Chapter 3

EXISTING DRAINAGE SYSTEM

SECTION 3
EXISTING DRAINAGE SYSTEM

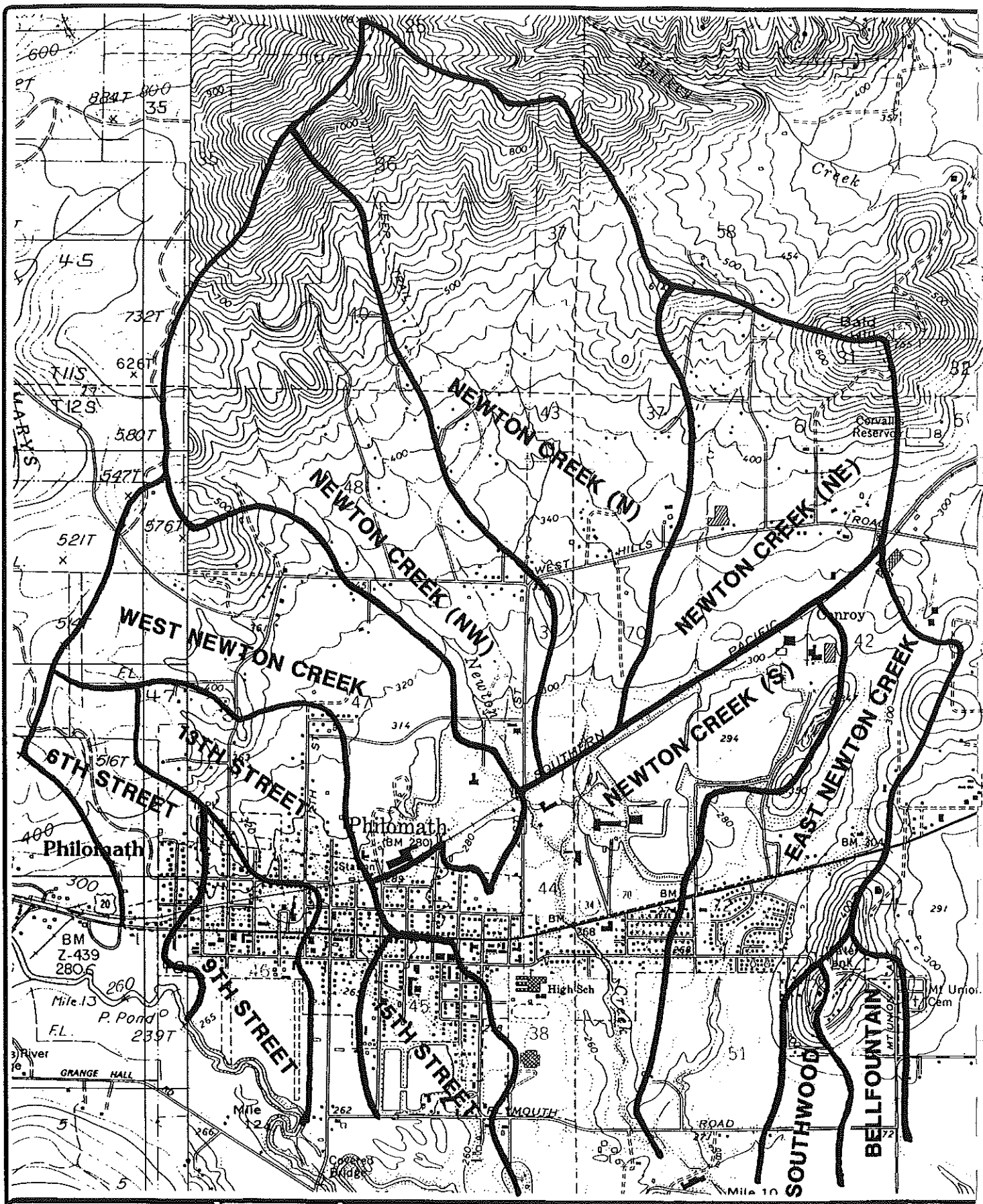
3.1 General

This section provides an overview of the existing drainage system within the study area and summarizes known or reported problems. The study area is divided into a number of major drainage basins as shown on **Figure 3-1**. The basin boundaries were determined based on the existing drainage patterns within the study area. To simplify the application of the storm drainage study for field personnel, the major basins are named based the portion of the storm drainage system to which the basin ultimately flows. For instance, the basin draining to the 13th Street storm drain south of Applegate Street is Basin 13, the basin draining to the Southwood Ditch is Basin SW (Southwood), the basin draining to Newton Creek is Basin NC (Newton Creek), while East Newton Creek is Basin ENC (East Newton Creek). **Table 3-1** lists the approximate areas within each of the major drainage basins shown. Each of these major drainage basins was then divided into subbasins as appropriate.

Table 3-1
MAJOR DRAINAGE BASIN AREAS

Basin Name	Drainage Basin Location	Area (Acres)
6	6th Street (north of Hwy 20)	136
9	9th Street (north of Chapel Rd/Plymouth Dr)	125
13	13th Street (north of Chapel Rd/Plymouth Dr)	238
15	15th Street (north of Chapel Rd/Plymouth Dr)	93
WNC	West Newton Creek	436
NC	Newton Creek (NW)	543
NC	Newton Creek (N)	838
NC	Newton Creek (NE)	391
NC	Newton Creek (S) (north of Chapel Rd/Plymouth Dr)	542
ENC	East Newton Creek (north of Chapel Rd/Plymouth Dr)	394
SW	Southwood (north of Chapel Rd/Plymouth Dr)	41
BF	Bell Fountain (north of Chapel Rd/Plymouth Dr)	56
	Total	3,833

Within the study area, three jurisdictions have responsibility for design and maintenance of the storm drainage system. In addition to the City, who is responsible for the majority of the system, the Oregon Department of Transportation (ODOT) is responsible for facilities in the right-of-ways



WESTECH ENGINEERING, INC. CONSULTING ENGINEERS AND PLANNERS 3841 Fairview Industrial Dr. S.E. Suite 100 Salem, Oregon 97302 PH (503) 585-2474 FAX (503) 585-3986	SCALE HORIZ: 1"=2000' VERT: NTS DATE: OCTOBER 1997	PHILOMATH STORM DRAIN SYSTEM MASTER PLAN MAJOR DRAINAGE BASINS BOUNDARIES	FIGURE 3-1 JOB NUMBER 960.501.0

along Main Street (Hwy 20/34), while Benton County is responsible for facilities within County right-of-ways outside City Limits.

3.2 Existing System

The **Storm Drainage System Map (Sheet 1 through 4)** show the location and size of the existing drainage system, while **Sheet 5** shows the boundaries of the subbasins within the UGB. Full scale copies of these maps are included in Appendix A.

The existing storm drainage system is a combination of open channels, storm pipes and culverts in the well developed areas of the City, and roadside ditches, cross country ditches and perennial streams, and cross culverts in the less developed areas. The total estimated length of pipe in the drainage system is approximately 69,590 feet (±13.2 miles) with ±380 catch basins and ±90 storm drain manholes. The new Nybeck Hill subdivisions are not included in this inventory. The remainder of the storm drainage system consists of small perennial streams and constructed open channels, including roadside ditches. A detailed inventory of these channels and ditches was not performed, but the total appears to be in excess of 25 miles (excluding highway ditches).

The study area is crossed by two major transportation corridors, Highway 20/34 and the Southern Pacific Railroad. These two corridors have modified the natural path of runoff flowing out of drainage basins upstream of these facilities, and the placement and sizing of culverts effects the amount of runoff to downstream drainage areas. The major storm lines (≥18-inch) crossing the railroad within or adjacent to the City are as follows, listed from west to east.

- 24" concrete, ±250 feet west of 7th Street
- 12" x 24" box culvert, ±100 feet west of 9th Street
- 12" x 24" box culvert, east side 10th Street
- 36" concrete, south of Pioneer Street between 12th & 13th
- Twin 36" concrete, Newton Creek on west side of Green Road
- 36" concrete, Green Road
- 36" CMP, ±900 feet east of Green Road
- 72" x 72" concrete box culvert, ±1500 feet east of Green Road
- 36" concrete, ±3100 feet east of Green Road

The major storm lines (≥15-inch) crossing the Highway are as follows, listed from west to east.

- 24" concrete, ±800 feet west of 7th Street
- 18" concrete, between 9th & 10th Street
- 30" concrete, between 12th & 13th Street
- 18" concrete, between 16th & 17th Street
- 24" concrete, between 21st Street & Newton Creek
- Newton Creek bridge
- 24" concrete, between Green & 24th Street
- 18" concrete, Hartz industrial site access road
- Twin 24" concrete, 30" concrete, East Newton Creek

PIPE MATERIALS

C – CONCRETE
BOX – BOX CULVERT
CI – CAST IRON
CMP – CORRUGATED METAL PIPE
DI – DUCTILE IRON
HDPE – HIGH DENSITY POLYETHELYNE
PVC – POLYVINYL CHLORIDE
STL – STEEL

LEGEND

- STORM DRAIN PIPE (PIPE DIAMETER / PIPE MATERIAL)
- MANHOLE
- CATCH BASIN
- JUNCTION BOX
- PLUGGED END
- CONTINUES AS PRIVATE SYSTEM
- SURFACE DRAINAGE FLOW DIRECTION
- DB – DETENTION BASIN
- DRAINAGE BASIN BOUNDARY

NOTE:
THESE MAPS ARE SCHEMATIC UTILITY MAPS ONLY & DO NOT SHOW EXACT LOCATIONS OF UTILITIES. FIELD VERIFY ALL LOCATIONS PRIOR TO DESIGN OR CONSTRUCTION.

GRAPHIC SCALE
(IN FEET)
1 inch = 200 ft.

TOWNSHIP 12 SOUTH, RANGE 6 WEST, W.M.

SCALE
HORIZ:
VERT:
DSN: D.M.
DRN: D.M.
CHD: A.V.
DATE: APR 1997

NO.	DATE	DESCRIPTION
		REVISIONS

MAP UPDATED: 4-10-98

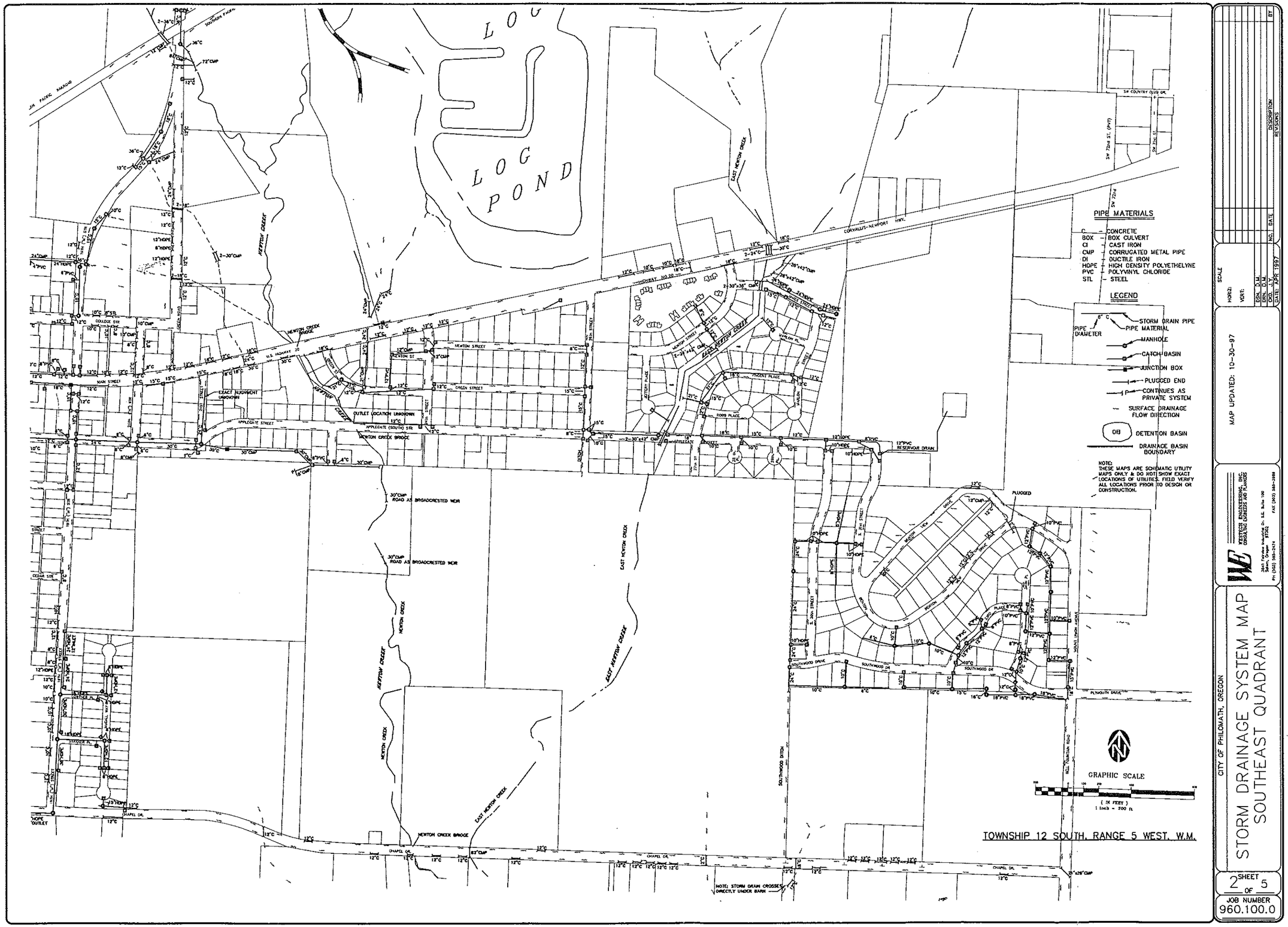
WESTECH ENGINEERING, INC.
CIVIL CONSULTING ENGINEERS AND PLANNERS
3841 Fairview Industrial Dr. S.E., Suite 100
Salem, Oregon 97302
PH (503) 585-2474 FAX (503) 585-3986

CITY OF PHILOMATH, OREGON

STORM DRAINAGE SYSTEM MAP SOUTHWEST QUADRANT

SHEET 1 OF 5

JOB NUMBER 960.100.0



BY | DESCRIPTION | NO. | DATE
REVISIONS

SCALE
HORIZ:
VERT:
DSN: D.M.
DRN: D.M.
CHD: J.Y.
DATE: APR. 1997

MAP UPDATED: 10-30-97

WESTECH ENGINEERING, INC.
CIVIL • STRUCTURAL • TRAFFIC
CONSULTING ENGINEERS AND PLANNERS
3841 Fairview Industrial Dr. S.E. Suite 100
Salem, Oregon 97302
PH: (503) 585-2474 FAX: (503) 585-2888

CITY OF PHILOMATH, OREGON

STORM DRAINAGE SYSTEM MAP SOUTHEAST QUADRANT

SHEET 2 OF 5

JOB NUMBER 960.100.0

CITY OF PHILOMATH, OREGON

STORM DRAINAGE SYSTEM MAP NORTHWEST QUADRANT

MAP UPDATED: 10-30-97

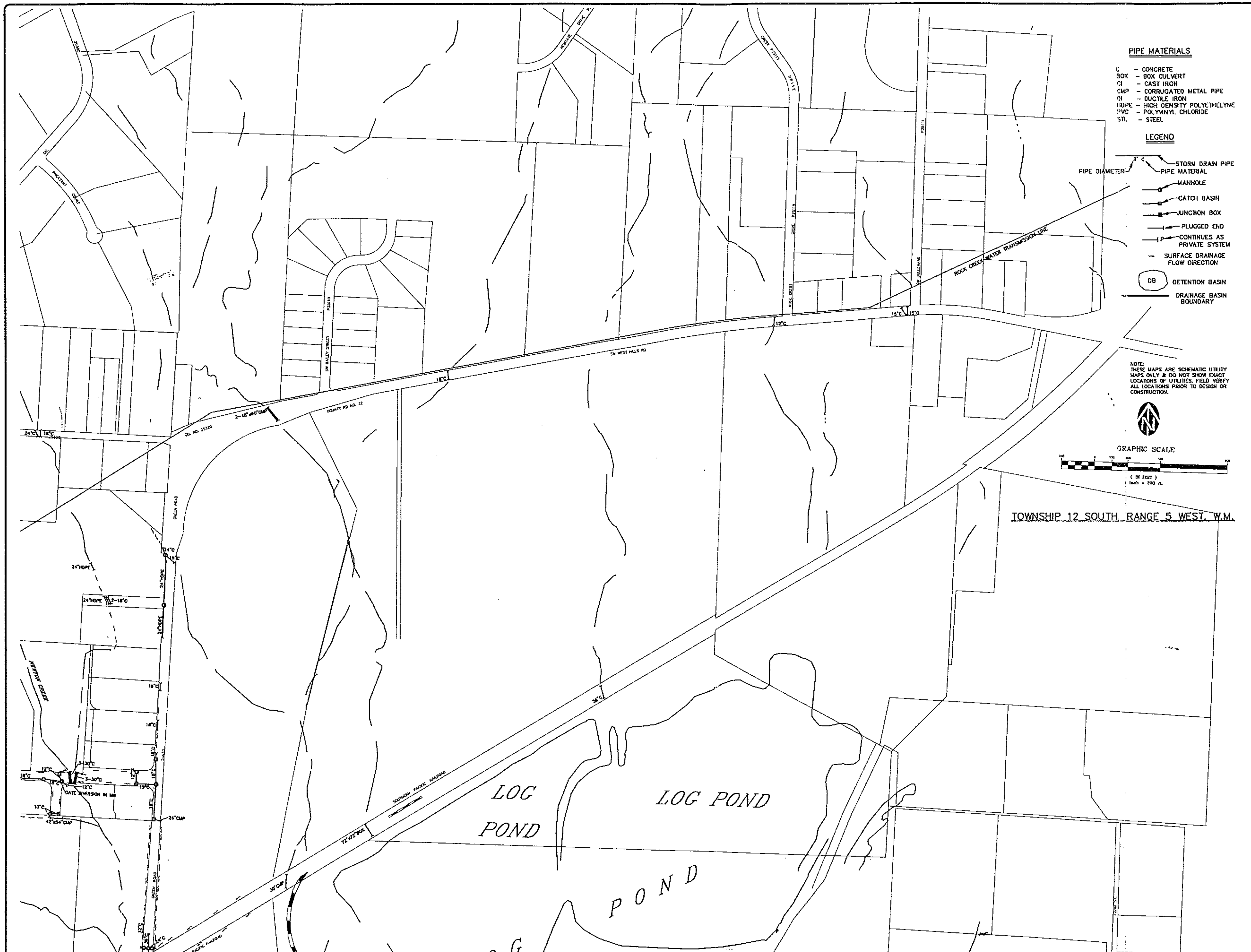
WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS

SCALE
HORIZ:
VERT:
DSN. D.M.
DRN. D.M.
CKD. J.Y.
DATE APR 1997

NO. | DATE | DESCRIPTION | BY
REVISIONS

SHEET 3 OF 5

JOB NUMBER 960.100.0



CITY OF PHILOMATH, OREGON

STORM DRAINAGE SYSTEM MAP
NORTHEAST QUADRANT

WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS
3841 Fairview Industrial Dr. S.E. Suite 100
Salem, Oregon 97302
PH (503) 585-2474 FAX (503) 585-3986

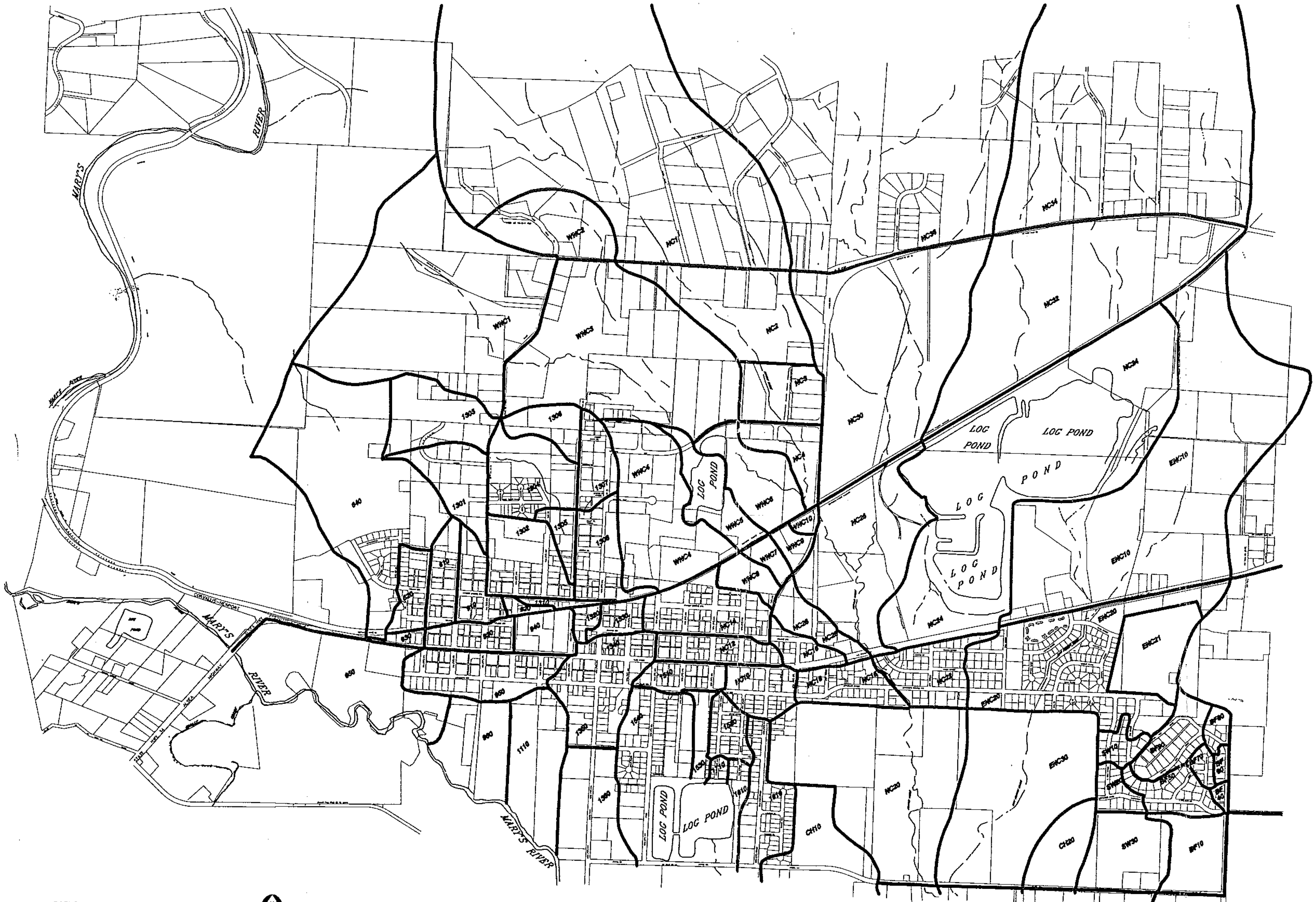
MAP UPDATED: 10-30-97

SCALE
HORIZ:
VERT:
DSN. D.M.
DRN. D.M.
CKD. J.Y.
DATE: APR 1997

NO. | DATE | DESCRIPTION | BY
REVISIONS

SHEET 4 OF 5

JOB NUMBER 960.100.0



LEGEND

DRAINAGE BASIN BOUNDARY

NOTE:
THESE MAPS ARE SCHEMATIC UTILITY MAPS ONLY & DO NOT SHOW EXACT LOCATIONS OF UTILITIES. FIELD VERIFY ALL LOCATIONS PRIOR TO DESIGN OR CONSTRUCTION.

GRAPHIC SCALE

(IN FEET)
1 inch = 600 ft.

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

SCALE
HORIZ:
VERT:
DSN. D.M.
DRN. D.M.
CKD. J.Y.
DATE: APR 1997

MAP UPDATED: 10-30-97

WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS
3841 Fairview Industrial Dr. S.E. Suite 100
Salem, Oregon 97302
PH (503) 585-2474 FAX (503) 585-3986

CITY OF PHILOMATH, OREGON

STORM DRAINAGE BASIN MAP

SHEET 5 OF 5

JOB NUMBER 960.501.0

Table 3-2 contains a summary of the estimated quantities of piping by size and material type in the Philomath storm system by material type and diameter.

TABLE 3-2
STORM DRAINAGE SYSTEM,
ESTIMATED PIPING QUANTITIES

Pipe Size	Total Estimated Pipe Quantities (feet)						
	Cast Iron	Concrete	CMP	HDPE	PVC	Steel	Totals
≤ 8"	35	1,675		930	560	35	3,235
8"	60	5,195	680	695	870	75	7,575
10"		6,015	800	980	1,460		8,255
12"	20	12,585	1,160	680	3,510		17,955
15"		3,940	20	220	1,220		6,400
18"		8,260	310	600	500		9,670
21"		1,310					1,310
24"		4,010	970	1,600			6,580
27"		70	250				320
30"		4,080	1,170				5,250
36"		1,230		680		50	1,960
82"			50				50
12 x 24 box		70					70
72 x 72 box		50					50
18" x 21"			80				80
21" x 26"			80				80
24" x 42"			100				100
28" x 42"			60				60
30" x 36"			100				100
30" x 42"			200				200
31" x 50"			500				500
42" x 54"			60				60
48" x 60"			530				530
Totals	115	48,490	7,120	6,385	8,120	160	70,390

Number of Catch Basins = ±381. Number of storm manholes = ±90.

The quantities shown on the table are limited to those within the UGB. As can be seen from this table, there is a variety of pipe materials in the current storm drainage system. The size of the storm drain pipes vary from 8 to 12 inches in diameter for local systems to 18-inch and larger pipes for major collector systems. Pipe materials include cast iron, concrete, corrugated metal (CMP), PVC, High Density Polyethylene (HDPE) and steel. For the purposes of estimating these quantities, the average length of driveway culverts was estimated at 20 feet, the average length of culverts crossing roads was estimated at 50 feet, while the average length of pipe runs crossing streets between catch basins was estimated at 35 feet. Open channels are typically natural stream/runoff channels or roadside ditches.

3.3 Existing Problem Areas

Problems with the City storm drainage system were identified from meetings and discussions with City Public Works staff. City personnel identified a number of locations where significant reoccurring storm drainage problems occur. The types of problems discussed can generally be divided into the following categories; lack of capacity, end of useful life, lack of facility, lack of maintenance, erosion, and on-site problems. A short discussion of each of these categories follows:

a. Lack of Capacity

This type of drainage problem results from open channels or pipes which are too small to handle the peak storm runoff. This type of problem typically results when upstream development increases the peak flow and volume of runoff, or because the existing system was constructed before storm drainage design standards were established. Therefor, although the storm system may have capacity to handle the runoff from smaller magnitude storms, they are unable to convey the runoff during major storm events. In either case, these portions of the existing system are undersized and need to be improved.

Design standards typically require that as the storm channel or pipe gets larger, it must be designed to convey the flow from a more intense storm event due to the increased risk of property damage should the system fail. For instance, local systems are typically sized based on a 10 year frequency storm, while larger storm drains serving a major basin must be designed for a 25 or 50 year frequency storm. If the local system overflows, the likelihood of significant property damage is relatively small, while failure of the major systems can result in significant damage to property.

It should be noted that some capacity problems are localized problems related to the storm drainage system for a particular site. These on-site drainage problems are outside of the scope of this report, and should be considered separately on a case-by-case basis.

b. On-site Problems

Examples of on-site drainage problems include standing water in yards, flooded driveway culverts on small local systems, flooding in private parking lots and problems related to groundwater and springs. In many cases, the on-site drainage problems are a result of conditions on the site (ie. clogged parking lot catch basins or driveway culverts) that are the responsibility of the private property owner. Evaluation of these type of problems is beyond the scope of this report.

c. End of Useful Life

This type of drainage problem is the result of old, damaged, or worn out systems that no longer function as designed. The most common example of this type of problem includes rusted or collapsed pipes or culverts. The correction of these type of problems requires replacement or reconstruction of the existing system.

d. Lack of Facility

Drainage problems in this category are caused by the absence of a drainage system. Examples include areas where there is no catch basin at the low spot in a street, lack of drainage systems for homes set back from the street, or property which is too low to drain to an established drainage system. Any of these cases typically results in ponding water and/or flooding on a regular basis.

e. Lack of Maintenance

Dirt, gravel, sediment, and other debris carried by storm runoff may settle out or become lodged in culverts, pipes and catch basins, resulting in flooding due to the reduced capacity of the system (sedimentation). This type of problem can be prevented or minimized by routine inspection and cleaning.

A second problem in this category results when ditches or other drainage facilities are located along back lot lines or through undeveloped areas without any provisions for maintenance access. Under this scenario, it is difficult and expensive for the City to maintain the storm drainage facilities on a regular basis, as the costs for obtaining access or restoring the area following maintenance may cost as much as the maintenance work itself.

A final concern under this category is when residents or developers dump debris into ditches during the dry season, which results in flooding when the wet season arrives.

f. Erosion

Unless erosion control measures are maintained during construction of new developments, rain washes soil from areas that have been cleared of vegetation and graded for

development. Erosion of stream beds and banks may also occur when development increases runoff flows. Deposition of these sediments downstream contributes to the maintenance problems experienced by the system. The irony of erosion problems is that the flooding caused by this sediment typically occurs far downstream of the source of the problem. Although an analysis of this issue is beyond the scope of this report, the City does require erosion control facilities during construction of new developments.

Table 3-3 outlines the major known problem areas reported by Public Works, as well as the category which the problem falls under.

Table 3-3
EXISTING DRAINAGE PROBLEM AREAS REPORTED BY CITY

Location	Problem Category
9th Street ditch south of WTP	Maintenance (access problems)
13th & Chapel Street intersection	Capacity
15th & Chapel Street intersection	Capacity
15th & Willow Lane	Capacity
Cooper Lane west of 15th Street	Lack of facility
Applegate Street just west of 13th Street	Capacity
12th & Pioneer Street	Capacity
Ditch from 11th to 12th Street north of Pioneer	Maintenance (access problems)
Ditch north of Pioneer between 12th & 13th Street	Maintenance (access problems), End of useful life
14th Street & railroad	Lack of facility
Green Street near Newton Creek	Capacity
East Newton Creek through park	Maintenance (access problems, sedimentation)
Applegate intersection with 27th, 28th & 29th Pla e	Lack of facility
North end Southwood Ditch (west end Southwood Drive)	Maintenance (debris dumping, access problems)
Southwood Ditch south of Chapel Drive	Capacity
Intersection of Upper & Lower Bentonview Drive	Lack of facility

It should be noted that the City is not currently under any specific regulatory water quality requirements for storm water flows. As such, consideration of storm water quality issues are not considered in this study. At such time that the City comes under regulatory requirements for storm water quality, a storm water management program will need to be developed to address these issues.

3.4 Existing Storm Drainage Funding Mechanisms

Based on conversations with the City Manager and Public Works Director, the City currently has no dedicated storm drainage funding mechanism available to finance needed repairs or upgrades to the storm drainage system. Maintenance of the storm drainage system is currently funded from other budgets, such as streets. In the past, the City has financed street and storm drainage improvements in certain areas of town through the LID process.

The City has indicated that they are interested in establishing a dedicated storm drainage funding mechanism. This is discussed further in Section 6.