RESOLUTION NO. 943-R

RESOLUTION ESTABLISHING/IMPOSING STORM WATER IMPROVEMENT CHARGES.

WHEREAS, Ordinance No. 574 establishes authority to set storm water development charges; and

WHEREAS, Council policy is to review fees and charges by separate resolution at least once each fiscal year; and

WHEREAS, Oregon State statute requires that system development charges be a true reflection of the cost for capital system improvements; and

WHEREAS, staff has conducted a review and analysis to establish storm water system development charges.

WHEREAS, the City of Troutdale contains two primary watersheds known as the "North Troutdale Watershed and the "Sandy River Watershed".

NOW, THEREFORE, BE IT RESOLVED BY THE COMMON COUNCIL OF THE CITY OF TROUTDALE THAT:

1) The storm water system development charge shall be set at $331.00 per equivalent resident unit for the North Troutdale Watershed (Exhibit "A"). The system development charge shall equate to $ .1226 per square foot of impervious surface area for this zone.

2) The storm water system development charge shall be set at $327.00 per equivalent residential unit for the balance of fiscal year 1990-91 for the Sandy River Watershed (Exhibit "B"). The system development charge shall equate to $.1212 per square foot of impervious surface area for this zone.

3) An equivalent residential unit shall be set in Troutdale at 2,700 square feet of imperious surface area for all watershed areas.

4) The Halsey storm water LID area has no identified benefitting capital projects and no system development charges are currently set.

5) All storm water system development charges shall be deposited in the "Storm Water Improvement Fund" established by this and previous resolutions.

6) Methodology as outlined in Exhibits A & B for calculation of storm water system development charges are hereby made a part of this resolution.

7) Capital projects determined to be necessary for storm water discharge capacity shall be those projects identified by Troutdale's Storm Water Management Master Plan and referenced in Exhibits A & B of this resolution.

ADOPTED BY THE COMMON COUNCIL OF THE CITY OF TROUTDALE THIS 25th DAY OF FEBRUARY, 1992.

YEAS: 4
NAYS: 1 (Fowler)
ABSTAINED: 0

Sam K. Cox

Sam K. Cox, Mayor

Dated: February 26, 1992

ATTEST:

Valerie J. Raglione

Valerie J. Raglione, CMC
City Recorder

D:\SDCSTORM

EXHIBIT "A"

CITY OF TROUTDALE

Drainage System Development Charge (SDC) Analysis
for the

North Troutdale Watershed

Prepared By
Oakley Engineering, Inc.
1991 N. Jantzen, #M39
Portland, OR 97217
(503) 289-7411

In Association with
Public Financial Management, Inc.

January 16, 1991

CITY OF TROUTDALE

Drainage System Development Charge (SDC) Analysis
for the
North Troutdale Watershed

January 16, 1991

INTENT

This report is intended to provide the City of Troutdale with the analytical basis for implementing a cost recovery program for the drainage capital improvements required in the North Troutdale watershed. Towards this goal, this report will summarize the drainage capital improvements which are anticipated to accommodate future development and will present a method for apportioning these costs to new development. Finally, these charges will be calculated on a "per unit" basis so that the burden to property owners and developers can be appropriately considered.

This report serves to document the first of two phases of analytical work, which is cost recovery of future capacity costs for the North Troutdale watershed. The second phase of work, which will be documented in a second report, will consider capital improvement cost recovery for the gravity flow (non-pumped) portion of the Troutdale watershed. This second report will also consider cost recovery in the form of periodic User Fees for the entire City watershed for storm drainage operations and maintenance (O&M) and for capacity upgrades to meet existing requirements.

Preparation of this present report has been accelerated to respond to the development interest within the North Troutdale watershed and to utilize the results of the "North Troutdale Drainage Master Plan", by David J. Newton Associates, Inc., March 1990.

Combined with the second phase of work as discussed above, this report will provide a comprehensive methodology for the entire City watershed for both O&M and capital improvement cost recovery. Together, these two phases of financial analysis will accomplish Action Recommendation #5 of the North Troutdale Drainage Master Plan which recommends that a detailed drainage utility feasibility analysis be prepared.

THEORETICAL BASIS FOR SYSTEM DEVELOPMENT CHARGES

As land is developed, porous ground surfaces such as forests, fields, and agricultural lands are partially, or completely, converted to impervious surfaces such as driveways, rooftops, parking lots, etc. The storm water runoff from a site can increase as much as five times in terms of both peak flow and total volume from this conversion to impervious area.

Development, therefore, creates the need for larger downstream drainage facilities. Because of this relationship between development and the need for additional drainage components, the costs for these drainage improvements can appropriately be recovered through one-time charges for new development. These one-time charges are generally referred to as System Development Charges or SDC's.

Ideally, the fees and charges paid by each property owner and/or developer for drainage service and improvements should reflect benefits accruing to that particular parcel. In practice, it is neither accurate nor practical to compute the precise benefit to each parcel. Instead, an appropriate method to apportion fees and charges must combine a reasonably accurate assessment of benefit with practical means of implementation. The magnitude of these SDC charges should, therefore, reflect the cost of necessary capital improvements to meet future capacity requirements and reflect the proportional impact of additional impervious area.

BASIS FOR DRAINAGE RATE ZONES

Two drainage rate zones are proposed. These are shown on Figure 1, "Proposed Drainage Rate Zones".

One zone is the "Sandy River Zone" where simple gravity drainage systems can be used to collect and discharge storm water runoff into Beaver Creek or directly into the Sandy River. No pumping systems are required.

The second zone is the "North Troutdale Zone", which includes all lands within the City which are located within, or drain into, the Sandy Drainage District. Storm water runoff from this watershed must ultimately be pumped to reach the Columbia River. The pump station is operated by Sandy Drainage District and is located next to Marine Drive near the north end of Blue Lake Road.

> NOTE: The Reynolds Aluminum plant is located within the limits of future Troutdale annexation, but drainage services to this plant site are not included in this analysis because the plant has an existing drainage system which is separate from the Sandy Drainage District's system and which discharges directly into the Columbia River.

There are significant costs in the North Troutdale Zone associated with providing adequate pumping capacity to meet the demands of future upstream development. The North Troutdale Drainage Master Plan identified $2.1 million in pump station improvements out

of $3.83 million of total capital improvement costs.

Since drainage from lands within the Sandy River Zone does not have to be pumped and since the cost of pumping in the North Troutdale Zone is large, it is recommended that recovery of the improvement costs from these two areas be considered independently. The SDC charges for the two areas would therefore be different. The SDC for each zone would reflect capital improvement costs required within the zone and anticipated increases in impervious surfaces within the zone.

MULTIPLE JURISDICTIONS

The North Troutdale Zone involves other jurisdictions. A portion of Wood Village (171 acres) lies within the headwaters of Arata Creek. Development within this area of Wood Village will impact downstream drainage facilities. Hence, participation by Wood Village in implementing SDC charges for development within this area is desireable.

The northerly portions of the North Troutdale Zone lie within the Sandy Drainage District. The Sandy Drainage District is currently responsible for providing floodplain protection services within the lowlands of their District. However, upstream development within the Cities of Troutdale and Wood Village increases the capacity needs for District facilities. Therefore, cost sharing amongst Troutdale, Wood Village, and the Sandy Drainage District for pump station capacity upgrades is recommended as a reasonable approach.

It should be noted that the cost sharing indicated in this report was discussed at the staff level during the Spring of 1990 in conjunction with the development of the North Troutdale Drainage Master Plan, but has never been formally presented, nor adopted, by the City of Wood Village or by the Sandy Drainage District. The cost sharing projections presented in this report are the consultant's recommendations. These cost sharing options are included in the analysis in order to consider the implications to SDC's in the City of Troutdale with/without participation by the City of Wood Village and with/without participation by the Sandy Drainage District.

STATUTORY REQUIREMENTS FOR SDC CHARGES

Oregon Revised Statutes Chapter 223.297 to 223.314 provides the legal framework within which local governments may impose system development charges. The SDC statute include the following key provisions:

* After July 1, 1991, any local government which has adopted a system development charge shall prepare a capital improvement plan, public facilities plan, master plan, or comparable plan which lists the capital improvements that are to be funded by the SDC revenues. The estimated cost and timing of each improvement must be included.

  NOTE: The North Troutdale Drainage Master Plan would appear to meet this requirement for the North Troutdale Zone. A drainage master plan (or similar) for the Sandy River Zone would be required prior to adoption of a SDC charge for the that zone.

* SDC's may only be used for capital improvements and for financing costs associated with those improvements. They cannot be used to recover routine operation or maintenance costs. Further, SDC's should be used only for that portion of capital improvements which are attributable to capacity increases necessitated by new development.

* SDC's must be established by an ordinance or resolution that sets forth a methodology that considers the cost of projected capital improvements needed to increase the capacity of the system to which the fee is related. The methodology must be available for public inspection.

The SDC methodology proposed below for the North Troutdale Zone is designed to satisfy the legal requirements of ORS 223.297 to 223.314. The proposed methodology includes an estimate of drainage improvement costs associated with capacity increasing improvements and a basis for the City to apportion SDC charges in order to fund the needed improvements.

COSTS OF DRAINAGE IMPROVEMENTS REQUIRED

The drainage capital improvements anticipated for the North Troutdale Zone are taken from the costs developed in the "North Troutdale Drainage Master Plan". The estimated construction cost for each project is shown in Table 8.1 of that plan.

NOTE: The Halsey Street Diversion improvement listed in the North Troutdale drainage Master Plan directs storm water out of the North Troutdale Zone and into the gravity discharge zone. Therefore, the cost of this improvement and the projected increases in impervious area within Sub-Basin B30L1 which would be serviced by this improvement are recommended to be shifted into the Sandy River Zone.

In addition to the capital improvements listed in the North Troutdale Drainage Master Plan, a $180,000 vacuum/ high pressure washer vehicle is planned for purchase by the City of Troutdale to be used cooperatively by the water, sewer, and storm utilities. For the storm drainage utility, this piece of equipments is required to maintain capacity in the system by preventing sediment build-up in the trapped style catch basins required by the Master Drainage Plan and by flushing out storm lines, particularly those with minimum slopes in the north part of the watershed. One quarter of this cost ($45,000) is attributable to storm needs in the North Troutdale watershed.

The total projected capital improvement costs for the North Troutdale Zone over a 20 year buildout period are estimated to be approximately $3.74 million in 1990 dollars. Of this amount, $111,000 is assumed to be paid by Oregon Department of Transportation (ODOT) for a pipe of increased capacity under Interstate 84 at the west interchange.

Table 1, "Cost Estimates and Benefit Allocations" of this current analysis shows the improvements needed, their total construction cost, and the portion of total construction cost which is estimated to be attributable to future capacity needs as distinguished from upgrade costs to meet current needs. This Table also shows the anticipated phasing of the improvements expressed in years forward from 1990. The right hand columns in the table show portions of the cost of each improvement recommended to be paid by City of Troutdale (together with the City of Wood Village) as distinguished from the portion recommended to be paid by the Sandy Drainage District.

Of the total $3.74 million in capital improvements, $2.70 million is considered to be attributable to future capacity improvements. It is recommended that the Sandy Drainage District be at least partially responsible for those improvements involving the pump station and/or the primary drainageways of the creek system within the District. This amount is shown on the far right hand column of Table 2 and totals $523,940. If Sandy Drainage District assumes this responsibility, then approximately $2.11 million in future capacity improvements will need to be funded by Troutdale SDC charges. If not, then the full $2.70 million for future capacity improvements will need to be recovered through SDC charges. Note that those portions of these improvements that are considered to be necessary to meet existing conditions, cannot be paid for through System Development Charges and will need to be funded through periodic User Fees instead.

IMPERVIOUS AREA DATA

A fundamental component of the drainage SDC methodology is a calculation of existing impervious area, anticipated future impervious area and the difference between the two. Table 2, "Impervious Area Estimates", is derived from data presented in Table 4.6 of the

North Troutdale Drainage Master Plan. Table 2 shows the various drainage sub-basins in the North Troutdale Zone. For each sub-basin, the total area lying within the current or future city limits of Troutdale and Wood Village is shown.

(NOTE: For consistency with the North Troutdale Drainage Master Plan, figures for that portion of Fairview lying within the Sandy Drainage District are also shown. Since these lands in Fairview lie downstream of Troutdale and wholly within the Sandy Drainage District boundaries, recovery of costs for development within this area is an isuue which is of concern only to the Sandy Drainage District and the City of Fairview and need not be considered in this analysis.)

Table 2 also estimates the current and anticipated future impervious area within each drainage sub-basin. The total impervious area within the North Troutdale Zone is expected to increase from 266 acres to 987 acres as development proceeds over the next 20 years. The 987 impervious acres within the North Troutdale Zone include assumed annexation and development lands currently outside the City but within the future defined limits of annexation.

SDC CALCULATION METHODOLOGY

Table 3, "Alternative Cost Cases", presents four alternative SDC calculation cases. Each case uses the same methodology but differs in the future capacity costs to be recovered with the SDC's and in the jurisdictional area(s) over which the calculation is made.

Case I: With SDD, and with WV:

Both Sandy Drainage District and Wood Village participate in the cost sharing. Sandy Drainage is assumed in this scenario to pay for their recommended portion of the capital improvements. Wood Village is assumed to levy an SDC charge for new development and to make the equivalent proceeds available to the City of Troutdale for needed downstream capital improvements. Negotiations with Sandy Drainage District and Wood Village should be directed towards achieving Case I.

Case II: With SDD, but without WV:

Sandy Drainage District is assumed in this scenario to participate in the cost sharing, but Wood Village is assumed to decline participation. In this

scenario, the improvement costs remain the same as in Case I, but the area to which those costs are apportioned is smaller, hence SDC costs will be slightly larger.

Case III: Without SDD, but with WV:

In this scenario, Sandy Drainage District does not participate in the funding of improvements. The SDD share of the future capacity costs is then assumed to be recovered through SDC's collected by Troutdale and Wood Village.

Case IV: Without either SDD or WV:

It is assumed in this scenario that neither Sandy Drainage District nor Wood Village participate in funding future capacity improvements. All of the improvements would still need to be constructed but the geographical area available for cost recovery of those improvements would be limited to Troutdale. This is the "worst case" of the four alternative Cases.

The "Cost Basis" line in Table 3 refers to the project costs noted in Table 1 for each jurisdictional area. In all four Cases, those project costs allocated to Troutdale/Wood Village are included. In Cases I and II, Sandy Drainage District's participation in cost sharing is assumed. In Cases III and IV, Sandy Drainage District's costs are added to the total to be recovered through SDC charges. The dollar cost (in 1990 dollars) of each of these four Cases is shown on the line called "Future Capacity Costs".

Table 3 also shows "Project Financing Costs". These financing costs need to be included in the total cost computations because SDC's can be collected only as development occurs, whereas construction of most capital improvements cannot be cost-effectively spread over a period of time. In the case of the pump station, capacity must be in place before the upstream development occurs so that sufficient capacity is continuously available. The financing costs for each of the four Cases is developed in Tables 4a, 4b, 4c, and 4d, "Project Financing Costs". Each table shows project costs occurring in the years they are anticipated. Annual cost recovery from SDC's are projected assuming a straight line rate of development over the 20 year buildout period. The SDC's in this column do not include financing costs. The table then computes the annual surplus or shortfall and identifies years when borrowing will probably be required. The amount borrowed to cover the shortfall is assumed to be financed at 7.5% over 20 years with a 2% cost of issuance. The total financing costs shown in the last column of Tables 4a, 4b, 4c, and 4d are included in Table 3 as the line labeled "Project Financing Costs".

Table 3 also shows the "Unit Basis" which indicates the area over which the costs are recovered. Cases I and III, both Troutdale and Wood Village adopt SDC's to pay for the planned future capacity improvements. In Cases II and IV, costs are recovered only from the City of Troutdale. The Unit Basis refers to the projected increase in impervious areas within the Troutdale and within Wood Village.

In the Cases where costs are recovered from both Troutdale and Wood Village (I and III), the incremental impervious area totals approximately 745 acres. In the Cases where costs are recovered only within Troutdale (II and IV), the increase totals 721 acres. These figures are derived from data in the North Troutdale Drainage Master Plan. In that plan, a "full buildout" of the watershed was assumed to occur over the next 20 years and these figures presume maximum use of all available lands. In reality, it is likely that development will not be that efficient. There will be some parcels which are under-developed and those which will not develop at all within the buildout period. Therefore, it is assumed that the actual impervious area will not increase to 100% of the estimated maximum projected in the Drainage Master Plan, but will increase to only 90% of that maximum. Applying this factor, the projected increase in impervious areas for Troutdale and Wood Village are as follows:

Troutdale	720.7 acres	@ 90% =	648.6 acres	=	28,254,597 SF
Wood Village	23.8 acres	@ 90% =	21.4 acres	=	934,545 SF

Finally, Table 3 calculates the recommended SDC per square foot of impervious area for each of the four Cases according to the following formula:

$$\frac{\text{Total Future Capacity Costs}}{\text{Incremental Impervious Square Footage}}$$

System Development Charges for various land uses are presented in Table 5, "Typical SDC Charges". This table shows SDC's for each of the four Cases for 2,700 SF of residential development which is recommended as a standard for an Equivalent Residential Unit (ERU). Assuming a worst case (Case IV), the SDC for a 2,700 SF ERU is $331. For comparison, the City of Gresham has recently adopted an System Development Charge for a 2,500 SF ERU of $525.

Because the methodology does not distinguish between alternative land uses (residential, commercial, industrial, etc.), the calculation of the SDC is simply a function of the total amount of impervious surface area for a given property. Table 5 shows typical SDC's for industrial and commercial properties of various sizes.

IMPLEMENTATION ISSUES

In implementing an SDC ordinance, the City should review at least annually the assumptions used in developing the SDC calculations and be prepared to revise its SDC charges based on changes in the assumptions used to establish the initial SDC rates. In particular, the following factors should be reviewed:

* Inflationary Impacts: The SDC charges should be indexed to some measure of inflation, such as the Consumer Price Index (CPI) or ENR data, so that the System Development Charge is able to keep pace with higher future project costs.

* Comprehensive Plan Changes: Changes in land use patterns which result in higher or lower ratios of impervious area should be monitored closely and, where necessary, the SDC should be recalculated based on the revised impervious area estimates.

* Jurisdictional Participation: The City Council may choose to adopt an interim SDC which may need to be adjusted at a later time as negotiations with other involved jurisdictional entities (Wood Village, Sandy Drainage District, ODOT) are finalized. A conservative approach would be to adopt the Case IV "worst case" SDC and modify the charge later as agreements were reached with other participating entities.

* Project Scope Changes: Most of the North Troutdale watershed is relatively undeveloped at this time. As development proceeds, listed projects may need to be altered or new projects may need to be added to meet the needs of this development. A specific possibility is that new storm water quality standards could be imposed which would create the need for regional water quality facilities.

* Finalization of Cost Analysis: The costs not recovered through this recommended System Development Charge will need to be recovered from a periodic User Fee. It is expected that this fee will be within the range of $2 to $3 per month per ERU. If the second phase of this analysis shows User Fees significantly outside this range, which is not expected, the SDC charge may need to be adjusted.

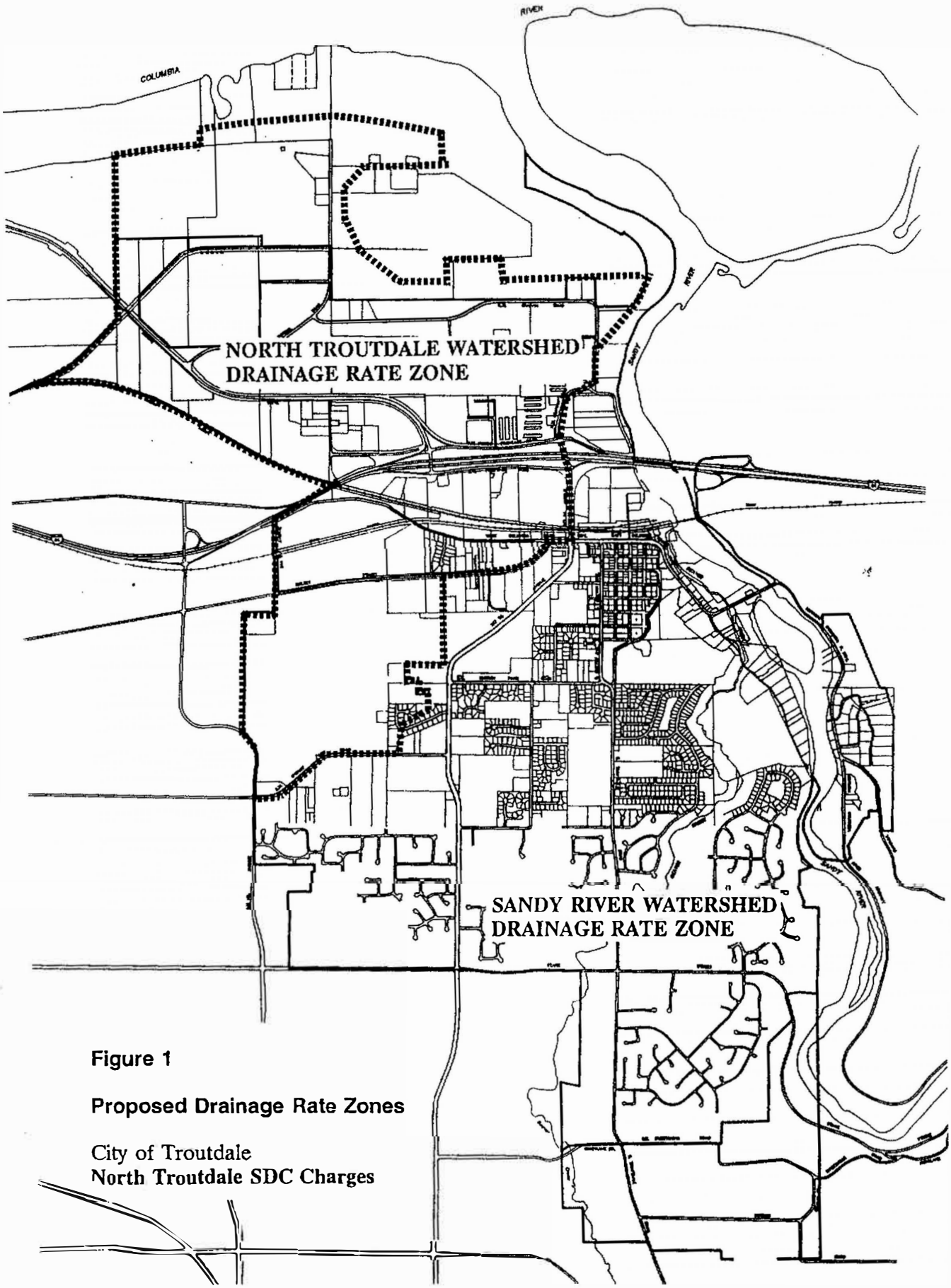

Figure 1

Proposed Drainage Rate Zones

City of Troutdale
North Troutdale SDC Charges

CITY OF TROUTDALE

Drainage SDC Charges

Table 1 January 11, 1991

Cost Estimates & Benefit Allocations

CAPITAL IMPROVEMEN PROJECTS	TOTAL ESTIMATED COST	PERCENT FUTURE BENEFIT	TOTAL FUTURE BENEFIT, $	PHASE	Recommended % Responsibility For FUTURE CAPACITY		Recommended Responsibility For FUTURE CAPACITY COSTS	
					Troutdale + WV	Sandy DD	Troutdale + WV	Sandy DD
Pump Station								
Phase 1: 50,000 gpm	$1,325,000	60%	$795,000	5 YEAR	75%	25%	$596,250	$198,750
Phase 2: 25,000 gpm	$250,000	100%	$250,000	10 YEAR	75%	25%	$187,500	$62,500
Phase 3: 40,000 gpm	$525,000	100%	$525,000	20 YEAR	75%	25%	$393,750	$131,250
Salmon Creek								
Marine Dr Culverts	$127,000	60%	$76,200	2 YEAR	100%	0%	$76,200	$0
Flood Storage Access	$25,000	50%	$12,500	2 YEAR	0%	100%	$0	$12,500
Private Crossing	$14,000	0%	$0	2 YEAR	0%	100%	$0	$0
Sundail Road Culverts	$40,000	25%	$10,000	10 YEAR	100%	0%	$10,000	$0
RR Crossing	$35,000	80%	$28,000	15 YEAR	50%	50%	$14,000	$14,000
Arata Creek								
RR Spur	$42,000	100%	$42,000	10 YEAR	50%	50%	$21,000	$21,000
Gas Line Ditch	$10,000	100%	$10,000	10 YEAR	0%	100%	$0	$10,000
Marine Dr to Sundail Rd	$480,000	75%	$360,000	5 YEAR	90%	10%	$324,000	$36,000
Columbia River Hwy	$12,500	75%	$9,375	2 YEAR	100%	0%	$9,375	$0
Wood Village Bypass	$56,000	80%	$44,800	15 YEAR	100%	0%	$44,800	$0
"B" Basin							$0	$0
Marine Drive Diversion	$542,000	70%	$379,400	2 YEAR	90%	10%	$341,460	$37,940
West I-5 Underpass	$111,000	60%	$66,600	15 YEAR	ODOT	0%	$0	$0
S. Frontage Rd Diversion	$42,000	50%	$21,000	2 YEAR	100%	0%	$21,000	$0
Columbia River Hwy	$57,500	50%	$28,750	15 YEAR	100%	0%	$28,750	$0
Capitalized Equipment	$45,000	100%	$45,000	2 YEAR	100%	0%	$45,000	$0
TOTALS	$3,739,000		$2,703,625				$2,113,085	$523,940

CITY OF TROUTDALE

Drainage SDC Charges

January 4, 1991

Table 2

IMPERVIOUS AREA ESTIMATES

	TOTAL AREA, Acres			EXISTING IMPERVIOUS	ANTICIPATED IMPERVIOUS	EXISTING IMPERVIOUS AREA, Acres			ANTICIPATED FUTURE IMP AREA, Acres		
BASIN	Troutdale	Wood Vill	Fairview	Area, %	Area, %	Troutdale	Wood Vill	Fairview	Troutdale	Wood Vill	Fairview
S-0	246.3	0.0	85.4	7%	70%	17	0	6	172	0	60
S-10	0.0	0.0	79.3	0%	45%	0	0	0	0	0	36
S-20	64.4	0.0	17.9	12%	24%	8	0	2	15	0	4
S-20R	45.5	0.0	0.0	0%	41%	0	0	0	19	0	0
S-20R1	61.0	0.0	0.0	0%	41%	0	0	0	25	0	0
S-20R2	0.0	0.0	62.4	5%	52%	0	0	3	0	0	32
S-30	96.8	0.0	0.0	20%	90%	19	0	0	87	0	0
S-40	86.8	0.0	0.0	32%	80%	28	0	0	69	0	0
A-0	93.3	0.0	0.0	9%	60%	8	0	0	56	0	0
A-10	101.2	7.5	0.0	28%	90%	28	2	0	91	7	0
A-20	33.1	9.5	0.0	2%	90%	1	0	0	30	9	0
A-30	12.1	0.0	0.0	8%	80%	1	0	0	10	0	0
A-40	0.0	13.2	0.0	65%	78%	0	9	0	0	10	0
A-50	0.0	26.4	0.0	38%	38%	0	10	0	0	10	0
A-60	47.8	0.0	0.0	10%	70%	5	0	0	33	0	0
A-60L	31.6	0.0	0.0	0%	0%	0	0	0	0	0	0
A-60L1	76.8	0.0	0.0	0%	40%	0	0	0	31	0	0
A-70	0.0	113.9	0.0	32%	40%	0	36	0	0	46	0
B-0	84.1	0.0	0.0	38%	48%	32	0	0	40	0	0
B-10	33.1	0.0	0.0	18%	80%	6	0	0	26	0	0
B-10L	38.6	0.0	0.0	90%	90%	35	0	0	35	0	0
B-10LL	52.3	0.0	0.0	30%	70%	16	0	0	37	0	0
B-20	51.4	0.0	0.0	35%	72%	18	0	0	37	0	0
B-30	23.1	0.0	0.0	20%	68%	5	0	0	16	0	0
B-30L	45.5	0.0	0.0	68%	90%	31	0	0	41	0	0
B-40	60.6	0.0	0.0	0%	80%	0	0	0	48	0	0
B-40L	21.3	0.0	0.0	22%	74%	5	0	0	16	0	0
B-50	34.5	0.0	0.0	8%	80%	3	0	0	28	0	0
B-60	43.0	0.0	0.0	3%	56%	1	0	0	24	0	0
TOTALS	1,484	171	245			266	57	11	987	81	132

Table 3

Alternative Cost Cases

	CASE I	CASE II	CASE III	CASE IV
Cost Basis:	TD + WV	TD + WV	TD + WV +SDD	TD + WV +SDD
Unit Basis:	TD + WV	TD Only	TD + WV	TD Only
Future Capacity Costs:	$2,113,085	$2,113,085	$2,637,025	$2,637,025
Project Financing Costs:	$697,698	$697,560	$821,527	$821,528
TOTAL COSTS	$2,810,783	$2,810,645	$3,458,552	$3,458,553
Estimated Full Buildout Incremental Impervious Acreage	744.5	720.7	744.5	720.7
Inefficiency of Development Correction Factor	90%	90%	90%	90%
Projected Incremental Impervious Acreage	670.1	648.6	670.1	648.6
Projected Impervious Square Footage	29,187,378	28,254,323	29,187,378	28,254,323
SDC per Square Foot	$0.0963	$0.0995	$0.1185	$0.1224
SDC per 2,700 SF ERU	$260	$269	$320	$331

NOTE: TD = City of Troutdale, WV = City of Wood Village, SDD = Sandy Drainage District
ERU = Equivalent Residential Unit with an assumed impervious area of 2, 700 SF

CASE 1

COST BASIS: TD + WV
UNIT BASIS: TD + WV

Table 4a
Project Financing Costs
North Troutdale SDC Charges

YEAR	ANNUAL PROJECT COSTS	SDC REVENUES	ANNUAL SURPLUS/ (DEFICIT)	INTERIM BALANCE	CASH FUNDING	BORROWING	FINANCING COST
SF/Year		1,459,369					
$SDC/SF		$0.0963					
1992	$269,018	$140,537	($128,481)	($128,481)	$140,537	$128,481	$126,148
1993	$224,018	$140,537	($83,481)	($83,481)	$140,537	$83,481	$81,965
1994	$0	$140,537	$140,537	$140,537	$0	$0	$0
1995	$460,125	$140,537	($319,588)	($179,051)	$281,074	$179,051	$175,800
1996	$460,125	$140,537	($319,588)	($319,588)	$140,537	$319,588	$313,785
1997	$0	$140,537	$140,537	$140,537	$0	$0	$0
1998	$0	$140,537	$140,537	$281,074	$0	$0	$0
1999	$0	$140,537	$140,537	$421,612	$0	$0	$0
2000	$109,250	$140,537	$31,287	$452,899	$109,250	$0	$0
2001	$109,250	$140,537	$31,287	$484,186	$109,250	$0	$0
2002	$0	$140,537	$140,537	$624,723	$0	$0	$0
2003	$0	$140,537	$140,537	$765,261	$0	$0	$0
2004	$0	$140,537	$140,537	$905,798	$0	$0	$0
2005	$43,775	$140,537	$96,762	$1,002,560	$43,775	$0	$0
2006	$43,775	$140,537	$96,762	$1,099,322	$43,775	$0	$0
2007	$0	$140,537	$140,537	$1,239,859	$0	$0	$0
2008	$0	$140,537	$140,537	$1,380,397	$0	$0	$0
2009	$0	$140,537	$140,537	$1,520,934	$0	$0	$0
2010	$196,875	$140,537	($56,338)	$1,464,596	$196,875	$0	$0
2011	$196,875	$140,537	($56,338)	$1,408,258	$196,875	$0	$0
TOTALS	$2,113,086	$2,810,745			$1,402,486	$710,600	$697,698

CASE II

Table 4b
Project Financing Costs
North Troutdale SDC Charges

COST BASIS: TD + WV
UNIT BASIS: TD Only

YEAR	ANNUAL PROJECT COSTS	SDC REVENUES	ANNUAL SURPLUS/ (DEFICIT)	INTERIM BALANCE	CASH FUNDING	BORROWING	FINANCING COST
SF/Year		1,412,716					
$SDC/SF		$0.0995					
1992	$269,018	$140,565	($128,453)	($128,453)	$140,565	$128,453	$126,121
1993	$224,018	$140,565	($83,453)	($83,453)	$140,565	$83,453	$81,938
1994	$0	$140,565	$140,565	$140,565	$0	$0	$0
1995	$460,125	$140,565	($319,560)	($178,994)	$281,131	$178,994	$175,745
1996	$460,125	$140,565	($319,560)	($319,560)	$140,565	$319,560	$313,758
1997	$0	$140,565	$140,565	$140,565	$0	$0	$0
1998	$0	$140,565	$140,565	$281,131	$0	$0	$0
1999	$0	$140,565	$140,565	$421,696	$0	$0	$0
2000	$109,250	$140,565	$31,315	$453,011	$109,250	$0	$0
2001	$109,250	$140,565	$31,315	$484,326	$109,250	$0	$0
2002	$0	$140,565	$140,565	$624,892	$0	$0	$0
2003	$0	$140,565	$140,565	$765,457	$0	$0	$0
2004	$0	$140,565	$140,565	$906,022	$0	$0	$0
2005	$43,775	$140,565	$96,790	$1,002,812	$43,775	$0	$0
2006	$43,775	$140,565	$96,790	$1,099,603	$43,775	$0	$0
2007	$0	$140,565	$140,565	$1,240,168	$0	$0	$0
2008	$0	$140,565	$140,565	$1,380,733	$0	$0	$0
2009	$0	$140,565	$140,565	$1,521,298	$0	$0	$0
2010	$196,875	$140,565	($56,310)	$1,464,989	$196,875	$0	$0
2011	$196,875	$140,565	($56,310)	$1,408,679	$196,875	$0	$0
TOTALS	$2,113,086	$2,811,305			$1,402,626	$710,460	$697,560

CASE III

COST BASIS: TD + WV + SDD
UNIT BASIS: TD + WV

Table 4c
Project Financing Costs
North Troutdale SDC Charges

YEAR	ANNUAL PROJECT COSTS	SDC REVENUES	ANNUAL SURPLUS/ (DEFICIT)	INTERIM BALANCE	CASH FUNDING	BORROWING	FINANCING COST
SF/Year		1,459,369					
$SDC/SF		$0.1181					
1992	$294,238	$172,351	($121,887)	($121,887)	$172,351	$121,887	$119,674
1993	$249,238	$172,351	($76,887)	($76,887)	$172,351	$76,887	$75,491
1994	$0	$172,351	$172,351	$172,351	$0	$0	$0
1995	$577,500	$172,351	($405,149)	($232,797)	$344,703	$232,797	$228,570
1996	$577,500	$172,351	($405,149)	($405,149)	$172,351	$405,149	$397,793
1997	$0	$172,351	$172,351	$172,351	$0	$0	$0
1998	$0	$172,351	$172,351	$344,703	$0	$0	$0
1999	$0	$172,351	$172,351	$517,054	$0	$0	$0
2000	$156,000	$172,351	$16,351	$533,406	$156,000	$0	$0
2001	$156,000	$172,351	$16,351	$549,757	$156,000	$0	$0
2002	$0	$172,351	$172,351	$722,109	$0	$0	$0
2003	$0	$172,351	$172,351	$894,460	$0	$0	$0
2004	$0	$172,351	$172,351	$1,066,812	$0	$0	$0
2005	$50,775	$172,351	$121,576	$1,188,388	$50,775	$0	$0
2006	$50,775	$172,351	$121,576	$1,309,965	$50,775	$0	$0
2007	$0	$172,351	$172,351	$1,482,316	$0	$0	$0
2008	$0	$172,351	$172,351	$1,654,668	$0	$0	$0
2009	$0	$172,351	$172,351	$1,827,019	$0	$0	$0
2010	$262,500	$172,351	($90,149)	$1,736,871	$262,500	$0	$0
2011	$262,500	$172,351	($90,149)	$1,646,722	$262,500	$0	$0
TOTALS	$2,637,026	$3,447,029			$1,800,307	$836,719	$821,527

CASE IV

Table 4d
Project Financing Costs
North Troutdale SDC Charges

COST BASIS: TD + WV + SDD
UNIT BASIS: TD Only

YEAR	ANNUAL PROJECT COSTS	SDC REVENUES	ANNUAL SURPLUS/ (DEFICIT)	INTERIM BALANCE	CASH FUNDING	BORROWING	FINANCING COST
SF/Year		1,412,716					
$SDC/SF		$0.1220					
1992	$294,238	$172,351	($121,887)	($121,887)	$172,351	$121,887	$119,674
1993	$249,238	$172,351	($76,887)	($76,887)	$172,351	$76,887	$75,491
1994	$0	$172,351	$172,351	$172,351	$0	$0	$0
1995	$577,500	$172,351	($405,149)	($232,797)	$344,703	$232,797	$228,571
1996	$577,500	$172,351	($405,149)	($405,149)	$172,351	$405,149	$397,793
1997	$0	$172,351	$172,351	$172,351	$0	$0	$0
1998	$0	$172,351	$172,351	$344,703	$0	$0	$0
1999	$0	$172,351	$172,351	$517,054	$0	$0	$0
2000	$156,000	$172,351	$16,351	$533,405	$156,000	$0	$0
2001	$156,000	$172,351	$16,351	$549,757	$156,000	$0	$0
2002	$0	$172,351	$172,351	$722,108	$0	$0	$0
2003	$0	$172,351	$172,351	$894,460	$0	$0	$0
2004	$0	$172,351	$172,351	$1,066,811	$0	$0	$0
2005	$50,775	$172,351	$121,576	$1,188,387	$50,775	$0	$0
2006	$50,775	$172,351	$121,576	$1,309,964	$50,775	$0	$0
2007	$0	$172,351	$172,351	$1,482,315	$0	$0	$0
2008	$0	$172,351	$172,351	$1,654,666	$0	$0	$0
2009	$0	$172,351	$172,351	$1,827,018	$0	$0	$0
2010	$262,500	$172,351	($90,149)	$1,736,869	$262,500	$0	$0
2011	$262,500	$172,351	($90,149)	$1,646,721	$262,500	$0	$0
TOTALS	$2,637,026	$3,447,027			$1,800,307	$836,719	$821,528

Table 5

Typical SDC Charges

	CASE I	CASE II	CASE III	CASE IV
Single Family Residential:				
2,700 SF	$260	$269	$320	$331
Commercial/ Multi-Family:				
10,000 SF	$963	$995	$1,185	$1,224
25,000 SF	$2,408	$2,487	$2,962	$3,060
Industrial:				
30,000 SF	$2,889	$2,984	$3,555	$3,672
43,560 SF	$4,195	$4,333	$5,162	$5,332

EXHIBIT "B"

CITY OF TROUTDALE

Drainage System Development Charge (SDC) Analysis
for the

Sandy River Watershed

Prepared By
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In Association with
Public Financial Management, Inc.

May 7, 1991

CITY OF TROUTDALE

Drainage System Development Charge (SDC) Analysis for the Sandy River Watershed

May 7, 1991

INTENT

This report is intended to provide the City of Troutdale with the analytical basis for implementing a cost recovery program for the drainage capital improvements required in the Sandy River watershed. The Sandy River watershed is that portion of the City of Troutdale which drains by gravity, directly or indirectly, into the Sandy River. This area is shown on Figure 1, "Proposed Drainage Rate Zones", as the Sandy River Watershed Drainage Rate Zone. This zone will be referred to as the Sandy River Zone in this report. Recommended drainage SDC charges for the other drainage rate zone shown (North Troutdale Watershed) were presented in our report "Drainage SDC Analysis for the North Troutdale Watershed", dated January 16, 1991 and subsequently adopted by City Council in the form of an amendment to the City's SDC ordinance.

This current report will identify drainage capital improvements which are anticipated to accommodate future development in the Sandy River watershed and will present a method for apportioning these costs to new development. Finally, these charges will be calculated on a "per unit" basis so that the burden to property owners and developers can be appropriately considered.

Analysis regarding proposed User Fees for storm drainage operations and maintenance (O&M) and for drainage improvements to meet existing capacity requirements will be addressed in a separate report to the City of Troutdale.

Preparation of this present report has been accelerated to respond to the development interest within the Sandy River watershed. The drainage improvements identified in this plan are based on a preliminary analysis of post-development drainage flows. It is recommended that a more detailed drainage analysis be performed to further refine the alignment, size, and service areas of the improvements proposed in this analysis.

THEORETICAL BASIS FOR SYSTEM DEVELOPMENT CHARGES

As land is developed, porous ground surfaces such as forests, fields, and agricultural lands are partially, or completely, converted to impervious surfaces such as driveways, rooftops, parking lots, etc. The storm water runoff from a site can increase as much as five times in terms of both peak flow and total volume from this conversion to impervious area. In many cases, this large increase in flows cannot be accommodated by prior overland flow routes.

Development, therefore, creates the need for improved downstream drainage facilities to convey this increased storm water flow. This relationship between development and the need for drainage improvements implies that the costs for these improvements should appropriately be recovered through fees levied on that new development. These fees are generally paid at the time of construction and are referred to as System Development Charges (SDC's).

Ideally, fees paid by each property owner or developer for drainage service and improvements should reflect benefits accruing to that particular parcel. In practice, it is neither possible nor practical to compute the precise benefit to each parcel. Instead, an appropriate method to apportion fees and charges must provide a reasonably accurate evaluation of benefit combined with a practical means of implementation. Since storm flows increase with the addition of new impervious area and since impervious area is typically used as a measure of impact on the drainage system, it is recommended that an SDC charge be proportional to the area of newly created impervious surfaces. The sum total of these SDC charges should equal the cost of necessary capital improvements to meet future capacity needs.

BASIS FOR DRAINAGE RATE ZONES

Two drainage rate zones are proposed. These are shown on Figure 1, "Proposed Drainage Rate Zones".

One zone is the "Sandy River Zone" where simple gravity drainage systems can be used to collect and discharge storm water runoff into Beaver Creek, Sweetbriar Creek, or directly into the Sandy River. No pumping systems are required.

The second zone is the "North Troutdale Zone", which includes all lands within the City which are located within, or drain into, the Sandy Drainage District. Storm water runoff from this watershed must ultimately be pumped to reach the Columbia River. There are significant costs ($2.1 million) in the North Troutdale Zone associated with providing adequate pumping capacity to meet the demands of future upstream development.

Because of the magnitude of this pumping cost, two separate rate zones are recommended. System Development Charge for these two zones are recommended to be computed independently. SDC rates for each zone should be a function of capital improvement costs and anticipated increases in impervious surfaces within that zone.

Included within the Sandy River Zone is approximately 104 acres of land lying outside the

current City limits, but within the future service area of the City in the vicinity of SE Sweetbriar Road and Strebin Road.

A later section of this report will also consider excluding the 306 acres which participated in the Halsey Street Storm Sewer L.I.D. from being subject the Sandy River Zone SDC charges.

STATUTORY REQUIREMENTS FOR SDC CHARGES

Oregon Revised Statutes Chapter 223.297 to 223.314 provides the legal framework within which local governments may impose system development charges. The SDC statute include the following key provisions:

* After July 1, 1991, any local government which has adopted a system development charge shall prepare a capital improvement plan, public facilities plan, master plan, or comparable plan which lists the capital improvements that are to be funded by the SDC revenues. The estimated cost and timing of each improvement must be included.

  NOTE: This report is intended to serve as an interim drainage facilities plan for the Sandy River watershed portion of the City of Troutdale.

* SDC's may only be used for capital improvements and for financing costs associated with those improvements. They cannot be used to recover routine operation or maintenance costs. Further, SDC's should be used only for that portion of capital improvements which are attributable to capacity increases necessitated by new development.

* SDC's must be established by an ordinance or resolution that sets forth a methodology that considers the cost of projected capital improvements needed to increase the capacity of the system to which the fee is related. The methodology must be available for public inspection.

The SDC methodology proposed below for the Sandy River Zone is designed to satisfy the legal requirements of ORS 223.297 to 223.314. The proposed methodology includes an estimate of drainage improvement costs associated with capacity increasing improvements and a basis for the City to apportion SDC charges in order to recover the cost of the needed improvements.

IDENTIFICATION OF DRAINAGE IMPROVEMENTS (Methodology)

The following method was used to identify, on a preliminary basis, drainage improvements which will be required in the Sandy River Zone to accommodate increased runoff from anticipated future development:

1. The existing storm drainage facility map was viewed as an overlay with a 1"=400' aerial topographic map (flight 4/10/90, topography by David C. Smith Photogrammetry). From this comparison, developed areas served by existing drainage facilities were identified. Undeveloped areas were identified directly from the aerial map and from review with City staff on recent development since the flight date.

2. The zoning designations for current undeveloped areas were identified. The location and generalized zone designations of these undeveloped areas are shown in Figure 2, "Future Development Area Map". For drainage purposes, zoning designations were categorized into Low Density Residential (R-7, R-10, and R-20), Medium Density Residential (R-5, R-4, and A-2), and Industrial/Commercial (NC, CC, GC, CBD, IP, LI, and GI). The following amounts of development land were identified (planimeter measure) in the Sandy River Zone:

CATEGORY	ACREAGE (Approx)
Low Density Residential	480.5 Acres*
Medium Density Residential	126.0 Acres
Industrial/Commercial	133.1 Acres
TOTAL DEVELOPMENT LAND	739.6 Acres**

* This figure includes approximately 104 acres of land lying outside current City limits, but within the watershed, in the vicinity of SE Sweetbriar Road and Strebin Road.

** This figure includes the Halsey Street L.I.D. "Exclusion Area" which will be discussed in a later section of this report.

3. Using the existing drainage facilities plan and the aerial topographic map, the topographical limits of drainage basins were delineated. The locations and discharge points of these drainage basins are shown in Figure 3, "Drainage Basin Map". Forty drainage basins were identified. These basins can be grouped into the following major drainage basins:

MAJOR BASIN	AREA SERVED	SIZE
S-0 Basin	257th Drive Corridor	565.3 A.
D- Basin	Downtown, Troutdale Rd, & 262nd Ave	158.5 A.
B- Basin	Beaver Creek Corridor	739.4 A.
S-A,B,C Basins	Extreme East and SE parts of watershed	226.5 A.

NOTE: These figures do not include undevelopable portions of the creek bed, steep embankments, or the large upstream watershed (City of Gresham and unincorporated Multnomah County) which enters the City of Troutdale through Beaver Creek at Stark Street. [See "Beaver Creek Drainage Evaluation", by David J. Newton Associates, Inc. prepared for the City of Troutdale.]

4. An alignment for storm drainage service was identified for each of the undeveloped areas. If an existing storm drain pipe was located downstream of the future development area, then that pipe was checked for adequate capacity to accept additional flows. Where no downstream facilities were present, an alignment was proposed to convey the storm runoff to Beaver Creek or to the Sandy River.

   It was assumed, in the absence of any known problems, that isolated storm drains serving only small, fully developed areas, such as a completed subdivision discharging directly into Beaver Creek, were adequately designed,

5. The US Soil Conservation Service's (SCS) Soil Survey for Multnomah County was used to identify the soil type within each drainage basin. The soil types were color-coded according to their Hydrologic Soil Group. SCS Curve Numbers were assigned to each Hydrologic Group as follows:

HYDROLOGIC GROUP	CHARACTERISTICS	CN
A	Poorly Drained, High Runoff	90
B	Moderately High Runoff	84
C	Moderately Well Drained, Lo Runoff	76
D	(None Present)	

The CN numbers for each basin were weighted based on area and a composite number was assigned to each drainage basin. These Soil Curve Numbers are shown on Figure 7, "Sandy River Zone - Areas".

5. Total rainfall for major storm events was taken from the North Troutdale Drainage Master Plan, by David J. Newton Associates (1990) with rainfall depths for the Troutdale area as follows:

EVENT	RAINFALL DEPTH, Inches
2 Year	2.50 Inches
5 Year	2.95 Inches
10 Year	3.20 Inches
25 Year	4.60 Inches
50 Year	3.95 Inches
100 Year	4.25 Inches

Rainfall was assumed to be distributed according to the SCS's Type IA distribution curve for the Northwestern United States.

6. Drainage flows for basins with future development areas were estimated using the Santa Barbara Unit Hydrograph Method. This method is recommended in the King County (Washington) Surface Water Design Manual (1990) for small watersheds. The inputs to this computer model are rainfall depth, soil CN and surface area for each component of the watershed (grass, woods, impervious, etc.), and time of concentration.

7. The recommended drainage facilities were sized using a 10-year frequency storm event and Manning's Equation for gravity flow systems. The facilities have been sized on a preliminary basis for costing purposes only and detailed hydrologic and hydraulic analyses are necessary before these facilities are designed and constructed.

RECOMMENDED DRAINAGE IMPROVEMENTS

Figure 4, "Capital Improvements Map", shows the location and conceptual alignment of recommended drainage capital improvements for the Sandy River Zone. The estimated costs are based on preliminary drainage analysis and should be refined prior to budgeting.

An estimated percentage of total improvement cost that is attributable to capacity increasing improvements to meet future development needs is indicated for each improvement.

The phasing shown is a projection of when the improvements may be required. If the improvement is required sooner than projected, financing costs may be somewhat different

than estimated. On the other hand, if many improvements are required sooner than projected, it would probably be an indication that the pace of development, and therefore the collection of SDC fees, is at a more rapid pace than anticipated. On balance, adjustments to the phasing are not expected to have a major impact on the SDC fee although some adjustment may be required.

The following projects are recommended:

1. Halsey Street Diversion

The Halsey Street Diversion improvement was listed in the North Troutdale Drainage Master Plan. This improvement directs storm water from Basin S-20R into the 257th Avenue storm trunk. Runoff from this basin would naturally drain into the North Troutdale watershed without this improvement. Since all storm water in the North Troutdale watershed must ultimately be discharged by pumping, it is preferable to divert as much water as possible into gravity drainage systems of the Sandy River Zone. Therefore, the cost of this improvement and the projected increases in impervious area within Basin S-20R which would be serviced by this improvement are appropriately shifted into the Sandy River Zone.

The Halsey Street Diversion would consist of approximately 1,000 LF of 24" CSP storm drain pipe. The pipe would service the east end of Halsey Street itself, the undeveloped areas northwest of 257th Drive, and would receive water from portions of the east side of the County farm property.

TOTAL ESTIMATED COST:	$67,500.
CAPACITY INCREASING %:	80%
CAPACITY INCREASING COST:	$54,000.
PROJECTED PHASING:	10 YEAR (1999 - 2001)

Note that the purpose of this improvement is not primarily to serve the lands within the old Halsey Street Storm Sewer LID area. The improvement is intended to divert water east of the Halsey Street LID area into a gravity drainage system.

2. East County Farm Trunk Bypass

This improvement would provide drainage service to the undeveloped residential land west of Reynolds High School and for the east side of the County Farm property. It would divert drainage from Cherry Park Road at a point west of the High School and route it northward along the east boundary of the County Farm property. This improvement would have the

following benefits:

A. Some portions of the County Farm property could be diverted into the 257th Avenue storm trunk via the Halsey Street Diversion. This water could, therefore, be routed into the Sandy River without pumping. Without this improvement, runoff from the east side of the County Farm property would drain into the North Troutdale watershed and would need to be pumped.

B. Storm drainage from the west sides of Anton Ridge and Columbia Crest Estates subdivisions could be intercepted and routed into the Sandy River without pumping.

C. The future residential lands west of the high school could be served without adding to the load on the 257th Avenue storm trunk between the High School and Halsey Street.

The improvement would consist of approximately 1,100 LF of 18" CSP in Cherry Park Road and approximately 1,600 LF of 27" CSP along the east side of the County Farm property. Some ditching would also be required downstream of the 27" pipe to direct this water into the Halsey Street storm drain.

TOTAL ESTIMATED COST:	$187,650.
CAPACITY INCREASING %:	100%
CAPACITY INCREASING COST:	$187,650
PROJECTED PHASING:	10 YEAR (1999 - 2001)

3. Stark Street Trunk

This improvement is needed to serve the residential and commercial lands lying to the north of Stark Street and west of 257th Drive. There are approximately 76 acres of undeveloped lands in this area which must be either sumped or drained to Beaver Creek.

Although the subdivision to the north has successfully used sumps (drywells) for drainage, sumps are not recommended for the development area in Basin B-10R. Sumps are a less expensive form of drainage since conveyance pipes are not needed, but sumps require permeable soils to function well. The soils in Basin B-10L are of Hydrologic Group C and moderately permeable. However, these same permeable soils will also readily transport any contaminants spilled in the streets directly into the groundwater. With the increasing regulatory awareness of groundwater problems in the East Multnomah County and with the

City's dependence of groundwater as a source for water supply, it is strongly recommended that sumps no longer be allowed within the City as a means of storm water disposal.

From discussions with Mr. Ron Wong of Multnomah County, the existing Stark Street storm drain could serve only some fringe portions of the development area in Basin B-10R. The majority of the site would have to be drained internally to the corner of 257th Drive and Stark Street. From this intersection a pipe parallel to the existing storm drain would need to be constructed along the north side of Stark Street approximately 2,200 LF to a discharge point into Beaver Creek. The pipe size is estimated to be 27" CSP at approximately 5.5% slope, but further analysis would be required to confirm these criteria.

TOTAL ESTIMATED COST:	$193,050.
CAPACITY INCREASING %:	100%
CAPACITY INCREASING COST:	$193,050.
PROJECTED PHASING:	5 YEAR (1995 - 1996)

4. 262nd Storm Drain

This improvement would serve 262nd Avenue south of Cherry Park Road. Currently, this street is drained by roadside ditches. Since there are approximately 56 acres of future residential development which must be drained into 262nd Avenue, a storm drain will be required in the future. When the Columbia Highway Storm Sewer Outfall L.I.D Number 85 was formed in 1984, a storm drain in 262nd Avenue was identified as a future need. This LID constructed the 24" storm drain in Cherry Park Road which is capable of receiving storm discharges from the proposed 262nd Avenue system.

Approximately 1,500 LF of 18" CSP and 2,000 LF of 24" CSP are estimated to be required.

TOTAL ESTIMATED COST:	$220,050.
CAPACITY INCREASING %:	80%
CAPACITY INCREASING COST:	$176,040.
PROJECTED PHASING:	10 YEAR (1999 - 2001)

5. Jackson Park Interceptor

This improvement is actually a series of smaller improvements to intercept the drainage and high ground water at the base of the bluff behind Jackson Park and Columbia River Highway. There is a large drainage basin (Basin B-A, 47 acres) which mostly drains down

the hill into the back of Jackson Park. High groundwater is evidenced by the wetland pond on the west side of Jackson Park. The north end of the area behind Harlow House Museum drains to the north in a rather well defined ditch, but the remaining areas, such as the area behind Boros Apartments have no clear drainage route to convey larger storm events through the area.

A total of approximately 1,400 LF of 18" CSP laid with open joints in a fabric wrapped bedding of drain rock will serve to drain groundwater behind the existing houses at the base of the hill. Where distinct drainageways are present in the hillside, field inlets will be needed to direct the water into the pipe. The south end of the site can be drained south to Beaver Creek and the mid portions of the site can be drained across the street into Beaver Creek as shown on Figure 4.

TOTAL ESTIMATED COST:	$79,380.
CAPACITY INCREASING %:	0%
CAPACITY INCREASING COST:	$0.
PROJECTED PHASING:	2 YEAR (1992 - 1993)

6. Columbia River Highway Culverts

The area of the City east of Sandy River is zoned for low density residential development with some neighborhood and community commercial areas. Additional impervious surfaces in this area will require some culvert and drainageway outfall improvements. Specific improvements will be identified in response to actual development in this area.

TOTAL ESTIMATED COST:	$54,000
CAPACITY INCREASING %:	60%
CAPACITY INCREASING COST:	$32,400.
PROJECTED PHASING:	15 YEAR (2005 - 2007)

7. Troutdale Road Detention

Beaver Creek enters the City of Troutdale at Stark Street. From Stark Street, the creek flows about 1,300 feet before being culverted under Troutdale Road. The culverts at Stark Street consist of two 5'x 7' concrete box culverts and one 5'x 5' box culvert. The culverts at Troutdale Road consist only of the two 5'x 7' box culverts. The problem with this configuration is that more water can get into this relatively small basin than can get out. That creates an unintentional detention basin. The difference in capacity between the two

culvert configurations will cause water to be stored which will impact adjacent properties and could threaten the stability of the Troutdale Road embankment. As the upstream watershed continues to develop, this situation will be of increasing concern.

The proposed improvement will add a culvert to the Troutdale Road crossing so that the downstream culverts have a capacity equal to or greater than the upstream culverts. As an alternative, the capacity of the Stark Street culvert configuration could be decreased, if it can be shown that some detention upstream of Stark Street is possible and that reduction in erosional pressures along Beaver Creek downstream of Troutdale Road could be achieved.

TOTAL ESTIMATED COST:	$87,750
CAPACITY INCREASING %:	75%
CAPACITY INCREASING COST:	$65,813
PROJECTED PHASING:	15 YEAR (2005 - 2007)

8. Beaver Creek Erosion Control

Beaver Creek is a deep erosional channel flowing northeasterly through the middle of the Sandy River Zone. It ultimately discharges into the Sandy River in the vicinity of downtown Troutdale. The primary area of concern is the reach between Troutdale Road and Jackson Park. Within this reach, there are at least four areas where the creek has meandered against one of its banks and has undercut the bank. Typically, when this happens, the weight of the earth above the cut is no longer supported and it collapses as a slice off the bank. This process tends to continue if left alone since these embankments, once cut, are often too steep to support sufficient vegetation to stabilize the exposed cut from further erosion. In some locations, this type of under-cutting, if left unchecked, could threaten to undermine some houses along the rim of Beaver Creek.

As development continues upstream in the watershed, flows in Beaver Creek will continue to increase causing increased erosional scouring. As discussed in Improvement #7 above, some upstream detention may be helpful. However, detention alone will not be sufficient to solve this problem.

The Beaver Creek Erosion Control improvement consists of constructing erosion protection at the base of those undercut areas which threaten structures above. The protection will consist of rip-rap, rock filled gabions (large wire baskets), and/or a planted berm along the unstable areas. It will be important to plan these corrective measures carefully to avoid re-directing the creek into the bank in another downstream location. The cost of this

improvement is quite high due to the difficulty in getting equipment and materials to the bottom of the creek with minimal disturbance to other functioning areas of the creek.

Fifty percent of the cost of this improvement is considered to be associated with additional upstream capacity demands. As upstream flows increase, the exposed embankments will need to be more heavily armored.

TOTAL ESTIMATED COST:	$405,000
CAPACITY INCREASING %:	50%
CAPACITY INCREASING COST:	$202,500
PROJECTED PHASING:	33% at 2 YEAR (1992 - 1993)
	33% at 5 YEAR (1995 - 1997)
	34% at 10 YEAR (1999 - 2001)

9. Beaver Creek Gaging Station

This improvement was identified in the "Beaver Creek Drainage Evaluation". It is proposed to be located in Beaver Creek at the Stark Street crossing. The purpose of this improvement will be to monitor increase in flow over the years and to calibrate the hydrologic model of Beaver Creek. The benefit of this improvement is that it will provide the City of Troutdale with a record of flow increases which will be essential in documenting impacts of development in the upstream watershed. This information is expected to be useful in any negotiations with the City of Gresham and Multnomah County concerning costs incurred to stabilize Beaver Creek.

This improvement will consist of a lockable concrete manhole set in the bank adjacent to Beaver Creek at Stark Street. The manhole would have a pipe extended into the creek so that the water level in the manhole reflected that in the creek. A continuous recording device would then be placed in the manhole to record fluctuations in water level in the creek. These fluctuations in water level can then be calibrated (for every water level there is a corresponding flow rate) so flow rates in the creek can be registered.

TOTAL ESTIMATED COST:	$33,750
CAPACITY INCREASING %:	100%
CAPACITY INCREASING COST:	$33,750
PROJECTED PHASING:	2 YEAR (1992 - 1993)

10. Sweetbriar Road Storm Drain

This improvement would be required when lands south of SE Sweetbriar Road are serviced by the City of Troutdale. The purpose of the improvement is to collect any water from Basins S-C, S-C10, or S-C20 which would naturally flow into Sweetbriar Creek and divert it into the small un-named drainageway flowing east along the north side of Sweetbriar Road in Basin S-C. This diversion will prevent excessive flows from these future development areas from adding to the flows in Sweetbriar Creek. Sweetbriar Creek will be at capacity when the residential lands within Basins S-B, S-BL, and S-B10 are developed.

This improvement will consist of approximately 1,200 LF of 18" CSP nd 800 LF of 30" CSP in Sweetbriar Road as shown in Figure 4, "Drainage Improvements Map".

TOTAL ESTIMATED COST:	$143,640
CAPACITY INCREASING %:	100%
CAPACITY INCREASING COST:	$143,640
PROJECTED PHASING:	15 YEAR (2005 - 2007)

IMPROVEMENT COSTS

The estimated capital improvement costs for the Sandy River Zone are summarized in Figure 5, "Capital Improvements". The total capital costs are estimated to be $1,471,770 in 1991 dollars.

Figure 6, "Future Capacity Improvements" shows the improvements needed, their total construction cost, and the portion of total construction cost which is estimated to be attributable to future capacity needs as distinguished from upgrade costs to meet current needs. This Figure also shows the anticipated phasing of the improvements expressed in years forward from 1991.

Of the total $1,471,770 in capital improvements, $1,088,843 is considered to be attributable to future capacity increasing improvements. Note that those portions of these improvements that are considered to be necessary to meet existing conditions, cannot be recovered through System Development Charges and will need to be funded through periodic User Fees instead.

IMPERVIOUS AREA DATA

A fundamental component of the drainage SDC methodology is a calculation of existing impervious area, anticipated future impervious area and the difference between the two. Figure 7, "Sandy River Zone - Areas", shows the remaining development area within each drainage basin.

Figure 7 also shows estimated future impervious area within each drainage basin. The values shown are in 1,000's of square feet of future impervious surfaces. The development areas were assumed to be developed only to 85% of their theoretical maximum. The percent of impervious area for each category of land use was 45%, 60% and 75% for Low Density Residential, Medium Density Residential and Commercial/Industrial, respectively. The total impervious area within the North Troutdale Zone is expected to increase by 14.5 million square feet over the next 20 years as the remainder of this portion of the City develops.

HALSEY STREET STORM SEWER L.I.D. SERVICE AREA

The Halsey Street-Columbia Highway Storm Sewer L.I.D. was undertaken in 1978 to provide a means of intercepting storm water runoff along Halsey Street and what is now 257th Drive and routing it past the sewer treatment plant to the Sandy River. A total of 306 acres of land were assessed approximately $2,166 per acre. If one assumes 6 ERU's per acre (an average for LDR and MDR lands comprising most of the LID area), then this per acre assessment represents a figure of $361 per ERU which has already been paid by these properties towards a very significant drainage improvement in Troutdale.

Normally, exceptions to drainage rate fees are not advisable because of administrative complications. Also, no two properties have precisely the same drainage impact and endless refinements are theoretically possible. However, in this case, notwithstanding the foregoing comments, it is our opinion that an exception should be made. Since none of the capital improvements recommended above directly benefit the lands within the Halsey Street LID area and since the primary drainage system serving this area has already been constructed using the L.I.D. mechanism, we recommend that the Halsey Street L.I.D. area be excluded from the Sandy River watershed with regard to drainage SDC charges. See Figure 7a, "Proposed Halsey Street LID Exclusion Area".

If this area is excluded from the SDC charges, the following square footage of potential impervious area within the Halsey Street LID area will be removed from the computations:

TYPE	ACRES	% EFFICIENCY	% IMPERVIOUS	IMPERVIOUS SF
LDR	36.2	85%	45%	603,000 SF
MDR	62.0	85%	60%	1,370,000 SF
Comm/Ind	39.2	85%	75%	1,090,000 SF

TOTAL Impervious SF removed from calculations with Exclusion: 3,063,000 SF

SDC CALCULATION METHODOLOGY

Figure 8A and 8B, "Financing Costs", show estimated costs for financing improvements for which sufficient SDC fees have not yet been received. Figure 8A assumes that the Halsey Street LID area would not be charged for drainage SDC's; Figure 8B assumes that the Halsey Street LID area would be charged drainage SDC's like other areas of Sandy River Drainage Rate Zone.

ORS 223.297 to 223.314 states that financing costs for capacity increasing improvements associated with future development can be recovered through SDC's. These financing costs need to be included in the total cost computations because SDC's can be collected only as development occurs, whereas construction of most capital improvements cannot be cost-effectively spread over a period of time. Figures 8A and 8B show project costs occurring in the years they are anticipated. Annual cost recovery from SDC's are projected assuming a straight line rate of development over the 20 year buildout period. The SDC's in this column ("SDC Revenues") do not include financing costs. Figures 8A and 8B then computes the annual surplus or shortfall and identifies years when borrowing may be required. The amount borrowed to cover the shortfall is assumed to be financed at 7.5% over 20 years with a 2% cost of issuance. The total financing costs for the two options are shown at the bottom of the far right-hand column of Figures 8A and 8B.

Figures 9A and 9B, "SDC Charge Summary" calculates drainage SDC's per square foot of impervious area according to the following formula:

$$\frac{\text{Total Future Capacity Costs}}{\text{Incremental Impervious Square Footage}}$$

Figure 9A shows the recommended SDC charge for the Sandy River Drainage Rate Zone assuming the Halsey Street LID "exclusion area" option is selected. Figure 9B shows the same results if the Halsey Street LID area is not excluded.

System Development Charges for various land uses are presented at the bottom of Figures 9A and 9B. These two figures show SDC's for typical sizes of residential, commercial, and industrial development. An Equivalent Residential Unit (ERU) of 2,700 SF of impervious area has been adopted by the City of Troutdale based on a planimeter study of five typical residential areas with in the City.

For the Sandy River Zone a drainage SDC of $327 per ERU is recommended if the Halsey Street LID exclusion option is selected, or, alternatively an SDC of $255 per ERU if the Halsey Street LID area is not excluded.

For comparison, the following System Development Charges have recently been adopted:

JURISDICTION	ERU, SF	SDC per ERU
Sandy River Zone	2,700 SF	$327.*
North Troutdale Zone	2,700 SF	$331.
City of Gresham	2,500 SF	$525.
Unified Sewerage Agency	2,640 SF	$375. (may vary)
Medford	RES LOT	$400.

NOTE: The drainage SDC per ERU would be reduced to $255 if the exclusion option is not selected.

Because the methodology treats a square foot of impervious area the same regardless of land use (residential, commercial, industrial, etc.), the calculation of the SDC is simply a function of the total amount of impervious surface area for a given property.

IMPLEMENTATION ISSUES

In implementing the drainage portion of the SDC ordinance, the City should review at least annually the assumptions used in developing the SDC calculations and be prepared to revise its SDC charges based on changes in the assumptions used to establish the initial SDC rates. In particular, the following factors should be reviewed:

* Inflationary Impacts: The SDC charges should be indexed to some measure of inflation, such as the Consumer Price Index (CPI) or ENR data, so that the SDC charge is able to keep pace with higher future project costs.

* Comprehensive Plan Changes: Changes in land use patterns which result in higher or lower ratios of impervious area should be monitored and, where necessary, the SDC should be recalculated based on the revised impervious area estimates.

* Project Scope Changes: Large portions of the Sandy Driver Zone are undeveloped at this time. As development proceeds, listed projects may need to be altered or new projects may need to be added to meet the specific needs of this development. Also, storm water quality standards could be imposed which would create the need for regional water quality facilities.

* Leveling SDC Charges: Since the recommended drainage SDC for the Sandy River Watershed ($327.) is so close to the recommended drainage SDC for the North Troutdale Watershed, the City may wish to make both rates the same for ease of administration.

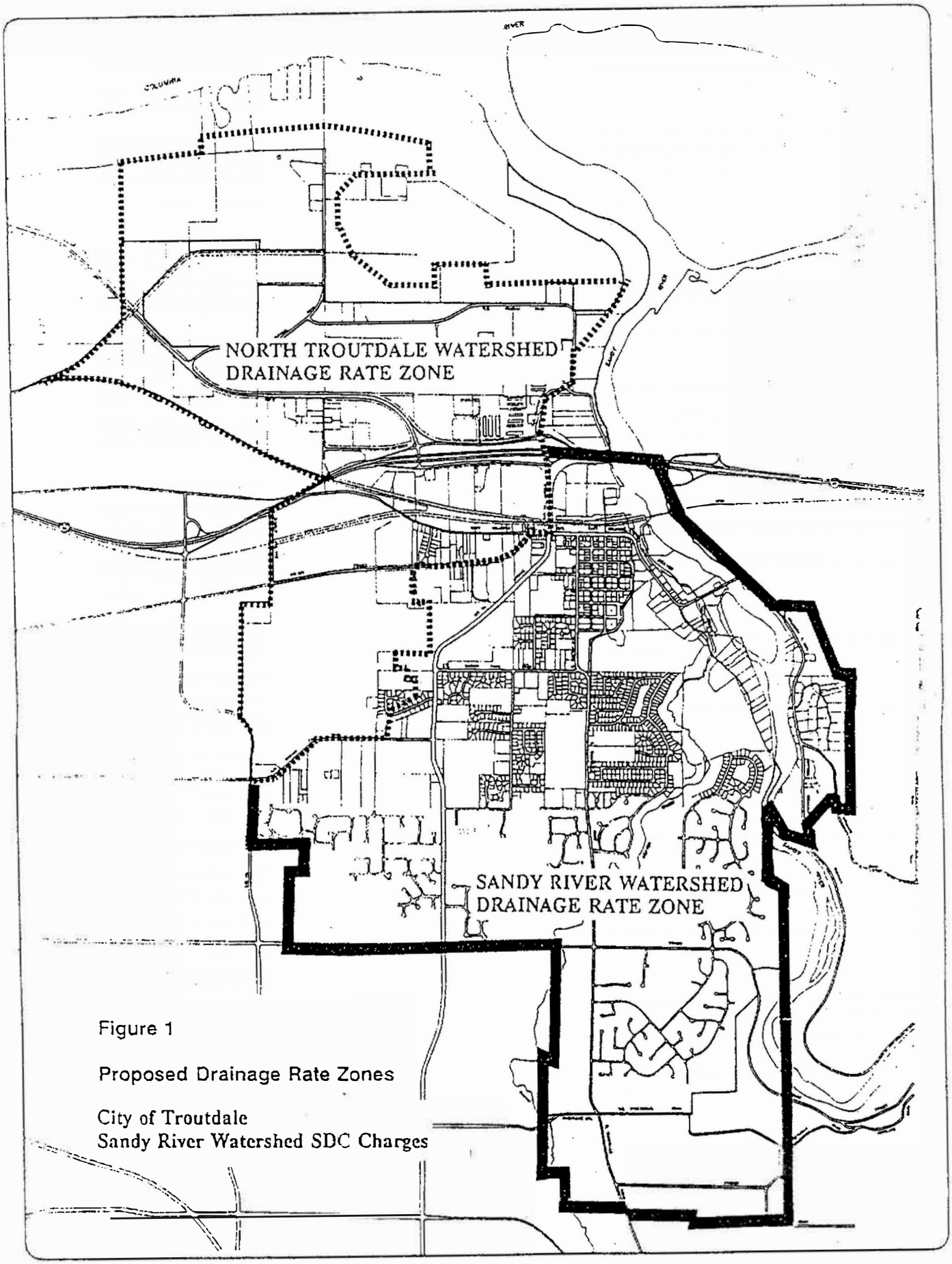
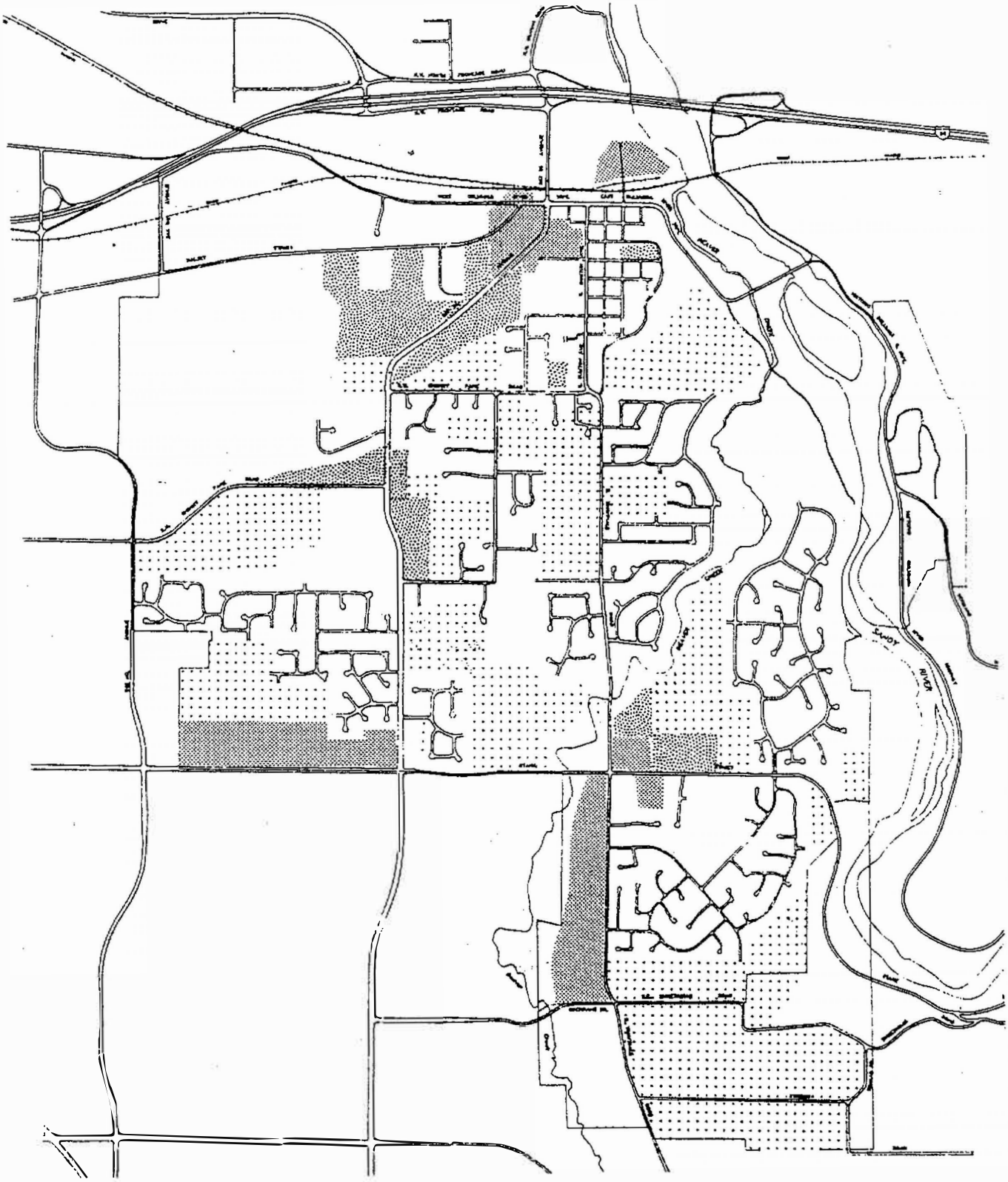


Figure 1

Proposed Drainage Rate Zones

City of Troutdale
Sandy River Watershed SDC Charges

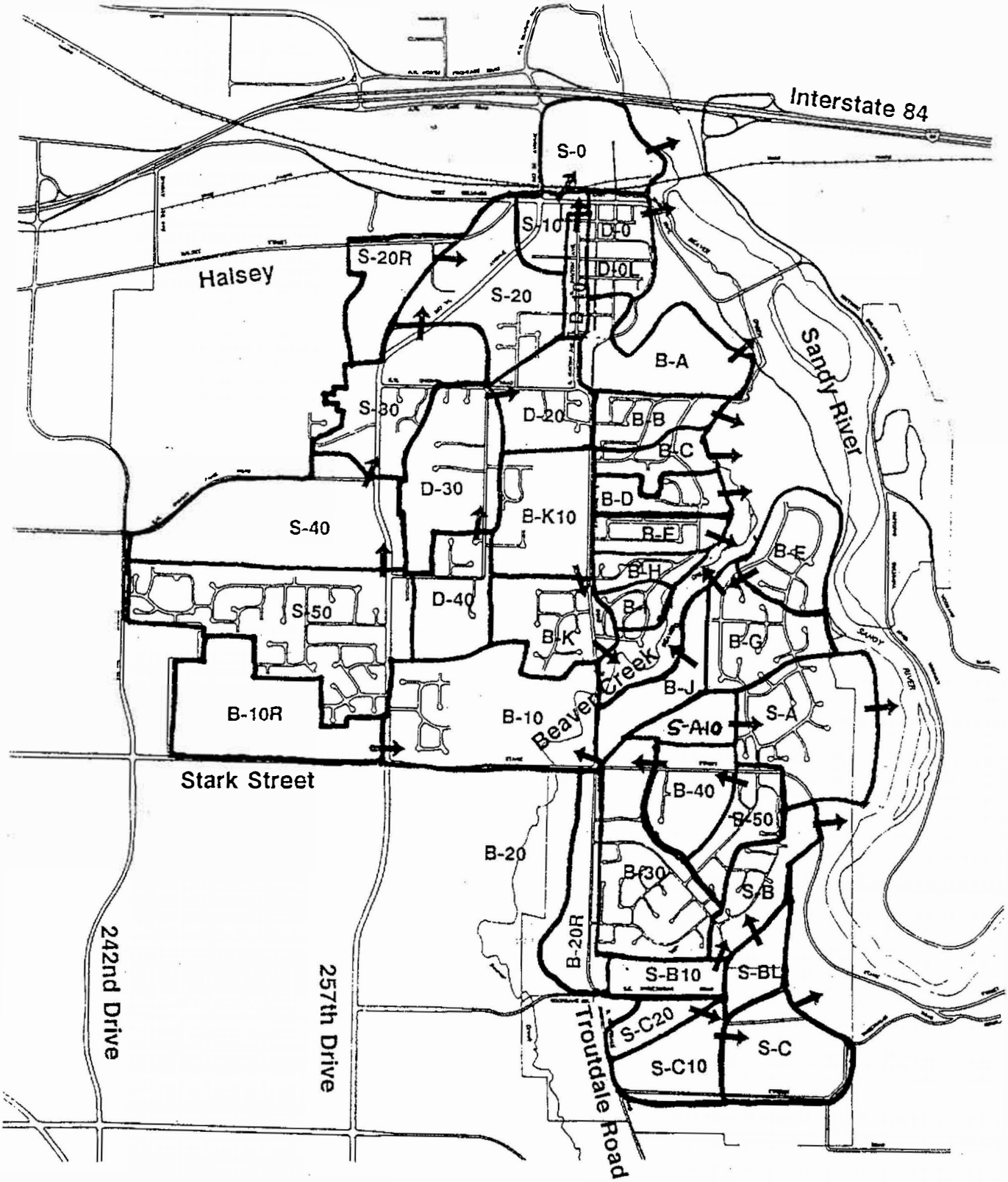


LOW DENSITY RESIDENTIAL

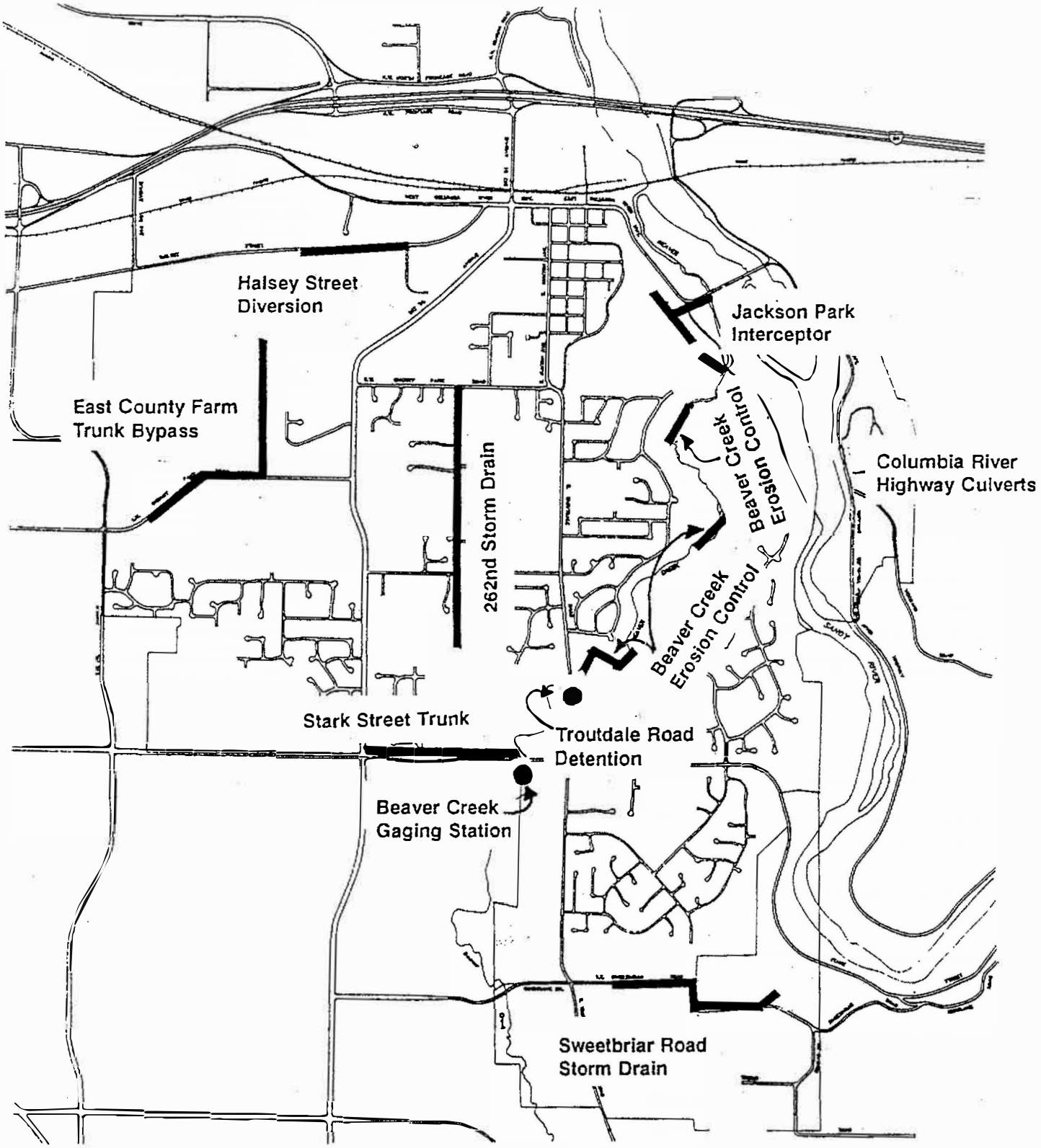
MEDIUM DENSITY RESIDENTIAL

COMMERCIAL/INDUSTRIAL

FUTURE DEVELOPMENT AREA MAP
FIGURE 2



DRAINAGE BASIN MAP
FIGURE 3



CAPITAL IMPROVEMENTS MAP
FIGURE 4

City of Troutdale
Storm Drainage SDC Charge

Sandy River Zone
March 11, 1991

FIGURE 5
Capital Improvements

IMP #	PROJECT	ELEMENT	QTY	UNITS	UNIT COST	SUB-TOTAL	Cont, Engr & Admin (+35%)	PROJECT TOTAL
1	Halsey St. Diversion	24" CSP Pipe	1,000	LF	$50	$50,000	$17,500	$67,500
2	East County Farm Trunk Bypass	27" CSP Pipe	1,600	LF	$58	$92,800	$32,480	$125,280
		18" CSP Pipe	1100	LF	$42	$46,200	$16,170	$62,370
3	Stark Street Trunk	27" CSP Pipe	2,200	LF	$65	$143,000	$50,050	$193,050
4	262nd Storm Drain	24" CSP Pipe	2,000	LF	$50	$100,000	$35,000	$135,000
		18" CSP Pipe	1,500	LF	$42	$63,000	$22,050	$85,050
5	Jackson Park Interceptor	18" CSP Pipe	1,400	LF	$42	$58,800	$20,580	$79,380
6	Columbia River Hwy Culverts	Culv. & Erosion	1	LS	$40,000	$40,000	$14,000	$54,000
7	Troutdale Rd Detention	Control Structure	1	LS	$65,000	$65,000	$22,750	$87,750
8	Beaver Creek Erosion Control	Bank Protection	1	LS	$300,000	$300,000	$105,000	$405,000
9	Beaver Creek Gaging Station	Flow Monitoring	1	LS	$25,000	$25,000	$8,750	$33,750
10	Sweetbriar Road Storm Drain	30" CSP Pipe	800	LF	$70	$56,000	$19,600	$75,600
		18" SCP Pipe	1,200	LF	42	$50,400	$17,640	$68,040
TOTAL								$1,471,770

City of Troutdale
Storm Drainage SDC Charge

Sandy River Zone
March 11, 1991

FIGURE 6
Future Capacity Improvements

IMP #	PROJECT	TOTAL PROJECT COST	PERCENT Attributable to Future Development	COST Attributable to Future Capacity Needs	COST Attributable to Existing Capacity Needs	PROJECT TIMING
1	Halsey St. Diversion	$67,500	80%	$54,000	$13,500	10 YEAR
2	East County Farm Trunk Bypass	$125,280 $62,370	100%	$187,650	$0	10 YEAR
3	Stark Street Trunk	$193,050	100%	$193,050	$0	5 YEAR
4	262nd Storm Drain	$135,000 $85,050	80%	$176,040	$44,010	10 YEAR
5	Jackson Park Interceptor	$79,380	0%	$0	$79,380	2 YEAR
6	Columbia River Hwy Culverts	$54,000	60%	$32,400	$21,600	15 YEAR
7	Troutdale Rd Detention	$87,750	75%	$65,813	$21,938	15 YEAR
8	Beaver Creek Erosion Control	$405,000	50%	$202,500	$202,500	33%: 2 Year 33%: 5 Year 34%: 10 Year
9	Beaver Creek Gaging Station	$33,750	100%	$33,750	$0	2 YEAR
10	Sweetbriar Road Storm Drain	$75,600 $68,040	100%	$143,640	$0	15 YEAR
	TOTALS	$1,471,770		$1,088,843	$382,928	

City of Troutdale
Storm Drainage SDC Charge

Sandy River Zone
March 11, 1991

FIGURE 7

BASIN Name	Comp. SOIL CN	Total AREA, Acres	DEVELOPMENT AREA LDR Acres	MDR Acres	Comm/Ind Acres	ADDITIONAL IMP AREA @85% Eff LDR 1,000 SF @45% Imp	MDR 1,000 SF @60% Imp	Comm/Ind 1,000 SF @75% Imp
S-0	84	35.4	0.0	0.0	11.0	0	0	305
S-10	84	118.8	0.0	0.0	10.7	0	0	297
S-20	84	70.8	0.0	29.1	9.2	0	646	255
S-20R	81	32.2	0.0	29.0	0.0	0	644	0
S-30	76	65.0	21.9	14.8	0.0	365	329	0
S-40	76	136.6	33.0	21.9	0.0	550	487	0
S-50	76	106.5	0.0	0.0	0.0	0	0	0
D-0	84	7.6	0.0	0.0	3.0	0	0	83
D-0L	84	20.6	4.0	7.4	0.0	67	164	0
D-10	84	11.8	2.5	0.0	2.0	42	0	56
D-20	90	30.8	5.8	1.7	0.0	97	38	0
D-30	76	53.5	27.8	0.0	0.0	463	0	0
D-40	76	34.2	22.4	0.0	0.0	373	0	0
B-A	85	47.2	32.8	0.0	0.0	547	0	0
B-B	84	30.2	0.0	0.0	0.0	0	0	0
B-C	89	15.1	1.8	0.0	0.0	30	0	0
B-D	86	19.6	10.5	0.0	0.0	175	0	0
B-E	76	53.2	4.0	0.0	0.0	67	0	0
B-F	85	20.6	0.0	0.0	0.0	0	0	0
B-G	89	39.5	0.0	0.0	0.0	0	0	0
B-H	85	15.9	0.0	0.0	0.0	0	0	0
B-I	84	10.3	0.0	0.0	0.0	0	0	0
B-J	84	38.7	26.4	8.3	4.0	440	184	111
B-K	80	31.6	1.5	0.0	0.0	25	0	0
B-K10	76	58.5	40.0	0.0	0.0	666	0	0
B-10	78	97.0	50.4	2.1	10.0	840	47	278
B-10R	76	81.5	38.9	0.0	37.2	648	0	1033
B-20		Out of City	0.0	0.0	8.2	0	0	228
B-20R	84	41.0	0.0	0.0	29.1	0	0	808
B-30	86	74.5	0.0	0.0	8.7	0	0	242
B-40	87	34.8	6.0	4.6	0.0	100	102	0
B-50	85	30.2	1.0	0.0	0.0	17	0	0
S-A	84	41.4	0.0	0.0	0.0	0	0	0
S-A10	84	21.8	14.7	7.1	0.0	245	158	0
S-B	84	25.7	3.0	0.0	0.0	50	0	0
S-BL	84	23.0	23.0	0.0	0.0	383	0	0
S-B10	84	21.6	21.6	0.0	0.0	360	0	0
S-C	84	45.6	44.0	0.0	0.0	733	0	0
S-C10	84	35.5	32.0	0.0	0.0	533	0	0
S-C20	84	11.9	11.5	0.0	0.0	192	0	0
TOTALS		1,689.7	480.5	126.0	133.1	8,006	2,799	3,696
TOTAL IMP AREA				739.6 Acres		14,501 SF, in 1,000's		

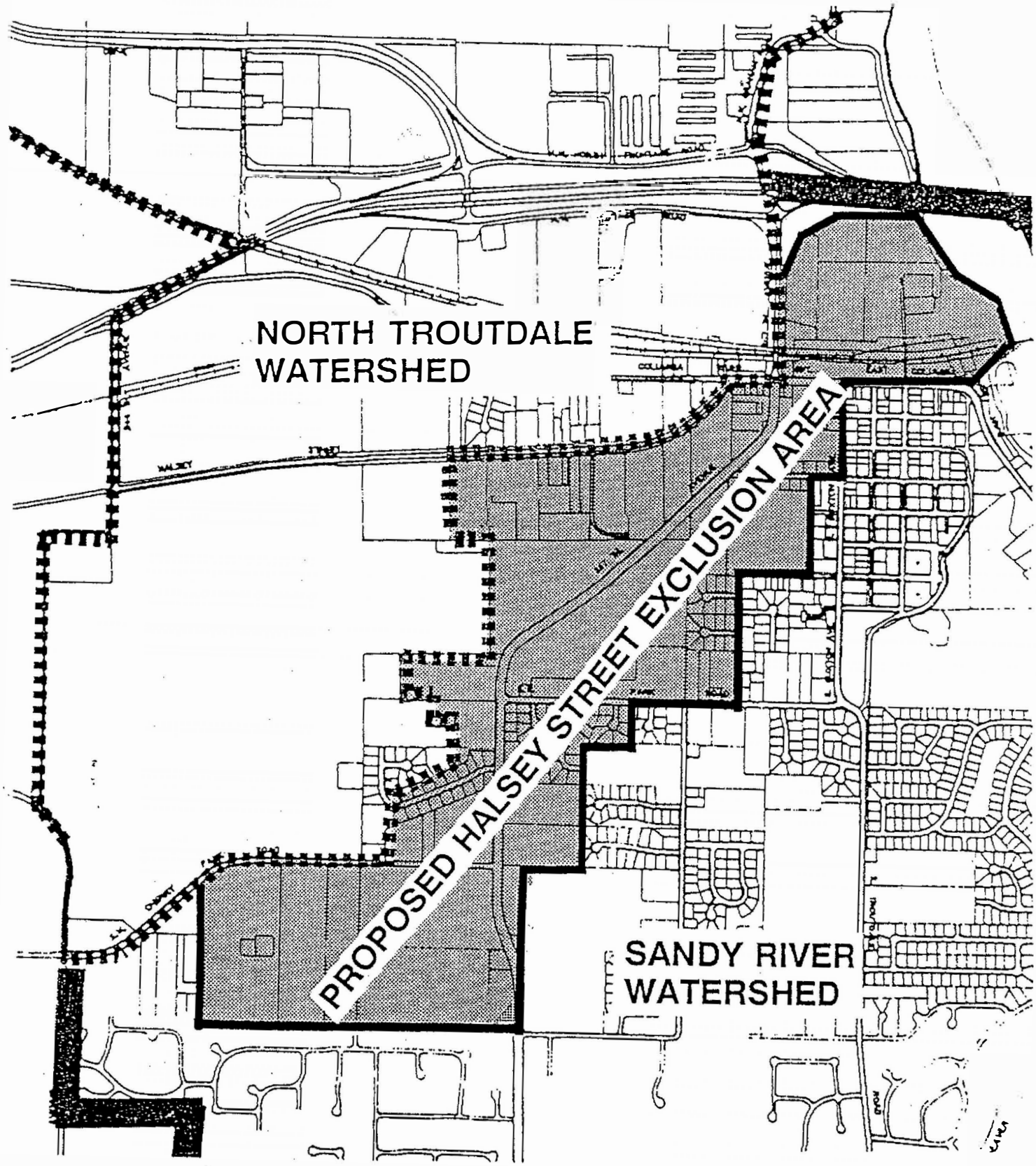


Figure 7a

Proposed Halsey Street LID Exclusion Area

City of Troutdale
Sandy River Watershed SDC Charges

City of Troutdale
Storm Drainage SDC

FIGURE 8A
Financing Costs

Sandy River Zone

Assumes NO SDC Participation within the Halsey Street LID Area
May 7, 1991

YEAR	ANNUAL PROJECT COSTS	SDC REVENUES	ANNUAL SURPLUS/ (DEFICIT)	INTERIM BALANCE	CASH FUNDING	BORROWING	FINANCING COST
SF/Year		571,907					
$SDC/SF		$0.0952					
1992	$50,287	$54,442	$4,155	$4,155	$58,597	$0	$0
1993	$50,287	$54,442	$4,155	$8,310	$58,597	$0	$0
1994	$0	$54,442	$54,442	$62,752	$0	$0	$0
1995	$129,937	$54,442	($75,495)	($12,742)	$117,195	$12,742	$12,511
1996	$129,938	$54,442	($75,496)	($75,496)	$54,442	$75,496	$74,125
1997	$0	$54,442	$54,442	$54,442	$0	$0	$0
1998	$0	$54,442	$54,442	$108,884	$0	$0	$0
1999	$162,180	$54,442	($107,738)	$1,146	$163,326	$0	$0
2000	$162,180	$54,442	($107,738)	($106,591)	$162,180	$106,591	$104,656
2001	$162,180	$54,442	($107,738)	($107,738)	$162,180	$107,738	$105,782
2002	$0	$54,442	$54,442	$54,442	$0	$0	$0
2003	$0	$54,442	$54,442	$108,884	$0	$0	$0
2004	$0	$54,442	$54,442	$163,326	$0	$0	$0
2005	$120,927	$54,442	($66,485)	$96,842	$120,927	$0	$0
2006	$0	$54,442	$54,442	$151,284	$0	$0	$0
2007	$120,927	$54,442	($66,485)	$84,799	$120,927	$0	$0
2008	$0	$54,442	$54,442	$139,241	$0	$0	$0
2009	$0	$54,442	$54,442	$193,683	$0	$0	$0
2010	$0	$54,442	$54,442	$248,125	$0	$0	$0
2011	$0	$54,442	$54,442	$302,568	$0	$0	$0
TOTALS	$1,088,843	$1,088,843			$1,018,372	$302,568	$297,074

City of Troutdale
Storm Drainage SDC

FIGURE 8B
Financing Costs

Sandy River Zone
Assumes SDC Participation within the Halsey Street LID Area
May 7, 1991

YEAR	ANNUAL PROJECT COSTS	SDC REVENUES	ANNUAL SURPLUS/ (DEFICIT)	INTERIM BALANCE	CASH FUNDING	BORROWING	FINANCING COST
SF/Year		725,050					
$SDC/SF		$0.0772					
1992	$50,287	$55,994	$5,707	$5,707	$61,702	$0	$0
1993	$50,287	$55,994	$5,707	$11,415	$61,702	$0	$0
1994	$0	$55,994	$55,994	$67,409	$0	$0	$0
1995	$129,937	$55,994	($73,943)	($6,533)	$123,404	$6,533	$6,415
1996	$129,938	$55,994	($73,944)	($73,944)	$55,994	$73,944	$72,601
1997	$0	$55,994	$55,994	$55,994	$0	$0	$0
1998	$0	$55,994	$55,994	$111,989	$0	$0	$0
1999	$162,180	$55,994	($106,186)	$5,803	$167,983	$0	$0
2000	$162,180	$55,994	($106,186)	($100,382)	$162,180	$100,382	$98,560
2001	$162,180	$55,994	($106,186)	($106,186)	$162,180	$106,186	$104,258
2002	$0	$55,994	$55,994	$55,994	$0	$0	$0
2003	$0	$55,994	$55,994	$111,989	$0	$0	$0
2004	$0	$55,994	$55,994	$167,983	$0	$0	$0
2005	$120,927	$55,994	($64,933)	$103,051	$120,927	$0	$0
2006	$0	$55,994	$55,994	$159,045	$0	$0	$0
2007	$120,927	$55,994	($64,933)	$94,113	$120,927	$0	$0
2008	$0	$55,994	$55,994	$150,107	$0	$0	$0
2009	$0	$55,994	$55,994	$206,102	$0	$0	$0
2010	$0	$55,994	$55,994	$262,096	$0	$0	$0
2011	$0	$55,994	$55,994	$318,090	$0	$0	$0
TOTALS	$1,088,843	$1,119,889			$1,036,999	$287,045	$281,833

City of Troutdale
Storm Drainage SDC Charge

FIGURE 9B
SDC CHARGE SUMMARY

Sandy River Zone

Assumes SDC Participation with the Halsey Street LID Area
March 11, 1991

Future Capacity Costs	$1,088,843
Project Financing Costs	$281,833
TOTAL COSTS	$1,370,676

Projected New Impervious Area	14,501,000 SF
SDC per square foot of New Impervious Area	$0.0945 per SF

TYPICAL SDC CHARGES

	Typical Impervious Area	SDC CHARGE
Residential	2,700 SF	$255
Commercial	10,000 SF	$945
	25,000 SF	$2,363
Industrial	30,000 SF	$2,836
	43,560 SF	$4,117