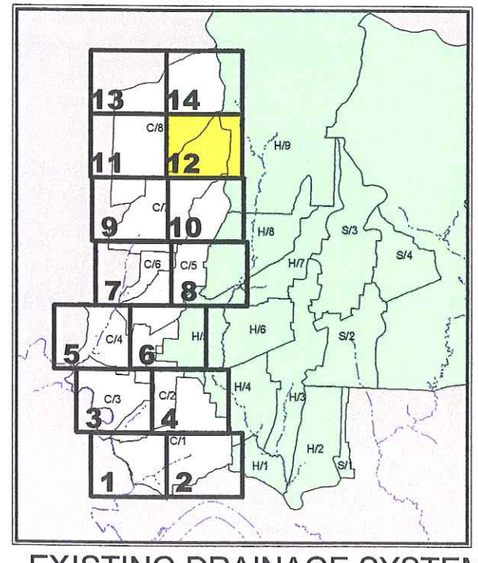

EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin

City of Newberg

MAP 12

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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250 0 250 Feet

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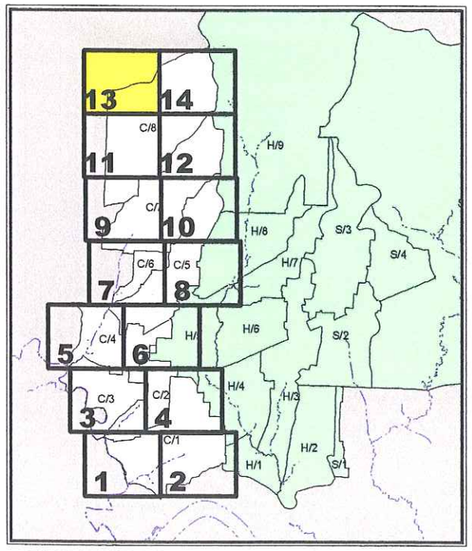
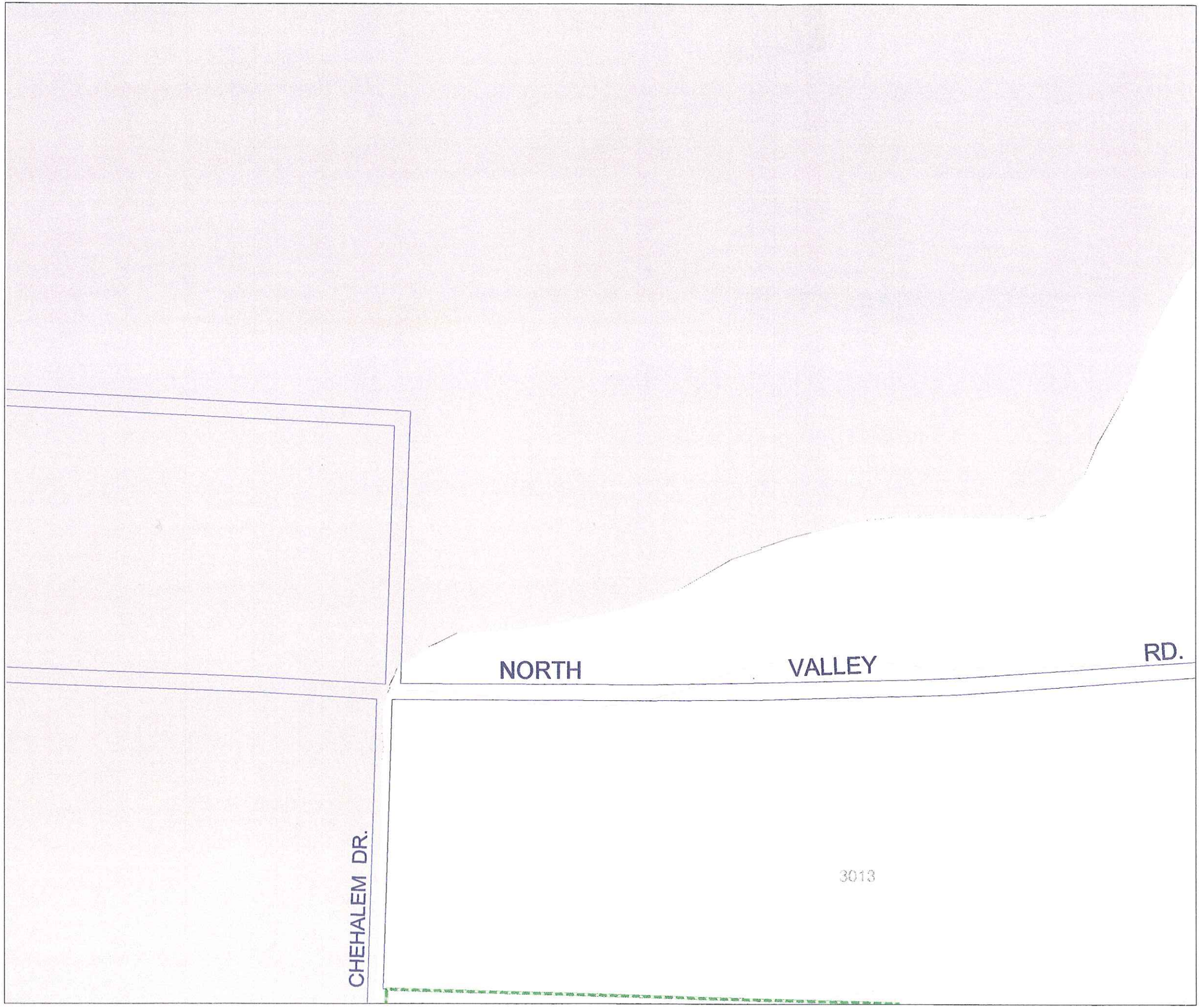


EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin

MAP 13



NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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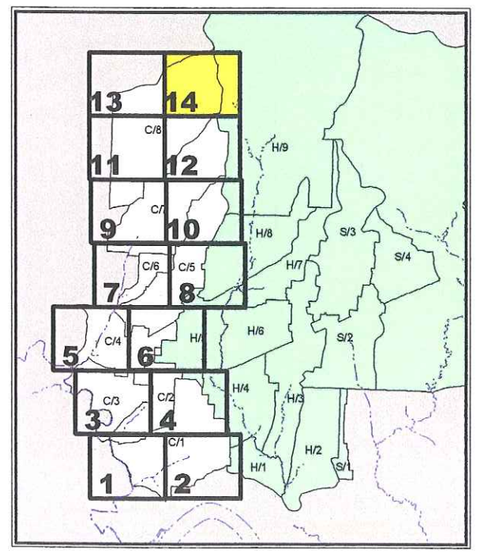
250 0 250 Feet

N



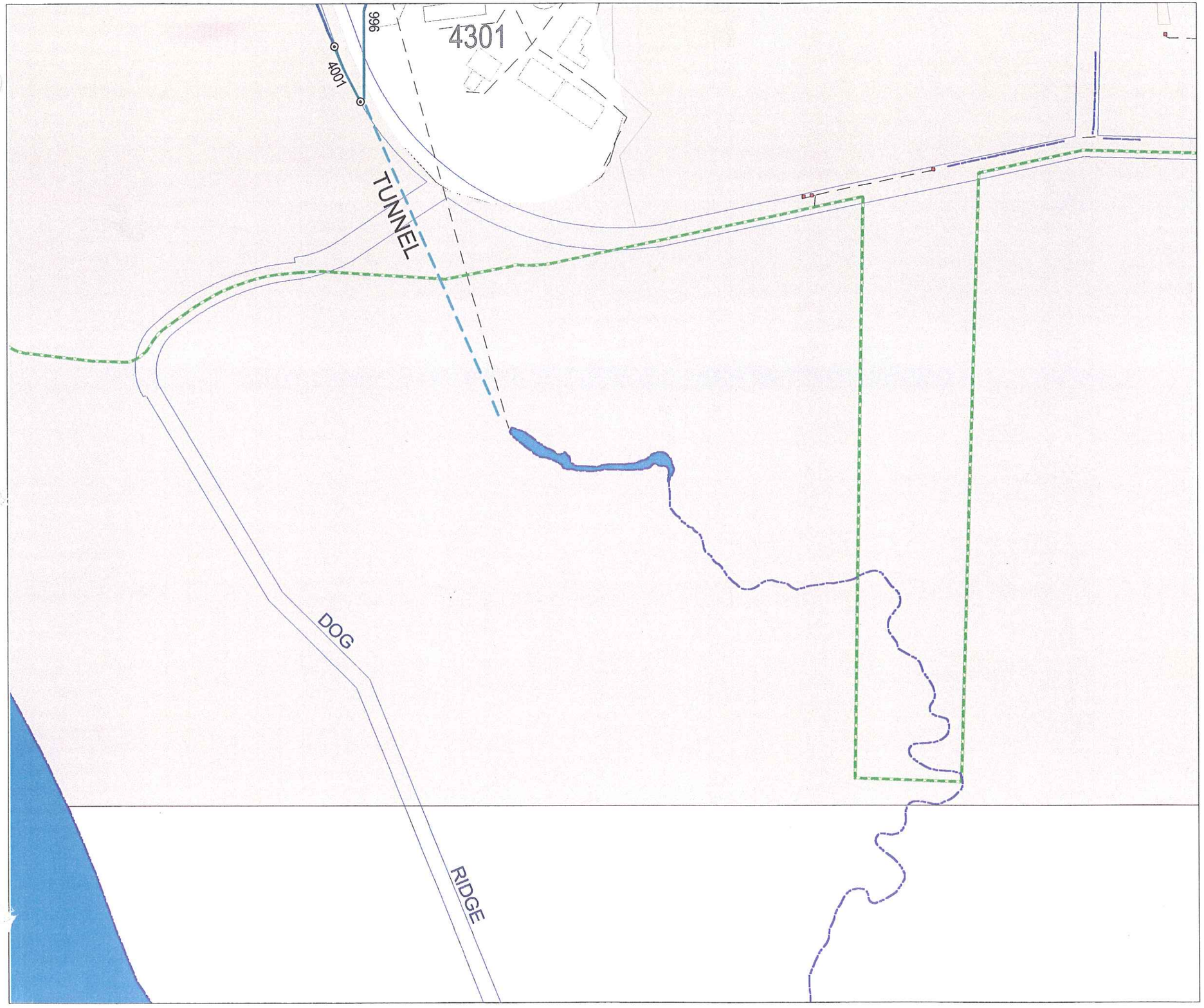
EXISTING DRAINAGE SYSTEM
Chehalem Creek Basin

City of Newberg

MAP 14

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
Engineers Planners



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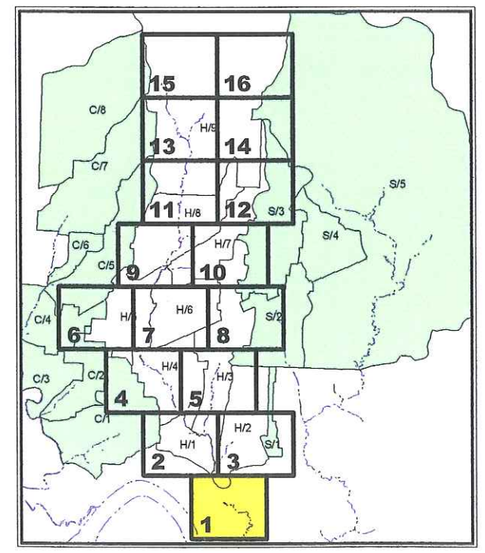
250 0 250 Feet

N



EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 1

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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250 0 250 Feet

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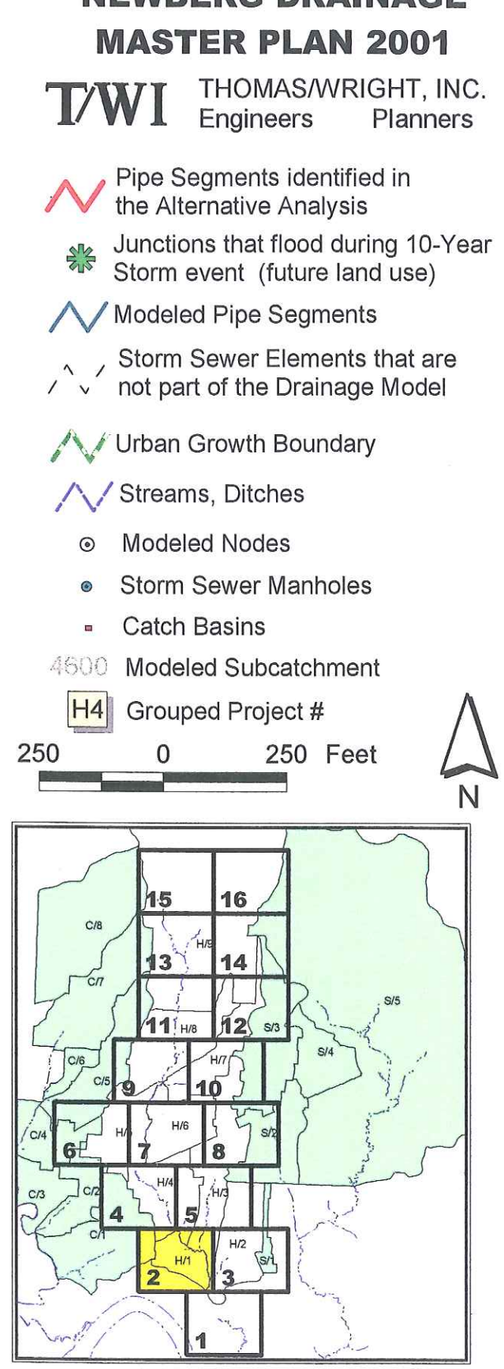

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 2

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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250 0 250 Feet

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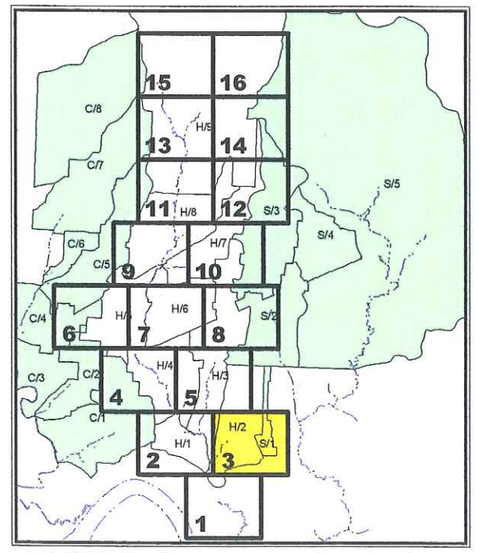

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 3

NEWBERG DRAINAGE MASTER PLAN 2001

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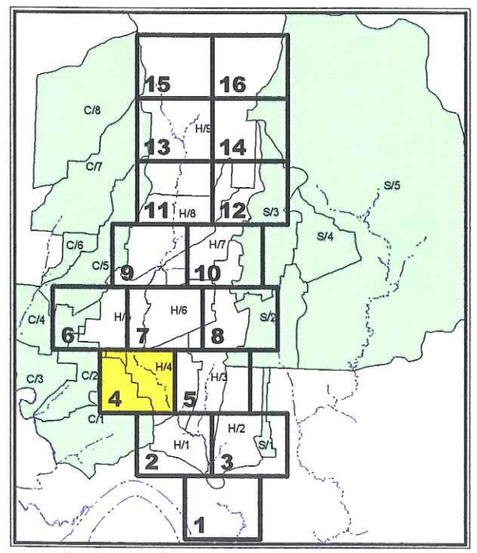

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 4

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
Engineers Planners

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- Urban Growth Boundary
- Streams, Ditches
- Modeled Nodes
- Storm Sewer Manholes
- Catch Basins
- 4600 Modeled Subcatchment
- H4 Grouped Project #

250 0 250 Feet

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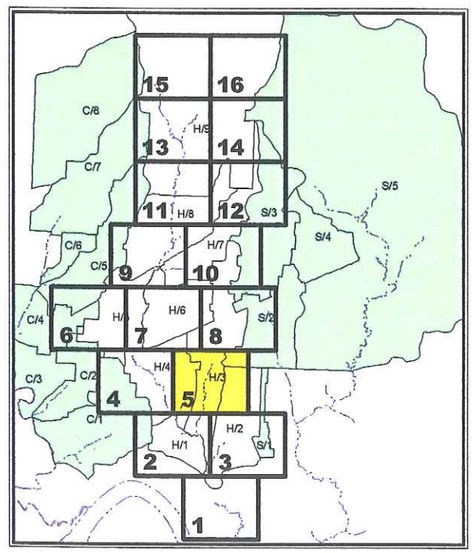

EXISTING DRAINAGE SYSTEM

Hess Creek Basin

MAP 5

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
Engineers Planners

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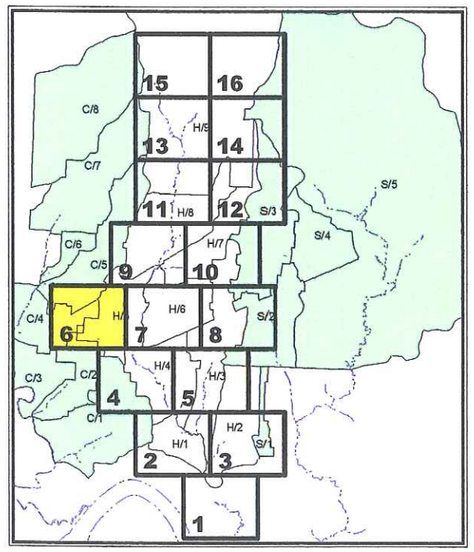

EXISTING DRAINAGE SYSTEM

Hess Creek Basin

MAP 6

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
Engineers Planners

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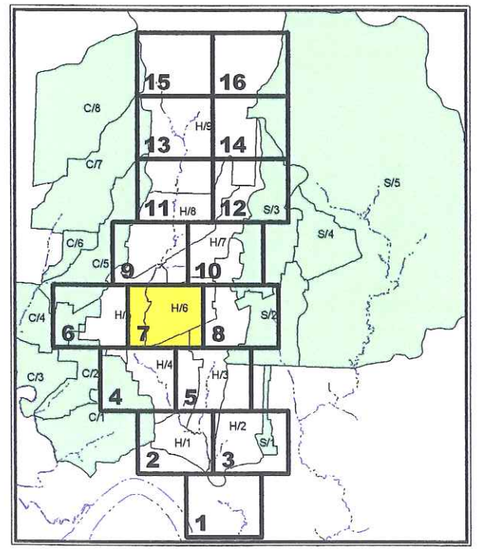

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 7

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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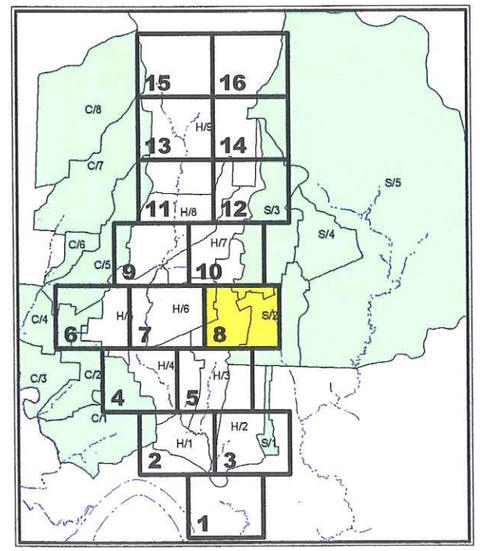

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 8

NEWBERG DRAINAGE MASTER PLAN 2001

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- Catch Basins
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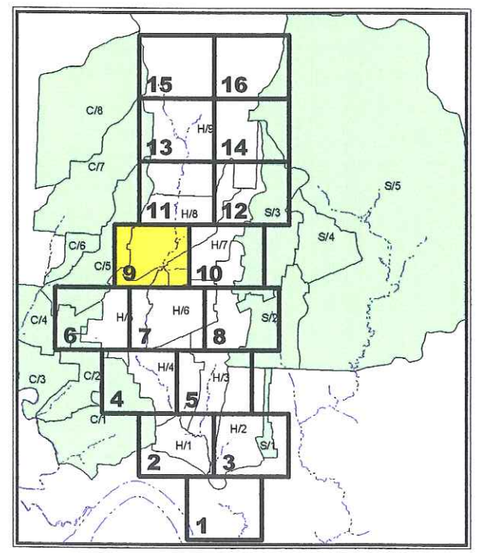

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 9

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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250 0 250 Feet

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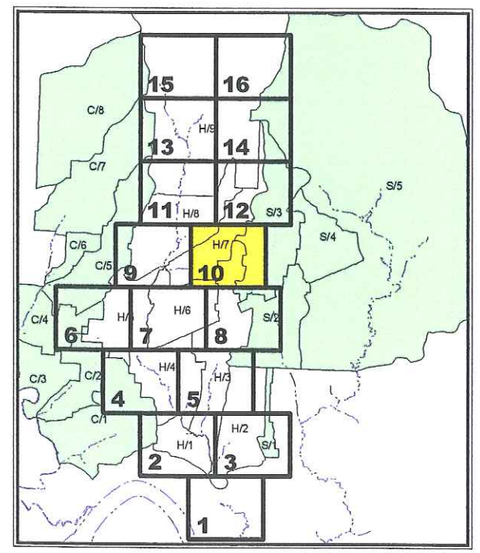

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 10

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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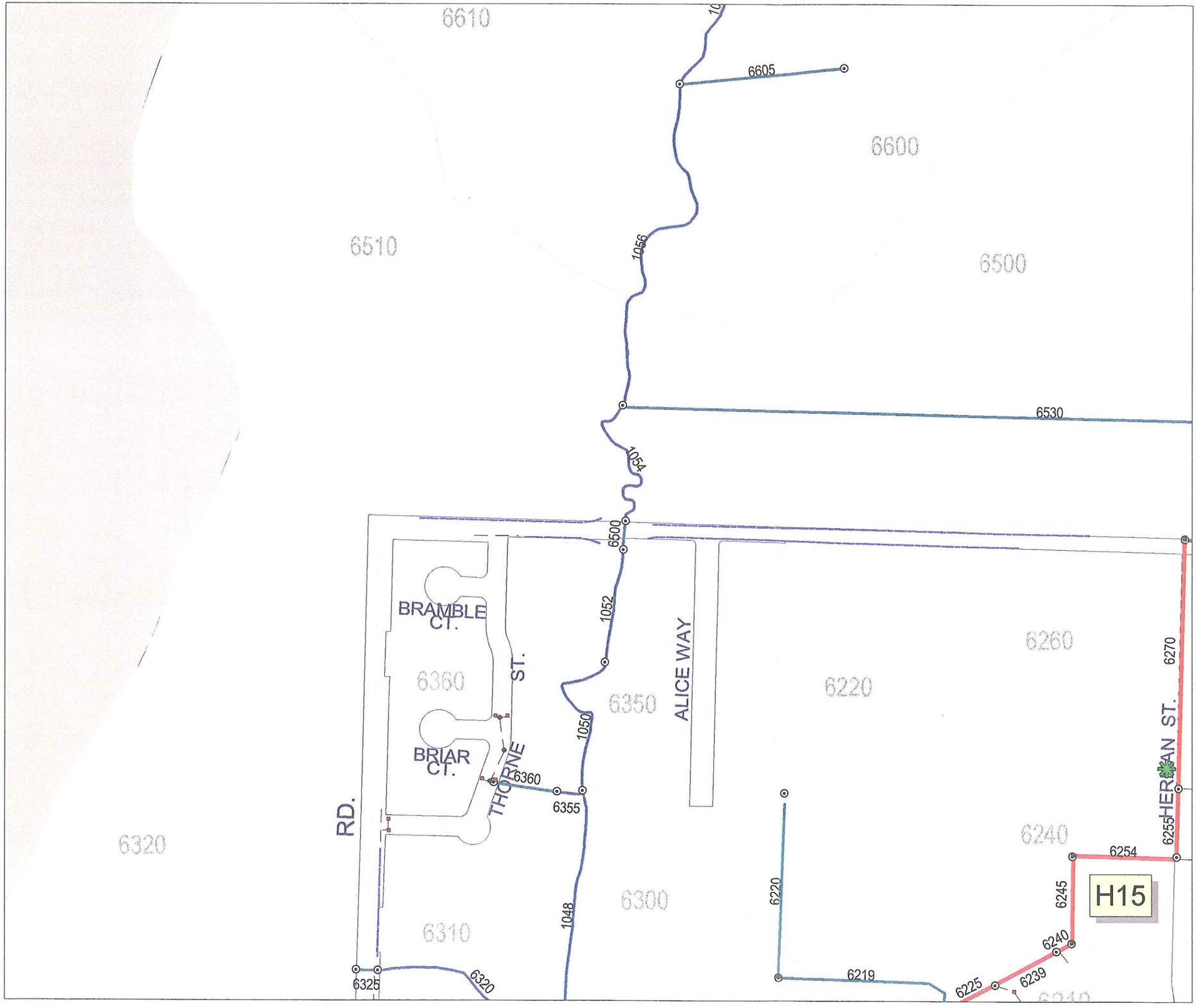

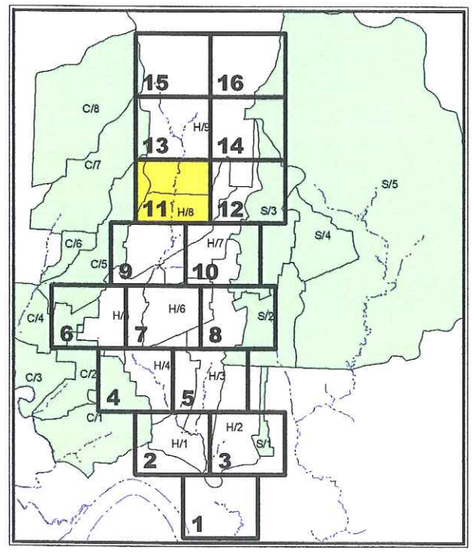

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 11

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250 0 250 Feet

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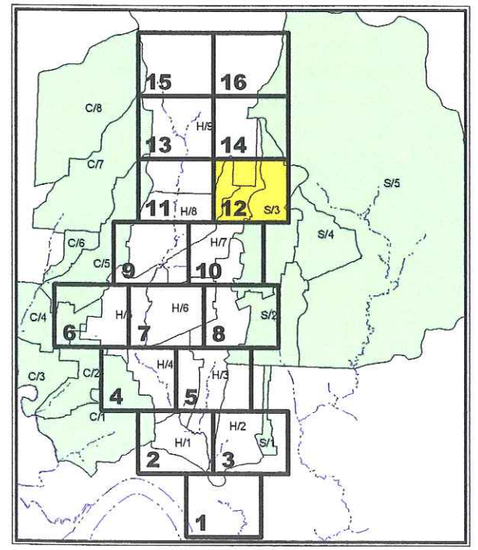


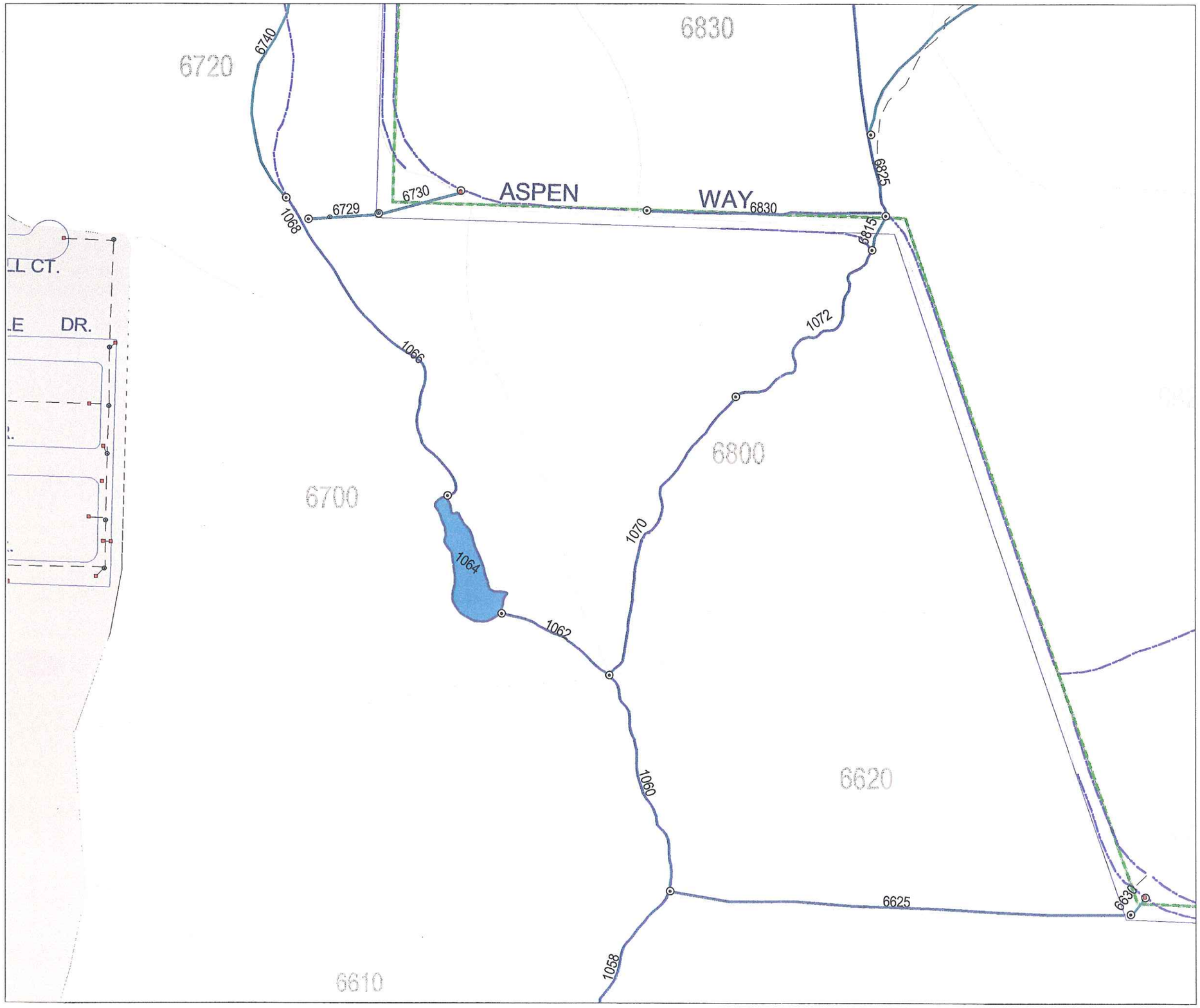
EXISTING DRAINAGE SYSTEM

Hess Creek Basin

MAP 12

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
Engineers Planners



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250 0 250 Feet

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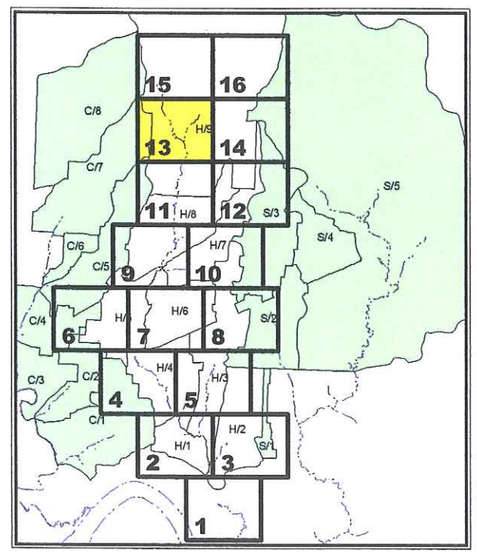

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 13

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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250 0 250 Feet

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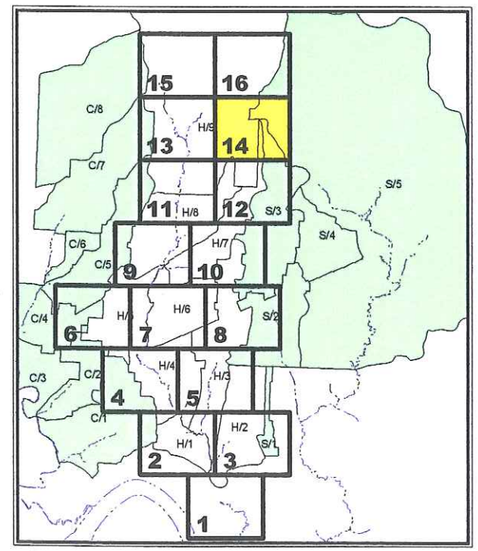

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 14

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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250 0 250 Feet

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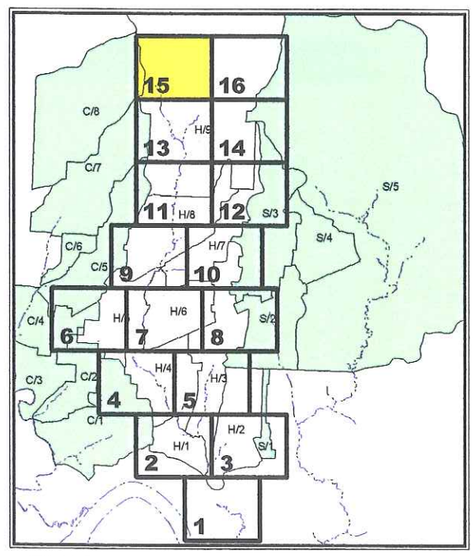

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 15

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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250 0 250 Feet

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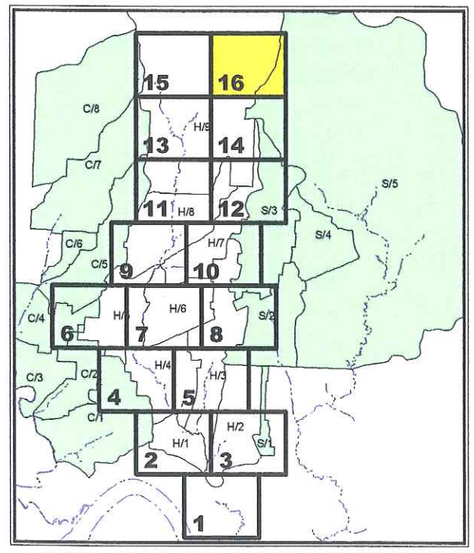

EXISTING DRAINAGE SYSTEM

City of Newberg

Hess Creek Basin

MAP 16

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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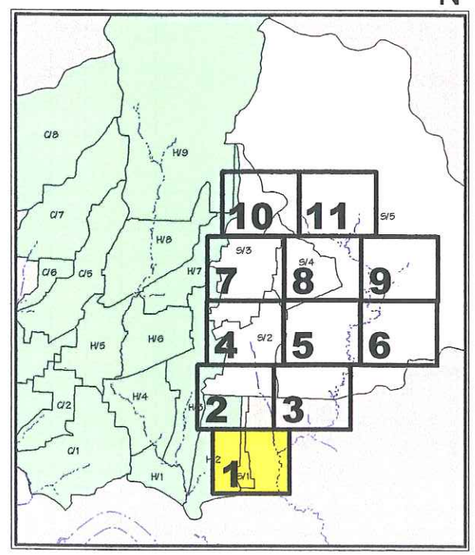

EXISTING DRAINAGE SYSTEM

Springbrook Basin

MAP 1

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
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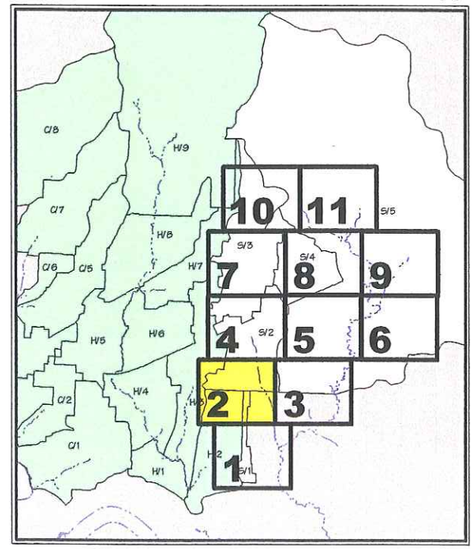

EXISTING DRAINAGE SYSTEM

Springbrook Basin

MAP 2

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
Engineers Planners

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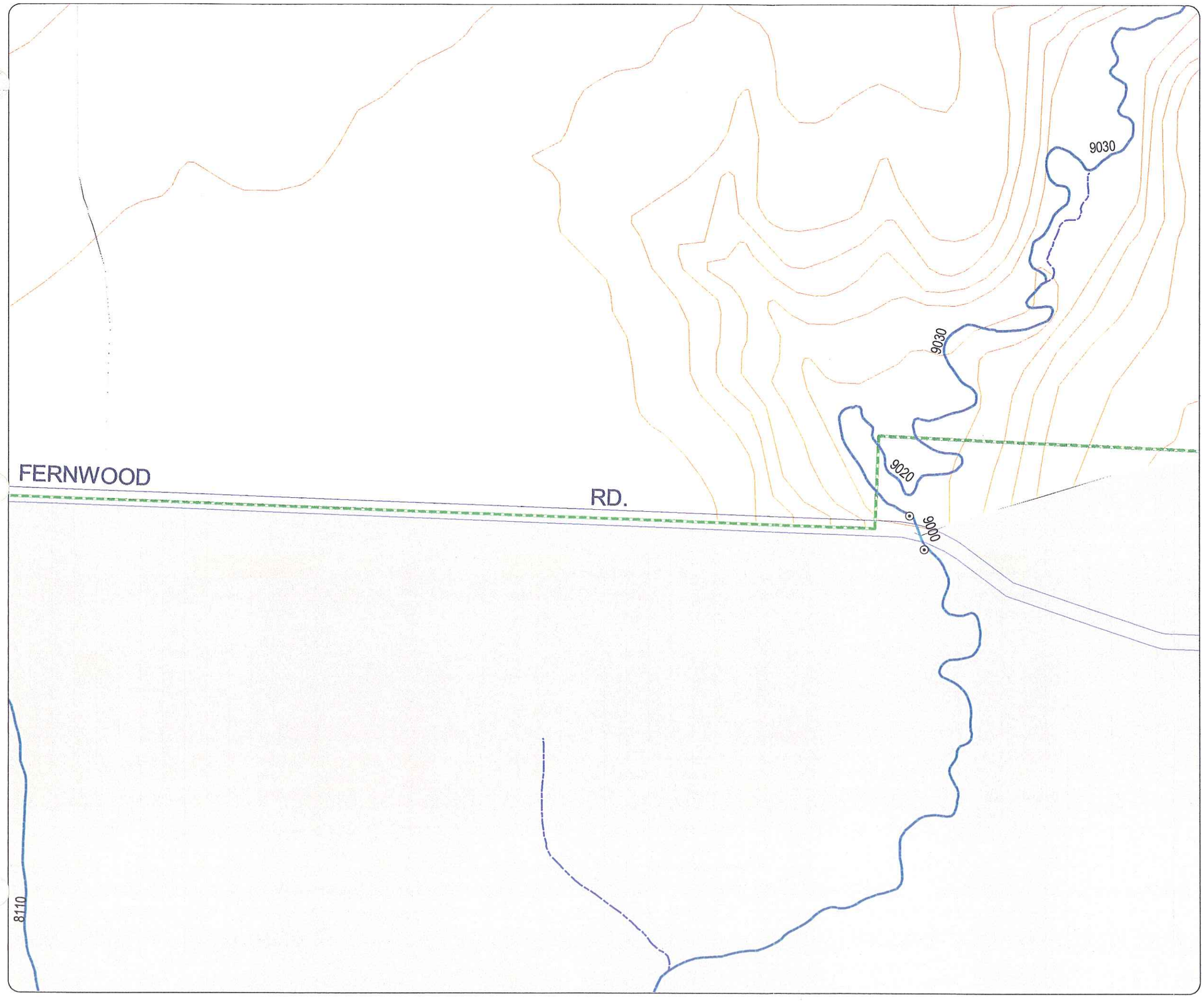

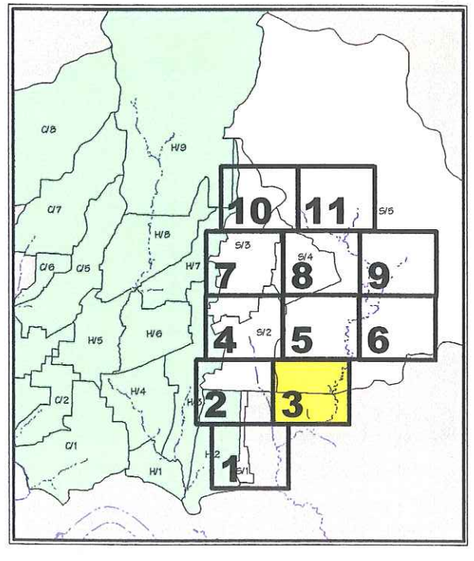

EXISTING DRAINAGE SYSTEM

City of Newberg

Springbrook Basin

MAP 3

NEWBERG DRAINAGE MASTER PLAN 2001

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250 0 250 Feet

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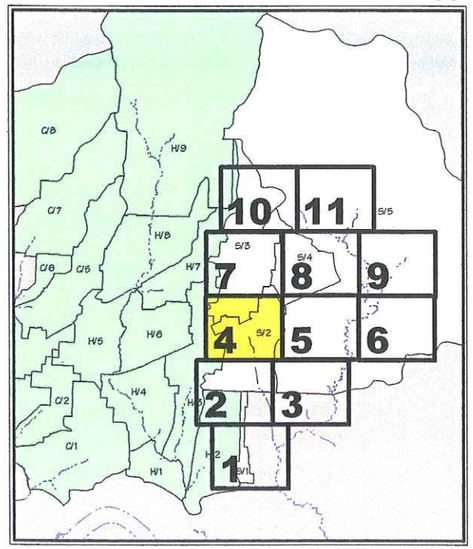

EXISTING DRAINAGE SYSTEM

Springbrook Basin

MAP 4

NEWBERG DRAINAGE MASTER PLAN 2001

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250 0 250 Feet

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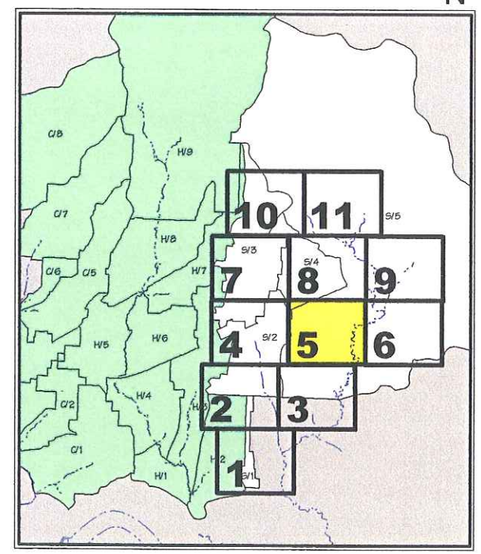

EXISTING DRAINAGE SYSTEM

Springbrook Basin

MAP 5

NEWBERG DRAINAGE MASTER PLAN 2001

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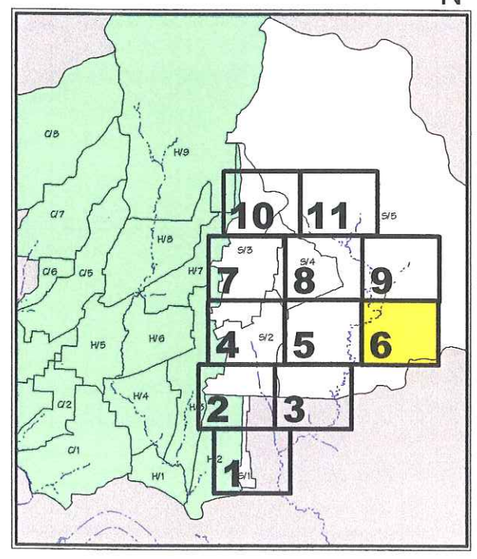

EXISTING DRAINAGE SYSTEM

City of Newberg

Springbrook Basin

MAP 6

NEWBERG DRAINAGE MASTER PLAN 2001

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250 0 250 Feet

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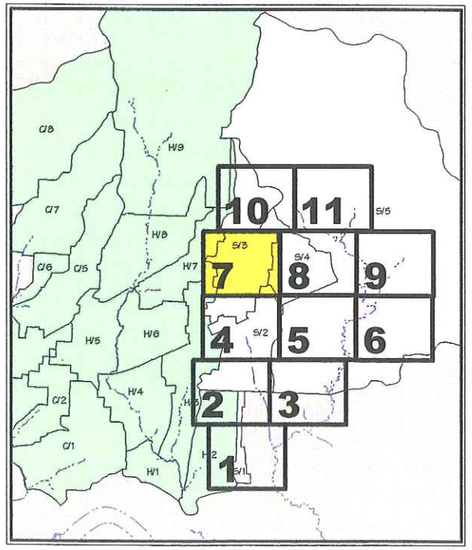

EXISTING DRAINAGE SYSTEM

City of Newberg

Springbrook Basin

MAP 7

NEWBERG DRAINAGE MASTER PLAN 2001

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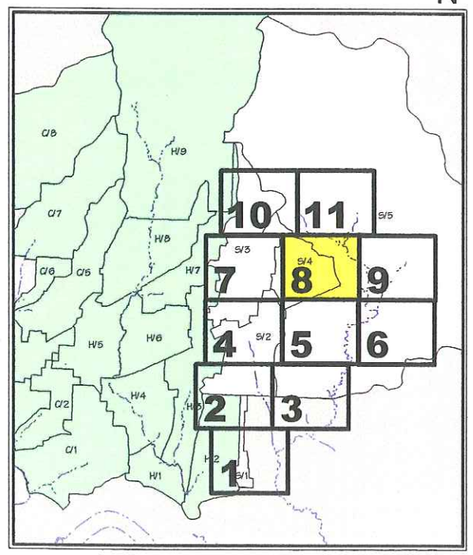
N



EXISTING DRAINAGE SYSTEM

Springbrook Basin

MAP 8

NEWBERG DRAINAGE MASTER PLAN 2001

T/WI THOMAS/WRIGHT, INC.
Engineers Planners

BENJAMIN RD.

HWY 99W

RD.

9100
9080
9060
9134
9075
9050

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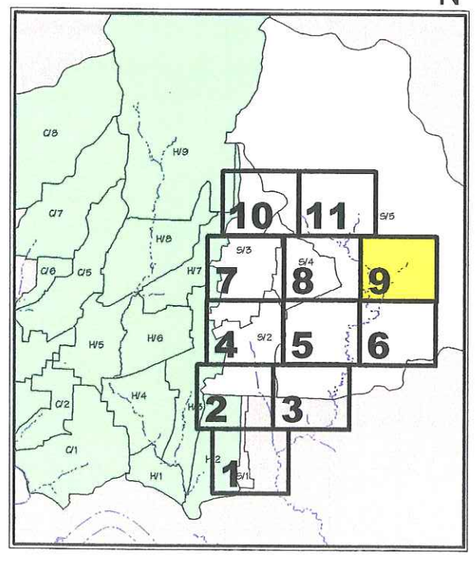

EXISTING DRAINAGE SYSTEM

Springbrook Basin

MAP 9

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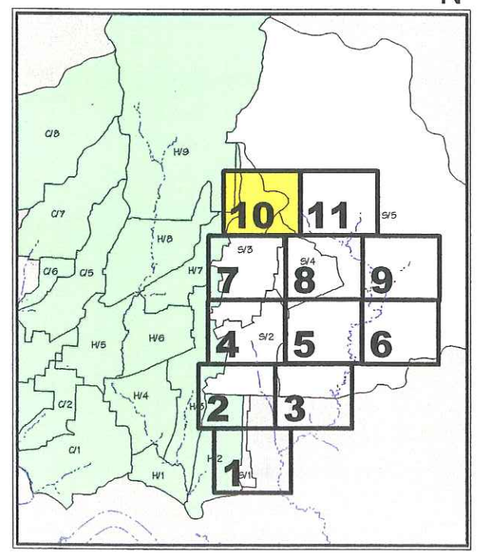
250 0 250 Feet

N



EXISTING DRAINAGE SYSTEM

Springbrook Basin

MAP 10

ROBERTS
LN.
6580
6575
6550
9080
8740
RD.
8720
SPRINGBROOK
9120
9125
9115
NTAINVIEW
DR.
5980
8720
8715
8735
S8
8725
8700
8725
8710
5975
8690
8690
S7
8705
8670
9250
9070
8700
8680
685

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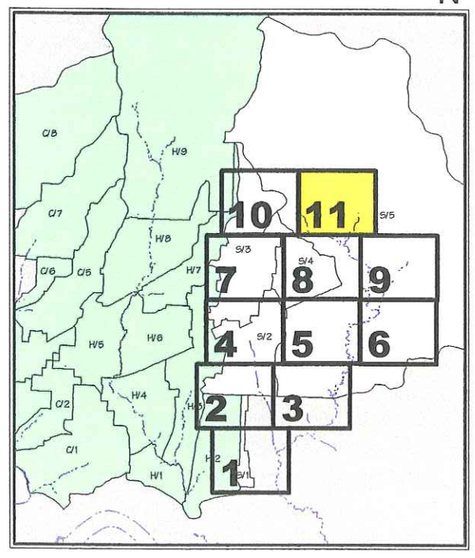


EXISTING DRAINAGE SYSTEM

Springbrook Basin

MAP 11

APPENDIX G

Project Summary Sheets

Newberg Drainage Master Plan Update
Project Summary Sheets

TABLE OF CONTENTS

Project Summary Sheet

CIP Project Number:	**C1**
Master Plan Link Number:	**1131, 1140**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

College St, south of Andrew St

Project Description

Replace two existing culverts with 130'L x 48"D culverts.

Special Considerations

Permit necessary (water body).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$3,300
1.20	Traffic control	lf	130	$5	$630
1.30	Erosion control measures	L.S.	1	1.4%	$720
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.06	$5,200	$290
2.20	Saw cutting asphalt	lf	124	$3	$380
2.30	Remove existing pipe	lf	130	$8	$1,000
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	130	$55	$7,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 48" diameter	lf	130	$134	$17,400
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall, 48" diameter	each	2	$3,600	$7,200
4.40	Rip-rap channel protection, 18" thick	sy	159	$78	$12,380
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	50	$25	$1,300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.06	$22,000	$1,210
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$11,100
	CONSTRUCTION COSTS SUBTOTAL:				**$66,400**
	PERMITTING COSTS			10%	$6,600
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$19,900
	PROJECT COSTS TOTAL:				**$92,900**

Pipe Worksheet

CIP Project Number:	**C1-A**
Master Plan Link Number:	**1131**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

West of College St, south of Andrew St

Project Description

Replace existing 43' long 24"D culvert with a 48"D culvert.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,700
1.20	Traffic control	lf	43	$5	$200
1.30	Erosion control measures	L.S.	1	1.4%	$310
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.02	$5,200	$120
2.20	Saw cutting asphalt	lf	32	$3	$100
2.30	Remove existing pipe	lf	43	$8	$300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	43	$55	$2,400
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 48" diameter	lf	43	$134	$5,800
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall, 48" diameter	each	1	$3,600	$3,600
4.40	Rip-rap channel protection, 18" thick	sy	79	$78	$6,190
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	10	$25	$300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.02	$22,000	$500
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$4,800
	CONSTRUCTION COSTS SUBTOTAL:				**$28,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$8,600
	PROJECT COSTS TOTAL:				**$37,200**

Pipe Worksheet

CIP Project Number:	**C1-B**
Master Plan Link Number:	**1140**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Across College St, south of Andrew St

Project Description

Replace existing 87' long 24"D culvert with a 48"D culvert.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,600
1.20	Traffic control	lf	87	$5	$430
1.30	Erosion control measures	L.S.	0	1.4%	$410
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.03	$5,200	$170
2.20	Saw cutting asphalt	lf	92	$3	$280
2.30	Remove existing pipe	lf	87	$8	$700
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	87	$55	$4,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 48" diameter	lf	87	$134	$11,600
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall, 48" diameter	each	1	$3,600	$3,600
4.40	Rip-rap channel protection, 18" thick	sy	79	$78	$6,190
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	40	$25	$1,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.03	$22,000	$710
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$6,300
	CONSTRUCTION COSTS SUBTOTAL:				**$37,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$11,300
	PROJECT COSTS TOTAL:				**$49,100**

Project Summary Sheet

CIP Project Number: C2

Master Plan Link Number: 1162, L1163, 1164

Basin: Chehalem Creek

Subbasin: C/1

Location

River St, south of 10th St

Project Description

Replace three existing pipes with 320'L of 18"D pipe; 284'L of 21"D pipe; and 223'L of 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$5,800
1.20	Traffic control	lf	827	$5	$4,100
1.30	Erosion control measures	L.S.	1	1.4%	$1,500
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	1,674	$3	$5,020
2.30	Remove existing pipe	lf	827	$8	$6,700
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	827	$15 - $19	$14,400
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 18 - 24" diameter	lf	827	$35 - $49	$36,000
4.20	Manholes, 6' deep	each	5	$2,300	$11,500
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	827	$25	$20,700
5.20	Sidewalk	sf	1,416	$5	$7,080
5.30	Concrete curb	lf	354	$12	$4,250
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$23,400
	CONSTRUCTION COSTS SUBTOTAL:				**$140,500**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$42,200
	PROJECT COSTS TOTAL:				**$182,700**

Pipe Worksheet

CIP Project Number:	**C2-A**
Master Plan Link Number:	**1162**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Along River St, south of 10th St

Project Description

Replace existing 320' long 10"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,900
1.20	Traffic control	lf	320	$5	$1,600
1.30	Erosion control measures	L.S.	1	1.4%	$490
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	647	$3	$1,940
2.30	Remove existing pipe	lf	320	$8	$2,600
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	320	$15	$4,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	320	$35	$11,200
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	320	$25	$8,000
5.20	Sidewalk	sf	160	$5	$800
5.30	Concrete curb	lf	40	$12	$480
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$7,700
	CONSTRUCTION COSTS SUBTOTAL:				**$46,100**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$13,800
	PROJECT COSTS TOTAL:				**$59,900**

Pipe Worksheet

CIP Project Number:	**C2-B**
Master Plan Link Number:	**L1163**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Along River St, south of 11th St

Project Description

Replace existing 284' long 10"D pipe with a 21"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,400
1.20	Traffic control	lf	284	$5	$1,400
1.30	Erosion control measures	L.S.	1	1.4%	$630
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	575	$3	$1,720
2.30	Remove existing pipe	lf	284	$8	$2,300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	284	$19	$5,400
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 21" diameter	lf	284	$49	$13,900
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	284	$25	$7,100
5.20	Sidewalk	sf	1136	$5	$5,680
5.30	Concrete curb	lf	284	$12	$3,410
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$9,700
	CONSTRUCTION COSTS SUBTOTAL:				**$58,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$17,500
	PROJECT COSTS TOTAL:				**$75,700**

Pipe Worksheet

CIP Project Number:	**C2-C**
Master Plan Link Number:	**1164**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Cul-de-sac 11th Ct

Project Description

Replace existing 223' long 18"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,500
1.20	Traffic control	lf	223	$5	$1,100
1.30	Erosion control measures	L.S.	1	1.4%	$390
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	452	$3	$1,360
2.30	Remove existing pipe	lf	223	$8	$1,800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	223	$19	$4,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	223	$49	$10,900
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	223	$25	$5,600
5.20	Sidewalk	sf	120	$5	$600
5.30	Concrete curb	lf	30	$12	$360
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$6,000
	CONSTRUCTION COSTS SUBTOTAL:				**$36,100**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$10,800
	PROJECT COSTS TOTAL:				**$46,900**

Project Summary Sheet

CIP Project Number:	**C3**
Master Plan Link Number:	**1180, 1181N, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1193, 1194**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

9th St and Center St

Project Description

Install 352'L of new 30"D pipe.
Replace thirteen existing pipes with 1771'L of 18"D pipe; 377'L of 24"D pipe; 69'L of 30"D pipe; 1038'L of 36"D pipe.

Special Considerations

L1181N: Planned location underneath residential area. Design may need to relocate.
L1183-L1185: Invert elevations may limit pipe placement.
L1186: Portion of pipe may be located under/near a structure. Easement necessary.
Permit necessary (water body, private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$28,300
1.20	Traffic control	lf	3,517	$5	$17,600
1.30	Erosion control measures	L.S.	1	1.4%	$6,910
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.06	$5,200	$330
2.20	Saw cutting asphalt	lf	5,257	$3	$15,780
2.30	Remove existing pipe	lf	3,256	$8	$26,200
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6 - 12' deep	lf	3,608	$15 - $55	$92,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18 - 36" diameter	lf	3,608	$35 - $98	$212,500
4.20	Manholes, 6 - 10' deep	each	15	$2300 - $3700	$41,500
4.30	Culvert headwall	each	1	n/a	$2,600
4.40	Rip-rap channel protection, 18" thick	sy	48	$78	$3,730
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	2,581	$25	$64,600
5.20	Sidewalk	sf	2,836	$5	$14,180
5.30	Concrete curb	lf	979	$12	$11,750
5.40	Revegetation	acre	0.06	$22,000	$1,380
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$107,900
	CONSTRUCTION COSTS SUBTOTAL:				**$647,600**
	PERMITTING COSTS			10%	$64,800
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$194,300
	PROJECT COSTS TOTAL:				**$906,700**

Pipe Worksheet

CIP Project Number:	**C3-A**
Master Plan Link Number:	**1180**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

South of 9th St and west of Center St

Project Description

Replace existing 91' long 18"D pipe with a 36"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,300
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$350
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.06	$5,200	$330
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	91	$8	$700
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	91	$55	$5,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	91	$98	$8,900
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall 36" diameter	each	1	$2,600	$2,600
4.40	Rip-rap channel protection, 18" thick	sy	48	$78	$3,730
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.06	$22,000	$1,380
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,300
	CONSTRUCTION COSTS SUBTOTAL:				**$31,900**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,600
	PROJECT COSTS TOTAL:				**$41,500**

Pipe Worksheet

CIP Project Number:	**C3-B**
Master Plan Link Number:	**1181N**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

New pipe along Center St, from 8th to 9th St

Project Description

Install a new 352' long 30"D pipe.

Special Considerations

Planned location underneath residential area. Design may need to relocate.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$3,100
1.20	Traffic control	lf	352	$5	$1,800
1.30	Erosion control measures	L.S.	1	1.4%	$790
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	712	$3	$2,130
2.30	Remove existing pipe	lf	0	$8	$0
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	352	$45	$15,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 30" diameter	lf	352	$72	$25,300
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	352	$25	$8,800
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$12,300
	CONSTRUCTION COSTS SUBTOTAL:				**$73,700**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$22,100
	PROJECT COSTS TOTAL:				**$95,800**

Pipe Worksheet

CIP Project Number:	**C3-C**
Master Plan Link Number:	**1182**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Across Center St, south of 8th St

Project Description

Replace existing 69' long 15"D pipe with a 30"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$900
1.20	Traffic control	lf	69	$5	$300
1.30	Erosion control measures	L.S.	1	1.4%	$160
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	88	$3	$260
2.30	Remove existing pipe	lf	69	$8	$600
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	69	$19	$1,300
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 30" diameter	lf	69	$72	$5,000
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	40	$25	$1,000
5.20	Sidewalk	sf	116	$5	$580
5.30	Concrete curb	lf	29	$12	$350
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$2,600
	CONSTRUCTION COSTS SUBTOTAL:				**$15,400**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$4,600
	PROJECT COSTS TOTAL:				**$20,000**

Pipe Worksheet

CIP Project Number: C3-D

Master Plan Link Number: 1183

Basin: Chehalem Creek

Subbasin: C/1

Location

Along 8th St, between Center and Chehalem St

Project Description

Replace existing 511' long 15"D pipe with a 36"D pipe.

Special Considerations

Invert elevations (3 -4') may limit pipe placement.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$4,700
1.20	Traffic control	lf	511	$5	$2,600
1.30	Erosion control measures	L.S.	1	1.4%	$1,210
2.00					
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	151	$3	$450
2.30	Remove existing pipe	lf	511	$8	$4,100
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	511	$24	$12,300
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 36" diameter	lf	511	$98	$50,100
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	71	$25	$1,800
5.20	Sidewalk	sf	1,760	$5	$8,800
5.30	Concrete curb	lf	440	$12	$5,280
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$18,700
	CONSTRUCTION COSTS SUBTOTAL:				**$112,300**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$33,700
	PROJECT COSTS TOTAL:				**$146,000**

Pipe Worksheet

CIP Project Number:	**C3-E**
Master Plan Link Number:	**1184**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Along 8th St, between Chehalem and Willamette St

Project Description

Replace existing 245' long 15"D pipe with an 18"D pipe.

Special Considerations

Invert elevations (2 - 3') may limit pipe placement.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,500
1.20	Traffic control	lf	245	$5	$1,200
1.30	Erosion control measures	L.S.	1	1.4%	$260
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	66	$3	$200
2.30	Remove existing pipe	lf	245	$8	$2,000
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	245	$15	$3,700
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	245	$35	$8,600
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	30	$25	$800
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$4,200
	CONSTRUCTION COSTS SUBTOTAL:				**$25,400**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$7,600
	PROJECT COSTS TOTAL:				**$33,000**

Pipe Worksheet

CIP Project Number:	**C3-F**
Master Plan Link Number:	**1185**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Along 8th St, Willamette and Columbia St

Project Description

Replace existing 258' long 15"D pipe with an 18"D pipe.

Special Considerations

Invert elevations (1 - 2') may limit pipe placement.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,400
1.20	Traffic control	lf	258	$5	$1,300
1.30	Erosion control measures	L.S.	1	1.4%	$360
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	102	$3	$310
2.30	Remove existing pipe	lf	258	$8	$2,100
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	258	$15	$3,900
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 18" diameter	lf	258	$35	$9,000
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	48	$25	$1,200
5.20	Sidewalk	sf	840	$5	$4,200
5.30	Concrete curb	lf	210	$12	$2,520
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$5,700
	CONSTRUCTION COSTS SUBTOTAL:				**$34,300**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$10,300
	PROJECT COSTS TOTAL:				**$44,600**

Pipe Worksheet

CIP Project Number:	**C3-G**
Master Plan Link Number:	**1186**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Along Center St, south of 8th St

Project Description

Replace existing 71' long 18"D pipe with a 36"D pipe.

Special Considerations

Portion of pipe may be located under/near a structure.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,300
1.20	Traffic control	lf	71	$5	$400
1.30	Erosion control measures	L.S.	1	1.4%	$230
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	69	$3	$210
2.30	Remove existing pipe	lf	71	$8	$600
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	71	$55	$3,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	71	$98	$7,000
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	30	$25	$800
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,700
	CONSTRUCTION COSTS SUBTOTAL:				**$22,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$6,700
	PROJECT COSTS TOTAL:				**$28,900**

Pipe Worksheet

CIP Project Number:	**C3-H**
Master Plan Link Number:	**1187**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Along Center St, north of 8th St

Project Description

Replace existing 55' long 18"D pipe with a 36"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,100
1.20	Traffic control	lf	55	$5	$300
1.30	Erosion control measures	L.S.	1	1.4%	$200
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	118	$3	$350
2.30	Remove existing pipe	lf	55	$8	$400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	55	$55	$3,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	55	$98	$5,300
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	55	$25	$1,400
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,200
	CONSTRUCTION COSTS SUBTOTAL:				**$19,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$5,700
	PROJECT COSTS TOTAL:				**$24,700**

Pipe Worksheet

CIP Project Number:	**C3-I**
Master Plan Link Number:	**1188**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Along Center St, between 7th and 8th St

Project Description

Replace existing 310' long 18"D pipe with a 36"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,900
1.20	Traffic control	lf	310	$5	$1,500
1.30	Erosion control measures	L.S.	1	1.4%	$760
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	629	$3	$1,890
2.30	Remove existing pipe	lf	310	$8	$2,500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	310	$24	$7,400
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	310	$98	$30,400
4.20	Manholes, 6' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	310	$25	$7,700
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$11,800

CONSTRUCTION COSTS SUBTOTAL:		**$70,600**
TECHNICAL SERVICES AND ADMINISTRATION:	30%	$21,200
PROJECT COSTS TOTAL:		**$91,800**

Pipe Worksheet

CIP Project Number: C3-J

Master Plan Link Number: 1189

Basin: Chehalem Creek

Subbasin: C/1

Location

Along 7th St, between Center and River St

Project Description

Replace existing 260' long 12"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,400
1.20	Traffic control	lf	260	$5	$1,300
1.30	Erosion control measures	L.S.	1	1.4%	$360
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	526	$3	$1,580
2.30	Remove existing pipe	lf	260	$8	$2,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	260	$15	$3,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	260	$35	$9,100
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	260	$25	$6,500
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,700
	CONSTRUCTION COSTS SUBTOTAL:				**$34,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$10,300
	PROJECT COSTS TOTAL:				**$44,500**

Pipe Worksheet

CIP Project Number:	**C3-K**
Master Plan Link Number:	**1190**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Along 7th St, between River and Chehalem St

Project Description

Replace existing 265' long 12"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,500
1.20	Traffic control	lf	265	$5	$1,300
1.30	Erosion control measures	L.S.	1	1.4%	$370
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	537	$3	$1,610
2.30	Remove existing pipe	lf	265	$8	$2,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	265	$15	$4,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	265	$35	$9,300
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	265	$25	$6,600
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,800
	CONSTRUCTION COSTS SUBTOTAL:				**$34,900**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$10,500
	PROJECT COSTS TOTAL:				**$45,400**

Pipe Worksheet

CIP Project Number:	**C3-L**
Master Plan Link Number:	**1191**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Along Center St, between 6th and 7th St

Project Description

Replace existing 377' long 18"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,400
1.20	Traffic control	lf	377	$5	$1,900
1.30	Erosion control measures	L.S.	1	1.4%	$610
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	762	$3	$2,290
2.30	Remove existing pipe	lf	377	$8	$3,000
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	377	$19	$7,200
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 24" diameter	lf	377	$49	$18,500
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	377	$25	$9,400
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$9,500
	CONSTRUCTION COSTS SUBTOTAL:				**$57,100**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$17,100
	PROJECT COSTS TOTAL:				**$74,200**

Pipe Worksheet

CIP Project Number:	**C3-M**
Master Plan Link Number:	**1193**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Along Center St, between 3rd and 4th St

Project Description

Replace existing 320' long 12"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,000
1.20	Traffic control	lf	320	$5	$1,600
1.30	Erosion control measures	L.S.	1	1.4%	$520
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	646	$3	$1,940
2.30	Remove existing pipe	lf	320	$8	$2,600
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	320	$15	$4,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	320	$35	$11,200
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	320	$25	$8,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	270	$12	$3,240
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$8,100
	CONSTRUCTION COSTS SUBTOTAL:				**$48,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$14,600
	PROJECT COSTS TOTAL:				**$63,200**

Pipe Worksheet

CIP Project Number:	**C3-N**
Master Plan Link Number:	**1194**
Basin:	**Chehalem Creek**
Subbasin:	**C/1**

Location

Along 8th St, west of Center St

Project Description

Replace existing 423' long 10"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,800
1.20	Traffic control	lf	423	$5	$2,100
1.30	Erosion control measures	L.S.	1	1.4%	$730
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	852	$3	$2,560
2.30	Remove existing pipe	lf	423	$8	$3,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	423	$38	$16,100
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	423	$35	$14,800
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	423	$25	$10,600
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$11,400
	CONSTRUCTION COSTS SUBTOTAL:				**$68,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$20,500
	PROJECT COSTS TOTAL:				**$88,700**

Project Summary Sheet

CIP Project Number:	**C4**
Master Plan Link Number:	**1450, 1451**
Basin:	**Chehalem Creek**
Subbasin:	**C/2**

Location

5th St, west of Blaine St

Project Description

Replace two existing pipes with 629'L of 24"D pipe.

Special Considerations

L1450: Pipe located under structures. Design will need to relocate.
Permit necessary (water body, private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$4,900
1.20	Traffic control	lf	629	$5	$3,100
1.30	Erosion control measures	L.S.	1	1.4%	$1,150
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	1,272	$3	$3,820
2.30	Remove existing pipe	lf	629	$8	$5,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6 - 12' deep	lf	629	$19 - $45	$14,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	629	$49	$30,800
4.20	Manholes, 6 - 10' deep	each	2	$2300 - $3700	$9,500
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	629	$25	$15,700
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$18,000
	CONSTRUCTION COSTS SUBTOTAL:				**$108,100**
	PERMITTING COSTS			10%	$10,800
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$32,400
	PROJECT COSTS TOTAL:				**$151,300**

Pipe Worksheet

CIP Project Number:	**C4-A**
Master Plan Link Number:	**1450**
Basin:	**Chehalem Creek**
Subbasin:	**C/2**

Location

Across 5th St, west of Blaine St

Project Description

Replace existing 546' long 12"D pipe with a 24"D pipe.

Special Considerations

Planned location underneath residential area. Design may need to relocate.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$3,600
1.20	Traffic control	lf	546	$5	$2,700
1.30	Erosion control measures	L.S.	1	1.4%	$910
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	1,098	$3	$3,300
2.30	Remove existing pipe	lf	546	$8	$4,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	546	$19	$10,400
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	546	$49	$26,700
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	546	$25	$13,600
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$14,200
	CONSTRUCTION COSTS SUBTOTAL:				**$85,400**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$25,600
	PROJECT COSTS TOTAL:				**$111,000**

Pipe Worksheet

CIP Project Number: C4-B

Master Plan Link Number: 1451

Basin: Chehalem Creek

Subbasin: C/2

Location

Across Blaine St, north of 5th St

Project Description

Replace existing 83' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,300
1.20	Traffic control	lf	83	$5	$400
1.30	Erosion control measures	L.S.	1	1.4%	$240
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	174	$3	$520
2.30	Remove existing pipe	lf	83	$8	$700
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	83	$45	$3,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	83	$49	$4,100
4.20	Manholes, 10' deep	each	1	$5,800	$5,800
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	83	$25	$2,100
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,800
	CONSTRUCTION COSTS SUBTOTAL:				**$22,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$6,800
	PROJECT COSTS TOTAL:				**$29,600**

Project Summary Sheet

CIP Project Number:	**C5**
Master Plan Link Number:	**1464, 1465, 1466, 1467, 1468, 1469, 1470**
Basin:	**Chehalem Creek**
Subbasin:	**C/2**

Location

West of Blaine St, north of 8th St

Project Description

Replace four existing pipes with 502'L of 24"D pipe and three pipes with 755'L of 18"D pipe.

Special Considerations

L1466: Portion of pipe may be located under/near a structure. Easement necessary.
Permit necessary (water body).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$8,100
1.20	Traffic control	lf	795	$5	$3,900
1.30	Erosion control measures	L.S.	1	1.4%	$1,910
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.22	$5,200	$1,170
2.20	Saw cutting asphalt	lf	2,226	$3	$6,680
2.30	Remove existing pipe	lf	1,258	$8	$10,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	1,258	$15 - $19	$20,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18 - 24" diameter	lf	1,258	$35 - $49	$51,000
4.20	Manholes, 6 - 10' deep	each	7	$2300 - $3700	$16,100
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	27	$78	$2,090
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	865	$25	$21,600
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0.22	$22,000	$4,940
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$29,700
	CONSTRUCTION COSTS SUBTOTAL:				**$178,200**
	PERMITTING COSTS			10%	$17,800
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$53,500
	PROJECT COSTS TOTAL:				**$249,500**

Pipe Worksheet

CIP Project Number:	**C5-A**
Master Plan Link Number:	**1464**
Basin:	**Chehalem Creek**
Subbasin:	**C/2**

Location

Project Description

Replace existing 228' long 18"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,400
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$390
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.16	$5,200	$820
2.20	Saw cutting asphalt	lf	464	$3	$1,390
2.30	Remove existing pipe	lf	228	$8	$1,800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	228	$19	$4,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	228	$49	$11,200
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.16	$22,000	$3,460
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,800
	CONSTRUCTION COSTS SUBTOTAL:				**$34,700**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$10,400
	PROJECT COSTS TOTAL:				**$45,100**

Pipe Worksheet

CIP Project Number:	**C5-B**
Master Plan Link Number:	**1465**
Basin:	**Chehalem Creek**
Subbasin:	**C/2**

Location

West of Blaine St, north of 8th St

Project Description

Replace existing 98' long 18"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$900
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	0	1.4%	$170
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.07	$5,200	$350
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	98	$8	$800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	98	$19	$1,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	98	$49	$4,800
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.07	$22,000	$1,480
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$2,500
	CONSTRUCTION COSTS SUBTOTAL:				**$15,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$4,600
	PROJECT COSTS TOTAL:				**$19,800**

Pipe Worksheet

CIP Project Number:	**C5-C**
Master Plan Link Number:	**1466**
Basin:	**Chehalem Creek**
Subbasin:	**C/2**

Location

West of Blaine St, north of 8th St

Project Description

Replace existing 137' long 18"D pipe with a 24"D pipe.

Special Considerations

Portion of pipe may be located under/near a structure.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,100
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$210
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	147	$3	$440
2.30	Remove existing pipe	lf	137	$8	$1,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	137	$19	$2,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	137	$49	$6,700
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	70	$25	$1,800
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,300
	CONSTRUCTION COSTS SUBTOTAL:				**$19,700**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$5,900
	PROJECT COSTS TOTAL:				**$25,600**

Pipe Worksheet

CIP Project Number:	**C5-D**
Master Plan Link Number:	**1467**
Basin:	**Chehalem Creek**
Subbasin:	**C/2**

Location

West of Blaine St, north of 8th St

Project Description

Replace existing 39' long 18"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$500
1.20	Traffic control	lf	39	$5	$200
1.30	Erosion control measures	L.S.	1	1.4%	$90
2.00					
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	86	$3	$260
2.30	Remove existing pipe	lf	39	$8	$300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	39	$19	$700
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	39	$49	$1,900
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	39	$25	$1,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$1,500
	CONSTRUCTION COSTS SUBTOTAL:				**$8,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$2,600
	PROJECT COSTS TOTAL:				**$11,400**

Pipe Worksheet

CIP Project Number: C5-E

Master Plan Link Number: 1468

Basin: Chehalem Creek

Subbasin:

Location

Along Blaine St, south of 6th St

Project Description

Replace existing 248' long 15"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,400
1.20	Traffic control	lf	248	$5	$1,200
1.30	Erosion control measures	L.S.	1	1.4%	$350
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	503	$3	$1,510
2.30	Remove existing pipe	lf	248	$8	$2,000
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	248	$15	$3,700
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 18" diameter	lf	248	$35	$8,700
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	248	$25	$6,200
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$5,500
	CONSTRUCTION COSTS SUBTOTAL:				**$32,900**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,900
	PROJECT COSTS TOTAL:				**$42,800**

Pipe Worksheet

CIP Project Number: C5-F

Master Plan Link Number: 1469

Basin: Chehalem Creek

Subbasin:

Location

Along 6th St, between Blaine and Howard St

Project Description

Replace existing 250' long 15"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,400
1.20	Traffic control	lf	250	$5	$1,200
1.30	Erosion control measures	L.S.	1	1.4%	$350
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	506	$3	$1,520
2.30	Remove existing pipe	lf	250	$8	$2,000
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	250	$15	$3,700
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 18" diameter	lf	250	$35	$8,700
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	250	$25	$6,200
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$5,500
	CONSTRUCTION COSTS SUBTOTAL:				**$32,900**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,900
	PROJECT COSTS TOTAL:				**$42,800**

Pipe Worksheet

CIP Project Number: C5-G

Master Plan Link Number: 1470

Basin: Chehalem Creek

Subbasin:

Location

Along 6th St, between Howard and School St

Project Description

Replace existing 257' long 15"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,400
1.20	Traffic control	lf	257	$5	$1,300
1.30	Erosion control measures	L.S.	1	1.4%	$360
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	520	$3	$1,560
2.30	Remove existing pipe	lf	257	$8	$2,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	257	$15	$3,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	257	$35	$9,000
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	3	$78	$230
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	257	$25	$6,400
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,700
	CONSTRUCTION COSTS SUBTOTAL:				**$34,300**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$10,300
	PROJECT COSTS TOTAL:				**$44,600**

Project Summary Sheet

CIP Project Number:	**C6**
Master Plan Link Number:	**1709**
Basin:	**Chehalem Creek**
Subbasin:	**C/3**

Location

Along eastside of Hwy 99, south of 3rd St

Project Description

Replace existing 313' long 8"D pipe with a 24"D pipe.

Special Considerations

L1709: Invert elevation (2') may limit pipe placement.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,700
1.20	Traffic control	lf	313	$5	$1,560
1.30	Erosion control measures	L.S.	1	1.4%	$430
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	219	$3	$660
2.30	Remove existing pipe	lf	313	$8	$2,500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	313	$19	$5,940
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	313	$49	$15,300
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	50	$25	$1,250
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$6,800
	CONSTRUCTION COSTS SUBTOTAL:				**$40,700**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$12,200
	PROJECT COSTS TOTAL:				**$52,900**

Project Summary Sheet

CIP Project Number: C7

Master Plan Link Number: 1719, 1720

Basin: Chehalem Creek

Subbasin: C/3

Location

Hwy 99 , south of 3rd St

Project Description

Replace two existing pipes with 405'L of 24"D pipe

Special Considerations

L1719 - L1720: Invert elevations may limit pipe placement.
Easement is necessary.
Permits necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$2,700
1.20	Traffic control	lf	303	$5	$1,500
1.30	Erosion control measures	L.S.	1	1.4%	$610
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0.07	$5,200	$360
2.20	Saw cutting asphalt	lf	612	$3	$1,840
2.30	Remove existing pipe	lf	404	$8	$3,200
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	404	$19	$7,700
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 24" diameter	lf	404	$49	$19,800
4.20	Manholes, 6' deep	each	3	$2,300	$6,900
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	50	$25	$1,300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.07	$22,000	$1,540
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$9,500

CONSTRUCTION COSTS SUBTOTAL:		**$57,000**
PERMITTING COSTS	10%	$5,700
TECHNICAL SERVICES AND ADMINISTRATION:	30%	$17,100
PROJECT COSTS TOTAL:		**$79,800**

Pipe Worksheet

CIP Project Number:	**C7-A**
Master Plan Link Number:	**1719**
Basin:	**Chehalem Creek**
Subbasin:	**C/3**

Location

Along westside of Hwy 99, south of 3rd St

Project Description

Replace existing 102' long 12"D pipe with a 24"D pipe.

Special Considerations

Invert elevations (1') may limit pipe placement.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,100
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$200
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.07	$5,200	$360
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	102	$8	$800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	102	$19	$1,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	102	$49	$5,000
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.07	$22,000	$1,540
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,100
	CONSTRUCTION COSTS SUBTOTAL:				**$18,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$5,600
	PROJECT COSTS TOTAL:				**$24,200**

Pipe Worksheet

CIP Project Number:	**C7-B**
Master Plan Link Number:	**1720**
Basin:	**Chehalem Creek**
Subbasin:	**C/3**

Location

Along westside of Hwy 99, south of 3rd St

Project Description

Replace existing 303' long 12"D pipe with a 24"D pipe.

Special Considerations

Invert elevations (2 -- 3') may limit pipe placement.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,600
1.20	Traffic control	lf	303	$5	$1,500
1.30	Erosion control measures	L.S.	1	1.4%	$400
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	612	$3	$1,840
2.30	Remove existing pipe	lf	303	$8	$2,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	303	$19	$5,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	303	$49	$14,800
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	50	$25	$1,300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$6,400
	CONSTRUCTION COSTS SUBTOTAL:				**$38,300**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$11,500
	PROJECT COSTS TOTAL:				**$49,800**

Project Summary Sheet

CIP Project Number:	**C8**
Master Plan Link Number:	**2011, 2012, 2014, 2020, 2025, 2030, 2044**
Basin:	**Chehalem Creek**
Subbasin:	**C/4**

Location

West of Morton St, south of Sheridan St

Project Description

Replace six existing pipes with 403'L of 18"D pipe; 106'L of 24"D pipe; 98'L of 30"D pipe; and 434'L of 36"D pipe.
Replace one existing culvert with 58' L of 24"D culvert.

Special Considerations

L2011 & L2020: Located between residential structures. Easement is necessary.
L2030: Underneath RR.
Permits necessary (water body, private property, RR, ODOT)

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$10,700
1.20	Traffic control	lf	589	$5	$2,900
1.30	Erosion control measures	L.S.	1	1.4%	$2,430
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.19	$5,200	$990
2.20	Saw cutting asphalt	lf	989	$3	$2,970
2.30	Remove existing pipe	lf	1,098	$8	$8,800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6 - 12' deep	lf	1,098	$15 - $55	$33,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18 - 36" diameter	lf	1,098	$35 - $98	$71,700
4.20	Manholes, 6 - 14' deep	each	8	$2300 - $5800	$29,600
4.30	Culvert headwall 36" diameter	each	1	$2,600	$2,600
4.40	Rip-rap channel protection, 18" thick	sy	48	$78	$3,730
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	483	$25	$12,100
5.20	Sidewalk	sf	120	$5	$600
5.30	Concrete curb	lf	40	$12	$480
5.40	Revegetation	acre	0.19	$22,000	$4,200
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$37,500
	CONSTRUCTION COSTS SUBTOTAL:				**$224,900**
	PERMITTING COSTS			10%	$22,500
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$67,500
	PROJECT COSTS TOTAL:				**$314,900**

Pipe Worksheet

CIP Project Number:	**C8-A**
Master Plan Link Number:	**2011**
Basin:	**Chehalem Creek**
Subbasin:	**C/4**

Location

West of Morton St, south of Sheridan St

Project Description

Replace existing 171' long 15"D pipe with a 36"D pipe.

Special Considerations

Located between residential structures. Easement is necessary.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,800
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$480
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.12	$5,200	$610
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	171	$8	$1,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	171	$24	$4,100
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	171	$98	$16,800
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall 36" diameter	each	1	$2,600	$2,600
4.40	Rip-rap channel protection, 18" thick	sy	48	$78	$3,730
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.12	$22,000	$2,600
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$7,300
	CONSTRUCTION COSTS SUBTOTAL:				**$43,700**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$13,100
	PROJECT COSTS TOTAL:				**$56,800**

Pipe Worksheet

CIP Project Number: C8-B

Master Plan Link Number: 2012

Basin: Chehalem Creek

Subbasin: C/4

Location

Across Morton St, south of Sheridan St

Project Description

Replace existing 88' long 15"D pipe with a 36"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,200
1.20	Traffic control	lf	88	$5	$400
1.30	Erosion control measures	L.S.	1	1.4%	$220
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	89	$3	$270
2.30	Remove existing pipe	lf	88	$8	$700
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	88	$24	$2,100
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 36" diameter	lf	88	$98	$8,600
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall,	each	0	$2,600	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	40	$25	$1,000
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$3,500
	CONSTRUCTION COSTS SUBTOTAL:				**$20,900**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$6,300
	PROJECT COSTS TOTAL:				**$27,200**

Pipe Worksheet

CIP Project Number:	**C8-C**
Master Plan Link Number:	**2014**
Basin:	**Chehalem Creek**
Subbasin:	**C/4**

Location

Across Harrison St, north of Hancock St

Project Description

Replace existing 98' long 12"D pipe with a 30"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,300
1.20	Traffic control	lf	98	$5	$500
1.30	Erosion control measures	L.S.	1	1.4%	$230
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	88	$3	$260
2.30	Remove existing pipe	lf	98	$8	$800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	98	$45	$4,400
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 30" diameter	lf	98	$72	$7,100
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall,	each	0	$2,100	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	40	$25	$1,000
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,700
	CONSTRUCTION COSTS SUBTOTAL:				**$22,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$6,600
	PROJECT COSTS TOTAL:				**$28,600**

Pipe Worksheet

CIP Project Number:	**C8-D**
Master Plan Link Number:	**2020**
Basin:	**Chehalem Creek**
Subbasin:	**C/4**

Location

South of Sheridan between Morton and Harrison St

Project Description

Replace existing 175' long 15"D pipe with a 36"D pipe.

Special Considerations

Located between residential structures. Easement is necessary.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,700
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$450
2.00					
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	175	$8	$1,400
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 12' deep	lf	175	$55	$9,600
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 36" diameter	lf	175	$98	$17,100
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall,	each	0	$2,600	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$6,800
	CONSTRUCTION COSTS SUBTOTAL:				**$40,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$12,200
	PROJECT COSTS TOTAL:				**$53,000**

Pipe Worksheet

CIP Project Number: C8-E

Master Plan Link Number: 2025

Basin: Chehalem Creek

Subbasin: C/4

Location

Across Hancock, east of Harrison St

Project Description

Replace existing 106' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,400
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$260
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.07	$5,200	$380
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	106	$8	$800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	106	$45	$4,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	106	$49	$5,200
4.20	Manholes, 14' deep	each	1	$5,800	$5,800
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.07	$22,000	$1,600
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$4,000
	CONSTRUCTION COSTS SUBTOTAL:				**$24,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$7,300
	PROJECT COSTS TOTAL:				**$31,500**

Pipe Worksheet

CIP Project Number:	**C8-F**
Master Plan Link Number:	**2030**
Basin:	**Chehalem Creek**
Subbasin:	**C/4**

Location

Across RR and Hancock St

Project Description

Replace existing 58' long 18"D culvert with a 24"D culvert.

Special Considerations

Underneath RR.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$900
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$170
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	58	$8	$500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	58	$45	$2,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	58	$49	$2,800
4.20	Manholes, 10' deep	each	1	$5,800	$5,800
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$2,600
	CONSTRUCTION COSTS SUBTOTAL:				**$15,400**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$4,600
	PROJECT COSTS TOTAL:				**$20,000**

Pipe Worksheet

CIP Project Number: C8-G

Master Plan Link Number: 2044

Basin: Chehalem Creek

Subbasin: C/4

Location

Along First St, between Lincoln and Grant St

Project Description

Replace existing 403' long 12"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,400
1.20	Traffic control	lf	403	$5	$2,000
1.30	Erosion control measures	L.S.	1	1.4%	$610
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	812	$3	$2,440
2.30	Remove existing pipe	lf	403	$8	$3,200
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	403	$15	$6,000
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 18" diameter	lf	403	$35	$14,100
4.20	Manholes, 6' deep	each	2	$3,700	$7,400
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	403	$25	$10,100
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$9,700
	CONSTRUCTION COSTS SUBTOTAL:				**$58,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$17,400
	PROJECT COSTS TOTAL:				**$75,400**

Project Summary Sheet

CIP Project Number:	**C9**
Master Plan Link Number:	**2070**
Basin:	**Chehalem Creek**
Subbasin:	**C/4**

Location

RR box culvert at Main St

Project Description

Replace existing 168' long 12"D pipe with an 18"D pipe.

Special Considerations

L2070: Portion of pipe may be located underneath a structure.
Permit necessary (RR).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,800
1.20	Traffic control	lf	168	$5	$840
1.30	Erosion control measures	L.S.	1	1.4%	$320
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	206	$3	$620
2.30	Remove existing pipe	lf	168	$8	$1,350
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	168	$38	$6,400
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	168	$35	$5,900
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	100	$25	$2,500
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,100
	CONSTRUCTION COSTS SUBTOTAL:				**$30,600**
	PERMITTING COSTS			10%	$3,100
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,200
	PROJECT COSTS TOTAL:				**$42,900**

Project Summary Sheet

CIP Project Number:	**C10**
Master Plan Link Number:	**2223, 2224, 2225, 2226**
Basin:	**Chehalem Creek**
Subbasin:	**C/5**

Location

East of Main St, north of Illinois St

Project Description

Replace four existing pipes with 515'L of 18"D pipe and 516'L of 24"D pipe.

Special Considerations

Permit necessary (water body).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$10,100
1.20	Traffic control	lf	1031	$5	$5,100
1.30	Erosion control measures	L.S.	1	1.4%	$2,470
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0.03	$5,200	$150
2.20	Saw cutting asphalt	lf	2,090	$3	$6,270
2.30	Remove existing pipe	lf	1031	$8	$8,200
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 12 - 20' deep	lf	1031	$38 - $85	$61,900
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 18 - 24" diameter	lf	1031	$35 - $49	$43,200
4.20	Manholes, 10 - 14' deep	each	4	$3700 - $5800	$21,100
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	990	$25	$24,700
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	460	$12	$5,520
5.40	Revegetation	acre	0.03	$22,000	$630
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$38,300
	CONSTRUCTION COSTS SUBTOTAL:				**$229,700**
	PERMITTING COSTS			10%	$23,000
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$68,900
	PROJECT COSTS TOTAL:				**$321,600**

Pipe Worksheet

CIP Project Number:	**C10-A**
Master Plan Link Number:	**2223**
Basin:	**Chehalem Creek**
Subbasin:	**C/5**

Location

East of Main St, north of Illinois St

Project Description

Replace existing 41' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,000
1.20	Traffic control	lf	41	$5	$200
1.30	Erosion control measures	L.S.	1	1.4%	$190
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.03	$5,200	$150
2.20	Saw cutting asphalt	lf	90	$3	$270
2.30	Remove existing pipe	lf	41	$8	$300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	41	$45	$1,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	41	$49	$2,000
4.20	Manholes, 14' deep	each	1	$5,800	$5,800
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0.03	$22,000	$630
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$2,900
	CONSTRUCTION COSTS SUBTOTAL:				**$17,500**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$5,300
	PROJECT COSTS TOTAL:				**$22,800**

Pipe Worksheet

CIP Project Number:	**C10-B**
Master Plan Link Number:	**2224**
Basin:	**Chehalem Creek**
Subbasin:	**C/5**

Location

Along Main St, north of Illinois St

Project Description

Replace existing 450' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$4,900
1.20	Traffic control	lf	450	$5	$2,200
1.30	Erosion control measures	L.S.	1	1.4%	$1,260
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	907	$3	$2,720
2.30	Remove existing pipe	lf	450	$8	$3,600
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 20' deep	lf	450	$85	$38,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	450	$49	$22,000
4.20	Manholes, 14' deep	each	1	$5,800	$5,800
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	450	$25	$11,200
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	450	$12	$5,400
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$19,500
	CONSTRUCTION COSTS SUBTOTAL:				**$116,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$35,000
	PROJECT COSTS TOTAL:				**$151,800**

Pipe Worksheet

CIP Project Number:	**C10-C**
Master Plan Link Number:	**2225**
Basin:	**Chehalem Creek**
Subbasin:	**C/5**

Location

Across Illinois St, east of Main St

Project Description

Replace existing 25' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$800
1.20	Traffic control	lf	25	$5	$100
1.30	Erosion control measures	L.S.	1	1.4%	$140
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	58	$3	$170
2.30	Remove existing pipe	lf	25	$8	$200
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 20' deep	lf	25	$85	$2,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	25	$49	$1,200
4.20	Manholes, 14' deep	each	1	$5,800	$5,800
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	25	$25	$600
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$2,200
	CONSTRUCTION COSTS SUBTOTAL:				**$13,400**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$4,000
	PROJECT COSTS TOTAL:				**$17,400**

Pipe Worksheet

CIP Project Number:	**C10-D**
Master Plan Link Number:	**2226**
Basin:	**Chehalem Creek**
Subbasin:	**C/5**

Location

Along Illinois St, between Main and Washington St

Project Description

Replace existing 515' long 12"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$3,400
1.20	Traffic control	lf	515	$5	$2,600
1.30	Erosion control measures	L.S.	1	1.4%	$870
2.00					
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	1035	$3	$3,110
2.30	Remove existing pipe	lf	515	$8	$4,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	515	$38	$19,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	515	$35	$18,000
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	515	$25	$12,900
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$13,700
	CONSTRUCTION COSTS SUBTOTAL:				**$82,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$24,600
	PROJECT COSTS TOTAL:				**$106,600**

Project Summary Sheet

CIP Project Number: C11

Master Plan Link Number: 2236

Basin: Chehalem Creek

Subbasin: C/5

Location

West of Hwy 219, north of Mission Dr

Project Description

Replace existing 155' long 24"D pipe with a 30"D pipe.

Special Considerations

Easement is necessary.
Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,400
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$370
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.11	$5,200	$550
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	155	$8	$1,240
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	155	$19	$2,940
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 30" diameter	lf	155	$72	$11,100
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall, 30" diameter	each	1	$2,100	$2,100
4.40	Rip-rap channel protection, 18" thick	sy	41	$78	$3,180
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.11	$22,000	$2,340
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,500
	CONSTRUCTION COSTS SUBTOTAL:				**$33,000**
	PERMITTING COSTS			10%	$3,300
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,900
	PROJECT COSTS TOTAL:				**$46,200**

Project Summary Sheet

CIP Project Number:	**C12**
Master Plan Link Number:	**2275, 2276**
Basin:	**Chehalem Creek**
Subbasin:	**C/5**

Location

Center St, north of Pioneer Ln

Project Description

Replace two existing pipes with 91'L of 24"D pipe and 104'L of 30"D pipe.

Special Considerations

Portion of pipe may be located underneath a structure. Easement is necessary.
Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$2,200
1.20	Traffic control	lf	104	$5	$500
1.30	Erosion control measures	L.S.	1	1.4%	$410
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.06	$5,200	$330
2.20	Saw cutting asphalt	lf	235	$3	$700
2.30	Remove existing pipe	lf	195	$8	$1,500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	195	$19	$3,700
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24 - 30" diameter	lf	195	$49 - $72	$12,000
4.20	Manholes, 6 - 10' deep	each	2	$2300 - $3700	$4,600
4.30	Culvert headwall 24 - 30" diameter	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	104	$25	$2,600
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0.06	$22,000	$1,390
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$6,400
	CONSTRUCTION COSTS SUBTOTAL:				**$38,500**
	PERMITTING COSTS			10%	$3,900
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$11,600
	PROJECT COSTS TOTAL:				**$54,000**

Pipe Worksheet

CIP Project Number: C12-A

Master Plan Link Number: 2275

Basin: Chehalem Creek

Subbasin: C/5

Location

Center St, north of Pioneer Ln

Project Description

Replace existing 104' long 18"D pipe with a 30"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,200
1.20	Traffic control	lf	104	$5	$500
1.30	Erosion control measures	L.S.	1	1.4%	$220
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	215	$3	$640
2.30	Remove existing pipe	lf	104	$8	$800
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	104	$19	$2,000
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 30" diameter	lf	104	$72	$7,500
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall 30" diameter	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	104	$25	$2,600
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$3,600

CONSTRUCTION COSTS SUBTOTAL:		**$21,400**
TECHNICAL SERVICES AND ADMINISTRATION:	30%	$6,400
PROJECT COSTS TOTAL:		**$27,800**

Pipe Worksheet

CIP Project Number:	**C12-B**
Master Plan Link Number:	**2276**
Basin:	**Chehalem Creek**
Subbasin:	**C/5**

Location

Center St, north of Pioneer Ln

Project Description

Replace existing 91' long 18"D pipe with a 24"D pipe.

Special Considerations

Portion of pipe may be located underneath a structure.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,000
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$190
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.06	$5,200	$330
2.20	Saw cutting asphalt	lf	20	$3	$60
2.30	Remove existing pipe	lf	91	$8	$700
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	91	$19	$1,700
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	91	$49	$4,500
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0.06	$22,000	$1,390
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$2,900
	CONSTRUCTION COSTS SUBTOTAL:				**$17,300**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$5,200
	PROJECT COSTS TOTAL:				**$22,500**

Project Summary Sheet

CIP Project Number:	**C13**
Master Plan Link Number:	**2280**
Basin:	**Chehalem Creek**
Subbasin:	**C/5**

Location

Along Crestview Dr, west of Meridian St

Project Description

Replace existing 64' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,600
1.20	Traffic control	lf	64	$5	$320
1.30	Erosion control measures	L.S.	1	1.4%	$290
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	135	$3	$400
2.30	Remove existing pipe	lf	64	$8	$510
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 12' deep	lf	64	$45	$2,880
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 24" diameter	lf	64	$49	$3,100
4.20	Manholes, 14' deep	each	2	$5,800	$11,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	64	$25	$1,600
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$4,500
	CONSTRUCTION COSTS SUBTOTAL:				**$26,800**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$8,000
	PROJECT COSTS TOTAL:				**$34,800**

Project Summary Sheet

CIP Project Number:	**C14**
Master Plan Link Number:	**2509, 2509N**
Basin:	**Chehalem Creek**
Subbasin:	**C/7**

Location

Columbia Dr, west of Main St

Project Description

Replace 12"D culvert with 35'L of 42"D pipe and install a parallel 24"D pipe.

Special Considerations

L2509 - L2509N: Invert elevations may limit pipe placement.
Permit necessary (water body).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$2,800
1.20	Traffic control	lf	70	$5	$400
1.30	Erosion control measures	L.S.	1	1.4%	$620
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	158	$3	$480
2.30	Remove existing pipe	lf	35	$8	$300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	70	$24	$1,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36 - 42" diameter	lf	70	$98 - $134	$8,100
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall, 36 - 42" diameter	each	4	$2,600	$11,400
4.40	Rip-rap channel protection, 18" thick	sy	254	$78	$19,850
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	70	$25	$1,800
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$9,500
	CONSTRUCTION COSTS SUBTOTAL:				**$56,900**
	PERMITTING COSTS			10%	$5,700
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$17,100
	PROJECT COSTS TOTAL:				**$79,700**

Pipe Worksheet

CIP Project Number:	**C14-A**
Master Plan Link Number:	**2509**
Basin:	**Chehalem Creek**
Subbasin:	**C/7**

Location

Across Columbia Dr, west of Main St

Project Description

Replace existing 35' long 12"D culvert with a 42"D culvert.

Special Considerations

Invert elevations may limit pipe placement.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,400
1.20	Traffic control	lf	35	$5	$200
1.30	Erosion control measures	L.S.	1	1.4%	$360
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	80	$3	$240
2.30	Remove existing pipe	lf	35	$8	$300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	35	$24	$800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 42" diameter	lf	35	$134	$4,700
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall, 42" diameter	each	2	$3,100	$6,200
4.40	Rip-rap channel protection, 18" thick	sy	159	$78	$12,390
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	35	$25	$900
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,500
	CONSTRUCTION COSTS SUBTOTAL:				**$33,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,900
	PROJECT COSTS TOTAL:				**$42,900**

Pipe Worksheet

CIP Project Number:	**C14-B**
Master Plan Link Number:	**2509N**
Basin:	**Chehalem Creek**
Subbasin:	**C/7**

Location

New parallel pipe across Columbia Dr

Project Description

Install a new 35' long 36"D pipe.

Special Considerations

Invert elevations may limit pipe placement.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,400
1.20	Traffic control	lf	35	$5	$200
1.30	Erosion control measures	L.S.	1	1.4%	$260
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	79	$3	$240
2.30	Remove existing pipe	lf	0	$8	$0
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	35	$24	$800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	35	$98	$3,400
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall, 36" diameter	each	2	$2,600	$5,200
4.40	Rip-rap channel protection, 18" thick	sy	96	$78	$7,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	35	$25	$900
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$4,000
	CONSTRUCTION COSTS SUBTOTAL:				**$23,900**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$7,200
	PROJECT COSTS TOTAL:				**$31,100**

Project Summary Sheet

CIP Project Number:	**C15**
Master Plan Link Number:	**2512**
Basin:	**Chehalem Creek**
Subbasin:	**C/7**

Location

Columbia Dr, west of Main St

Project Description

Replace existing 229' long 18"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,600
1.20	Traffic control	lf	229	$5	$1,150
1.30	Erosion control measures	L.S.	1	1.4%	$410
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	465	$3	$1,400
2.30	Remove existing pipe	lf	229	$8	$1,830
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	229	$19	$4,350
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	229	$49	$11,200
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	229	$25	$5,730
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$6,400
	CONSTRUCTION COSTS SUBTOTAL:				**$38,200**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$11,500
	PROJECT COSTS TOTAL:				**$49,700**

Project Summary Sheet

CIP Project Number:	**C16**
Master Plan Link Number:	**2620**
Basin:	**Chehalem Creek**
Subbasin:	**C/7**

Location

Park Ct, west of Donald Ln

Project Description

Replace existing 51' long 27"D pipe with a 36"D pipe.

Special Considerations

Permit necessary (water body).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,600
1.20	Traffic control	lf	51	$5	$250
1.30	Erosion control measures	L.S.	1	1.4%	$300
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	111	$3	$330
2.30	Remove existing pipe	lf	51	$8	$410
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	51	$24	$1,220
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	51	$98	$5,000
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall, 36" diameter	each	2	$2,600	$5,200
4.40	Rip-rap channel protection, 18" thick	sy	96	$78	$7,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	30	$25	$750
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$4,600
	CONSTRUCTION COSTS SUBTOTAL:				**$27,800**
	PERMITTING COSTS			10%	$2,800
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$8,300
	PROJECT COSTS TOTAL:				**$38,900**

Project Summary Sheet

CIP Project Number:	**C17**
Master Plan Link Number:	**3010**
Basin:	**Chehalem Creek**
Subbasin:	**C/8**

Location

Crater Ln, south of Foothills Dr

Project Description

Replace existing 26' long 18"D culvert with a 36"D culvert.

Special Considerations

L3010: Invert elevation may limit pipe placement.
Permit necessary (water body).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,300
1.20	Traffic control	lf	26	$5	$130
1.30	Erosion control measures	L.S.	1	1.4%	$240
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	49	$3	$150
2.30	Remove existing pipe	lf	26	$8	$200
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	26	$24	$610
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 36" diameter	lf	26	$98	$2,500
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall, 36" diameter	each	2	$2,600	$5,200
4.40	Rip-rap channel protection, 18" thick	sy	96	$78	$7,460
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	20	$25	$500
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$3,700
	CONSTRUCTION COSTS SUBTOTAL:				**$22,000**
	PERMITTING COSTS			10%	$2,200
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$6,600
	PROJECT COSTS TOTAL:				**$30,800**

Project Summary Sheet

CIP Project Number:	**C18**
Master Plan Link Number:	**3114, 3115**
Basin:	**Chehalem Creek**
Subbasin:	**C/8**

Location

Myrtlewood Ct, south of Edgewood Dr.

Project Description

Replace two existing pipes with 426'L of 36"D pipe.

Special Considerations

L3115: Located between residential structures. Easement is necessary.
Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$4,400
1.20	Traffic control	lf	135	$5	$700
1.30	Erosion control measures	L.S.	1	1.4%	$1,150
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	369	$3	$1,110
2.30	Remove existing pipe	lf	426	$8	$3,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12 - 6' deep	lf	426	$24 - $55	$19,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	426	$98	$41,800
4.20	Manholes, 6 - 14' deep	each	3	$2300 - $5800	$10,400
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	170	$25	$4,300
5.20	Sidewalk	sf	120	$5	$600
5.30	Concrete curb	lf	30	$12	$360
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$17,500
	CONSTRUCTION COSTS SUBTOTAL:				**$104,900**
	PERMITTING COSTS			10%	$10,500
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$31,500
	PROJECT COSTS TOTAL:				**$146,900**

Pipe Worksheet

CIP Project Number:	**C18-A**
Master Plan Link Number:	**3114**
Basin:	**Chehalem Creek**
Subbasin:	**C/8**

Location

Along Myrtlewood Ct

Project Description

Replace existing 135' long 30"D pipe with a 36"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,500
1.20	Traffic control	lf	135	$5	$700
1.30	Erosion control measures	L.S.	1	1.4%	$380
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	280	$3	$840
2.30	Remove existing pipe	lf	135	$8	$1,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	135	$24	$3,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	135	$98	$13,300
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	130	$25	$3,300
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,800
	CONSTRUCTION COSTS SUBTOTAL:				**$35,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$10,500
	PROJECT COSTS TOTAL:				**$45,500**

Pipe Worksheet

CIP Project Number: C18-B

Master Plan Link Number: 3115

Basin: Chehalem Creek

Subbasin: C/8

Location

Edgewood to Myrtlewood Ct

Project Description

Replace existing 291' long 30"D pipe with a 36"D pipe.

Special Considerations

Located between residential structures. Easement is necessary.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,900
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$770
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	89	$3	$270
2.30	Remove existing pipe	lf	291	$8	$2,300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	291	$55	$16,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	291	$98	$28,500
4.20	Manholes, 14' deep	each	1	$5,800	$5,800
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	40	$25	$1,000
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$11,600
	CONSTRUCTION COSTS SUBTOTAL:				**$69,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$20,900
	PROJECT COSTS TOTAL:				**$90,700**

Project Summary Sheet

CIP Project Number: C19

Master Plan Link Number: 3130

Basin: Chehalem Creek

Subbasin: C/8

Location

Sunset Dr to Quail Dr

Project Description

Replace existing 265' long 30"D pipe with a 36"D pipe.

Special Considerations

L3130: Located between residential structures. Easement is necessary.
Invert elevation may limit pipe placement.
Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,200
1.20	Traffic control	lf	100	$5	$500
1.30	Erosion control measures	L.S.	1	1.4%	$580
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	89	$3	$270
2.30	Remove existing pipe	lf	265	$8	$2,120
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	265	$24	$6,370
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 36" diameter	lf	265	$98	$26,000
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	40	$25	$1,000
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$8,900
	CONSTRUCTION COSTS SUBTOTAL:				**$53,200**
	PERMITTING COSTS			10%	$5,300
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$16,000
	PROJECT COSTS TOTAL:				**$74,500**

Project Summary Sheet

CIP Project Number:	**C20**
Master Plan Link Number:	**3145**
Basin:	**Chehalem Creek**
Subbasin:	**C/8**

Location

Along Hwy 219, north of Foothills Dr

Project Description

Replace existing 240' long 18"D pipe with a 36"D pipe.

Special Considerations

Permit necessary (ODOT).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,500
1.20	Traffic control	lf	240	$5	$1,200
1.30	Erosion control measures	L.S.	1	1.4%	$660
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	489	$3	$1,470
2.30	Remove existing pipe	lf	240	$8	$1,920
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	240	$24	$5,760
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	240	$98	$23,500
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	240	$25	$6,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	240	$12	$2,880
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$10,100
	CONSTRUCTION COSTS SUBTOTAL:				**$60,600**
	PERMITTING COSTS			10%	$6,100
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$18,200
	PROJECT COSTS TOTAL:				**$84,900**

Project Summary Sheet

CIP Project Number:	**C21**
Master Plan Link Number:	**3148**
Basin:	**Chehalem Creek**
Subbasin:	**C/8**

Location

Along Morris St, south of Foothills Dr

Project Description

Replace existing 7' long 18"D pipe with a 30"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$500
1.20	Traffic control	lf	100	$5	$500
1.30	Erosion control measures	L.S.	1	1.4%	$80
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	23	$3	$70
2.30	Remove existing pipe	lf	7	$8	$60
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	7	$19	$140
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 30" diameter	lf	7	$72	$500
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	7	$25	$190
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$1,300
	CONSTRUCTION COSTS SUBTOTAL:				**$7,900**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$2,400
	PROJECT COSTS TOTAL:				**$10,300**

Project Summary Sheet

CIP Project Number:	**C22**
Master Plan Link Number:	**3400, 3405, 3410**
Basin:	**Chehalem Creek**
Subbasin:	**C/8**

Location

South of Foothills Dr, west of Jones St

Project Description

Replace three existing pipes with 329'L of 24"D pipe.

Special Considerations

L3405: Portion of pipe may be located underneath a fence. Easement is necessary.
L3410: Portion of pipe may be located underneath a structure.
Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$3,600
1.20	Traffic control	lf	109	$5	$500
1.30	Erosion control measures	L.S.	1	1.4%	$780
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.21	$5,200	$1,070
2.20	Saw cutting asphalt	lf	47	$3	$140
2.30	Remove existing pipe	lf	328	$8	$2,700
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6 - 12' deep	lf	328	$19 - $45	$11,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	328	$49	$16,000
4.20	Manholes, 6 - 10' deep	each	4	$2300 - $3700	$17,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	20	$25	$500
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0.21	$22,000	$4,520
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$11,900
	CONSTRUCTION COSTS SUBTOTAL:				**$71,500**
	PERMITTING COSTS			10%	$7,200
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$21,500
	PROJECT COSTS TOTAL:				**$100,200**

Pipe Worksheet

CIP Project Number:	**C22-A**
Master Plan Link Number:	**3400**
Basin:	**Chehalem Creek**
Subbasin:	**C/8**

Location

West of Sunset Dr, south of Foothills Dr

Project Description

Replace existing 170' long 18"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,300
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$340
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.12	$5,200	$610
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	170	$8	$1,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	170	$45	$7,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	170	$49	$8,300
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.12	$22,000	$2,570
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,200
	CONSTRUCTION COSTS SUBTOTAL:				**$31,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,300
	PROJECT COSTS TOTAL:				**$40,300**

Pipe Worksheet

CIP Project Number: C22-B

Master Plan Link Number: 3405

Basin: Chehalem Creek

Subbasin: C/8

Location

North of Sunset Dr to Foothills Dr

Project Description

Replace existing 50' long 18"D pipe with a 24"D pipe.

Special Considerations

Portion of pipe may be located underneath a fence.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,300
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$250
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.03	$5,200	$180
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	50	$8	$400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	50	$45	$2,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	50	$49	$2,400
4.20	Manholes, 14' deep	each	2	$5,800	$11,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.03	$22,000	$750
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,800
	CONSTRUCTION COSTS SUBTOTAL:				**$22,900**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$6,900
	PROJECT COSTS TOTAL:				**$29,800**

Pipe Worksheet

CIP Project Number:	**C22-C**
Master Plan Link Number:	**3410**
Basin:	**Chehalem Creek**
Subbasin:	**C/8**

Location

North of Sunset Dr to Foothills Dr

Project Description

Replace existing 109' long 18"D pipe with a 24"D pipe.

Special Considerations

Portion of pipe may be located underneath a structure.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,000
1.20	Traffic control	lf	109	$5	$500
1.30	Erosion control measures	L.S.	1	1.4%	$190
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0.05	$5,200	$280
2.20	Saw cutting asphalt	lf	47	$3	$140
2.30	Remove existing pipe	lf	109	$8	$900
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	109	$19	$2,100
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 24" diameter	lf	109	$49	$5,300
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	20	$25	$500
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0.05	$22,000	$1,200
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$2,900
	CONSTRUCTION COSTS SUBTOTAL:				**$17,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$5,300
	PROJECT COSTS TOTAL:				**$22,900**

Project Summary Sheet

CIP Project Number:	**H1**
Master Plan Link Number:	**4218, 4220, 4225**
Basin:	**Hess Creek**
Subbasin:	**H/1**

Location

Wynooski St, south of 11th St

Project Description

Replace three existing pipes with 265'L of 18"D pipe and 99'L of 21"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$3,400
1.20	Traffic control	lf	365	$5	$1,900
1.30	Erosion control measures	L.S.	1	1.4%	$610
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	748	$3	$2,250
2.30	Remove existing pipe	lf	365	$8	$2,900
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	365	$15 - $19	$5,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18 - 21" diameter	lf	365	$35 - $49	$14,200
4.20	Manholes, 6' deep	each	3	$2,300	$6,900
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	365	$25	$9,200
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$9,700
	CONSTRUCTION COSTS SUBTOTAL:				**$58,400**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$17,500
	PROJECT COSTS TOTAL:				**$75,900**

Pipe Worksheet

CIP Project Number:	**H1-A**
Master Plan Link Number:	**4218**
Basin:	**Hess Creek**
Subbasin:	**H/1**

Location

West side of Wynooski St, south of 11th St

Project Description

Replace existing 130' long 12' pipe with an 18" pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$2,300
1.20	Traffic control	lf	130	$5	$700
1.30	Erosion control measures	L.S.	1	1.4%	$200
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	266	$3	$800
2.30	Remove existing pipe	lf	130	$8	$1,000
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	130	$15	$2,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	130	$35	$4,600
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	130	$25	$3,300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,400
	CONSTRUCTION COSTS SUBTOTAL:				**$20,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$6,200
	PROJECT COSTS TOTAL:				**$26,800**

Pipe Worksheet

CIP Project Number:	**H1-B**
Master Plan Link Number:	**4220**
Basin:	**Hess Creek**
Subbasin:	**H/1**

Location

West side of Wynooski St, south of 11th St

Project Description

Replace existing 99' long 12" pipe with a 21" pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,000
1.20	Traffic control	lf	99	$5	$500
1.30	Erosion control measures	L.S.	1	1.4%	$180
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	205	$3	$620
2.30	Remove existing pipe	lf	99	$8	$800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	99	$19	$1,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 21" diameter	lf	99	$49	$4,900
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	99	$25	$2,500
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$2,900
	CONSTRUCTION COSTS SUBTOTAL:				**$17,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$5,300
	PROJECT COSTS TOTAL:				**$22,900**

Pipe Worksheet

CIP Project Number:	**H1-C**
Master Plan Link Number:	**4225**
Basin:	**Hess Creek**
Subbasin:	**H/1**

Location

West side of Wynooski St, south of 11th St

Project Description

Replace existing 135' long 12" pipe with an 18" pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,300
1.20	Traffic control	lf	135	$5	$700
1.30	Erosion control measures	L.S.	1	1.4%	$220
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.00	$5,200	$0
2.20	Saw cutting asphalt	lf	276	$3	$830
2.30	Remove existing pipe	lf	135	$8	$1,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	135	$15	$2,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	135	$35	$4,700
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	135	$25	$3,400
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,600
	CONSTRUCTION COSTS SUBTOTAL:				**$21,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$6,500
	PROJECT COSTS TOTAL:				**$28,100**

Project Summary Sheet

CIP Project Number: H2

Master Plan Link Number: 4370

Basin: Hess Creek

Subbasin: H/2

Location

Hwy 219, north of 9th St

Project Description

Replace existing 66' long 18"D culvert with a 30"D culvert.

Special Considerations

Permit necessary (ODOT).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,500
1.20	Traffic control	lf	66	$5	$330
1.30	Erosion control measures	L.S.	1	1.4%	$270
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	108	$3	$320
2.30	Remove existing pipe	lf	66	$8	$530
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	66	$19	$1,260
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 30" diameter	lf	66	$72	$4,800
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall, 30" diameter	each	2	$2,100	$4,200
4.40	Rip-rap channel protection, 18" thick	sy	82	$78	$6,360
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	50	$25	$1,250
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$4,200
	CONSTRUCTION COSTS SUBTOTAL:				**$25,000**
	PERMITTING COSTS			10%	$2,500
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$7,500
	PROJECT COSTS TOTAL:				**$35,000**

Project Summary Sheet

CIP Project Number:	**H3**
Master Plan Link Number:	**4390**
Basin:	**Hess Creek**
Subbasin:	**H/2**

Location

Hwy 219, south of 2nd St

Project Description

Replace existing 93' long 12" pipe with a 21" pipe.

Special Considerations

Permit necessary (ODOT).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,100
1.20	Traffic control	lf	93	$5	$470
1.30	Erosion control measures	L.S.	1	1.4%	$200
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	193	$3	$580
2.30	Remove existing pipe	lf	93	$8	$750
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	93	$19	$1,780
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 21" diameter	lf	93	$49	$4,600
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	93	$25	$2,340
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,200
	CONSTRUCTION COSTS TOTAL:				**$19,200**
	PERMITTING COSTS			10%	$1,900
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$5,800
	PROJECT COSTS TOTAL:				**$26,900**

Project Summary Sheet

CIP Project Number:	**H4**
Master Plan Link Number:	**5030, 5040, 5050**
Basin:	**Hess Creek**
Subbasin:	**H/4**

Location

Wynooski St, 7th St to 5th St

Project Description

Replace three existing pipes with 1318'L of 18"D pipe.

Special Considerations

L5040 - L5050: Accounted for new MH due to length of pipes.
Permit necessary (water body).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$8,000
1.20	Traffic control	lf	1,317	$5	$6,600
1.30	Erosion control measures	L.S.	1	1.4%	$1,940
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	748	$3	$2,250
2.30	Remove existing pipe	lf	1,317	$8	$10,500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	1,317	$15	$19,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	1,317	$35	$46,100
4.20	Manholes, 6' deep	each	4	$2,300	$9,200
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	365	$25	$9,200
5.20	Sidewalk	sf	4,808	$5	$24,040
5.30	Concrete curb	lf	1,202	$12	$14,420
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$30,700
	CONSTRUCTION COSTS SUBTOTAL:				**$184,200**
	PERMITTING COSTS			10%	$18,400
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$55,300
	PROJECT COSTS TOTAL:				**$257,900**

Pipe Worksheet

CIP Project Number:	**H4-A**
Master Plan Link Number:	**5030**
Basin:	**Hess Creek**
Subbasin:	**H/4**

Location

Across Wynooski St, south of 7th Ave

Project Description

Replace existing 65' long 15" pipe with an 18" pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$800
1.20	Traffic control	lf	65	$5	$300
1.30	Erosion control measures	L.S.	1	1.4%	$140
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	136	$3	$410
2.30	Remove existing pipe	lf	65	$8	$500
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	65	$15	$1,000
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 18" diameter	lf	65	$35	$2,300
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection 18" thick	sy	19	$78	$1,460
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	65	$25	$1,600
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$2,200
	CONSTRUCTION COSTS SUBTOTAL:				**$13,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$3,900
	PROJECT COSTS TOTAL:				**$16,900**

Pipe Worksheet

CIP Project Number:	**H4-B**
Master Plan Link Number:	**5040**
Basin:	**Hess Creek**
Subbasin:	**H/4**

Location

Wynooski St, north of 7th Ave

Project Description

Replace existing 635' long 10" pipe with an 18" pipe.

Special Considerations

Accounted for new MH due to length of pipes.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$3,500
1.20	Traffic control	lf	635	$5	$3,200
1.30	Erosion control measures	L.S.	1	1.4%	$880
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	106	$3	$320
2.30	Remove existing pipe	lf	635	$8	$5,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	635	$15	$9,500
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	635	$35	$22,200
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	50	$25	$1,300
5.20	Sidewalk	sf	2,338	$5	$11,690
5.30	Concrete curb	lf	585	$12	$7,010
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$13,900
	CONSTRUCTION COSTS SUBTOTAL:				**$83,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$25,000
	PROJECT COSTS TOTAL:				**$108,200**

Pipe Worksheet

CIP Project Number:	**H4-C**
Master Plan Link Number:	**5050**
Basin:	**Hess Creek**
Subbasin:	**H/4**

Location

Wynooski St, south of 5th Ave

Project Description

Replace existing 618' long 10" pipe with an 18" pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$3,700
1.20	Traffic control	lf	618	$5	$3,100
1.30	Erosion control measures	L.S.	1	1.4%	$930
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	506	$3	$1,520
2.30	Remove existing pipe	lf	618	$8	$4,900
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	618	$15	$9,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	618	$35	$21,600
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	250	$25	$6,300
5.20	Sidewalk	sf	2,470	$5	$12,350
5.30	Concrete curb	lf	618	$12	$7,410
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$14,700
	CONSTRUCTION COSTS SUBTOTAL:				**$88,100**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$26,400
	PROJECT COSTS TOTAL:				**$114,500**

Project Summary Sheet

CIP Project Number:	**H5**
Master Plan Link Number:	**5110, 5112, 5115**
Basin:	**Hess Creek**
Subbasin:	**H/4**

Location

Church St & Hwy 99W

Project Description

Replace three existing pipes with 1485'L of 18"D pipe.

Special Considerations

L5115: Accounted for new MH due to length of pipe.
Permits necessary (water body, private property, ODOT).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$8,100
1.20	Traffic control	lf	1,260	$5	$6,300
1.30	Erosion control measures	L.S.	1	1.4%	$2,060
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.15	$5,200	$810
2.20	Saw cutting asphalt	lf	2,032	$3	$6,100
2.30	Remove existing pipe	lf	1,485	$8	$11,900
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	1,485	$15	$22,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	1,485	$35	$52,000
4.20	Manholes, 6' deep	each	4	$2,300	$9,200
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	752	$25	$18,800
5.20	Sidewalk	sf	2,372	$5	$11,860
5.30	Concrete curb	lf	593	$12	$7,120
5.40	Revegetation	acre	0.15	$22,000	$3,410
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$32,300

CONSTRUCTION COSTS SUBTOTAL:		**$193,700**
PERMITTING COSTS	10%	$19,400
TECHNICAL SERVICES AND ADMINISTRATION:	30%	$58,100
PROJECT COSTS TOTAL:		**$271,200**

Pipe Worksheet

CIP Project Number:	**H5-A**
Master Plan Link Number:	**5110**
Basin:	**Hess Creek**
Subbasin:	**H/4**

Location

Church St and 3rd St

Project Description

Replace existing 545' long 12"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,700
1.20	Traffic control	lf	320	$5	$1,600
1.30	Erosion control measures	L.S.	1	1.4%	$700
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.15	$5,200	$810
2.20	Saw cutting asphalt	lf	646	$3	$1,940
2.30	Remove existing pipe	lf	545	$8	$4,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	545	$15	$8,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	545	$35	$19,100
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	320	$25	$8,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.15	$22,000	$3,410
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$10,900
	CONSTRUCTION COSTS SUBTOTAL:				**$65,500**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$19,700
	PROJECT COSTS TOTAL:				**$85,200**

Pipe Worksheet

CIP Project Number:	**H5-B**
Master Plan Link Number:	**5112**
Basin:	**Hess Creek**
Subbasin:	**H/4**

Location

Church St, north of 2nd St

Project Description

Replace existing 347' long 12"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,900
1.20	Traffic control	lf	347	$5	$1,700
1.30	Erosion control measures	L.S.	1	1.4%	$470
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	700	$3	$2,100
2.30	Remove existing pipe	lf	347	$8	$2,800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	347	$15	$5,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	347	$35	$12,100
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	347	$25	$8,700
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$7,500
	CONSTRUCTION COSTS SUBTOTAL:				**$44,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$13,400
	PROJECT COSTS TOTAL:				**$58,200**

Pipe Worksheet

CIP Project Number:	**H5-C**
Master Plan Link Number:	**5115**
Basin:	**Hess Creek**
Subbasin:	**H/4**

Location

North side of 99W, east of Springbrook Rd

Project Description

Replace existing 593' long 12"D pipe with an 18"D pipe.

Special Considerations

Accounted for new MH due to length of pipe.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$3,500
1.20	Traffic control	lf	593	$5	$3,000
1.30	Erosion control measures	L.S.	1	1.4%	$880
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	686	$3	$2,060
2.30	Remove existing pipe	lf	593	$8	$4,700
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	593	$15	$8,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	593	$35	$20,800
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	85	$25	$2,100
5.20	Sidewalk	sf	2,372	$5	$11,860
5.30	Concrete curb	lf	593	$12	$7,120
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$13,900
	CONSTRUCTION COSTS SUBTOTAL:				**$83,400**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$25,000
	PROJECT COSTS TOTAL:				**$108,400**

Project Summary Sheet

CIP Project Number:	**H6**
Master Plan Link Number:	**5233, 5234, 5235**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

2nd St, between Center St and Edwards St

Project Description

Replace three existing pipes with 469'L of 15"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$3,300
1.20	Traffic control	lf	469	$5	$2,300
1.30	Erosion control measures	L.S.	1	1.4%	$680
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	954	$3	$2,860
2.30	Remove existing pipe	lf	469	$8	$3,800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	469	$15	$7,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 15" diameter	lf	469	$29	$13,600
4.20	Manholes, 6' deep	each	4	$2,300	$9,200
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	469	$25	$11,700
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$10,900
	CONSTRUCTION COSTS SUBTOTAL:				**$65,300**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$19,600
	PROJECT COSTS TOTAL:				**$84,900**

Pipe Worksheet

CIP Project Number:	**H6-A**
Master Plan Link Number:	**5233**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

2nd St, between Meridian and Center St

Project Description

Replace existing 248' long 12" pipe with a 15" pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,400
1.20	Traffic control	lf	248	$5	$1,200
1.30	Erosion control measures	L.S.	1	1.4%	$360
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	501	$3	$1,500
2.30	Remove existing pipe	lf	248	$8	$2,000
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	248	$15	$3,700
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 15" diameter	lf	248	$29	$7,200
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	248	$25	$6,200
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,600
	CONSTRUCTION COSTS SUBTOTAL:				**$33,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$10,100
	PROJECT COSTS TOTAL:				**$43,900**

Pipe Worksheet

CIP Project Number:	**H6-B**
Master Plan Link Number:	**5234**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

2nd St and Meridian St

Project Description

Replace existing 12' long 12" pipe with a 15" pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$300
1.20	Traffic control	lf	12	$5	$100
1.30	Erosion control measures	L.S.	0	1.4%	$50
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	29	$3	$90
2.30	Remove existing pipe	lf	12	$8	$100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	12	$15	$200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 15" diameter	lf	12	$29	$300
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	12	$25	$300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$700

CONSTRUCTION COSTS SUBTOTAL:		**$4,400**
TECHNICAL SERVICES AND ADMINISTRATION:	30%	$1,300
PROJECT COSTS TOTAL:		**$5,700**

Pipe Worksheet

CIP Project Number:	**H6-C**
Master Plan Link Number:	**5235**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

2nd St, between Edwards and Meridian St

Project Description

Replace existing 209' long 12" pipe with a 15" pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,600
1.20	Traffic control	lf	209	$5	$1,000
1.30	Erosion control measures	L.S.	0	1.4%	$280
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	424	$3	$1,270
2.30	Remove existing pipe	lf	209	$8	$1,700
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	209	$15	$3,100
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 15" diameter	lf	209	$29	$6,100
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	209	$25	$5,200
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$4,500
	CONSTRUCTION COSTS SUBTOTAL:				**$27,100**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$8,100
	PROJECT COSTS TOTAL:				**$35,200**

Project Summary Sheet

CIP Project Number:	**H7**
Master Plan Link Number:	**5284, 5285**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Hancock St, between School St and Meridian St

Project Description

Replace two existing pipes with 922'L of 18"D and 94'L of 21"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$7,400
1.20	Traffic control	lf	1,017	$5	$5,100
1.30	Erosion control measures	L.S.	1	1.4%	$1,890
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	2,046	$3	$6,140
2.30	Remove existing pipe	lf	1,017	$8	$8,200
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	1,017	$38 - $45	$39,400
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18 - 21" diameter	lf	1,017	$35 - $49	$36,900
4.20	Manholes, 10 - 14' deep	each	4	$3700 - $5800	$16,900
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	1,017	$25	$25,500
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$29,500
	CONSTRUCTION COSTS SUBTOTAL:				**$176,900**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$53,100
	PROJECT COSTS TOTAL:				**$230,000**

Pipe Worksheet

CIP Project Number:	**H7-A**
Master Plan Link Number:	**5284**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Hancock St, between School and Meridian St

Project Description

Replace existing 922' long 15"D pipe with an 18"D pipe.

Special Considerations

US invert elev = 7 ft, DS invert elev = 13 ft. Put US manhole plus mid-L5284 MH on L5285 due to depth = 10'

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$6,100
1.20	Traffic control	lf	922	$5	$4,600
1.30	Erosion control measures	L.S.	1	1.4%	$1,550
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	1,851	$3	$5,550
2.30	Remove existing pipe	lf	922	$8	$7,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	922	$38	$35,100
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	922	$35	$32,300
4.20	Manholes, 14' deep	each	1	$5,800	$5,800
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	922	$25	$23,100
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$24,300
	CONSTRUCTION COSTS SUBTOTAL:				**$145,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$43,700
	PROJECT COSTS TOTAL:				**$189,500**

Pipe Worksheet

CIP Project Number:	**H7-B**
Master Plan Link Number:	**5285**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Hancock St, west of School St

Project Description

Replace existing 94' long 15"D pipe with a 21"D pipe.

Special Considerations

Includes two MHs for L5284 due to depth.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,300
1.20	Traffic control	lf	94	$5	$500
1.30	Erosion control measures	L.S.	1	1.4%	$340
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	195	$3	$590
2.30	Remove existing pipe	lf	94	$8	$800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	94	$45	$4,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 21" diameter	lf	94	$49	$4,600
4.20	Manholes, 10' deep	each	3	$3,700	$11,100
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	94	$25	$2,400
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,200
	CONSTRUCTION COSTS SUBTOTAL:				**$31,100**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,300
	PROJECT COSTS TOTAL:				**$40,400**

Project Summary Sheet

CIP Project Number:	**H8**
Master Plan Link Number:	**5314, 5315, 5320**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Sherman St, between Carlton Way and Meridian St

Project Description

Replace three existing pipes with 756'L of 18"D pipe and 856'L of 15"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$10,500
1.20	Traffic control	lf	1612	$5	$8,100
1.30	Erosion control measures	L.S.	1	1.4%	$2,690
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	3,241	$3	$9,720
2.30	Remove existing pipe	lf	1,612	$8	$12,800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	1,612	$38	$61,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 15 - 18" diameter	lf	1,612	$29 - $35	$51,300
4.20	Manholes, 6 - 10' deep	each	5	$2300 - $3700	$14,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	1,612	$25	$40,300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$42,200
	CONSTRUCTION COSTS SUBTOTAL:				**$253,100**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$75,900
	PROJECT COSTS TOTAL:				**$329,000**

Pipe Worksheet

CIP Project Number:	**H8-A**
Master Plan Link Number:	**5314**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Carlton Way

Project Description

Replace existing 305' long 12"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,000
1.20	Traffic control	lf	305	$5	$1,500
1.30	Erosion control measures	L.S.	1	1.4%	$520
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	616	$3	$1,850
2.30	Remove existing pipe	lf	305	$8	$2,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	305	$38	$11,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	305	$35	$10,700
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	305	$25	$7,600
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$8,100
	CONSTRUCTION COSTS SUBTOTAL:				**$48,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$14,600
	PROJECT COSTS TOTAL:				**$63,200**

Pipe Worksheet

CIP Project Number:	**H8-B**
Master Plan Link Number:	**5315**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Sheridan St, between River and Carlton Way

Project Description

Replace existing 451' long 12"D pipe with an 18"D pipe.

Special Considerations

MH from L5320 included due to depth.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$3,200
1.20	Traffic control	lf	451	$5	$2,300
1.30	Erosion control measures	L.S.	1	1.4%	$820
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	908	$3	$2,720
2.30	Remove existing pipe	lf	451	$8	$3,600
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	451	$38	$17,100
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	451	$35	$15,800
4.20	Manholes, 10' deep	each	2	$3,700	$7,400
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	451	$25	$11,300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$12,800
	CONSTRUCTION COSTS SUBTOTAL:				**$77,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$23,100
	PROJECT COSTS TOTAL:				**$100,100**

Pipe Worksheet

CIP Project Number: H8-C

Master Plan Link Number: 5320

Basin: Hess Creek

Subbasin: H/5

Location

Sherman St, between Meridian and River St

Project Description

Replace existing 856' long 12"D pipe with a 15"D pipe.

Special Considerations

MH added at 90 degree pipe bend (River and Sherman).
MH at DS invert (10'deep) is addressed in L5315 PWS

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$5,300
1.20	Traffic control	lf	856	$5	$4,300
1.30	Erosion control measures	L.S.	1	1.4%	$1,350
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	1718	$3	$5,150
2.30	Remove existing pipe	lf	856	$8	$6,800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	856	$38	$32,500
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 15" diameter	lf	856	$29	$24,800
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	856	$25	$21,400
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$21,200
	CONSTRUCTION COSTS SUBTOTAL:				**$127,400**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$38,200
	PROJECT COSTS TOTAL:				**$165,600**

Project Summary Sheet

CIP Project Number: H9

Master Plan Link Number: 5430

Basin: Hess Creek

Subbasin: H/6

Location

Portland Rd, west of Elliott St

Project Description

Replace existing 286' long 12"D pipe with an 18"D pipe.

Special Considerations

DS invert elevation (0.2') may limit pipe placement.
Permit necessary (ODOT).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,700
1.20	Traffic control	lf	286	$5	$1,430
1.30	Erosion control measures	L.S.	1	1.4%	$430
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	579	$3	$1,740
2.30	Remove existing pipe	lf	286	$8	$2,290
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	286	$15	$4,290
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 18" diameter	lf	286	$35	$10,000
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	286	$25	$7,160
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$6,700
	CONSTRUCTION COSTS SUBTOTAL:				**$40,300**
	PERMITTING COSTS			10%	$4,000
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$12,100
	PROJECT COSTS TOTAL:				**$56,400**

Project Summary Sheet

CIP Project Number:	**H10**
Master Plan Link Number:	**5564, 5565, 5573, 5574, 5575, 5582, 5583, 5584, 5585**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Vermillion St, between Center St and the RR

Project Description

Replace eight existing pipes with 209'L of 18"D pipe and 886'L of 24"D pipe.
Replace one existing culvert with 62'L of 24"D culvert.

Special Considerations

L5582: Portion of pipe may be located under/near a structure. Easement is necessary.
L5583: US & DS invert elevation (2' & 1.6') may limit pipe placement.
L5584: DS invert elevation (1.6') may limit pipe placement. L5585: Underneath RR.
Permits neceesary (private property, RR).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$9,000
1.20	Traffic control	lf	768	$5	$3,800
1.30	Erosion control measures	L.S.	1	1.4%	$1,920
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.08	$5,200	$430
2.20	Saw cutting asphalt	lf	1,034	$3	$3,100
2.30	Remove existing pipe	lf	1,158	$8	$9,200
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	1,158	$15 - $19	$21,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18 - 24" diameter	lf	1,158	$35 - $49	$53,900
4.20	Manholes, 6' deep	each	10	$2,300	$23,000
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	503	$25	$12,500
5.20	Sidewalk	sf	1,059	$5	$5,300
5.30	Concrete curb	lf	265	$12	$3,180
5.40	Revegetation	acre	0.08	$22,000	$1,800
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$30,000
	CONSTRUCTION COSTS SUBTOTAL:				**$180,200**
	PERMITTING COSTS			10%	$18,000
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$54,100
	PROJECT COSTS TOTAL:				**$252,300**

Pipe Worksheet

CIP Project Number: H10-A

Master Plan Link Number: 5564

Basin: Hess Creek

Subbasin: H/5

Location

Center St, south of Vermillion St

Project Description

Replace existing 277' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,900
1.20	Traffic control	lf	277	$5	$1,400
1.30	Erosion control measures	L.S.	1	1.4%	$490
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	561	$3	$1,680
2.30	Remove existing pipe	lf	277	$8	$2,200
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	277	$19	$5,300
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 24" diameter	lf	277	$49	$13,600
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	277	$25	$6,900
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$7,600
	CONSTRUCTION COSTS SUBTOTAL:				**$45,700**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$13,700
	PROJECT COSTS TOTAL:				**$59,400**

Pipe Worksheet

CIP Project Number:	**H10-B**
Master Plan Link Number:	**5565**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Across Vermillion St, east of Meridian St

Project Description

Replace existing 265' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,800
1.20	Traffic control	lf	265	$5	$1,300
1.30	Erosion control measures	L.S.	1	1.4%	$470
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	265	$8	$2,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	265	$19	$5,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	265	$49	$13,000
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	1059	$5	$5,300
5.30	Concrete curb	lf	265	$12	$3,180
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$7,400
	CONSTRUCTION COSTS SUBTOTAL:				**$44,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$13,300
	PROJECT COSTS TOTAL:				**$57,500**

Pipe Worksheet

CIP Project Number:	**H10-C**
Master Plan Link Number:	**5573**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Vermillin St, across Meridian St

Project Description

Replace existing 40' L 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$500
1.20	Traffic control	lf	40	$5	$200
1.30	Erosion control measures	L.S.	1	1.4%	$90
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	88	$3	$260
2.30	Remove existing pipe	lf	40	$8	$300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	40	$19	$800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	40	$49	$2,000
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	40	$25	$1,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$1,500
	CONSTRUCTION COSTS SUBTOTAL:				**$9,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$2,700
	PROJECT COSTS TOTAL:				**$11,700**

Pipe Worksheet

CIP Project Number:	**H10-D**
Master Plan Link Number:	**5574**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Vermillin St, west of Meridian St

Project Description

Replace existing 116' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,200
1.20	Traffic control	lf	116	$5	$600
1.30	Erosion control measures	L.S.	1	1.4%	$210
2.00					
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	239	$3	$720
2.30	Remove existing pipe	lf	116	$8	$900
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	116	$19	$2,200
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 24" diameter	lf	116	$49	$5,700
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	116	$25	$2,900
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$3,300
	CONSTRUCTION COSTS SUBTOTAL:				**$20,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$6,000
	PROJECT COSTS TOTAL:				**$26,000**

Pipe Worksheet

CIP Project Number:	**H10-E**
Master Plan Link Number:	**5575**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Vermillin St, east of Edwards St

Project Description

Replace existing 69' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$800
1.20	Traffic control	lf	69	$5	$300
1.30	Erosion control measures	L.S.	1	1.4%	$140
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	146	$3	$440
2.30	Remove existing pipe	lf	69	$8	$600
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	69	$19	$1,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	69	$49	$3,400
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	69	$25	$1,700
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$2,200
	CONSTRUCTION COSTS SUBTOTAL:				**$13,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$4,000
	PROJECT COSTS TOTAL:				**$17,200**

Pipe Worksheet

CIP Project Number:	**H10-F**
Master Plan Link Number:	**5582**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

North of Vermillin St, west of Meridian St

Project Description

Replace existing 114' long 12"D pipe with an 18"D pipe.

Special Considerations

Portion of pipe may be located under/near a structure. Easement is necessary.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$700
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$130
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	114	$8	$900
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	114	$15	$1,700
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 18" diameter	lf	114	$35	$4,000
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$1,900
	CONSTRUCTION COSTS SUBTOTAL:				**$11,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$3,500
	PROJECT COSTS TOTAL:				**$15,100**

Pipe Worksheet

CIP Project Number:	**H10-G**
Master Plan Link Number:	**5583**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

North of Vermillin St, west of Meridian St

Project Description

Replace existing 95' long 12"D pipe with an 18"D pipe.

Special Considerations

US & DS invert elevation (2' & 1.6') may limit pipe placement.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$600
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$110
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	95	$8	$800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	95	$15	$1,400
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	95	$35	$3,300
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$1,700
	CONSTRUCTION COSTS SUBTOTAL:				**$10,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$3,100
	PROJECT COSTS TOTAL:				**$13,300**

Pipe Worksheet

CIP Project Number:	**H10-H**
Master Plan Link Number:	**5584**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

South of RR, east of College St

Project Description

Replace existing 119' long 12"D pipe with a 24"D pipe.

Special Considerations

DS invert elevation (1.6') may limit pipe placement.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,000
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$190
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.08	$5,200	$430
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	119	$8	$900
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	119	$19	$2,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	119	$49	$5,800
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.08	$22,000	$1,800
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$2,900
	CONSTRUCTION COSTS SUBTOTAL:				**$17,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$5,300
	PROJECT COSTS TOTAL:				**$22,900**

Pipe Worksheet

CIP Project Number:	**H10-F**
Master Plan Link Number:	**5585**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Across RR, east of College St

Project Description

Replace existing 62' long 12"D culvert with a 24"D culvert.

Special Considerations

Underneath RR.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$500
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$90
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	62	$8	$500
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	62	$19	$1,200
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 24" diameter	lf	62	$49	$3,100
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$1,500
	CONSTRUCTION COSTS SUBTOTAL:				**$8,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$2,600
	PROJECT COSTS TOTAL:				**$11,400**

Project Summary Sheet

CIP Project Number:	**H11**
Master Plan Link Number:	**5645, 5655, 5656**
Basin:	**Hess Creek**
Subbasin:	**H/6**

Location

Sitka St & Oak Dr

Project Description

Replace three existing pipes with 282'L of 18"D pipe and 347'L of 21"D pipe.

Special Considerations

L5655: Located between residential structures. Easement is necessary.
Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$4,100
1.20	Traffic control	lf	377	$5	$1,800
1.30	Erosion control measures	L.S.	1	1.4%	$930
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	767	$3	$2,300
2.30	Remove existing pipe	lf	630	$8	$5,000
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	630	$15 - $19	$10,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18 - 21" diameter	lf	630	$35 - $49	$26,800
4.20	Manholes, 6 - 10' deep	each	4	$2300 - $3700	$10,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	377	$25	$9,400
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$14,500
	CONSTRUCTION COSTS SUBTOTAL:				**$86,900**
	PERMITTING COSTS			10%	$8,700
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$26,100
	PROJECT COSTS TOTAL:				**$121,700**

Pipe Worksheet

CIP Project Number:	**H11-A**
Master Plan Link Number:	**5645**
Basin:	**Hess Creek**
Subbasin:	**H/6**

Location

Across Hulet, north of Oak Dr

Project Description

Replace existing 347' long 12"D pipe with a 21"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,300
1.20	Traffic control	lf	347	$5	$1,700
1.30	Erosion control measures	L.S.	1	1.4%	$580
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	701	$3	$2,100
2.30	Remove existing pipe	lf	347	$8	$2,800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	347	$19	$6,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 21" diameter	lf	347	$49	$17,000
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	347	$25	$8,700
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$9,100
	CONSTRUCTION COSTS SUBTOTAL:				**$54,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$16,400
	PROJECT COSTS TOTAL:				**$71,000**

Pipe Worksheet

CIP Project Number:	**H11-B**
Master Plan Link Number:	**5655**
Basin:	**Hess Creek**
Subbasin:	**H/6**

Location

Across Hulet, north of Oak Dr

Project Description

Replace existing 252' long 12"D pipe with an 18"D pipe.

Special Considerations

Located between residential structures. Easement is necessary.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,300
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$250
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	252	$8	$2,000
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	252	$15	$3,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	252	$35	$8,800
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,800
	CONSTRUCTION COSTS SUBTOTAL:				**$22,900**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$6,900
	PROJECT COSTS TOTAL:				**$29,800**

Pipe Worksheet

CIP Project Number:	**H11-C**
Master Plan Link Number:	**5656**
Basin:	**Hess Creek**
Subbasin:	**H/6**

Location

Across Hulet, north of Oak Dr

Project Description

Replace existing 30' long 12"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$500
1.20	Traffic control	lf	30	$5	$100
1.30	Erosion control measures	L.S.	1	1.4%	$100
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	66	$3	$200
2.30	Remove existing pipe	lf	30	$8	$200
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	30	$15	$400
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 18" diameter	lf	30	$35	$1,000
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	30	$25	$700
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$1,600
	CONSTRUCTION COSTS SUBTOTAL:				**$9,400**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$2,800
	PROJECT COSTS TOTAL:				**$12,200**

Project Summary Sheet

CIP Project Number:	**H12**
Master Plan Link Number:	**5709, 5710**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Fulton St, east of Center St

Project Description

Replace two existing pipes with 305'L of 12"D pipe.

Special Considerations

L5709: Portion of pipe may be located under/near a structure. Easement necessary. Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$2,300
1.20	Traffic control	lf	305	$5	$1,500
1.30	Erosion control measures	L.S.	1	1%	$410
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.14	$5,200	$750
2.20	Saw cutting asphalt	lf	204	$3	$620
2.30	Remove existing pipe	lf	305	$8	$2,500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	305	$15	$4,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 12" diameter	lf	305	$23	$7,000
4.20	Manholes, 6' deep	each	3	$2,300	$6,900
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	97	$25	$2,400
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0.14	$22,000	$3,160
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$6,600
	CONSTRUCTION COSTS SUBTOTAL:				**$39,400**
	PERMITTING COSTS			10%	$3,900
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$11,800
	PROJECT COSTS TOTAL:				**$55,100**

Pipe Worksheet

CIP Project Number:	**H12-A**
Master Plan Link Number:	**5709**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

Across Fulton St, east of Center St

Project Description

Replace existing 248' long 8"D pipe with a 12"D pipe.

Special Considerations

Portion of pipe may be located under/near a structure.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,600
1.20	Traffic control	lf	248	$5	$1,200
1.30	Erosion control measures	L.S.	1	1%	$280
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0.14	$5,200	$750
2.20	Saw cutting asphalt	lf	85	$3	$260
2.30	Remove existing pipe	lf	248	$8	$2,000
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	248	$15	$3,700
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 12" diameter	lf	248	$23	$5,700
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	40	$25	$1,000
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0.14	$22,000	$3,160
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$4,500
	CONSTRUCTION COSTS SUBTOTAL:				**$27,100**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$8,100
	PROJECT COSTS TOTAL:				**$35,200**

Pipe Worksheet

CIP Project Number:	**H12-B**
Master Plan Link Number:	**5710**
Basin:	**Hess Creek**
Subbasin:	**H/5**

Location

East end of Cherry St

Project Description

Replace existing 57' long 8"D pipe with a 12"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$700
1.20	Traffic control	lf	57	$5	$300
1.30	Erosion control measures	L.S.	1	1%	$130
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	119	$3	$360
2.30	Remove existing pipe	lf	57	$8	$500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	57	$15	$900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 12" diameter	lf	57	$23	$1,300
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	57	$25	$1,400
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$2,000
	CONSTRUCTION COSTS SUBTOTAL:				**$12,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$3,700
	PROJECT COSTS TOTAL:				**$15,900**

Project Summary Sheet

CIP Project Number:	**H13**
Master Plan Link Number:	**5960, 5964**
Basin:	**Hess Creek**
Subbasin:	**H/7**

Location

Aspen Way & RR

Project Description

Replace two existing pipes with 210'L of 24"D pipe.

Special Considerations

L5960: Underneath RR.
Permit necessary (RR)

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$2,000
1.20	Traffic control	lf	157	$5	$800
1.30	Erosion control measures	L.S.	1	1.4%	$370
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	320	$3	$960
2.30	Remove existing pipe	lf	210	$8	$1,700
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	210	$19	$4,000
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 24" diameter	lf	210	$49	$10,300
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	100	$25	$2,500
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$5,800
	CONSTRUCTION COSTS SUBTOTAL:				**$34,900**
	PERMITTING COSTS			10%	$3,500
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$10,500
	PROJECT COSTS TOTAL:				**$48,900**

Pipe Worksheet

CIP Project Number:	**H13-A**
Master Plan Link Number:	**5960**
Basin:	**Hess Creek**
Subbasin:	**H/7**

Location

Across RR, south of Crestview Dr

Project Description

Replace existing 53' long 12"D pipe with a 24"D pipe.

Special Considerations

Underneath RR.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$600
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$120
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	53	$8	$400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	53	$19	$1,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	53	$49	$2,600
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$1,800
	CONSTRUCTION COSTS SUBTOTAL:				**$10,700**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$3,200
	PROJECT COSTS TOTAL:				**$13,900**

Pipe Worksheet

CIP Project Number:	**H13-B**
Master Plan Link Number:	**5964**
Basin:	**Hess Creek**
Subbasin:	**H/7**

Location

South of Aspen Way

Project Description

Replace existing 157' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,400
1.20	Traffic control	lf	157	$5	$800
1.30	Erosion control measures	L.S.	1	1.4%	$250
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	320	$3	$960
2.30	Remove existing pipe	lf	157	$8	$1,300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	157	$19	$3,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	157	$49	$7,700
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	100	$25	$2,500
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$4,000
	CONSTRUCTION COSTS SUBTOTAL:				**$24,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$7,300
	PROJECT COSTS TOTAL:				**$31,500**

Project Summary Sheet

CIP Project Number:	**H14**
Master Plan Link Number:	**6021**
Basin:	**Hess Creek**
Subbasin:	**H/Creek**

Location

Villa Rd Culvert

Project Description

Replace existing 55' long 30"D culvert with a 60"D culvert.

Special Considerations

Permit necessary (water body).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,000
1.20	Traffic control	lf	55	$5	$280
1.30	Erosion control measures	L.S.	1	1.4%	$520
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	123	$3	$370
2.30	Remove existing pipe	lf	55	$8	$440
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	55	$32	$1,770
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 60" diameter	lf	55	$180	$9,900
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall, 60" diameter	each	2	$3,600	$7,200
4.40	Rip-rap channel protection, 18" thick	sy	204	$78	$15,900
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	30	$25	$750
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$8,000
	CONSTRUCTION COSTS SUBTOTAL:				**$47,800**
	PERMITTING COSTS			10%	$4,800
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$14,300
	PROJECT COSTS TOTAL:				**$66,900**

Project Summary Sheet

CIP Project Number:	**H15**
Master Plan Link Number:	**6215, 6225, 6239, 6240, 6245, 6254, 6255, 6270**
Basin:	**Hess Creek**
Subbasin:	**H/8**

Location

West of Herman St

Project Description

Replace eight existing pipes with 604'L of 24"D pipe; and 1122'L of 30"D pipe.

Special Considerations

L6254: Portion of pipe may be located under/near a structure. Easement necessary.
Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$15,300
1.20	Traffic control	lf	1,194	$5	$5,900
1.30	Erosion control measures	L.S.	1	1.4%	$3,860
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.25	$5,200	$1,300
2.20	Saw cutting asphalt	lf	2,246	$3	$6,740
2.30	Remove existing pipe	lf	1,727	$8	$14,000
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6 - 12' deep	lf	1,727	$19 - $45	$76,500
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24 - 30" diameter	lf	1,727	$49 - $72	$110,500
4.20	Manholes, 6 - 14' deep	each	8	$2300 - $5800	$28,900
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	1,057	$25	$26,400
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0.25	$22,000	$5,450
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$59,400
	CONSTRUCTION COSTS SUBTOTAL:				**$356,200**
	PERMITTING COSTS			10%	$35,600
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$106,900
	PROJECT COSTS TOTAL:				**$498,700**

Pipe Worksheet

CIP Project Number: H15-A

Master Plan Link Number: 6215

Basin: Hess Creek

Subbasin: H/8

Location

West of Herman St

Project Description

Replace existing 144' long 8"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$900
1.20	Traffic control	lf	44	$5	$200
1.30	Erosion control measures	L.S.	1	1.4%	$160
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.03	$5,200	$160
2.20	Saw cutting asphalt	lf	95	$3	$290
2.30	Remove existing pipe	lf	44	$8	$400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	44	$45	$2,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	44	$49	$2,200
4.20	Manholes, 6' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.03	$22,000	$670
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$2,500
	CONSTRUCTION COSTS SUBTOTAL:				**$15,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$4,500
	PROJECT COSTS TOTAL:				**$19,500**

Pipe Worksheet

CIP Project Number: H15-B

Master Plan Link Number: 6225

Basin: Hess Creek

Subbasin: H/8

Location

West of Herman St

Project Description

Replace existing 146' long 18"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,300
1.20	Traffic control	lf	146	$5	$700
1.30	Erosion control measures	L.S.	1	1.4%	$330
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	299	$3	$900
2.30	Remove existing pipe	lf	146	$8	$1,200
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 12' deep	lf	146	$45	$6,600
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 24" diameter	lf	146	$49	$7,200
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	146	$25	$3,600
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$5,100
	CONSTRUCTION COSTS SUBTOTAL:				**$30,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,200
	PROJECT COSTS TOTAL:				**$40,000**

Pipe Worksheet

CIP Project Number:	**H15-C**
Master Plan Link Number:	**6239**
Basin:	**Hess Creek**
Subbasin:	**H/8**

Location

West of Herman St

Project Description

Replace existing 184' long 18"D pipe with a 24"D pipe.

Special Considerations

None noted

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,500
1.20	Traffic control	lf	184	$5	$900
1.30	Erosion control measures	L.S.	1	1.4%	$370
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.03	$5,200	$160
2.20	Saw cutting asphalt	lf	287	$3	$860
2.30	Remove existing pipe	lf	184	$8	$1,500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	184	$45	$8,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	184	$49	$9,000
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	140	$25	$3,500
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.03	$22,000	$660
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,800
	CONSTRUCTION COSTS SUBTOTAL:				**$34,900**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$10,500
	PROJECT COSTS TOTAL:				**$45,400**

Pipe Worksheet

CIP Project Number:	**H15-D**
Master Plan Link Number:	**6240**
Basin:	**Hess Creek**
Subbasin:	**H/8**

Location

West of Herman St

Project Description

Replace existing 46' long 18"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$500
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$100
2.00					
2.10	Clear and grub brush	acre	0.03	$5,200	$170
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	46	$8	$400
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	46	$19	$900
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 24" diameter	lf	46	$49	$2,300
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.03	$22,000	$700
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$1,500
	CONSTRUCTION COSTS SUBTOTAL:				**$8,900**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$2,700
	PROJECT COSTS TOTAL:				**$11,600**

Pipe Worksheet

CIP Project Number:	**H15-E**
Master Plan Link Number:	**6245**
Basin:	**Hess Creek**
Subbasin:	**H/8**

Location

West of Herman St

Project Description

Replace existing 225' long 15"D pipe with a 30"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,900
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$510
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0.16	$5,200	$810
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	225	$8	$1,800
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	225	$45	$10,100
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 30" diameter	lf	225	$72	$16,200
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	$2,100	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.16	$22,000	$3,420
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$7,700
	CONSTRUCTION COSTS SUBTOTAL:				**$46,100**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$13,800
	PROJECT COSTS TOTAL:				**$59,900**

Pipe Worksheet

CIP Project Number:	**H15-F**
Master Plan Link Number:	**6254**
Basin:	**Hess Creek**
Subbasin:	**H/8**

Location

West of Herman St

Project Description

Replace existing 261' long 15"D pipe with a 30"D pipe.

Special Considerations

Portion of pipe may be located under/near a structure.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,400
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$630
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	530	$3	$1,590
2.30	Remove existing pipe	lf	261	$8	$2,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	261	$45	$11,700
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 30" diameter	lf	261	$72	$18,800
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	$2,100	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	261	$25	$6,500
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$9,500
	CONSTRUCTION COSTS SUBTOTAL:				**$56,900**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$17,100
	PROJECT COSTS TOTAL:				**$74,000**

Pipe Worksheet

CIP Project Number:	**H15-G**
Master Plan Link Number:	**6255**
Basin:	**Hess Creek**
Subbasin:	**H/8**

Location

Herman St

Project Description

Replace existing 184' long 15"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,300
1.20	Traffic control	lf	184	$5	$900
1.30	Erosion control measures	L.S.	1	1.4%	$350
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	127	$3	$380
2.30	Remove existing pipe	lf	184	$8	$1,500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	184	$45	$8,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	184	$49	$9,000
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	60	$25	$1,500
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,400
	CONSTRUCTION COSTS SUBTOTAL:				**$32,300**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,700
	PROJECT COSTS TOTAL:				**$42,000**

Pipe Worksheet

CIP Project Number:	**H15-H**
Master Plan Link Number:	**6270**
Basin:	**Hess Creek**
Subbasin:	**H/8**

Location

Herman St, south of Mountainview Rd

Project Description

Replace existing 636' long 15"D pipe with a 30"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$5,500
1.20	Traffic control	lf	636	$5	$3,200
1.30	Erosion control measures	L.S.	1	1.4%	$1,410
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	908	$3	$2,720
2.30	Remove existing pipe	lf	636	$8	$5,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	636	$45	$28,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 30" diameter	lf	636	$72	$45,800
4.20	Manholes, 14' deep	each	1	$5,800	$5,800
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	450	$25	$11,300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$21,900
	CONSTRUCTION COSTS SUBTOTAL:				**$131,300**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$39,400
	PROJECT COSTS TOTAL:				**$170,700**

Project Summary Sheet

CIP Project Number:	**H16**
Master Plan Link Number:	**6555**
Basin:	**Hess Creek**
Subbasin:	**H/9**

Location

Aspen Way, north of Mountainview Rd

Project Description

Replace existing 39' long 12"D culvert with a 24"D culvert.

Special Considerations

Permit necessary (water body).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$600
1.20	Traffic control	lf	39	$5	$190
1.30	Erosion control measures	L.S.	1	1.4%	$110
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	85	$3	$250
2.30	Remove existing pipe	lf	39	$8	$310
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	39	$19	$740
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	39	$49	$1,900
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	48	$78	$3,710
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	39	$25	$970
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$1,800
	CONSTRUCTION COSTS SUBTOTAL:				**$10,600**
	PERMITTING COSTS			10%	$1,100
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$3,200
	PROJECT COSTS TOTAL:				**$14,900**

Project Summary Sheet

CIP Project Number: H17

Master Plan Link Number: 6980

Basin: Hess Creek

Subbasin: H/9

Location

Bell Rd, east of Zimri Dr

Project Description

Replace existing 44' long 12"D culvert with a 21"D culvert.

Special Considerations

Permit necessary (water body).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$700
1.20	Traffic control	lf	44	$5	$220
1.30	Erosion control measures	L.S.	1	1.4%	$120
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	95	$3	$280
2.30	Remove existing pipe	lf	44	$8	$350
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	44	$19	$840
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 21" diameter	lf	44	$49	$2,200
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	48	$78	$3,710
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	44	$25	$1,100
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$1,900
	CONSTRUCTION COSTS SUBTOTAL:				**$11,400**
	PERMITTING COSTS			10%	$1,100
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$3,400
	PROJECT COSTS TOTAL:				**$15,900**

Project Summary Sheet

CIP Project Number: S1

Master Plan Link Number: 8185

Basin: Spring Brook

Subbasin: S/2

Location

Springbrook Rd and Hancock St

Project Description

Replace existing 179' long 8"D pipe with a 15"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,500
1.20	Traffic control	lf	179	$5	$900
1.30	Erosion control measures	L.S.	1	1.4%	$260
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	364	$3	$1,090
2.30	Remove existing pipe	lf	179	$8	$1,430
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	179	$15	$2,690
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 15" diameter	lf	179	$29	$5,200
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	179	$25	$4,480
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$4,300
	CONSTRUCTION COSTS SUBTOTAL:				**$25,600**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$7,700
	PROJECT COSTS TOTAL:				**$33,300**

Project Summary Sheet

CIP Project Number:	**S2**
Master Plan Link Number:	**8270, 8275**
Basin:	**Spring Brook**
Subbasin:	**S/2**

Location

North side of 99W, east of Springbrook Rd

Project Description

Replace two existing pipes with 258'L of 18"D pipe and 164'L of 24"D pipe .

Special Considerations

Easement may be necessary.
Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$3,200
1.20	Traffic control	lf	422	$5	$2,100
1.30	Erosion control measures	L.S.	1	1.4%	$680
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	489	$3	$1,470
2.30	Remove existing pipe	lf	422	$8	$3,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	422	$15 - $45	$11,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18 - 24" diameter	lf	422	$35 - $49	$17,000
4.20	Manholes, 6 - 10' deep	each	2	$2300 - $3700	$6,000
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	238	$25	$6,000
5.20	Sidewalk	sf	120	$5	$600
5.30	Concrete curb	lf	40	$12	$480
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$10,700
	CONSTRUCTION COSTS SUBTOTAL:				**$64,400**
	PERMITTING COSTS			10%	$6,400
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$19,300
	PROJECT COSTS TOTAL:				**$90,100**

Pipe Worksheet

CIP Project Number:	**S2-A**
Master Plan Link Number:	**8270**
Basin:	**Spring Brook**
Subbasin:	**S/2**

Location

North side of 99W, east of Springbrook Rd

Project Description

Replace existing 164' long 12"D pipe with an 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,800
1.20	Traffic control	lf	164	$5	$800
1.30	Erosion control measures	L.S.	1	1.4%	$320
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	207	$3	$620
2.30	Remove existing pipe	lf	164	$8	$1,300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	164	$45	$7,400
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	164	$49	$8,000
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	100	$25	$2,500
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,100
	CONSTRUCTION COSTS SUBTOTAL:				**$30,500**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,200
	PROJECT COSTS TOTAL:				**$39,700**

Pipe Worksheet

CIP Project Number:	**S2-B**
Master Plan Link Number:	**8275**
Basin:	**Spring Brook**
Subbasin:	**S/2**

Location

North side of 99W, east of Springbrook Rd

Project Description

Replace existing 258' long 12"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,400
1.20	Traffic control	lf	258	$5	$1,300
1.30	Erosion control measures	L.S.	1	1.4%	$360
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	282	$3	$850
2.30	Remove existing pipe	lf	258	$8	$2,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	258	$15	$3,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	258	$35	$9,000
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	138	$25	$3,500
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	30	$12	$360
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,700
	CONSTRUCTION COSTS SUBTOTAL:				**$34,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$10,200
	PROJECT COSTS TOTAL:				**$44,200**

Project Summary Sheet

CIP Project Number:	**S3**
Master Plan Link Number:	**8334**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

West of Springbrook Rd, north of 99W

Project Description

Replace existing 441' long 36"D culvert with an 48"D culvert.

Special Considerations

Large trees located along pipe location.
Easement is necessary.
Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$5,700
1.20	Traffic control	lf	441	$5	$2,210
1.30	Erosion control measures	L.S.	1	1.4%	$1,490
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	371	$3	$1,110
2.30	Remove existing pipe	lf	441	$8	$3,530
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	441	$55	$24,280
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 48" diameter	lf	441	$134	$59,200
4.20	Manholes, 14' deep	each	2	$5,800	$11,600
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	180	$25	$4,500
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	30	$12	$360
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$22,800

CONSTRUCTION COSTS SUBTOTAL:		**$137,000**
PERMITTING COSTS	10%	$13,700
TECHNICAL SERVICES AND ADMINISTRATION:	30%	$41,100
PROJECT COSTS TOTAL:		**$191,800**

Project Summary Sheet

CIP Project Number:	**S4**
Master Plan Link Number:	**8505, 8510, 8520**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Aquarius Blvd, west of Coffey Ln

Project Description

Replace three existing pipes with 331'L of 18"D pipe and 230'L of 36"D pipe.

Special Considerations

L8505 & 8520: Pipe located between structures. Easement is necessary.
Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$4,800
1.20	Traffic control	lf	561	$5	$2,800
1.30	Erosion control measures	L.S.	1	1.4%	$1,110
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	775	$3	$2,320
2.30	Remove existing pipe	lf	561	$8	$4,500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6 - 12' deep	lf	561	$15 - $55	$15,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18 - 36" diameter	lf	561	$35 - $98	$34,200
4.20	Manholes, 6 - 10' deep	each	3	$2300 - $3700	$8,300
4.30	Culvert headwall, 18 - 36" diameter	each	1	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	48	$78	$3,730
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	376	$25	$9,400
5.20	Sidewalk	sf	80	$5	$400
5.30	Concrete curb	lf	20	$12	$240
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$17,400
	CONSTRUCTION COSTS SUBTOTAL:				**$104,200**
	PERMITTING COSTS			10%	$10,400
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$31,300
	PROJECT COSTS TOTAL:				**$145,900**

Pipe Worksheet

CIP Project Number:	**S4-A**
Master Plan Link Number:	**8505**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

South of Aquarius Blvd

Project Description

Replace existing 85' long 24"D pipe with a 36"D pipe.

Special Considerations

Pipe located between residential structures. Easement is necessary.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,400
1.20	Traffic control	lf	85	$5	$400
1.30	Erosion control measures	L.S.	1	1.4%	$250
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	8	$3	$20
2.30	Remove existing pipe	lf	85	$8	$700
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	85	$24	$2,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	85	$98	$8,400
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall,	each	1	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	48	$78	$3,730
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,900
	CONSTRUCTION COSTS SUBTOTAL:				**$23,400**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$7,000
	PROJECT COSTS TOTAL:				**$30,400**

Pipe Worksheet

CIP Project Number:	**S4-B**
Master Plan Link Number:	**8510**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Along Aquarius Blvd

Project Description

Replace existing 331' long 10"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,800
1.20	Traffic control	lf	331	$5	$1,700
1.30	Erosion control measures	L.S.	1	1.4%	$450
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	668	$3	$2,000
2.30	Remove existing pipe	lf	331	$8	$2,600
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	331	$15	$5,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	331	$35	$11,600
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	331	$25	$8,300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$7,200
	CONSTRUCTION COSTS SUBTOTAL:				**$43,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$12,900
	PROJECT COSTS TOTAL:				**$55,900**

Pipe Worksheet

CIP Project Number:	**S4-C**
Master Plan Link Number:	**8520**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

North of Aquarius Blvd

Project Description

Replace existing 145' long 24"D pipe with a 36"D pipe.

Special Considerations

Pipe located between residential structures. Easement is necessary.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,600
1.20	Traffic control	lf	145	$5	$700
1.30	Erosion control measures	L.S.	1	1.4%	$410
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	99	$3	$300
2.30	Remove existing pipe	lf	145	$8	$1,200
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	145	$55	$8,000
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	145	$98	$14,200
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	45	$25	$1,100
5.20	Sidewalk	sf	40	$5	$200
5.30	Concrete curb	lf	10	$12	$120
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$6,300
	CONSTRUCTION COSTS SUBTOTAL:				**$37,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$11,300
	PROJECT COSTS TOTAL:				**$49,100**

Project Summary Sheet

CIP Project Number:	**S5**
Master Plan Link Number:	**8545, 8550, 8560**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Vittoria Way, between Coffey Ln and Springbrook St

Project Description

Replace three existing pipes with 515'L of 18" pipe and 510'L of 21"D pipe.

Special Considerations

L8560: Portion of pipe located between structures. Easement is necessary.
Permit necessary (private property).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$6,600
1.20	Traffic control	lf	1,025	$5	$5,200
1.30	Erosion control measures	L.S.	3	1.4%	$1,680
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	1,538	$3	$4,610
2.30	Remove existing pipe	lf	1,025	$8	$8,200
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	1,025	$15 - $19	$17,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18 - 21" diameter	lf	1,025	$35 - $49	$43,000
4.20	Manholes, 6 - 10' deep	each	6	$2300 - $3700	$15,200
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	760	$25	$19,100
5.20	Sidewalk	sf	880	$5	$4,400
5.30	Concrete curb	lf	391	$12	$4,690
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$26,300
	CONSTRUCTION COSTS SUBTOTAL:				**$157,700**
	PERMITTING COSTS			10%	$15,800
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$47,300
	PROJECT COSTS TOTAL:				**$220,800**

Pipe Worksheet

CIP Project Number:	**S5-A**
Master Plan Link Number:	**8545**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Vittoria Way, between Coffey Ln and Springbrook St

Project Description

Replace existing 339' long 15"D pipe with a 21"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,300
1.20	Traffic control	lf	339	$5	$1,700
1.30	Erosion control measures	L.S.	1	1.4%	$590
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	684	$3	$2,050
2.30	Remove existing pipe	lf	339	$8	$2,700
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	339	$19	$6,400
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 21" diameter	lf	339	$49	$16,600
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	339	$25	$8,500
5.20	Sidewalk	sf	200	$5	$1,000
5.30	Concrete curb	lf	50	$12	$600
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$9,200
	CONSTRUCTION COSTS SUBTOTAL:				**$55,300**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$16,600
	PROJECT COSTS TOTAL:				**$71,900**

Pipe Worksheet

CIP Project Number:	**S5-B**
Master Plan Link Number:	**8550**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Vittoria Way, between Coffey Ln and Springbrook St

Project Description

Replace existing 171' long 15"D pipe with a 21"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,400
1.20	Traffic control	lf	171	$5	$900
1.30	Erosion control measures	L.S.	1	1.4%	$350
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	348	$3	$1,040
2.30	Remove existing pipe	lf	171	$8	$1,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	171	$19	$3,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 21" diameter	lf	171	$49	$8,400
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	171	$25	$4,300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	171	$12	$2,050
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,500
	CONSTRUCTION COSTS SUBTOTAL:				**$33,100**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,900
	PROJECT COSTS TOTAL:				**$43,000**

Pipe Worksheet

CIP Project Number: S5-C

Master Plan Link Number: 8560

Basin: Spring Brook

Subbasin: S/3

Location

Coffey Ln and Vittoria Way

Project Description

Replace existing 515' long 12"D pipe with an 18"D pipe.

Special Considerations

Portion of pipe located between structures. Easement is necessary.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,900
1.20	Traffic control	lf	515	$5	$2,600
1.30	Erosion control measures	L.S.	1	1.4%	$730
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	506	$3	$1,520
2.30	Remove existing pipe	lf	515	$8	$4,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	515	$15	$7,700
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	515	$35	$18,000
4.20	Manholes, 6' deep	each	3	$2,300	$6,900
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	250	$25	$6,300
5.20	Sidewalk	sf	680	$5	$3,400
5.30	Concrete curb	lf	170	$12	$2,040
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$11,500
	CONSTRUCTION COSTS SUBTOTAL:				**$69,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$20,800
	PROJECT COSTS TOTAL:				**$90,000**

Project Summary Sheet

CIP Project Number:	**S6**
Master Plan Link Number:	**8625, 8640**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Springbrook Way, between Aquarius Blvd and Douglas St

Project Description

Replace two existing pipes with 509'L of 36"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$5,100
1.20	Traffic control	lf	509	$5	$2,500
1.30	Erosion control measures	L.S.	1	1.4%	$1,250
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	976	$3	$2,930
2.30	Remove existing pipe	lf	509	$8	$4,000
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	509	$24	$12,200
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 36" diameter	lf	509	$98	$49,800
4.20	Manholes, 6' deep	each	3	$2,300	$6,900
4.30	Culvert headwall, 36" diameter	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	479	$25	$12,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$19,300

CONSTRUCTION COSTS SUBTOTAL:		**$116,000**
PERMITTING COSTS	0%	$0
TECHNICAL SERVICES AND ADMINISTRATION:	30%	$34,800
PROJECT COSTS TOTAL:		**$150,800**

Pipe Worksheet

CIP Project Number:	**S6-A**
Master Plan Link Number:	**8625**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Springbrook Way, north of Aquarius

Project Description

Replace existing 68' long 27"D pipe with a 36 D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,100
1.20	Traffic control	lf	68	$5	$300
1.30	Erosion control measures	L.S.	1	1.4%	$210
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	85	$3	$260
2.30	Remove existing pipe	lf	68	$8	$500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	68	$24	$1,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	68	$98	$6,600
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	38	$25	$1,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$3,200
	CONSTRUCTION COSTS SUBTOTAL:				**$19,400**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$5,800
	PROJECT COSTS TOTAL:				**$25,200**

Pipe Worksheet

CIP Project Number:	**S6-B**
Master Plan Link Number:	**8640**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Springbrook Way, south of Douglas St

Project Description

Replace existing 441' long 27"D pipe with a 36"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$4,000
1.20	Traffic control	lf	441	$5	$2,200
1.30	Erosion control measures	L.S.	1	1.4%	$1,040
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	891	$3	$2,670
2.30	Remove existing pipe	lf	441	$8	$3,500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	441	$24	$10,600
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	441	$98	$43,200
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	441	$25	$11,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$16,100
	CONSTRUCTION COSTS SUBTOTAL:				**$96,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$29,000
	PROJECT COSTS TOTAL:				**$125,600**

Project Summary Sheet

CIP Project Number:	**S7**
Master Plan Link Number:	**8667, 8670, 8675, 8700, 8705, 8725, 8735**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Springbrook Rd. between Mountainview Dr and Crestview Dr

Project Description

Replace six existing pipes with 807' of 18"D pipe; 252'L x 24"D; and 1022'L of 30"D pipe. Replace one existing culvert with 38'L of 36"D culvert.

Special Considerations

L8667: Pipe located between residential structures. Easement is necessary.
L8675: Portion of pipe may be located under a structure.
L8700: Portion of pipe may be located under a structure.
L8725: Portion of pipe underneath RR.
Permits necessary (private property, RR).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$14,100
1.20	Traffic control	lf	1,411	$5	$7,100
1.30	Erosion control measures	L.S.	1	1.4%	$3,470
2.00	**SITE WORK**		0		
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	1,665	$3	$5,000
2.30	Remove existing pipe	lf	2,120	$8	$16,900
3.00	**EARTHWORKS**		0		
3.10	Trench excavation & backfi 6' deep	lf	2,120	$15 - $24	$37,300
4.00	**STRUCTURAL WORKS**		0		
4.10	Reinforced concrete pipe, 18 - 36" diameter	lf	2,120	$35 - $98	$117,800
4.20	Manholes, 6 - 10' deep	each	10	$2300 - $3700	$24,400
4.30	Culvert headwall 36" diameter	each	2	$2,600	$5,200
4.40	Rip-rap channel protection, 18" thick	sy	260	$78	$20,320
5.00	**SURFACE RESTORATION**		0		
5.10	Asphalt pavement, 4", including base	lf	704	$25	$17,700
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0.00	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$53,900

CONSTRUCTION COSTS SUBTOTAL:		**$323,200**
PERMITTING COSTS	10%	$32,300
TECHNICAL SERVICES AND ADMINISTRATION:	30%	$97,000
PROJECT COSTS TOTAL:		**$452,500**

Pipe Worksheet

CIP Project Number:	**S7-A**
Master Plan Link Number:	**8667**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

South of Crestview Dr, west of Springbrook Rd

Project Description

Replace existing 257' long 21"D pipe with a 30"D pipe.

Special Considerations

Pipe located between residential structures. Easement is necessary.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,800
1.20	Traffic control	lf	257	$5	$1,300
1.30	Erosion control measures	L.S.	1	1.4%	$460
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	0	$3	$0
2.30	Remove existing pipe	lf	257	$8	$2,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	257	$19	$4,900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 30" diameter	lf	257	$72	$18,500
4.20	Manholes, 10' deep	each	1	$3,700	$3,700
4.30	Culvert headwall	each	0	$2,100	$0
4.40	Rip-rap channel protection, 18" thick	sy	41	$78	$3,180
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	0	$25	$0
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$7,200
	CONSTRUCTION COSTS SUBTOTAL:				**$43,100**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$12,900
	PROJECT COSTS TOTAL:				**$56,000**

Pipe Worksheet

CIP Project Number:	**S7-B**
Master Plan Link Number:	**8670**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Crestview Dr, west of Springbrook Rd

Project Description

Replace existing 38' long 21"D culvert with a 36"D culvert.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,500
1.20	Traffic control	lf	38	$5	$200
1.30	Erosion control measures	L.S.	1	1.4%	$280
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	299	$3	$900
2.30	Remove existing pipe	lf	38	$8	$300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	38	$24	$900
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	38	$98	$3,700
4.20	Manholes, 6' deep	each	0	$2,300	$0
4.30	Culvert headwall, 36" diameter	each	2	$2,600	$5,200
4.40	Rip-rap channel protection, 18" thick	sy	96	$78	$7,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	38	$25	$1,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$4,300
	CONSTRUCTION COSTS SUBTOTAL:				**$25,700**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$7,700
	PROJECT COSTS TOTAL:				**$33,400**

Pipe Worksheet

CIP Project Number:	**S7-C**
Master Plan Link Number:	**8675**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Crestview Dr, west of Springbrook Rd

Project Description

Replace existing 252' long 12"D pipe with a 24"D pipe.

Special Considerations

Portion of pipe may be located under a structure.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,500
1.20	Traffic control	lf	252	$5	$1,300
1.30	Erosion control measures	L.S.	1	1.4%	$390
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	267	$3	$800
2.30	Remove existing pipe	lf	252	$8	$2,000
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	252	$19	$4,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	252	$49	$12,400
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	130	$25	$3,300
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$6,100
	CONSTRUCTION COSTS SUBTOTAL:				**$36,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$11,000
	PROJECT COSTS TOTAL:				**$47,800**

Pipe Worksheet

CIP Project Number:	**S7-D**
Master Plan Link Number:	**8700**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

North of Crestview Dr, west of Springbrook Rd

Project Description

Replace existing 709' long 21"D pipe with a 30"D pipe.

Special Considerations

Portion of pipe may be located under a structure.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$4,600
1.20	Traffic control	lf	0	$5	$0
1.30	Erosion control measures	L.S.	1	1.4%	$1,230
2.00					
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	248	$3	$740
2.30	Remove existing pipe	lf	709	$8	$5,700
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	709	$19	$13,500
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 30" diameter	lf	709	$72	$51,000
4.20	Manholes, 6' deep	each	4	$2,300	$9,200
4.30	Culvert headwall	each	0	$2,100	$0
4.40	Rip-rap channel protection, 18" thick	sy	41	$78	$3,180
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	120	$25	$3,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$18,400
	CONSTRUCTION COSTS SUBTOTAL:				**$110,600**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$33,200
	PROJECT COSTS TOTAL:				**$143,800**

Pipe Worksheet

CIP Project Number:	**S7-E**
Master Plan Link Number:	**8705**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Springbrook Rd, north of Crestview Dr

Project Description

Replace existing 56' long 21"D pipe with a 30"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,000
1.20	Traffic control	lf	56	$5	$300
1.30	Erosion control measures	L.S.	1	1.4%	$180
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	120	$3	$360
2.30	Remove existing pipe	lf	56	$8	$400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	56	$19	$1,100
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 30" diameter	lf	56	$72	$4,000
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	$2,100	$0
4.40	Rip-rap channel protection, 18" thick	sy	41	$78	$3,180
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	56	$25	$1,400
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$2,800
	CONSTRUCTION COSTS SUBTOTAL:				**$17,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$5,100
	PROJECT COSTS TOTAL:				**$22,100**

Pipe Worksheet

CIP Project Number:	**S7-F**
Master Plan Link Number:	**8725**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Springbrook Rd, south of RR

Project Description

Replace existing 490' long 15"D pipe with an 18"D pipe.

Special Considerations

Portion of pipe underneath RR.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,400
1.20	Traffic control	lf	490	$5	$2,400
1.30	Erosion control measures	L.S.	1	1.4%	$610
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	646	$3	$1,940
2.30	Remove existing pipe	lf	490	$8	$3,900
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	490	$15	$7,300
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	490	$35	$17,100
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	320	$25	$8,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$9,700
	CONSTRUCTION COSTS SUBTOTAL:				**$58,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$17,400
	PROJECT COSTS TOTAL:				**$75,400**

Pipe Worksheet

CIP Project Number:	**S7-G**
Master Plan Link Number:	**8735**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

Mountainview Dr, north of RR

Project Description

Replace existing 317' long 12"D pipe with an 18"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$1,300
1.20	Traffic control	lf	317	$5	$1,600
1.30	Erosion control measures	L.S.	1	1.4%	$330
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	86	$3	$260
2.30	Remove existing pipe	lf	317	$8	$2,500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	317	$15	$4,800
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 18" diameter	lf	317	$35	$11,100
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	19	$78	$1,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	40	$25	$1,000
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$5,300
	CONSTRUCTION COSTS SUBTOTAL:				**$32,000**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$9,600
	PROJECT COSTS TOTAL:				**$41,600**

Project Summary Sheet

CIP Project Number:	**S8**
Master Plan Link Number:	**8720**
Basin:	**Spring Brook**
Subbasin:	**S/3**

Location

RR, east of Springbrook Rd

Project Description

Replace existing 39' long 12"D culvert with a 24"D culvert.

Special Considerations

L8720: Underneath RR.
Permits necessary (water body, RR).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$700
1.20	Traffic control	lf	39	$5	$190
1.30	Erosion control measures	L.S.	1	1.4%	$120
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	85	$3	$250
2.30	Remove existing pipe	lf	39	$8	$310
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	39	$19	$740
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	39	$49	$1,900
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	24	$78	$1,860
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	39	$25	$970
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$1,900
	CONSTRUCTION COSTS SUBTOTAL:				**$11,200**
	PERMITTING COSTS			10%	$1,100
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$3,400
	PROJECT COSTS TOTAL:				**$15,700**

Project Summary Sheet

CIP Project Number:	**S9**
Master Plan Link Number:	**9140**
Basin:	**Spring Brook**
Subbasin:	**S/4**

Location

99W, east of Klimek Ln

Project Description

Replace existing 143' long 24"D culvert with a 36"D culvert.

Special Considerations

Permits necessary (water body, ODOT).

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,200
1.20	Traffic control	lf	143	$5	$710
1.30	Erosion control measures	L.S.	1	1.4%	$580
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	295	$3	$880
2.30	Remove existing pipe	lf	143	$8	$1,140
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 12' deep	lf	143	$55	$7,850
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 36" diameter	lf	143	$98	$14,000
4.20	Manholes, 10' deep	each	0	$3,700	$0
4.30	Culvert headwall, 36" diameter	each	2	$2,600	$5,200
4.40	Rip-rap channel protection, 18" thick	sy	96	$78	$7,460
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	180	$25	$4,500
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$8,900
	CONSTRUCTION COSTS SUBTOTAL:				**$53,400**
	PERMITTING COSTS			10%	$5,300
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$16,000
	PROJECT COSTS TOTAL:				**$74,700**

Project Summary Sheet

CIP Project Number:	**S10**
Master Plan Link Number:	**9235, 9245, 9250, 9255**
Basin:	**Spring Brook**
Subbasin:	**S/4**

Location

Libra St, between Vittoria Wy and Crestview Dr

Project Description

Replace four existing pipes with 1502' of 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%-7%	$10,600
1.20	Traffic control	lf	1095	$5	$7,500
1.30	Erosion control measures	L.S.	1	1.4%	$2,650
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	832	$3	$4,960
2.30	Remove existing pipe	lf	1,095	$8	$12,100
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	1,095	$19	$28,500
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	1,095	$49	$73,600
4.20	Manholes, 6' deep	each	8	$2,300	$25,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	406	$25	$20,400
5.20	Sidewalk	sf	2,760	$5	$13,800
5.30	Concrete curb	lf	690	$12	$8,280
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$41,500
	CONSTRUCTION COSTS SUBTOTAL:				**$249,200**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$74,800
	PROJECT COSTS TOTAL:				**$324,000**

Pipe Worksheet

CIP Project Number:	**S10-A**
Master Plan Link Number:	**9235**
Basin:	**Springbrook Creek**
Subbasin:	**S/4**

Location

Vittoria Wy, west of Meadow Ln

Project Description

Replace existing 486' long 15"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$3,400
1.20	Traffic control	lf	486	$5	$2,400
1.30	Erosion control measures	L.S.	1	1.4%	$870
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	499	$3	$1,500
2.30	Remove existing pipe	lf	486	$8	$3,900
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	486	$19	$9,200
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	486	$49	$23,800
4.20	Manholes, 6' deep	each	4	$2,300	$9,200
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	246	$25	$6,200
5.20	Sidewalk	sf	960	$5	$4,800
5.30	Concrete curb	lf	240	$12	$2,880
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$13,600
	CONSTRUCTION COSTS SUBTOTAL:				**$81,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$24,500
	PROJECT COSTS TOTAL:				**$106,300**

Pipe Worksheet

CIP Project Number:	**S10-B**
Master Plan Link Number:	**9245**
Basin:	**Springbrook Creek**
Subbasin:	**S/4**

Location

Libra St, north of Vittoria Wy

Project Description

Replace existing 553' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$3,700
1.20	Traffic control	lf	553	$5	$2,800
1.30	Erosion control measures	L.S.	0	1.4%	$940
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	213	$3	$640
2.30	Remove existing pipe	lf	553	$8	$4,400
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	553	$19	$10,500
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	553	$49	$27,100
4.20	Manholes, 6' deep	each	3	$2,300	$6,900
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	103	$25	$2,600
5.20	Sidewalk	sf	1,800	$5	$9,000
5.30	Concrete curb	lf	450	$12	$5,400
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$14,800
	CONSTRUCTION COSTS SUBTOTAL:				**$88,800**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$26,600
	PROJECT COSTS TOTAL:				**$115,400**

Pipe Worksheet

CIP Project Number:	**S10-C**
Master Plan Link Number:	**9250**
Basin:	**Spring Brook**
Subbasin:	**S/4**

Location

Heater St and Libra St

Project Description

Replace existing 57' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	7%	$700
1.20	Traffic control	lf	57	$5	$300
1.30	Erosion control measures	L.S.	1	1.4%	$120
2.00	**SITE WORK**				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	120	$3	$360
2.30	Remove existing pipe	lf	57	$8	$500
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	57	$19	$1,100
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	57	$49	$2,800
4.20	Manholes, 6' deep	each	1	$2,300	$2,300
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	57	$25	$1,400
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$1,900
	CONSTRUCTION COSTS SUBTOTAL:				**$11,500**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$3,500
	PROJECT COSTS TOTAL:				**$15,000**

Pipe Worksheet

CIP Project Number:	**S10-D**
Master Plan Link Number:	**9255**
Basin:	**Spring Brook**
Subbasin:	**S/4**

Location

Libra St, north of Heater St

Project Description

Replace existing 406' long 12"D pipe with a 24"D pipe.

Special Considerations

None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	**GENERAL REQUIREMENTS**				
1.10	Mobilization/demobilization	L.S.	1	5%	$2,800
1.20	Traffic control	lf	406	$5	$2,000
1.30	Erosion control measures	L.S.	1	1.4%	$720
2.00					
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	820	$3	$2,460
2.30	Remove existing pipe	lf	406	$8	$3,300
3.00	**EARTHWORKS**				
3.10	Trench excavation & backfi 6' deep	lf	406	$19	$7,700
4.00	**STRUCTURAL WORKS**				
4.10	Reinforced concrete pipe, 24" diameter	lf	406	$49	$19,900
4.20	Manholes, 6' deep	each	3	$2,300	$6,900
4.30	Culvert headwall	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	**SURFACE RESTORATION**				
5.10	Asphalt pavement, 4", including base	lf	406	$25	$10,200
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	**CONTINGENCIES**				
6.10	Contingencies	L.S.	1	20%	$11,200
	CONSTRUCTION COSTS SUBTOTAL:				**$67,200**
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$20,200
	PROJECT COSTS TOTAL:				**$87,400**

Project Summary Sheet

CIP Project Number:	**S11**
Master Plan Link Number:	**9290**
Basin:	**Spring Brook**
Subbasin:	**S/4**

Location

Aquarius Blvd, east of Libra St

Project Description

Replace existing 125' long 8"D pipe with an 18"D pipe.

Special Considerations

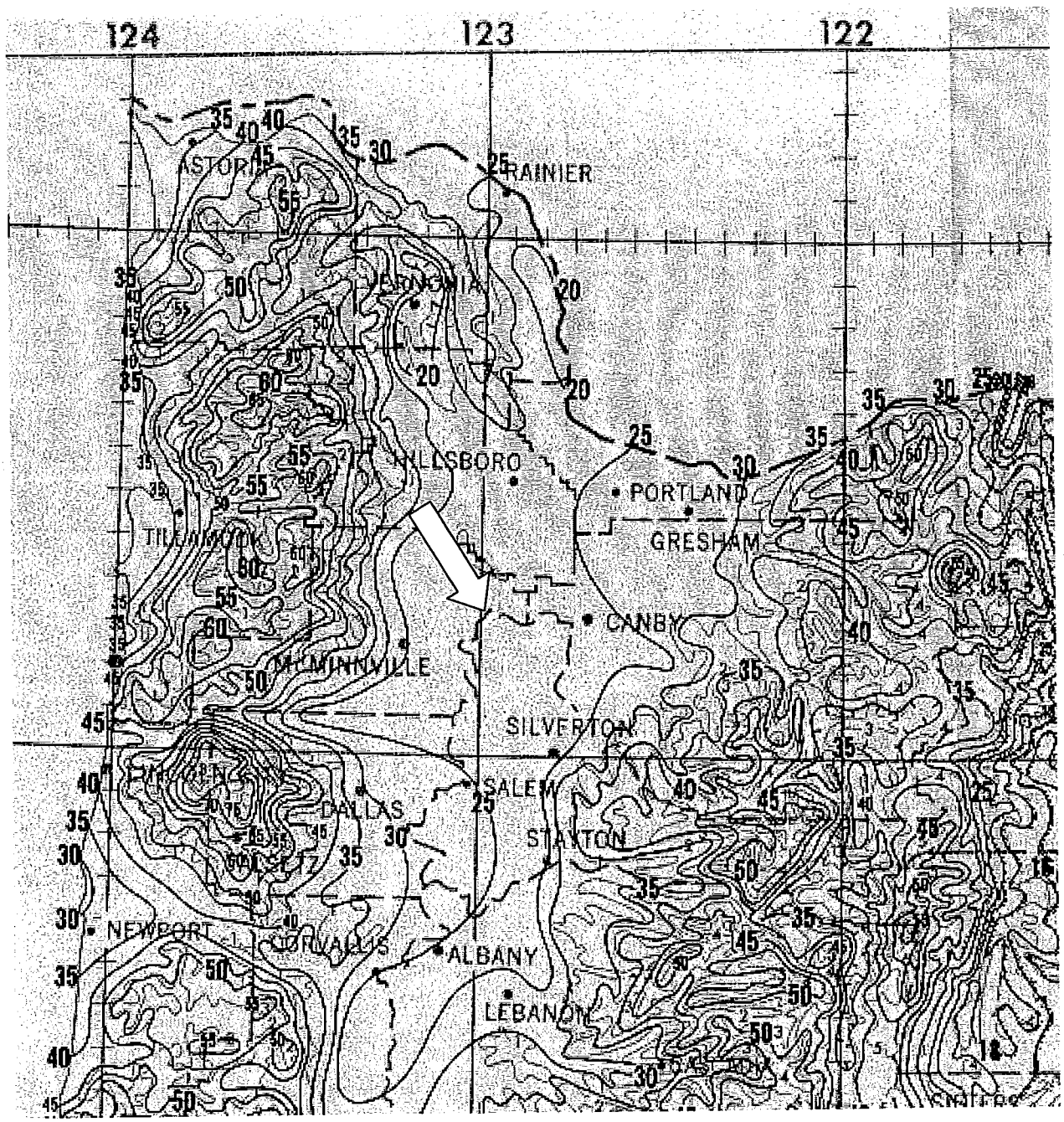
None noted.

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1.00	GENERAL REQUIREMENTS				
1.10	Mobilization/demobilization	L.S.	1	7%	$1,400
1.20	Traffic control	lf	125	$5	$620
1.30	Erosion control measures	L.S.	1	1.4%	$240
2.00	SITE WORK				
2.10	Clear and grub brush	acre	0	$5,200	$0
2.20	Saw cutting asphalt	lf	256	$3	$770
2.30	Remove existing pipe	lf	125	$8	$1,000
3.00	EARTHWORKS				
3.10	Trench excavation & backfi 6' deep	lf	125	$15	$1,870
4.00	STRUCTURAL WORKS				
4.10	Reinforced concrete pipe, 18" diameter	lf	125	$35	$4,400
4.20	Manholes, 6' deep	each	2	$2,300	$4,600
4.30	Culvert headwall,	each	0	n/a	$0
4.40	Rip-rap channel protection, 18" thick	sy	0	$78	$0
5.00	SURFACE RESTORATION				
5.10	Asphalt pavement, 4", including base	lf	180	$25	$4,500
5.20	Sidewalk	sf	0	$5	$0
5.30	Concrete curb	lf	0	$12	$0
5.40	Revegetation	acre	0	$22,000	$0
6.00	CONTINGENCIES				
6.10	Contingencies	L.S.	1	20%	$3,900
	CONSTRUCTION COSTS SUBTOTAL:				**$23,300**
	PERMITTING COSTS			0%	$0
	TECHNICAL SERVICES AND ADMINISTRATION:			30%	$7,000
	PROJECT COSTS TOTAL:				**$30,300**

APPENDIX H

NOAA Isopluvials of Design Storms

ISOPLUVIALS OF 2-YR 24-HR PRECIPITATION
TENTHS OF AN INCH



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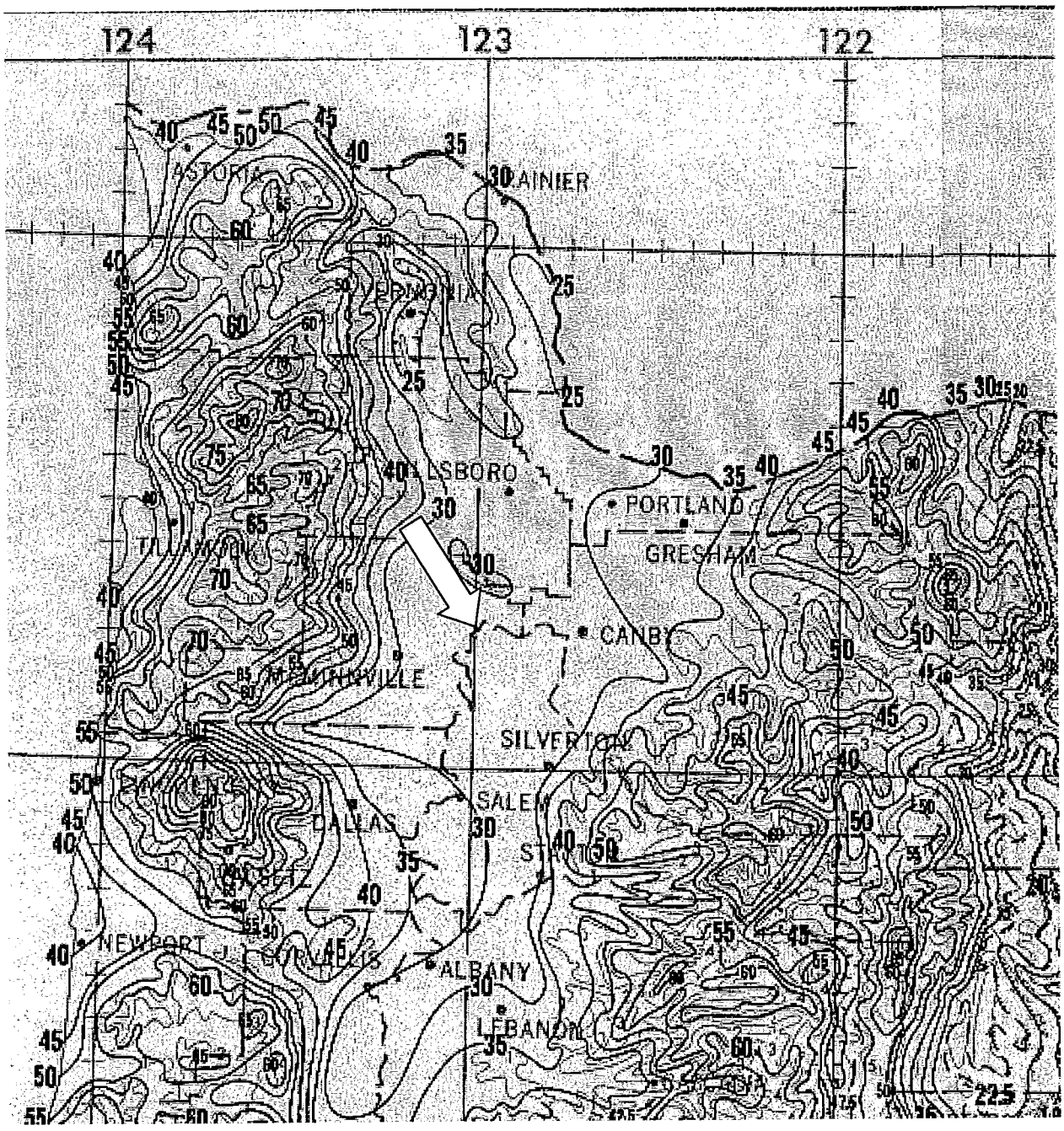
ISOPLUVIALS OF 5-YR 24-HR PRECIPITATION
TENTHS OF AN INCH



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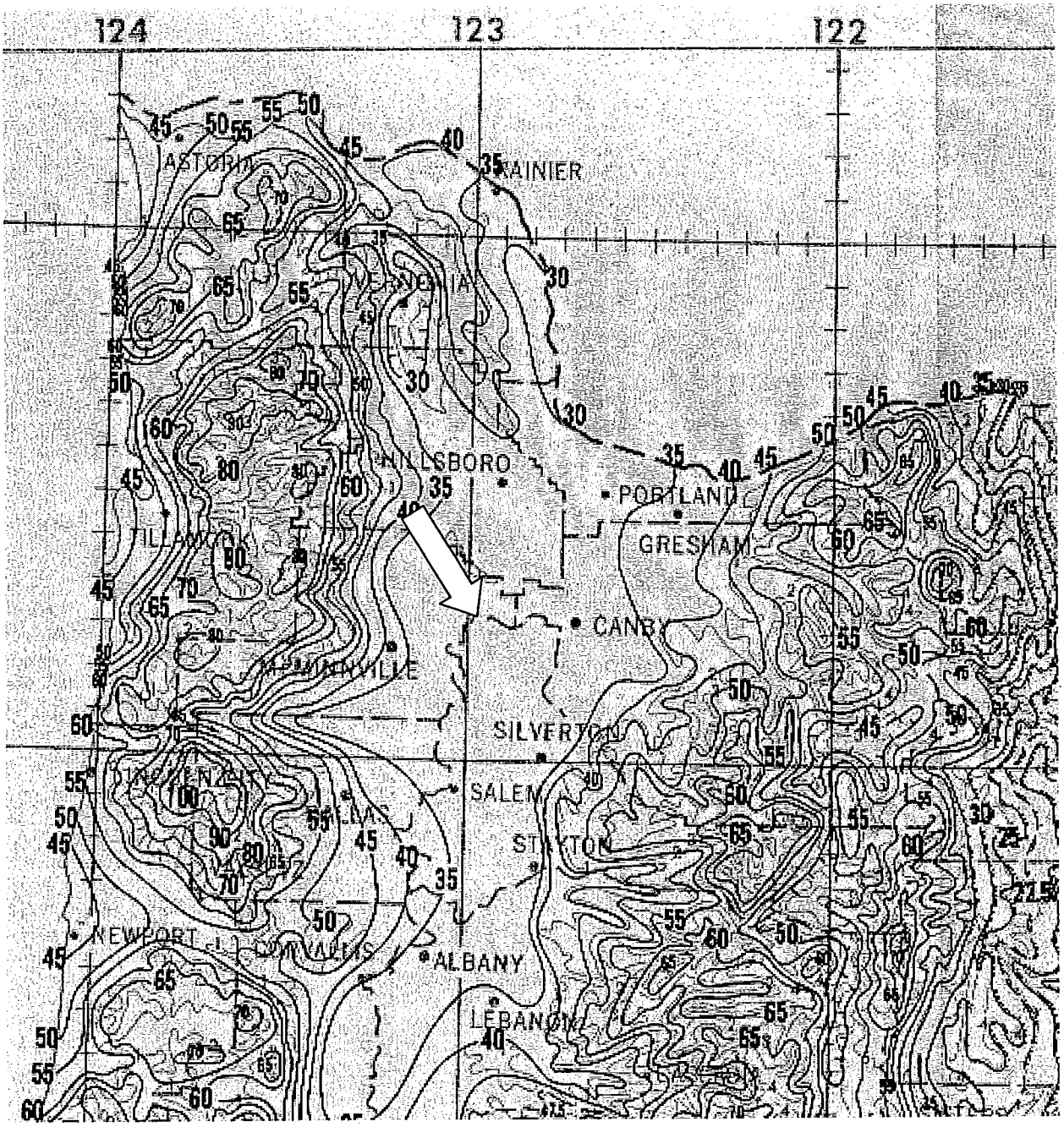
ISOPLUVIALS OF 10-YR 24-HR PRECIPITATION
TENTHS OF AN INCH



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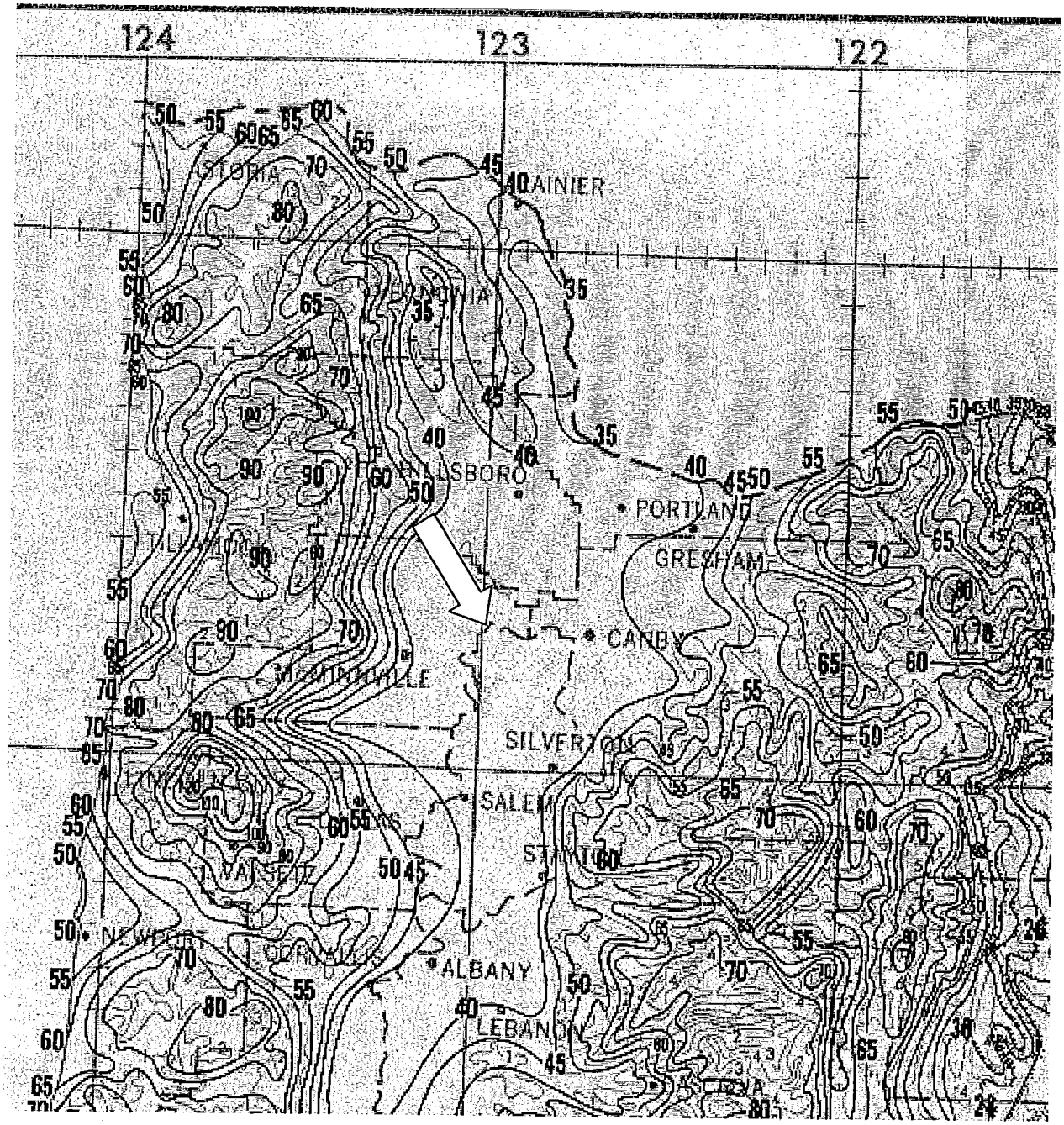
ISOPLUVIALS OF 25-YR 24-HR PRECIPITATION
TENTHS OF AN INCH



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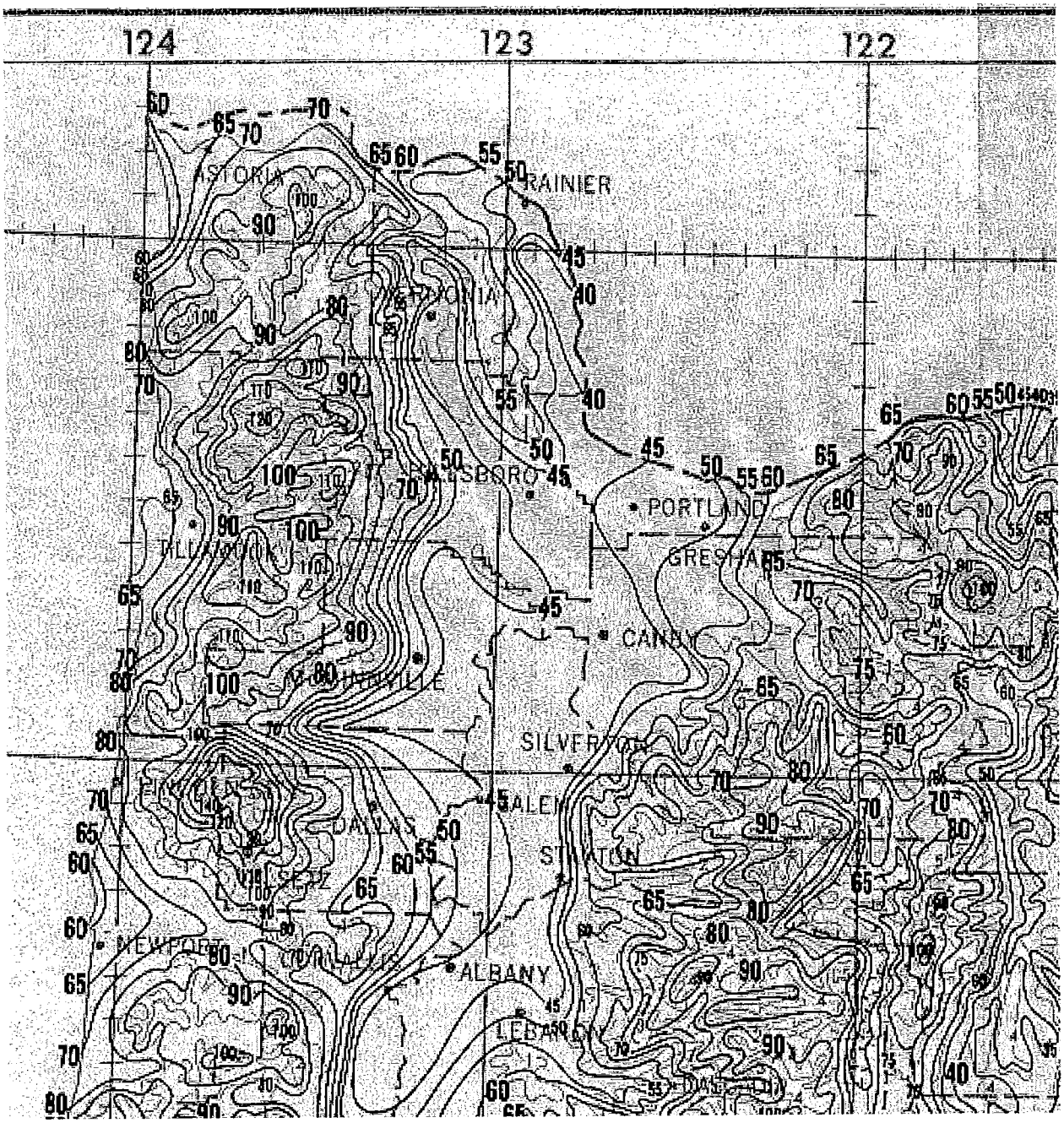
ISOPLUVIALS OF 100-YR 24-HR PRECIPITATION
TENTHS OF AN INCH



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