City of Sherwood, Oregon
RESOLUTION NO. 90-472

A RESOLUTION ADOPTING THE CITY SANITARY SEWER PLAN UPDATE, AS PREPARED BY DAVID EVANS AND ASSOCIATES, AND DATED JANUARY 1990, DIRECTING THAT THE FINDINGS OF THIS SERVICE PLAN BE INCORPORATED INTO THE SHERWOOD COMPREHENSIVE PLAN, AND ESTABLISHING AN EFFECTIVE DATE

WHEREAS, the City of Sherwood adopted a Sewer Service Plan in 1979, and elements of that Service Plan were incorporated into the 1981 Comprehensive Plan; and

WHEREAS, in the intervening years some of the assumptions of that Service Plan, specifically levels and patterns of City population growth and the extension of the existing system, have changed dramatically; and

WHEREAS, in order to adequately plan for the community in the 1990's, and to address the new factors that have emerged over the last decade, it is necessary to update the City's Sewer Service Plan, and

WHEREAS, accordingly the City commissioned the firm of David Evans and Associates to prepare a Sanitary Sewer Plan Update, said update, dated January, 1990, attached hereto as "Exhibit A".

NOW, THEREFORE, THE CITY RESOLVES AS FOLLOWS:

Section 1. Update Adopted. The 1990 Sanitary Sewer Plan Update, attached hereto as "Exhibit A", is hereby ADOPTED and shall modify the 1979 Service Plan as applicable.

Section 2. Guidelines. The findings and standards of the 1990 Plan Update shall serve, in conjunction with those still valid findings of the 1979 Plan, as the guidelines for planning sewer system capital improvements, and requiring service extensions and replacements as part of development.

Section 3. Periodic Review. The findings and standards of the 1990 Plan Update shall be incorporated into the Periodic Review of the Sherwood Comprehensive Plan, scheduled to be complete in March 1991.

Section 4. Effective Date. This Resolution shall become effective upon approval and adoption.

Duly passed by the City Council on Sept 26, 1990.

Attest:

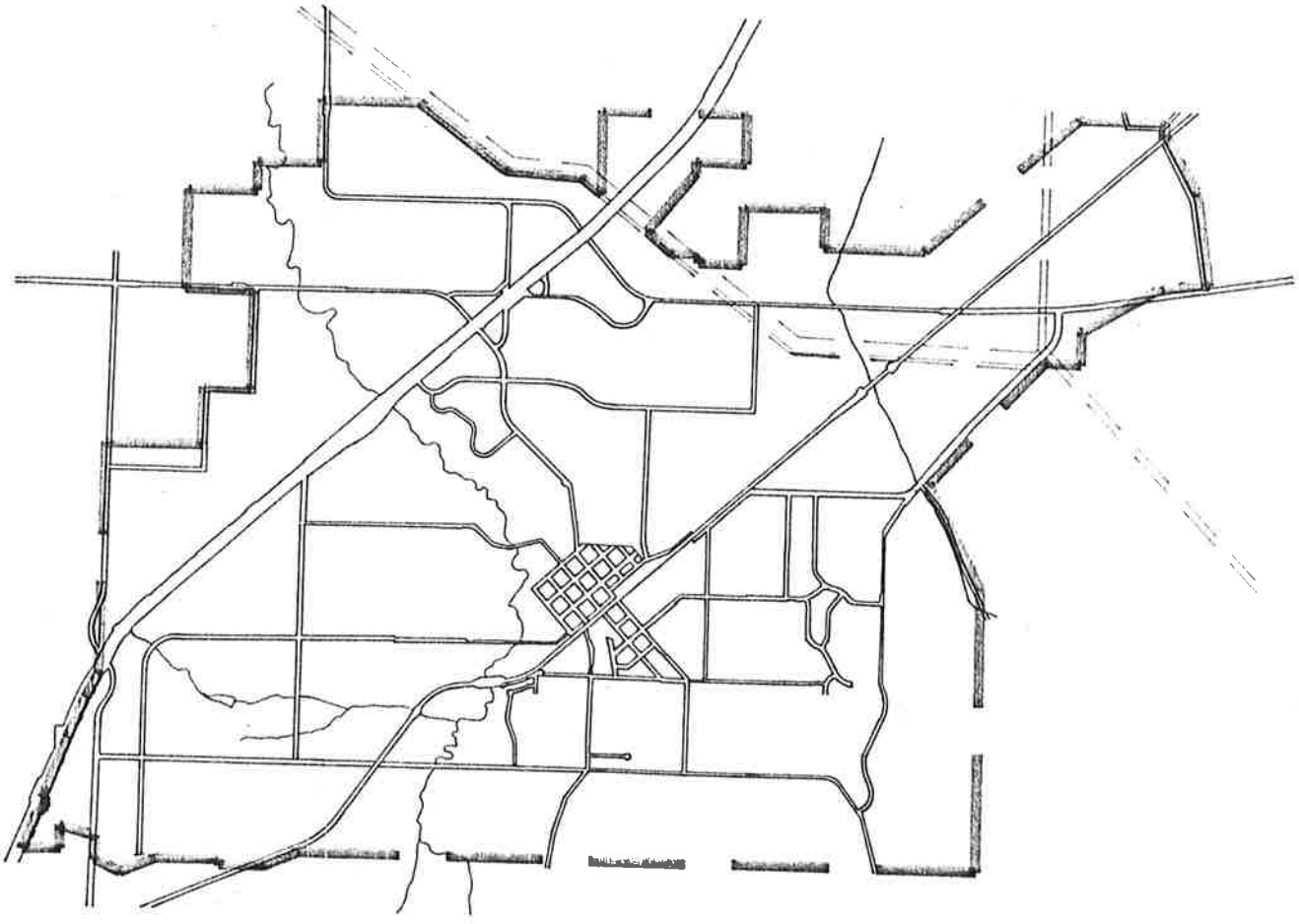
Polly Blankenbaker,
City Recorder

Norma Jean Oyler, Mayor

City of Sherwood

SANITARY SEWER PLAN UPDATE

January 1990



DAVID EVANS AND ASSOCIATES, INC.
2828 S.W. CORBETT AVENUE
PORTLAND, OREGON 97201
(503) 223-6663

January 19, 1990

SHW020

Mr. Jim Rapp
City Manager
City of Sherwood
90 N.W. Park Street
Sherwood, Or 97140

RE: SANITARY SEWER SERVICE PLAN UPDATE

Dear Jim:

David Evans and Associates, Inc. (DEA) is pleased to have prepared this SANITARY SEWER SERVICE PLAN UPDATE for the City of Sherwood. This is an update to the Sanitary Sewer Service Plan Element of the Sherwood Comprehensive Plan dated July, 1979.

Design and analysis considerations have changed substantially since the 1979 Sewer Service Plan. The updated 1985 Unified Sewerage Agency's (USA) Master Plan presents design data and methodology that differs from the 1979 Sewer Plan. These design differences along with population growth and upgrades to the City's sewer system warrant an upgrade to the 1979 Sewer Service Plan.

In this update the City's existing sewer lines are analyzed for their ability to convey peak flows. These peak flows are conservatively based on full-development of the Sherwood Urban Growth Boundary (UGB).

No improvements are required to convey current peak flows. Specific improvements are recommended to the existing system in order to convey full-development flows. These improvements occur in the Rock Creek basin and the Cedar Creek basin trunk lines. The estimated cost of these improvements is $1,222,300.00 in 1990 dollars.

The major sewer lines required for expansion into areas without current service are identified and their costs are estimated to be $1,189,000.00 in 1990 dollars. It is recommended that an 8-inch diameter be the minimum size for all new extensions. These costs are typically paid for by the land development that create the need for sewer extensions. There is no particular priority to the improvements except to serve those who require the sewer service.

DAVID EVANS AND ASSOCIATES, INC.
ENGINEERS, SURVEYORS, PLANNERS, LANDSCAPE ARCHITECTS, SCIENTISTS
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2828 S.W. CORBETT AVENUE
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In summary, the City of Sherwood's sanitary sewer system can adequately handle full-development of the City's UGB with improvements to the two basin trunk lines.

Very truly yours,

DAVID EVANS AND ASSOCIATES, INC.

Anthony O. Righellis
Vice President

AOR:aep

CITY OF SHERWOOD
SANITARY SEWER SERVICE PLAN UPDATE

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PURPOSE AND SCOPE OF SEWER SERVICE PLAN UPDATE

This report is an update to the Sewer Service Plan Element of the Sherwood Comprehensive Plan dated July, 1979. The population projections are conservatively based on full development of the City of Sherwood's Urban Growth Boundary (UGB).

The City's existing sewer lines are analyzed for their ability to convey future peak flows. These peak flow rates were calculated assuming full-development of the entire UGB based on current land use designations, contributing basin sizes and the Unified Sewerage Agency's (USA) design criteria.

Improvements are recommended to eliminate deficiencies in the existing system. Each recommended improvement is prioritized by need and the cost of the recommended improvements are listed in 1989 dollars.

New sewer lines have been sized and located in order to expand the existing sewer system to areas of the City currently without service. The construction cost of each of these improvements has been estimated.

EXISTING SEWER SYSTEM

The City of Sherwood's existing sewer system is as shown on Figure 2. The system is located in USA's Durham South Basin which consists of two sub-basins, the Sherwood sub-basin and the Onion Flat sub-basin. These two sub-basins are centered around Cedar Creek and Rock Creek, respectively, and will be referred to as the Cedar Creek basin and the Rock Creek basin through out the remainder of this report.

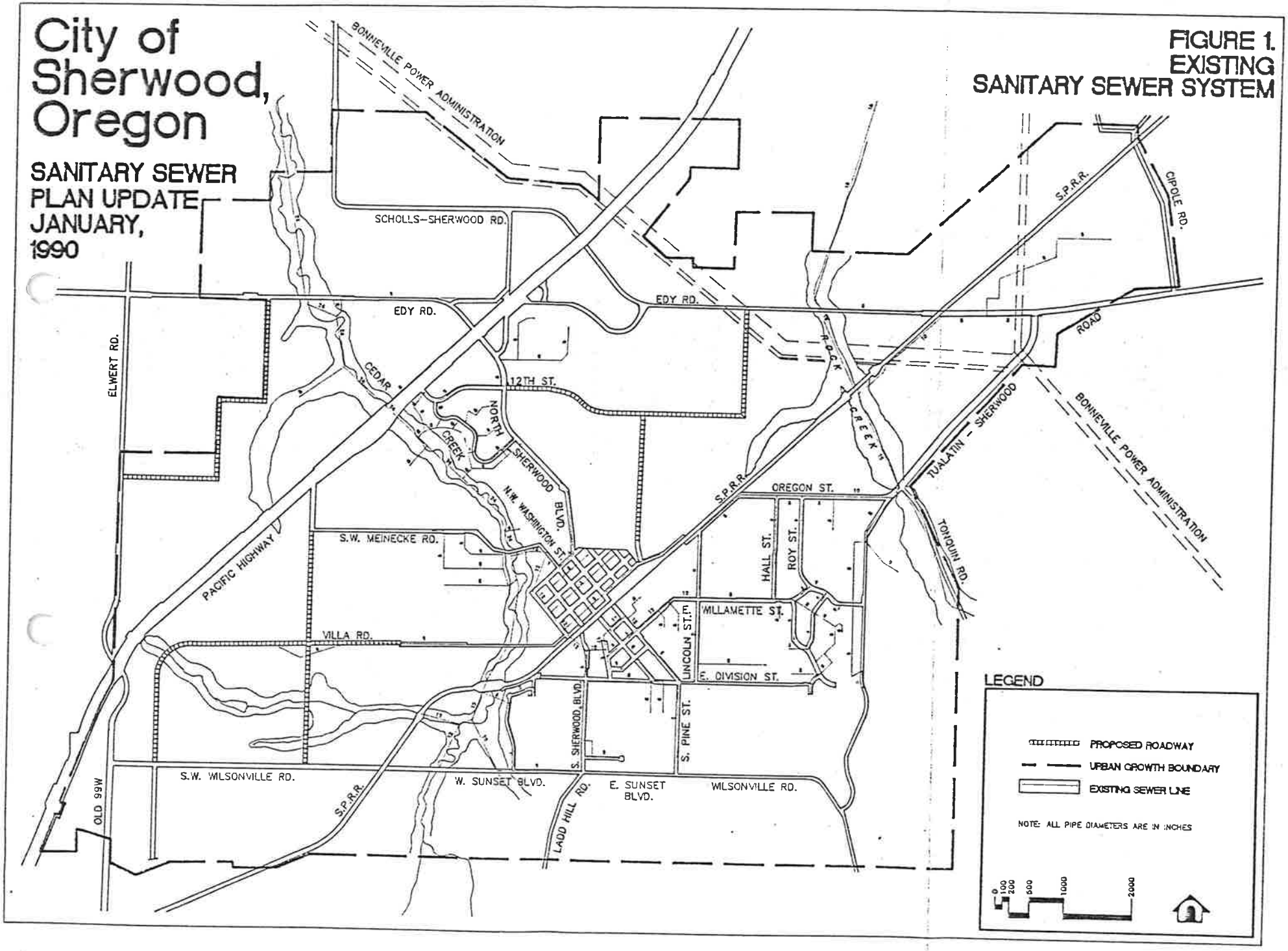
The Rock Creek Basin system currently serves a residential area bounded by Lincoln Street to the west, West Sunset Boulevard to the south, Oregon Street to the north and the UGB to the east. Rock Creek Basin also contains approximately 7.2 acres of land, north of Oregon Street, which is currently zoned and developed for industrial use. The remaining northern portion of the Basin is essentially undeveloped and zoned primarily for industrial use. Flow is by gravity from south to north, eventually connecting to USA's Rock Creek trunk. This trunk then follows Rock Creek until it connects with the Upper Tualatin Interceptor which transports sewage to the Durham treatment plant.

The Cedar Creek Basin system serves the majority of Sherwood. Drainage is again from south to north and the main trunk of the system follows Cedar Creek from Sunset Boulevard under Pacific Highway continuing north until it connects with the Upper Tualatin Interceptor. From this point sewage is transported to the Durham Treatment plant.

City of Sherwood, Oregon

SANITARY SEWER PLAN UPDATE JANUARY, 1990

FIGURE 1. EXISTING SANITARY SEWER SYSTEM



ANALYSIS OF EXISTING SEWER SYSTEM

The population for the City of Sherwood in the year 2008 is estimated to be 7,000 people. The 1979 Sewer Service Plan estimated a population of 10,600 people in the year 2008, and a full-development population within the Sherwood Urban Growth Boundary (UGB) of 18,900 people.

In order to accentuate any deficiencies in the existing sanitary sewer system, peak flowrates were generated based on full development or saturation of the Sherwood UGB. This analysis was used for the following reasons. Maximum design flows for sanitary sewers are far less than peak storm sewer flows. Very often sanitary sewer pipes are sized at a minimum 8-inch diameter for maintenance purposes; consequently the majority of these pipes are flowing at a minimum of their capacity. A full-development demand analysis was the most conservative and efficient way of analyzing the system for all deficiencies.

Wastewater flow criteria for the analysis was taken from USA's 1985 Master Sewer Plan Update and is based on land use designation as listed below:

TABLE 1
WASTEWATER FLOW DESIGN CRITERIA

LAND USE DESIGNATION	DESIGN UNIT FLOW RATE EXISTING	FUTURE
RESIDENTIAL	75 gpcd	75 gpcd
COMMERCIAL	1000 gpad	1000 gpad
INDUSTRIAL	3000 gpad	3000 gpad
INSTITUTIONAL	500 gpad	500 gpad
PEAK ANNUAL INFILTRATION/INFLOW	4000 gpad	4000 gpad

The City of Sherwood's Zoning Map was used to determine the amount of acreage of each land use designation. This acreage was then applied to tributary basins contributing to their respective sewers and multiplied by the appropriate land use design unit flow rate in order to generate the total design flowrate. An average of residential densities per tributary basin was used to account for the five different residential zoning densities shown on the current City Zoning Map.

The domestic sewage flow allowance for the 1979 Sewer Plan followed the 1969 USA Master Plan value of 90 gallons per capita per day (gpcd). The updated, June 1985 USA Master Plan, has reduced this value to 75 gpcd.

In order to account for periods of maximum use, flowrates are multiplied by factors which result in peak flowrates. The 1979 Sewer Service Plan used peak factors of 3.0 for lateral sewers and 2.7 for trunk sewer lines. The 1985 USA Master Plan Update requires peak factors ranging from 1.5 to 2.0. These lower values are based on actual dry-weather flow monitoring, performed in June and July of 1984, at points throughout the Durham Basin.

The July 1979 Sewer Service Plan used values ranging from 500 gallons per acre per day (gpad) to 700 gpad for inflow and infiltration (I&I), depending on land use designation. These values were concurrent with past EPA design standards and were based on the assumption that rehabilitation measures would remove 60 to 90 percent of excessive I&I. According to USA's 1985 Master Plan these abatement techniques proved to be ineffective. USA's review of the and Durham treatment facility led to the design rate of 4000 gpad for the existing peak annual occurrence for infiltration and inflow. This value is not anticipated to decrease for the Durham basin and is therefore also used for the future design flowrates.

Two areas of special concern exist inside the current City of Sherwood UGB. Both areas are recent additions to the UGB and have not yet been assigned a land use. Rather than assume zoning designations for the areas they were both excluded from the model. Both areas can be served by gravity and neither will cause deficiencies in the system. Their service routes are discussed below.

The first area is located in the southwest corner of the UGB in the Cedar Creek Basin, between Pacific Highway and Old Highway 99W. This area can be served by line number 1 in area A (Fig. 3). The northern half of this area may also be served by connecting to the southern most extension of line number 2 in area B. The second area is located east of Pacific Highway and north of Edy Road, in the Rock Creek Basin. The southern portion Should be incorporated in line number 3 extending from Rock Creek west along Edy Road (Fig. 3). The northern half must be served using a direct lateral to the area from the Rock Creek trunk.

DESIGN CRITERIA

The calculations used in the sewer system analysis are presented below:

$$Q_{Total} = Q_R + Q_i + Q_A$$

Where:

Q_{Total} Is the maximum flow each sewer is designed to convey; measured in gallons per day (gpd) and converted to cubic feet per second (CFS).

Q_R Is the peak flow generated from residential zoning areas only, and is calculated as follows:

Q_R = (service area, acres) x (residential zoning density, dwelling units per acre, DU/AC) x 75 gallons per person per day x (2.5 capita per unit) x (peaking factor).

Q_i Is the flow from infiltration and inflow and is calculated as follows:

Q_i = (service area, acres) x (infiltration unit flow rate, Table 1).

Q_A Is the flow developed from added zoning in a given service area other than residential. The remaining zoning types and their unit flow rates are shown in Table 1.

Q_A = (service area) x (zoning unit flow rate, Table 1) x (peaking factor)

The results of the analysis are presented in Tables 2 and 3. The primary sewer or trunk of each tributary is listed and a flowrate is calculated based on the above design parameters and an existing slope. The final two columns in each table list the required diameter, based on full development peak flow rates, and then the existing diameter of the pipe.

RECOMMENDED IMPROVEMENTS TO EXISTING SEWER SYSTEM

The analysis of the of the existing system shows no size deficiencies in any of the City maintained pipes. City officials have confirmed that there are no areas of surcharge in the system due to pipe under sizing. Surcharge due to blockage of the system has occurred but has since been remedied.

Improvements are recommended to the existing sewer systems main trunk lines. These improvements are required due to very slight slopes which occur in the northern sections of the Rock Creek and Cedar Creek main trunk lines.

The Rock Creek trunk requires improvements from manhole number 11663, which is located at the confluence of the Rock Creek and Cedar Creek trunk lines, south to a manhole located near the Southern Pacific crossing of Rock Creek.(see Fig.4) The existing 18-inch diameter pipe has a length of 6,035 feet and an existing slope of 0.0031 feet/feet. The USA master plan recommends that a 15-inch diameter pipe be placed parallel to the existing 18-inch in order to convey future flows based on 20-year ultimate development peak flowrates. Our analysis is based on total ultimate development of the Sherwood UGB and therefore suggests that an 18-inch diameter pipe parallel the existing 18-inch at the existing slope of 0.0031 feet/feet.

The Cedar Creek Trunk presents similar slope problems along the northern trunk. USA's Master Plan breaks these into three sections but this report will combine them for simplicity. The section of sewer begins at manhole 11663, which is located at the confluence of the Rock Creek and Cedar Creek trunks, and continues south to manhole number 11752 which is 200 feet south of Edy Road and slightly west of the UGB.(see Fig.1) The entire 12,640 feet of this line is outside of the UGB, and has a slope averaging between 0.0016 feet/feet and 0.0025 feet/feet. Depending on existing slopes a parallel system will be required ranging from 18 to 30-inches in diameter.

ROCK CREEK BASIN IMPROVEMENT COSTS

Pipe Size	Unit Cost	Linear Feet	Cost
18 Inch	$50/Linear Foot	6750	$337,500

CEDAR CREEK BASIN IMPROVEMENT COSTS

Pipe Size	Unit Cost	Linear Feet	Cost
15 to 30 Inch	$70/Linear Foot (average)	12,640	$884,800

City of Sherwood, Oregon

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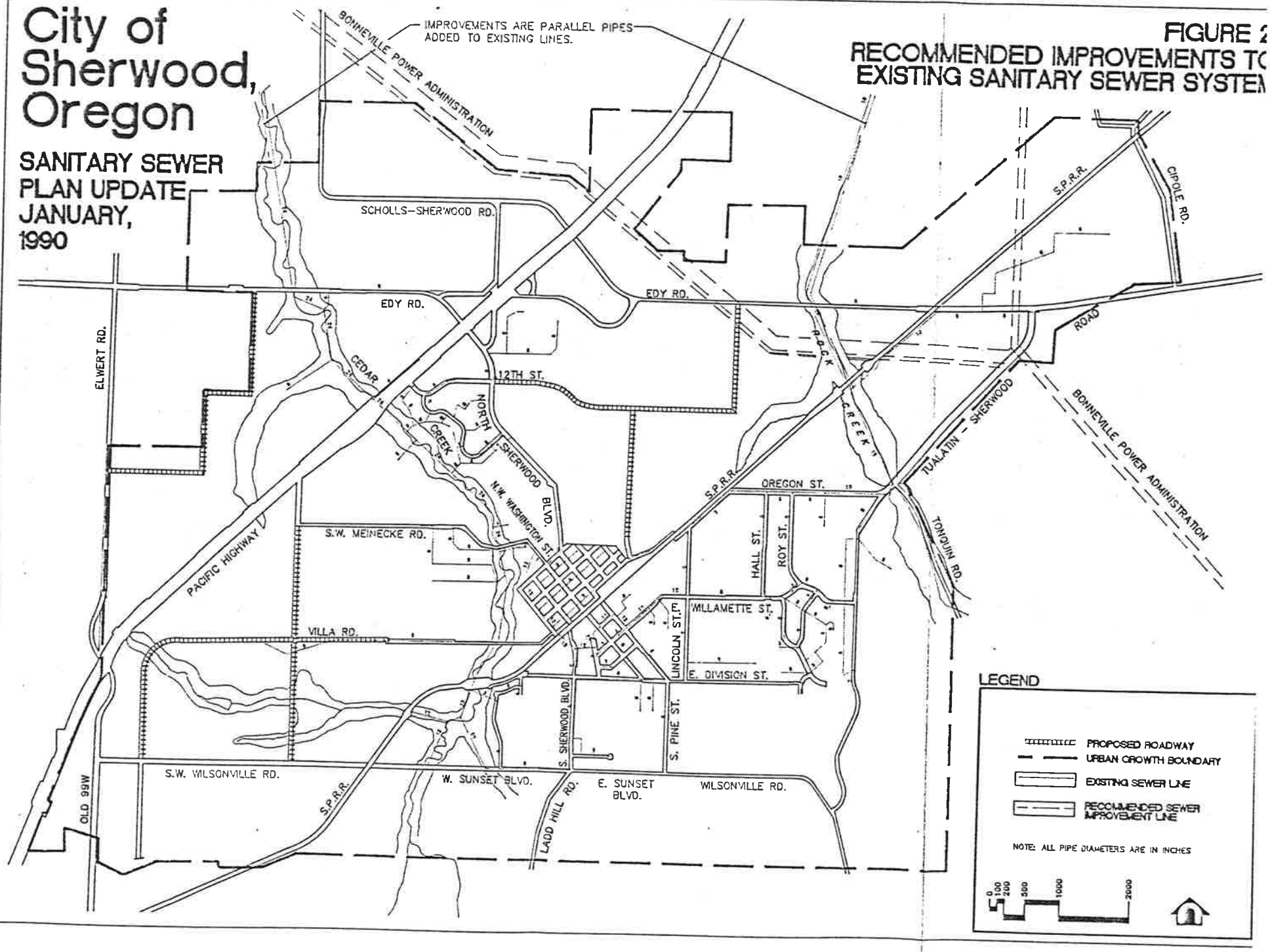

FIGURE 2
RECOMMENDED IMPROVEMENTS TO EXISTING SANITARY SEWER SYSTEM

RECOMMENDED SEWER SYSTEM EXPANSION

The City of Sherwood's Urban Growth Boundary includes significant areas that are currently not served by the existing sanitary sewer system. All of these areas are part of either the Rock Creek Basin system or the Cedar Creek Basin system and can be easily served by extending laterals off the respective trunk lines of each basin. These new laterals have no special priority except to serve those who require sewer service. The locations of the recommended sewers are shown on figure 4.

All new sewer lines should have a minimum diameter of 8-inches for ease of serviceability. These new laterals were designed by setting the slope of the sewer pipe invert, equal to the slope of the existing ground along the sewer line path. Individual pipe slopes may be required to be less than natural ground slopes in order to serve isolated areas of low ground elevation.

The sewer expansions are listed below under the basin in which they occur. The costs are listed by pipe diameter and are in 1989 dollars. These costs are typically paid for by the land developments that create the need for the extensions. The costs include design and construction. Land acquisition may be required but those costs are not included in the estimates below.

ROCK CREEK BASIN EXPANSION COSTS

	Pipe Size	Unit Cost	Linear Feet	Cost
1	8 Inch	$30/Linear Foot	1,400	$102,000
2	8 Inch	$30/Linear Foot	3,000	$ 90,000
3	8 Inch	$30/Linear Foot	2,300	$ 69,000
4	8 Inch	$30/Linear Foot	5,000	$150,000
5	8 Inch	$30/Linear Foot	2,900	$ 87,000
	Total Cost in 1989 Dollars			$498,000

CEDAR CREEK BASIN EXPANSION COST

	Pipe Size	Unit Cost	Linear Feet	Cost
1	10 Inch	$35/Linear Foot	4,100	$143,500
2	12 Inch	$40/Linear Foot	650	$ 26,000
	10 Inch	$35/Linear Foot	4,100	$143,500
3	8 Inch	$30/Linear Foot	1,300	$ 39,000
4	8 Inch	$30/Linear Foot	3,500	$105,000
5	8 Inch	$30/Linear Foot	1,200	$ 36,000
6	8 Inch	$30/Linear Foot	3,100	$ 93,000
7	8 Inch	$30/Linear Foot	3,500	$105,000
		Total Cost in 1989 Dollars		$691,000

City of Sherwood, Oregon

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FIGURE 3. RECOMMENDED MAJOR SEWERLINE EXPANSION

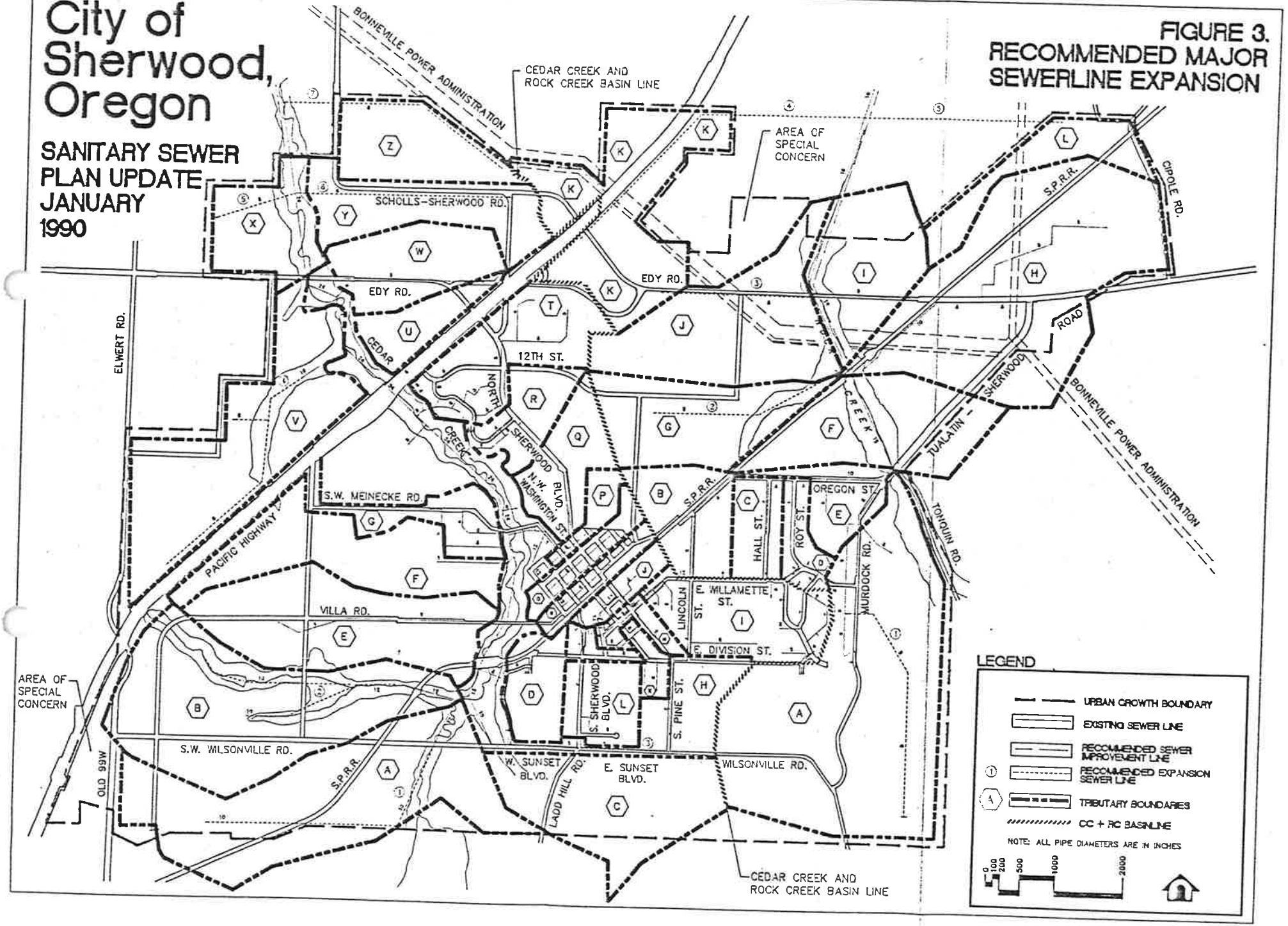

FIGURE 4.
USA BASIN MAP

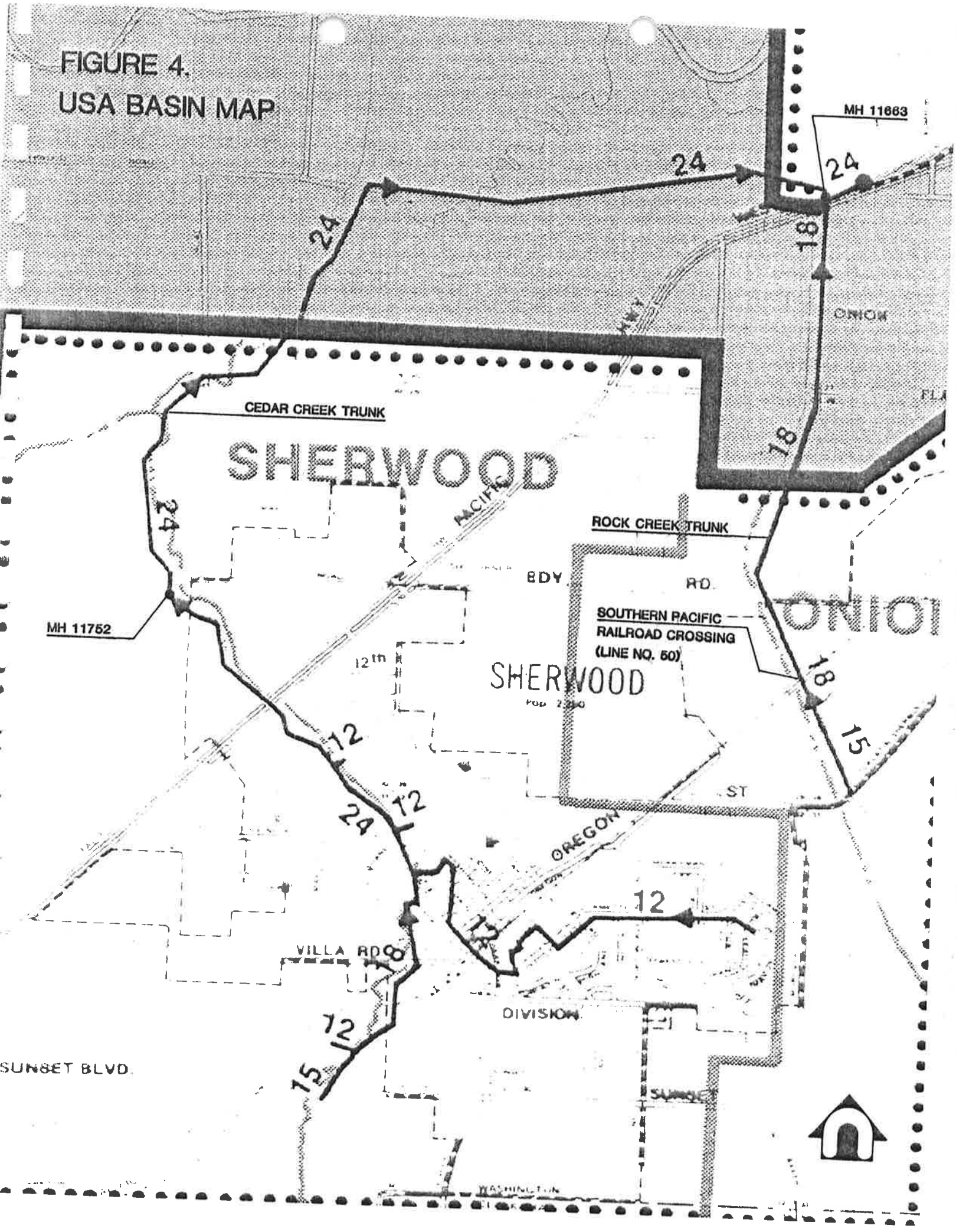

TABLE 2

CEDAR CREEK BASIN

TRIBUTARY	RESIDENTIAL				INFILTRATION AND INFLOW		NON-RESIDENTIAL									
	RESI-DENTIAL UNITS	CAPITA PER UNIT	LOADING GPCD	P.F.	I/I GPAD	TRIBUTARY ACREAGE	ADDED ZONING GPAD	ADDED ZONING ACERAGE	P.F	ADDED ZONING GPD	FLOW-RATES GPD	FLOW-RATES CFS	SLOPE	REQ'D DIAM. (IN)	EXIST. DIAM. (IN)
CEDAR CREEK LATERAL	50	2.5	75	2	4000	182	3000	131.8	2	790800	1537550	2.368	0.037	8.03	12
CEDAR CREEK LATERAL	670	2.5	75	2	4000	158.98	0	0	2	0	887170	1.366	0.011	8.20	12
WEST SUNSET	631	2.5	75	2	4000	127.27	0	0	2	0	745705	1.148	0.022	6.75	8
MAIN TRUNK	1351	2.5	75	1.5	4000	468.25	3000	131.8	1.5	593100	2846068.75	4.383	0.022	11.15	15
ST. CHARLES STREET	420	2.5	75	2	4000	54.57	0	0	2	0	375780	0.579	0.022	5.22	8
CEDAR CREEK LATERAL	561	2.5	75	2	4000	114.36	0	0	2	0	667815	1.028	0.0465	5.62	8
C EDAR CREEK LATERAL	290	2.5	75	2	4000	83.46	500	44.25	2	44250	486840	0.750	0.02	5.85	8
MEINEKE RD.\TRAVIS CT	166	2.5	75	2	4000	33.58	0	0	2	0	196570	0.303	0.021	4.13	8
JTH PINE STREET	184	2.5	75	2	4000	36.77	0	0	2	0	216080	0.333	0.013	4.68	6
WILLAMETTE STREET	354	2.5	75	2	4000	59.01	0	0	2	0	368790	0.568	0.016	5.50	12
COLUMBIA STREET	0	2.5	75	2	4000	17.69	3000	17.69	2	106140	176900	0.272	0.01	4.56	8
SCHAMBURG DRIVE	38	2.5	75	2	4000	7.5	0	0	2	0	44250	0.068	0.05	2.01	6
S. SHERWOOD BLVD.	254	2.5	75	2	4000	36.7	500	5	2	5000	247050	0.380	0.021	4.50	8
PARK ROW	44	2.5	75	2	4000	4	0	0	2	0	32500	0.050	0.04	1.86	
OREGON STREET	0	2.5	75	2	4000	10.33	3000	10.33	2	61980	103300	0.159	0.01	3.73	8
FIRST AND SECOND ST.	0	2.5	75	2	4000	13.4	1000	13.4	2	26800	80400	0.124	0.013	3.23	8
SECOND AND THIRD ST	170	2.5	75	2	4000	15.41	0	0	2	0	125390	0.193	0.013	3.82	8
NORTH SHERWOOD	0	2.5	75	2	4000	38.72	500	38.72	2	38720	193600	0.298	0.005	5.37	8
CEDAR CREEK TRUNK	2788	2.5	75	1.5	4000	754.22				626287.5	4427292.5	6.818	0.01	15.25	18
CEDAR CREEK TRUNK	1044	2.5	75	1.5	4000	239.53				178980	1430725	2.203	0.05	7.38	12
CEDAR CREEK TRUNK	3832					993.75					5858017.5	9.021	0.01	16.94	24
GLENEAGLE AND 10TH ST.	360	2.5	75	2	4000	36.03	0	0	2	0	279120	0.430	0.015	5.01	8
NORTH MEINEKE ROAD	281	2.5	75	2	4000	52.6	0	0	2	0	315775	0.486	0.022	4.89	8
TWELFTH STREET	0	2.5	75	2	4000	72.13	1000	70.7	2	141400	429920	0.662	0.008	6.63	8
NE PACIFIC HIGHWAY	270	2.5	75	2	4000	35.56	1000	8.9	2	17800	261290	0.402	0.06	3.77	8
NW PACIFIC HIGHWAY	1116	2.5	75	2	4000	130.9	0	0	2	0	942100	1.451	0.02	7.50	0
EDI OAD	0	2.5	75	2	4000	59.41	1000	56.88	2	113760	351400	0.541	0.016	5.40	8
CEDAR CREEK LATERAL	107	2.5	75	2	4000	49.5	0	0	2	0	238125	0.367	0.02	4.48	
CHICKEN CREEK LATERAL	690	2.5	75	2	4000	80	500	4	2	4000	582750	0.897	0.02	6.26	0
CHICKEN CREEK LATERAL	460	2.5	75	2	4000	53					384500	0.592	0.02	5.36	0
MAIN CREEK	4473	2.5	75	1.5	4000	1065.88				1012987.5	6534538.75	10.063	0.005	20.10	24
MAIN TRUNK TOTAL	7116	2.5	75	1.5	4000	1474.25				1114657.5	9013032.5	13.880	0.0019	27.18	24

TABLE 3

ROCK CREEK BASIN

TRIBUTARY	RESIDENTIAL				INFILTRATION AND INFLOW	NON-RESIDENTIAL									
	RESI-DENTIAL UNITS	CAPITA PER UNIT	LOADING GPCD	P.F.	I/I GPAD	ACREAGE	ADDED ZONING GPAD	ACREAGE	P.F.	ADDED ZONING GPD	FLOW-RATES GPD	FLOW-RATES CFS	SLOPE	REQ'D DIAM. (IN)	EXIST. DIAM. (IN)
A MURDOCK ROAD	1330	2.5	75	2	4000	266	3000	0	2	0	1562750.00	2.41	0.03	8.40	8
B LINCOLN STREET	260	2.5	75	2	4000	41	3000	15	2	90000	351500.00	0.54	0.037	4.62	8
C HALL STREET	168	2.5	75	2	4000	24		0		0	159000.00	0.24	0.028	3.61	8
D ROY STREET	100	2.5	75	2	4000	20		0	2	0	117500.00	0.18	0.022	3.37	8
E PACIFIC STREET	216	2.5	75	2	4000	29	3000	2	2	12000	209000.00	0.32	0.016	4.44	8
(B-E) OREGON STREET	744	2.5	75	1.5	4000	114	3000	17	1.5	76500	741750.00	1.14	0.016	7.15	10
F ROCK CREEK	0	2.5	75	2	4000	77	3000	38	2	0		0.00			
(A-F) ROCK CR. TRUNK	2074	2.5	75	1.5	4000	457	3000	55	1.5	228000	536000.00	0.83	0.02	6.07	8
G FUTURE LINE	420	2.5	75	2	4000	78		0	2	247500	2658812.50	4.09	0.02	11.06	15
H ROCK CREEK(8"-10")	0	2.5	75	2	4000	200	3000	163	2	0	469500.00	0.72	0.01	6.57	0
I E DY RD LAT.2	0	2.5	75	2	4000	65	3000	55	2	978000	1778000.00	2.74	0.02	9.51	10
EDY ROAD LATERAL	675	2.5	75	2	4000	177	2164	67	2	330000	590000.00	0.91	0.02	6.29	8
A-H EDY ROAD LATERAL	2494	2.5	75	1.5	4000	735	3000	218	1.5	289976	1251101.00	1.93	0.02	8.34	0
A-J ROCK CR.EEK	3169	2.5	75	1.5	4000	997	2835	340	1.5	981000	4869937.50	7.50	0.0031	19.69	18
K FUTURE LINE	264	2.5	75	2	4000	44		0		1445982	6325131.25	9.74	0.0031	21.72	18
L FUTURE LINE	0	2.5	75	2	4000	62	1000	42	2	0					
A-L TRUNK TOTAL	3433	2.5	75	1.5	4000	1103	2633	382	1.5	84000	332000.00	0.51	0.02	4.72	0
										1508709	6886240.25	10.60	0.0031	22.42	18