[7159]

City of Seattle

Proposed 2004 Comprehensive Drainage Plan

Volume II—Appendices

Prepared by

Seattle Public Utilities
with
Herrera Environmental Consultants
and
R.W. Beck
Shannon and Wilson

May 12, 2004

City of Seattle Proposed 2004 Comprehensive Drainage Plan prepared by Seattle Public Utilities with Herrera Environmental Consultants, Inc., R.W. Beck, Inc., and Shannon & Wilson, Inc.

Cover photograph and spine photograph
by Art Campbell, Herrera Environmental Consultants

Cover photo insets (from left to right)
by Seattle Public Utilities, Herrera Environmental Consultants, Will Austin,
and Seattle Public Utilities

The maps in this Comprehensive Drainage Plan were prepared by Seattle Public Utilities for general illustration only, to help conceptualize the drainage policy issues considered in the plan. The maps are intended for use by the City of Seattle only as advisory planning-level tools. They do not reflect any determination, legal or otherwise, of the status or attributes of specific Seattle locations. The maps may be revised from time to time, even when the Comprehensive Drainage Plan is not formally amended.

Contents

Volume II—Appendices

Appendix A Public Information Materials
Residential Customer Survey
Community Groups Contacted for Comments
Comments Received at Public Meetings
Creeks, Drainage, and Wastewater Citizen Advisory Committee Reports

Appendix B Information on Permits for City Capital Improvement Projects

Appendix C Stormwater Analysis Information
Inventory and Assessment of SPU Hydrologic/Hydraulic Models
Flooding Conditions Assessment
Flooding Incident Database
Flooding Incident Maps

Appendix D Program Area Prioritization Schemes
Stormwater and Flood Control Prioritization
Landslide Mitigation Prioritization
Water Quality Prioritization
Habitat Prioritization

Appendix E Financial Program

Appendix F City Council Resolution 29774—Landslide Program Guidance

Appendix G Environmental Checklist for 2004 Comprehensive Drainage Plan

Chapter 1: Introduction and Methods

Study Background and Purposes

Over the years, SPU has conducted quantitative and qualitative market research with their residential customers to better understand their views on various issues and services and to track progress toward service goals. SPU has used this research to help guide its outreach and communications, to improve existing services, and to develop new services.

However, this is the first SPU survey focused on customer views of drainage and wastewater management issues and services. Attention to these services, while always important and requiring significant utility resources, has shifted in recent years. Historically, SPU has approached drainage services from a conveyance-focused standpoint, with the main trunk system being the solution for drainage problems, and with water quality and habitat issues being dealt with on an "as needed" basis.

With the 2004 Comprehensive Drainage Plan, SPU is taking a more proactive approach to water quality and habitat enhancement. In addition, SPU is looking at flooding, habitat, and water quality issues from a drainage basin standpoint and trying to create citywide levels of service to customers. At the same time, SPU must decide how to best allocate utility resources among key drainage and wastewater management activities. This survey is one way for SPU to get public input on how to prioritize their core services.

The purposes of this telephone survey of 655 SPU residential customers were to:

- Determine ratepayers' satisfaction with current drainage and wastewater services
- Establish a baseline for key satisfaction and service indicators so SPU can track these indicators over time through future surveys and other research
- Determine enhanced or additional services ratepayers would like SPU to provide

Study Methods

Initial drafts of the survey instrument were developed through brainstorming and review sessions with representatives from all SPU branches; consultation with the Performance Resource Group, a division of City Personnel; input from the Creeks Drainage and Wastewater Citizens Advisory Committee; and CDP consultant review.

SPU staff then worked closely with a local research and evaluation firm (Dethman & Associates) to review and revise the design, oversee fielding, and analyze the results. Dethman & Associates hired Market Trends Inc, a survey fielding agency in Seattle to collect and process the data. The telephone interviews were conducted during March and early April 2003, using a computer assisted interviewing system; each interview

lasted about 10 minutes. Data were analyzed using standard data reduction and statistical methods. The database is being supplied to SPU for any further analysis, as are all data runs. Verbatim comments for open-ended questions are also available.

The randomly drawn, representative sample of 655 residential Seattle households reliably estimates the overall Seattle population of SPU customers, carrying a **margin of error of +/- 4%** at the 95% confidence level (95 samples out of 100 would yield similar results). This reliability is supported by the correspondence of several household characteristics to census and other survey data, as reported in the first section of Chapter 2.

Table and Figure Notes

Where possible, the report incorporates the actual survey wording to help characterize findings (although questions may be paraphrased to save space). Please refer to the Appendix for a full copy of the survey instrument.

Throughout the report, significant differences from cross-tabulation analyses (e.g., comparing attitudes by household characteristics) are reported. If significant differences exist, it is indicated by Sig. =<.05, meaning that there is less than a 5% chance that the differences would occur by chance. If significant differences are not mentioned, it is because none were found. Due to rounding, or to questions where multiple responses were allowed, total percentages in tables may exceed 100%.

Chapter 2: Views of Drainage and Wastewater Services

This chapter presents findings on:

- household characteristics
- overall customer satisfaction with drainage and wastewater services
- customer experience and satisfaction with sewage back-ups and flooding
- customer assessments of lake and stream health, including their role in maintaining surface water health

Household Characteristics

The survey gathered four household characteristics, which are summarized in Table 3 below.

- Home ownership
- Presence of a yard
- Gender (Note: Respondents were recruited to reflect a 50-50 split per the population.)
- Zip code

While this household information is not a complete picture of how well the data represent the entire population, the split of home ownership (64% own; 36% rent), the presence of a yard (69% with yard; 31% without a yard), and gender, are similar to other recent random sample surveys of SPU customers (for instance, see SPU's *2001Regional Water Conservation Survey*), and, for home ownership and gender, similar to census statistics.

Respondent zip codes were used to place respondents in one of these four drainage infrastructure groups:

- **Combined.** Areas with a fully combined system where all stormwater and sewage goes into a single pipe and is transported to a treatment plant.
- **Sanitary.** Areas with sanitary sewers in underground pipes that transport sewage to a treatment plant. Drainage in these areas consists of ditches and culverts where much of the runoff goes into city creeks.
- **Partially Separated.** Areas with a combination of combined and sanitary systems.
- **Mixed.** Areas with two or more categories above.

Table 3 Summary of Household Characteristics

Characteristic	Percent
Home Ownership	
Owner	64%
Renter	36%
Presence of Yard	
Yard	69%
No Yard	31%
Gender	
Female	50%
Male	50%
Infrastructure Type	
Combined	20%
Sanitary	20%
Partially Separated	19%
Mixed	41%
N=655	

As shown throughout this report, findings often differ significantly by household characteristics, and these findings can be used to provide further insight into the overall data. Significant differences also exist between some household characteristics, as shown in the next tables. As might be expected, homeowners were much more likely to have yards than renters, as shown in Table 4 (87% to 37%).

Table 4 Comparison of Owners/Renters by Presence of a Yard

Do you have a yard?	Owners	Renters	Overall
Yes	87%	37%	69%
No	13%	63%	31%
N=651, Sig. =< .05			

Table 5 shows that home ownership and presence of a yard differ by infrastructure types. Of particular notes is that sanitary system areas, where drainage is visible in open culverts and ditches, have a higher level of home ownership (likely single family homes with yards) than combined areas where piping is all underground. On the other hand, combined areas have a highest proportion of rentals by far (likely multifamily dwellings without yards).

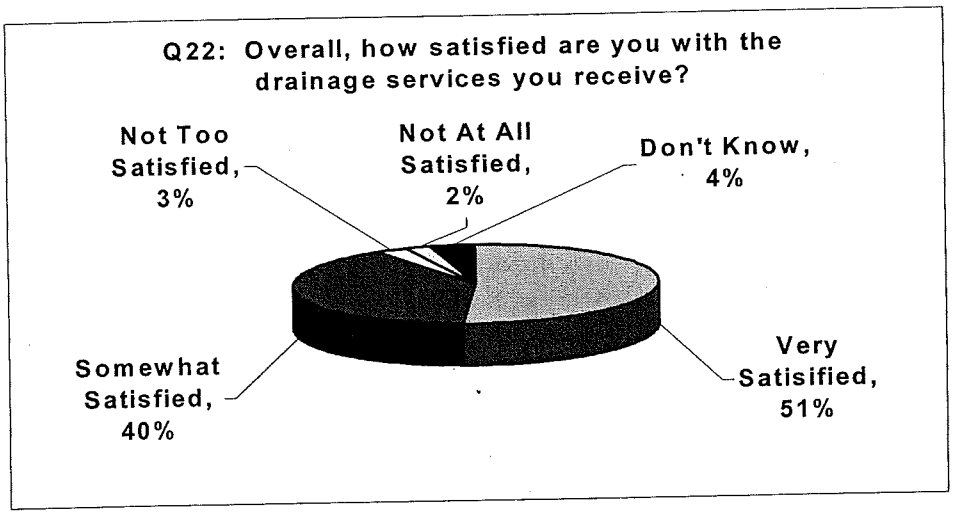
Table 5 Comparison of Infrastructure Groups by Owners/Renters and Yards

Do you own or rent your home?	Sanitary	Partially Separated	Combined	Mixed Group	Overall
Own	72%	67%	47%	66%	64%
Rent	28%	33%	53%	34%	36%
Do you have a yard?					
Yes	78%	74%	49%	71%	69%
No	22%	26%	51%	29%	31%
Sig. =< .05					

Overall Satisfaction

When asked to rate their overall level of satisfaction with the drainage services they received from SPU, just over half of respondents (51%) said they were very satisfied with the city's drainage services, while 40% were somewhat satisfied, and 5% were less than satisfied (see Figure 3).

Figure 3 Satisfaction with SPU Drainage Services



When asked to explain the reasons for their satisfaction ratings, many customers (62%) simply said they had had "no problems" with drainage at their homes or that SPU did a good job, as shown in Table 6 below. Another 8% said that problems were taken care of quickly and regularly and 4% said they had seen improvements in the drainage system.

Table 6 Reasons Behind Satisfaction Ratings

Categories	Percent
Positive comments	
No problems or good job	62%
Resolve problems quickly/regularly	8%
Have seen improvements (e.g. in water quality)	4%
Good job educating the public	3%
Costs are reasonable/cost-effective	2%
Other positive comments	5%
Negative or indifferent comments	
Minor, infrequent but sometimes persistent problems	14%
Storm drains or flooding concerns	10%
Costs too high	5%
Improve water quality/reduce pollution	5%
Always room for improvement	5%
Inform the public better/offer classes	4%
Clean drains/streets more often	4%
Want more sidewalks in my neighborhood	1%
Not familiar with them	5%
Other negative comments	4%
N = 627	
Total adds up to more than 100% because respondents were encouraged to give more than one reason	

Fourteen percent of customers reported a variety of what they termed minor or infrequent problems, while 10% specifically mentioned more regular flooding or storm drain problems such as debris build-up, and 5% said the costs were too high (note: some of these customers referred to their sewer bills as being too high).

Overall satisfaction levels varied by home ownership, with homeowners being significantly less likely to be very satisfied (49%) than renters (60%), as shown in Table 7. Satisfaction levels are likely related to the much lower proportion of renters living in single family homes with yards, where drainage or sewage problems more often occur, are more apparent, and require more direct action by customers.

Table 7 Satisfaction with Drainage Services by Renters Versus Owners

Level of Satisfaction	Owners	Renters
Very Satisfied	49%	60%
Somewhat satisfied	44%	36%
Not too satisfied	4%	3%
Not at all satisfied	3%	1%
N=624, Sig. =<.05		

Satisfaction with drainage services also varied significantly by viewpoints about the health of lakes and streams in Seattle (see Chapter 3 for more on these topics). As Table 8 clearly shows, the level of satisfaction is directly related to perceptions about the health of the city's lakes and streams: the higher the rating of surface water body health, the higher the level of satisfaction with overall drainage services.

Table 8 Satisfaction with Drainage Services by Lake and Steam Health

	Health of Lakes and Streams			
Level of Satisfaction	**Excellent**	**Good**	**Fair**	**Poor**
Very satisfied	63%	57%	49%	20%
Somewhat Satisfied	31%	40%	46%	55%
Not Too Satisfied	3%	2%	3%	15%
Not At All Satisfied	3%	1%	2%	10%
P = <.05 *N =*	*38*	*296*	*202*	*40*

Table 9 presents a less clear picture; however, those customers that think the health of lakes and streams has deteriorated are significantly less satisfied than those who think it has improved, stayed the same, or among those who don't know.

Table 9 Satisfaction with Drainage Services by Lake and Stream Improvements

	Health of Lakes and Streams Improved?			
Level of Satisfaction	**Improved**	**Stayed Same**	**Gotten Worse**	**Don't Know**
Very satisfied	56%	55%	42%	59%
Somewhat Satisfied	38%	41%	47%	38%
Not Too Satisfied	4%	2%	7%	2%
Not At All Satisfied	2%	2%	4%	1%
P=<.05 *N =*	*161*	*188*	*158*	*120*

Sewage Back-Ups

The survey specifically asked respondents about their experience with sewage back-ups and how satisfied they were with the services that SPU provides customers that experience such back-ups. Overall, only a small proportion of customers (13%) reported they had ever had a sewage backup at their home, as shown in Table 10; still, such occurrences can be memorable for customers given that raw sewage is backing up into their homes.

As Table 10 also shows, significant differences occurred among housing characteristics groups. Customers with yards were over three times as likely to have had a sewage backup as those without yards (17% vs. 5%). Similarly, homeowners, who more often have yards, were twice as likely as renters to have had a sewage backup (16% vs. 8%).

Table 10 Incidence of Sewage Back-Ups

Back-up?	Overall	Yard	No yard	Homeowners	Renters
Yes	13%	17%	5%	16%	8%
No	87%	83%	95%	84%	92%
N =655		*Sig = <.05*		*Sig = <.05*	

Those customers experiencing sewage back-ups (n=86) were asked a series of follow-up questions. Within this subgroup, 41% had had one backup, 26% had experienced two back-ups, 19% had had three or four back-ups, 13% had had five or more back-ups, and 2% were unsure of the number of back-ups. There were no significant differences by housing characteristics.

When asked about the cause of the back-up, 45% said the back-up was caused by a problem in their home's plumbing, while 34% said it was a problem with the City's sewer system, and 21% didn't know the location of the problem. When asked if they had even called to get help from SPU for a sewer back-up, only 6 of the 86 respondents said that they had done so. This small number is unreliable for reporting response time or satisfaction levels with response services.

Flooding Problems

All respondents were also asked if they had ever had any type of flooding problem near their home that occurred due to a storm. Flooding was not defined more specifically for respondents and thus could range from street puddling to water coming into homes.

Similar to the incidence of sewage back-ups, 13% (n=87) said they had experienced flooding problems (Table 11), and once again customers with yards and homeowners were significantly more likely to have experienced flooding, indicating a higher incidence of flooding in neighborhoods with single family homes. Only 8 customers experiencing flooding problems said they had called SPU for help; again, this number is insufficient for reliably reporting response times or satisfaction with the City's response to flooding problems.

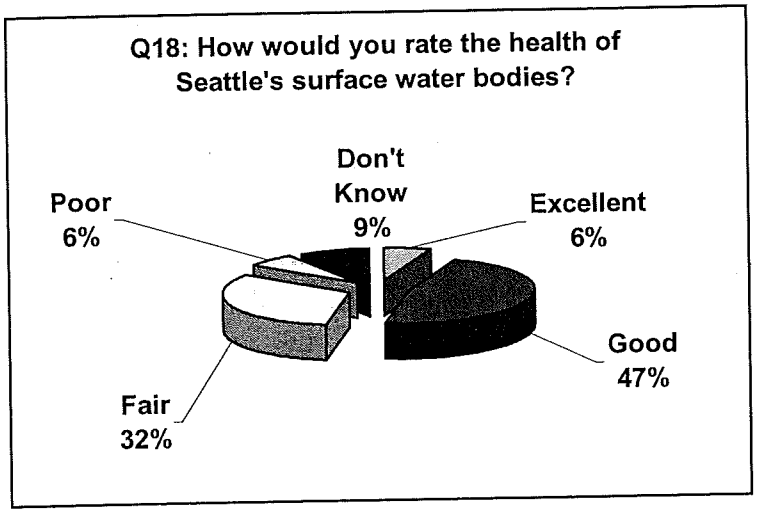
Table 11 Incidence of Flooding Problems

	Overall	Yard	No yard	Homeowners	Renters
Yes	13%	16%	8%	15%	10%
No	87%	84%	92%	85%	90%
N =	*655*	*Sig = <.05*		*Sig = <.05*	

Customers Rate the Health of Seattle's Lakes and Streams

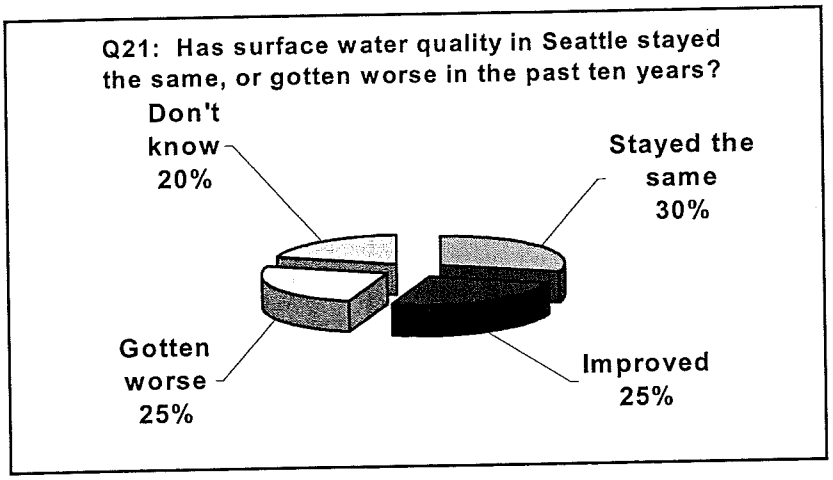
As shown in Figure 4, when customers rated the health of Seattle's lakes and streams, 6% rated surface water health as excellent, while 47% percent said it was good, 32% rated it as fair, 6% rated it as poor and 9% didn't know. Women tended to rate the health of lakes and streams lower than men (50% vs. 56% excellent or good).

Figure 4 Customers Rate the Health of Seattle's Lakes and Streams



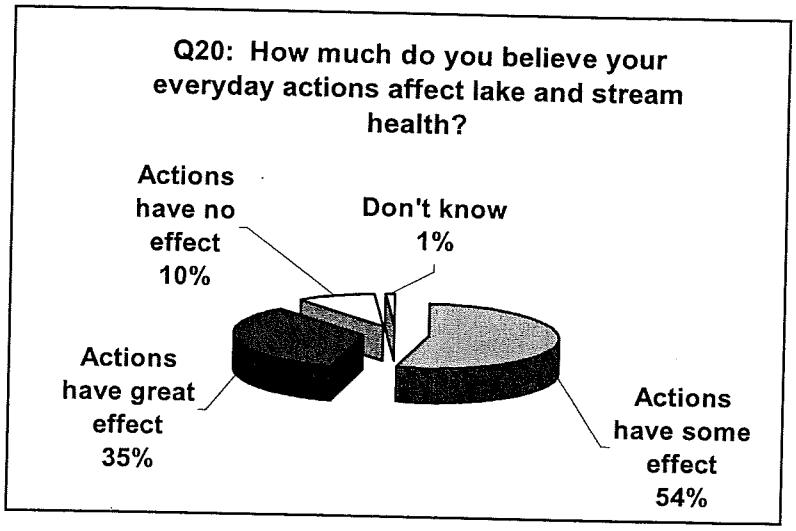
As shown in Figure 5 below, when customers were asked for opinions on the relative improvement in surface water quality in the past 10 years, responses were divided. Just under one-third (30%) said that surface water quality had stayed the same, 25% said it had gotten worse, 25% said it had improved, and a large proportion (20%) said they didn't know.

Figure 5 Changes in Surface Water Quality over the Past Ten Years



When asked about their individual influence on the health of Seattle lakes and streams, most customers believe their everyday actions have some (53%) or great (35%) effect. Only 10% said their everyday actions had no effect on lake and stream health. (See Figure 6)

Figure 6 Effects of Everyday Behavior on Stream and Lake Water Quality



Findings varied significantly by gender and home ownership. Women, by a wide margin, more often responded that "My actions have a great effect" on the health of Seattle's lakes and streams as compared to men (45% of women vs. 26% of men). Renters and homeowners also differed significantly in their response to this question. Homeowners were more likely to respond "My actions have great effect" compared to renters (38% vs. 32%). Renters were more likely to select "My actions have no effect" compared to homeowners (14% compared to 8%).

Chapter 3: Customer Preferences for Enhanced Services

Customers were asked several questions to help guide SPU in its allocation of resources among competing priorities for drainage and wastewater services. First, customers gave level-of-importance ratings for six key utility funding uses. Results, ordered by the highest proportion of very important" ratings are shown in Table 12.

Table 12 Importance of Funding for Drainage and Water Management Services:

	Very Important	Somewhat Important	Not too important	Not at all important	DK/ NA
Keeping up the drain system we already have.	82%	16%	1%	0%	2%
Improving the water quality in lakes and streams.	74%	23%	1%	1%	1%
Protecting public property such as roads/sewers from landslides, floods, and other disasters.	69%	26%	3%	1%	1%
Making improvements to stream & lake habitats	60%	34%	2%	2%	2%
Reducing flooding in neighborhoods where it occurs	57%	34%	5%	2%	2%
Protecting recreation uses of lakes and streams for swimming and fishing.	55%	38%	6%	1%	1%

N =655 for all questions

Totals may add to more than 100% due to rounding.

Respondents in general saw all six uses as important. Combined very important and somewhat important rankings ranged from 91% to 98% for each use. In looking only at the very important ratings, however, the highest rating was for keeping up the current drain system (82%), followed by making improvements to water quality in lakes and streams (74%). Protecting public property from landslides, floods, and other disasters was also seen as very important by over two-thirds of respondents (69%). These results suggest that the public tends to see basic maintenance and water quality improvements as the most important uses.

Significant differences did appear by some housing characteristics. Renters and those without yards were significantly more likely than homeowners and those with yards to rate improving stream and lake habitats and water quality as very important. On the other hand, homeowners and those with yards were significantly more likely than renters and those without yards to say keeping up the drain system we already have was very important. These results are notable because homeowners with yards are an especially important group to influence about the importance of the water quality and habitats in lakes and streams: they both pay the drainage fee and their yard care is very important to the health of surface water bodies.

In addition to the four housing characteristics, differences between those who had experienced flooding and those who hadn't were examined in terms of their responses to this set of questions. There were no significant differences found between those who had experienced flooding and those who hadn't for any of the items.

When customers were asked to choose the single most important use of resources among the six funding choices, findings are consistent for the top two priorities, but customers ranked improving water quality first (37%), followed by maintaining the present drainage system (25%). Improving habitats is ranked third with 15% of customers. These results suggest that environmental quality is key to customer priorities and for many takes precedence, or is equal to, basic maintenance activities. Protecting recreational uses was the lowest rank priorities for customers. (See Table 13)

Table 13 Single most important way for the City to spend drainage resources

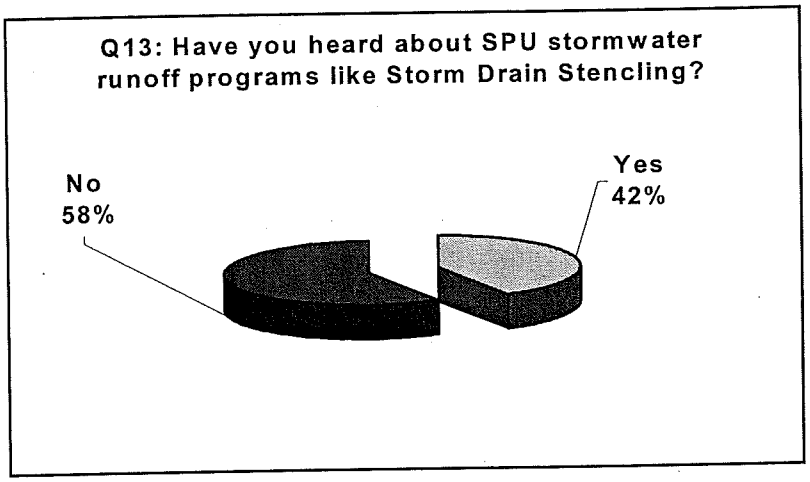
	Percent
Improving water quality in lakes & streams	37%
Maintaining the present drainage system	25%
Improving habitats	15%
Reducing flooding	10%
Protecting public property from damage	8%
Protecting the recreational uses of lakes and streams	5%
N = 655	

Once again, however, crosstabs with owners and renters, and those with and without yards, reveal a clear tendency among owners and those with yards to favor maintenance and protection of drainage systems over more environmental improvement uses, when they are asked to choose between the two.

Chapter 4: Water Quality Program Awareness and Interest in Stormwater Programs

Fewer than half of respondents overall (42%) said they had heard about SPU storm water runoff programs like Storm Drain Stenciling, as Figure 7 shows.

Figure 7 Awareness of SPU Stormwater Runoff Programs



Homeowners (47%) and those with yards (47%) were significantly more likely to have heard about these programs compared to renters (35%) and those without yards (31%).

When asked how they heard about these programs, customers mentioned a variety of ways. They most frequently mentioned newspaper ads (33%), followed by word-of-mouth (26%) and the actual stencils on the storm drains themselves (19%). Other sources are listed in Table 14.

Table 14 Sources of Information About Runoff Programs

Category	Percent
Newspaper ads or stories	33%
Word of mouth (friend, coworker etc.)	26%
I've seen the stencils/seen signs	19%
TV ads or stories	14%
Information I received in the mail/bill insert	9%
At school or volunteer organization	6%
At work/through where I used to work	3%
Web sites	2%
Radio	2%
Other	3%
Don't know/don't remember	3%

N = 273 Total adds to more than 100% because respondents could give more than one answer.

A series of crosstabs provides further insight into the effects of customers being aware of stormwater runoff programs. As Table 15 shows, those who are and are not aware of runoff programs do not rate the health of lakes and streams similarly. However, those who are aware of runoff programs are significantly more likely to believe water quality has improved in lakes and streams in the past 10 years and to believe that their actions greatly affect the health of lakes and streams.

Table 15 Health of Seattle's Lakes and Streams and Awareness of Programs

Ratings of Health in Seattle's Lakes and Streams	Aware Runoff Programs	Not Aware of Runoff Programs
Excellent	7%	6%
Good	48%	54%
Fair	37%	34%
Poor	8%	6%
NS. *N* =	258	331

Interest in Drainage Programs Participation

The 450 respondents who had yards were asked a special set of questions about their interest in participating programs that would help control the effects of stormwater runoff and benefit lakes and streams. Table 18 summarizes their interest in these various program offerings, and shows that about one-third of customers say they are very likely to participate in one or more of the program. (Note: "Very likely to participate" should be interpreted as "very interested.") The two highest rated program ideas were for SPU to (1) provide rebates on water management equipment such as cisterns (37% very likely to participate), and (2) give customers incentives to reduce water runoff (35% very likely).

Table 16 Interest in Participating Stormwater Runoff and Drainage Programs

(N =450)	Very Likely	Some-what Likely	Not too Likely	Not at all Likely	DK/NA
Q18 Likelihood of participating in a program that:					
Gave you a **rebate on water management equipment** like rain barrels/cisterns.	37%	32%	14%	15%	3%
Provided financial incentives to reduce amount of water runoff you send to the City's drainage system.	35%	32%	16%	12%	4%
Gave you **free training** on water conservation/ natural law care practices in your neighborhood.	30%	30%	21%	18%	2%
Reduced bill paid for drainage if you reduce size of areas where water can't seep through.	29%	26%	19%	20%	6%

Totals may add to more or less than 100% due to rounding.

Men and women were significantly different in terms of their interest in participating in conservation and natural lawn care training sessions in their neighborhoods, with women saying they were much more interested in these course (see Table 17).

Table 17 Interest in Free Water Conservation/Natural Yard Care Training by Gender

	Male	Female	Overall
Very likely	24%	36%	30%
Somewhat likely	33%	28%	30%
Not too likely	28%	15%	21%
Not at all likely	16%	20%	18%
P=>.05			

APPENDIX A

Public Information Materials

Contents:

Residential Customer Survey

Community Groups Contacted for Comments

Comments Received at Public Meetings

Creeks, Drainage, and Wastewater Citizen Advisory Committee Reports

Residential Customer Survey

Seattle Public Utilities
2003 Drainage and Wastewater Management Residential Customer Survey

Final Report

Prepared for:

Seattle Public Utilities

Prepared by:

Dethman & Associates
3600 38th Avenue South
Seattle, Washington 98144

August 2003

Table of Contents

Executive Summary 4
Study Background, Purposes, and Methods 4
Key Findings 5
Satisfaction With Drainage Services 5
Rating the Health of Seattle's Lakes and Streams 6
Enhancing or Adding Drainage and Wastewater Services 7
Chapter 1: Introduction and Methods 9
Study Background and Purposes 9
Study Methods 9
Table and Figure Notes 10
Chapter 2: Views of Drainage and Wastewater Services 11
Household Characteristics 11
Overall Satisfaction 13
Sewage Back-Ups 15
Flooding Problems 16
Customers Rate the Health of Seattle's Lakes and Streams 17
Chapter 3: Customer Preferences for Enhanced Services 19
Chapter 4: Water Quality Program Awareness and Interest in Stormwater Programs21
Interest in Participating in Drainage Programs 22

Table of Tables

Table 1 What is the single most important way to spend drainage and wastewater resources? 7
Table 2 Likelihood of Participating Stormwater Runoff and Drainage Programs 8
Table 3 Summary of Household Characteristics 12
Table 4 Comparison of Owners/Renters by Presence of a Yard 12
Table 5 Comparison of Infrastructure Groups by Owners/Renters and Yards 13
Table 6 Reasons Behind Satisfaction Ratings 14
Table 7 Satisfaction with Drainage Services by Renters Versus Owners 14
Table 8 Satisfaction with Drainage Services by Lake and Steam Health 15
Table 9 Satisfaction with Drainage Services by Lake and Stream Improvements 15
Table 10 Incidence of Sewage Back-Ups 16
Table 11 Incidence of Flooding Problems 16
Table 12 Importance of Funding for Drainage and Water Management Services: 19
Table 13 Single most important way for the City to spend drainage resources 20
Table 14 Sources of Information About Runoff Programs 21
Table 15 Health of Seattle's Lakes and Streams and Awareness of Programs 22
Table 16 Interest in Participating Stormwater Runoff and Drainage Programs 22
Table 17 Interest in Free Water Conservation/Natural Yard Care Training by Gender 23

Table of Figures

Figure 1 Baseline Overall Satisfaction with SPU Drainage Services 5
Figure 2 Baseline Rating for Surface Water Body Health 6
Figure 3 Satisfaction with SPU Drainage Services 13
Figure 4 Customers Rate the Health of Seattle's Lakes and Streams 17
Figure 5 Changes in Surface Water Quality over the Past Ten Years 17
Figure 6 Effects of Everyday Behavior on Stream and Lake Water Quality 18
Figure 7 Awareness of SPU Stormwater Runoff Programs 21

Executive Summary

Study Background, Purposes, and Methods

This is the first SPU survey focused on customer views of drainage and wastewater services. Attention to these services, while always important and requiring significant utility resources, has shifted in recent years. Historically, SPU has approached drainage services from a conveyance-focused standpoint, with the main trunk system being the solution for drainage problems, and with water quality and habitat issues being dealt with on an as needed basis.

However, with its 2004 Comprehensive Drainage Plan, SPU is being more proactive in its approach to water quality and habitat enhancement. SPU is also looking at flooding, habitat, and water quality issues from a drainage basin, citywide standpoint. At the same time, SPU must decide how to best allocate utility resources among key drainage and wastewater management activities. This survey report is one way SPU has gathered public input on how to prioritize its core drainage services.

The purposes of this survey were to:

- Determine ratepayers' satisfaction with current drainage and wastewater services
- Establish baselines for service indicators so SPU can track these indicators over time through future surveys and other research
- Determine enhanced or additional services ratepayers would like SPU to provide

Beginning in mid-2002, SPU began the transition to an asset management approach, which allows SPU to select the most cost-effective ways to construct and implement new projects, maintain existing systems, and design and administer programs. SPU's asset management–based approach is aimed at meeting agreed upon customer and environmental service levels at the lowest cost, calculated over the life of a project and including maintenance.

A critical step in making asset management decisions is to define the customer and environmental levels of service. Customer levels of service are the utility's commitments to its customers (for example, preventing flooding of major arterials in the city for a certain level storm). Environmental levels of service are those commitments that are driven by environmental regulations or the utility's environmental values.

This survey is one of many tools that SPU is using to help define customer levels of service. By determining levels of satisfaction, customer expectations and additional services that customers would like SPU to provide, SPU can use this survey to make

more informed decisions about projects and programs. And evaluate, over time, whether it is meeting customer expectations.

SPU and Dethman & Associates worked closely to develop and implement this research. The randomly drawn, representative sample of 655 residential Seattle households reliably estimates the overall Seattle population of SPU customers, carrying a margin of error of +/- 4% at the 95% confidence level. Market Trends, Inc. fielded the telephone interviews in March and April 2003.

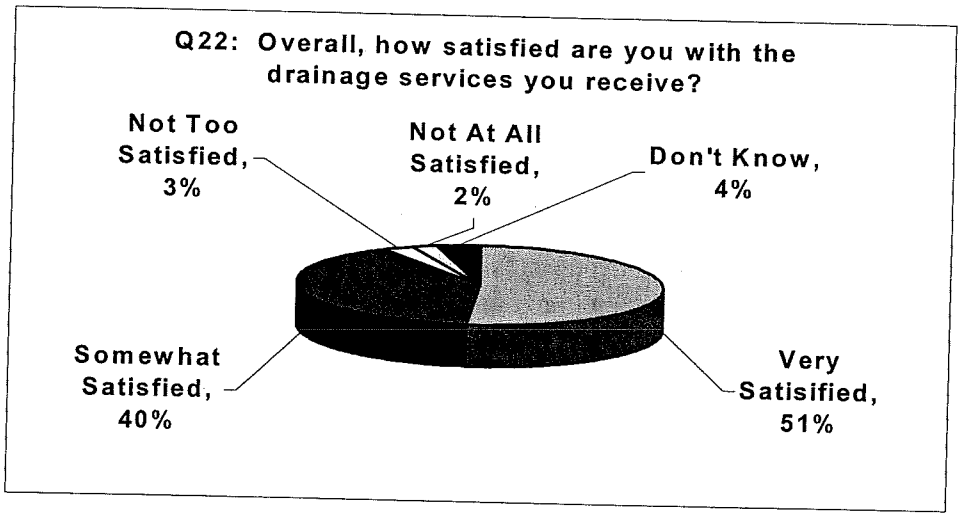
Key Findings

Key findings, organized around the purposes of the survey, are highlighted in this Executive Summary. More detailed information can be found in the main body of the report. Appendix A contains a copy of the final survey instrument. SPU also will maintain the survey data, verbatim comments to open-ended survey questions, and additional data tables in an electronic file.

Satisfaction With Drainage Services

- Overall, 91% of customers were very satisfied or somewhat satisfied with SPU Drainage Services, as shown in Figure 1 below.

Figure 1 Baseline Overall Satisfaction with SPU Drainage Services



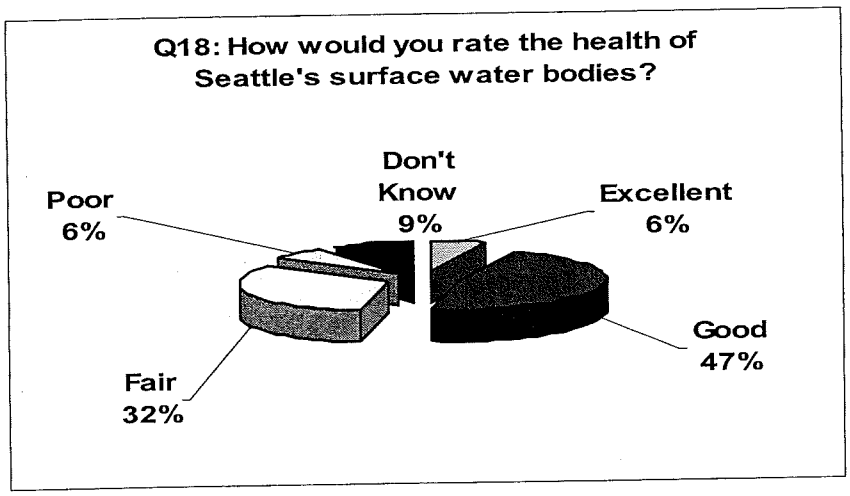
- Homeowners were significantly less likely than renters to be very satisfied with those services (49% versus 60% very satisfied).
- When asked for reasons behind their satisfaction ratings, many customers gave general answers. The most frequent positive reason (62%) was to say they had "no problems" or that the City was doing a "good job." The most frequent negative comments were about a variety of minor drainage problems (14%) or problems with storm drains or flooding (10%).

- Satisfaction ratings were directly related to perceptions about the health of the city's lakes and streams. Customers that feel these bodies of water are healthy gave significantly higher overall satisfaction ratings.
- The baseline level of customers who had experienced sewage back-ups in their homes is 13% (86 respondents). Of this group, 34% (or 4% of all respondents) attributed the problem to the City's sewer system, and only 6 respondents (or 1% of all respondents) had called SPU for help.
- As with sewage back-ups, 13% of customers reported experience with **any** type of flooding problems near their homes due to a storm. Only 8 respondents (or 1% of all respondents) had ever called SPU for help.
- For both back-ups and flooding, homeowners were more likely to have experienced flooding problems than those renting their homes.

Rating the Health of Seattle's Lakes and Streams

- Just over half of customers (53%) rated the health of Seattle's lakes and streams as excellent (6%) or good (47%), while 38% said it was fair (32%) or poor (6%), and 9% could not rate lake and stream health (see Figure 2).

Figure 2 Baseline Rating for Surface Water Body Health



- Baseline measures of surface water quality show diverse views: 30% said surface water quality has stayed the same, 26% said it has gotten worse, 25% said it has improved, and 20% said they don't know.
- Most respondents (89%) said they believed their everyday actions have some effect (53%) or great effect (35%) on the health of Seattle's streams and lakes.
- Women were significantly more likely than men to say their actions had a great effect on stream health (45% of women compared to 26% of men). Homeowners were also significantly more likely than renters to feel they could directly affect stream health.

Enhancing or Adding Drainage and Wastewater Services

- Although customers agreed that all six of the drainage activities referenced in the interview were important, they ranked "keeping up the drain system we already have" and "improving the water quality in lakes and streams" as the two most important uses of funds (82% and 74% very important respectively).
- When asked to choose the single most important way for the City to spend its resources, water quality and maintenance again were the highest ranked choices: improving water quality in lakes and streams was chosen by 37% of customers, and basic maintenance was chosen by 25% of customers, as shown in Table 1 below.

Table 1 What is the single most important way to spend drainage and wastewater resources?

	Percent
Improving water quality in lakes & streams	37%
Maintaining the present drainage system	25%
Improving habitats	15%
Reducing flooding	10%
Protecting public property from damage	8%
Protecting the recreational uses of lakes and streams	5%
N = 655	

- Homeowners are significantly more likely than renters to favor use of funds for maintenance rather than for environmental upgrades.
- When asked how likely they were to participate in each of four potential utility-sponsored programs, about one-third of customers with yards (n = 450) said they were very interested in each one (see Table 2). The most popular program was one that would give a rebate on water management equipment (37% very likely to participant), with the next most popular one being a program and would pay incentives to reduce water runoff.

Table 2 Likelihood of Participating Stormwater Runoff and Drainage Programs

	Very Likely	Some-what Likely	Not too Likely	Not at all Likely	DK/NA
Rebate on water management equipment like rain barrels/cisterns	37%	32%	14%	15%	3%
Financial incentives to reduce amount of water runoff sent to the City's drainage system	35%	32%	16%	12%	4%
Free neighborhood training on water conservation/ natural law care practices	30%	30%	21%	18%	2%
Reduced bill for drainage if size of impermeable areas is reduced.	29%	26%	19%	20%	6%

Totals may add to more or less than 100% due to rounding.

- 42% of customers reported having heard about SPU stormwater runoff programs such as Storm Drain Stenciling. Homeowners and those with yards were both more likely to have heard about such programs, compared to renters and those without yards, suggesting that outreach has successfully targeted key audiences.
- Most customers found out about water runoff programs through newspaper ads or stories (33%), word of mouth (26%), or actually seeing the stencils on storm drains (19%).
- Those who are aware of water quality programs to control stormwater runoff are significantly more likely to think stream and lake water quality had improved and that their individual actions do make a difference to water quality.

APPENDIX A

SPU DRAINAGE SURVEY FINAL VERSION 3-20-03

Hello. I'm calling on behalf of Seattle Public Utilities. We're conducting a survey of a small group of customers to better understand how well their sewer and drain systems work and what Seattle Public Utilities can do to improve service to you. Your opinions are essential to making services better for all Seattle residents. The survey will take about five minutes.

First, just to double-check, are you a resident of Seattle?

1 Yes
2 No/DK (thank respondents and politely say the survey is only for Seattle residents)

1. The first questions are to assess sewer capacity. Have you ever had a sewage backup in your house? (INTERVIEWER (READ IF NECESSARY) A **sewage backup** is when sewage backs up into your home because the sewage lines are not functioning properly. Generally, the sewage backs up into the lowest point in your home that is connected to your sewer, like a downstairs shower or drain.)

   1 Yes
   2 No (go to Q8)
   3 DK/REFUSED (go to Q8)

2. How many times have you had a sewage back up? Would you say . . .

   1 Once
   2 Twice
   3 3-4 times
   4 5 times or more
   5 DK/REFUSED

3. Was the most recent backup you remember caused by a problem that originated . . .

   1 Within your house?
   2 Within the City of Seattle's system?
   3 (DO NOT READ) DK/REFUSED

4. Have you ever called Seattle Public Utilities to get help for a sewer that was backed-up?

   1 Yes
   2 No (Go to Q8)
   3 (DO NOT READ) DK/REFUSED (Go to Q8)

5. How quickly were they able to help you with your backup problem?

   1 Less than one day
   2 1 to 2 days
   3 More than 2 days
   4 DK/REFUSED

6. How satisfied were you with the service that you received when you called about the back up? Would you say you were. . .

   1 Very satisfied
   2 Somewhat satisfied

3 Not too satisfied
4 Not at all satisfied
5 DK/REFUSED

7. Why do you say (fill in rating)?

_____

8. Have you ever had a flooding problem near your home that occurred due to a storm?

1 Yes
2 No (Go to Q13)
3 DK/REFUSED (Go to Q13)

9. Have you ever called Seattle Public Utilities to get help for a flooding problem from a storm that occurred near your home?

1 Yes
2 No (Go to Q13)
3 DK/REFUSED (Go to Q13)

10. How quickly were they able to help you with the flooding problem?

1 Less than one day
2 1 to 2 days
3 More than 2 days
4 (DO NOT READ) DK/REFUSED

11. How satisfied were you with the service that you received when you called about the flooding problem? Would you say you were. . .

1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not at all satisfied
5 (DO NOT READ) DK/REFUSED

12. Why do you say (fill in rating)?

_____

I now have some questions about stormwater runoff. Stormwater runoff is rainwater that comes off rooftops, driveways and other surfaces, and ends up in our streams and lakes. Stormwater can affect the quality of this water by carrying pollutants, by changing the temperature of the water, or by changing the flow of the water.

13. Seattle Public Utilities is the city agency responsible for controlling the quality of water and reducing the damage to our lakes and streams from stormwater runoff. They sponsor programs like "Storm Drain Stenciling" where people can get involved in efforts to ensure lakes and streams are protected from the bad effects of stormwater runoff. Have you heard about these programs?

(INTERVIEWER (READ IF NECESSARY) Seattle's **drinking water** comes from watersheds in the Cascade Mountains. For the purpose of this survey we are only addressing the water quality of surface water, the rainwater that drains off you home or property, and ends up in creeks, streams, lakes and rivers.)

1 Yes

2 No (go to Q15)
3 DK/REFUSED (go to Q15)

14. How did you hear about these programs? (indicate all responses)

1 Word of mouth (friend, coworker etc.)
2 Newspaper ads or stories
3 Web sites
4 TV ads or stories
5 Other (please specify) _____

15. Aside from meeting regulatory requirements, Seattle Public Utilities must decide how it will allocate utility resources among various activities. Please rate how important you think it is for the utility to spend money on the following activities. The first one is. . .would you say that's. . . .

	Very Important	Somewhat Important	Not Too Important	Not At All Important	(DO NOT READ) DK/REFUSED
a. Reducing flooding in neighborhoods where it occurs					
b. Making improvements to stream and lake habitats					
c. Keeping up the drain system we already have					
d. Protecting public property such as roads and sewers from landslides, floods, and other disasters					
e. Improving the water quality in lakes and streams					
f. Protecting the recreational uses of lakes and streams for swimming and fishing					

16. You've just rated the importance of six water management activities:

1 Reducing flooding
2 Improving habitats
3 Maintaining the present drainage system
4 Protecting public property from damage
5 Improving water quality in lakes and streams, and
6 Protecting the recreational uses of lakes and streams.

17. Of these six uses, which use do you think is the very most important way for the City to spend its resources? (Repeat as needed to help respondent choose; fill in number from list above)

_____

(INTERVIEWER (READ IF NECESSARY) Seattle's **drinking water** comes from watersheds in the Cascade Mountains. For the purpose of this survey we are only addressing the water quality of surface water, the rainwater that drains off you home or property, and ends up in creeks, streams, lakes and rivers.)

Q.17a Do you have a yard?

1 Yes - Continue
2 No - Skip to Q.19

Seattle Public Utilities would like to help residents improve water quality, reduce stormwater flows and practice natural lawn care.

18. How likely would you be to take part in a city-sponsored program that. . .

	Very Likely	**Somewhat Likely**	**Not too Likely**	**Not at all Likely**	**(DO NOT READ) DK/REFUSED**
a. Provided you financial incentives to reduce the amount of water runoff that you send to the City's drainage system					
b. Reduced the bill you pay for drainage if you reduce the amount of surface on your property where water can't seep through, like concrete and asphalt					
c. Gave you a rebate on water management equipment like rain barrels or cisterns					
d. Gave you free training on water conservation and natural lawn care practices in your neighborhood					

Now I have some general questions about Seattle's lakes and streams.

19. *Overall, how would you rate the health of Seattle's surface water bodies?*
    1 Excellent
    2 Good
    3 Fair
    4 Poor
    5 (DO NOT READ) DK/REFUSED

20. How much do you believe your everyday actions affect the health of Seattle's streams and lakes? Would you say . . .
    1 My actions have no effect
    2 My actions have some effect
    3 My actions have great effect
    4 (DO NOT READ) DK/REFUSED

21. Do you think surface water quality in Seattle area streams, lakes and other water bodies has improved, stayed the same, or gotten worse in the past 10 years?

    1 Improved
    2 Stayed the same
    3 Gotten worse
    4 DK/REFUSED

22. We've talked about various parts of Seattle's drainage services, such as controlling floods and reducing the impacts of storm water on streams and lakes. Overall, how satisfied are you with the drainage services that you receive from Seattle Public Utilities? Would you say . . .

    1 Very satisfied
    2 Somewhat satisfied
    3 Not too satisfied
    4 Not at all satisfied

5 (DO NOT READ) DK/REFUSED

23. Why do you say (fill in rating)?

_____

24. Finally, just for analysis purposes, do you rent your home or own it?

1 Rent/lease/or other non-home owner
2 Homeowner
3 DK/REFUSED

25. And what is your zip code please? _____

That's all the questions I have. Thank you so much for you help!

26. Record respondent gender:
1 Female
2 Male
3 DK/REFUSED

Community Groups Contacted for Comments

Groups Contacted for Comment on the 2004 Comprehensive Drainage Plan

Organization	Address	Contact	Contact Date	Form of Contact
Business Groups				
Seattle Chamber of Commerce (Utilities Committee)	Suite 2400 Seattle, Wa 98101	Eugene Wasserman	11/13/2003	Meeting
North Seattle Industrial Association	Adobe Campus Bldg 701Rm 3 701 N. 34th 98103	Eugene Wasserman	5/27/2003 & 2/24/2004	Meeting
Master Builders		Scoot Hildebrand/Tim Attebery	4/7/2003	E-mail
ECOSS	8201 10th Ave. S. 98108	Charlie Cunniff	12/16/2003	phone call
South Park Business Association	8814 14th Ave. S.	Charlie Cunniff	2/18/2004	Meeting
Association of Realtors		Randy Bannecker	4/6/2003	Phone call & e-mail
Watersheds				
Fauntleroy Watershed Council	Fauntleroy Church Hall	Judy Pickens	11/13/2003 & 1/8/2004	Meeting
Piper's Creek Watershed Council	Carkeek Park Environ. Learning Cen.	Martha Tuttle, Beth Miller (SPU)	5/8/2003 & 1/21/2004	Meeting
Thornton Watershed Council			5/28/2003 & 1/28/2004	Meeting
Longfellow	Camp Long	Sheryl Shapiro	1/12/2004	Meeting
District Councils/Community Councils				
Neighborhood Service Center Coordinators	Artic Bldg 1002	Brent Crook	2/1/2003	Meeting
City Neighborhood Council	West Precinct Conf. Rm		3/31/2003	Meeting
North District Neighborhood Stewardship Group	NE123rd	Cheryl Klinker	6/9/2003 & 1/7/2004	Meeting
NW DC	8515 Greenwood Ave. N.	Beth Pflug	2/26/2003 & 1/28/2004	Meeting
SW DC	SCCollege	Stan Lock	2/5/2003 & 1/7/2004	Meeting

Organization	Address	Contact	Contact Date	Form of Contact
NE DC	Wedgwood Presbyterian Chruch 8008 35th Ave NE		1/8/2004	Meeting
Duwamish DC	8201 10th Ave. S. Park Neigh. Cen.	Glenn Harris	1/28/2004	Meeting
Central DC	500 30th Ave. S. Central Area Senior Center	Ted Divina	2/12/2004	Meeting
Lake Union DC	908 N 34th St.	Steve Louie	3/3/2003	Meeting
Broadview CC	Luther Memorial Church, Greenwood Ave.	Paul Miles	5/22/2003	Meeting
Greenwood CC	Greenwood Neighborhood Service Center	Kate Martin	4/15/2003	Meeting
Maple Leaf CC	Olympic View Elementary School 504 NE 95th St.		1/28/2004	Meeting
Licton Springs CC				Meeting
Environmental				
Coordinated Environmental Meeting	911 Western Ave. Suite 580, Seattle 98104	Pam Johnson	1/23/2004	Meeting
People for Puget Sound	911 Western Ave. Suite 580, Seattle 98104	Kathy Fletcher/Pam Johnson	May, 2003	Meeting
Audubon		Laruen Braden	4/6/2003	Phone Call & e-mail
Duwamish River Cleanup Coalition		Pam Johnson		Attended env. Meeting
Puget Sound Keepers				Attended env. Meeting
Sierra Club				Attended env. Meeting
Thornton Creek Alliance	Olympic View Elementary School 504 NE 95th St.	Bob Vreeland/Cheryl Klinker	4/21/2003	Attended env. Meeting
Good Government				
Municipal League		Mr. Barber	4/7/2003	E-mail
League of Women Voters	1402 18th Ave Seattle 98122	Ann Aagaard	3/31/2003	E-mail
Large Ratepayers				
Port of Seattle		Wayne Grotheer/John Okomoto	4/6/2003	e-mail
U. of W.		Theresa Doherty/ Jan Arntz	5/9/2003	meeting
Seattle Housing Authority		Harry Thomas	3/23/2003	phone call
Agencies				
Ecology		Bill Moore		e-mail and meeting?
WDOT				
King County		Don Theiler/ Betsy Cooper	Feb-03	Meeting
Lake Union Action Team			Feb-04	Meeting

Comments Received at Public Meetings

Comprehensive Drainage Plan 2005–2010
Public Outreach 2003
Compilation of Comments

Fall 2003 Public Meetings

Verbal comments from the public as recorded by an SPU notetaker

- Commented that water quality is number one but SPUs budget priority doesn't seem to reflect this.
- More money needs to go to flood control.
- SEA Streets are great.
- Track old garbage dumps to keep drainage water away from these areas.
- Maintenance problem on creeks. City is asking citizens to do too much.
- Citizen is concerned that City seems to be allowing more mother-in-law development, so more paving is happening.
- Concerned about growth in the Aurora / Lichton Springs area.
- Would like more information about protection from landslides on private property.
- We should consider automatic shutoff valves in pipes in landslide areas.
- Concerned about condos sliding into I-5.
- Citizen was concerned about consistency of a City contact while dealing with an ongoing drainage problem.
- Concerned about de-watering in Greenwood neighborhood.
- Would like to see these projects done faster - SPU already made lists when we went through the urban village process years ago.
- The 2002 expenditure "pie" shows a very different amount spent on water quality than I think it should be, given your figures from the random survey.
- SEA Streets are terrific, thanks!
- Coordinate with groups in the city that do permitting. Since density is increasing there will be increased impervious surface. It is a concern that the thresholds to trigger code review and enforcement are too high to capture some of the smaller (but potentially cumulative) effects of increased density and development on runoff. It is good to give incentives to developers, but this is not the only answer.
- The City should require developers / construction sites to use only clean sand to help solve water quality problems.
- Concern about fluoride and caffeine in the water system.
- I am tired on studies, it is time to do the work.
- Don't ignore private property when considering landslide protection.
- Concerned that Natural Drainage Systems (NDS) are being introduced in an urban environment. Perhaps these projects are not really NDS, for example, SEA Streets used lining.
- In West Seattle drainage seems to be improving.
- Maintain current water quality.
- Public asset protection is too narrowly defined.
- On Marine View Drive (in W. Seattle) the City spent money on 47th St., below us, but we don't have a storm sewer because the City says it is King County.
- I would support the City moving toward mitigation of landslide areas even on non City property.
- Regarding major policy shifts - Citywide landslide mitigation and NDS are not compatible. There are more effective ways to deal with water quality issues.
- The sewage continues to back up in the West Seattle Junction area.

Spring 2003 Public Meetings

Verbal comments from the public as recorded by an SPU notetaker

- Comment regarding Asset Management - we have different concerns than a business.
- We have already seen significant rate increases; the decision has been made to make the "pie" bigger, but nothing has been done here (South Park) in terms of drainage.

- Lots of areas are landslide prone; this should go into the same category as flooding; reducing flows through use of discharge to the ground doesn't work well in such areas.
- We should not be looking at just protection of City owned assets.
- We need to look at localized areas for flooding, and consider what development should be required to do (example of Bellevue and sumps)
- We need to know the time frame over which these standards (level of service) could be achieved.
- Some were "shocked" that all the projects for South Park will have to go through an asset mangement review and be prioritized through the CDP. They believed that SPU had promised that this work would be done.
- More emphasis needed to protect city assets
- SPU should consider implementing incentives for green roof installation.
- Reiterate that we need to look at the big picture. Identify risk in areas such as flooding, landslides, erosion, etc. and mapping of slide areas. These have a huge financial impact. Want to see this level of detail in the DEIS. Also, don't hear much about other agencies being concerned with drainage and landslides. Encouraged that SPU is making the connection with other agencies. City-wide prioritization needs to anticipate development and work with DCLU.
- General concern about Clean Water Act and that developers ignore the rules because fines are so low.
- Money needs to be clearly identified. All costs of future development, transportation, etc. should be forcast in short and long term planning.
- SPU should account for ground water in planning.
- Include criteria for both flooding and landslides - these two notions should not be separated.
- Concern about pesticide use in Seattle.

2003 Public Meetings

Written comments compiled from surveys

Subject: Stormwater Conveyance

- Moving away from the trunk line system is good idea.
- SPU is going in the right direction.
- Support varying levels of protection. Natural Drainage Systems are very appropriate.
- Policy shift moving toward protection of public property at lower levels is a good thing for the taxpayers of Seattle. This program area should be called "Stormwater & Flooding Control"
- Please make sure that while the city rushes to meet requests for sidewalks as called for in neighborhood plans by installing stamped asphalt with curbs and no drainage, they are not taking us backwards. This will offset all the good work being done with natural drainage systems! This plan should emphasize improved coordination between SPU and Seattle Dept. of Transportation.
- 55% in flood control is unsatisfactory. It should be closer to 80%. We are not getting enough for our tax dollar.
- Health & Safety "key" - This needs to be addressed as completely as possible or else we will get a groundswell from angry folks and not be able to do the fun stuff!
- Explore natural drainage systems as appropriate (not in landslide areas).

Subject: Water Quality

- You need to follow guidelines.
- SPU is going in the right direction.
- Monitor suspected problems - good - one is influenced by the other.
- Strongly support the long term vision and policy shifts.
- Number one priority is our watershed.
- Highest priority. What we do for this will help address flooding in trying to achieve sediment/erosion control, and better protect the health of people, their children and pets, and wildlife. Glad to hear we will start monitoring! Let's look at all contaminants from pesticides, fecal coliform, metals, industrial waste and hormone disruption in fish and other wildlife. Emphasize this is for people too, not just fish.
- I think that people are aware of this issue - reduce flooding.

- Do a better job of communicating existing problems. The steps to improve WQ are incorporated in stormwater conveyance and flow control and habitat activities. Think - source control activities more important than expanding WQ monitoring in salt water beaches.
- Interrelated - highly support long term vision and policy shift.
- Clearly this area is considered far more improtant than in past plans. That is good.
- It seems good, but the description was sort of general, so I'm not completely clear on th especific directions.

Subject: Habitat

- Look at amount of paved surfaces. Need to work more closely with city permitting.
- SPU is going in the right direction.
- Natural drainage where appropriate.
- Improve habitat based on the best available science.
- Number two priority in our watershed.
- Hope creek plan will include education about what makes good habitat and what is or is not a "clean" creek. Pulling woody debris out is considered by some citizens as cleaning the creek. Also, SPU needs to take an active roll in bringing neighbors together to address erosion and habitat destruction or obstruction on private property. Provide permit assistance, loans, technical assistance and design consultation, etc.
- Aquatic Resource Protection Program is a 10! Would appreciate ecosystem/Puget Sound watershed policy for SPU (i.e. if you take care of flooding problems responsibly there would be no adverse effects on either households/business or recurring water habitat).
- Needs ever more emphasis as City grows and diversifies. Habitat will degrade exponentially.
- I think the move to being a major influence in protecting and improving habitat is great and should definitely happen.

Subject: Public Asset Protection

- This always gets in the papers when things go wrong - explain to the public - after a storm - how things can go right.
- This is important and I am glad it is getting addressed more than before.
- Support basic part as city infrastructure.
- Policy shift seems to be moving toward more landslide mitigation, and that is a good thing. The program area should be called Landslide Mitigation or Landslide Protection.
- SPU needs to clarify its role, but hope they are in conversation with other departments so there are no gaps.
- I don't see this as an SPU issue.
- Landslide prevention - Public & Private Asset protection - strengthen this area and be pro-active. Also, salt water beaches are public assets.
- Needs to happen, as well as inclusion of less critical infrastructure.

Subject: CDP Proposed Prioritization Criteria

- Related to 98th St. - protect, operate and maintain drainage to reduce liabilities associated with landslides. 1) We strongly support the long term vision and the proposed shifts in policy. 2) Be a major influence in protecting and improving habitat. 3) Natural drainage system where appropriate. 4) Landslide mitigation in the park.
- Looks good but more priority should be placed on improving the approximately 25% of Seattle that does not have adequate drainage infrastucture. Priority to provide a "Basic Level of Service" to all properties in Seattle.
- Use of fund needs to be clearly connected to drainage, and I hope this always includes habitat.
- Phasing is critical, but not all needed projects will always be easy.
- Look at neighborhood plans to make sure there is consistency.
- Customer / community support - sometimes education is needed before you get support.
- Environmental stewardship, multipurpose and goals and program criteria are all good.

- Landslides in general should be given more priority as a primary program area.
- Stormwater conveyance and flow control should be number one.
- Overall, I like the criteria.
- It seems valid.

Subject: Other Comments

- You should do more to promote/publish how the existing system works - so people become more familiar with what's right with the utility they pay for.
- Slides project/program development very difficult for me to read - need more contrast and heard no mention of impacts on Puget Sound. 2000 Puget Sound WQ Management Plan addresses this. In 1989, Metro received $7.3 million for Carkeek Sewage Plant.
- I am advocating stream, drainage and habitat issues as a study topic for the League of Women Voters and need background information.
- I think everyone's patience with the comments & questions during the meeting was very admirable.

Written comments from organizations

Fauntleroy Watershed Stewardship Team

1) Priorities are water quality and habitat, support science based approach, and the proposed policy directions.
2) The city needs to do more with water quality stewardship - particularly supporting citizen projects through assistance from watershed staff.
3) STEP grant program is good - allows us to do projects we would otherewise not be able to do.
4) Need to consider maintenance of CIP projects - example - Fauntleroy fish ladder landscaping had no maintenance plan.

Longfellow Creek Watershed Stewardship Team

1) Concerned about CSOs in Longfellow Creek like the one by Kmart. Ongoing maintenance is needed.
2) Myrtle Street drainage is a problem - the problem is stormwater runoff from Delridge Way.
3) Concern about the increased density of the Highpoint development.
4) Drainage problem at Forest Lawn Cemetary.
5) Suggested having people plant native vegetation in the watershed (upland) rather than only riparian areas. Mentioned street tree program, planting strip easements.
6) Interest expressed in the downspout disconnect program (their wording) on pribate and public property.

North District Neighborhoods Stewardship Group

- They have drainage flooding problems. Many seem to be spot drainage in nature. Part of 130th is an open ditch. Problem with flow off NE 105th from Fisher Place to 35th (over crest of hill). They felt that development in the area was increasing drainage problems by increasing the impervious areas. They asked that developers in the area with no drainage system be required to put one in.

North Seattle Industrial Association/Neighborhood Business Council

- Concerns with CSO improvement/maintenance. Thompson Sewer at 34th and 3rd NW may be leaking. Foot of Stoneway is a concern. Drainage issues on Burke Gilman Trail. Leary Way to the Ship Canal has many streets that are cut off from the drainage system. Fisher Plaza CSO picks up drainage from Queen Anne Hill. North Lake Union CSO is a problem that they believe won't be addresses for another 15 to 20 years.

Lake Union District Council

- This group is very intersted in rates and whether they are equitable given service levels. There was discussion on whether businesses or home owners pay comparatively more, and some questioning of how impervious surface is determined for purposes of setting rates. They would like to see a pie chart

showing how much each group pays. Include a thorough description of the drainage system and how it works in the CDP (including groundwater). Mentioned ponding at base of 39th Street. Concerned that WDOT and SDOT don't pay drainage fees since they are a significant part of the impervious surface. Thought there should be rate incentives for actions property owners take to reduce runoff. Generally, they are concerned about rate increases.

NW District Council

- Management of water - dirty and clean; essentially concerned about the whole water budget. Good water lost/wasted via pumping activities. Results in a loss of summer baseflow in Pipers Creek. Comment: why can't the city charge for water pumped…it can be metered like regular water and revenue spent to address adverse impacts of pumping. Land Use - the environmental planning of land does not seem to be within the realm of DPD (formerly DCLU) or SPU; how can we be comprehensive without addressing development. Age of drainage infrastructure is a concern. Water Quality - while they are concerned about basic issues such as flodding, the most interest and concern centered around water quality. Bitter and Haller Lakes, water quality inspections on private property (catch basins, etc. on private property such as apartment complexes are often totally clogged), and concern about runoff from street pollution.

SW District Council

- In this area much of the system is ditch and culvert drainage infrastructure, so they see basic drainage service as a priority. They are interested in defineing a level of service for this type of drainage system. Some areas in SW have steep slopes and they are concerned about sloughing off these slopes due to drainage. They mentions some of the work done as part of the Drainage Policy Study in terms of defining level of service and asked how that would be implemented. They were told that the plan would identify levels of service for different program areas, and the response was that conveyance was a top priority for them. However, they did express the committment to protect the investment and improvements that had been made to Longfellow Creek. There was some skepticism about natural drainage systems, in terms of its cost and its applicability to their area (given their concern about sloughing). One individual was also very concerned about illegal auto repair businesses operating in residential areas with no control of oils and fuels that drain to the streets from these operations. She urged stiffer enforcement and participation by SPU in community efforts to control these businesses.

SE District Council

- Concern with issues along 39th. They also mentioned concern about the continual ponding in front of SEED in Columbia City.

Creeks, Drainage, and Wastewater Citizen Advisory Committee Reports

CDWCAC

Creeks, Drainage, and Wastewater
Citizen Advisory Committee

Date: 07April2004

To: Seattle Mayor **Greg Nickels**
Seattle City Council:
Jan Drago, President; **Jim Compton**; **Richard Conlin**; **David Della**; **Jean Godden**; **Nick Licata**; **Richard McIver**; **Tom Rasmussen**; **Peter Steinbrueck**

Subject: **Committee Report on the Comprehensive Drainage Plan**

Overview:

The purpose of this committee is to represent the citizens of the City of Seattle in regard to Seattle's creeks, drainage, wastewater, lakes and watershed plans. The committee participates in the planning and development of related Seattle Public Utilities (SPU) policies and programs, advises the Director of SPU, and communicates with other governmental agencies as appropriate.

This citizen committee includes a diverse range of backgrounds, interests, and viewpoints. It has dealt with SPU on this Plan for a year, in a way that we consider a close, positive relationship at all levels of the Department. Considerable time and effort have been spent on this project. Differences among committee members and between the committee and the SPU were identified and resolved. The committee report to the SPU Director (copy attached) illustrates the involvement that the committee has taken in the development of this plan.

This committee is still working with the SPU on the support and implementation of this Plan. It has provided and defended citizen's perspectives for this Plan. It plans to do so to deal with Seattle's continuing drainage concerns.

Findings:

1. We believe that the plan has been notably improved as a result of accepted committee's inputs.
2. We believe that citizen concerns and views have been integrated into the finished plan.
3. We believe that working in partnership helped to create a meaningful and pertinent current and future plan for the drainage utility.
4. We believe that the Council should resolve: that the entire water cycle in the city needs to be explored and our precious water resources protected, and that they should establish long term city drainage goals, ensure interdepartmental coordination, and provide ***some*** funding to compensate for the legal limitations on the use of drainage fees.

Recommendation:

This committee has reviewed this Comprehensive Drainage Plan and recommends that the Plan be accepted for implementation.

Respectfully,

/s/
Cheryl Klinker
Committee Chair

Committee Members

Robert Anderson
Nancy Malmgren
Mark Saporito
Al Campbell
Tom Martin
Mary Sevilla
Ted Hilton
Gary Minton
Jim Thompson
Robert Johnson
Bonnie Orme
Michael Vincent

CDWCAC

Creeks, Drainage, and Wastewater
Citizen Advisory Committee

Date: 07April2004

To: **Chuck Clarke**, Director, Seattle Public Utilities

Cc: **Nancy Ahern**, Deputy Director, Resource Management Branch
Martha Burke, Resource Planning Division

Subject: **Committee Report on the Final Comprehensive Drainage Plan**

Overview:

This Citizen Advisory Committee has been involved since early in the development of the Plan and has worked on bringing the view of the Seattle citizen into the Plan's progress. The Committee is composed of a diverse group of citizens from across the city and represents many different interests. Members attended the SPU public meetings and participated in over 20 separate meetings with SPU personnel as the Plan developed. The committee and sub-committee met over 40 additional times in study, communication, and report about the Plan.

As the Plan reached draft status, members of the committee studied the Plan in depth and submitted reports to SPU that identified concerns, made suggestions for improvements, and projected how the Plan would be received by a typical Seattle citizen.

We are pleased to note that SPU was very receptive to our reports and did incorporate the vast majority of our suggestions and comments into this final version of the Plan. The Plan itself will continue to adapt to the changing conditions that face the city. Certain portions of the Plan, such as the financial aspects and individual projects, will remain dynamic, changing as necessary while maintaining the basic future elements and goals as set forth in this Comprehensive Drainage Plan.

Findings:

This committee finds the following:

1. We believe that this Plan does represent a forward-looking assessment that has been adapted to the current requirements and the anticipated future needs.
2. The Creeks, Drainage and Wastewater Citizen Advisory Committee (CDWCAC) is pleased to support the Comprehensive Drainage Plan that the Seattle Public Utilities Department has developed for adoption by the Seattle City Council.
3. We are especially grateful for the splendid cooperation from Martha Burke and Nancy Ahern, under the direction of Chuck Clarke, in working with the Committee as the Plan developed. We believe that the Plan better serves the interests of the citizens of Seattle due to this close working relationship during the Plan development.
4. This committee believes that the submitted Plan, presently updated in its completed form, establishes a benchmark for Seattle's drainage activities. It will stand as a basis for future development.

CDWCAC

5. This committee will continue to monitor the Plan as it progresses to adoption and implementation, continuing its citizen involvement in Plan activities.
6. As the Comprehensive Drainage Plan becomes effective there are other areas beyond the scope and responsibilities of the Plan that should be studied.
   a. The usability and quality of Seattle's water resources, from the fisheries habitat to the human recreation uses, needs to be maintained and improved.
   b. This study subject goes far beyond the Comprehensive Drainage Plan and must be addressed in a **more** comprehensive way on behalf of Seattle's current and future citizens, to deal with continuing policy/legal/editorial aspects of the Plan.
   c. We believe that the Council should resolve that the entire water cycle in the city needs to be explored - from the rainfall to the surface water and sub-surface ground water, as that water travels through the creeks and lakes to the Sound.
   d. We believe that the protection of our precious water resources must be improved and the Council should establish long term city drainage goals, ensure interdepartmental coordination, and provide ***some*** funding to compensate for existing legal limitations on the use of drainage fees.

Recommendation:

This committee has reviewed this Comprehensive Drainage Plan and recommends that it be accepted for implementation by the Mayor and City Council.

Respectfully,

/s/

Cheryl Klinker
Committee Chair

Committee Members

Robert Anderson
Nancy Malmgren
Mark Saporito
Al Campbell
Tom Martin
Mary Sevilla
Ted Hilton
Gary Minton
Jim Thompson
Robert Johnson
Bonnie Orme
Michael Vincent

APPENDIX B

Information on Permits for City Capital Improvement Projects

Information on Key Permits Required for City Capital Improvement Projects

Capital Project Permitting and Regulations

Chapter 4 outlines local, state, and federal law that significantly affects surface water management programs. The following question-driven checklist is not comprehensive but outlines key authorizations, agreements, or notices that could potentially be required for capital projects. Additional information can be found in the 2003 *Environmental Permit Handbook for City of Seattle Capital Improvement Projects*.

Does the project involve clearing, grading, or modification of the drainage on the site?

- Washington State, General Permit to Discharge Stormwater Associated with Construction
- Seattle, Site Review (Drainage)

Does the project involve the installation of boreholes, sumps, dry wells, drainfields, or other devices used to put fluids into the ground?

- Washington State, Underground Injection Control Registration

Will the project withdraw ground water in excess of 5,000 gallons per day, irrigate more than 1/2 acre, or divert surface water?

- Washington State, Water Use Permit; Certificate of Water Right

Will you construct, modify, or repair any dam or controlling works for storage of 10 or more acre-feet of water, waste, or mine tailings?

- Washington State, Dam Safety Construction Permit

Does the project include construction, use or activities on submerged land that are under the ownership/jurisdiction of the Washington Department of Natural Resources?

- Washington State, Aquatic Use Authorization (Aquatic Lease)

Does the project include placement of fill or dredging in water or wetlands?

- United States, Section 404 Permit

Does the project involve construction or other activity below the ordinary high water mark? Or will the activity use, divert, obstruct or change the natural flow or bed of any waters of the state?

- Washington State, Hydraulic Project Approval (HPA)

Does the proposal involve construction within navigable waters?

- United States, Section 10 Permit: Work in Navigable Waters

Is the project or activity within 200 feet of the ordinary high water mark?

- King County, Shoreline Substantial Development Permit, Shoreline Conditional Use

Is the project or activity within 200 feet of the ordinary high water mark?

- Seattle, Shoreline Special Use, Shoreline Substantial Development Permit, Shoreline Conditional Use

Could the project involve handling, removal or disturbance of asbestos?

- Puget Sound Region, Notice of Intent (for asbestos work)

Does the project involve construction of a new or modification to an existing source of air pollution, including temporary sources?

- Washington State, New Source Review

Would the project affect a hydroelectric facility? ▪

- United States, FERC License

Does the project involve clearing, grading, or modification of the drainage on the site?

- King County, Clearing Permit, Grading Permit
- Seattle, Site Review (Grading)

Could the project affect historic or archaeological resources?

- United States, Section 106 Review (National Historic Preservation Act)
- Washington State, Archaeological Excavation Permit

Will the project modify a designated historic landmark or landmark district?

- Seattle, Certificate of Approval (Landmarks)

Does the project involve a use that is not typical of development in the zone it is located in?

- King County, Special Use
- Seattle, Conditional Use Permit

Does the project involve any activity relating to the growing, harvesting or processing of timber?

- King County, Forest Practices Approval

Does the project involve any activity relating to the growing, harvesting, or processing of timber?

- Washington State, Forest Practices Approval

Does the project involve public utility work within or near an environmentally critical area?

- King County, Public Agency and Utility Exception (PAUE)

Does the project involve the establishment, expansion, or change of use on the property?

- Seattle, Master Use Permit (MUP)

Does the project involve work in or near environmentally critical areas including: wetlands, geologically hazardous areas, frequently flooded areas, fish and wildlife habitat areas, and aquifer recharge areas?

- King County, Sensitive Area Approval
- Seattle, Critical Area Approval

Will equipment generate electromagnetic radiation in the 300 khz to UV frequency range, except 800-900 mHz or 1.8-2.0 Ghz?

- King County, Non-ionizing Electromagnetic Radiation (NIER) Review

Does the project involve construction of a new building, retaining wall, or other structure?

- King County, Building Permit

Does the project involve construction of a new building, retaining wall, or other structure?

- Seattle, Building Permit

Does the project involve construction of a new building?

- Seattle, Design Review for CIP Projects

Does the project involve the demolition, removal, or destruction of any building (including accessory buildings or garages) or walls?

- King County, Demolition Permit
- Seattle, Demolition Permit

Does the project involve work in the public right-of-way, including hauling, street closures, utility lines, or permanent improvements?

- Washington State, General Permit, Franchise Approval

Does the project involve work in the public right-of-way, including hauling, street closures, utility lines, or permanent improvements?

- King County, Special Use, Right-of-Way Use
- Seattle, Street Use- utilities, street improvements, haul routes and temporary closures

Will construction occur at night, on weekends, or otherwise exceed allowable noise limits?

- King County, Seattle Noise Variance

Will you install or permanently close an underground storage tank?

- Washington State, Underground Storage Tank (UST) Notification

APPENDIX C

Stormwater Analysis Information

Contents:

Inventory and Assessment of SPU Hydrologic/Hydraulic Models
Flooding Conditions Assessment
Flooding Incident Database
Flooding Incident Maps

Inventory and Assessment of SPU Hydrologic/Hydraulic Models

TECHNICAL MEMORANDUM

R·W·BECK

To: Darla Inglis, CDP Project Manager

From: Mike Giseburt, R. W. Beck
Willie Moneda, R. W. Beck

Subject: **Inventory and Assessment of SPU Hydrologic/Hydraulic Models (Final)**

Date: July 29, 2003

This technical memorandum provides a summary of the hydraulic and hydrologic computer models Seattle Public Utilities (SPU) has developed for separated (non-combined) drainage basins. It also includes an assessment of the effort that would be needed to bring the models up to date if SPU desires to use them to evaluate alternative solutions as part of the Comprehensive Drainage Plan. This work was done as a separate task (Task 3) of the update to the City of Seattle Comprehensive Drainage Plan (CDP).

The computer models for each of the basins came from the 1988 *Comprehensive Drainage Plan*[1], the *1995 Comprehensive Drainage Plan Update*[2], or basin studies for the specific basins. To develop the model inventory and assessment, R. W. Beck reviewed the model digital files and model documentation and then met with Tai Ovbiebo and Terry Martin of SPU on November 19, 2002, to discuss the models.

Table 1 (attached) provides a summary of the model inventory and includes the following details about each model.

- Basin Name – Note that in some instances a creek name is also used to refer to a basin.
- Year Created – The approximate year the model was produced.
- Hydraulic Model and Version – The specific computer model or methodology used in the analysis (and version, if applicable).
- Hydrology – The hydrologic methodology used. Examples include the SWMM RUNOFF (Storm Water Management Model) method, or the Santa Barbara Unit Hydrograph (SBUH) method.
- Design Storm – The type of design storm used in the model (typically the City of Seattle 24-hour design storm defined in Seattle Engineering Department Director's Rule 93-3).
- Extent of Calibration – This briefly describes the calibration of the model, if any.
- Datum – The vertical datum used for the model.
- Model Documentation – Describes any documentation that was prepared in association with the model.
- Extent of Drainage System Modeled – A brief description of the conveyance system included in the model.

[1] Seattle Engineering Department. November 1988. *Seattle Drainage and Wastewater Utility Comprehensive Drainage Plan Technical Appendices.* Prepared by KCM, Inc.
[2] Seattle Engineering Department. December 1995. *Seattle Drainage and Wastewater Utility 1995 Comprehensive Drainage Plan Update.*

1001 Fourth Avenue, Suite 2500 Seattle, WA 98154-1004 Phone (206) 695-4700, Fax (206) 695-4701

- Unusual Conditions – Conditions or parameters beyond the basic drainage system (e.g., tidal influences, structures, or pumps).
- Assessment of Model's Representation of Existing System – R. W. Beck's assessment of how well the hydraulic model's "existing system" compares with the system currently in place. R. W. Beck spot-checked each model comparing the pipe system(s) in Seattle's Geographic Information System (GIS) with the system(s) in the model.
- Assessment of Model's Representation of Improved System – For some basins, separate models were developed to evaluate "improved" or alternative conditions to eliminate flooding problems. R. W. Beck conducted a brief review of the GIS mapping to determine if improvements suggested in the individual basin plans had been completed and if the models were current.
- Degree of Effort Needed to Bring Model Up to Date – Amount of effort required to modify data from the existing models for use in XP-SWMM to evaluate new alternative solutions, if desired, as part of the CDP. It is assumed that any model would be converted to XP-SWMM, version 8.05 or higher.
- Primary SPU Contact – SPU staff involved in original basin plan/project.
- Current Physical Location of Model – Location of the modeling files.

Most of the modeling was done using some version of SWMM. The SWMM computer model was first developed in the early 1970s by the Environmental Protection Agency (EPA) and has been continually maintained and updated. Software developers, such as XP-SWMM, have made enhancements to the computer model to add features and make the program more user-friendly. Input formats for the computer models vary depending on the date created and the software used to run the program. As of January 2003, the software currently used by SPU is XP-SWMM version 8.5.

Many of the basin plans developed between 1999 and 2002 were modeled using XP-SWMM, so rehabilitation for use is minimal or not necessary. Models developed prior to 1999 were completed using various programs and formats. Some were able to be brought directly into XP-SWMM. However, others would require additional effort before they can be imported into XP-SWMM.

The Norfolk model was developed in XP-SWMM in 2002 and can also be used with moderate rehabilitation for existing conditions. A reach segment located on the East side of I-5 and West of the the Southwest corner of the Nelson Trucking property was assumed to be an enclosed pipe was discovered to be an open channel segment instead. Other observations about the existing condition model are that: (1) Tai Ovbiebo suggested revisiting the calibration due to malfunctioning stream gages; and (2) the Norfolk Basin outfall is located in tidally influenced Duwamish River and a conservative assumption of a constant tailwater elevation equal to high tide was assumed. This is a very conservative assumption. Based on more recent work done on the South Park Basin Plan which is also subject to tidal conditions and located very close to the Norfolk basin, a more accurate analysis is to consider a joint probability analysis of tides and

precipitation. It was also noted that the analysis of improved conditions that each of the Norfolk subbasins were modeled separately for the alternatives analysis and a master model with all of the recommended solution was not created. Some of the alternatives incorporate different improvements depending on subsequent alternatives. It is recommended that any updates to the improved condition model include the combining the separate versions of the alternatives to create a master model of the recommended solution.

Conclusions

The basins that were modeled between 1999 and 2002 with XP-SWMM have good documentation and can easily be updated for use in future analysis of alternatives. The datum for these models is NAVD 88. This is the same datum used in Seattle's GIS. The Norfolk model of the existing conditions can also easily be updated, however additional work will be required to build a master model of the recommended solution for future analysis of alternatives.

The basin that was modeled in 1995 can be imported into XP-SWMM and has some documentation from the *1995 Comprehensive Drainage Plan Update.* The datum for this model is unknown, so a datum correction will be necessary. The model can be updated for future analysis of alternatives with a moderate degree of rehabilitation.

The basins that were modeled as part of the 1988 *Comprehensive Drainage Plan* were modeled using with EPA SWMM. Moderate to extensive work would be required to bring the data files up to date. The datum for this data is based on the old City of Seattle Datum and may need to be converted to NAVD 88. The EPA SWMM model files that were developed with the old data format would need to be converted to a usable format for import into XP-SWMM. The representations of the existing system would need to be updated in each model. The models were spot-checked for this and the degree to which they were accurate varied—additional study would be necessary before the models would be usable. Finally, since documentation for these models is limited, additional time would likely be required to assess the variables and methodologies for consistency with the current modeling standards[3].

In summary, updating the XP-SWMM models developed since 1998 will require minimal effort, with the exception of the Norfolk model. This effort would likely be limited to performing additional checks that the models incorporate conveyance projects constructed since the models were developed. The effort to update the SWMM models developed in 1995 will require performing a datum correction and a moderate degree of model rehabilitation. The effort to update the other models would be more significant and will differ for each model. The following list outlines the steps needed to update these models. All of these steps would not be entirely necessary for alternative solution analysis—the most important step is Step 1, checking that the model's representation of the existing conveyance system is current.

[3] Seattle Public Utilities. November 2002. *Hydrologic/Hydraulic Modeling Standards and Guidelines.* Prepared by the Resource Planning Division and the Drainage/Wastewater and Solid Waste Division.

1. Modify system data to account for changes in system (i.e., improvements made since model was developed) and confirm infrastructure information is current.
2. Convert model to XP-SWMM.
3. Modify hydrologic parameters to current standards.
4. Modify land use parameters.
5. Convert elevations to NAVD 88.

It is also noted that under a separate contract SPU is evaluating the City's standard design storm precipitation and hyetograph distribution. Although the results of the analysis are not available at this time, they will likely become available in late 2003 or 2004. Future updates to these models should incorporate the findings of this other study (such as a new design storm) when it becomes available.

WAM/jlg

Attachment

c: Tai Ovbiebo, SPU

Donna Pacanovsky, R.W. Beck

Basin Name	Year Created	Hydraulic Model & Version	Hydrology	Design Storm	Ext Calib	urs required to bring up to te (does not include land use/characterization)	Primary SPU Contact	Current Physical location of Model	Capital Improvements Completed
Seola Beach	1988	EPA SWMM	SWMM RUNOFF	SPU 25-year design strom	No ca	100	Neil/Tai	Neil	Improvements not shown on GIS
Longfellow (Delridge)	1988	EPA SWMM	SWMM RUNOFF	SPU 25-year design strom	Compa FEMA b marks a HEC estim	140	Tai	Neil	Spot check shows some improvements completed
Carkeek Park (Pipers Creek)	1988	EPA SWMM. KC Comp Plan model converted to PCSWMM4	SWMM RUNOFF	SPU 25-year design strom	No ca	100	Neil	Neil	Need model info but improvements to the conveyance system was not recommended in the plan
Carkeek Park (Becker Pond)	2001	XP-SWMM	XP-SWMM SBUH	It appears that the SPU design event was used.	Flow M 2/9/01 Calibr Black a repo Carke Detenti 2001) i predicte the	N/A	Neil, Terry M.,Chollada Y.	Chollada Y.	Not shown in GIS
Puget Ridge	1995	XP SWMM (version 1.6)	SWMM RUNOFF	SPU 25-year design strom	2 flow station Marginal basin n and 18 call	60	Tai	Tai	No (recommendation in the Basin Plan was to do a more detailed plan)
Norfolk	2002	XP-SWMM (version 8.5)	XP-SWMM SBUH	SPU design storm	An at made b were n functio calibr per	80	Tai	On CD with Tai, Liz, Neil, Terry M.	No
Densmore	2002	XP-SWMM (version 8.5)	XP SWMM RUNOFF	SPU 25-year design strom	Mino gagi gage from c was u un availa signifi	16	Tai, Sahba, Liz	R.W. Beck	No
Thornton Creek	1999	XP-SWMM (version 6.0), HEC-RAS	XP-SWMM RUNOFF	SPU design storm	Some stream brie	40	Eleanor, with some involvement from Masako and Tai	SPU	Some (golf course bridges under construction). Other projects pending selection of preferred alternative and supporting environmental documentation.
South Park	2002	XP-SWMM (version 8.5)	XP SWMM RUNOFF	25-yr combined probablility (storm/tidal event analysis)	Mine gag avail st ups downs va	16	Tai, Reed B., Sahba	R.W. Beck	No
Lake Washington North	2002	Manning's Equation	SBUH using Water Works	SPU rainfall distribution with KCSW isopluvial maps for 2-year and 25-year 24-hour precip		N/A	Hugh Huiyang	Berryman & Henigar	No

Flooding Conditions Assessment

Flooding Conditions Assessment

As part of developing this 2004 Comprehensive Drainage Plan, SPU assessed flooding conditions to identify and evaluate reported flooding incidents in Seattle associated with stormwater runoff from the public right-of-way. An assessment of flooding incidents across the city was needed to support the development of a program strategy and plan. This appendix describes the methods and results of the flooding conditions assessment. It also presents a general characterization of system conditions.

The general method used for the flooding conditions assessment was as follows:

Step 1: Identification and documentation of reported flooding locations

Step 2: Compilation of supporting data (e.g., data availability on extent and severity of flooding)

Step 3: Determination of probable causal factors (e.g., insufficient capacity in the existing drainage system).

The results of the assessment include a series of maps showing specific locations of all the flooding incidents and a corresponding set of tables that summarize known data about the incidents. The series of maps and tables is included at the end of this appendix.

C.1 Specific Flooding Incident Identification and Characterization

C.1.1 Step 1 – Identification and Documentation of Reported Flooding Locations

Several sources were used to identify and provide information on specific flooding incidents throughout the city. These sources include basin plans, neighborhood plans, drainage complaints, SPU's critical drainage list, and SPU's spot drainage improvement program. Table C-1 provides more detail on each of these sources.

The amount of information about these reported incidents varies substantially. The source of information that tended to provide the most comprehensive information about drainage problems was the basin plans. Basin plans are studies of drainage basins that have had historically more extensive flooding problems. These studies describe the topography and land use characteristics as well as existing natural and constructed drainage systems within the basin. The studies analyze flooding incidents, evaluate alternative solutions, recommend capital improvement projects, and present cost estimates for recommended projects. Basin plans typically involve the development of hydrologic and hydraulic computer models that simulate the drainage systems response to

severe flood events. These models are usually developed for the larger trunk systems and are used both to identify flooding incidents and evaluate alternative solutions.

Table C-1. Information sources for flooding incident identification.

Information Source	No. of Incidents Identified	Description
Basin Plans		Several basin studies conducted after the 1995 CDP have identified flooding incidents. These were: • Densmore (Densmore Drainage Study, produced for SPU by R.W. Beck, Inc., 2003) • Norfolk (Norfolk Basin Study, produced for SPU by Jacobs Civil Inc., 2002) • South Park (South Park Drainage Study, produced for SPU by R.W. Beck Inc., 2002) • Thornton (Thornton Creek Basinwide Flow Control Plan, produced for SPU by Entranco, Inc., 2001) • Burke-Gilman (Lake Washington) (Burke Gilman/NE 144th Street Landslide Mitigation Basin Study (R.W. Beck, Inc., 2002). Chapter 5 of the CDP includes a summary description of each of these basin plans, except Burke-Gilman, which primarily studied landslide problems but included some drainage analysis.
SPU Staff (e.g., field operations input, critical drainage list, spot program)		The CDP includes flooding incidents that the city maintenance staff or consultant staff have observed. SPU staff track many of these smaller flooding incidents on a list of small or spot locations that can be addressed each year based on available funding. In addition, SPU staff maintain a critical drainage list of incident locations that typically require targeted maintenance (e.g., cleaning leaves from grates or removal of sediment) to avoid flooding. In some cases a capital project is needed to address these incidents.
Neighborhood plans		From 1995 to 1998, Seattle's Neighborhood Planning Office managed a process that developed 38 neighborhood plans. These plans address many issues and the level of detail devoted to drainage varies greatly between plans.
Citizen complaints		The city keeps a file of drainage complaints; these come in the form of telephone calls and e-mail messages

C.1.2 Step 2 – Compilation of Supporting Data

Using the different information sources, a database was created to characterize flooding incidents. Until the development of this comprehensive plan, the city had no comprehensive or systematic way to document information about flooding incidents. The database was generated using geographic information system (GIS) technology so that the information on flooding incidents could be presented and analyzed in several ways. The database contains the following information for each incident:

- Incident number
- Location

- Receiving water body and geographic area (such as a basin)
- Description of the flooding problem
- Source of incident identification (see Table C-1)
- Reference to the basin plan problem identification number (if an incident was identified in a basin plan)
- Drainage system area type (i.e., whether the problem area is within the combined system area, a partially separated area, or an area of informal ditch culvert system)
- Street type (whether the street floods and whether it is an arterial or nonarterial)
- Property flooding (the type of property that gets flooded, such as yards, parking lots, or structures)
- Frequency of flooding, if known (this information was generally available for incidents analyzed in basin plans)
- Confirmation of the flooding incident (i.e., whether the reported flooding problem still exists and whether a capital improvement is needed to solve it)
- Whether additional data or investigations are needed to assess the flooding incident.

The following paragraphs provide more detailed information about the information collected and kept in the database.

Incident Number

A unique identifier for reported incidents. In some instances, where two reported incidents were located close to each other (such as citizen complaints from next-door neighbors), the incidents were combined and identified as one incident.

Location.

The location of the incident, based upon available information. In some instances, such as a citizen complaint, a specific street address was entered. Where only a general location of the incident was known or where the problem extended over a larger area, the location was defined as a street intersection or a street segment between two blocks.

Receiving Water Body and Geographic Area.

The receiving water body is the major water body that receives drainage from the area in which the problem is located. The main receiving water bodies include the Duwamish Waterway, Lake Union/Ship Canal, Lake Washington, and Puget Sound. In addition, the combined drainage system was listed as a receiving water body for those areas in which all surface drainage is collect by the city's combined (wastewater/stormwater) sewer system and ultimately conveyed to a wastewater treatment plant.

The geographic area is a more distinct area than the receiving water body and is often a drainage basin. The geographic areas defined in the GIS database are:

- Densmore basin

- Duwamish Waterway
- Longfellow Creek watershed
- Norfolk basin
- Piper's Creek watershed
- South Park basin
- Thornton Creek watershed
- Lake Washington North
- Lake Washington Central
- Lake Washington South
- Lake Union/Ship Canal
- Puget Sound North
- Puget Sound Central
- South Puget Sound
- Combined system.

Problem Description

This includes a brief sentence or two about each incident, where information is available. It sometimes includes a description of areas subject to flooding. Incident descriptions are much more detailed and complete for those problems that had been identified in a basin plan. For many incidents identified through other sources, little or no description is available. Consequently, the amount of information available for each incident varies. Incidents without any description were either identified through field operations or neighborhood plans. Incidents with little or no description will need further investigation.

Data Source for Incident Identification

Data sources are those sources described previously in Step 1. For some incidents, a secondary data source was included in the database. When the primary source is a basin plan, no secondary source is given in the database. Secondary data sources for these incidents can be found in the corresponding basin plans.

Reference to Reported Incident in an Existing Basin Plan

For each incident previously identified in a basin plan, the incident number given in the basin plan is included in the database. This provides a reference that can be used to find more information about a incident in the basin plan.

Drainage System Area Type

This includes the predominant type of drainage system in the part of the city in which the incident is located. This does not necessarily indicate the drainage system at the specific

incident location. The three main area types are informal ditch/culvert, partially separated sewer, and combined sewer. Within each of these predominant drainage system area types, there can be a variety of situations that do not specifically fit into these categories. For example, within the informal ditch/culvert system area, there are many blocks of roads that have no drainage system. Also, sections of formal drainage systems (i.e., curb and gutter and closed piped systems meeting all of the city's drainage standards for pipe depth and size) can be found within both the informal ditch/culvert system area and the partially separated sewer area.

Public Right-of-Way Flooding

This describes whether a public street is being flooded and type of street, such as residential street, collector arterial, or principal arterial. If the flooding incident does not affect a street, the incident is noted as non-street-related.

Property Flooding

This includes a description of the type of property flooding (e.g., yards, parking lots, or residential or commercial structures) that gets flooded. If more than one type of area is flooded, a secondary type of property flooding is included. Note, however, that for incidents that were evaluated in basin plans, the secondary type of property flooding was generally not entered into the database. This is because the basin plans usually provide more detailed information about the property flooding (including number of properties affected and types of areas affected). For these incidents, the reader should refer to the specific basin plan.

Frequency of Flooding

The frequency of flooding refers to the chance of a flood occurring in any given year. For example, a incident designated as a 2-year frequency has a one in two (50%) chance of occurring in any given year. For most incidents, the frequency of flooding was unknown. However, the frequency of flooding was generally known for incidents analyzed in basin plans. This is because more information was typically collected on these incidents, such as hydrologic and hydraulic modeling results.

Incident Confirmation

To help prioritize the implementation of solutions to problems, a criterion was developed to identify "confirmed" problems. This was necessary because of the wide variety in the amount of information and in the quality and reliability of the flooding incident data. Some incidents are very well documented by several sources, while the data for other incidents is minimal. Reported flooding incidents were identified as "confirmed" in one of three ways.

The first method was to check whether a reported incident had been documented by multiple sources (e.g., complaints, computer modeling, neighborhood plan, SPU staff observation, or documented in a filed claim). Documentation by several sources (rather than, for example, just computer modeling) increases the reliability that a incident needs to be addressed by a capital improvement.

The second method was through review of the incidents by SPU maintenance staff. Once an initial database and set of reported incident maps were developed, both the SPU drainage maintenance leads and the spot drainage improvement program leads reviewed them. The purpose of this was to add any incidents that staff knew about but that had not been documented previously. This review also helped to distinguish between flooding incidents that can be solved by routine maintenance versus those that require a capital solution be constructed. Incidents that SPU drainage maintenance leads identified as needing a capital solution were identified as "confirmed."

The third method to identify confirmed incidents was through a field visit by SPU staff (of selected incident sites) during a major flood event. During the development of this comprehensive drainage plan, two significant flood events occurred that caused a variety of flooding problems at many locations throughout the city. These floods happened during the October 21, 2003 and November 18, 2003 rainfall events. These significant storms had 24-hour precipitation values of 5.02-inches and 2.64-inches, respectively. These floods provided an opportunity for the city to send staff out to visit incident sites and observe those sites during significant storms to assess and confirm the incidents. Because these storms occurred over short periods and because limited numbers of staff were available, all reported incident sites could not be visited. City staff visited approximately 100 sites. In general, while the November storm had less precipitation, it resulted in as many (or sometimes more) flooding incidents. This is likely due to several factors: the antecedent (time period before the storm) conditions were wet, leaves had recently fallen and contributed to plugging, and the peak rainfall precipitation pattern may have had higher peak intensities.

Incidents that have been confirmed by one of these three methods were identified with a "yes" in the database. For some of the confirmed incidents, additional analysis is still needed to determine the frequency of flooding. This is necessary to assess whether the incident frequency exceeds SPU's goals for level of protection. Where incidents are not labeled as confirmed, this may be because they are no longer considered a incident (e.g., because they have been solved or because the problem has been determined to occur at a flood frequency that exceeds SPU's goals for level of protection) or because additional data or investigations are needed to assess the problem.

Whether additional data or investigations are needed to assess the flooding incident.

Incidents not confirmed will require further investigation to assess the nature of the problem. For example, an unconfirmed incident may have been identified by a hydrologic model but not observed, or it may have been reported as a drainage complaint but not observed by a technical professional. In addition, some incidents that have been reported through drainage complaints may only require maintenance rather than a constructed solution.

C.1.3 Step 3 – Determination of Probable Causal Factors

The information entered into the database also includes a determination of the probable causal factors for reported incidents. This determination was possible only for reported incidents where enough data was available. Sources for this information included basin plans, SPU staff knowledge (including a review by SPU maintenance leads), and a review of any prior documentation about the drainage problem. The categories of probable causal factors include:

- Inadequate capacity in the existing drainage infrastructure
- Lack of drainage infrastructure
- Improper street grading
- Need for maintenance or increased frequency maintenance.

Often, one or more factors contribute to an existing flooding incident. For example, a flooding incident may be due to a need for increased maintenance of the existing drainage infrastructure (e.g., more frequent catch basin cleaning) and a need for proper street grading to direct the stormwater runoff to the drainage facility. Where multiple causes were know they were included into the database as "additional problem causes."

The cause for many incidents was the need for maintenance or an increased frequency of maintenance. Examples of such maintenance activities include cleaning pipes for root intrusion, leaf cleaning during the fall, or removal of accumulated sediment at catch basins and culverts. These increased maintenance needs do not necessarily translate entirely to SPU. For example, some activities, particularly cleaning leaves at catch basin grates during the fall, could be partially done by the public if educational and public outreach efforts were increased.

C.2 Results

The incident characterization provides several benefits that aid in the comprehensive planning process. For example, the characterization allows:

- Evaluation of data such as sorting by geographical area, probable cause, or confirmed versus unconfirmed incidents
- Characterization of flooding incidents by what is being flooded (e.g., residential streets versus arterials), thus allowing easier evaluation of different levels of service for different service area types
- Identification of preferred stormwater solutions, considering information such as type of system, basin location, and cause of incident (for example, a natural drainage system solution may be preferred over a pipe installation in a creek basin, whereas a pipe solution may be preferred in other areas)
- Characterization of flooding incidents that require a capital improvement versus more frequent maintenance.

Tables C-2 through C-4 summarize the flooding incident characterization. Table C-2 provides the incident characterization by drainage area type. Table C-3 gives the breakdown of incidents by confirmed, unconfirmed, and maintenance-related incidents. Table C-4 presents a summary of the incident causes for the confirmed incidents (primarily based on information contained in basin plans rather than the entire number of incidents).

Table C-2. Flooding incident characterization by drainage system area type.

Type of System	Number of Incidents
Combined sewer	190
Partially separated sewer	429
Informal ditch/culvert	435
Other	16
Total	1070

Table C-3. Flooding incident characterization by confirmed, unconfirmed, and maintenance-related incidents.

Incident Confirmation	Number of Incidents
Unconfirmed (incidents needing further investigation)	313
Maintenance (incidents needing more frequent or regular maintenance, and not a capital improvement project)	440
Total	317
	1070

Table C-4. Flooding incident characterization by primary cause (based on confirmed incidents).

Cause of Flooding	Number of Incidents
Inadequate capacity	45
Lack of system	40
Improper street grading	35
Lack of maintenance	5
Other/unknown	188
Total	313

Flooding Incident Database

ATTACH. C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
1	N 143rd Street and Palantine Avenue N from N 144th Street to Greenwood Avenue N.	Densmore Basin	Lack of capacity in ditches and culverts causes street, yard and home flooding along a three-block section	Separated System	Residential Street	Residential Structure	0-2 years	Inadequate Capacity
2	Greenwood Avenue N and N 137th Street	Densmore Basin	Street floods for modeled large events even with new drainage system	Separated System	Principal Arterial		0-2 years	Inadequate Capacity
3	N 128th Street and Northpark Avenue N between N 128th and 130th Street.	Densmore Basin	Undersized ditch and culvert system causes widespread overflows frequently flooding of homes	Separated System	Residential Street		0-2 years	Inadequate Capacity
4	N 125th Street and Linden ROW	Densmore Basin	Trunk in N 125th Street surcharges cause flow onto street. This also causes Lowe's detention system to overtop. Identified as Activity A-6 #3 in the Bitter L	Separated System	Collector Arterial		0-2 years	Inadequate Capacity
5	Evergreen Cemetery in the 11800 to 12100 block	Densmore Basin	Flooding of private cemetery streets due limited capacity of trunk	Separated System	Non-Street Related		0-2 years	Inadequate Capacity
6	Along Aurora Avenue N from Home Depot to N 115th Street. Also along N 115th Stree	Densmore Basin	Inadequate capacity in shallow system causes flooding along Aurora Avenue N between N 115th Street and Home Depot. Overflows which go east on N 115th Street	Separated System	Principal Arterial		0-2 years	Inadequate Capacity
7	Greenwood Avenue N at N 140th Street	Densmore Basin	Downsizing of pipe system at confluence of two branches causes overflows into street.	Separated System	Principal Arterial		0-2 years	Inadequate Capacity
8	Greenwood Avenue N between N 136th and 137th Streets	Densmore Basin	Under capacity ditch and culvert system along west side of street overflows into street.	Separated System	Principal Arterial		0-2 years	Inadequate Capacity
9	North shore of Bitter Lake along N 137th Street	Densmore Basin	High lake levels will flood a residential finished floor	Separated System	Non-Street Related	Residential Structure	2-25 years	Lake Levels
10	N 125th Street at entrance to Evergreen Cemetery	Densmore Basin	Street and sidewalk flooding at entrance to cemetery	Separated System	Collector Arterial			Lack of System
11	Aurora Avenue N at N 110th Street	Densmore Basin	Inadequate system capacity causes minor street flooding	Separated System	Principal Arterial		0-2 years	Inadequate Capacity
12	Greenwood Avenue N north of N 134th Street	Densmore Basin	Roof leaders causing flooding problem for neighbor	Separated System	Non-Street Related	Yards		Lack of System
13	Park Avenue N North of N 117th Street	Densmore Basin	Residential basement is receives groundwater seepage and requires sump pump	Separated System	Non-Street Related	Residential Structure		groundwater seepage
14	500 block of N 137th Street, west of Wingard Court N	Densmore Basin	Ditch on north side of street overflows at culvert undercrossing. Identified as Activity A-6 #9 in the Bitter Lake Neighborhood Plan.	Separated System	Residential Street			Inadequate Capacity
15	500 block of N 138th Street, west of Dayton Avenue N	Densmore Basin	No specific problems identified but listed as Activity A-6 #8 in the Bitter Lake Neighborhood Plan. Probably culvert clogging	Separated System	Residential Street			Increased Maintenance Needed
16	South end of Fremont Avenue N right-of-way south of N 137th Street	Densmore Basin	Pipe system along right of way surcharges causing nuisance ponding.	Separated System	Non-Street Related			Inadequate Capacity
17	Greenwood Avenue N south of N 132nd Street	Densmore Basin	Gutter and sidewalk flooding	Separated System	Non-Street Related			Increased Maintenance Needed
18	N 117th Street and Northpark Avenue	Densmore Basin	Asphalt swale on north portion of North Park Avenue N directs flow south. Swale ends causing yard flooding on south portion of street.	Separated System	Residential Street	Yards		Lack of System
19	N 109th Street and Linden Avenue N	Densmore Basin	Gravel shoulder erodes.	Separated System	Residential Street		0-2 years	Increased Maintenance Needed
20	N 133rd Street at Bitter Place N	Densmore Basin	Inadequate culverts along N 133rd Street cause yard flooding and deposition	Separated System	Non-Street Related	Yards		Inadequate Capacity

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
21	Phinney Avenue N north of N 143rd Street	Densmore Basin	Ponding in driveway	Separated System	Non-Street Related	Driveway		Increased Maintenance Needed
22	Intersection of Evanston Avenue N & N 127th Street	Densmore Basin	Frequent flooding of intersection.	Separated System	Residential Street		0-2 years	
23	Fremont Avenue N north of N. 112th Street	Densmore Basin	About eight residences on both sides of street experience basement and crawl space flood due to lack of drainage facilities and groundwater seepage	Separated System	Residential Street	Residential Structure	0-2 years	Lack of System
24	Fremont Avenue N north of N. 125th Street	Densmore Basin	Ponding of a residential driveway due to street runoff not collected by ditch	Separated System	Non-Street Related	Driveway	-	Lack of System
25	Evanston Avenue N north of N 125th Street	Densmore Basin	Lack of gutter or swale allows street runoff to flood yards. Yards and houses are lower than street	Separated System	Non-Street Related	Yards	-	Lack of System
26	N 130th Street and Aurora Avenue N	Densmore Basin	Street flooding, overflowing catch basins. Listed as Activity A-6 #5 in the Bitter Lake Neighborhood Plan.	Separated System	Principal Arterial		-	Increased Maintenance Needed
27	N 130th Street and Linden Avenue N	Densmore Basin	No specific problem described but listed as Activity A-6 #5 in the Bitter Lake Neighborhood Plan.	Separated System	Principal Arterial		-	
28	Bitter Lake	Densmore Basin	Deposition in lake and oil and soapsuds on lake surface	Separated System	Non-Street Related		-	
29	North side of N 137th Street and east of Meridian Avenue N	Densmore Basin	Flooding of low finished floor of home due to backwater from pipe system	Separated System	Non-Street Related	Residential Structure	2-25 years	Inadequate Capacity
30	South side of Roosevelt Way N at about N 136th Street	Densmore Basin	Undersized drainage trunk on private property lies on ground and has poor pipe connections causing flooding.	Separated System	Non-Street Related		0-2 years	Increased Maintenance Needed
31	N 133rd Street east of Meridian Avenue N	Densmore Basin	Lack of capacity of trunk in topographic low across private properties causes flooding along street	Separated System	Non-Street Related		0-2 years	Inadequate Capacity
32	East of Meridian Avenue N between N 132nd and 133rd Streets	Densmore Basin	Lack of capacity of trunk in topographic low across private properties causes flooding between houses	Separated System	Non-Street Related	Yards	0-2 years	Inadequate Capacity
33	N 132nd Street east of Meridian Avenue N	Densmore Basin	Lack of capacity of trunk in topographic low across private properties causes flooding at end of cul-de-sac	Separated System	Residential Street		2-25 years	Inadequate Capacity
34	N 130th Street east of Meridian Avenue N	Densmore Basin	Lack of capacity of trunk in topographic low across private properties causes flooding of street	Separated System	Non-Street Related		0-2 years	Inadequate Capacity
35	N 128th Street east of Meridian Avenue N	Densmore Basin	Lack of capacity in ditch on north side of street causes flooding	Separated System	Collector Arterial		0-2 years	Inadequate Capacity
36	N 128th Street east of Meridian Avenue N	Densmore Basin	Manhole on south side of street surcharges causing flooding	Separated System	Collector Arterial		0-2 years	Inadequate Capacity
37	Ditch and pipe system west of Densmore Avenue N bypassing Ashworth Pond	Densmore Basin	Pipes, culverts and ditches have inadequate capacity and tendency to clog, causing flooding of area around pond	Separated System	Collector Arterial		2-25 years	Inadequate Capacity
38	South end of Stone Pond at 12000 block of Stone Avenue N	Densmore Basin	Storm water overtops outlet on south and west sides causing damage	Separated System	Residential Street		2-25 years	Inadequate Capacity
39	Meridian Avenue N north of N 130th Street	Densmore Basin	Ditch and pipe system overflows caused by lack of pipe capacity and culvert blockages. Impacts homes below street grade. Identified as Activity A-6 #6 in the	Separated System	Collector Arterial	Residential Structure	2-25 years	Inadequate Capacity
40	N 135th Street east of Meridian Avenue N	Densmore Basin	Basement and garage flooding due to street runoff flowing down driveway.	Separated System	Residential Street	Residential Structure	-	Improper Street Grading

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (If Known)
41	End of N 122nd Place , southeast of Haller Lake	Densmore Basin	Lack of drainage facilities on private street causes ponding in the cul-de-sac. Identified as Activity A-6 #10 in the Bitter Lake Neighborhood Plan.	Separated System	Residential Street		0-2 years	Lack of System
42	1032 S Rose St.	Combined System	No collection system, and poor pavement; ponding in front of house, there inlets close by, but no way for the water to reach it.	Combined System	Residential Street			Improper Street Grading
43	8806 3rd Avenue S.	Combined System	Flooding from new business parking lot. No system; severe ponding in front yard.	Separated System	Residential Street	Yards		
44	530 S. Cloverdale St.	South Park Basin	Alley is in extremely poor condition. Large ruts and significant flooding.	Separated System	Alley			
45	5430 17th Ave SW	Duwamish Waterway	Runoff from 16th Ave SW is flooding the back yard of the residence at 5430 17th Ave SW.	Partially Separated System	Residential Street	Yards		groundwater seepage
46	1244 S Concord St	Combined System	Citizen reports a foot of standing water in front of her apartment. During the last big storm, the unit was flooded and threatening to flood again.	Combined System	Residential Street	Residential Structure		
47	N120th Street and Ashworth Avenue N	Densmore Basin	Flooding on N 120th Street just north of intersection due to a blocked culvert.	Separated System	Residential Street		-	Increased Maintenance Needed
48	Areas Adjacent to Haller Lake.	Densmore Basin	Problem unknown but assumed to be flooding of lawns, docks and boathouses. Model indicates no flooding so probably outlet clogging. Identified as Activity A-	Separated System	Non-Street Related	Yards	-	Increased Maintenance Needed
49	Meridian Avenue N north of N 133rd Street	Densmore Basin	Ditch and culvert system down Meridian Avenue N has inadequate capacity or clogs flooding parking strip and basements	Separated System	Collector Arterial	Residential Structure	0-2 years	Increased Maintenance Needed
50	End of N 134th Street east of Meridian Avenue N	Densmore Basin	Main drainage trunk across private properties has broken pipe segment causing some flooding.	Separated System	Residential Street	Yards	-	Increased Maintenance Needed
51	N 134th Street east of Corliss Avenue N.	Densmore Basin	Runoff from Corliss Avenue and site drainage collects in apartment parking area	Separated System	Residential Street	Parking Lot	-	Lack of System
52	N 130th Street and Sunnyside Avenue N	Densmore Basin	Ponding in low area in street and driveway. Identified as Activity A-6 #1 in the Bitter Lake Neighborhood Plan	Separated System	Principal Arterial	Driveway	2-25 years	Lack of System
53	Burke Avenue N from N. 137th to 135th Street	Densmore Basin	Frequent flooding of street and 137th intersection due to flat gradient on N 137th Street and lack of drainage facilities on Burke Avenue N. Similar flooding	Separated System	Residential Street		0-2 years	Improper Street Grading
54	West end of N 121st Street between Ashworth Avenue N and Stone Pond	Densmore Basin	Frequent street ponding	Separated System	Residential Street		0-2 years	Improper Street Grading
55	N 128th Street east of Meridian Avenue N	Densmore Basin	Ditch and culvert system on N 128th Street has inadequate capacity and overflows to the east.	Separated System	Collector Arterial		0-2 years	Inadequate Capacity
56	N 128th Street east of Densmore Avenue N	Densmore Basin	No specific problems described or observed in field	Separated System	Collector Arterial		-	
57	N 107th Street and Midvale Avenue N	Densmore Basin	Large scale flooding of commercial area due to lack of capacity in trunk. Area is a local topographic depression.	Separated System	Residential Street	Commercial/Industrial	0-2 years	Inadequate Capacity
58	Backyard channel between N 97th and 100th Streets and Ashworth and Woodlawn Avenu	Densmore Basin	Flow overtops channel in backyards and travels down private property to N 97th Street then flows onto the street.	Separated System	Non-Street Related	Yards	2-25 years	Inadequate Capacity

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
59	Backyard channel between N 97th and 100th Streets and Densmore and Woodlawn Avenu	Densmore Basin	Flow overtops channel in backyards	Separated System	Non-Street Related	Yards	0-2 years	Inadequate Capacity
60	N 97th Street between Ashworth and Woodlawn Avenue N	Densmore Basin	Inadequate capacity of the main trunk surcharges and floods street	Separated System	Residential Street		0-2 years	Inadequate Capacity
61	Woodlawn Avenue N between Licton Springs Park and Wilson Pacific School	Densmore Basin	Pond overflows and inadequate trunk capacity forces high quantity of runoff to be conveyed down street.	Separated System	Residential Street		2-25 years	Inadequate Capacity
62	2,100 feet of trunk on Ashworth Avenue N from N 87th Street to N 85th Street, N 8	Densmore Basin	Main Densmore trunk has inadequate capacity throughout the 2,100 linear foot reach causing street flooding.	Separated System	Residential Street		0-2 years	Inadequate Capacity
63	Stone Avenue N between N 90th and 92nd Street	Densmore Basin	Inadequate trunk capacity causes street flooding	Separated System	Residential Street	Critical Facility Access	2-25 years	Inadequate Capacity
64	Intersection of Aurora Avenue N & N 92nd Street	Densmore Basin	Lack of trunk capacity causes flooding of intersection and N 92nd Street	Separated System	Principal Arterial		2-25 years	Inadequate Capacity
65	Between Aurora and Linden Avenue N and N 95th and 96th Streets	Densmore Basin	Trunk in topographic low across private properties has inadequate capacity	Separated System	Non-Street Related		2-25 years	Inadequate Capacity
66	N 88th Street east of Ashworth Avenue N	Densmore Basin	Lack of capacity in pipe system causes street flooding	Separated System	Residential Street		0-2 years	Inadequate Capacity
67	Aurora Avenue N between N 92nd and 98th Streets	Densmore Basin	Lack of capacity in pipe system causes street flooding	Separated System	Principal Arterial		0-2 years	Inadequate Capacity
68	N. 88th Street west of Ashworth Avenue N.	Densmore Basin	Lack of capacity in pipe system causes street flooding	Separated System	Residential Street		2-25 years	Inadequate Capacity
69	N 90th Street between Aurora and Stone Avenue N	Densmore Basin	Lack of pipe system capacity causes occasional flooding of street	Separated System	Collector Arterial		2-25 years	Inadequate Capacity
70	Residence on Ashworth Avenue N. north of N. 88th Street	Densmore Basin	Seepage through basement walls floods basement	Separated System	Non-Street Related	Residential Structure	0-2 years	groundwater seepage
71	Ashworth Avenue N north of N 88th Street	Densmore Basin	Residential basement is flooded by groundwater seepage many times each year	Separated System	Non-Street Related	Residential Structure	0-2 years	groundwater seepage
72	Alley between Fremont and Evanston Avenue N north of N 92nd Street	Densmore Basin	New townhouses covered ditch causing flooding in alley	Separated System	Alley		-	Lack of System
73	Dayton Avenue N just north of N 92nd Street	Pipers Creek Watershed	Flooding of crawl space	Separated System	Non-Street Related	Residential Structure	0-2 years	
74	N 97th Street east of Fremont Avenue N.	Densmore Basin	Residential basement flooded in 2000	Separated System	Non-Street Related	Residential Structure	2-25 years	
75	NE corner of intersection of N. 97th Street & Evanston Avenue	Densmore Basin	Annual flooding of street and basement as ditch fills and drainage system plugs	Separated System	Residential Street	Residential Structure	-	Increased Maintenance Needed
76	N 94th Street east of Fremont Avenue N	Densmore Basin	Garage floods frequently.	Separated System	Non-Street Related	Residential Structure	0-2 years	
77	Alley between N 95th & 97th Street and between Wallingford & Densmore Avenue N	Densmore Basin	Runoff from N 97th Street causes flooding	Separated System	Alley		0-2 years	
78	N 103rd and Stone Avenue N	Densmore Basin	Inadequate ditch allows water from N 105th St to pond by front gate	Separated System	Residential Street		-	Increased Maintenance Needed
79	N 101st Street just east of Dayton Avenue N	Densmore Basin	During heavy rainfall storm water ponds in the shoulder and runs into yards.	Separated System	Residential Street	Yards	0-2 years	Improper Street Grading

See footnotes on final page of table.

ATTACH C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
80	N. 95th Street between Fremont Avenue N and Evanston Avenue N	Densmore Basin	Drainage patterns altered by apartment construction creates ponding in Seattle City Light right-of-way	Separated System	Non-Street Related		-	Lack of System
81	Wallingford Avenue N north of N 95th Street	Densmore Basin	Frequent flooding of residential yard and crawl space	Separated System	Non-Street Related	Residential Structure	0-2 years	
82	Alley between Interlake & Stone Avenue N north of N 105th Street	Densmore Basin	Fill for construction modified flow pattern, causing flooding of yard, driveway and alley	Separated System	Alley	Yards	-	Lack of System
83	920 & 927 M 101st Street	Densmore Basin	Street runoff ponds along street, parking area and yards	Separated System	Residential Street	Yards	-	Improper Street Grading
84	Evanston Avenue N. north of N 95th Street	Densmore Basin	Roadside ditch has limited capacity and properties below street experience flooding	Separated System	Residential Street	Residential Structure	2-25 years	Inadequate Capacity
85	Aurora Avenue N north of N 88th Street	Densmore Basin	Frequent flooding of street near catch basin	Separated System	Principal Arterial		0-2 years	
86	Culvert in ditch on south side of Roosevelt between Stone and Interlake Avenues N	Densmore Basin	Culvert has inadequate capacity	Separated System	Collector Arterial		2-25 years	Inadequate Capacity
87	Interlake Avenue N. south of Roosevelt Way N	Densmore Basin	Ditch on west side of street overtops	Separated System	Residential Street		0-2 years	Inadequate Capacity
88	Culvert under N 140th Street between Stone and Interlake Avenues N	Densmore Basin	Culvert has inadequate capacity	Separated System	Residential Street		0-2 years	Inadequate Capacity
89	Between Stone and Interlake Avenues N at about 139th Street	Densmore Basin	Drainage channel ends in unfinished alley and flows through homes to Stone Avenue N. Ponding also in street. Ponding in street identified as Activity A-6 #4 i	Separated System	Alley	Yards	2-25 years	Lack of System
90	Low point west of intersection of N 138th St and Linden Ave N	Densmore Basin	Ponding water at topographic depression which may affect driveway to apartments.	Separated System	Residential Street	Driveway	0-2 years	Lack of System
91	N 137th Street between Linden and Aurora Avenue N	Densmore Basin	Future input of runoff will cause trunk system to be inadequate	Separated System	Residential Street		2-25 years	Inadequate Capacity
92	N 130th Street and Stone Avenue N	Densmore Basin	Lack of capacity of trunk causes street and intersection flooding	Separated System	Principal Arterial		2-25 years	Inadequate Capacity
93	Stone Avenue between N 130th and N 135th Streets	Densmore Basin	Inadequate trunk capacity causes street flooding	Separated System	Residential Street		0-2 years	Inadequate Capacity
94	Petco parking lot at Aurora Avenue N and N 130th Street	Densmore Basin	Private detention system will be surcharged to the ground surface during large storm events	Separated System	Non-Street Related	Parking Lot	2-25 years	Inadequate Capacity
95	Ashworth pond at Ashworth Avenue N and N 126th Street	Densmore Basin	Pond overflows during large storm events	Separated System	Non-Street Related		2-25 years	Inadequate Capacity
96	700 block of N. 143rd Street between Evanston and Linden Avenue N	Combined System	Lack of facilities cause ponding on shoulder and sidewalk	Separated System	Residential Street		0-2 years	Lack of System
97	N 125th Street east of Stone Avenue N	Densmore Basin	Runoff floods across N 125th Street into garage.	Separated System	Collector Arterial	Residential Structure	-	Lack of System
98	700 block of N. 138th Street between Dayton and Linden Avenue N	Densmore Basin	Runoff flows across a small, breached berm and floods garage and yard.	Separated System	Residential Street	Residential Structure	-	Increased Maintenance Needed
99	N 143rd and Linden Avenue N	Combined System	Ponding in vicinity of intersection due to lack of drainage facilities. Identified as Activity A-6 #7 in the Bitter Lake Neighborhood Plan.	Separated System	Collector Arterial		0-2 years	Lack of System
100	42nd Avenue NE and NE 132nd Street	North Lake Washington	Flow collected along 42nd Ave NE is routed east down the steep NE 130th Street right-of-way in a series of pipes and ditches. This system is undersized and w	Separated System	Residential Street		2-25 years	Increased Maintenance Needed

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
101	41st Avenue NE and NE 142nd Street	North Lake Washington	Asphalt-lined ditches along 41st Ave NE have degraded and are causing saturation of the roadway prism. Stormwater collected in a drainage structure on the we	Separated System	Residential Street		2-25 years	Increased Maintenance Needed
102	NE 145th Street and 38th Avenue NE	Combined System	At the SE corner of NE 145th Street and 38th Avenue NE, an asphalt-lined drainage ditch is broken where surface water enters the ditch system. Erosion is tak	Separated System	Residential Street		2-25 years	Increased Maintenance Needed
103	NE 145th Street and 40th Avenue NE	Combined System	At the intersection of NE 145th Street and 40th Avenue NE surface water is not collected by an adjacent catch basin, allowing the water to escape the storm sy	Separated System	Residential Street		2-25 years	Improper Street Grading
104	42nd Avenue NE just south of the NE 140th Street	North Lake Washington	Stormwater collected on the west side of 41st Avenue NE is routed east and discharges onto the roadway embankment. An existing half round pipe section is des	Separated System	Residential Street		2-25 years	Increased Maintenance Needed
105	From 42nd Avenue NE to the Burke Gilman trail	North Lake Washington	Stormwater flows in a natural swale down slope from 41st Avenue NE, down to 42nd Avenue NE and across an undeveloped tract, causing minor hillside erosion. F	Separated System	Residential Street	Yards	2-25 years	Lack of System
106	Westwood Place NE	North Lake Washington	Surface flow along 38th Avenue NE may drain east down Westwood Place NE allowing stormwater to drain uncontrolled to the residences at the lower end of the st	Separated System	Residential Street	Yards	2-25 years	Improper Street Grading
107	42nd Avenue NE and NE 125th Street	North Lake Washington	Stormwater sheet flows east off of 42nd Avenue NE and into the private yard and ditch located at the residence of 12506. The existing culvert system is under	Separated System	Residential Street	Yards	2-25 years	Inadequate Capacity
108	42nd Avenue and NE 127th Street	North Lake Washington	Drainage collected along 42nd Avenue between NE 125th and 135th Streets is primarily routed along the west side of 42nd Avenue in a ditch and culvert system.	Separated System	Residential Street		2-25 years	Inadequate Capacity
109	42nd Place NE	North Lake Washington	Stormwater flows into 42nd Place NE creating heavy flows for the existing ditch and culverts system. Residents commented that sheet flow comes off of the str	Separated System	Residential Street		2-25 years	Inadequate Capacity
110	South branch Thornton Creek at 35th Ave NE	Thornton Creek Watershed	Culvert lacks capacity and periodically causes flooding of 35th Ave NE	Separated System	Principal Arterial			Inadequate Capacity
111	Main branch Thornton Creek at 4023 NE105th	Thornton Creek Watershed	Bank overtops and yard floods; recent flooding may be a result of debris clogging Meadowbrook pond overflw structure resulting in additional flow down the mai	Separated System	Non-Street Related	Yards		Increased Maintenance Needed
112	Little's Creek at 12th Ave NE and NE 140th	Thornton Creek Watershed	Condos flooded due to undersized culvert	Separated System	Non-Street Related	Residential Structure		Inadequate Capacity
113	Littlebrook Creek at NE 125th St and 33rd Ave NE	Thornton Creek Watershed	Undersized strom drain floods 33rd Ave NE, parking lot, and several buildings	Separated System	Residential Street	Residential Structure		Inadequate Capacity
114	South branch Thornton Creek at 30th Ave NE and NE 107th St	Thornton Creek Watershed	Flooding of 30th Ave NE and Kramer Creek	Separated System	Collector Arterial			Natural Creek Flooding

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
115	South branch Thornton Creek at NE 103rd St and I-5	Thornton Creek Watershed	The I-5 culvert is lower than the downstream culvert, which results in stormwater backing up in the I-5 culvert and upstream flooding	Separated System	Minor Arterial			Inadequate Capacity
116	North branch Thornton Creek at 35th Ave NE south of NE 110th St	Thornton Creek Watershed	Stream channel overtops and floods private property	Separated System	Non-Street Related	Yards		Natural Creek Flooding
117	Main branch Thornton Creek at 35th Ave NE upstream of Meadowbrook Pond	Thornton Creek Watershed	Stream channel overtops and floods private property	Separated System	Non-Street Related	Yards		Natural Creek Flooding
118	North branch Thornton Creek west of 25th Ave NE	Thornton Creek Watershed	Culvert has surcharged during recent storm events, though exten of flooding uncertain	Separated System	Non-Street Related			Inadequate Capacity
119	Storm drain in 35th Ave NE, south of NE 130th St, tributary to Littlebrook Creek	Thornton Creek Watershed	A bottleneck in the storm drain (15-inch to 12-inch) causes backups and floods 35th Ave NE	Separated System	Minor Arterial			Inadequate Capacity
120	South branch Thornton Creek at NE 105th St	Thornton Creek Watershed	Creek Reportedly caused flooding of NE 105th St	Separated System	Residential Street			Natural Creek Flooding
121	North branch Thornton Creek at 25th Ave NE	Thornton Creek Watershed	Creek reportedly rose quickly during January 1997 storm and flooded a garage	Separated System	Non-Street Related	Residential Structure		Natural Creek Flooding
122	Kramer Creek at 30th Ave NE	Thornton Creek Watershed	Flooding of private properties and Nathan Hale High School along 30th Ave NE due to high water in Thornton Creek backing up flown in Kramer Creek	Separated System	Non-Street Related	Yards		Natural Creek Flooding
123	Main Branch Thornton Creek at 39th Ave NE & NE 105th St	Thornton Creek Watershed	Flooding of private properties due to undersized drainage system and backwater effects from creek	Separated System	Non-Street Related	Yards		Natural Creek Flooding
124	Burke-Gilman Trail	Thornton Creek Watershed	Concrete box/arch culvert overtopping	Separated System	Non-Street Related		25-100 years	Inadequate Capacity
125	45th Ave NE	Thornton Creek Watershed	Street bridge overtopping	Separated System	Residential Street		25-100 years	Inadequate Capacity
126	9728-44th Ave NE	Thornton Creek Watershed	Driveway bridge overtopping	Separated System	Non-Street Related	Driveway	25-100 years	Inadequate Capacity
127	9817-44th Ave NE	Thornton Creek Watershed	House over creek	Separated System	Non-Street Related		25-100 years	
128	4023 NE 105th St	Thornton Creek Watershed	Driveway bridge overtopping	Separated System	Non-Street Related	Driveway	25-100 years	Inadequate Capacity
129	4011 NE 105th St	Thornton Creek Watershed	Driveway bridge overtopping	Separated System	Non-Street Related	Driveway	25-100 years	Inadequate Capacity
130	4007 NE 105th St	Thornton Creek Watershed	Driveway bridge overtopping	Separated System	Non-Street Related	Driveway	25-100 years	Inadequate Capacity
131	3927 NE 105th St	Thornton Creek Watershed	Driveway bridge overtopping	Separated System	Non-Street Related	Driveway	25-100 years	Inadequate Capacity
132	3926 NE 105th St	Thornton Creek Watershed	Driveway bridge overtopping	Separated System	Non-Street Related	Driveway	25-100 years	Inadequate Capacity
133	39th Ave NE	Thornton Creek Watershed	Street bridge overtopping	Separated System	Residential Street		25-100 years	Inadequate Capacity
134	10727 36th Ave NE	Thornton Creek Watershed	Shed over creek	Separated System	Non-Street Related		2-25 years	
135	10743 36th Ave NE	Thornton Creek Watershed	Shed over creek	Separated System	Non-Street Related		2-25 years	
136	NE 110th St	Thornton Creek Watershed	Street bridge overtopping	Separated System	Collector Arterial		25-100 years	Inadequate Capacity

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
137	1915 NE 130th St	Thornton Creek Watershed	Driveway bridge overtopping	Separated System	Non-Street Related	Driveway	25-100 years	Inadequate Capacity
138	10565-30th Ave NE	Thornton Creek Watershed	Driveway bridge overtopping	Separated System	Non-Street Related	Driveway	2-25 years	Inadequate Capacity
139	10559-30th Ave NE	Thornton Creek Watershed	Driveway bridge overtopping	Separated System	Non-Street Related	Driveway	2-25 years	Inadequate Capacity
140	NE 100th St	Thornton Creek Watershed	Street bridge overtopping	Separated System	Minor Arterial		25-100 years	Inadequate Capacity
141	NE 93rd St	Thornton Creek Watershed	Street conc box culvert overtopping	Separated System	Residential Street		25-100 years	Inadequate Capacity
142	NE 95th St	Thornton Creek Watershed	Street twin box culverts overtopping	Separated System	Minor Arterial		25-100 years	Inadequate Capacity
143	30th Ave NE	Thornton Creek Watershed	Street conc box culvert overtopping	Separated System	Collector Arterial		2-25 years	Inadequate Capacity
144	NE 107th St	Thornton Creek Watershed	Street conc box culvert overtopping	Separated System	Residential Street		2-25 years	Inadequate Capacity
145	105th St/Ravenna	Thornton Creek Watershed	Street CMP culvert overtopping	Separated System	Residential Street		2-25 years	Inadequate Capacity
146	105th St/ 17th Ave	Thornton Creek Watershed	Street twin conc pipe culverts overtopping	Separated System	Residential Street		25-100 years	Increased Maintenance Needed
147	8th Ave NE	Thornton Creek Watershed	Street conc box culvert overtopping	Separated System	Residential Street	Critical Facility Access	25-100 years	Increased Maintenance Needed
148	Private Driveway	Thornton Creek Watershed	Twin CMP pipe culverts overtopping	Separated System	Non-Street Related		25-100 years	Inadequate Capacity
149	N 36th St & Stone Ave N	Lake Union/Ship Canal	No Problem Description Available. See Note 10.	Partially Separated System	Minor Arterial			
150	N 34th St & Stone Ave N	Lake Union/Ship Canal	Street ponding	Partially Separated System	Minor Arterial			Increased Maintenance Needed
151	NW 39th St & 3rd Ave NW	Lake Union/Ship Canal	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
152	Street end of NW 39th St	Lake Union/Ship Canal	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
153	7th Ave NW north of NW 42nd St	Combined System	Ponding	Partially Separated System	Residential Street			
154	11th Ave NW from NW 46th St to Ballard Way NW	Lake Union/Ship Canal	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Street Settling
155	NW 52nd St from 11th Ave NW to 14th Ave NW	Lake Union/Ship Canal	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Street Settling

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
156	5400 Ballard Ave NW	Lake Union/Ship Canal	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Street Settling
157	N 125th St and Aurora Ave N	Densmore Basin	large ponding and and intersection flooding	Separated System	Principal Arterial			
158	Stone Ave N, north of N 137th St	Densmore Basin	Street flooding - large problem, shoulder under 1-3 inches of water.	Separated System	Residential Street			Increased Maintenance Needed
159	N 130th St and Greenwood Ave N	Pipers Creek Watershed	No Problem Description Available. See Note 10.	Separated System	Principal Arterial			
160	Alley of NE 92nd ST between Wallingford Ave N and Meridian Ave N	Densmore Basin	Flooding	Separated System	Alley			
161	Corliss Ave N and 1st Ave N	Thornton Creek Watershed	Drainage problems	Separated System	Collector Arterial			
162	Intersection of N 137th St and Sunnyside Ave N	Thornton Creek Watershed	heavy flooding -	Separated System	Residential Street			
163	20th Ave NE Ditch (Hamlin Creek)	Thornton Creek Watershed	safety and water quality concerns	Separated System	Residential Street			
164	Between NE 143rd St & NE 145th ST, just west of 30th Ave NE	Thornton Creek Watershed	Little Brook tributary. Very complicated private drainage on Little Brook Creek.	Separated System	Collector Arterial			
165	Between NE 125th St & NE 127th St on the NE side of 33rd Ave NE	Thornton Creek Watershed	SHA - Lake City Townhouses	Separated System	Non-Street Related			
166	NE 127th St between 28th Ave NE & 30th Ave NE including intersection of 28th Ave	Thornton Creek Watershed	Repeated pooling in the ROW. Hui Yang believes it to be a grading problem - has agreed to add an inlet if SDOT will repair grading. SDOT added a pedestrian	Separated System	Residential Street	Critical Facility Access		Improper Street Grading
167	Along 35th Ave NE at about NE 125th St. - Lake City Detention Pond	Thornton Creek Watershed	Flooding at Springhill Condos	Separated System	Non-Street Related	Residential Structure		
168	36th Ave NE block just south of NE 104th St	Thornton Creek Watershed	Regular, on-going flood prone area from Thornton Creek. SPU purchased properties in 2001-2002.	Separated System	Non-Street Related	Yards		Natural Creek Flooding
169	NE 85th St & Ravenna Ave NE	Thornton Creek Watershed	2001-2002 flooding. Ravenna Woods Condos - SPU is working w/ condo association (SPU reparied culvert in 2001).	Separated System	Non-Street Related	Residential Structure		
170	Business park south of Northgate near NE 100th St and 3rd Ave. NE	Thornton Creek Watershed	Surcharge to flooding at a 25 year storm event	Separated System	Non-Street Related			Inadequate Capacity
171	Apt. building near 7th Ave NE & NE Northgate Way	Thornton Creek Watershed	Ditch and culvert flooding	Separated System	Residential Street			Inadequate Capacity
172	Lake City Way NE near NE 100th St	Thornton Creek Watershed	5 ft. by 6 ft. concrete box culvert under roadway	Separated System	Principal Arterial			
173	Lake City Way NE between NE 92nd St. & NE 97th St.	Thornton Creek Watershed	30 inch and 36 inch culverts create flooding	Separated System	Non-Street Related			Inadequate Capacity
174	Culvert under NE 105th St near 27th Ave NE	Thornton Creek Watershed	Residential flooding	Separated System	Non-Street Related	Residential Structure		
175	N 105th St & Merdian Ave N North Precinct "wetland"	Thornton Creek Watershed	Flooding	Separated System	Minor Arterial			
176	Between N 100th St & N 85th St from Greenwood Ave N to Fremont Ave N	Densmore Basin	Needs drainage - flooding/ponding	Separated System	Principal Arterial			Lack of System

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
177	2166 N 122nd Pl	Densmore Basin	Large ponding and flooding. The asphalt sidewalk on the east side of the lake diverts water down N 122nd not to the ditch, but to the street and then onto a	Separated System	Residential Street			Improper Street Grading
178	13th Ave & E Remington Ct	Combined System	Flooding	Combined System	Collector Arterial			Increased Maintenance Needed
179	N 110th St & Dayton Ave N	Pipers Creek Watershed	Ditch has insufficient capacity and overflows during a two year storm event.	Separated System	Collector Arterial		0-2 years	Inadequate Capacity
180	523 N 104th St	Densmore Basin	Water from other side of street flooding her garage	Separated System	Residential Street	Residential Structure		Improper Street Grading
181	715 28th Ave E	Combined System	Water washing away her parking strip	Combined System	Residential Street	Driveway		
182	753 18th Ave E	Combined System	Water eroding away landscape and parking strip	Combined System	Collector Arterial	Yards		
183	905 E Howe St	Combined System	Water going into the garage.	Combined System	Non-Street Related	Residential Structure		Increased Maintenance Needed
184	936 N 143rd St	Combined System	Kid Valley resturant parking being flooded by runoff	Separated System	Residential Street	Parking Lot		
185	1936 NE 135th St	Thornton Creek Watershed	Ditch full of water and does not drain. Concerned about kids playing in the water	Separated System	Residential Street			
186	2166 N 120th St	Thornton Creek Watershed	Street runoff ponds in front of their property	Separated System	Residential Street	Yards		
187	2207 Fairview Ave E	Combined System	Ponding in front of his property, closed contour	Combined System	Non-Street Related	Yards		Lack of System
188	2225 W Commodore Way	Combined System	Street runoff floods parking lot. Closed contour ponding in the low spot	Combined System	Non-Street Related			Lack of System
189	2636 Mayfair Ave N	Combined System	Water coming out of the middle of the street. It seems that a system Parks put in is not being maintained. Street settling around the hole where the water i	Combined System	Residential Street			Increased Maintenance Needed
190	2728 NE 100th St	Thornton Creek Watershed	Our system runs into private system, backs up their system	Separated System	Non-Street Related			Inadequate Capacity
191	5001 Ravenna Ave NE	Combined System	Ponding at the stairway of an apartment	Combined System	Non-Street Related	Driveway		
192	8538 Mary Ave NW	Combined System	Water running down driveway causing damage	Separated System	Non-Street Related	Driveway		Area too low to Drain to System
193	8556 13th Ave NW	Combined System	Ponding in front of his property	Separated System	Non-Street Related	Yards		Improper Street Grading
194	8818 Ravenna Ave NE	Thornton Creek Watershed	Spring water from her property causing damage	Separated System	Non-Street Related	Residential Structure		groundwater seepage
195	9039 Corliss Ave N	Thornton Creek Watershed	Grassy Swale too deep	Separated System	Non-Street Related			
196	9113 25th Ave NE	Thornton Creek Watershed	Sandbox no longer functioning correctly. Need a local area solution.	Separated System	Residential Street			
197	10051 46th Ave NE	Thornton Creek Watershed	Inadequate system in an unimproved area. Water overflows the ditch and enters low spot on property	Separated System	Residential Street			Inadequate Capacity
198	10226 23RD Ave NE	Thornton Creek Watershed	Inadequate system in an unimproved area. Low spot flooded from street. Need capital solution	Separated System	Residential Street			Inadequate Capacity

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
199	10608 Rivera Pl NE	North Lake Washington	Overall system and riviera needs to be looked at.	Separated System	Residential Street			
200	12005 10th Ave NW	Pipers Creek Watershed	Ponding on his driveway	Separated System	Non-Street Related	Driveway		
201	12203 11th Ave NW	Pipers Creek Watershed	Wants very deep ditch filled in	Separated System	Residential Street			Increased Maintenance Needed
202	12239 Evanston Ave N	Pipers Creek Watershed	ponding in front of property and causing damage to garage	Separated System	Non-Street Related	Residential Structure		Improper Street Grading
203	12344 Riviera Pl NE	North Lake Washington	System on riviera is in poor condition, whole system needs improvement	Separated System	Residential Street			
204	12527 Densmore Ave N	Densmore Basin	Runoff flooding private property	Separated System	Non-Street Related	Yards		
205	12759 6th Ave NW	Pipers Creek Watershed	Inadequate system, need capital fix	Separated System	Residential Street			
206	13027 27th Ave NE	Thornton Creek Watershed	Water running down into her driveway	Separated System	Non-Street Related	Driveway		
207	13th Ave & E Jefferson St	Combined System	leaves blocking inlets at intersection	Combined System	Collector Arterial			Increased Maintenance Needed
208	4020 E Madison St	Central Lake Washington	leaves blocking inlets, street settled	Partially Separated System	Minor Arterial			Increased Maintenance Needed
209	4205 NE 123rd St	North Lake Washington	flooded from Exeter	Separated System	Residential Street			
210	2nd Ave NW and NW 130th St	Pipers Creek Watershed	ponding at intersection	Separated System	Collector Arterial			Improper Street Grading
211	1932 N 120th St	Thornton Creek Watershed	flooded from street, low spot	Separated System	Collector Arterial			Lack of System
212	357 N 100th St	Pipers Creek Watershed	sandbox overflowing	Separated System	Residential Street			Inadequate Capacity
213	11011 3rd Ave NW	Pipers Creek Watershed	flooded from street, low spot	Separated System	Minor Arterial			Lack of System
214	2912 NW 85th St	Puget Sound North	alley flooding; floods her driveway	Separated System	Alley	Driveway		Lack of System
215	36th Ave & E Terrace	Central Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
216	Lk Wash Blvd & Miller	Central Lake Washington	@ D/E alley - 1246 19th Ave E	Partially Separated System	Collector Arterial			Increased Maintenance Needed
217	Dead End of E Howe St	Combined System	D/E Howe west of 10th	Combined System	Residential Street			
218	5 corner intersection	Lake Union/Ship Canal	Boyer Ave E & 16th Ave E	Partially Separated System	Minor Arterial			
219	25th NE & 45th Viad	Central Lake Washington	W/S 25th NE next to N 3 pillars und. 45th Viad S/B	Partially Separated System	Principal Arterial			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
220	1700 Blk Pacific St	Lake Union/Ship Canal	on 1700 blk Pacific St N/S	Partially Separated System	Principal Arterial			
221	Univ Bridge & NE 40th	Lake Union/Ship Canal	beneath Univ Bridge 3 pillar row S of NE 40th	Partially Separated System	Principal Arterial			Increased Maintenance Needed
222	Dead End of Phinney Ave N, s/o N 143 St	Densmore Basin	D/E Phinney Ave - south of 143 - 1 box	Separated System	Residential Street			
223	13300 Blk Aurora	Densmore Basin	2 boxes/trash racks (n/o Burger King) & ditch line	Separated System	Principal Arterial			
224	NE 113th & Burke Gilman Trail	North Lake Washington	trash rack	Separated System	Residential Street			Increased Maintenance Needed
225	8000 block Sand Point Wy	North Lake Washington	trash rack	Partially Separated System	Minor Arterial			Increased Maintenance Needed
226	2800 block Perkins Ln	Puget Sound Central	1 LIT & 1 inlet	Partially Separated System	Residential Street			
227	Fremont N 6600 blk in driveway	Combined System	No Problem Description Available. See Note 10.	Combined System	Residential Street			
228	Fremont N 6700 blk in alley	Combined System	No Problem Description Available. See Note 10.	Combined System	Residential Street			
229	Pike Pl & Pine St	Puget Sound Central	both sides - 1 CB & 2 inlets	Partially Separated System	Residential Street			
230	Minor & Columbia	Lake Union/Ship Canal	Minor btwn Union & Columbia - both sides	Partially Separated System	Residential Street	Critical Facility Access		Increased Maintenance Needed
231	9th & University	Lake Union/Ship Canal	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
232	1214 8th Ave	Lake Union/Ship Canal	100' north of 1214 in planting strip - Check C/B in ivy & inlet line to C/B	Partially Separated System	Minor Arterial			Increased Maintenance Needed
233	9th & Union	Lake Union/Ship Canal	both sides	Partially Separated System	Collector Arterial			Increased Maintenance Needed
234	Terry & Hubbell Pl	Lake Union/Ship Canal	Manhole cover blows off	Partially Separated System	Principal Arterial			Increased Maintenance Needed
235	Dead End of E Howell st east of 23rd Ave	Combined System	at dead end of E Howell e/o 23rd	Combined System	Residential Street			Increased Maintenance Needed
236	40th Ave & E Olive St	Central Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
237	40th Ave & E Pine St	Central Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
238	Dead End of 40th Ave south of E Pine St	Central Lake Washington	at dead end of 40th s/o Pine	Partially Separated System	Residential Street			Increased Maintenance Needed
239	Evergreen Pl & E Pine	Central Lake Washington	C/B on e/s	Partially Separated System	Residential Street			Increased Maintenance Needed
240	1528 Grand Ave	Central Lake Washington	between E Pike & E Pine - Possible CB installation	Partially Separated System	Residential Street			Increased Maintenance Needed
241	E Spring & Grand Ave	Central Lake Washington	both sides - box on w/s - Box on Parks property	Partially Separated System	Residential Street			Increased Maintenance Needed
242	38th & E Spring	Central Lake Washington	box on w/s - Box on Parks property	Partially Separated System	Residential Street			Increased Maintenance Needed
243	Dead End of E Lee St	Central Lake Washington	at dead end - clean ditch line to lake	Partially Separated System	Residential Street			Increased Maintenance Needed
244	E Spring St, e/o 35th Ave	Central Lake Washington	E Spring e/o 35th - in alley - inlet	Partially Separated System	Alley			Increased Maintenance Needed
245	36th & Union	Central Lake Washington	36th btwn Union & Marion	Partially Separated System	Residential Street			Increased Maintenance Needed
246	Alley s/o E Cherry St, between 36th Ave & 37 thAve	Central Lake Washington	Alley s/o E Cherry - C/B	Partially Separated System	Alley			Increased Maintenance Needed
247	E Conover Court, e/o 35th Ave	Central Lake Washington	E Conover e/o 35th Ave	Partially Separated System	Residential Street			Increased Maintenance Needed
248	Lake Washington Blvd & Lakeside	Central Lake Washington	Lake Wash Blvd btwn Lakeside & Coleman Park - both sides - C/B's	Partially Separated System	Residential Street			Increased Maintenance Needed
249	37th Ave & Randolph Pl	Central Lake Washington	e/s in front of 608	Partially Separated System	Residential Street			Increased Maintenance Needed
250	Wellington Ave & James	Central Lake Washington	Wellington btwn James & Randolph	Partially Separated System	Residential Street			Increased Maintenance Needed
251	3701 105th	Thornton Creek Watershed	sb - N/S; Culvert to south	Separated System	Residential Street			
252	3718 98th	Thornton Creek Watershed	west of 98th	Separated System	Residential Street			
253	3735 98th	Thornton Creek Watershed	west of 98th	Separated System	Residential Street			
254	Road End of E Shelby St.	Combined System	D/E on Shelby - east of Furhman	Combined System	Residential Street			Increased Maintenance Needed

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
255	Shelby & Furhman	Combined System	N/E corner	Combined System	Collector Arterial			Increased Maintenance Needed
256	Road End of E Hamlin St.	Lake Union/Ship Canal	on Hamlin E of Boyer D/E	Combined System	Residential Street			Increased Maintenance Needed
257	Boyer & Edgar	Combined System	No Problem Description Available. See Note 10.	Combined System	Collector Arterial			Increased Maintenance Needed
258	10th & Edgar	Combined System	S/E Dish CB	Combined System	Residential Street			Increased Maintenance Needed
259	Alley between 16th Ave E & Boyer Ave E	Lake Union/Ship Canal	Alley 16th between Boyer & McGraw - CB	Partially Separated System	Alley			Increased Maintenance Needed
260	Alley e/o 19th Ave E, between Boyer Ave E & E Blaine St	Combined System	Alley east of 19th between Boyer & Blaine	Combined System	Alley			Increased Maintenance Needed
261	Eaton & 21st	Lake Union/Ship Canal	on Eaton from 21st to 20th	Combined System	Residential Street			
262	26th Ave E, between E Newton St & Boyer Ave E	Central Lake Washington	2 LIT's @ 1770 26th Ave. & 2 LIT'S @ 1936 26th Ave.	Partially Separated System	Residential Street			
263	E Park Dr & Hamlin	Combined System	on E Park from Hamlin to Shelby	Combined System	Residential Street			
264	W Park Dr & Shelby	Combined System	on W Park from Hamlin to Shelby	Combined System	Residential Street			Increased Maintenance Needed
265	Alley n/o E Highland St, between 19th Ave E & 20th Ave E	Combined System	19th Ave - Alley north of Highland	Combined System	Alley			
266	17th & Garfield	Combined System	No Problem Description Available. See Note 10.	Combined System	Residential Street			
267	Everett & Lynn	Combined System	CB & Inlet - Closed Contour	Combined System	Residential Street			Increased Maintenance Needed
268	13th & Miller	Combined System	CB &SB	Combined System	Residential Street			Increased Maintenance Needed
269	Broadway & Howe	Combined System	SB	Combined System	Residential Street			Increased Maintenance Needed
270	Broadway E, n/o E Blaine St	Combined System	Broadway north of Blaine	Combined System	Residential Street			Increased Maintenance Needed
271	W Blaine St, w/o 10th Ave W	Combined System	D/E Blaine west of 10th	Partially Separated System	Residential Street			
272	10th & Prospect	Combined System	No Problem Description Available. See Note 10.	Combined System	Minor Arterial			
273	Summit & Prospect	Combined System	No Problem Description Available. See Note 10.	Combined System	Residential Street			
274	Eastlake & Galer	Combined System	Ponding at the intersection.	Partially Separated System	Principal Arterial			Increased Maintenance Needed
275	Eastlake & Garfield	Lake Union/Ship Canal	Ponding at the intersection.	Partially Separated System	Principal Arterial			

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
276	Eastlake & Blaine	Combined System	Ponding at the intersection.	Combined System	Principal Arterial			
277	Eastlake & Howe	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			
278	Eastlake & Newton	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			Increased Maintenance Needed
279	Eastlake & Boston	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			
280	Eastlake & Lynn	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			
281	Eastlake & Louisa	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			
282	Eastlake & Roanoke	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			
284	Eastlake & Hamlin	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			
285	Eastlake & Allison	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			Increased Maintenance Needed
286	Eastlake & Harvard	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			Increased Maintenance Needed
287	Eastlake & Fuhrman	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			Increased Maintenance Needed
288	24th & Crescent	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			Increased Maintenance Needed
289	Fairview & Garfield	Lake Union/Ship Canal	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
290	Fairview & Newton	Lake Union/Ship Canal	Ponding at intersection.	Combined System	Residential Street			
291	Fairview & Boston	Lake Union/Ship Canal	No Problem Description Available. See Note 10.	Combined System	Residential Street			
292	Fairview & Lynn	Lake Union/Ship Canal	Heavy ponding, CB gets plugged with leaves.	Combined System	Residential Street			Increased Maintenance Needed
293	2360 Fairview	Lake Union/Ship Canal	Heavy street ponding.	Combined System	Residential Street			
294	Fairview & Roanoke	Lake Union/Ship Canal	Heavy ponding at the intersection	Combined System	Residential Street			
295	Minor & Louisa	Combined System	Fairview south of Roanoke	Combined System	Residential Street			
296	Yale & Roanoke	Combined System	on Yale from Roanoke to Edgar	Combined System	Residential Street			
297	Fairview & Fuhrman	Lake Union/Ship Canal	East side Fairview between Fuhrman & Allison	Combined System	Residential Street			Increased Maintenance Needed
298	Lakeview & Belmont	Lake Union/Ship Canal	Lakeview - north of Belmont - B/S	Combined System	Minor Arterial			Increased Maintenance Needed
299	Melrose & Roy	Lake Union/Ship Canal	D/E CB & Inlet	Combined System	Residential Street			Increased Maintenance Needed

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
300	Harrison & Bellevue	Lake Union/Ship Canal	D/E Harrison west of Bellevue - CB & Inlet	Partially Separated System	Residential Street			Increased Maintenance Needed
301	Melrose Ave, between E Denny Way & E Olive Pl	Lake Union/Ship Canal	Melrose between Olive & Denny	Partially Separated System	Residential Street			Increased Maintenance Needed
302	Stewart & Denny	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			
303	Bellevue Pl E & Bellevue E	Lake Union/Ship Canal	D/E Bellevue Pl E west of Bellevue E- CB & Inlet	Partially Separated System	Residential Street			Increased Maintenance Needed
304	Fairview & Eastlake	Combined System	Fairview from Eastlake to Valley	Partially Separated System	Principal Arterial			
305	Boren & Valley	Combined System	Ponding	Combined System	Principal Arterial			
306	Roy St, e/o Eastlake Ave E	Lake Union/Ship Canal	Roy west of Eastlake - CB, ponding (catchbasin plugged with debris)	Partially Separated System	Residential Street			Increased Maintenance Needed
307	Lakeview & Bolyston	Combined System	all corners	Combined System	Minor Arterial			Increased Maintenance Needed
308	NE 50th St, e/o 50th Ave NE	North Lake Washington	on NE 50th; east of 50th NE	Partially Separated System	Residential Street			
309	Laurelcrest Ln & 51st NE	North Lake Washington	on Laurelcrest S/W of 51st NE(s of Swim Clubhouse)	Partially Separated System	Residential Street			
310	3914 NE 45th	Central Lake Washington	behind 3914(Trash Rack in Creek)	Partially Separated System	Collector Arterial			
311	NE 45th & Union Bay Pl	Central Lake Washington	NE corner	Partially Separated System	Principal Arterial			
312	Alley on 24th NE, betweem NE 60th St & NE 61st St	Combined System	on 24th B/T NE 60th and NE 61st(Dead End of Alley) - Inlet	Combined System	Alley			
313	Pacific Pl & Montlake Blvd	Combined System	on Pacific Pl west of Montlake Blvd - ROOTS	Partially Separated System	Principal Arterial			
314	N 35th St, e/o Stone Way N	Lake Union/Ship Canal	N/S of N 35th - east of Stone Way next to RRX Tressle	Partially Separated System	Collector Arterial	Yards		
315	N 130th St, e/o Fremont Ave N	Densmore Basin	on 130th east of Fremont - 2 c/b	Separated System	Principal Arterial			
316	328 N 138th	Densmore Basin	Junction box @ 528	Separated System	Residential Street			
317	N 141 & Linden Ave N	Densmore Basin	1 box	Separated System	Collector Arterial			

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
318	741 N 128th	Densmore Basin	Inlets to drain line east of 741	Separated System	Residential Street			
319	N 143rd & Stone Ave N	Densmore Basin	1 box w/s of intersection, one inlet of CB at NW corner of intersection receiving gutter flow and ditch flow in huge volumes. Inlet could fail if debris collects and blocks it.	Separated System	Residential Street			
320	N 140th & Stone Ave N	Densmore Basin	SWC-culvert	Separated System	Residential Street			
321	N 130th & Meridian	Densmore Basin	NWC-1 box	Separated System	Principal Arterial			
322	N 130th ST, e/o Meridian Ave N	Densmore Basin	on 130th east of Meridian-2 c/b	Separated System	Principal Arterial			
323	12227 Corliss Ave N	Thornton Creek Watershed	1 SB (w/s) & 1 Junction box (e/s)	Separated System	Collector Arterial			
324	Corliss Ave N & Northgate Wy	Thornton Creek Watershed	NWC-1 box - Improved	Separated System	Principal Arterial			
325	10317 Midvale Ave N	Densmore Basin	2 boxes	Separated System	Residential Street			Increased Maintenance Needed
326	10309 Stone Ave N	Densmore Basin	on Corliss south of Northgate Wy - W/S -c/b	Separated System	Residential Street			Increased Maintenance Needed
327	N 105th & Aurora Ave N	Densmore Basin	1 box	Separated System	Principal Arterial			Increased Maintenance Needed
328	N 98th St, w/o Aurora Ave N	Densmore Basin	on 98th west of Aurora - 2 c/b - Closed Cotour	Separated System	Residential Street			
329	N 97th St, w/o Aurora Ave N	Densmore Basin	on 97th west of Aurora - 2 c/b - Closed Cotour	Separated System	Residential Street			
330	N 96th St, w/o Aurora Ave N	Densmore Basin	on 96th west of Aurora - 2 c/b	Separated System	Residential Street			
331	Fremont Ave N & N 95th	Densmore Basin	NWC Fremont & 95th in D/W-1 c/b	Separated System	Residential Street			
332	9527 Evanston Ave N	Densmore Basin	culvert	Separated System	Residential Street			
333	N 95th St, e/o Greenwood Ave N	Pipers Creek Watershed	culvert - n/s 95th & east of Greenwood	Separated System	Residential Street			
334	N 125th & Ashworth Ave N	Densmore Basin	trash rack - Improved	Separated System	Collector Arterial			
335	Stone Ave N, s/o N 125th St	Densmore Basin	on Stone south of 125th - 2 trash racks - Improved	Separated System	Residential Street			
336	N 138th & Greenwood	Densmore Basin	culvert - n/e/c rack - w/s of Greenwood	Separated System	Principal Arterial			
337	12th NW & NW 132nd	Puget Sound North	1 junction box n/s behind hedge	Separated System	Residential Street			
338	NW 130th & 12th NW	Puget Sound North	on NW 130 west of 12th - 48" pipe in small ravine	Separated System	Residential Street			
339	Dead End of NW 116th St	Pipers Creek Watershed	on NW 116th @ D/E west of 12th - 2 c/b	Separated System	Residential Street			Increased Maintenance Needed
340	11838 11th NW	Pipers Creek Watershed	2 SB & Junction box to 18" culvert	Separated System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
341	NW 110th & Carkeek Pk Dr	Pipers Creek Watershed	LIT/CB NW corner	Separated System	Residential Street			Increased Maintenance Needed
342	12042 4th NW	Pipers Creek Watershed	cross culvert	Separated System	Residential Street			
343	NW 107th & 4th NW	Pipers Creek Watershed	CB higher than the grade	Separated System	Residential Street			Area too low to Drain to System
344	NW 105th St, w/o 3rd Ave NW	Pipers Creek Watershed	On 105th west of 3rd - Swale & Trash rack	Separated System	Residential Street			
345	NW 105th & Dibble Ave NW	Pipers Creek Watershed	1 box & trash rack; ditches full and ponding at the nw corner	Separated System	Residential Street			Increased Maintenance Needed
346	Mary Ave NW & NW 100th	Pipers Creek Watershed	Same as 501	Separated System	Principal Arterial			
347	17th Ave NW, s/o NW 87th St	Combined System	on 17th south of 87th W/S culvert; flooding at the intersection ditches overflowing	Separated System	Residential Street			Inadequate Capacity
348	Blue Ridge Dr & Triton Dr	Puget Sound North	ROUTINE	Separated System	Collector Arterial			Increased Maintenance Needed
349	NW 97th & 21st Ave NW	Puget Sound North	ROUTINE	Separated System	Residential Street			
350	10209 Belgrove Ct NW	Puget Sound North	1 box	Separated System	Residential Street			
351	10233 Belgrove Ct NW	Puget Sound North	1 box	Separated System	Residential Street			
352	10337 Bedford Ct NW	Puget Sound North	2 boxes	Separated System	Residential Street			
353	10653 Culpepper Ct NW	Combined System	1 box & 1 inlet @ D/E of Culpepper Ct.	Separated System	Residential Street			
354	1719 NE 137th	Thornton Creek Watershed	junction box and inlet + across the street-trash rack	Separated System	Residential Street			
355	12716 12th NE	Thornton Creek Watershed	2 SB; 1 CB & 1 inlet - E/S & W/S - shallow sumps in boxes	Separated System	Residential Street			
356	NE 137th St, w/o 28th Ave NE	Thornton Creek Watershed	on 137 west of 28th - N/S - 1 box & S/S-2 boxes; private property ponding on the west side of 28th Ave NE.	Separated System	Residential Street			
357	NE 135th & 32nd NE	Thornton Creek Watershed	N/E/C-inlet	Separated System	Residential Street			
358	NE 135th St, w/o 32nd Ave NE	Thornton Creek Watershed	on 135th 100' west of 32nd - S/S-box; water doesn't drain to junction box.	Separated System	Residential Street			Improper Street Grading
359	30th Ave NE, n/o Lake City WY	Thornton Creek Watershed	on 30th north of Lake City Wy - E/S-box	Separated System	Collector Arterial			Increased Maintenance Needed
360	2741 NE 143rd	Thornton Creek Watershed	box and inlet	Separated System	Residential Street			Increased Maintenance Needed
361	14034 26th NE	Thornton Creek Watershed	box	Separated System	Residential Street			
362	26th NE & NE 120th	Thornton Creek Watershed	S/W/C - culvert xing	Separated System	Residential Street			
363	1033 NE 123rd	Thornton Creek Watershed	box	Separated System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
364	13001 42nd NE	North Lake Washington	across the street - box	Separated System	Residential Street			Increased Maintenance Needed
365	NE 123rd & Lakeside Pl NE	North Lake Washington	S/W/C - box	Separated System	Residential Street			Increased Maintenance Needed
366	14014 36th NE	Thornton Creek Watershed	box	Separated System	Residential Street			
367	NE 123rd & 35th NE	Thornton Creek Watershed	box - IMPROVED	Separated System	Minor Arterial			
368	NE 110th St, e/o 31st Ave NE	Thornton Creek Watershed	N/S NE 110th - 100' east of 31st- trash rack - Need improved structure	Separated System	Collector Arterial			
369	NE 117th & 30th NE	Thornton Creek Watershed	N/S 117th - 2 boxes	Separated System	Residential Street			
370	3121 NE 133rd	Thornton Creek Watershed	box	Separated System	Residential Street			
371	9023 30th NE	Thornton Creek Watershed	E/S & W/S-boxes @ 9023	Separated System	Residential Street			
372	10660 Riviera Pl NE	North Lake Washington	across street-box	Separated System	Residential Street			
373	13036 10th NE	Thornton Creek Watershed	across street-trash rack + 1 LIT & SB @ 13014	Separated System	Residential Street			
374	NE 135th & 20th NE	Thornton Creek Watershed	trash rack	Separated System	Residential Street			
375	20th Ave NE, n/o NE 135th St	Thornton Creek Watershed	E/S & W/S 20th north of NE 135th - ROUTINE	Separated System	Residential Street			
376	3042 NE 137th	Thornton Creek Watershed	trash rack - NEEDS NEW STRUCTURE; trash rack clogs causing flooding.	Separated System	Residential Street			Increased Maintenance Needed
377	12570 33rd NE	Thornton Creek Watershed	across street-trash rack	Separated System	Residential Street			Increased Maintenance Needed
378	12333 35th NE	Thornton Creek Watershed	trash rack	Separated System	Residential Street			
379	NE 123rd St, e/o 35th Ave NE	Thornton Creek Watershed	on NE 123rd east of 35th -creek crossing	Separated System	Residential Street			
380	11537 34th NE	Thornton Creek Watershed	creek crossing	Separated System	Residential Street			
381	NE 118th & 31st Pl NE	Thornton Creek Watershed	closed contour	Separated System	Residential Street			Increased Maintenance Needed
382	NE 117th & Lake City Wy	Thornton Creek Watershed	behind KFC - trash rack	Separated System	Principal Arterial			Increased Maintenance Needed
383	NE 113th & Lake City Wy	Thornton Creek Watershed	grate lid	Separated System	Principal Arterial			
384	NE 130th & 35th NE	Thornton Creek Watershed	Flooding on shoulder on street and shoulder on NE 130th St and 35th Ave NE; tiny inlet and large drainage area.	Separated System	Minor Arterial			Inadequate Capacity
385	13709 41st NE	North Lake Washington	trash rack - ED FIXED	Separated System	Residential Street			
386	14362 Edgewater Dr NE	North Lake Washington	culvert crossing	Separated System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
387	NE 110th & 38th NE	Thornton Creek Watershed	trash rack - NEC	Separated System	Collector Arterial			Increased Maintenance Needed
388	25th Ave NE, between NE 123rd St & NE 125th St	Thornton Creek Watershed	on 25th between NE 123rd & NE 125th - Creek crossing	Separated System	Residential Street			
389	NE 142nd & 41st NE	North Lake Washington	closed contour - culvert &S/B	Separated System	Residential Street			
390	27th Ave NE, s/o NE 145 St	Thornton Creek Watershed	on 27th south of NE 145th - S/B & culvert east of - ROUTINE	Separated System	Residential Street			
391	Northgate Wy & 12th NE	Thornton Creek Watershed	N/S - trash rack	Separated System	Principal Arterial			Increased Maintenance Needed
392	12348 22nd NE	Thornton Creek Watershed	cross culvert	Separated System	Residential Street			
393	Lakeside NE & NE 112th	North Lake Washington	ditches	Separated System	Residential Street			Increased Maintenance Needed
394	NE 120th & 35th NE	Thornton Creek Watershed	creek crossing	Separated System	Minor Arterial			
395	NE 113th & 15th NE	Thornton Creek Watershed	culvert	Separated System	Minor Arterial			Increased Maintenance Needed
396	10540 39th NE	Thornton Creek Watershed	No Problem Description Available. See Note 10.	Separated System	Residential Street			
397	2701 NE 100th	Thornton Creek Watershed	Trash rack w/o 2701	Separated System	Residential Street			
398	30th NE & NE 110th	Thornton Creek Watershed	on 30th south of 110th-open ditches - Needs large sand catcher installed on SWC	Separated System	Collector Arterial			
399	NE 93rd & Sand Point Wy	Thornton Creek Watershed	N/S NE 93rd west of Sand Point-creek xing	Separated System	Minor Arterial			
400	4566 NE 89th	Thornton Creek Watershed	retention manhole - Sewer checks routine under WO cards	Partially Separated System	Residential Street			
401	58th NE & NE 77th	North Lake Washington	W/S - box top	Partially Separated System	Residential Street			Increased Maintenance Needed
402	NE 92nd & Ravenna	Thornton Creek Watershed	S/S NE 92nd between Lake City Wy & Ravenna-trash rack in greenbelt	Separated System	Residential Street			Increased Maintenance Needed
403	NE 95th & 35th NE	Thornton Creek Watershed	NE 95th between 35th NE & Sand Point Wy-drain tops	Separated System	Minor Arterial			
404	NE 98th & 15th NE	Thornton Creek Watershed	NE 98th between 15th & Lake City Wy-drain tops	Separated System	Residential Street			
405	NE 97th & 20th NE	Thornton Creek Watershed	trash rack	Separated System	Residential Street	Critical Facility Access		
406	Lake City Wy & NE 95th	Thornton Creek Watershed	E/S Lake City Wy 200' N of 95th-trash rack	Separated System	Principal Arterial			
407	NE 106th & 12th NE	Thornton Creek Watershed	S/E/C-rack	Separated System	Residential Street			Increased Maintenance Needed
408	NE 94th & 27th NE	Thornton Creek Watershed	trash rack SE/S	Separated System	Residential Street			

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
409	17th Ave NE, e/o NE 105th St	Thornton Creek Watershed	O/E west of 17th on 105th-creek xing	Separated System	Residential Street			Increased Maintenance Needed
410	NE 105th & 8th NE	Thornton Creek Watershed	2 Creek xings under 105th & 8th	Separated System	Residential Street	Critical Facility Access		Increased Maintenance Needed
411	Sand Point Wy & Matthews Ave	Thornton Creek Watershed	W/S Sand Pt Wy 50' N of Matthews Ave-box	Separated System	Minor Arterial			
412	NE 98th & Ravenna	Thornton Creek Watershed	S/S NE 98 between Ravenna & Lake City Wy-closed contour - small trash rack!!!!!	Separated System	Collector Arterial			
413	NW 68th & 37th NW	Puget Sound North	C/B Ditch	Partially Separated System	Residential Street			
414	NW 67th & 34th NW	Combined System	2 boxes	Partially Separated System	Residential Street			
415	NW 65th & 36th NW	Puget Sound North	1 box	Partially Separated System	Collector Arterial			
416	NW 61st & 38th NW	Puget Sound North	Two SB's @ RR X-ing; pipes coming from the tracks overwhelming SB's	Partially Separated System	Collector Arterial			
417	Dead End of NW 56th ST w/o 34th Ave NW	Combined System	1 cb & 1 inlet @ D/E of 56th w/o 34th	Partially Separated System	Residential Street			
418	NW Market & 20th NW	Lake Union/Ship Canal	All CB'S & inlets	Partially Separated System	Minor Arterial			
419	Ballard Ave & Dock St	Lake Union/Ship Canal	2 inlets &1 C/B - SE Corner	Partially Separated System	Residential Street			Street Settling
420	2nd NW & Canal St	Combined System	2 inlets	Partially Separated System	Residential Street			
421	144 Canal St	Combined System	2 CB's, flooding along the shoulder and sidewalk	Partially Separated System	Residential Street			
422	N 35th & Fremont	Lake Union/Ship Canal	2 inlets	Partially Separated System	Minor Arterial			
423	N 64th & Woodland Pl	Densmore Basin	1 C/B & 2 INLETS	Combined System	Minor Arterial			
424	N 72nd & Aurora	Combined System	2 inlets	Combined System	Principal Arterial			
425	N 85th & Palatine	Combined System	1 box	Separated System	Principal Arterial			
426	3614 W Lawton St	Combined System	1 SB	Partially Separated System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
427	3734 W Lawton St	Combined System	1 SB	Partially Separated System	Residential Street			
428	3508 W Thurman St	Combined System	IMPROVED	Combined System	Residential Street			
429	3225 Perkins Ln W	Puget Sound Central	1 LIT & 2 inlet	Partially Separated System	Residential Street			
430	2620 Perkins Ln W	Puget Sound Central	1 SB; 1 LIT CB & 1 inlet	Partially Separated System	Residential Street			
431	2529 Perkins Ln W	Puget Sound Central	1 LIT	Partially Separated System	Residential Street			
432	2437 Perkins Ln W	Puget Sound Central	From 2437 to 2445 1 LIT & 2 inlet; S/B @ 2457	Partially Separated System	Residential Street			
433	2364 Perkins Ln W	Puget Sound Central	1 SB & 1 inlet	Partially Separated System	Residential Street			
434	1987 Perkins Ln W	Puget Sound Central	1 SB & 2 inlet	Partially Separated System	Residential Street			
435	Perkins Ln W & W Raye St	Puget Sound Central	2 CB; 1 S/B & 3 inlets	Partially Separated System	Residential Street			
436	W Ruffner & Perkins Ln W	Puget Sound Central	dead end of W Ruffner west of Perkins Lane	Separated System	Residential Street			
437	Westlake N & Galer	Lake Union/Ship Canal	Improved - sidewalks and drainage	Partially Separated System	Principal Arterial			
438	6th W & Nickerson	Combined System	ED A. FIXED	Combined System	Residential Street			
439	661 Nickerson	Combined System	2 SB's and 8" drain line west of 661 from alley to W. Nickerson & J/B in c/w	Combined System	Principal Arterial			
440	3rd W & W Fulton, NW side 40' from the corner	Combined System	1 SB - NW side 40' from corner - in vacant lot	Combined System	Non-Street Related			
441	Birch & Halliday	Combined System	SE corner	Combined System	Minor Arterial			
442	Aurora & Galer	Combined System	1st landing from bottom of stairs on W side of Aurora	Combined System	Principal Arterial			
443	3rd Ave W & Dravus	Combined System	No Problem Description Available. See Note 10.	Combined System	Minor Arterial			
444	12th W & W Howe	Puget Sound Central	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
445	1015 W Lee	Combined System	1 box btw houses 200' down path - E side	Combined System	Residential Street			

See footnotes on final page of table.

ATTACH C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
446	9th Ave W & W Galer	Combined System	ROUTINE	Combined System	Residential Street			
447	7th Ave W, s/o W Cremona St	Combined System	1 box betwen houses 200' down path - E side - yearly schedule	Combined System	Residential Street			
448	W Barret & 5th W	Combined System	SE corner - bottom of stairs	Combined System	Residential Street			
449	6th W & W Ewing	Combined System	SW corner	Combined System	Residential Street			
450	1629 Aurora N, 300' w/o Aurora Ave N	Combined System	1 SB - 300' west of Aurora - Parks Property	Combined System	Non-Street Related			
451	2622 3rd N	Combined System	NE corner	Combined System	Residential Street			
452	15th W & W Garfield	Puget Sound Central	SB & 30" half round pipe - north of Garfield in fenced area	Partially Separated System	Principal Arterial			
453	McGraw St, e/o Bigelow Ave N	Combined System	CB @ D/E	Combined System	Residential Street			
454	15th W & Dravus	Combined System	on 15th under Dravus	Partially Separated System	Principal Arterial			
455	15th W & Emerson	Combined System	fills up L.I.T. w/gravel	Partially Separated System	Principal Arterial			
456	7th Ave W, between W Howe St & W Crockett St	Combined System	on 7th between Howe & Crocket	Partially Separated System	Residential Street			
457	Aurora & Mercer	Combined System	Mercer under Aurora	Partially Separated System	Principal Arterial			Increased Maintenance Needed
458	10th W & W Highland	Combined System	No Problem Description Available. See Note 10.	Combined System	Minor Arterial			
459	2nd W & Canal St	Combined System	w/s	Partially Separated System	Residential Street			
460	3426 23rd W	Combined System	w/s - Side walk drain	Combined System	Residential Street			
461	23rd W & W Ruffner St	Combined System	West side	Combined System	Residential Street			
462	23rd W & Gilman Ave W	Combined System	NW & SW - 2 Boxes	Combined System	Minor Arterial			
463	16th W & W Barrett	Combined System	2 Inlets / 1 CB	Combined System	Residential Street			
464	W Armor St & Magnolia Blvd	Puget Sound Central	on Armor between Magnolia & 46th W - 4 boxes	Partially Separated System	Residential Street			
465	Magnolia Blvd & Howe St	Puget Sound Central	SW corner-1 box	Partially Separated System	Collector Arterial			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
466	3903 31st Ave W	Combined System	E side - 1 box	Combined System	Residential Street			
467	5144 40th Ave W	Combined System	E side - 1 box	Partially Separated System	Collector Arterial			
468	3737 Commodore Way	Combined System	2 CB's	Partially Separated System	Collector Arterial			
469	29th Ave W & W Elmore Pl	Combined System	SE corner - 1 box	Combined System	Residential Street			
470	Burton Pl W, n/o W Thurman St	Combined System	1 box & ditch - 100' north of Thurman	Combined System	Residential Street			
471	W Emerson St, w/o 24th Ave W	Combined System	Culvert inlet & 2 boxes on Emerson w/o 24th	Combined System	Residential Street			
472	24th Ave W & W Ruffner	Combined System	NW & NE corners-2 boxes	Combined System	Residential Street			
473	24th Ave W & W Armour	Combined System	NE corner 1box	Combined System	Residential Street			
474	24th Ave W & W Raye	Combined System	SW corner 1 box	Combined System	Residential Street			
475	24th Ave W & W McGraw	Combined System	SW corner 1 box	Partially Separated System	Residential Street			
476	35th Ave W, s/o W Government Way	Combined System	150' south in ravine behind bldg.-sandbox	Combined System	Residential Street			
477	Sandbox south of 3614 W Lawton St	Combined System	SB	Partially Separated System	Residential Street			
478	Road End of Federal Ave E	Combined System	D/E Federal north of Miller - CB & SB	Combined System	Residential Street			
479	Portage Bay Pl E & E Martin St	Lake Union/Ship Canal	Portage Bay Pl	Combined System	Residential Street			Increased Maintenance Needed
480	48th Ave NE & NE 44th St	North Lake Washington	4800 blk	Partially Separated System	Collector Arterial			
481	NW Elford Dr, n/o NW 137th Pl	Puget Sound North	NW Elford - 2 boxes/trash racks @ D/E & 1 cross culvert @ 945	Separated System	Residential Street			
482	10356 Mary Ave. NW	Pipers Creek Watershed	on Mary north of 100th - 2 boxes @ dead end	Separated System	Residential Street			Increased Maintenance Needed
483	At about 3046 NW Esplande	Puget Sound North	1 box	Separated System	Residential Street			
484	At about 1503 NW Woodbine Way	Pipers Creek Watershed	1 CB & 1 inlet	Separated System	Residential Street			
485	At about 10546 35th Ave NE	Thornton Creek Watershed	35th & 107th - across street-Lake City Dam - 3 racks	Separated System	Minor Arterial			
486	Seaview Ave NW, n/o NW 67th St Ext	Puget Sound North	on Seaview - 2 boxes	Partially Separated System	Minor Arterial			

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
487	Dravus & Perkins	Puget Sound Central	3200 blk; 1 LIT & 1 inlet	Partially Separated System	Residential Street			
488	Dexter & Newell	Combined System	3boxes 1-30' W of sidewalk 2-300' W of Dexter in lot 3-300' W of sidewalk then N	Combined System	Minor Arterial			Increased Maintenance Needed
489	5th Ave N & Mercer St	Combined System	5th N & Mercer - 2 boxes	Partially Separated System	Principal Arterial			
490	Thorndyke W & W Ruffner	Combined System	No Problem Description Available. See Note 10.	Combined System	Residential Street			
491	Meadowbrook Detention Pond	Thornton Creek Watershed	Bypass & birdcage trash racks	Separated System	Residential Street			
492	1014 NW 120th St.	Pipers Creek Watershed	1 Juction box @ D/E & 1 SB @ edge of ravine	Separated System	Residential Street			Increased Maintenance Needed
493	3239 NW Esplanade	Puget Sound North	1 SB @ north property line	Separated System	Residential Street			
494	6117 Ravenna Ave NE	Combined System	LIT C/B	Combined System	Residential Street			
495	48th Ave NE & NE 45th St	North Lake Washington	Closed contour, check all C/B's & inlets	Partially Separated System	Residential Street			
496	NE Blakeley St & NE 51st St	Central Lake Washington	Closed contour; 5 C/B's & 1 inlet	Partially Separated System	Residential Street			
497	SW Kenyon St., between 11th Ave SW & 10th Ave SW	Duwamish Waterway	Drainge from the hillside along the sidewalk and into the street	Partially Separated System	Residential Street			
498	S. Elmgrove St between 5th Ave S & 7th Ave S	South Park Basin	Roadway flooding, business and parking area flooding, insufficient road grade for drainage.	Partially Separated System	Collector Arterial	Parking Lot	0-2 years	Lack of System
499	S. Monroe St between 3rd and 5th Ave S	South Park Basin	Loading ramp, interior business and parking area flooding	Partially Separated System	Collector Arterial	Commercial/Industrial	0-2 years	Lack of System
500	Alley bordered by S Monroe St, Kenyon St., 7th and 8th Ave S	South Park Basin	Flooding from the Duwamish River. Flooding in the poorly graded alley, roof drain from business drains to alley, potholes in alley, basement flooding. Combin	Combined System	Collector Arterial	Residential Structure	0-2 years	Lack of System
501	7th Ave S. between S. Kenyon and Monroe St.	South Park Basin	Inlet is too far from curb to pick up drainage, causing flooding in parking lot downstream; ponding along both sides of the road.	Partially Separated System	Collector Arterial	Parking Lot	0-2 years	Improper Street Grading
502	S Chicago between 5th Ave S & 7th Ave S	South Park Basin	Flooding inlet, pipe has reverse grade; severe flooding of roadway and businesses (deep water).	Partially Separated System	Collector Arterial		0-2 years	Inadequate Capacity
503	5th Ave S between S Holden St & S Austin St	South Park Basin	System exists, however no inlets into the system; severe flooding of roadway and businesses.	Partially Separated System	Collector Arterial		0-2 years	Lack of System

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
504	S Holden St between 2nd Ave S & 3rd Ave S	South Park Basin	Flooding of parking and yard area. Both are below road elevation; severe flooding of roadway and businesses.	Partially Separated System	Collector Arterial	Yards	0-2 years	Lack of System
505	5th Ave S between S. Kenyon St & S. Monroe St	South Park Basin	Ponding in parking lot/loading dock	Partially Separated System	Collector Arterial	Parking Lot	0-2 years	Lack of System
506	S Cloverdale St at 7th Ave S	South Park Basin	Basement flooding, possible surcharging drainline.	Partially Separated System	Collector Arterial	Residential Structure	0-2 years	Inadequate Capacity
507	8th Ave S and S Cloverdale St	South Park Basin	Flooding near inlet on 8th. Road not graded to drain.	Combined System	Collector Arterial		0-2 years	Improper Street Grading
508	5th Ave S and S Concord St	South Park Basin	Large scale sidewalk, street and yard flooding, low spot with no inlet	Separated System	Collector Arterial	Yards	0-2 years	Lack of System
509	5th Ave S and S Trenton St	South Park Basin	Street and yard ponding; ponding minor.	Separated System	Collector Arterial	Yards	0-2 years	Lack of System
510	Alley bordered by Cloverdale, Donovan, 7th and 5th Ave S.	Combined System	Flooding of apartments and marginally improved alley which lacks drainage system	Separated System	Collector Arterial	Residential Structure	0-2 years	Lack of System
511	Cloverdale St. between 5th and 6th Ave S.	South Park Basin	Parking lot flooding	Separated System	Collector Arterial	Parking Lot	0-2 years	Lack of System
512	S. Henderson St and 4th Ave S.	South Park Basin	Ditch blocked by neighbor	Partially Separated System	Residential Street		0-2 years	Increased Maintenance Needed
513	S Webster St between 2nd and 3rd Ave s.	Duwamish Waterway	Pipe system and insufficient pipe storage causes flooding with rainfall and high tides	Combined System	Minor Arterial		0-2 years	Inadequate Capacity
514	S Webster St between 3rd and 4th Ave S	Duwamish Waterway	Roadway and parking area flooding; significant flooding of roadway and businesses.	Combined System	Minor Arterial	Parking Lot	0-2 years	Lack of System
515	5th Avenue S and S Henderson St	Combined System	Ditch on south side of S Director Street is overgrown and lacks sufficient capacity, causing flooding on S Henderson St	Separated System	Minor Arterial		0-2 years	Increased Maintenance Needed
516	3rd Ave S between S Henderson and Trenton St	Combined System	Illegal fill causes flooding due to flow direction changes; large pond/flooding in open space.	Separated System	Minor Arterial		0-2 years	Lack of System
517	7th Ave S south of Director St.	Combined System	Roadway, driveway and private yard flooding	Separated System	Minor Arterial	Driveway	0-2 years	Lack of System
518	S Trenton St. between 3rd Ave S and 4th Ave S	Combined System	Flooding caused by runoff from street and business parking lot.	Partially Separated System	Minor Arterial		0-2 years	Lack of System
519	S Trenton St between 7th and 8th Ave S.	Combined System	Sidewalk, basement, street and driveway flooding; ponding in front of house and street.	Partially Separated System	Minor Arterial	Driveway	0-2 years	Lack of System
520	S Director and Henderson between 8th and 7th Ave. S.	Combined System	Roadway, driveway and parking area flooding. No drainage system.	Separated System	Minor Arterial	Driveway	0-2 years	Lack of System
521	Area bounded by S Cloverdale St, S Donovan St, 15th Ave S and 17th Ave S.	Combined System	Roadway, driveway, basement and yard flooding.	Combined System	Minor Arterial	Driveway	0-2 years	Lack of System
522	S Rose St and 10th Ave S.	Combined System	Driveway flooding, no inlets.	Combined System	Minor Arterial	Driveway	0-2 years	Lack of System

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (If Known)
523	4th Ave S & S Trenton St	Combined System	Ponding in the yard and parking area from street runoff. No inlet to existing system; poorly defined drainage system along both sides of the road. Significant ponding along both sides of the street.	Partially Separated System	Minor Arterial	Yards	0-2 years	Lack of System
524	7th Ave S and S Trenton St	Combined System	Home, alley, parking lot and yard ponding below hill; ponding on the street and sidewalk on the south side of S Trenton St.	Partially Separated System	Minor Arterial	Parking Lot	0-2 years	Area too low to Drain to System
525	S Henderson St and 8th Ave S.	Combined System	Basement and yard flooding. An inlet is present but runoff cannot enter.	Separated System	Minor Arterial	Residential Structure	0-2 years	Area too low to Drain to System
526	S Concord St and 14th Ave S.	Combined System	Low area that collects water and has no inlet. Surrounding area is higher so flow by gravity to existing storm drain system is not currently possible.	Combined System	Minor Arterial		0-2 years	Area too low to Drain to System
527	S Thistle St and 8th Ave S.	Combined System	Driveway and basement flooding possibly from street drainage.	Combined System	Minor Arterial	Driveway	0-2 years	Lack of System
528	S. Donovan St. and 7th Ave S.	Combined System	Minor street ponding due to improper street grades	Partially Separated System	Minor Arterial		0-2 years	Improper Street Grading
529	S. Southern St. and 10th Ave S.	Combined System	Minor street ponding at low point in street	Combined System	Minor Arterial		0-2 years	Lack of System
530	S. Sullivan St and 8th Ave S	Combined System	Basement and yard flooding	Combined System	Minor Arterial	Yards	0-2 years	Area too low to Drain to System
531	12th Ave S and Trenton Ave S.	Combined System	Basement and yard flooding	Combined System	Minor Arterial	Yards	0-2 years	Area too low to Drain to System
532	S. Donovan St. and 10th Ave S.	Combined System	Basement and yard flooding	Combined System	Minor Arterial	Yards	0-2 years	Area too low to Drain to System
533	S Cloverdale St. and 12th Ave S.	Combined System	Basement flooding	Combined System	Minor Arterial	Residential Structure	0-2 years	Area too low to Drain to System
534	S. Donovan St. and 12th Ave S.	Combined System	Basement bathroom flooding	Combined System	Minor Arterial	Residential Structure	0-2 years	Area too low to Drain to System
535	S. Sullivan St and 10th Ave S	Duwamish Waterway	Basement flooding	Combined System	Minor Arterial	Residential Structure	0-2 years	Area too low to Drain to System
536	S. Donovan St. and 5th Ave S.	Combined System	Basement and yard flooding	Separated System	Minor Arterial	Yards	0-2 years	Area too low to Drain to System
537	S. Cloverdale St and 8th Ave S.	South Park Basin	Basement and yard flooding	Combined System	Minor Arterial	Yards	0-2 years	Area too low to Drain to System
538	S. Rose St. and 7th Ave. S.	South Park Basin	Combined sewer backup in basement	Combined System	Residential Street	Residential Structure	2-25 years	Lack of System
539	S. Southern St. and 8th Ave S.	Combined System	Water Quality concern. No flooding; appears to be no ponding at the street corner or the residence.	Combined System	Minor Arterial		0-2 years	
540	S. Thistle St. and 8th Ave S.	Combined System	Leaves clog inlets	Combined System	Collector Arterial		0-2 years	Increased Maintenance Needed
541	Between S. Monroe St. & S. Elmgrove St at 7th Ave S.	South Park Basin	Combined sewer backup in basement	Partially Separated System	Non-Street Related	Residential Structure	0-2 years	Increased Maintenance Needed
544	8th Ave S. between S. Cambridge and Director St.	Duwamish Waterway	Street and driveway flooding; severe flooding of roadway and business.	Separated System	Collector Arterial	Driveway	0-2 years	Inadequate Capacity

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
546	Military Road subbasin runoff	Norfolk Basin	System overtopping causes flooding in 1.0' diameter pipe system.	Partially Separated System	Collector Arterial		2-25 years	Inadequate Capacity
547	40th Ave S, east portion of Norfolk Street subbasin	Norfolk Basin	System overtopping causes floodingin 1.5' diameter pipe system.	Partially Separated System	Residential Street		2-25 years	Increased Maintenance Needed
548	ML Kingf Way, downstream portion of ML King Way subbasin	Norfolk Basin	System overtopping causes flooding in 1.5' diameter pipe system.	Partially Separated System	Principal Arterial		2-25 years	Inadequate Capacity
549	ML King Way and Norfolk St, upstream node of I-5 off-ramp loop ditch	Norfolk Basin	System overtopping causes flooding in 3' diameter pipe system.	Partially Separated System	Principal Arterial		2-25 years	Inadequate Capacity
550	Military Road, Military Road subbasin runoff; ditch on eastside of Military Road S.	Norfolk Basin	System overtopping causes flooding in 1.25' diameter pipe system.	Separated System	Collector Arterial		2-25 years	Increased Maintenance Needed
551	ML King Way, middle portion of ML King Way sub-basin	Norfolk Basin	System overtopping causes flooding in 1.25' diameter pipe system.	Partially Separated System	Principal Arterial		2-25 years	Inadequate Capacity
552	First node for WSDOT drainage system at northern limits of project	Norfolk Basin	System overtopping causes flooding in 1.0' diameter pipe system.	Partially Separated System	Principal Arterial		2-25 years	Inadequate Capacity
553	ML King Way, downstream portion of ML King Way subbasin	Norfolk Basin	System overtopping causes flooding in 5.0' diameter system.	Partially Separated System	Principal Arterial		2-25 years	Inadequate Capacity
554	Ranier Ave S. between S. Ferdinand St.	South Lake Washington	Sidewalks in business area	Partially Separated System	Principal Arterial			
555	S. Juneau St and 39th Ave S	South Lake Washington	Flooded Sidewalks	Partially Separated System	Residential Street			
556	Mt. View between Beacon Ave S MLK & S Alaska St & S Holly St	South Lake Washington	Spot Drainage Complaints; leaves clogging inlets	Partially Separated System	Principal Arterial			Increased Maintenance Needed
557	Renton Ave S & Sturtevant Ave S	South Lake Washington	UW Mapes Study	Partially Separated System	Collector Arterial			Increased Maintenance Needed
558	4th Ave S & S Dawson St	Combined System	Ponding and flooding	Combined System	Principal Arterial			Increased Maintenance Needed
559	4th Ave S & S Michigan St	Combined System	Drainage improvements	Partially Separated System	Principal Arterial			
560	Airport Way S & S Lucile St	Combined System	Drainage improvements	Combined System	Principal Arterial			
561	S Horton St.between 4th Ave S & East Marginal Way	Combined System	No Problem Description Available. See Note 10.	Combined System	Residential Street			Increased Maintenance Needed
562	S Lander St between 1st Ave S & 4th Ave S	Duwamish Waterway	No Problem Description Available. See Note 10.	Partially Separated System	Minor Arterial			Increased Maintenance Needed

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
563	Railroad crossing at S Holgate St & Occidental Ave S	Combined System	No Problem Description Available. See Note 10.	Combined System	Minor Arterial			Increased Maintenance Needed
564	Occidental Ave S from S Lander St to S Horton St	Duwamish Waterway	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
565	The entire length of S Spokane St to Airport Way S	Duwamish Waterway	No Problem Description Available. See Note 10.	Combined System	Minor Arterial			
566	6th Ave S from S Massachusetts St to S Lander St	Combined System	No Problem Description Available. See Note 10.	Combined System	Minor Arterial			Increased Maintenance Needed
567	3rd Ave S between S Dawson St and S Lucille St	Combined System	No Problem Description Available. See Note 10.	Combined System	Residential Street			Increased Maintenance Needed
568	S Hudson St & 1st Ave S	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			Increased Maintenance Needed
569	S Holden St from SR 509 to 5th Ave S	Duwamish Waterway	No Problem Description Available. See Note 10.	Partially Separated System	Principal Arterial			
570	Holden alignment east of 5th Ave S to Riverside Drive & 8th Ave S	South Park Basin	No Problem Description Available. See Note 10.	Partially Separated System	Principal Arterial			
571	Dallas Ave S from 10th Ave S to 14th Ave S	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			
572	Corspn Ave S. & Airport Way S. near S. Hardy St.	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			Increased Maintenance Needed
573	California Ave SW between SW Alaska St. & SW Hudson St. - alleys directly east an	Puget Sound South	No Problem Description Available. See Note 10.	Partially Separated System	Principal Arterial			
574	Pioneer Square - Alley drainage plan as prioritized in plan	Combined System	drainage repairs in alleys of Priority 1, 2,3	Combined System	Principal Arterial			Increased Maintenance Needed
575	2nd Ave S & S Main St	Combined System	flooding	Combined System	Principal Arterial			
576	10026 31st Ave SW	Puget Sound South	broken pipe on private property, noeasement	Separated System	Residential Street			Increased Maintenance Needed
577	3400 SW Manning St	Combined System	ditch not flowing, needs maint	Combined System	Residential Street			Increased Maintenance Needed
578	9814 45th Ave SW	Puget Sound South	ponding in unimproved alley	Separated System	Residential Street			Erosion
579	9915 47th Ave S	Norfolk Basin	broken pipe on private property, noeasement	Partially Separated System	Residential Street			Increased Maintenance Needed
580	6938 Flora Ave S	Combined System	ponding where street settled	Combined System	Residential Street			Improper Street Grading
581	5956 SW Raymond St	Puget Sound South	sidewalk and alley settling	Partially Separated System	Residential Street			Improper Street Grading
582	10408 41st Ave SW	Puget Sound South	alley flooding	Separated System	Residential Street			
583	5624 34th Ave SW	Longfellow Creek Watershed	flooded from street, low spot	Separated System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
584	7532 31st Ave SW	Combined System	ponding in unimproved alley	Combined System	Residential Street			
585	1000 S Myrtle St	Duwamish Waterway	runoff into Water Op yard	Partially Separated System	Residential Street	Critical Facility Access		
586	727 S Trenton St	Combined System	spring in homwowners yard flooding street	Partially Separated System	Residential Street			
587	4411 SW Graham St	Puget Sound South	street settled after EQ	Partially Separated System	Residential Street			Increased Maintenance Needed
588	7519 S Taft St	Combined System	flooding from street behind house	Separated System	Residential Street	Yards		Increased Maintenance Needed
589	4240 Chilberg Ave SW	Puget Sound South	spring in homwowners yard flooding street	Partially Separated System	Residential Street			
590	6300 Block of Beach Drive SW	Puget Sound South	street settled	Partially Separated System	Residential Street			Improper Street Grading
591	923 S Homer St	Combined System	Street runoff floods parking/loading area.	Combined System	Residential Street	Parking Lot		
592	4137 22nd Ave SW	Combined System	flooded from street, low spot; runoff form multi-family driveway crosses street and runs onto private property.	Combined System	Residential Street	Residential Structure		Lack of System
593	519 S Concord St	South Park Basin	flooded from street, low spot; major street flooding.	Separated System	Residential Street			
594	4816 SW Brandon St	Puget Sound South	alley flooding	Partially Separated System	Residential Street			Increased Maintenance Needed
595	3608 33rd Ave SW	Combined System	water popping out in middle of the street	Combined System	Residential Street			Increased Maintenance Needed
596	3807 2nd Ave S	Duwamish Waterway	flooded from street, low spot	Combined System	Residential Street			Increased Maintenance Needed
597	7500 45th Ave SW	Puget Sound South	water popping out of ROW	Partially Separated System	Residential Street			Increased Maintenance Needed
598	39th Ave S & S Juneau St	South Lake Washington	entire block is flooded from street	Partially Separated System	Residential Street			
599	11239 Arroyo Beach Pl SW	Puget Sound South	outfall to sound backs up during high-tide and storms	Partially Separated System	Residential Street			Inadequate Capacity
600	Walnut Ave SW & SW Grayson St	Puget Sound Central	intersection of two unimproved streets flooding backyard	Partially Separated System	Residential Street	Yards		
601	40th & Evergreen Pl	Combined System	No Problem Description Available. See Note 10.	Combined System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
602	Corner of Newport & 38th	Duwamish Waterway	Newport just n/o E Spring (two boxes and inlets)	Partially Separated System	Residential Street			
603	Lakeside Ave S & S Lane St	Central Lake Washington	closed contour - Install inlet @ low point	Partially Separated System	Residential Street			Lack of System
604	9803 49th Ave SW	Puget Sound South	S/E - across form 9803 - Ditch; culvert & SB	Separated System	Residential Street			
605	S Edmunds St & Empire Wy S	South Lake Washington	NW cor - Install inlets	Partially Separated System	Residential Street			Lack of System
606	Empire Wy S & S Graham St	South Lake Washington	on Empire N of S Graham(behind gas station)	Partially Separated System	Residential Street			Increased Maintenance Needed
607	S Morgan St one block west of MLK Way S	South Lake Washington	on Morgan one blk west of Empire	Partially Separated System	Residential Street			Increased Maintenance Needed
608	7719 MLK Jr Way S	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
609	MLK Jr. Wy S & S Kenyon St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
610	S Angeline St east of MLK Jr. Way S	South Lake Washington	on Angeline - east of empire way	Partially Separated System	Residential Street			
611	MLK Jr. Wy S & S Holly St	South Lake Washington	on empire s of s holly	Partially Separated System	Residential Street			Increased Maintenance Needed
612	MLK Jr. Wy S & S Thistle St	South Lake Washington	ne corner	Partially Separated System	Residential Street			
613	Alley south of S Taft St & 75th Ave S	Combined System	Improved - new inlet	Separated System	Residential Street			Increased Maintenance Needed
614	11th & Beacon Ave	Duwamish Waterway	n/s	Partially Separated System	Residential Street			
615	Spokane St & 4th Ave	Combined System	n/s - between 4th and 1st Ave	Combined System	Residential Street			
616	Hanford & E Marginal	Duwamish Waterway	in front of Crescent Foods	Partially Separated System	Residential Street			Increased Maintenance Needed
617	Yesler & 12th	Combined System	clean all inlets	Combined System	Residential Street			Increased Maintenance Needed
618	21st Ave & E Yesler Wy	Duwamish Waterway	21st between Yesler & Terrace	Partially Separated System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
619	S Jackson Pl & 20th Ave S	Duwamish Waterway	closed contour both sides	Partially Separated System	Residential Street			Lack of System
620	S Irving St & Lake Washington Blvd S	Central Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
621	35th Ave S & S Irving St	Central Lake Washington	Dead end of 35th and S Irving	Partially Separated System	Residential Street			
622	S McClellan St & Mt Baker Dr S	South Lake Washington	n/s - ROUTINE	Partially Separated System	Minor Arterial			
623	31st Ave S & S Norman St	Central Lake Washington	both sides	Partially Separated System	Collector Arterial			
624	9604 44th Ave SW	Puget Sound South	east side - need to cut blackberries	Separated System	Residential Street			Increased Maintenance Needed
625	9323 44th AveSW	Puget Sound South	Berm installed	Partially Separated System	Residential Street			solved?
626	9336 47th Ave SW	Puget Sound South	east side	Partially Separated System	Residential Street			Increased Maintenance Needed
627	18th SW & Brandon	Duwamish Waterway	S/E; large puddles on the side of the street.	Partially Separated System	Residential Street			Increased Maintenance Needed
628	18th SW & Dawson	Duwamish Waterway	N/E & S/E	Partially Separated System	Minor Arterial			Increased Maintenance Needed
629	23rd SW & Brandon	Longfellow Creek Watershed	S/E; seepage/runoff from hill runs down center of Brandon St.	Combined System	Residential Street			
630	Croft Pl & SW Juneau	Longfellow Creek Watershed	Ditch & SB from Juneau to 21st. Trash rack	Combined System	Residential Street	Critical Facility Access		
631	California Ave SW & 98th	Puget Sound South	S/E; water not going into the ditch	Separated System	Residential Street			
632	9716 44th SW	Puget Sound South	Next to 9716 - N/E - S/B in front yard; check ditch N/B to next C/B, water not going to ditch	Separated System	Residential Street	Yards		
633	45TH SW & Roxbury	Puget Sound South	Ditch, culvert & SB from 45th to 47th on Roxbury, drain plugged	Partially Separated System	Collector Arterial			Increased Maintenance Needed
634	9715 45TH SW	Puget Sound South	No Problem Description Available. See Note 10.	Separated System	Residential Street			
635	46th SW & Roxbury	Puget Sound South	At 9830 47th ave SW, water not going into ditch system	Partially Separated System	Residential Street			
636	10208 47th SW	Puget Sound South	Junction box in closed contour	Separated System	Residential Street			Lack of System

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
637	47th SW & Maplewood	Puget Sound South	New drainage system @ retaining wall	Separated System	Residential Street			Lack of System
638	9666 50th SW	Puget Sound South	Large s/b 20ft long; shoulder ponding	Separated System	Residential Street			
639	9844 51st SW	Puget Sound South	Shoulder ponding	Separated System	Residential Street			Lack of System
640	10013 51st SW	Puget Sound South	across from 10013	Separated System	Residential Street			
641	31st SW & SW 104th	Puget Sound South	next to 10253 SW 104th - N/W = Replace existing inlet; spot drainage fix 2 years ago	Separated System	Residential Street			Increased Maintenance Needed
642	32nd & SW 104th	Puget Sound South	N/E & N/W - Replace existing inlets	Separated System	Residential Street			Increased Maintenance Needed
643	31st SW & 32nd SW	Puget Sound South	N/W - improved	Separated System	Residential Street			solved?
644	31st SW & SW 97th	Puget Sound South	N/W - next to SW 97th- Replace existing inlets; shoulder ponding	Separated System	Residential Street			Increased Maintenance Needed
645	32nd SW & 97th	Puget Sound South	S/W - needs repair - Replace existing inlets; shoulder ponding	Separated System	Residential Street			Increased Maintenance Needed
646	32nd SW & 100th	Puget Sound South	N/W - Replace existing inlets	Separated System	Residential Street			Increased Maintenance Needed
647	33rd SW & 100th	Puget Sound South	N/W - improved	Separated System	Residential Street			
648	33rd SW & 97th	Puget Sound South	S/E & S/W - needs repair (3) - Replace existing inlets; shoulder ponding	Separated System	Residential Street			Increased Maintenance Needed
649	34th SW & 104th	Puget Sound South	N/W- Replace existing inlets	Separated System	Residential Street			Increased Maintenance Needed
650	35th SW & 100th	Puget Sound South	S/W - Improve existing junction boxes; ponding on the NW corner	Separated System	Minor Arterial			Increased Maintenance Needed
651	10259 35th SW	Puget Sound South	next to 10259; water not getting into system	Separated System	Minor Arterial			
652	104th & 35th SW	Puget Sound South	N/W	Separated System	Minor Arterial			
653	3702 106th	Puget Sound South	S/B in parking strip connected to S/B @ 37th Ave SW & SW 105th St.	Separated System	Collector Arterial	Parking Lot		
654	10222 37th Pl SW	Puget Sound South	next to 10222 - Replace existing junction box; small shoulder ponding	Separated System	Residential Street			Increased Maintenance Needed
655	37th SW & 102nd	Puget Sound South	N/E; small shoulder ponding	Separated System	Residential Street			
656	10037 37th SW	Puget Sound South	needs repair - next to 10037	Separated System	Residential Street			Increased Maintenance Needed
657	39th SW & 106th	Puget Sound South	N/W; water not entering the drain	Separated System	Collector Arterial			Requires minor adjustment to the system
658	40th SW & 106th	Puget Sound South	N/W; drain, but water doesn't enter it.	Separated System	Collector Arterial			Requires minor adjustment to the system
659	40th SW & 104th	Puget Sound South	Infiltration pit; Alley b/t 40th & 41st Ave SW - N/S; pit not functioning, 15-20 feet of street ponding	Separated System	Residential Street			Inadequate Capacity

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
660	41st SW & 104th	Puget Sound South	N/W & S/W	Separated System	Residential Street			
661	3010 Hanford	Duwamish Waterway	n/of Hanford - ROUTINE	Partially Separated System	Residential Street	Critical Facility Access		
662	37th & Prescott	Combined System	2214 n/of 37th & Prescott - N/W	Combined System	Residential Street			
663	Manning & Fauntelroy	Combined System	e/side Manning	Combined System	Residential Street			Increased Maintenance Needed
664	Spokane & 33rd	Combined System	repair 77	Combined System	Residential Street			Increased Maintenance Needed
665	Findlay & 30th	Longfellow Creek Watershed	N/W & S/E - S/B on SEC needs to be repaired	Separated System	Residential Street			Increased Maintenance Needed
666	Juneau & 31st	Longfellow Creek Watershed	S/E & S/W	Separated System	Residential Street			
667	Holly & 32nd	Longfellow Creek Watershed	N/W	Partially Separated System	Residential Street	Critical Facility Access		
668	7109 Sylvan Way	Puget Sound South	S/W - repair	Partially Separated System	Residential Street			Increased Maintenance Needed
669	4151 23rd SW	Combined System	No Problem Description Available. See Note 10.	Combined System	Residential Street			Increased Maintenance Needed
670	Andover & 16th	Duwamish Waterway	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
671	7204 Delridge	Longfellow Creek Watershed	Very large puddle at busy busstop (30ft. X 200 ft.) that crosses 2 lanes of traffic and half the sidewalk. Bus riders get very wet!	Partially Separated System	Principal Arterial			
672	6747 46th SW	Puget Sound South	across from 6747 e/side - SB	Partially Separated System	Residential Street			
673	6031 Beach Dr SW	Puget Sound South	6031 e/side	Partially Separated System	Minor Arterial			
674	5301 SW Shore Pl	Puget Sound South	dead end street e of Beach Drive - N/E	Partially Separated System	Residential Street			
675	5406 Jacobsen Rd	Puget Sound South	e/side - Same as 673	Partially Separated System	Minor Arterial			
676	SW Forest St & 52nd	Puget Sound South	N/E	Partially Separated System	Residential Street			
677	4942 SW Forney	Puget Sound South	N/W	Partially Separated System	Residential Street			

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
678	56th & Snoqualmie	Puget Sound South	s/of Snoqualmie - in the woods - Same as 710	Partially Separated System	Residential Street			
679	57th & Tieg	Puget Sound South	Same as 152	Partially Separated System	Residential Street			
680	52nd & College	Puget Sound South	north of College	Partially Separated System	Residential Street			
681	1635 Bonair Dr	Puget Sound South	200ft w/of 1635	Partially Separated System	Residential Street			
682	Ferry & California	Puget Sound Central	N/W & S/W	Partially Separated System	Collector Arterial			
683	1709 Victoria	Puget Sound Central	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
684	1617 Ferry Ave	Puget Sound Central	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
685	2130 Belvidere	Puget Sound Central	e/of Belvidere & Fairmont	Partially Separated System	Residential Street			
686	3016 Harbor Ave	Duwamish Waterway	Harbor Lane & Harbor Ave	Combined System	Residential Street			
687	Hinds & 31st	Combined System	No Problem Description Available. See Note 10.	Combined System	Residential Street			
688	4th Ave S. & S Barton St.	South Park Basin	Creek & 2 CB's - Install concrete trench & grate	Partially Separated System	Residential Street			Lack of System
689	Olson Pl SW & Myers WY SW	Duwamish Waterway	ponding	Partially Separated System	Principal Arterial			
690	26th Ave SW & SW Juneau St	Longfellow Creek Watershed	ditch. St drain plugs	Partially Separated System	Residential Street			Increased Maintenance Needed
691	SW Juneau St & 25th Ave SW	Longfellow Creek Watershed	on Juneau b/t 25th & 26th - Bypass Trash Rack; also trash rack SWC 26th & Juneau	Partially Separated System	Residential Street			Increased Maintenance Needed
692	SW Webster & Delridge Wy SW	Longfellow Creek Watershed	Trash rack @ creek culvert in "Webster Basin"	Partially Separated System	Principal Arterial			
693	Delridge Way SW & SW Holden St	Longfellow Creek Watershed	West of Delridge - n and s of SW Holden. Large puddle on east side by busstop.	Partially Separated System	Principal Arterial			Improper Street Grading

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
694	SW Colverdale & 25th Ave SW	Longfellow Creek Watershed	Colverdale w of 25th	Partially Separated System	Residential Street			
695	SW 106th & 30th Ave SW	Puget Sound South	trash rack - Detention pond	Separated System	Minor Arterial			
696	Seola Beach Drive SW & SW 106 St	Puget Sound South	on Seola from 106 to 116 ditch & trash racks	Separated System	Minor Arterial			
697	Sw Tieg Place & 57th Ave	Puget Sound South	pond; ditch; sandboxes & catch basin	Partially Separated System	Residential Street			
698	Boyd Place SW & Chilberg Ave SW	Puget Sound South	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
699	56th Ave SW & SW Oregon St	Puget Sound South	ditch & sandbox	Partially Separated System	Residential Street			
700	Chilberg Ave SW & SW Genesee St	Puget Sound South	4240 Chilberg - stream & sandbox	Partially Separated System	Residential Street			
701	Murray Ave SW & Lincoln Pk Wy SW	Puget Sound South	Murray Ave n of Lincoln - ditch; sandbox &LIT - check for root problems	Partially Separated System	Minor Arterial			Increased Maintenance Needed
702	35th Ave SW & Marine View Drive SW	Puget Sound South	trash rack	Separated System	Collector Arterial			Increased Maintenance Needed
703	7000 Highland Park Drive SW	Duwamish Waterway	sandbox behind building -50 ft west - Needs to be impr. with larger sumped struct.	Partially Separated System	Principal Arterial			Inadequate Capacity
704	Marine View Dr SW & 39th Pl SW	Puget Sound South	E/S 39th Pl SW @ 109TH; erosion on the shoulder	Separated System	Collector Arterial			Requires minor adjustment to the system
705	68 Ave. S & Rainier Ave. S	Combined System	On 68 w of Rainier - Install new culvert on north side of 68th	Separated System	Principal Arterial			Increased Maintenance Needed
706	68 Ave. S & Holyoke Wy S	South Lake Washington	Taylor Creek culvert & trash rack	Separated System	Residential Street			
707	Rainier Ave. S & Cornell Ave. S	Combined System	Major ponding at both corners. The water is a few inches deep. Local resident has expressed concern and also the need for a pipe along the eastern edge to reduce flooding. Also mentioned that his neighbor was flooded recently.	Separated System	Principal Arterial			Increased Maintenance Needed
708	52 Ave S & S Roxbury St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Collector Arterial			
709	Renton Ave S & 52 Ave S	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Minor Arterial			Increased Maintenance Needed
710	30 Ave S & S Morgan St.	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
711	S Juneau St & S Shafer St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
712	S Orcas St & 32 Ave S	South Lake Washington	on Orcas w of 32 Ave	Partially Separated System	Collector Arterial			Increased Maintenance Needed
713	Mt View Dr S & S Alaska St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Principal Arterial			
714	55 Ave S & S Bangor St	South Lake Washington	on 55 south of S Bangor - FIXED	Partially Separated System	Minor Arterial			Increased Maintenance Needed
715	55 Ave S & S Fountain St	Combined System	Same as 343	Separated System	Residential Street			
716	Beacon Ave S & S Avon St	Combined System	Ponding just south of the S Avon St intersection. No inlet and water collecting on unimproved shoulder of northbound lane.	Separated System	Collector Arterial			Increased Maintenance Needed
717	53 Ave S & S Fountain St	Combined System	No Problem Description Available. See Note 10.	Separated System	Residential Street			Increased Maintenance Needed
718	Rainier Ave S & S Henderson St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Principal Arterial			Increased Maintenance Needed
719	Columbian Wy S & S Alaska	South Lake Washington	s/side Columbian btwn Beacon Ave S & Martin Luther King Jr Wy S	Partially Separated System	Principal Arterial			
720	32nd Ave S & S Orcas St	South Lake Washington	on 32nd between S Orcas & S Graham - Improved with s/w & curbs	Partially Separated System	Collector Arterial			
721	S Eddy St & Beacon Ave S	South Lake Washington	on Eddy btween Swift & Beacon	Partially Separated System	Principal Arterial			Increased Maintenance Needed
722	28th Ave S & S Holly St	South Lake Washington	NW corner	Partially Separated System	Residential Street			Increased Maintenance Needed
723	S Graham St & Beacon Ave S	South Lake Washington	on Graham between Beacon and MLK	Partially Separated System	Principal Arterial			Increased Maintenance Needed
724	S Graham St & 48th Ave S	South Lake Washington	BERM INSTALLED	Partially Separated System	Residential Street			solved?
725	48th Ave S & S Spencer St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
726	48th Ave S & S Juneau St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
727	47th Ave S & S Juneau St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
728	4th Ave S & S Mead St	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			Increased Maintenance Needed
729	45th Ave S & S Brandon St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
730	37th Ave S & S Dawson St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
731	S Orcas & 42nd Ave S	South Lake Washington	on S Orcas btw 39th & 42nd	Partially Separated System	Minor Arterial			Increased Maintenance Needed
732	S Juneau St & 42nd Ave S	South Lake Washington	on S Juneau btw 39th & 42nd	Partially Separated System	Residential Street			Increased Maintenance Needed
733	39th Ave S & S Graham St	South Lake Washington	on 39th between Juneau & Graham	Partially Separated System	Minor Arterial			Increased Maintenance Needed
734	42nd Ave S & S Eddy St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
735	33rd Ave S & S Myrtle Pl	South Lake Washington	on E side of 33rd S of Myrtle	Partially Separated System	Principal Arterial			Increased Maintenance Needed
736	Military Rd S & S Austin St	Norfolk Basin	SE corner	Separated System	Residential Street			Increased Maintenance Needed
737	36th Ave S & S Rose St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
738	S Thistle St & 37th Ave S	South Lake Washington	on Thistle btw 37th and 42nd	Partially Separated System	Residential Street			
739	3929 Sullivan St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
740	42nd Ave S & S Sullivan St	South Lake Washington	4 corners- Improved w/ berm	Partially Separated System	Residential Street			solved?
741	S Cloverdale & Beacon Ave S	South Lake Washington	on cloverdale btw beacon & mlk - Improved w/ berm	Partially Separated System	Principal Arterial			solved?
742	51st Ave S & S Ruggles St	South Lake Washington	SE corner; box on N side Ruggles E of 51str - Improved w/ cb; LIT& inlet	Combined System	Minor Arterial			solved?
743	Cornell Ave S & S Ryan St	Combined System	S/B & C/B bomb hoist needed - Same as 165 & 348	Separated System	Residential Street			

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
744	75th Ave S & S Taft St	Combined System	SW corner	Separated System	Residential Street			Increased Maintenance Needed
745	Ithaca Pl S & Rainier Ave S	Combined System	E side of Ithaca - s of Rainer- Improved w/ berm	Partially Separated System	Principal Arterial			Increased Maintenance Needed
746	55th Ave S & Renton Ave S	South Lake Washington	SW corner	Partially Separated System	Minor Arterial			Increased Maintenance Needed
747	S Fletcher St & Spear Pl S	South Lake Washington	NW corner	Partially Separated System	Residential Street			Increased Maintenance Needed
748	Yukon Ave S & S Valdez St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
749	4735 30th Ave S	South Lake Washington	private	Partially Separated System	Residential Street			
750	31st Ave S & S Hudson ST	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
751	33rd Ave S & S Dawson St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
752	S Brandon St & 28th Ave S	Combined System	No Problem Description Available. See Note 10.	Combined System	Residential Street			Increased Maintenance Needed
753	S Brandon St & 31st Ave S	South Lake Washington	SB - SW Corner	Partially Separated System	Residential Street			Increased Maintenance Needed
754	S Lucille St & 35th Ave S	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
755	S Orcas St & 30th Ave S	South Lake Washington	on Orcas one block east of of 30th	Partially Separated System	Collector Arterial			Increased Maintenance Needed
756	S Orcas St & 30th Ave S	South Lake Washington	on Orcas one half block west of 30th	Partially Separated System	Collector Arterial			
757	S Graham St & 30th Ave S	South Lake Washington	two	Partially Separated System	Minor Arterial			Increased Maintenance Needed
758	S Juneau St & 28th Ave S	South Lake Washington	on Juneau 125' west of 28th	Partially Separated System	Residential Street			Increased Maintenance Needed
759	3803 S Holly St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
760	3556 S Holly St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
761	37th Ave S & S Holly St	South Lake Washington	on 37th south of Holly (three)	Partially Separated System	Residential Street			Increased Maintenance Needed
762	37th Ave S & S Myrtle St	South Lake Washington	on 37th one block north of Myrtle(two) - PARKS PROPERTY	Partially Separated System	Residential Street			
763	S Myrtle St & 37th Ave S	South Lake Washington	two - Same as 246	Partially Separated System	Residential Street			Increased Maintenance Needed
764	38th Ave S & S Myrtle St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
765	S Morgan St & 31st Ave S	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
766	28th Ave S & S Frontenac St	South Lake Washington	on 28th one-half block north of Frontenac - Cl. contour - install CB/inlet	Partially Separated System	Residential Street			Increased Maintenance Needed
767	Holly Pk Dr S & S Myrtle Pl	South Lake Washington	ELIMINATE SB; minor pooling along Othello St.	Partially Separated System	Principal Arterial			Increased Maintenance Needed
768	3532 S Kenyon St	South Lake Washington	CB Installed	Partially Separated System	Residential Street	Critical Facility Access		Increased Maintenance Needed
769	S Kenyon St & 37th Ave S	South Lake Washington	on Kenyon - west of 37th - CB Installed	Partially Separated System	Residential Street	Critical Facility Access		Increased Maintenance Needed
770	42nd Ave S & S Thistle St (two)	South Lake Washington	two	Partially Separated System	Residential Street			
771	S Sullivan St & 42nd Ave S	South Lake Washington	on Sullivan - west of 42nd	Partially Separated System	Residential Street			
772	41st Ave S & S Henderson St	South Lake Washington	41st alley - one-half blk north of Henderson	Partially Separated System	Residential Street			Increased Maintenance Needed
773	S Trenton St & 42nd Ave S	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
774	8423 42nd Ave S	South Lake Washington	private	Partially Separated System	Residential Street			
775	Carkeek Dr S & 40th Ave S	South Lake Washington	three; leaves clogging inlets.	Combined System	Collector Arterial			Increased Maintenance Needed

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
776	32nd Ave S & S Angeline St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
777	3529 S Ferdinand St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street	Critical Facility Access		
778	35th Ave S & Renton Ave S	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
779	39th Ave S & S Dawson St	South Lake Washington	IMPROVED	Partially Separated System	Residential Street			Increased Maintenance Needed
780	Juneau Terrace S & S Orcas St	South Lake Washington	Ditch & SB on Juneau Terrace S n/o Orcas	Partially Separated System	Minor Arterial			Increased Maintenance Needed
781	42nd Ave S & S Mead St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
782	4432 S Morgan St	South Lake Washington	behind front yard - PRIVATE	Partially Separated System	Residential Street	Yards		Increased Maintenance Needed
783	4228 S Willow St	South Lake Washington	Needs new CB @ 4228	Partially Separated System	Residential Street	Critical Facility Access		Increased Maintenance Needed
784	4426 S Frontenac St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
785	4621 S Frontenac St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
786	4833 S Orchard St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
787	7021 Rainer Ave S	South Lake Washington	front yard	Partially Separated System	Principal Arterial	Yards		Increased Maintenance Needed
788	4835 S Garden St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
789	4620 S Myrtle St	South Lake Washington	east of address	Partially Separated System	Residential Street			Increased Maintenance Needed
790	4514 S Myrtle St	South Lake Washington	Needs cb @ this location	Partially Separated System	Residential Street			Increased Maintenance Needed
791	7135 45th Ave S	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
792	45th Ave S & S Holden St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
793	4427 S Kenyon St	South Lake Washington	backyard	Partially Separated System	Residential Street	Yards		Increased Maintenance Needed
794	S Thistle St & Rainier Ave S	South Lake Washington	on Thistle west of Rainier	Partially Separated System	Residential Street			Increased Maintenance Needed
795	50th Ave S & S Cloverdale St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Collector Arterial			Increased Maintenance Needed
796	S Director St & 48th Ave S	South Lake Washington	on Director east of 48th	Partially Separated System	Residential Street			Increased Maintenance Needed
797	Yukon Ave S & Valdez Ave S	South Lake Washington	on yukon - south of Valdez - Same as 224	Partially Separated System	Residential Street			
798	Rainier Ave S & 53rd Ave s	Combined System	No Problem Description Available. See Note 10.	Partially Separated System	Principal Arterial			Increased Maintenance Needed
799	S Henderson St & Yukon Ave S	South Lake Washington	on Henderson - west of Yukon - Same as 224	Partially Separated System	Principal Arterial			Increased Maintenance Needed
800	43rd Ave S & S Genesse	South Lake Washington	on 43rd south of Genesse - (three)	Partially Separated System	Minor Arterial			
801	S Alaska St & 38th Ave S	South Lake Washington	on Alaska east of 38th - IMPROVED	Partially Separated System	Residential Street			solved?
802	S Alaska St & 39th Ave S	Combined System	on Alaska east of 39th	Combined System	Principal Arterial			Increased Maintenance Needed
803	4420 46th Ave S	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
804	46th Ave S & S Angeline St	South Lake Washington	on 46th - south of Angeline - IMPROVED	Partially Separated System	Residential Street			solved?
805	42nd Ave S & Rainier Ave S	South Lake Washington	ne corner - two concrete - IMPROVED	Partially Separated System	Principal Arterial			Increased Maintenance Needed
806	54th Ave S & S Pearl St	South Lake Washington	on 54th north of Pearl - BERM INSTALLED	Partially Separated System	Residential Street			solved?
807	5231 57th Ave S	South Lake Washington	GROUND WATER PROBLEM	Partially Separated System	Residential Street			groundwater seepage

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
808	4700 S Mead St	South Lake Washington	back of - private	Partially Separated System	Residential Street			
809	S Kenny St & Rainier Ave S	South Lake Washington	on Kenny - 50' east of Rainier	Partially Separated System	Principal Arterial			Increased Maintenance Needed
810	Upland Terrace S & 52nd Ave S	South Lake Washington	ROUTINE	Partially Separated System	Residential Street			Increased Maintenance Needed
811	51st Ave S & S Raymond St	South Lake Washington	ROUTINE	Partially Separated System	Residential Street			Increased Maintenance Needed
812	47th Ave S & S Morgan ST	South Lake Washington	on 47th - north of Morgan - CB INSTALLED	Partially Separated System	Residential Street			Increased Maintenance Needed
813	47th Ave S & S Graham St	South Lake Washington	ROUTINE	Partially Separated System	Residential Street			
814	7430 Rainier Ave S	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Principal Arterial			Increased Maintenance Needed
815	S Rose St & Wabash Ave S	South Lake Washington	on rose - west of Wabash - Unimproved - Review for possible improvements	Partially Separated System	Residential Street			Increased Maintenance Needed
816	50th Ave S & S Roxbury St	South Lake Washington	on 50th one-half block south of Roxbury	Partially Separated System	Residential Street			Increased Maintenance Needed
817	S Creston St & 51st Ave S	South Lake Washington	private - Same as 325	Combined System	Minor Arterial			Increased Maintenance Needed
818	South Ruggles St & 51st Ave S	South Lake Washington	on Creston east of 51st - two	Combined System	Minor Arterial			
819	S Ruggles St & 51st Ave S	South Lake Washington	on Ruggles one block east of 51st	Combined System	Residential Street			
820	51st Ave S & S Avon St	Combined System	concrete	Combined System	Residential Street			Increased Maintenance Needed
821	51st Ave S & South Augusta St	Combined System	across from 10349 51st - City of Tukwila improved area	Combined System	Residential Street			Increased Maintenance Needed
822	Beacon Ave S & S Augusta St	Combined System	No Problem Description Available. See Note 10.	Separated System	Principal Arterial			Increased Maintenance Needed
823	57th Ave S & Beacon Ave S	Combined System	1 CB; ponding just north of intersection, clogged inlet.	Combined System	Principal Arterial			Increased Maintenance Needed
824	Beacon Ave S & S 119th St	Combined System	1 LIT & Culvert	Combined System	Principal Arterial			Increased Maintenance Needed
825	5543 S Juniper St	Combined System	1 CB	Combined System	Residential Street			Increased Maintenance Needed
826	59th Ave S & S Avon St	South Lake Washington	1 LIT	Separated System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
827	53rd Ave S & S Avon St	Combined System	1 SB - NEC	Separated System	Residential Street			Increased Maintenance Needed
828	5335 South Avon St	Combined System	1 inlet & 1 CB - S/S	Separated System	Residential Street			Increased Maintenance Needed
829	5339 South Leo St	Combined System	No Problem Description Available. See Note 10.	Separated System	Residential Street			Increased Maintenance Needed
830	53rd Ave S & S Hazel St	Combined System	2 inlets & 1 big SB	Separated System	Residential Street			Increased Maintenance Needed
831	53rd Ave S & S Bangor St	South Lake Washington	on 53rd right-of-way between bangor & hazel	Partially Separated System	Minor Arterial			Increased Maintenance Needed
832	10015 68th Ave S	Combined System	private	Separated System	Residential Street			
833	Arrowsmith Ave S & S Norfolk St	South Lake Washington	on arrowsmith alley - south of norfolk(four)	Partially Separated System	Alley			Increased Maintenance Needed
835	Cornell Ave S & S Taft St	Combined System	two	Separated System	Residential Street			Increased Maintenance Needed
836	10367 Rainier Ave S	Combined System	SB; CB & inlet	Separated System	Principal Arterial			Increased Maintenance Needed
837	Military Rd S & S Fontanelle St	Norfolk Basin	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
838	2928 S Fontanelle St	Norfolk Basin	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			Increased Maintenance Needed
839	30th Ave S & S Portland St	Norfolk Basin	on 30th - south of Portland(drainpipe)	Separated System	Residential Street			
840	29th Ave S & Military Rd S	Norfolk Basin	drainpipe	Separated System	Collector Arterial			Increased Maintenance Needed
841	S River St, e/o of East Marginal Wy S	Combined System	on River - east of Marginal - Under construction	Combined System	Residential Street			solved?
842	Corson Ave S & East Marginal Wy S	Combined System	SE corner	Combined System	Principal Arterial			
843	14 Ave S & E Marginal Wy	Duwamish Waterway	SW corner	Partially Separated System	Principal Arterial			
844	7 Ave S & S Andover St	Duwamish Waterway	NW corner - vactor rain route	Partially Separated System	Residential Street			
845	S Dakota St & 6 Ave S	Duwamish Waterway	on Dakota - east of 6 Ave	Partially Separated System	Minor Arterial			
846	S Alaska St, e/o of Colorado Ave S	Duwamish Waterway	on Alaska - east of Colorado	Combined System	Residential Street			
847	16 Ave S & S Dakota St	Duwamish Waterway	E & W sides	Partially Separated System	Residential Street			

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
848	21 Ave S & S Graham St	Duwamish Waterway	N side	Partially Separated System	Minor Arterial			Increased Maintenance Needed
849	S Graham St, w/o 21st Ave S	Duwamish Waterway	on Graham west of 21 Ave S	Partially Separated System	Minor Arterial			Increased Maintenance Needed
850	S Juneau & 47th Ave S	South Lake Washington	Same as 195	Partially Separated System	Residential Street			
851	S Mead St & 4th Ave S	Combined System	Same as 196	Combined System	Principal Arterial			
852	S Rose St & 36th Ave S	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
853	Beacon Ave S & S Bond St	South Lake Washington	IMPROVED	Partially Separated System	Principal Arterial			solved?
854	37th Ave S & S Thistle St	South Lake Washington	No Problem Description Available. See Note 10.	Partially Separated System	Residential Street			
855	37th Ave S & S Cloverdale St	South Lake Washington	Possible swale from 37th to CB n/s of Cloverdale	Partially Separated System	Collector Arterial			
856	33rd Ave S & S Spokane St	South Lake Washington	IMPROVED W/ CURBS AND GUTTERS	Partially Separated System	Residential Street			solved?
857	24th Ave W & W Burton Pl	Longfellow Creek Watershed	SW corner 1 box	Partially Separated System	Minor Arterial			Increased Maintenance Needed
858	37th Pl SW & SW 104th St	Puget Sound South	Drainage Location; current drainage system not working	Separated System	Residential Street	Critical Facility Access		Lack of System
860	Fauntleroy Way SW & SW Thistle St	Puget Sound South	on Fauntelroy pl from Fauntelroy Wy	Partially Separated System	Minor Arterial			
861	SW Fontanelle St & Vashon Pl SW	Puget Sound South	Drainage on Vashon from fontanelle to webster - Parks property	Partially Separated System	Residential Street			Increased Maintenance Needed
862	Murray Ave SW N/O Lincoln Park Way SW	Puget Sound South	Creek X-ing & trash rack n/s of Lincoln between Murray & 48th	Separated System	Residential Street			
863	5200 and 5300 blocks on SW Jacobsen Rd	Puget Sound South	On Jacobsen from 5300 to 5200 blocks + CB & INLET @ 5406	Partially Separated System	Minor Arterial			
864	SW Andover St & 58th Pl SW	Puget Sound South	Drainage on 58th from SW Andover	Partially Separated System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
865	SW Stevens St & SW Teig Pl	Puget Sound South	Drainage on Stevens from 57th	Partially Separated System	Residential Street			
866	52nd Ave SW & Bonair Dr SW	Puget Sound South	Drainage on Bonair from 52nd	Partially Separated System	Residential Street			
867	SW Hill St & 42nd Ave SW	Puget Sound Central	on 42nd from Hill to Ferry	Partially Separated System	Residential Street			
868	SW Brandon St & 30th Ave SW	Longfellow Creek Watershed	Drainage on 30th from Brandon to Findlay	Separated System	Residential Street			
869	SW Myrtle St & 18th Ave SW	Longfellow Creek Watershed	Drainage on Myrtle from 18th	Partially Separated System	Residential Street	Critical Facility Access		Increased Maintenance Needed
870	Sylvan Way SW, w/o Delridge Way SW	Longfellow Creek Watershed	on Sylvan west of Delridge - until SW Morgan. Large puddle.	Partially Separated System	Principal Arterial			
871	SW Orchard St & Dumar Way SW	Longfellow Creek Watershed	on Dumar from Orchard	Partially Separated System	Principal Arterial			
872	16th Ave SW & SW Orchard St	Longfellow Creek Watershed	Drainage on 16th from Orchard	Partially Separated System	Minor Arterial			Increased Maintenance Needed
873	21st Ave SW , n/o SW Myrtle St	Longfellow Creek Watershed	Drainage on 21st from 300' North of Myrtle flows over shoulder down steep slope; big puddle on west side.	Combined System	Residential Street	Critical Facility Access		Erosion
874	SW 103rd St & 31st Ave SW	Puget Sound South	on 31st from sw 103rd; system get plugged with leaves and threatens property owners on 31st	Separated System	Residential Street			Requires minor adjustment around inlet
875	14th Ave S & S Cloverdale St	Combined System	Drainage on 14th AVe S from S Cloverdale	Combined System	Principal Arterial			
876	14th Ave S & S Director St	Combined System	Drainage on 14th from Director	Combined System	Principal Arterial			
877	S. Rose St & 7th Ave S.	Combined System	Install CB @ D/E & inlet across for 5305; significant ponding at street end.	Combined System	Residential Street			Lack of System
878	1st Ave S & SW Orchard St	Duwamish Waterway	Drainage on 1st(under bridge) from Orchard	Partially Separated System	Principal Arterial			
879	Marginal Way SW & SW Myrtle St	Duwamish Waterway	Drainage on Myrtle from west of Marginal	Partially Separated System	Principal Arterial			
880	S Sullivan St & 5th Ave S	South Park Basin	Drainage on 5th from Sullivan	Separated System	Collector Arterial			
881	4th Ave SW & SW Cloverdale St	Duwamish Waterway	Drainage on Cloverdale from 4th	Separated System	Residential Street			Increased Maintenance Needed
882	At about 1550 Alki Ave SW	Puget Sound South	Vactor Beach Route -1 SB & 1 CB	Partially Separated System	Minor Arterial			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
883	At About 1704 Alki Ave SW	Puget Sound South	Vactor Beach Route - 1 SB	Partially Separated System	Minor Arterial			
884	SW Andover St & 26th Ave SW	Longfellow Creek Watershed	Trash Rack fills with debris - overflows w. of intersection	Partially Separated System	Residential Street			Increased Maintenance Needed
885	26th Ave SW & SW Yancy St	Longfellow Creek Watershed	West of intersection - usually no problem	Partially Separated System	Residential Street			Increased Maintenance Needed
886	26th Ave SW & SW Dakota St	Longfellow Creek Watershed	west of 26th @ Dakota - Rack fills with debris	Partially Separated System	Residential Street			Increased Maintenance Needed
887	26th Ave SW & SW Nevada St	Longfellow Creek Watershed	w of 26th @ Nevada - washed out	Partially Separated System	Residential Street			Increased Maintenance Needed
888	26th Ave SW & Brandon St	Longfellow Creek Watershed	New Construction (needs trash rack)	Combined System	Residential Street			Increased Maintenance Needed
889	26th Ave SW & SW Findlay St	Longfellow Creek Watershed	St Drain plugs SE corner; large puddle, leaf clogged drain.	Partially Separated System	Residential Street			Increased Maintenance Needed
890	SW Graham St, e/o of 26th Ave SW	Longfellow Creek Watershed	On Graham btwn Delridge and 26th - culvert plugs	Combined System	Residential Street			Increased Maintenance Needed
891	24th Ave SW from 6355 to 6549	Longfellow Creek Watershed	on 24th from 6549 to 6355 - culvert plugged	Combined System	Residential Street			Increased Maintenance Needed
892	SW Willow St & 24th Ave S	Longfellow Creek Watershed	On 24th - s of Willow - culvert plugs	Partially Separated System	Residential Street			Increased Maintenance Needed
893	SW Webster St & 24th Ave SW	Longfellow Creek Watershed	on Webster btw Delridge and 24th - rack plugs	Partially Separated System	Residential Street			Increased Maintenance Needed
894	SW Holden St between 24th Ave SW & SW Delridge Way	Longfellow Creek Watershed	ON Holden between 24th & Delridge - Creek X-ing. Large puddle covering 4 lanes of traffic.	Partially Separated System	Collector Arterial			Increased Maintenance Needed
895	Near 2408 SW Cloverdale St	Longfellow Creek Watershed	J/B NWC of 2408 SW Cloverdale residence	Partially Separated System	Residential Street	Yards		
896	4118 SW Southern St	South Lake Washington	Inlets n/s	Partially Separated System	Residential Street			
897	SW Brace Point between 46th Ave SW & 47t Ave SW	Puget Sound South	btwn 46th & 47th - Brace Pt s/side	Partially Separated System	Residential Street			Increased Maintenance Needed
898	Road End of California Dr SW	Puget Sound South	E of 9357 - s/side	Separated System	Residential Street			
899	9335 California Drive SW	Puget Sound South	across from 9335 - e/side	Separated System	Residential Street			
900	Harbor Ave SW N/O SW Harbor Ln	Duwamish Waterway	On Hanford west of Harbor	Combined System	Minor Arterial			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
901	At about 2485 55th Ave SW	Puget Sound South	stream & sand catchers	Partially Separated System	Residential Street			
902	Road End of SW Arroyo Court	Puget Sound South	include SW Arroyo Dr - Arroyo Beach Pl S	Partially Separated System	Residential Street			
903	23rd Ave S , n/o Swift Ave S	Combined System	200' north of 23rd on Swift - box	Combined System	Residential Street			Increased Maintenance Needed
904	S Fountain St & S Leo St	South Lake Washington	57 AVe S & S Leo St	Separated System	Residential Street			Increased Maintenance Needed
905	S 115th St & Crestwood Dr S	South Lake Washington	S 115th St & 72 AVe s	Separated System	Residential Street			Increased Maintenance Needed
906	Martin Luther King Jr Way between S Norfolk St & Merton Way S	Norfolk Basin	Empire Way S & S Norfolk St	Partially Separated System	Principal Arterial			
907	Martin Luther King Jr Way north of 9317	Norfolk Basin	On MLK north of 9317 - Improved	Partially Separated System	Principal Arterial			
908	51st Ave S & South Hazel St	Combined System	51st; 53rd and S Hazel - wood box requires extension tubes - Same as 327	Separated System	Collector Arterial			Increased Maintenance Needed
909	S Bangor St & 51st Ave S	South Lake Washington	52nd AVe S - south of S Bangor St - Same as 326	Partially Separated System	Minor Arterial			Increased Maintenance Needed
910	59th Ave S n/o Beacon Ave S	Combined System	59th AVe S - north of Beacon AVe S - Same as 332	Combined System	Residential Street			Increased Maintenance Needed
911	Road End of McCoy Pl S	South Lake Washington	On McCoy - south of Columbian(dead end)	Partially Separated System	Residential Street			
912	S Lucille St & 28th Ave S	South Lake Washington	S Lucille St & 28th Ave S - unable to locate address	Partially Separated System	Residential Street			
913	Carkeek Dr S & S Fairbanks St	South Lake Washington	Carkeek Dr S & S Fairbanks St; leaves clogging inlets.	Partially Separated System	Collector Arterial			Increased Maintenance Needed
914	Carkeek Dr S & Beacon Ave S	Norfolk Basin	Carkeek Dr S & Beacon Ave S	Combined System	Principal Arterial			Increased Maintenance Needed
915	Alley on S Alaska St just west of Ranier Ave S	South Lake Washington	S of Alaska St Alley - west of Rainier	Partially Separated System	Alley			
916	NE corner S Cloverdale St & 43rd Ave S	South Lake Washington	NE corner S Cloverdale St & 43rd Ave S	Partially Separated System	Collector Arterial			
917	47th Ave S & S Huson St	South Lake Washington	on 47th - south of Hudson - Possible improvement; unimproved street - no dr. syste	Partially Separated System	Residential Street			Lack of System
918	S Mead St & 39th Ave S	South Lake Washington	On mead from 39th to 42nd - Closed Contour - inlets installed	Partially Separated System	Residential Street			Increased Maintenance Needed

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
919	39th Ave S & S Juneau St	South Lake Washington	-- Closed Contour - inlets installed	Partially Separated System	Residential Street			solved?
920	S Findlay St & 39th Ave S	South Lake Washington	On Findlay from 39th to 42nd - Closed Contour - inlets installed	Partially Separated System	Residential Street			Increased Maintenance Needed
921	S Orcas St between 39 Ave S & 42nd Ave S	South Lake Washington	On Orcas from 39th to 42nd - Closed Contour - inlets installed	Partially Separated System	Minor Arterial			Increased Maintenance Needed
922	S Lucile St & 39th Ave S	South Lake Washington	Lucile from 39th to 42nd - Closed Contour - inlets installed	Partially Separated System	Residential Street			Increased Maintenance Needed
923	33rd Ave S & S Morgan St	South Lake Washington	Morgan from 6518	Partially Separated System	Residential Street			Increased Maintenance Needed
924	S Court St w/o Ranier Ave S	South Lake Washington	S Court St west of Rainier Ave	Partially Separated System	Residential Street			
925	55th Ave S & S Cloverdale St	South Lake Washington	on 55th from Cloverdale to Grattan	Partially Separated System	Residential Street			Increased Maintenance Needed
926	S Frontenac St between 55th Ave S & 56th Ave S	South Lake Washington	Frontenac from 55th to 56th	Partially Separated System	Residential Street			
927	56th Ave S & S Willow St	South Lake Washington	On Willow from 56th to dead end	Partially Separated System	Residential Street			
928	51st Ave S & S Bateman St	South Lake Washington	Bateman from 51st to dead end - STREET RUNOFF FLOWS OVER STEEP SLOPE	Partially Separated System	Residential Street			Increased Maintenance Needed
929	S Raymond St between 48th Ave S & 51st Ave S	South Lake Washington	Raymond from 48th to 51st - RESTORE DITCH LINE	Partially Separated System	Residential Street			Increased Maintenance Needed
930	Road End of S Gazelle St	Norfolk Basin	Gazelle from Beacon to dead end	Partially Separated System	Residential Street			
931	Renton Ave S between S Bradford St & S Dakota St	Combined System	Renton from N of S Dakota to Bradford - 2 Closed contours; needs drainage struct.s	Combined System	Residential Street			Lack of System
932	S Bangor St e/o 51st Ave S	South Lake Washington	Bangor from 51st to 53rd; major flooding of two residential properties at low point of roadway; street water collecting on property lawn/front yard with some damage also expected in the house.	Partially Separated System	Minor Arterial	Residential Structure		Increased Maintenance Needed
933	S Frontenac St w/o Ranier Ave S	South Lake Washington	Frontenac from Rainier to the west	Partially Separated System	Residential Street			
934	SW Genesee St w/o 26th Ave SW	Longfellow Creek Watershed	w of 26th s of Genesse - trash rack plugs	Partially Separated System	Collector Arterial			Increased Maintenance Needed

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
935	Arroyo Beach Pl & SW Arroyo Dr	Puget Sound South	On Arroyo from 112th, nuisance ponding	Partially Separated System	Residential Street			
936	SW Director St between 45th Ave SW & SW Fauntleroy Way	Puget Sound South	On Director from 46th to Fauntelroy	Partially Separated System	Residential Street			
937	SW Admiral Way between 52nd Ave SW & 53rd Ave SW	Puget Sound South	On Admiral from 52nd to 53rd	Partially Separated System	Minor Arterial			
938	Fairmont Ave SW & SW Prince St Ext	Puget Sound Central	On Fairmont from Prince	Partially Separated System	Residential Street			Increased Maintenance Needed
939	Lotus Ave Access Rd & Harbor Ave SW	Puget Sound Central	On Harbor from Florida to Fauntelroy	Partially Separated System	Minor Arterial			Increased Maintenance Needed
940	30th Ave SW & SW Juneau St	Longfellow Creek Watershed	On Juneau - east of High Point Dr SW	Partially Separated System	Residential Street			
941	23rd Ave SW south of SW Edmunds St	Longfellow Creek Watershed	23rd Ave SW south of SW Edmunds ST	Combined System	Residential Street			
942	On Cloverdale west of 2nd Ave S	South Park Basin	On Cloverdale west of 2nd Ave S	Separated System	Principal Arterial			
943	Road End of 10th Ave S	Duwamish Waterway	CB @ D/E of Director w/o 12th	Partially Separated System	Residential Street			
944	Road End of 7th Ave S	Duwamish Waterway	On Sullivan from 7th	Partially Separated System	Residential Street			
945	7th Pl SW & SW Othello St	Duwamish Waterway	On Othello from Highland Parkway	Combined System	Residential Street			Increased Maintenance Needed
946	22nd Ave SW, n/o SW Andover St	Combined System	On 22nd from North of Andover(above Spokane St)	Combined System	Residential Street			Increased Maintenance Needed
947	59th SW & SW Boyd Pl	Puget Sound South	Improved	Partially Separated System	Residential Street			solved?
948	2466 Olga Pl SW	Puget Sound Central	pond; ditch; sandboxes & catch basin	Partially Separated System	Residential Street			Increased Maintenance Needed
949	Califonia Way SW & SW Harbor	Puget Sound Central	CIP project	Partially Separated System	Minor Arterial			
950	Fairmont SW & SW Harbor	Puget Sound Central	No Problem Description Available. See Note 10.	Partially Separated System	Minor Arterial			
951	Harbor Ave Sw & SW Fauntelroy	Puget Sound Central	Harbor Ave Sw & SW Fauntelroy	Partially Separated System	Minor Arterial			Increased Maintenance Needed

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
952	53rd SW & Admiral Way	Puget Sound South	No Problem Description Available. See Note 10.	Partially Separated System	Minor Arterial			
953	46th Ave S between S Victor St & S Cooper St	Norfolk Basin	On 46th from Victor to Cooper - X- culvert & inlet @ 10011 46th; vactor rain route	Partially Separated System	Residential Street			Increased Maintenance Needed
954	55th Ave S between S Leo St & S Bangor St	Combined System	On 55th from Leo to Bangor - Same as 339	Separated System	Residential Street			Increased Maintenance Needed
955	3700 SW Hill St.	Puget Sound Central	Creek inlet and SB @ D/E of Hill St.	Partially Separated System	Residential Street			
956	Dallas Ave S & 17th Ave S	Combined System	CB; fr. drain, rock pocket no longer works - Res. Planning looks at; major ponding in roadway.	Combined System	Residential Street			
957	West of 8100 block of 1st Ave S	Duwamish Waterway	w/s 8100 blk 1st Ave S - 3 CB's	Partially Separated System	Collector Arterial			
958	Near Alki Ave SW	Puget Sound South	SB behind house	Partially Separated System	Minor Arterial			
959	19th Ave SW & SW Brandon St	Duwamish Waterway	Drainage X-ing - 2 CMP culverts; low spot, large puddles at two corners, water crossing over street.	Combined System	Residential Street	Residential Structure		Increased Maintenance Needed
960	N Northlake Place west of Densmore approx. 200 ft west of Densmore	Lake Union/Ship Canal	Flooding in the travel lane	Partially Separated System	Residential Street			
961	N Northlake Place approx. 600 ft west of Densmore	Lake Union/Ship Canal	Shoulder/private parking lot on north side of N Northlake Place. Flooding	Partially Separated System	Residential Street			
962	N Northlake Place approx. 1 block east of Stone Way	Lake Union/Ship Canal	Flooding in travel lane	Partially Separated System	Residential Street			
963	N Northlake Place approx. 100 ft east of Meridian	Lake Union/Ship Canal	Flooding in travel lane	Partially Separated System	Residential Street			
964	N Northlake Place approx. 100 ft west of Densmore	Lake Union/Ship Canal	Flooding in travel lane	Partially Separated System	Residential Street			
965	N 105th Street and N Park Ave N	Densmore Basin	Flooding in travel lane during heavy rain (likely due to inadequate number of catch basins)	Separated System	Principal Arterial			
966	Greenwood Ave N between N 144th St and N 145th St	Densmore Basin	Flooding in travel lane during heavy rain (likely due to inadequate number of catch basins)	Separated System	Principal Arterial			
967	Montlake Blvd NE west of large UW parking lot	Central Lake Washington	Floods 1-1/2 lanes between pedestrian overpasses (closer to the north overpass)	Partially Separated System	Principal Arterial			
968	Denny Way and Fairview Ave N	Combined System	Portion of intersection floods frequently	Combined System	Principal Arterial			
969	329 Coryell Ct E	Combined System	Rainfallácreates a large pond during any significant rainfall event and extends across the entire roadway.á In larger ev	Partially Separated System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
970	Lakeside Ave NE, approx. 200 ft south of NE 123rd St	North Lake Washington	Maintence personnel report a CIP is required to solve problem. No problem description available.	Separated System	Residential Street			
971	36th Avenue NE , between NE 115th St and NE 113th St	Thornton Creek Watershed	Maintence personnel report a CIP is required to solve problem. No problem description available.	Separated System	Residential Street			
972	Crestwood Dr. S, between S 115th St and Lake Ridge Dr. S	South Lake Washington	Maintence personnel report a CIP is required to solve problem. No problem description available.	Separated System	Residential Street			
973	17th Ave. SW, between SW Bradon St and SW Findlay St	Duwamish Waterway	Runoff from 16th Ave SW flows through residential property on 16th and 17th; home owner built a trench drain to to capture flow coming down slope to convey it through a pipe around property to 17th.	Partially Separated System	Residential Street	Residential Structure		
974	30th Ave E and E John St	Combined System	Maintence personnel report a CIP is required to solve problem. No problem description available.	Partially Separated System	Collector Arterial			
975	19th Ave E, between E Harrison St and E Thomas St	Combined System	No Problem description available.	Partially Separated System	Residential Street			
976	Denny Way, between Fairview Ave N and Pontius Ave N	Combined System	No Problem description available.	Combined System	Principal Arterial			
977	Mayfair Ave N, between 2nd Ave N and 3rd Ave N	Combined System	No Problem description available.	Combined System	Residential Street			
978	N Northlake Way, between Meridian Ave N and Bagley Ave N	Combined System	No Problem description available.	Partially Separated System	Minor Arterial			
979	N Northlake Pl and Woodland Ave N	Lake Union/Ship Canal	No Problem description available.	Partially Separated System	Residential Street			
980	N 34th St and Interlake Ave N	Lake Union/Ship Canal	No Problem description available. Street ponding.	Partially Separated System	Minor Arterial			
981	Montlake Ave NE, between Pend Orielle Rd NE andNE Canal Rd NE	Central Lake Washington	Maintence personnel report a CIP is required to solve problem. No problem description available. Street ponding.	Partially Separated System	Principal Arterial			
982	N 105th St and N Park Ave N	Densmore Basin	No Problem description available.	Separated System	Principal Arterial			
983	Fremont Ave N, and N 107th St	Densmore Basin	No Problem description available.	Separated System	Residential Street			
984	Latona, between N 34th St and N Northlake Way	Lake Union/Ship Canal	Information obtained from e-mail communication between Betty Richardson (brgc@seanet.com) the South Wallingford Draft Co	Partially Separated System	Residential Street			
985	NW 114th St, between NW 112th St and NW Puget Dr	Pipers Creek Watershed	Maintence personnel report a CIP is required to solve problem. No problem description available.	Separated System	Residential Street			
986	Greenwood Ave N and Wetminster Wy N	Combined System	No Problem Description Available. See Note 10.	Combined System	Principal Arterial			
987	Lakeside Ave NE, between NE 123rd St and NE 120th St	North Lake Washington	Maintence personnel report a CIP is required to solve problem. No problem description available.	Separated System	Residential Street			
988	36th Ave NE, between N 115th St and NE 113rd St	Thornton Creek Watershed	Maintence personnel report a CIP is required to solve problem. No problem description available.	Separated System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
989	4th Ave NE, between NE 138th St and NE 136th St	Thornton Creek Watershed	Maintence personnel report a CIP is required to solve problem. No problem description available.	Separated System	Residential Street			
990	4th Ave NE, between NE 136th St and NE 135th St	Thornton Creek Watershed	Maintence personnel report a CIP is required to solve problem. No problem description available.	Separated System	Residential Street			
991	4th Ave NE, between NE 133rd and NE 135th St	Thornton Creek Watershed	Maintence personnel report a CIP is required to solve problem. No problem description available.	Separated System	Residential Street			
992	Northlake Way, between Latona and Burke Ave N	Lake Union/Ship Canal	Information obtained from e-mail communication between Betty Richardson (brgc@seanet.com) the South Wallingford Draft Co	Partially Separated System	Minor Arterial			
993	Burke Ave N, between N 34th st and N Northlake Way	Combined System	Information obtained from e-mail communication between Betty Richardson (brgc@seanet.com) the South Wallingford Draft Co	Combined System	Residential Street			
994	N 40th, east of Meridan	Combined System	Information obtained from e-mail communication between Betty Richardson (brgc@seanet.com) the South Wallingford Draft Co	Combined System	Minor Arterial			
995	Sunnyside Ave N south of N 38th	Combined System	Information obtained from e-mail communication between Barbara Reine (Briene@labcor.net from South Wallingford Draft Com	Combined System	Residential Street			
996	2315 N. 38th	Combined System	Information obtained from e-mail communication between Barbara Reine (Briene@labcor.net from South Wallingford Draft Com	Combined System	Residential Street			
997	NW 120th St and 6th Ave NW	Pipers Creek Watershed	Catchbasin higher than grade, ponding over roadway	Separated System	Residential Street			Area too low to Drain to System
998	Near 201 Elliot Ave W	Combined System	Ponding in one of the street lanes.	Combined System	Principal Arterial			
999	Near 101 Elliot Ave W.	Combined System	Ponding in one of the street lanes.	Combined System	Principal Arterial			
1000	Near 2611 Alaskan Way	Puget Sound Central	Ponding in load/unload zones and into one lane of the street.	Combined System	Principal Arterial			
1001	Near 2411 Alaskan Way	Puget Sound Central	Ponding in load/unload zones and into one lane of the street.	Combined System	Principal Arterial			
1002	Alaskan Way S & S Massachusetts St	Combined System	Ponding in one lane of the street	Partially Separated System	Principal Arterial			
1003	Near 2917 East Marginal Way S.	Duwamish Waterway	Ponding in Soutbound two lanes	Partially Separated System	Principal Arterial			
1004	SE corner of 4th Ave S & S Lander St.	Duwamish Waterway	Ponding into Eastbound lanes	Partially Separated System	Principal Arterial			
1005	Delridge Way S, underneath WSB on-ramp.	Longfellow Creek Watershed	Ponding on East side of the street underneath WSB on-ramp	Partially Separated System	Principal Arterial			
1006	NE 105th St and NE 41st St	Thornton Creek Watershed	Major flooding of intersection	Separated System	Residential Street			
1007	Shilshole Ave NW and NW 22nd St.	Lake Union/Ship Canal	Ponding along the road	Partially Separated System	Minor Arterial			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (If Known)
1008	847 S. Thistle St.	Combined System	Clogged inlets, ponding in front of house and street.	Combined System	Residential Street			Increased Maintenance Needed
1068	17th Ave W & W Dravus St.	Combined System	Major flooding of one driving lane.	Partially Separated System	Principal Arterial			
1009	NE 110th St, between Lake City Way and 30th Ave NE	Thornton Creek Watershed	Ditch/culvert system cannot handle flow volumes on north side of NE 110th st. No storm system on south side of the street. Water flowing into driveways that are below road grade.	Separated System	Collector Arterial	Driveway		Inadequate Capacity
1010	N. 85th St between Greenwood Ave. N and 3rd Ave NW	Combined System	Significant flooding of the ROW (travel lane) occurs below the 25-yr storm event.	Separated System	Principal Arterial		2-25 years	Lack of System
1011	N 105th St between Aurora and Northgate Way	Densmore Basin	Significant flooding of the travel lane occurs below the 25-yr storm event.	Separated System	Principal Arterial			Lack of System
1012	12226 Corliss Ave N	Thornton Creek Watershed	Ponding along east shoulder, partial lane blockage.	Separated System	Collector Arterial			Area too low to Drain to System
1013	Meridan Ave N and N 128th St (NW corner)	Densmore Basin	Corner under water, ponding on the both the street and shoulder.	Separated System	Collector Arterial			Area too low to Drain to System
1069	NE 70th St & Sand Point Way NE	North Lake Washington	Flooding at the intersection; runoff from Sand Point Way NE can't enter the ditch system.	Partially Separated System	Principal Arterial			Area too low to Drain to System
1014	1731 128th St. N.	Densmore Basin	Ponding at the entrance of the driveway.	Separated System	Non-Street Related	Driveway		
1015	Meridian Ave. N. and N. 137th St. (east of intersection)	Densmore Basin	Ponding along south shoulder, east of intersection	Separated System	Residential Street			Area too low to Drain to System
1016	Interlake Ave N and N 140th St.	Densmore Basin	Entire intersection flood primarily along the the street edge.	Separated System	Residential Street			Lack of System
1017	1220 N 137th St. (road shoulder across the street)	Densmore Basin	Ponding along the shoulder to the center lane of the street	Separated System	Residential Street			Closed Contour
1019	12246 12th Ave NW	Pipers Creek Watershed	Local flooding for many years due to inadequate storm drainage system that backs up. Water levels reach up to 3-5 feet in their garage, leaving sediment there once the water recedes.	Separated System	Residential Street	Residential Structure		Inadequate Capacity
1020	4110 NE 142nd Street	North Lake Washington	Changes to reduce hillside erosion have resulted in a marked increase of stormwater runoff at the intersection of 41st ave NE and NE 142nd St. Once the system is overwhelmed, is send a torent of water down 142nd into the owner's house and garage.	Separated System	Residential Street	Residential Structure		Inadequate Capacity
1021	19th Ave NE and NE 145th St.	Thornton Creek Watershed	Whole width of 19th Ave NE flooded.	Separated System	Collector Arterial			
1022	SW corner of NE 145th St and 37th Ave NE	Thornton Creek Watershed	Ponding at the intersection	Separated System	Collector Arterial			
1023	1265 SW Orchard St.	Longfellow Creek Watershed	Ponding in her yard coming off the hillside.	Partially Separated System	Non-Street Related	Yards		
1024	5030 32nd Ave South	South Lake Washington	Drain in front of owner's garage is backed up.	Partially Separated System	Non-Street Related	Residential Structure		

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (If Known)
1025	1262 Parkside Dr. E	Combined System	3" water and sewage in the basement. Owner believes City drain system is inadequate.	Combined System	Non-Street Related	Residential Structure		
1026	10550 Midvale Ave N.	Densmore Basin	Drainage problem at n 107th St and Midvale Ave N, causing two bottom units of 4-plex to flood. Water came in through toilets and showers filling basement with 6-12 inches of water.	Separated System	Residential Street	Residential Structure		
1027	Alley between California Ave SW and 44th Ave SW and Parking lots on east side of 44th Ave SW between SW Alaska St and SW Edmunds St.	Puget Sound South	No workable outlets for local drains, owner believes alley drainage needs to be connected to City storm network.	Partially Separated System	Alley	Commercial/Industrial	0-2 years	
1028	10731 30th Ave NE	Thornton Creek Watershed	Runoff entering property from adjacent proprty at 2819 NE 110th St.	Separated System	Non-Street Related	Yards		
1029	10721 30th Ave NE	Thornton Creek Watershed	Flooding in yards coming from hillside	Separated System	Non-Street Related	Yards		
1030	10721 30th Ave NE	Thornton Creek Watershed	Flooding from Kramer Creek	Separated System	Non-Street Related	Residential Structure		
1031	2820 NE 107th St.	Thornton Creek Watershed	Flooding from Kramer Creek.	Separated System	Non-Street Related	Yards		
1032	10703 30th Ave NE	Thornton Creek Watershed	Flooding from confluence of Kramer Creek and Thornton Creek South Branch.	Separated System	Non-Street Related	Residential Structure		
1033	Beacon Ave S & S Juneau St.	Combined System	Inlets plugged with leaves, causing major ponding.	Combined System	Principal Arterial			Increased Maintenance Needed
1034	S Graham St & Swift Ave S	Combined System	Ponding from leaves clogging inlet.	Partially Separated System	Principal Arterial			Increased Maintenance Needed
1035	Swift Ave S & S Willow St	Combined System	Major ponding from leaves cloggin inlet.	Partially Separated System	Principal Arterial			Increased Maintenance Needed
1036	S Augusta St and Luther Ave S	Combined System	Major ponding at NW corner of the intersection and minor ponding at the corner.	Combined System	Residential Street			
1037	Renton Ave S & S 116th Pl	South Lake Washington	Two clogged inlets at the SE corner, also noted ponidng at the entrance of a business (Operations Center) where water is ponding at a low point even though an inlet is located a few feet from the ponding.	Separated System	Minor Arterial	Commercial/Industrial		Increased Maintenance Needed
1038	Just n/o Ranier Ave S & S Byron St. In front of the 3120 Ranier Ave S Wells Fargo Bank	South Lake Washington	Large ponding along northbound curb lane; 8" to 12" deep; pedestrain/vehicle safety hazard.	Partially Separated System	Principal Arterial			
1039	S Othello St & 44th Ave S	South Lake Washington	Inlet clogged, creating ponding in the eastbound lane.	Partially Separated System	Minor Arterial			Increased Maintenance Needed
1040	S Othello St w/o MLK Way S	South Lake Washington	Ponding; could be related to construction of New Holly housing development.	Partially Separated System	Minor Arterial			
1041	37th Ave S, between S Hudson St and S Dawson St	South Lake Washington	Ponding on the northbound lane of 37th Ave S.	Partially Separated System	Residential Street			

See footnotes on final page of table.

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
1042	S Trenton St & 8th Ave S	Combined System	Major flooding in the roadway.	Partially Separated System	Collector Arterial			
1043	830 S Thistle St.	Combined System	Ponding along roadway due to plugged inlets with leaves and debris.	Combined System	Residential Street			Increased Maintenance Needed
1044	727 S Donavan St.	Combined System	It appears that a slight grade causes street spot flooding. The flooding appears to be relatively minor. Ponding in the street appears to be due to leaves and debris.	Partially Separated System	Residential Street			
1045	41st Ave NE & 42nd Ave NE	North Lake Washington	Almost entire intersection flooded.	Separated System	Residential Street			
1046	Near 1032 S. Southern St.	Combined System	Ponding in the street due to lack of conveyance system.	Combined System	Residential Street			
1047	12015 9th Ave NW	Pipers Creek Watershed	A pipe runs through several private properties from 7th Ave NW to 10th Ave NW. Property owner would like the system re-routed to existing ditch system on 9th Ave NW.	Separated System	Residential Street			
1048	9216 8th Ave South	Duwamish Waterway	The rainwater from 8th Ave S. drains onto owner's property druing heavy rains. Owner's drainage system (private) cannot handle extra drainage and consequently, the property floods.	Separated System	Collector Arterial	Commercial/Industrial		
1049	Montlake Blvd NE and NE 45th St.	Central Lake Washington	Ponding and splashing onto windshields	Partially Separated System	Principal Arterial			
1050	2036 NE 98th St and 2025 NE 98th St, south side of the street.	Thornton Creek Watershed	Storm drains flowing into creek and house at 2036 NE 98th is perched about the creek. In past two years, 46' x 9' of the creek bank eroded.	Separated System	Non-Street Related	Residential Structure	0-2 years	
1051	9717 Woodlawn Ave N	Densmore Basin	Current system of stream and culverts backs up in large storm events, and floods owners properties and adjacent neighbor's properties.	Separated System	Non-Street Related	Residential Structure	0-2 years	
1052	9533 Wallingford Ave. N.	Densmore Basin	Flooding under the house and in the yard. Sump pump system has do work continuously. October 2003 storm blew out the entire system.	Separated System	Non-Street Related	Residential Structure	0-2 years	
1053	East end of improved alley bordered by: N 105th St, Linden Ave N, N 104th St, and Aurora Ave. N.	Densmore Basin	Flooding up to two during October 20th, 2003 storm.	Separated System	Alley		0-2 years	
1054	4514 NE 92nd Street	Thornton Creek Watershed	Inadequate drainage system along 45th Ave NE causes massive flooding to home along NE 92nd St. New houses in the area seem to have overtaxed the drainage system.	Separated System	Residential Street	Residential Structure	0-2 years	Inadequate Capacity
1055	Closed ROW of 52nd Ave S, between S Henderson St and Ranier Ave S	South Lake Washington	Complaints from nearby residents about a lot of standing water in the ditches. Also, complaints from Lake Washington apartment residents about rats.	Partially Separated System	Non-Street Related			
1056	8165 1st Ave S	Duwamish Waterway	Green belt area west of highway 509 drains through owner's property. Silt fills ditch system and causes flooding. Has been a problem for years.	Partially Separated System	Non-Street Related	Commercial/Industrial	0-2 years	

See footnotes on final page of table.

ATTACHMENT C-1
FLOODING INCIDENT REPORT
DATABASE

GIS Problem No.	Incident Location/Address	Geographic Area	Incident Description	Drainage Area Type (3)	Public Right-of-Way Flooding (4)	Primary Private Property Flooding (4)	Flooding Frequency (6)	Probable Cause (if Known)
1057	Property south of 2139 Harbor Ave SW	Puget Sound Central	This property has hillside seepage.	Partially Separated System	Minor Arterial		0-2 years	
1058	southwest corner of SW Myrtle St and Delridge Way SW	Longfellow Creek Watershed	Large ponding from bus stop covers both lanes of northbound traffic and half of the sidewalk	Partially Separated System	Principal Arterial			
1059	5500 block of 18th Ave SW	Duwamish Waterway	Water from approximately one mile on the east side of 18th Ave SW crosses over the street and halfway into a few yards.	Partially Separated System	Residential Street	Yards		Lack of System
1060	Shilshole Ave NW & 20th Ave NW	Lake Union/Ship Canal	Street ponding	Partially Separated System	Minor Arterial			
1061	NE Northlake Way, underneath I-5 bridge.	Lake Union/Ship Canal	Street ponding.	Partially Separated System	Residential Street			
1062	Fairview Ave E, north of E Blaine St.	Lake Union/Ship Canal	Heavy ponding of entire intersection.	Partially Separated System	Residential Street			
1063	Fairview Ave N & E Republican St.	Combined System	NE corner catchbasin surcharging	Combined System	Principal Arterial			
1064	Mercer St. & Boren Ave. N.	Combined System	Heavy ponding on the SE corner	Combined System	Principal Arterial			
1065	Mercer St. & Terry Ave. N.	Combined System	Heavy ponding along Mercer St.	Partially Separated System	Principal Arterial			
1066	NW 36th St & 3rd Ave NW	Lake Union/Ship Canal	Intersection completely flooded during large storm events.	Partially Separated System	Residential Street			
1067	NW 36th St. & Leary Way NW	Lake Union/Ship Canal	Eastern lane of Leary Way NW is flooded.	Partially Separated System	Principal Arterial			

NOTES

(1) Refer to Sections C.3.2 and C.3.3 for a description of the data base development

(2) For problems identified in basin plans, refer to the specific basin plan for information on problem data sources.

(3) Drainage Area Type referes to the general type of drainage system in the area of the problem and not the specific drainage system associated with the problem.

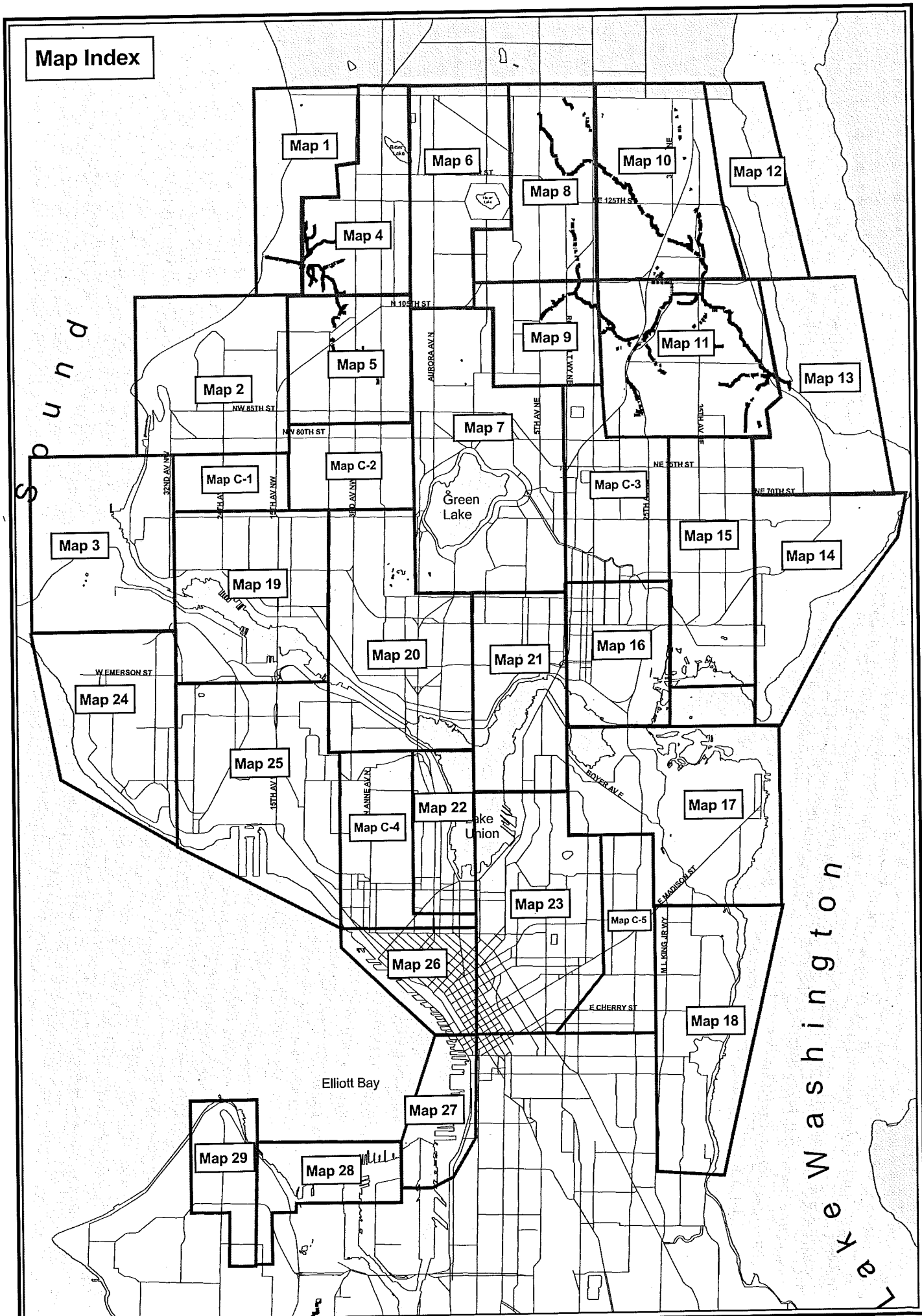
(4) Indicates with public roads (and type of road) is subject to flooding problems. Non-street related indicates flooding problem affects private property.

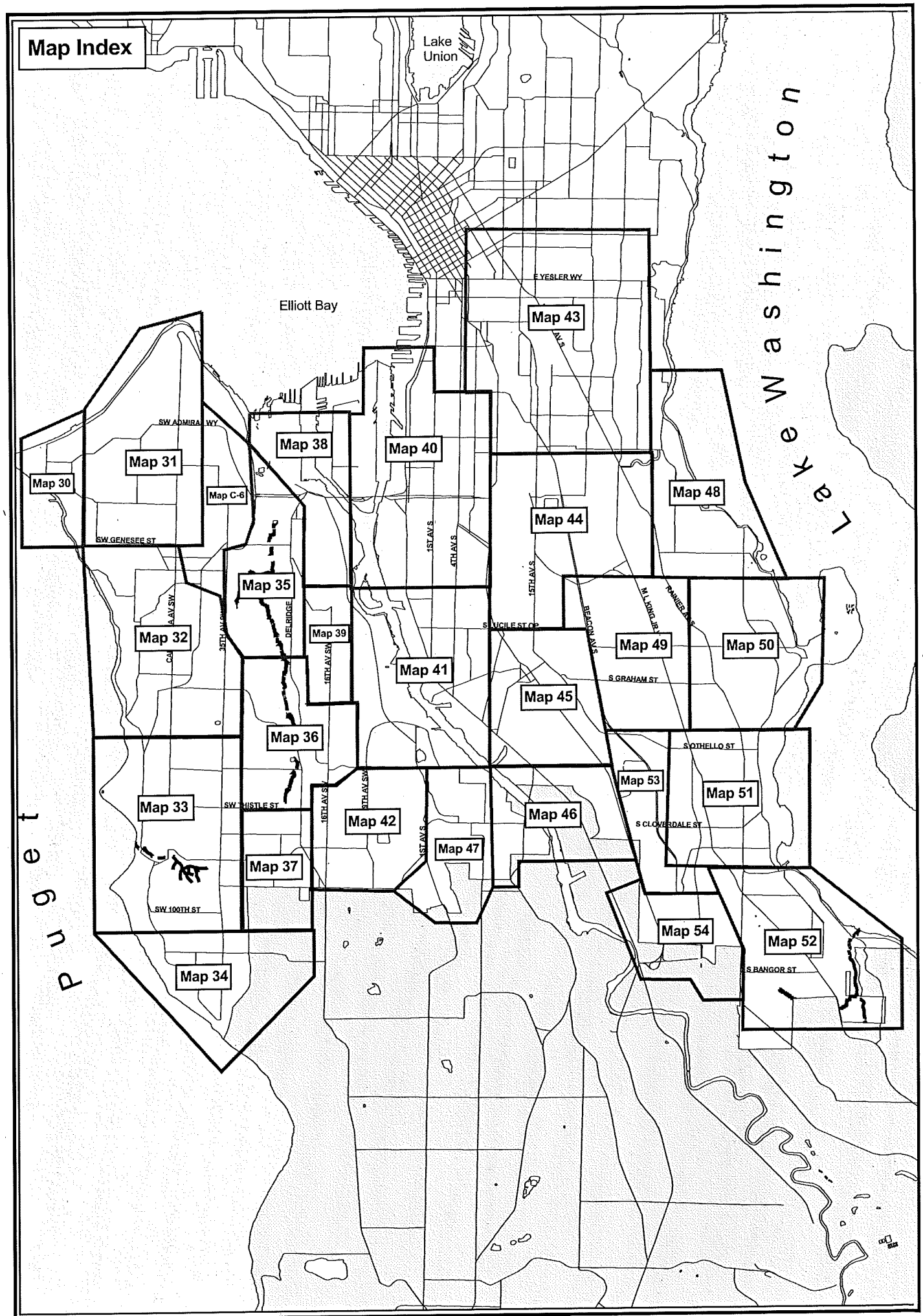
(5) Indicates secondary types of areas subject to flooding. For problems identified in basin plans, refer to the specific basin plan for information on areas subject to

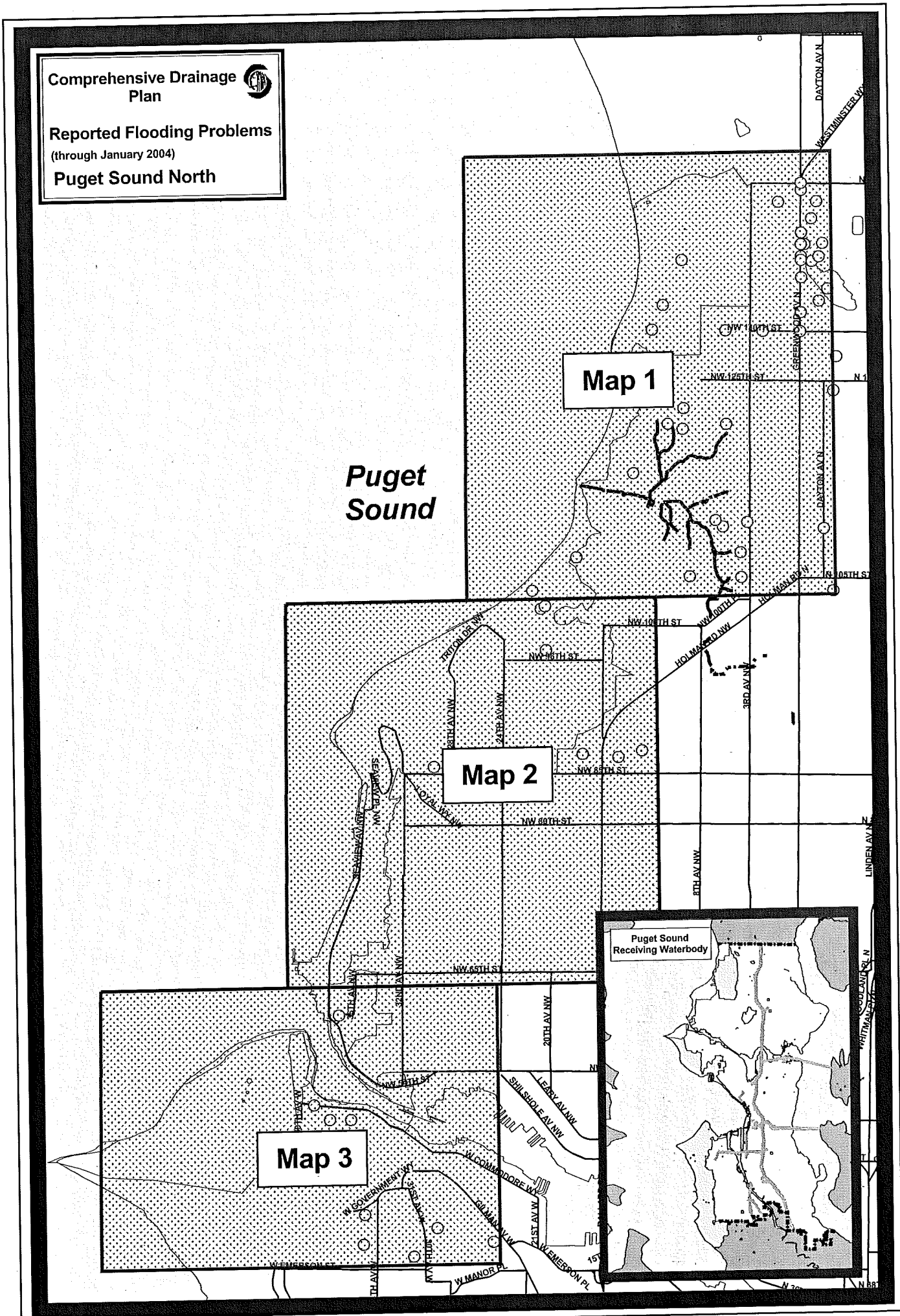
(6) Frequency of flooding is generally given as a range. For example 2-25 yr indicates that the flooding occurrence has a probability of occuring between once every

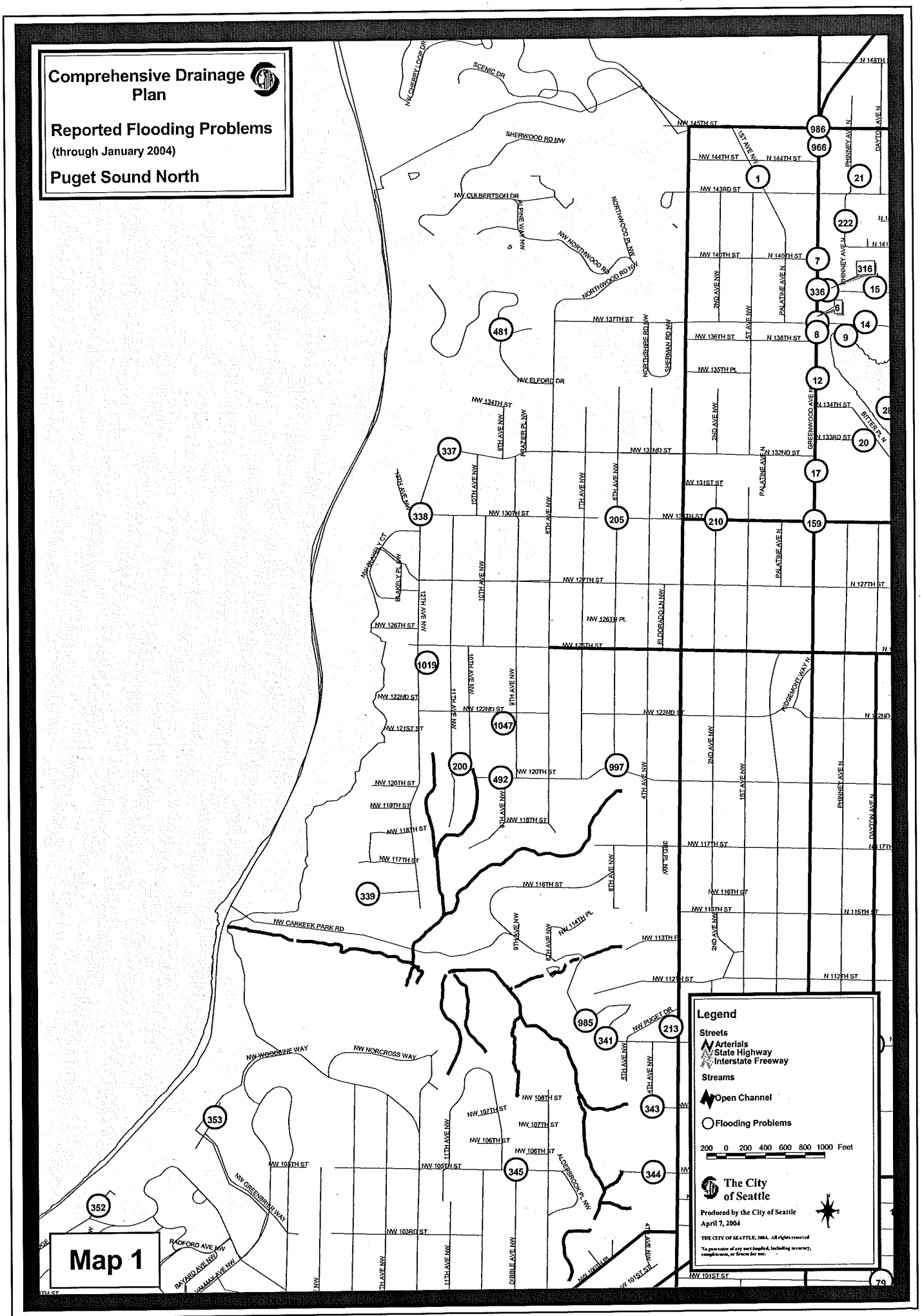
See footnotes on final page of table.

Flooding Incident Maps


Map Index
Map 1
Map 2
Map 3
Map 4
Map 5
Map 6
Map 7
Map 8
Map 9
Map 10
Map 11
Map 12
Map 13
Map 14
Map 15
Map 16
Map 17
Map 18
Map 19
Map 20
Map 21
Map 22
Map 23
Map 24
Map 25
Map 26
Map 27
Map 28
Map 29
Map C-1
Map C-2
Map C-3
Map C-4
Map C-5
Green Lake
Lake Union
Elliott Bay
Sound
Lake Washington
N 105TH ST
NW 85TH ST
NW 80TH ST
NE 125TH ST
NE 75TH ST
NE 70TH ST
W EMERSON ST
E CHERRY ST
BOYER AV E
AURORA AV N
32ND AV NW
15TH AV NW
5TH AV NE
M L KING JR WY


Map Index
Lake Union
Elliott Bay
Lake Washington
Puget
E YESLER WY
SW ADMIRAL WY
SW GENESEE ST
SW THISTLE ST
SW 100TH ST
S LUCILE ST OP
S GRAHAM ST
S OTHELLO ST
S CLOVERDALE ST
S BANGOR ST
1ST AV S
4TH AV S
15TH AV S
16TH AV SW
35TH AV SW
DELRIDGE
BEACON AV S
M L KING JR
RAINIER AV S
Map 30
Map 31
Map C-6
Map 32
Map 33
Map 34
Map 35
Map 36
Map 37
Map 38
Map 39
Map 40
Map 41
Map 42
Map 43
Map 44
Map 45
Map 46
Map 47
Map 48
Map 49
Map 50
Map 51
Map 52
Map 53
Map 54


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound North
Puget Sound
Map 1
Map 2
Map 3
Puget Sound Receiving Waterbody
DAYTON AV N
WESTMINSTER WY
NW 140TH ST
NW 125TH ST
GREENWOOD AV N
N 105TH ST
HOLMAN RD N
NW 100TH ST
NW 96TH ST
TRITON DR NW
28TH AV NW
24TH AV NW
3RD AV NW
NW 85TH ST
NW 80TH ST
8TH AV NW
LINDEN AV N
NW 65TH ST
32ND AV NW
20TH AV NW
SHILSHOLE AV NW
LEARY AV NW
W COMMODORE WY
W GOVERNMENT WY
GILMAN AV W
21ST AV W
W EMERSON PL
W MANOR PL
W EMERSON ST

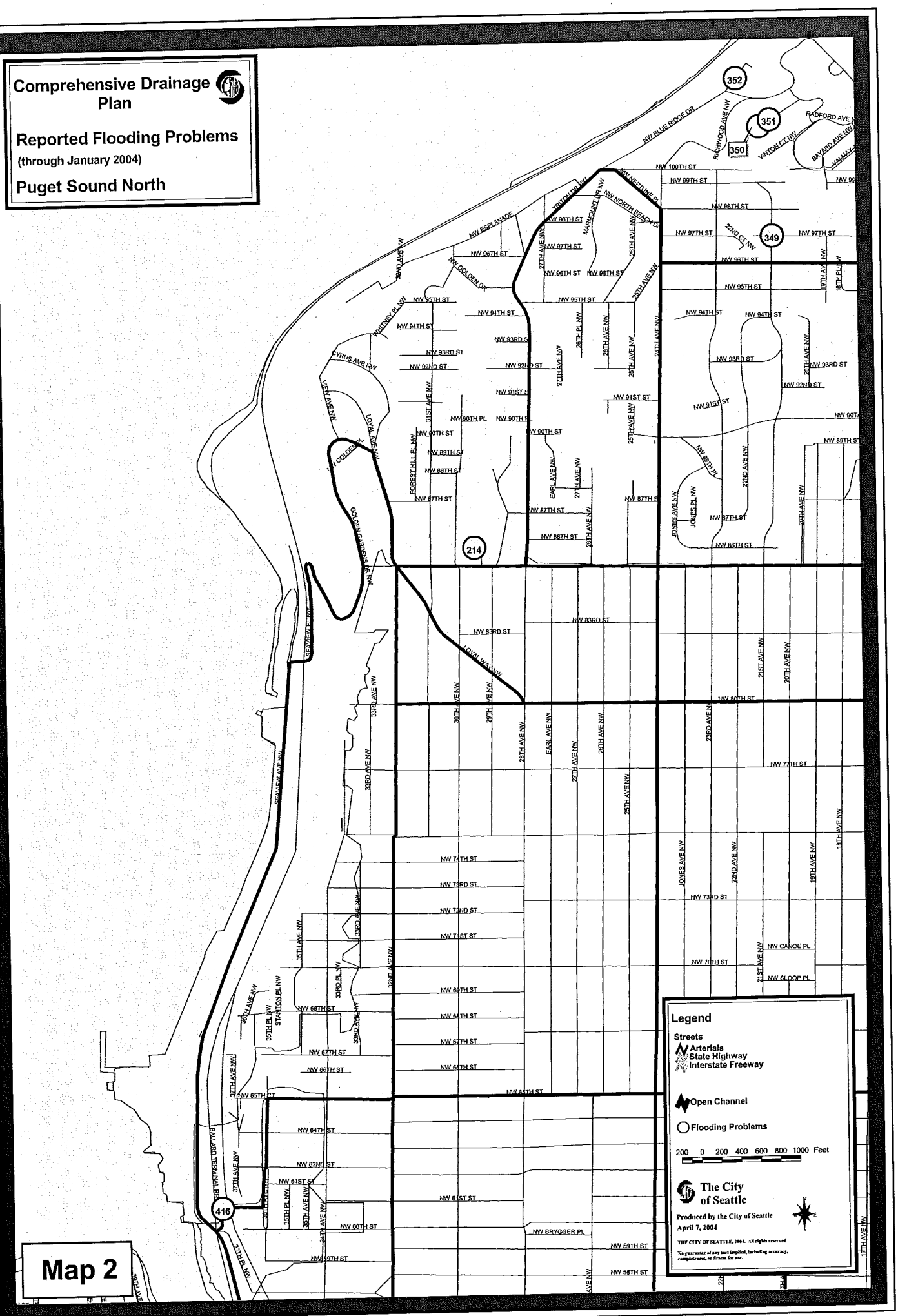

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound North
Map 1
Legend
Streets
Arterials
State Highway
Interstate Freeway
Streams
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
NW CARKEEK PARK RD
NW WOODBINE WAY
NW NORCROSS WAY
NW GREENBRIER WAY
NW PUGET DR
NW 145TH ST
NW 144TH ST
N 144TH ST
NW 143RD ST
NW 140TH ST
N 140TH ST
NW 137TH ST
NW 136TH ST
N 136TH ST
NW 135TH PL
NW 134TH ST
N 134TH ST
NW 133RD ST
N 133RD ST
NW 132ND ST
N 132ND ST
NW 131ST ST
NW 130TH ST
NW 127TH ST
N 127TH ST
NW 126TH ST
NW 126TH PL
NW 125TH ST
NW 122ND ST
NW 121ST ST
NW 120TH ST
NW 119TH ST
NW 118TH ST
NW 117TH ST
NW 116TH ST
NW 115TH ST
N 115TH ST
NW 113TH PL
NW 112TH ST
N 112TH ST
NW 108TH ST
NW 107TH ST
NW 106TH ST
NW 105TH ST
NW 103RD ST
NW 101ST ST
NW CULBERTSON DR
NW NORTHWOOD RD
NW ELFORD DR
SHERWOOD RD NW
SCENIC DR
NW CHERRY LOOP DR
NORTHWOOD PL NW
NORTHSHIRE RD NW
SHERMAN RD NW
PALATINE AVE N
GREENWOOD AVE N
PHINNEY AVE N
DAYTON AVE N
RIDGEMONT WAY N
ALDERBROOK PL NW
DIBBLE AVE NW
RADFORD AVE NW
BAYARD AVE NW
VALMAY AVE NW
BLAKELY PL NW
ELDORADO LN NW
1ST AVE NW
2ND AVE NW
4TH AVE NW
5TH AVE NW
6TH AVE NW
7TH AVE NW
8TH AVE NW
9TH AVE NW
10TH AVE NW
11TH AVE NW
12TH AVE NW
1
21
222
7
316
336
15
6
8
9
14
12
20
17
159
210
205
481
337
338
1019
1047
200
492
997
339
985
341
213
343
344
345
353
352
986
966
79

Comprehensive Drainage Plan

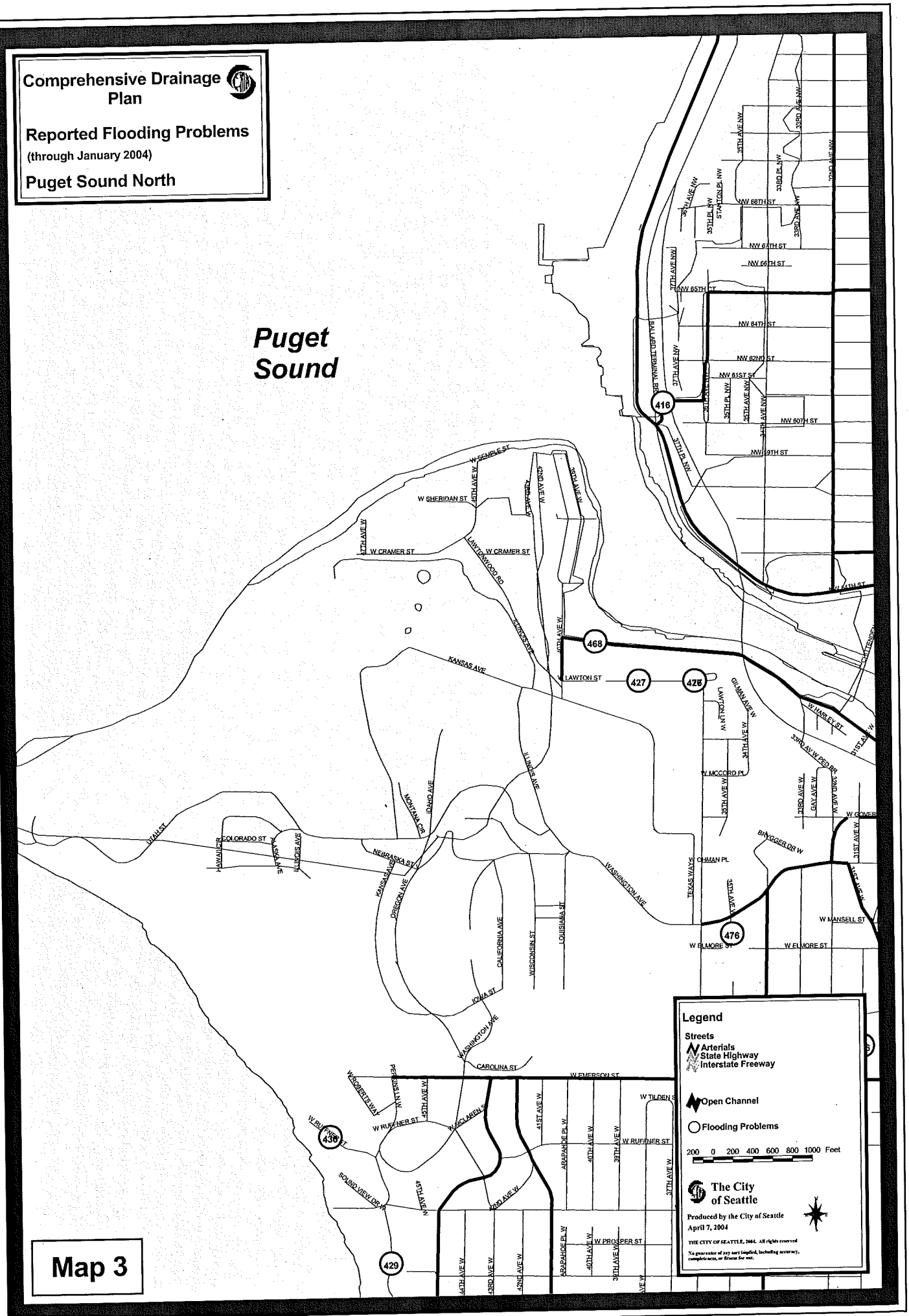
Reported Flooding Problems

(through January 2004)

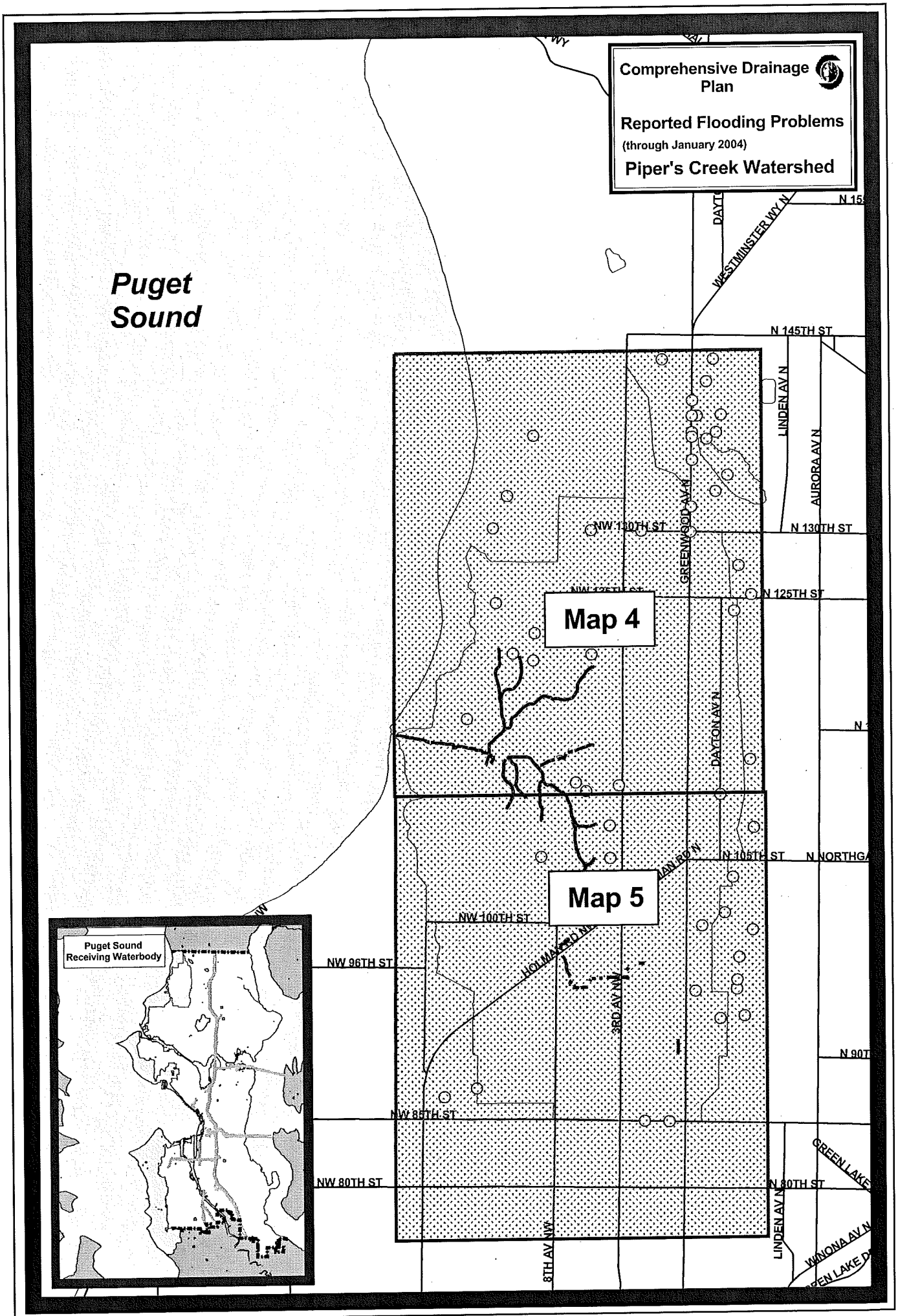
Puget Sound North

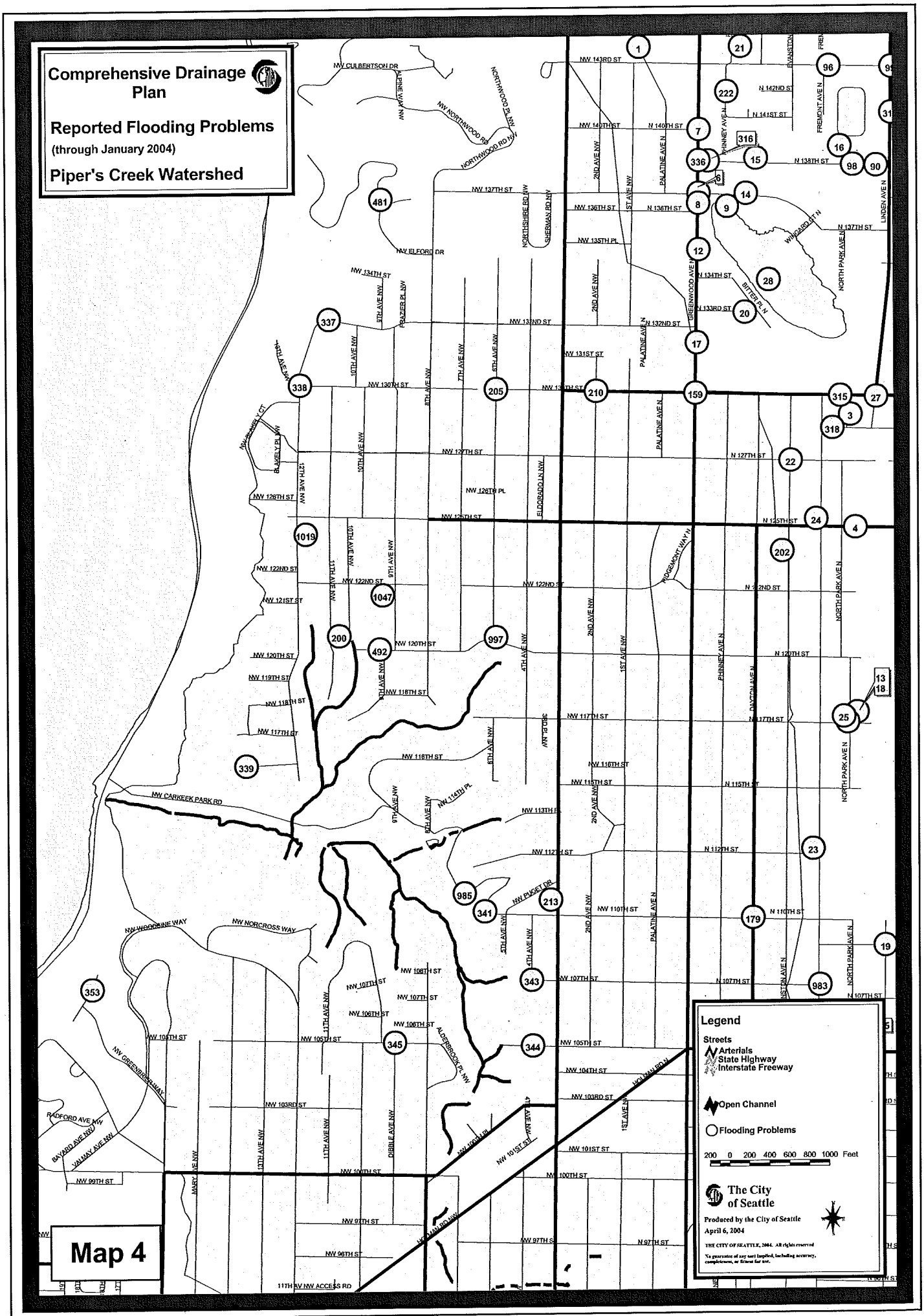


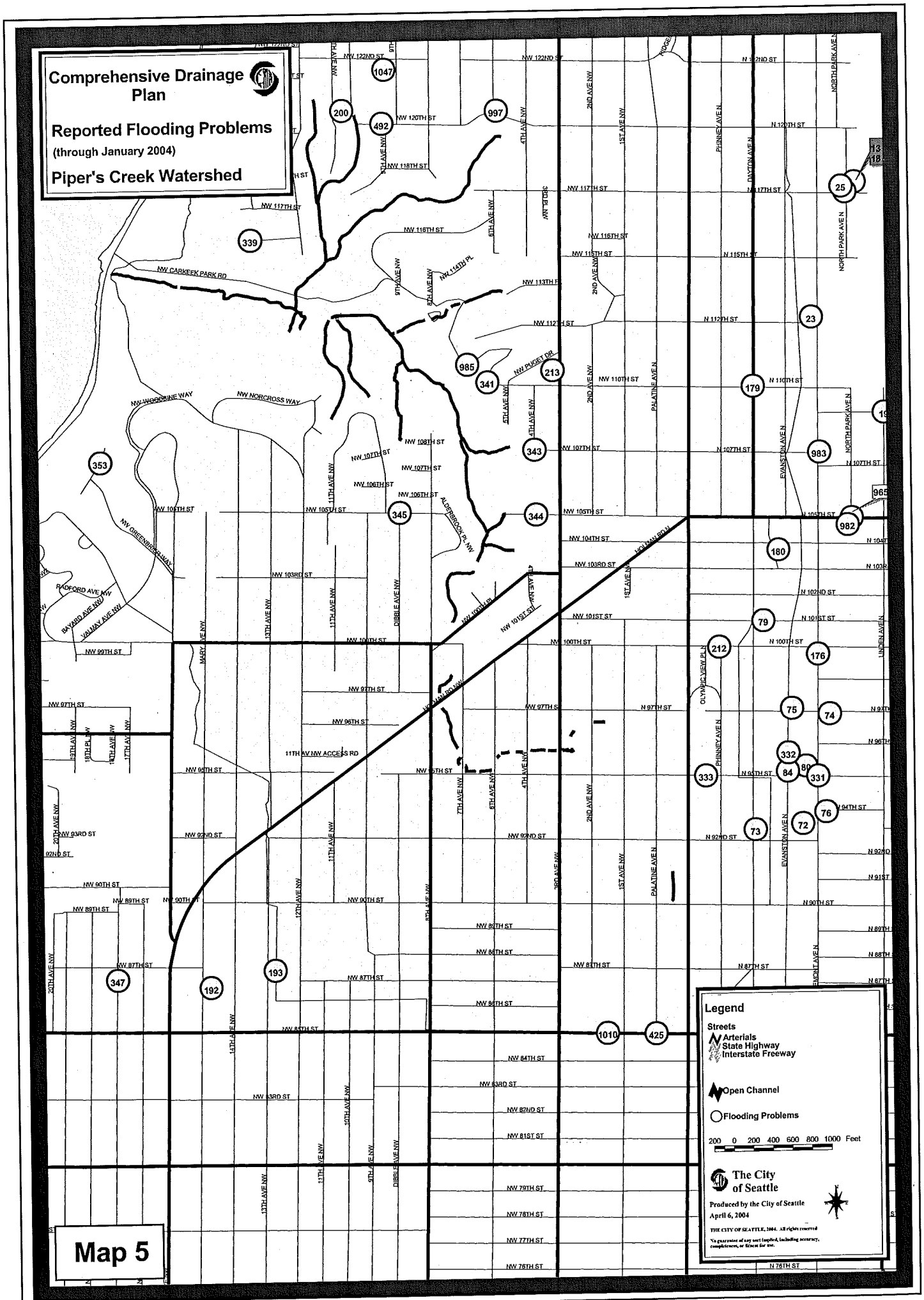
Map 2

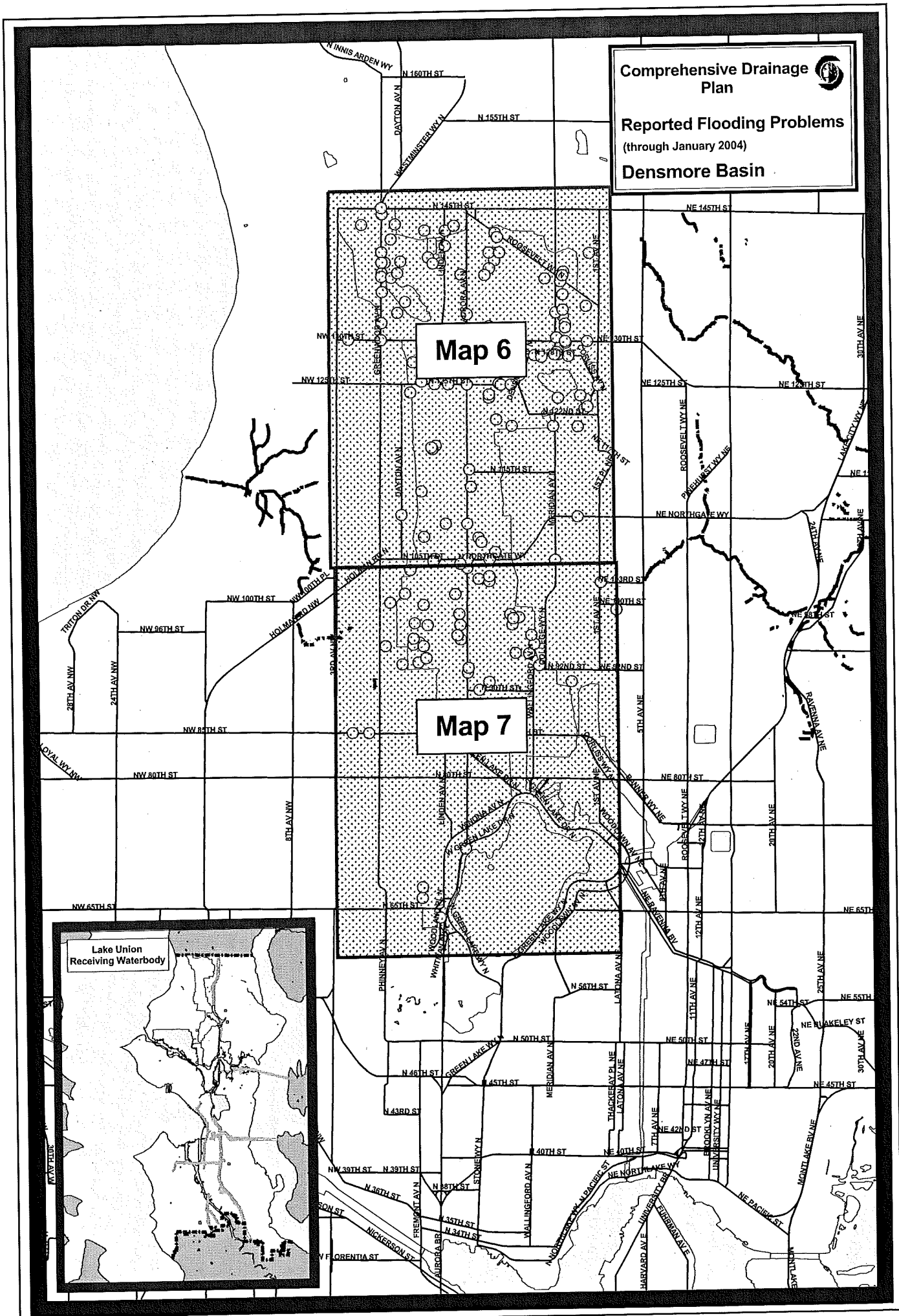

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound North
Puget Sound
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
416
468
427
426
476
430
429
W SEMPLE ST
W SHERIDAN ST
W CRAMER ST
LAWTONWOOD RD
KANSAS AVE
W LAWTON ST
W HARLEY ST
W MCCORD PL
W GOVER
BRYGGER DR W
W MANSELL ST
W ELMORE ST
W EMERSON ST
W RUFFNER ST
W PROSPER ST
SOUND VIEW DR W
UTAH ST
COLORADO ST
NEBRASKA ST
OREGON AVE
CALIFORNIA AVE
WISCONSIN ST
LOUISIANA ST
WASHINGTON AVE
IOWA ST
CAROLINA ST
ILLINOIS AVE
MONTANA CIR
IDAHO AVE
LAWTON LN W
GILMAN AVE W
TEXAS WAY
BALLARD TERMINAL RR
NW 68TH ST
NW 67TH ST
NW 66TH ST
NW 65TH ST
NW 64TH ST
NW 62ND ST
NW 61ST ST
NW 60TH ST
NW 59TH ST
STANTON PL NW
35TH AVE NW
33RD AVE NW
32ND AVE NW
37TH AVE NW
37TH PL NW
35TH PL NW
35TH AVE NW
34TH AVE NW
33RD AVE NW
33RD AV W PED BR
32ND AVE W
GAY AVE W
31ST AVE W
35TH AVE W
34TH AVE W
40TH AVE W
42ND AVE W
39TH AVE W
45TH AVE W
47TH AVE W
41ST AVE W
ARAPAHOE PL W
38TH AVE W
37TH AVE W
43RD AVE W
44TH AVE W
PERKINS LN W
W ROBERTS WAY
W MCLAREN ST
W TILDEN ST

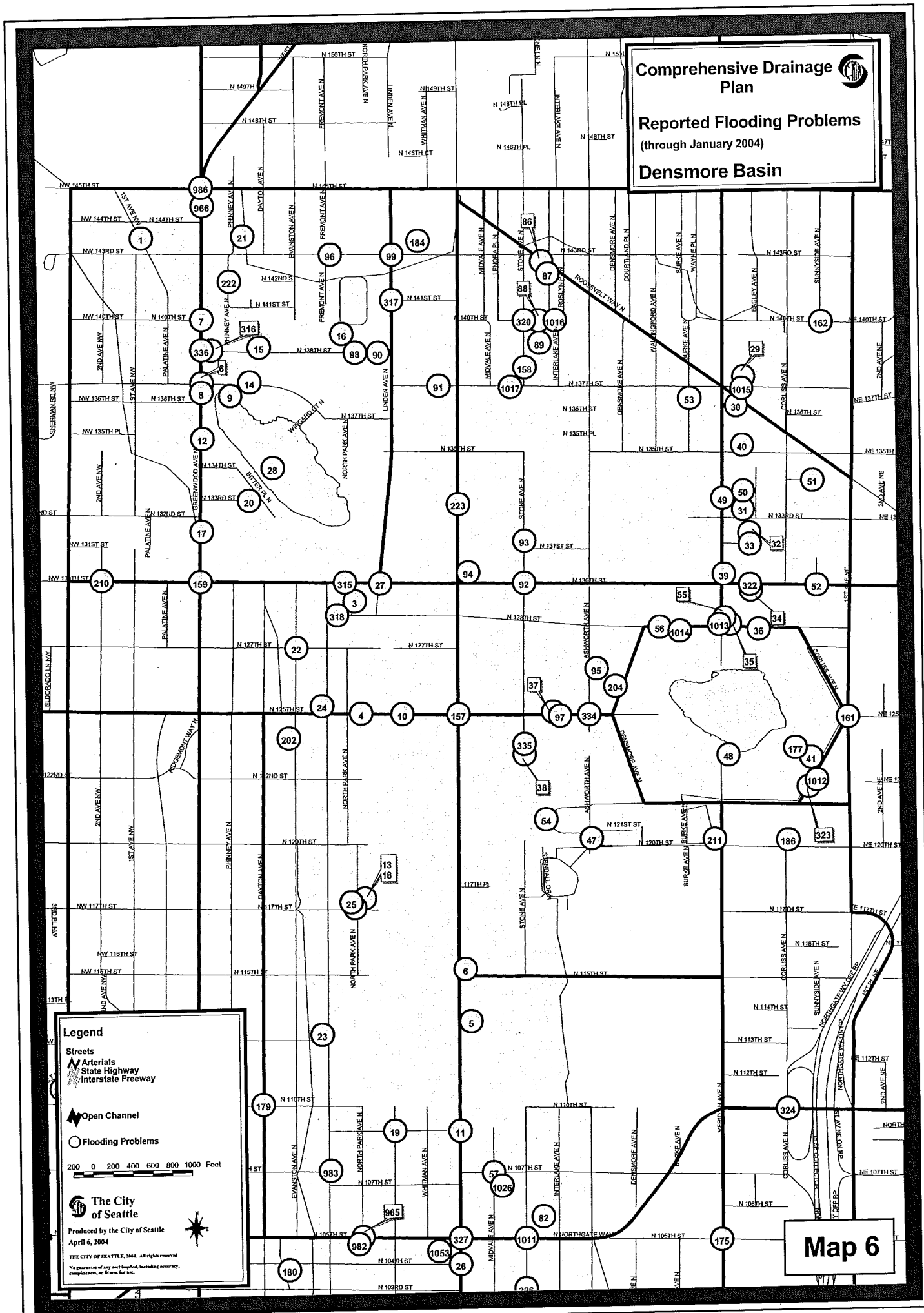
Map 3

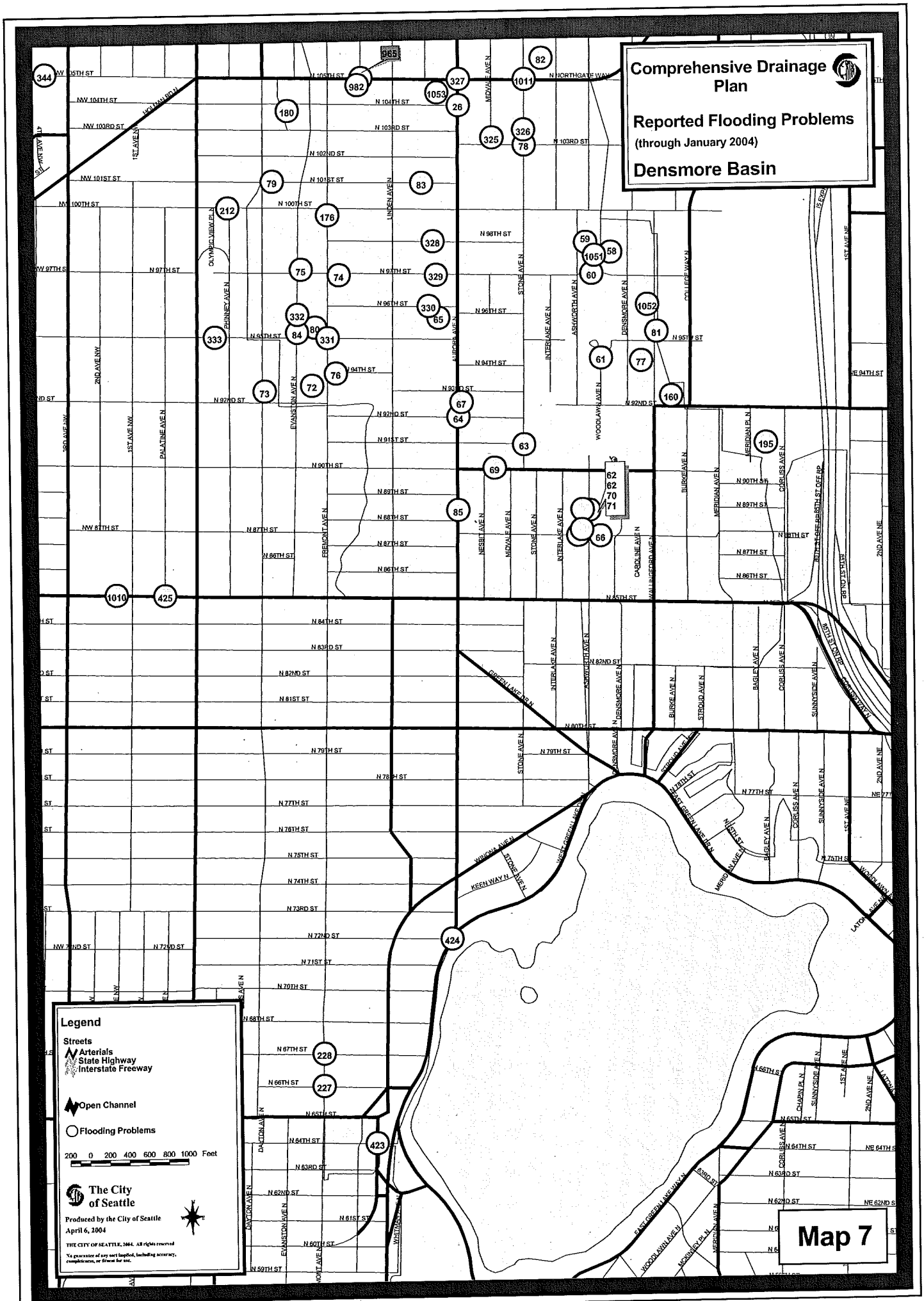

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Piper's Creek Watershed
Puget Sound
Map 4
Map 5
Puget Sound Receiving Waterbody
WESTMINSTER WY N
N 145TH ST
LINDEN AV N
AURORA AV N
GREENWOOD AV N
NW 110TH ST
N 130TH ST
N 125TH ST
DAYTON AV N
N 105TH ST
NW 100TH ST
NW 96TH ST
3RD AV NW
NW 85TH ST
NW 80TH ST
N 80TH ST
8TH AV NW
GREEN LAKE
WINONA AV N

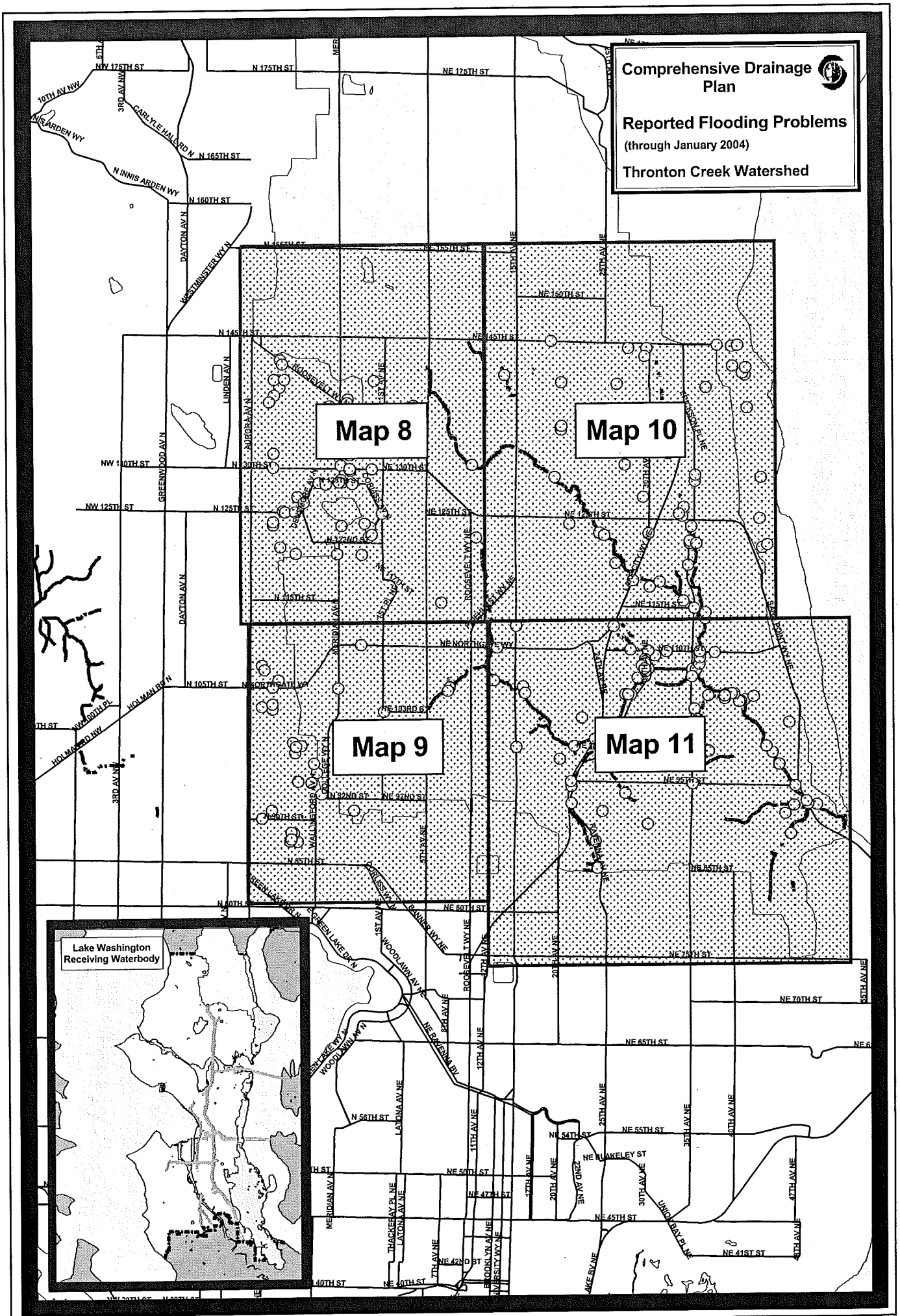

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Piper's Creek Watershed
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 4
NW CARKEEK PARK RD
NW WOODBINE WAY
NW NORCROSS WAY
NW GREENBRIER WAY
NW PUGET DR
NW 143RD ST
NW 140TH ST
N 140TH ST
N 138TH ST
NW 137TH ST
NW 136TH ST
N 136TH ST
NW 135TH PL
NW 134TH ST
N 134TH ST
N 133RD ST
NW 132ND ST
N 132ND ST
NW 131ST ST
NW 130TH ST
NW 127TH ST
N 127TH ST
NW 126TH ST
NW 126TH PL
NW 125TH ST
N 125TH ST
NW 122ND ST
N 122ND ST
NW 121ST ST
NW 120TH ST
N 120TH ST
NW 119TH ST
NW 118TH ST
NW 117TH ST
N 117TH ST
NW 116TH ST
NW 115TH ST
N 115TH ST
NW 114TH PL
NW 113TH PL
NW 112TH ST
N 112TH ST
NW 110TH ST
N 110TH ST
NW 108TH ST
NW 107TH ST
N 107TH ST
NW 106TH ST
NW 105TH ST
NW 104TH ST
NW 103RD ST
NW 101ST ST
NW 100TH ST
NW 99TH ST
NW 97TH ST
NW 96TH ST
11TH AV NW ACCESS RD
HOLMAN RD NW
NORTH PARK AVE N
PALATINE AVE N
GREENWOOD AVE N
PHINNEY AVE N
DAYTON AVE N
1ST AVE NW
2ND AVE NW
4TH AVE NW
5TH AVE NW
6TH AVE NW
7TH AVE NW
8TH AVE NW
9TH AVE NW
10TH AVE NW
11TH AVE NW
12TH AVE NW
13TH AVE NW
ALDERBROOK PL NW
DIBBLE AVE NW
MARY AVE NW
ELDORADO LN NW
SHERMAN RD NW
NORTHSHIRE RD NW
NORTHWOOD RD NW
NORTHWOOD PL NW
NW CULBERTSON DR
NW ELFORD DR
ALPINE WAY NW
FRAZIER PL NW
BLAKELY PL NW
BITTER PL N
WINCARD CT N
FREMONT AVE N
LINDEN AVE N
EVANSTON
RIDGEMONT WAY N
HOLMAN RD N
RADFORD AVE NW
BAYARD AVE NW
VALMAY AVE NW
1
21
96
222
316
7
336
15
16
98
90
6
14
8
9
481
12
28
20
337
17
338
205
210
159
315
27
3
318
22
24
4
1019
202
1047
200
492
997
13
18
25
339
985
341
213
179
19
343
983
353
345
344

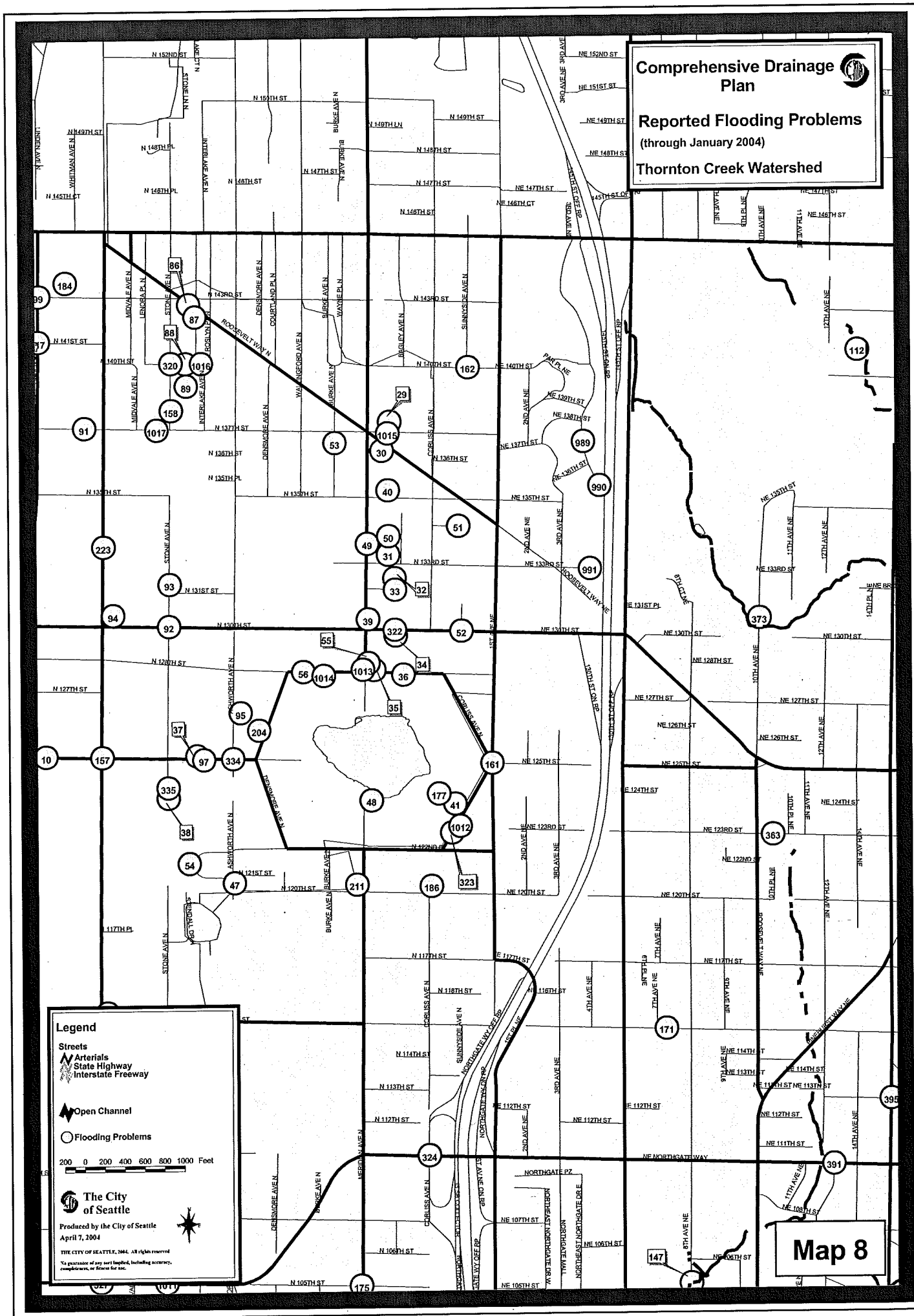

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Piper's Creek Watershed
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 5
NW CARKEEK PARK RD
NW WOODBINE WAY
NW NORCROSS WAY
NW GREENBRIER WAY
RADFORD AVE NW
BAYARD AVE NW
VALMAY AVE NW
NW PUGET DR
ALDERBROOK PL NW
HOLMAN RD N
11TH AV NW ACCESS RD
NW 122ND ST
NW 120TH ST
NW 118TH ST
NW 117TH ST
NW 116TH ST
NW 115TH ST
NW 114TH PL
NW 113TH PL
NW 112TH ST
NW 110TH ST
NW 108TH ST
NW 107TH ST
NW 106TH ST
NW 105TH ST
NW 104TH ST
NW 103RD ST
NW 102ND ST
NW 101ST ST
NW 100TH ST
NW 99TH ST
NW 97TH ST
NW 96TH ST
NW 95TH ST
NW 94TH ST
NW 93RD ST
NW 92ND ST
NW 90TH ST
NW 89TH ST
NW 88TH ST
NW 87TH ST
NW 86TH ST
NW 85TH ST
NW 84TH ST
NW 83RD ST
NW 82ND ST
NW 81ST ST
NW 79TH ST
NW 78TH ST
NW 77TH ST
NW 76TH ST
N 122ND ST
N 120TH ST
N 117TH ST
N 115TH ST
N 112TH ST
N 110TH ST
N 107TH ST
N 105TH ST
N 104TH ST
N 103RD ST
N 102ND ST
N 101ST ST
N 100TH ST
N 97TH ST
N 95TH ST
N 94TH ST
N 92ND ST
N 90TH ST
N 87TH ST
N 76TH ST
1047
200
492
997
339
25
23
985
341
213
179
343
983
353
345
344
982
180
79
212
176
75
74
332
84
80
331
333
76
73
72
347
192
193
1010
425
1ST AVE NW
2ND AVE NW
3RD AVE NW
4TH AVE NW
5TH AVE NW
6TH AVE NW
7TH AVE NW
8TH AVE NW
9TH AVE NW
10TH AVE NW
11TH AVE NW
12TH AVE NW
13TH AVE NW
14TH AVE NW
17TH AVE NW
18TH PL NW
19TH AVE NW
20TH AVE NW
PALATINE AVE N
PHINNEY AVE N
DAYTON AVE N
NORTH PARK AVE N
EVANSTON AVE N
OLYMPIC VIEW PL N
LINDEN AVE N
MARY AVE NW
DIBBLE AVE NW

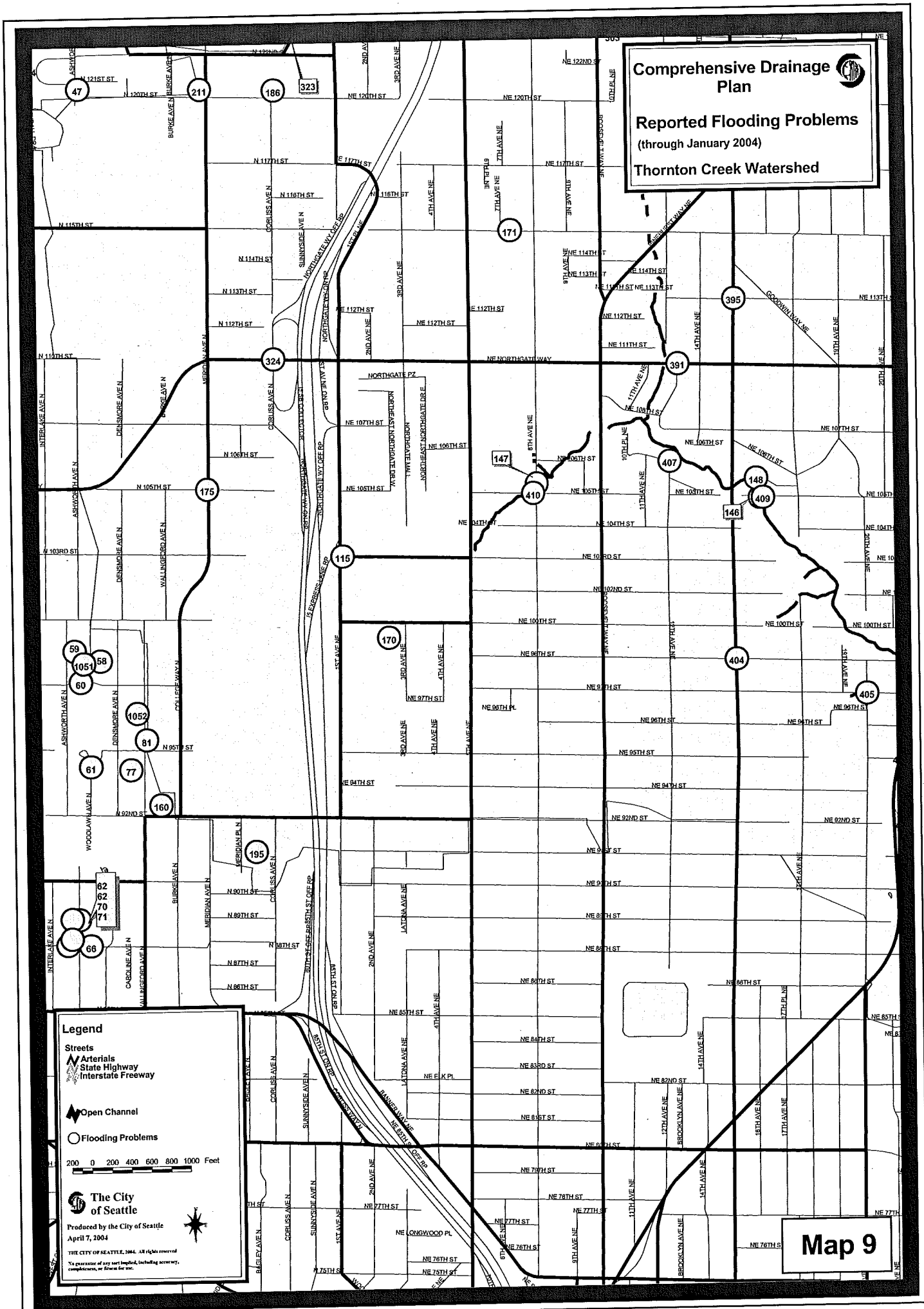

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Densmore Basin
Map 6
Map 7
Lake Union Receiving Waterbody
N INNIS ARDEN WY
N 160TH ST
N 155TH ST
DAYTON AV N
WESTMINSTER WY N
N 145TH ST
NE 145TH ST
ROOSEVELT WY N
NW 130TH ST
NE 130TH ST
NW 125TH ST
NE 125TH ST
N 122ND ST
N 115TH ST
NE NORTHGATE WY
N 105TH ST
NE 103RD ST
NE 100TH ST
NW 100TH ST
NW 96TH ST
TRITON DR NW
HOLMAN RD NW
NW 85TH ST
NW 80TH ST
NE 80TH ST
NW 65TH ST
NE 65TH
N 56TH ST
NE 55TH
NE 54TH ST
NE BLAKELEY ST
N 50TH ST
NE 50TH ST
NE 47TH ST
N 46TH ST
N 45TH ST
NE 45TH ST
N 43RD ST
N 40TH ST
NE 40TH ST
NW 39TH ST
N 39TH ST
N 36TH ST
N 35TH ST
N 34TH ST
NE NORTHLAKE WY
NE PACIFIC ST
NICKERSON ST
W FLORENTIA ST
28TH AV NW
24TH AV NW
8TH AV NW
LOYAL WY NW
PHINNEY AV N
LATONA AV NE
11TH AV NE
12TH AV NE
20TH AV NE
25TH AV NE
30TH AV NE
5TH AV NE
RAVENNA AV NE
MERIDIAN AV N
THACKERAY PL NE
LATONA AV NE
7TH AV NE
NE 42ND ST
BROOKLYN AV NE
UNIVERSITY WY NE
UNIVERSITY BR
FUHRMAN AV E
HARVARD AV E
MONTLAKE BV NE
FREMONT AV N
AURORA BR
STONEWAY N
WALLINGFORD AV N
N NORTHLAKE WY
N PACIFIC ST
GREEN LAKE WY N
WOODLAWN AV N
WOODLAWN AV NE
BANNER WY NE
ROOSEVELT WY NE
PINEHURST WY NE
LAKE CITY WY NE
24TH AV NE
30TH AV NE
NE 98TH ST
NE 92ND ST
N 92ND ST
N 90TH ST
N 80TH ST
N 65TH ST
LINDEN AV N
WINONA AV N
W GREEN LAKE DR N
GREEN LAKE DR N
GREEN LAKE WY N
WHITMAN AV N
GREEN LAKE WY N
WALLINGFORD AV N
COLLEGE WY N
GORLISS WY N
1ST AV NE
1ST PL NE
1ST AV NE
3RD AV NE
HOLMAN RD N
NW 100TH PL
HOLMAN RD NW
GREENWOOD AV N
LINDEN AV N
AURORA AV N
DAYTON AV N
MERIDIAN AV N
1ST AV NE
ROOSEVELT WY NE
PINEHURST WY NE
LAKE CITY WY NE
NE RAVENNA BV
NE RAVENNA BV
NE BLAKELEY ST
22ND AV NE
17TH AV NE
30TH AV NE
30TH AV W

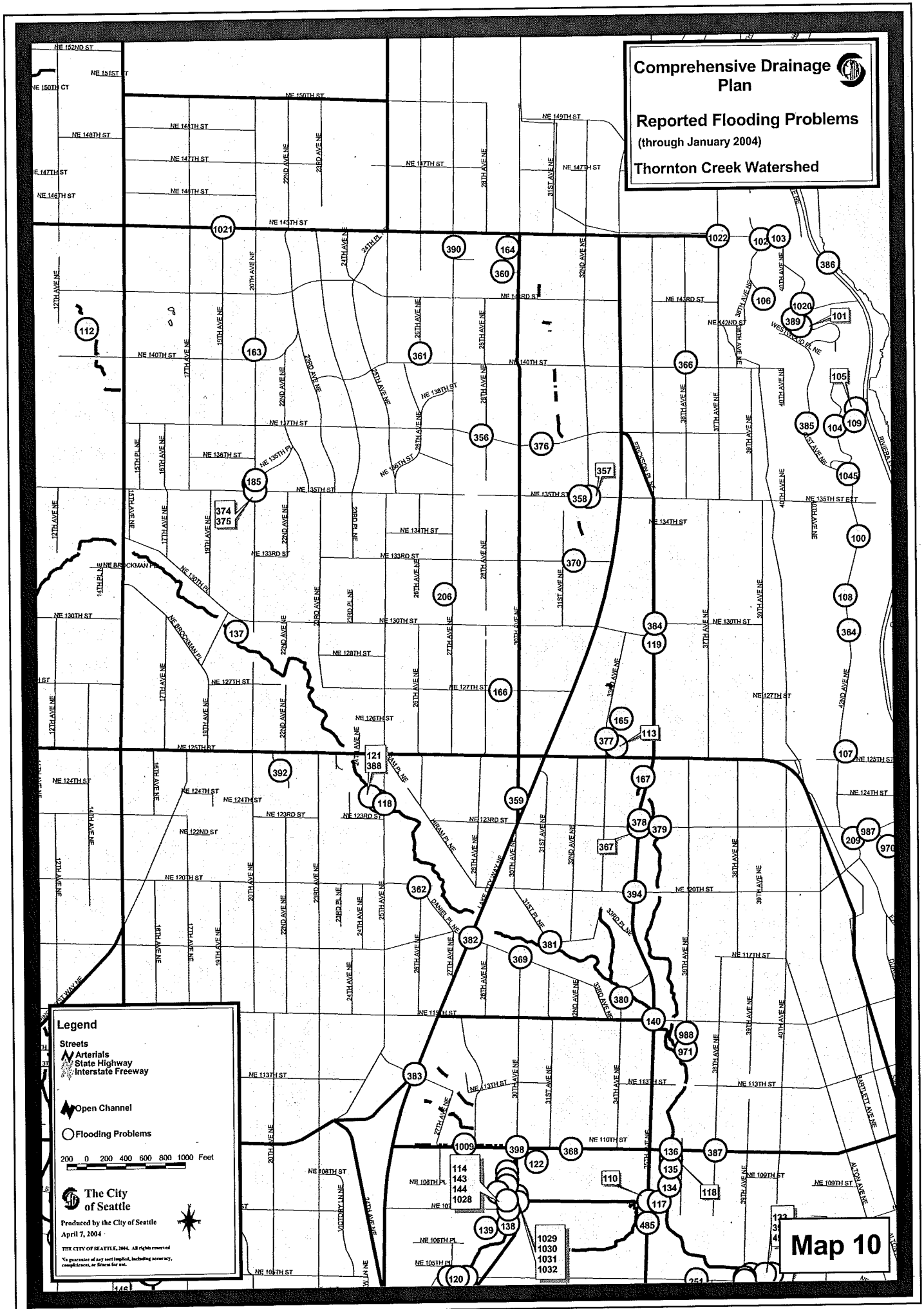

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Densmore Basin
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 6

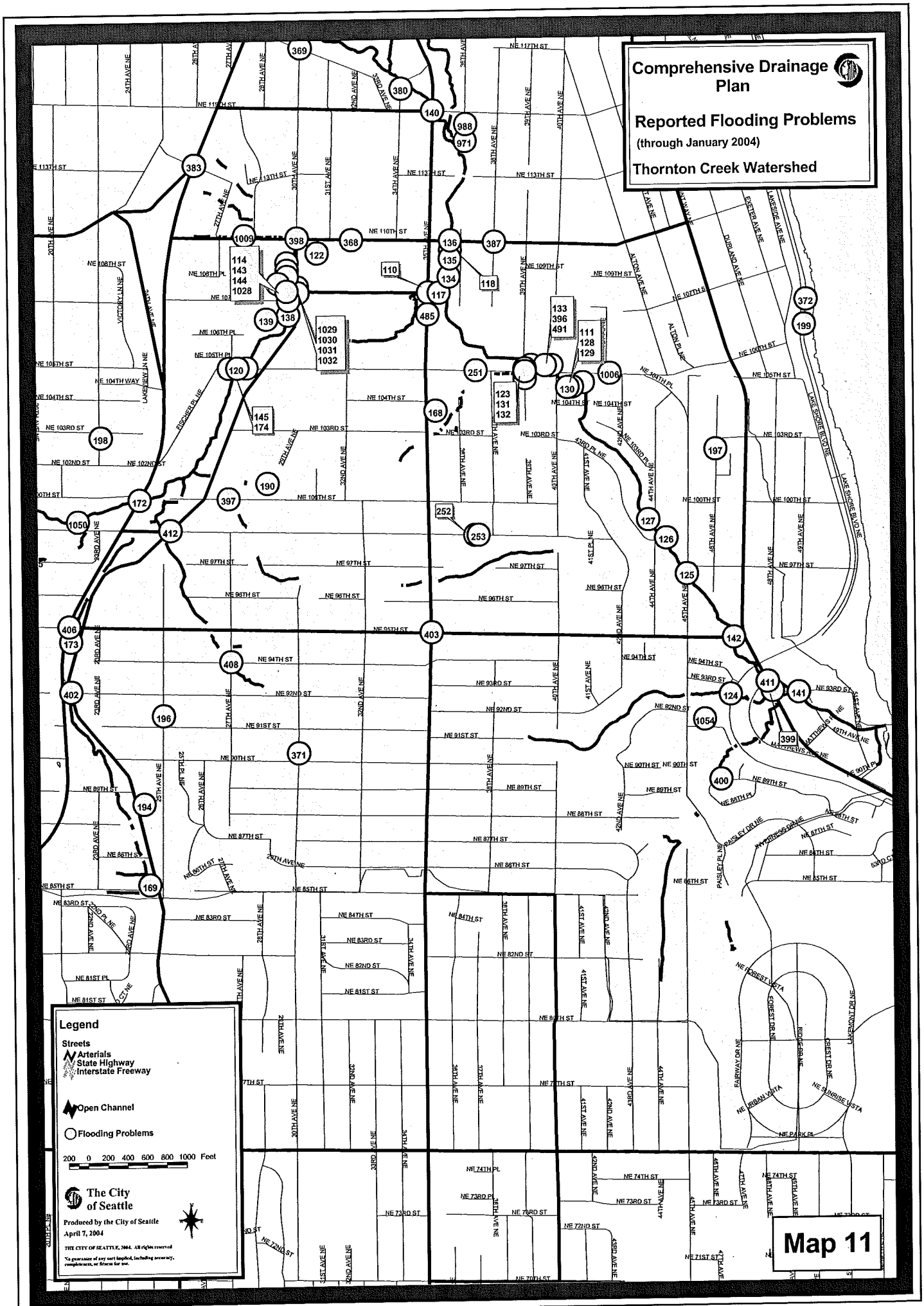

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Densmore Basin
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 7

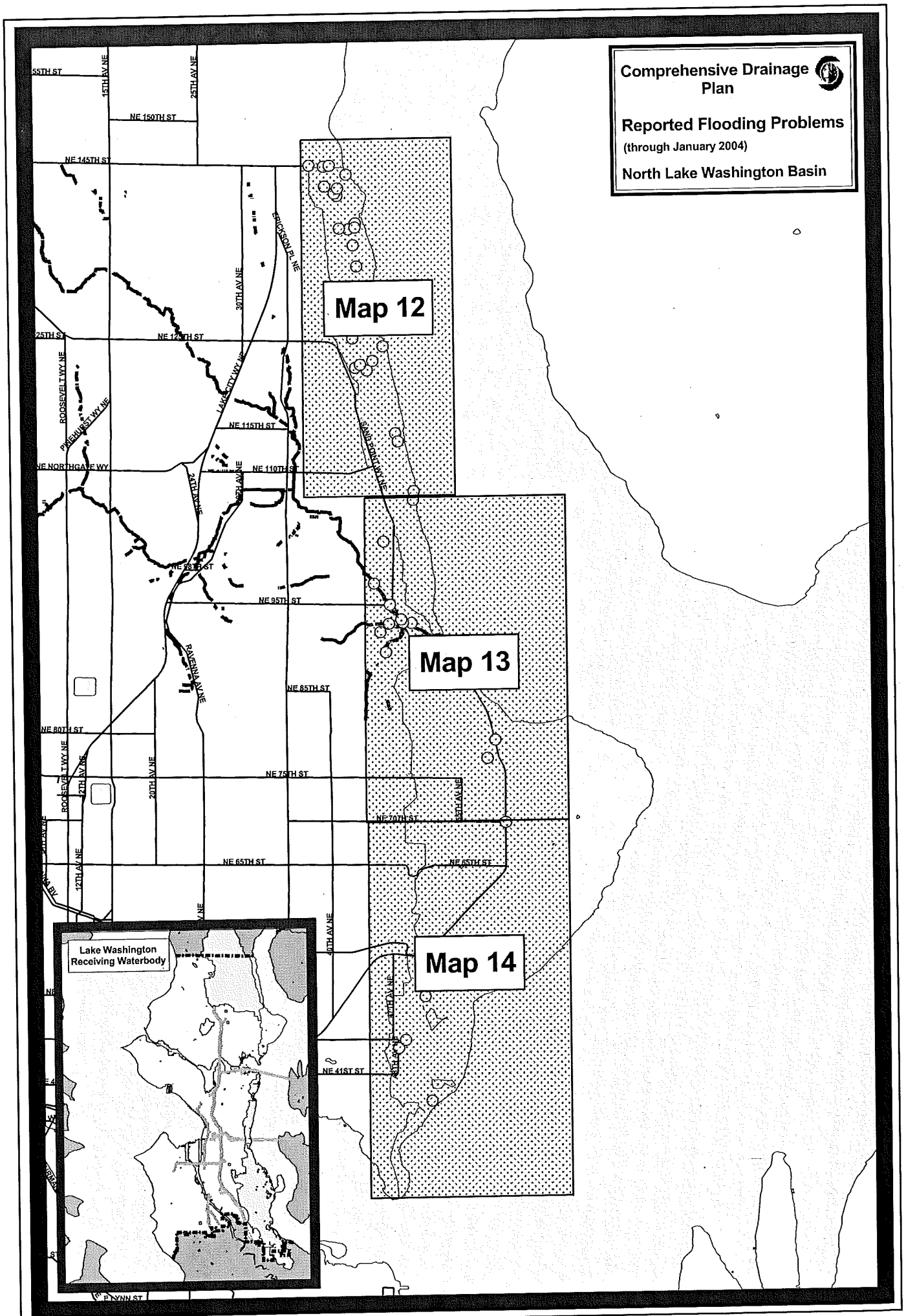

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Thronton Creek Watershed
Map 8
Map 10
Map 9
Map 11
Lake Washington Receiving Waterbody

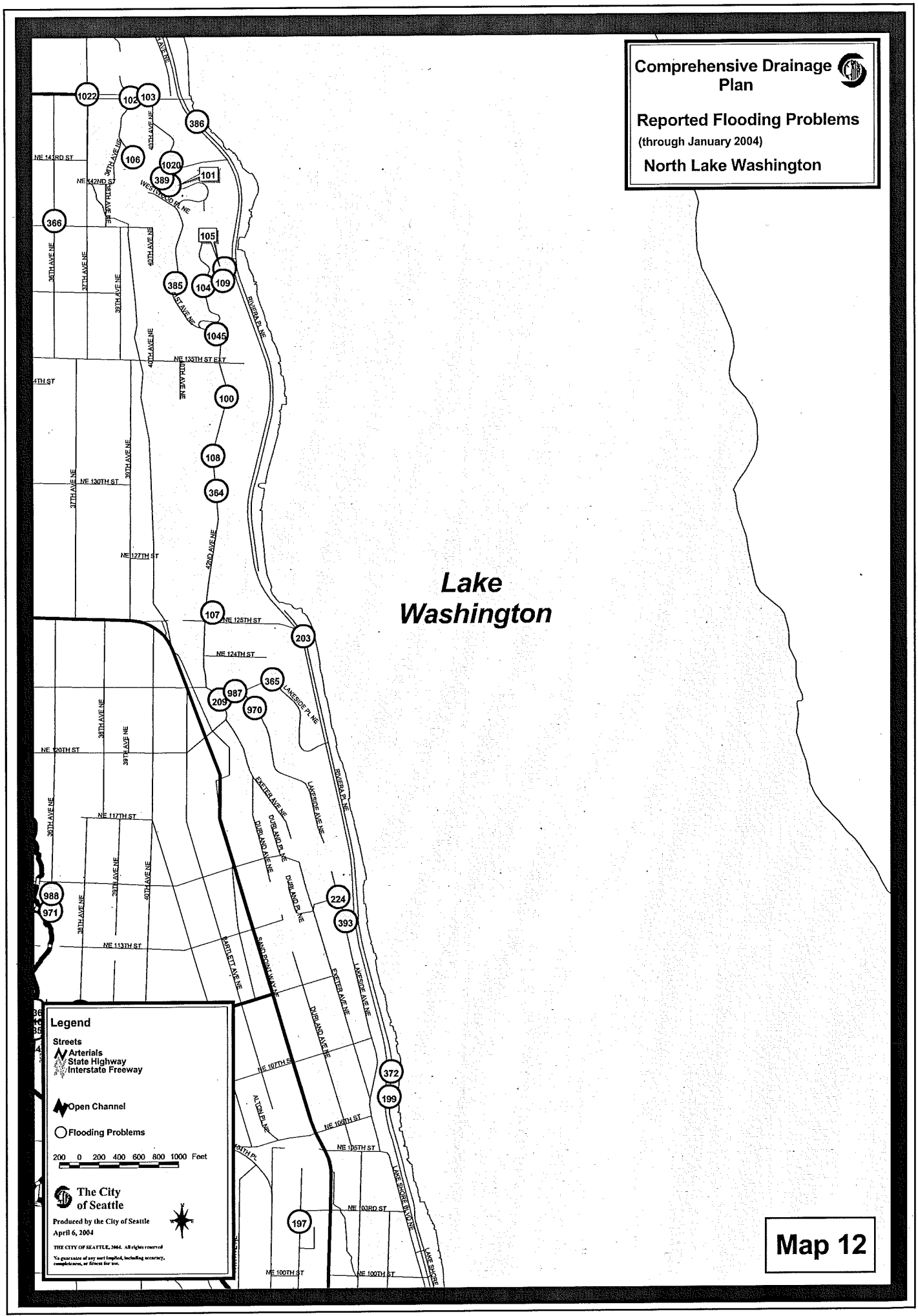

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Thornton Creek Watershed
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 8

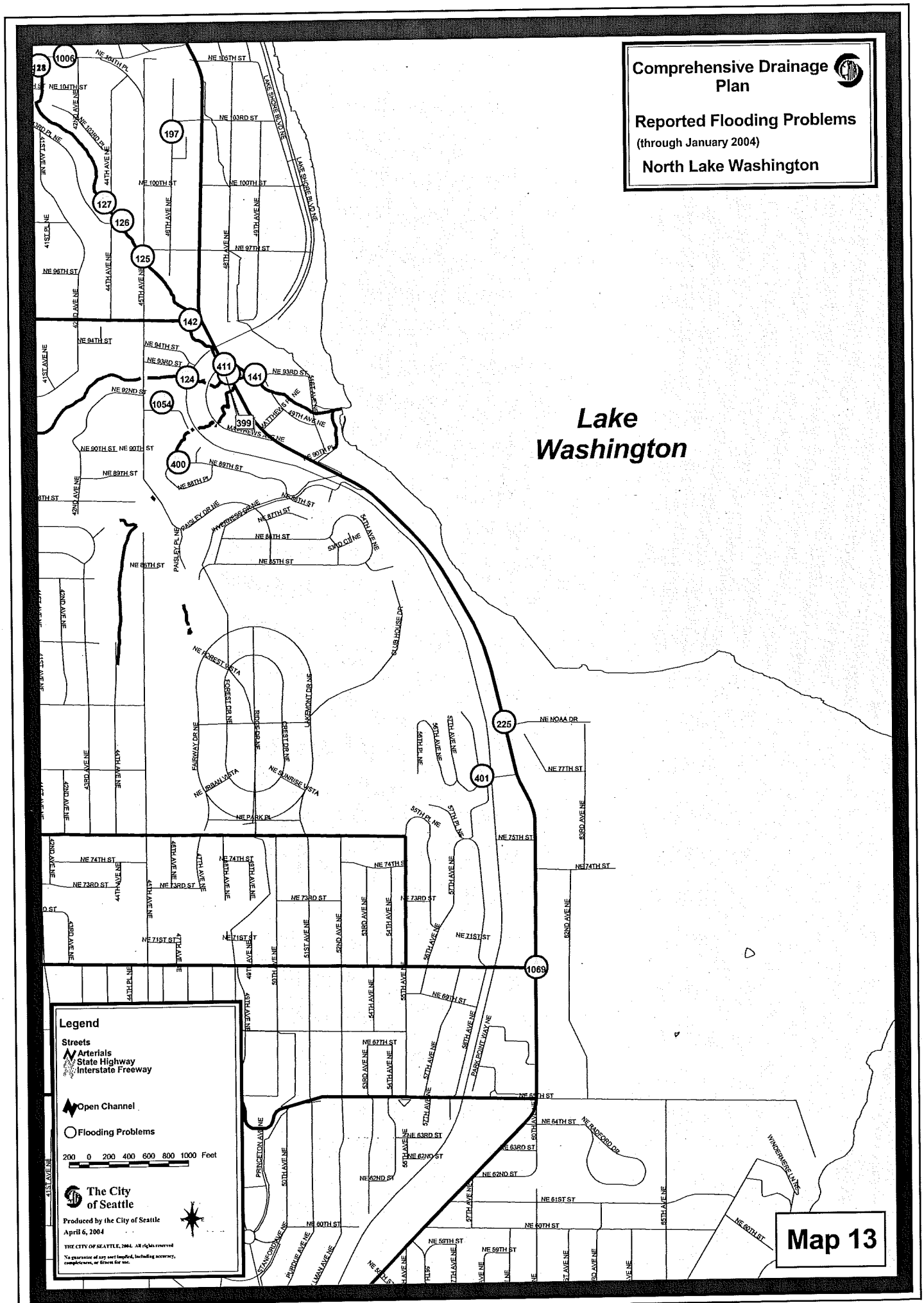

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Thornton Creek Watershed
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 9

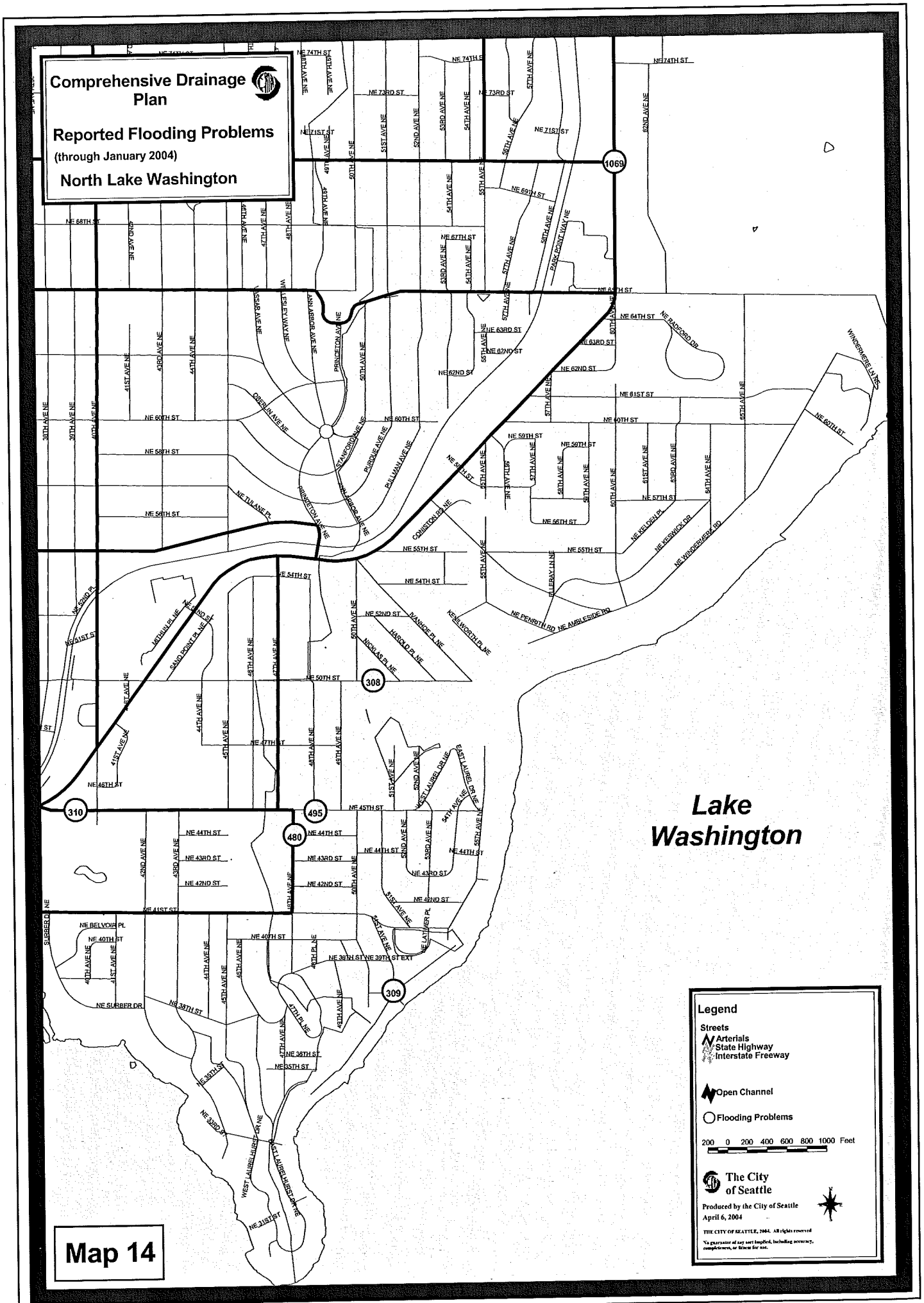

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Thornton Creek Watershed
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 10

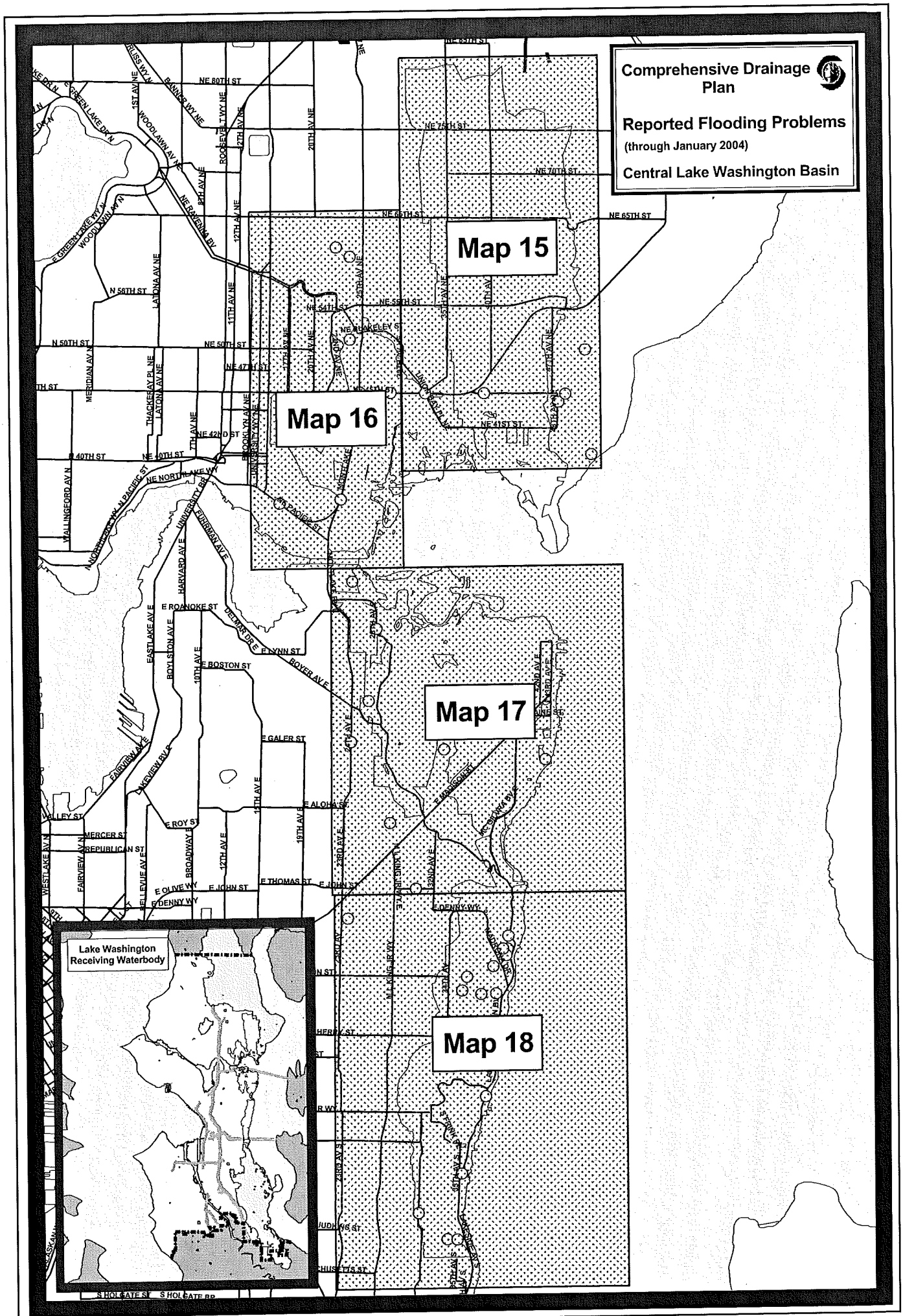

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Thornton Creek Watershed
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 11

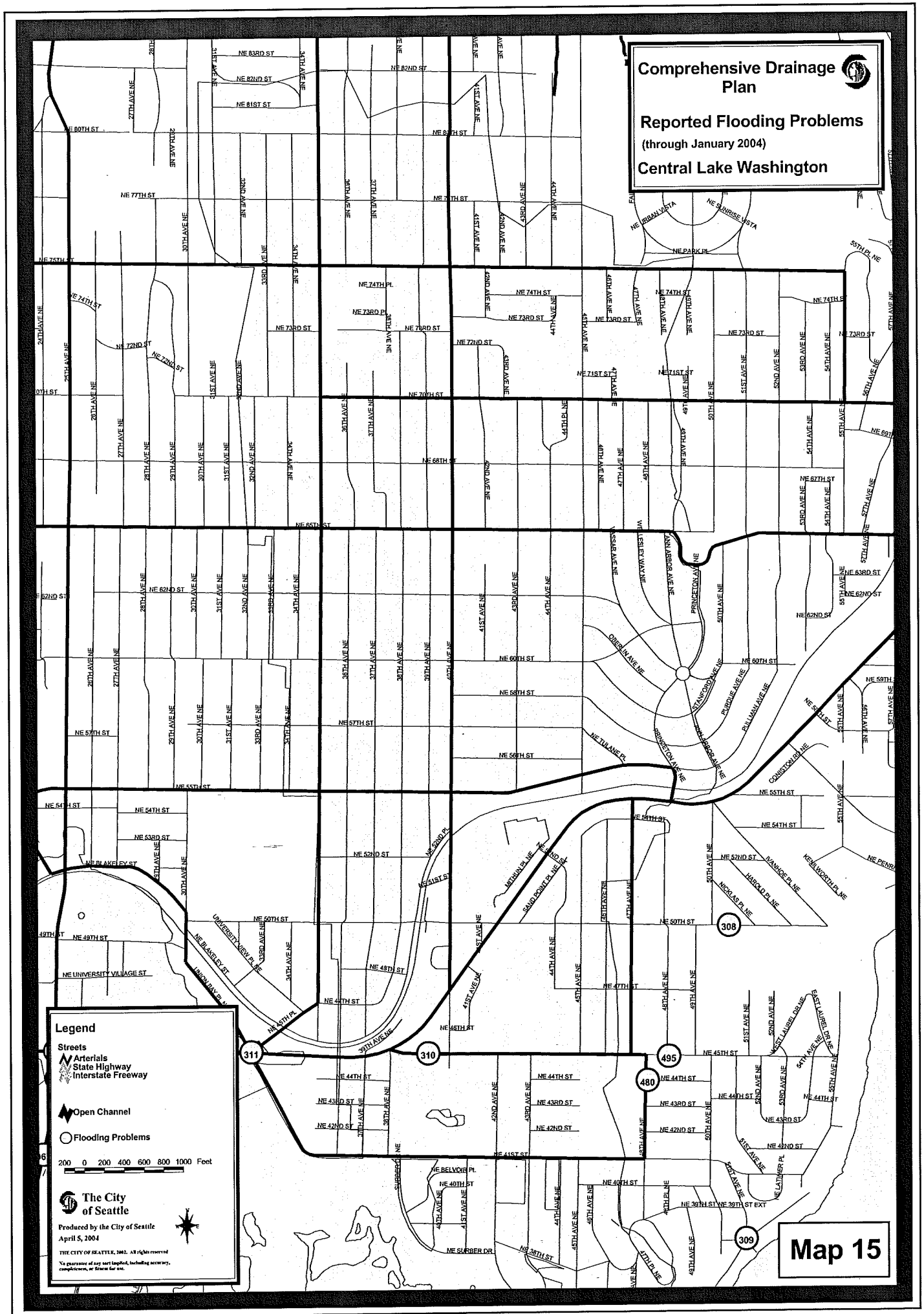

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
North Lake Washington Basin
Map 12
Map 13
Map 14
Lake Washington Receiving Waterbody
NE 150TH ST
NE 145TH ST
NE 125TH ST
NE 115TH ST
NE 110TH ST
NE NORTHGATE WY
NE 95TH ST
NE 85TH ST
NE 80TH ST
NE 75TH ST
NE 70TH ST
NE 65TH ST
NE 41ST ST
15TH AV NE
25TH AV NE
30TH AV NE
ERICKSON PL NE
ROOSEVELT WY NE
PALMHURST WY NE
LAKE CITY WY NE
SAND POINT WY NE
24TH AV NE
RAVENNA AV NE
20TH AV NE
12TH AV NE
40TH AV NE
B LYNN ST

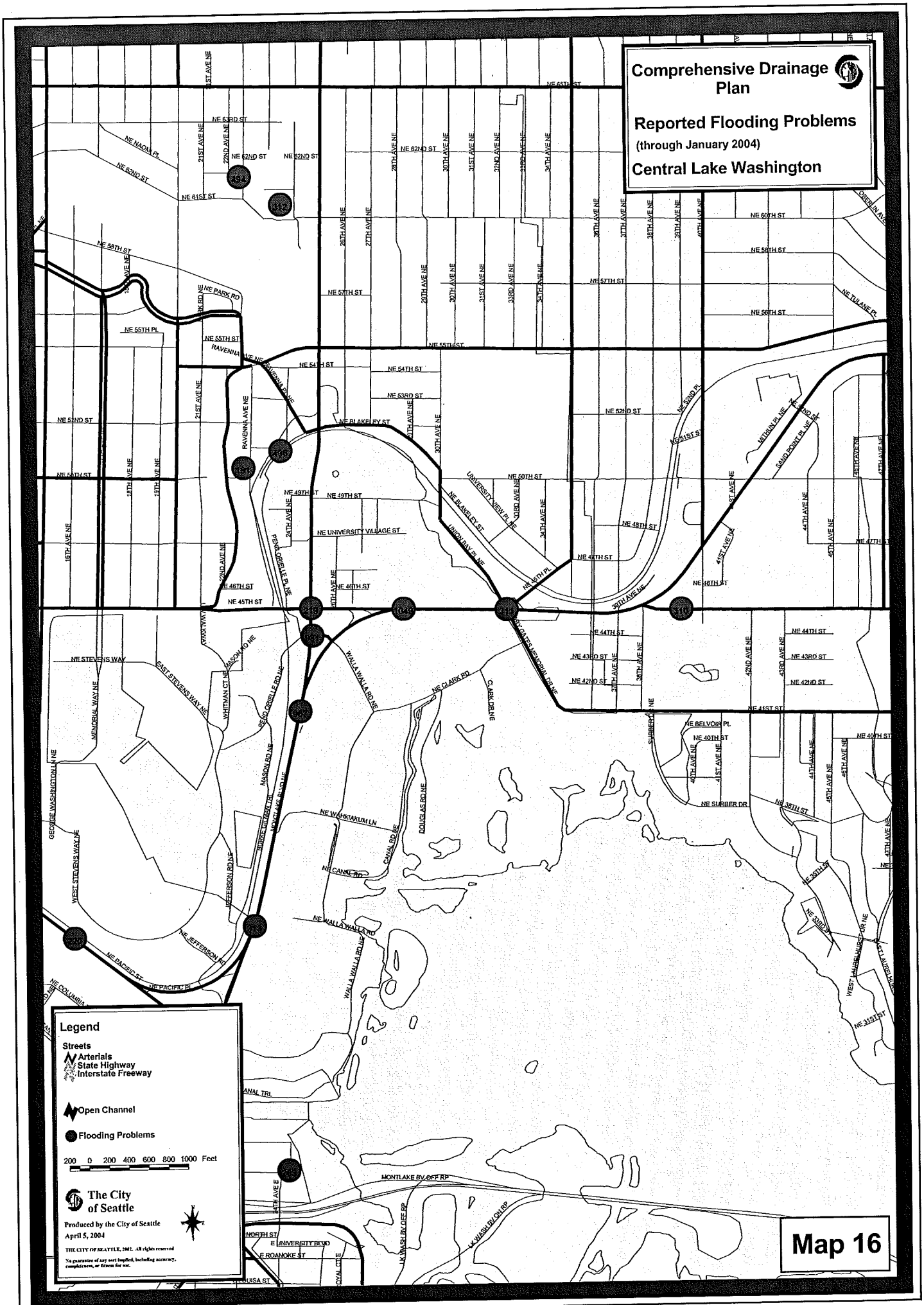

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
North Lake Washington
Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 12
NE 143RD ST
NE 142ND ST
NE 135TH ST EXT
NE 130TH ST
NE 127TH ST
NE 125TH ST
NE 124TH ST
NE 120TH ST
NE 117TH ST
NE 113TH ST
NE 107TH ST
NE 106TH ST
NE 105TH ST
NE 103RD ST
NE 100TH ST
36TH AVE NE
37TH AVE NE
38TH AVE NE
39TH AVE NE
40TH AVE NE
41ST AVE NE
42ND AVE NE
RIVIERA PL NE
LAKESIDE PL NE
LAKESIDE AVE NE
EXETER AVE NE
DUBLAND PL NE
DUBLAND AVE NE
BARTLETT AVE NE
SAND POINT WAY NE
ALTON PL NE
LAKE SHORE BLVD NE
1022
102
103
386
106
1020
389
101
366
105
385
104
109
1045
100
108
364
107
203
987
209
970
365
988
971
224
393
372
199
197

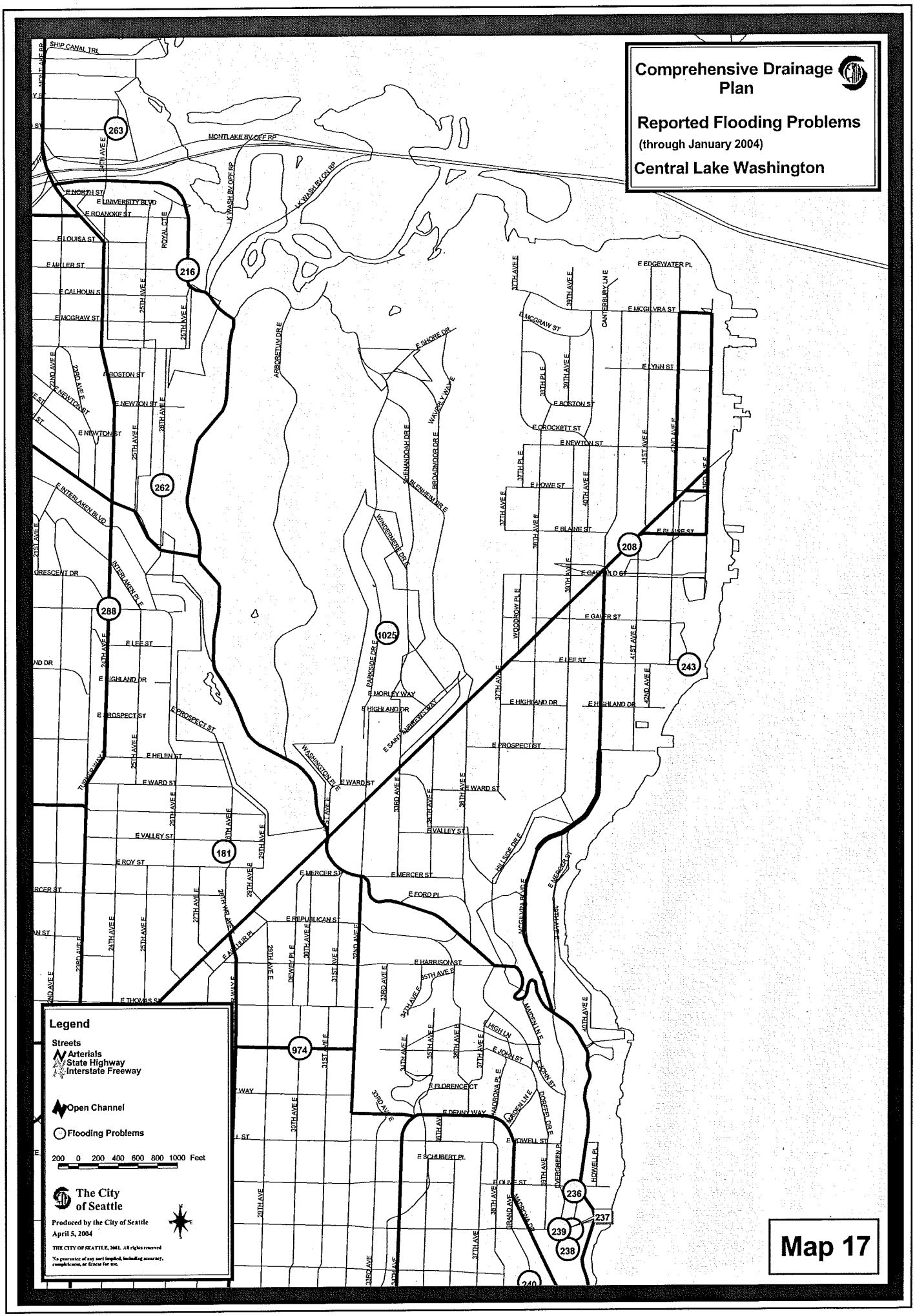

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
North Lake Washington
Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 13

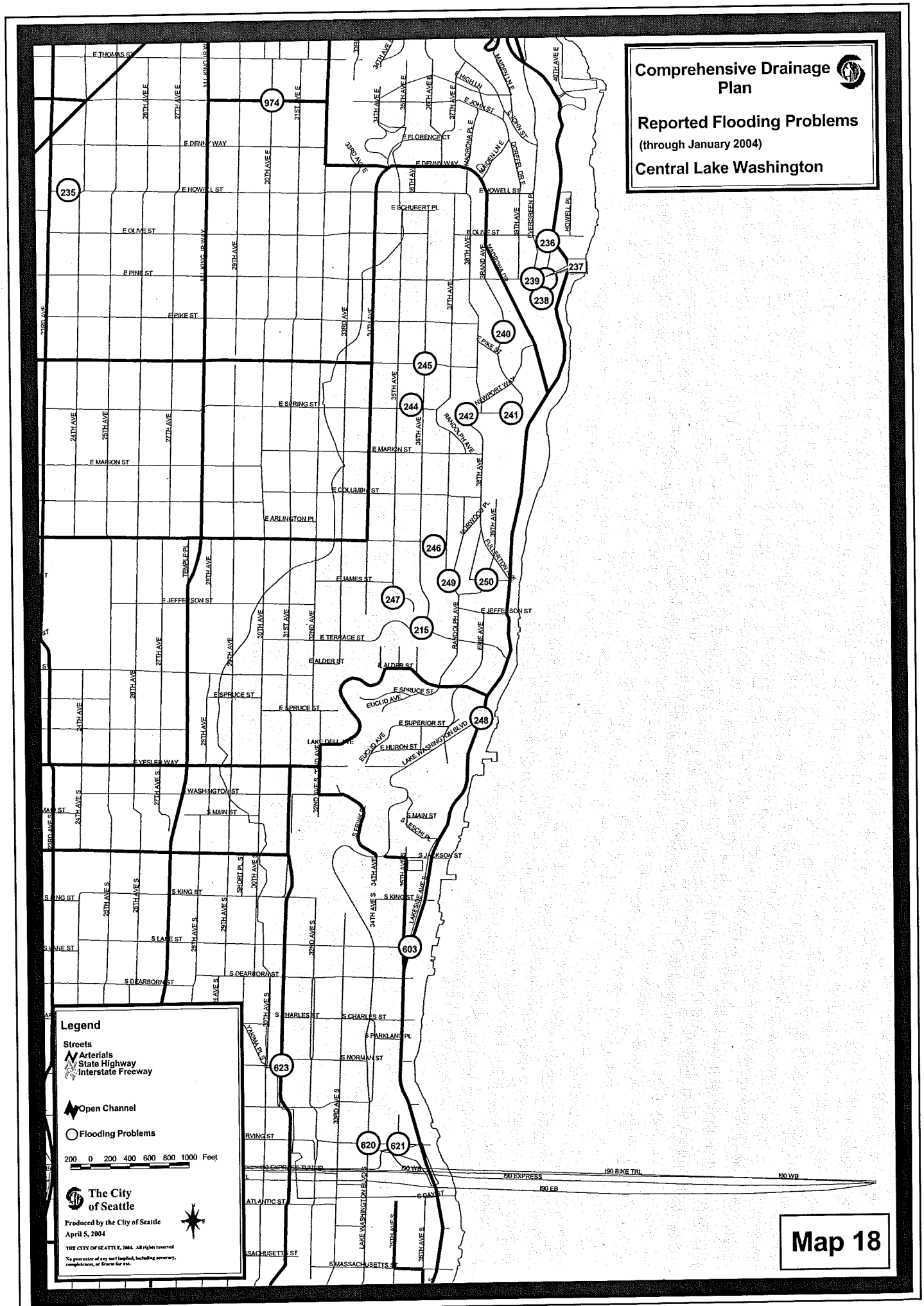

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
North Lake Washington
Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 14

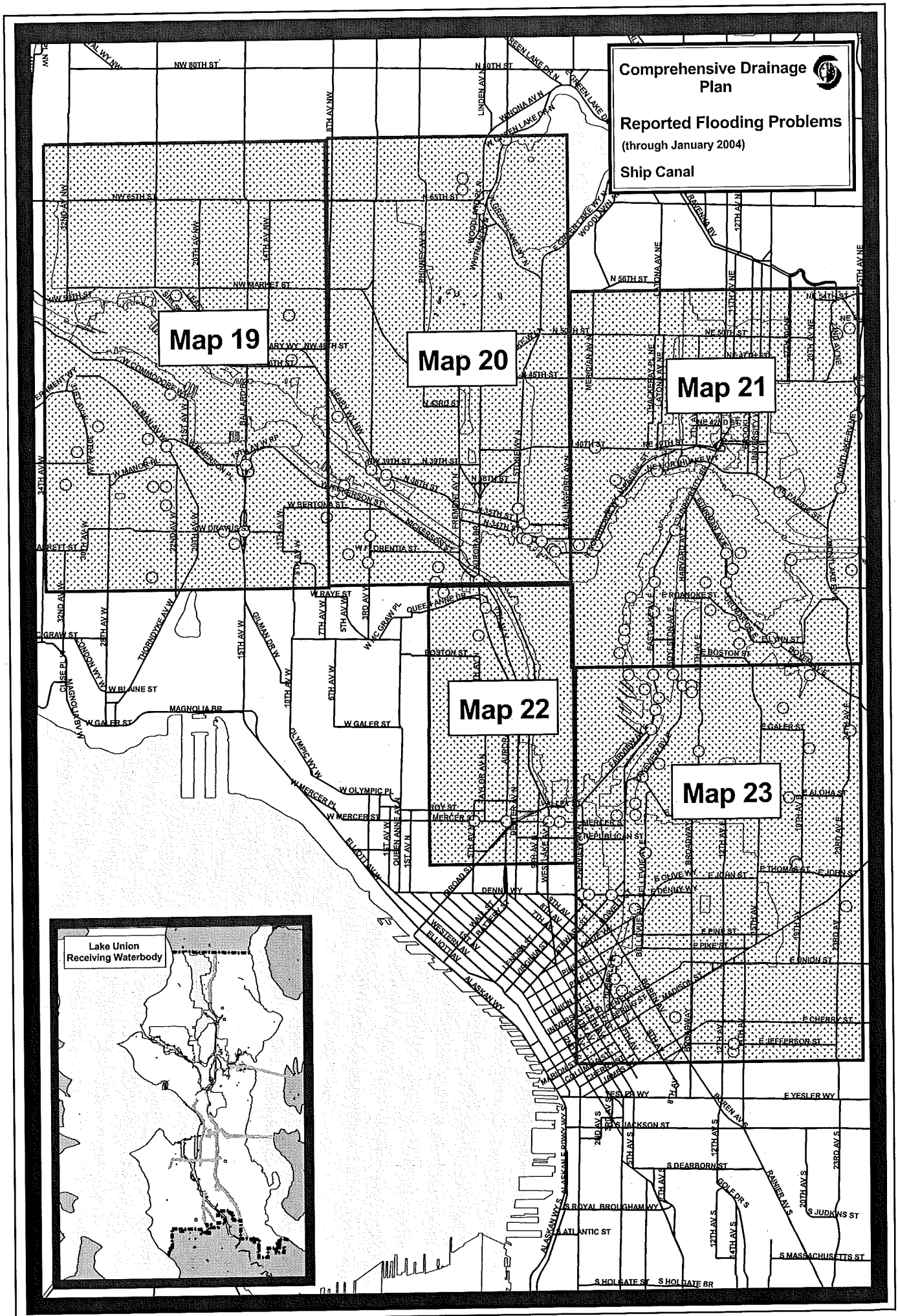

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Central Lake Washington Basin
Map 15
Map 16
Map 17
Map 18
Lake Washington Receiving Waterbody
NE 80TH ST
NE 75TH ST
NE 70TH ST
NE 65TH ST
NE 60TH ST
NE 54TH ST
NE 50TH ST
NE 47TH ST
NE 42ND ST
NE 41ST ST
NE 40TH ST
N 56TH ST
N 50TH ST
E ROANOKE ST
E LYNN ST
E BOSTON ST
E GALER ST
E ALOHA ST
E ROY ST
MERCER ST
REPUBLICAN ST
E OLIVE WY
E JOHN ST
E THOMAS ST
E DENNY WY
S HOLGATE ST
S HOLGATE BP

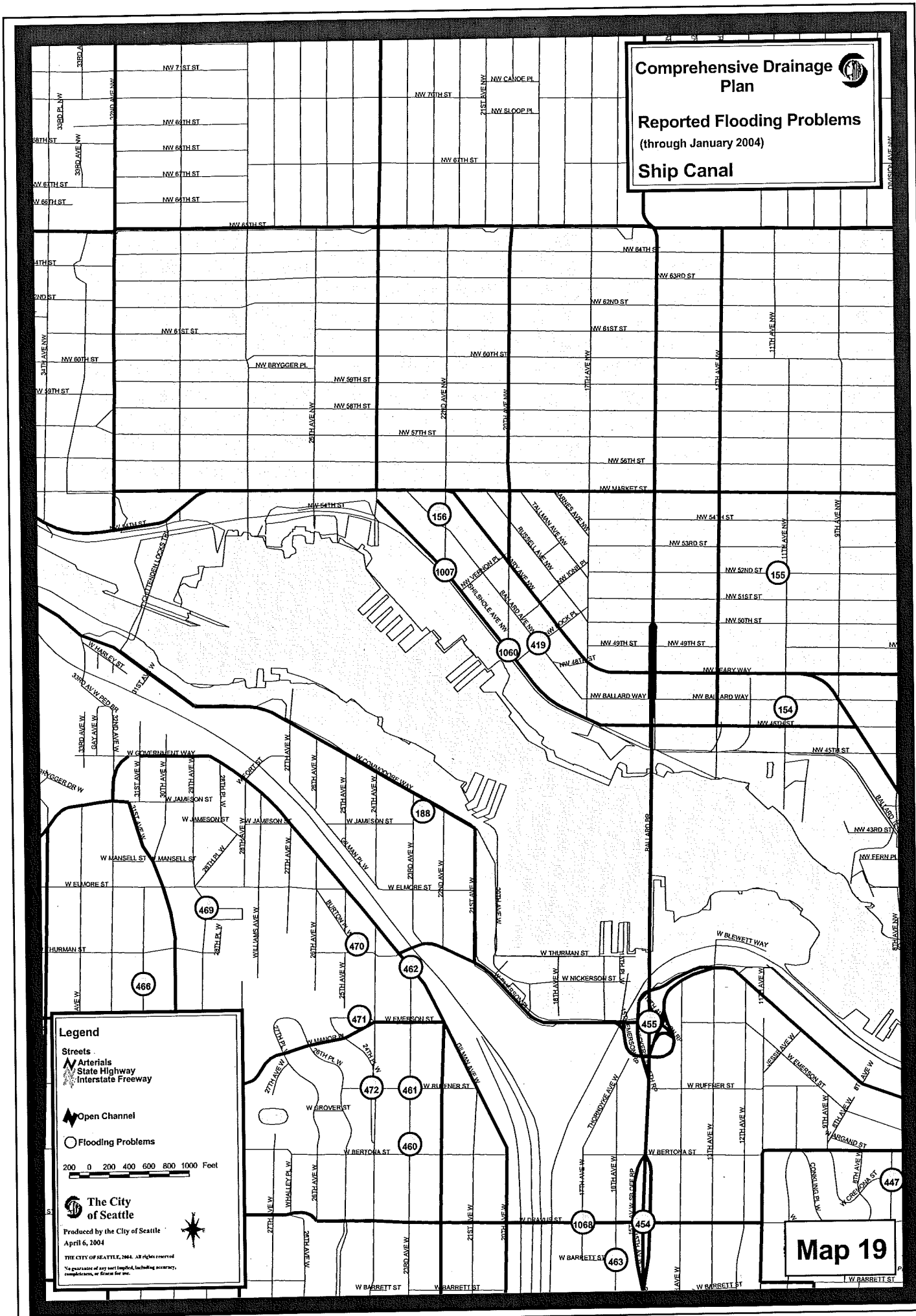

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Central Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 5, 2004
THE CITY OF SEATTLE, 2002. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 15
311
310
495
480
308
309

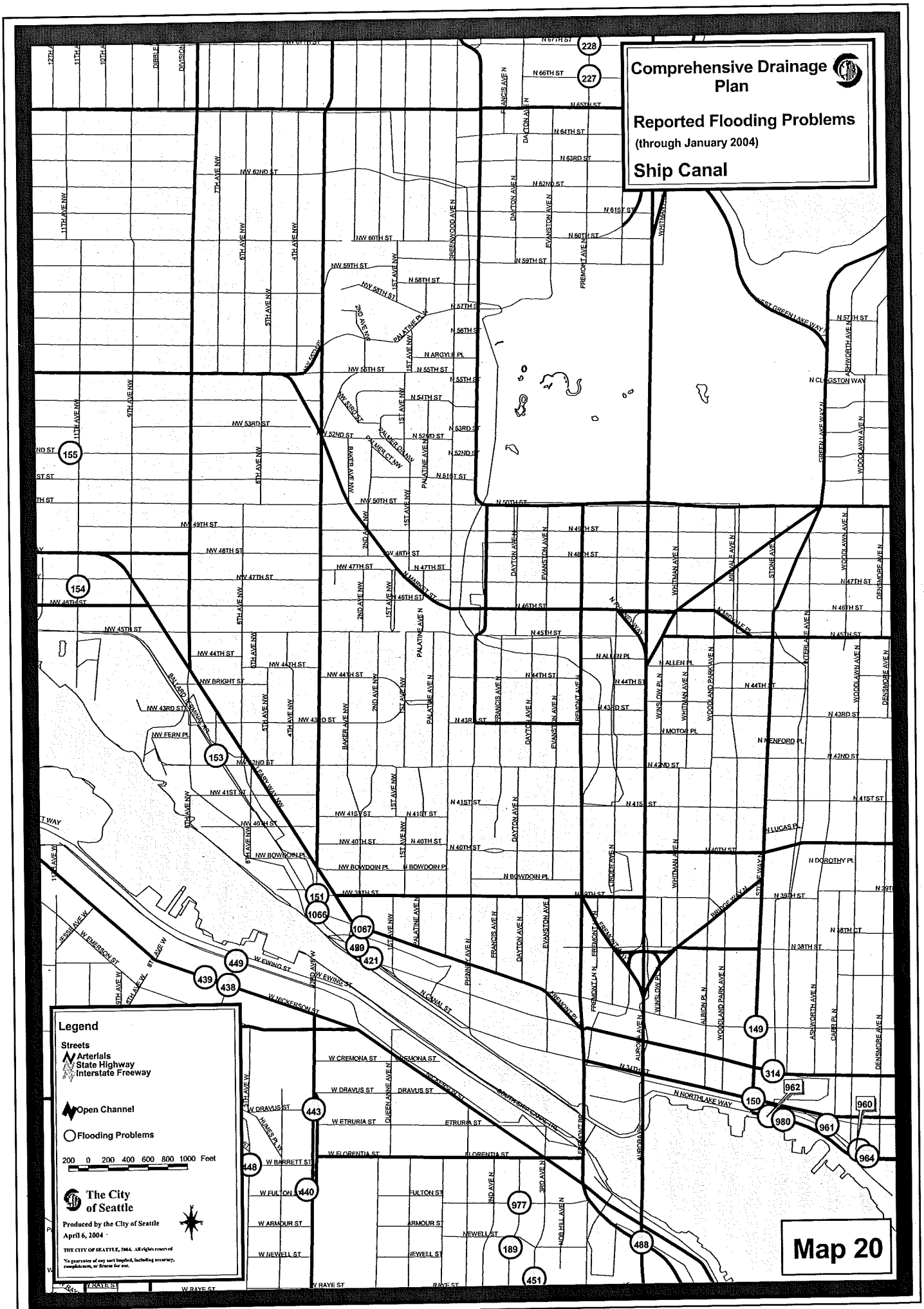

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Central Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 5, 2004
THE CITY OF SEATTLE, 2002. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 16
NE 65TH ST
NE 63RD ST
NE 62ND ST
NE 61ST ST
NE 60TH ST
NE 58TH ST
NE 57TH ST
NE 56TH ST
NE 55TH ST
NE 54TH ST
NE 53RD ST
NE 52ND ST
NE 51ST ST
NE 50TH ST
NE 49TH ST
NE 48TH ST
NE 47TH ST
NE 46TH ST
NE 45TH ST
NE 44TH ST
NE 43RD ST
NE 42ND ST
NE 41ST ST
NE 40TH ST
NE 38TH ST
NE 35TH ST
NE 33RD ST
NE 31ST ST
NE PARK RD
NE NAOMI PL
NE 55TH PL
RAVENNA AVE NE
NE BLAKELEY ST
NE UNIVERSITY VILLAGE ST
NE STEVENS WAY
EAST STEVENS WAY NE
WEST STEVENS WAY NE
MEMORIAL WAY NE
GEORGE WASHINGTON LN NE
WHITMAN CT NE
MASON RD NE
PEND ORIELLE RD NE
PEND ORIELLE PL NE
WALLA WALLA RD NE
NE CLARK RD
CLARK DR NE
NE WAHKIAKUM LN
CANAL RD NE
DOUGLAS RD NE
NE CANAL RD
NE WALLA WALLA RD
NE JEFFERSON RD
NE PACIFIC ST
NE PACIFIC PL
NE COLUMBIA
NE BELVOIR PL
NE SURBER DR
NE SURBER CT NE
MONTLAKE BV OFF RP
LK WASH BV ON RP
LK WASH BV OFF RP
E UNIVERSITY BLVD
E ROANOKE ST
NORTH ST
UNIVERSITY VIEW PL NE
UNION BAY PL NE
MITHUN PL NE
SAND POINT PL NE
OBERLIN AVE
NE TULANE PL
WEST LAUREL HURST DR NE
NE 45TH PL
38TH AVE NE
21ST AVE NE
22ND AVE NE
24TH AVE NE
26TH AVE NE
27TH AVE NE
28TH AVE NE
29TH AVE NE
30TH AVE NE
31ST AVE NE
32ND AVE NE
33RD AVE NE
34TH AVE NE
36TH AVE NE
37TH AVE NE
38TH AVE NE
39TH AVE NE
40TH AVE NE
41ST AVE NE
42ND AVE NE
43RD AVE NE
44TH AVE NE
45TH AVE NE
46TH AVE NE
47TH AVE NE
16TH AVE NE
18TH AVE NE
19TH AVE NE
21ST AVE NE
22ND AVE NE
24TH AVE NE
26TH AVE NE
27TH AVE NE
28TH AVE NE
29TH AVE NE
30TH AVE NE
31ST AVE NE
32ND AVE NE
33RD AVE NE
34TH AVE NE
36TH AVE NE
37TH AVE NE
38TH AVE NE
39TH AVE NE
40TH AVE NE
41ST AVE NE
42ND AVE NE
43RD AVE NE
44TH AVE NE
45TH AVE NE
46TH AVE NE
47TH AVE NE
494
312
490
191
219
1049
313
310
267
220
313
243

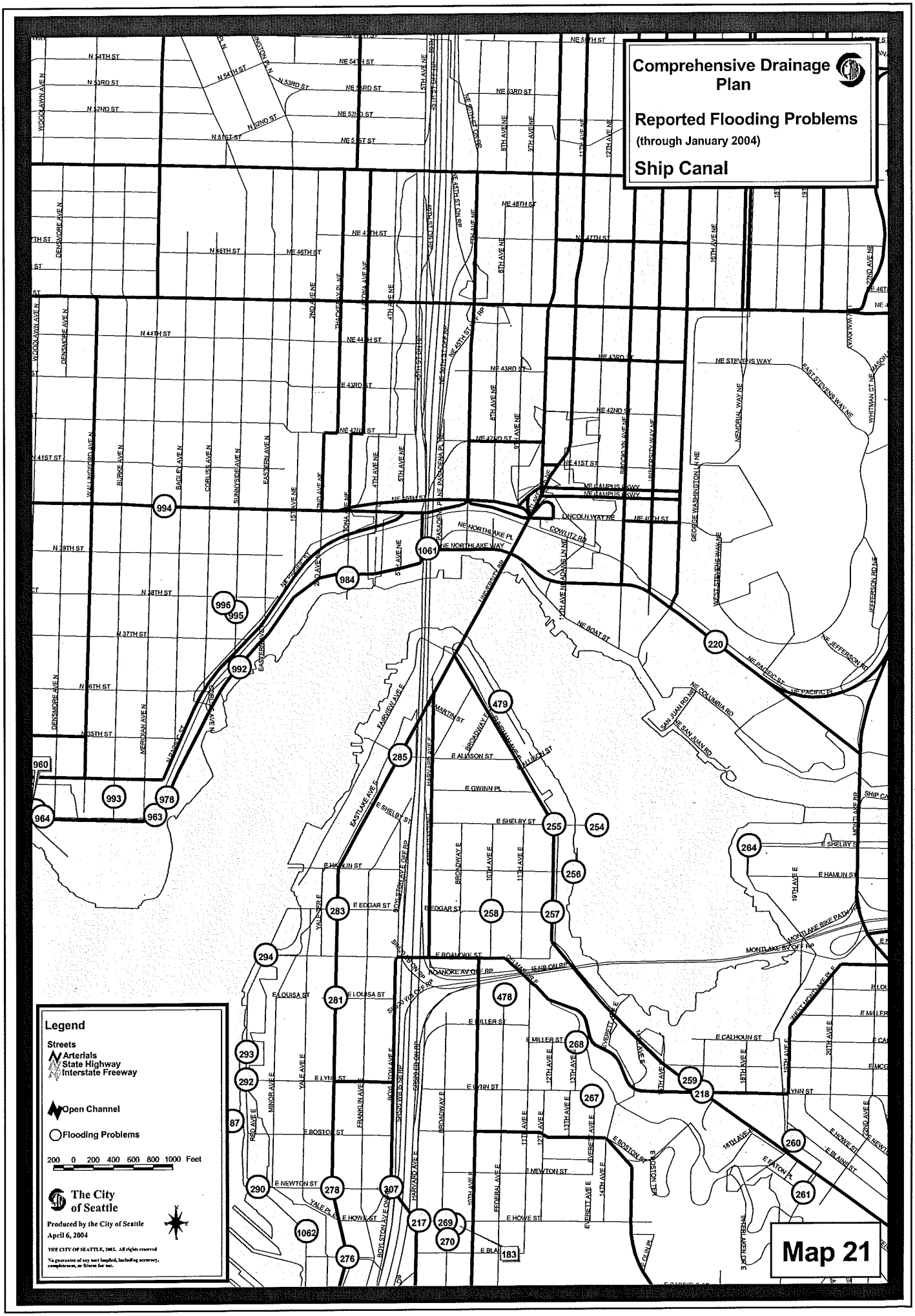

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Central Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 5, 2004
THE CITY OF SEATTLE, 2002. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 17
SHIP CANAL TRL
MONTLAKE BV OFF RP
E NORTH ST
E UNIVERSITY BLVD
E ROANOKE ST
E LOUISA ST
E MILLER ST
E CALHOUN ST
E MCGRAW ST
E BOSTON ST
E NEWTON ST
E INTERLAKEN BLVD
E LEE ST
E HIGHLAND DR
E PROSPECT ST
E HELEN ST
E WARD ST
E VALLEY ST
E ROY ST
E MERCER ST
E FORD PL
E REPUBLICAN ST
E HARRISON ST
E THOMAS ST
E SHORE DR
E MORLEY WAY
E SAINT ANDREWS WAY
E EDGEWATER PL
E MCGILVRA ST
E LYNN ST
E CROCKETT ST
E HOWE ST
E BLAINE ST
E GARFIELD ST
E GALER ST
E HIGHLAND DR
E PROSPECT ST
E WARD ST
E VALLEY ST
E MERCER ST
E HARRISON ST
E JOHN ST
E FLORENCE CT
E DENNY WAY
E HOWELL ST
E SCHUBERT PL
E OLIVE ST
263
216
262
288
1025
208
243
181
974
236
237
239
238
240

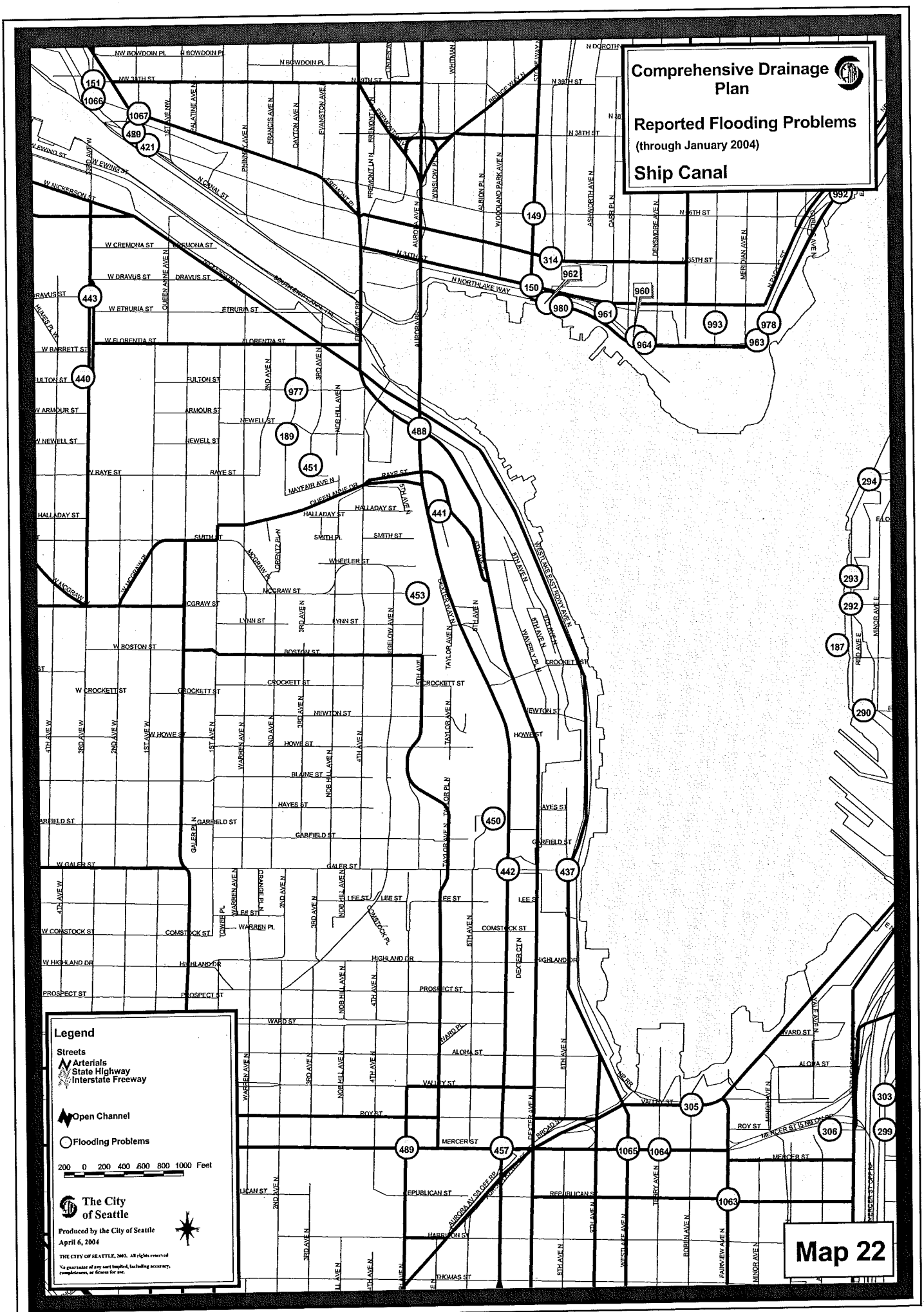

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Central Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 5, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 18
E THOMAS ST
E DENNY WAY
E HOWELL ST
E OLIVE ST
E PINE ST
E PIKE ST
E SPRING ST
E MARION ST
E COLUMBIA ST
E ARLINGTON PL
E JAMES ST
E JEFFERSON ST
E TERRACE ST
E ALDER ST
E SPRUCE ST
E SUPERIOR ST
E HURON ST
E YESLER WAY
S WASHINGTON ST
S MAIN ST
S JACKSON ST
S KING ST
S LANE ST
S DEARBORN ST
S CHARLES ST
S PARKLAND PL
S NORMAN ST
S DAY ST
S MASSACHUSETTS ST
I90 EXPRESS
I90 BIKE TRL
I90 WB
I90 EB
974
235
236
237
239
238
240
245
244
242
241
246
249
250
247
215
248
603
623
620
621

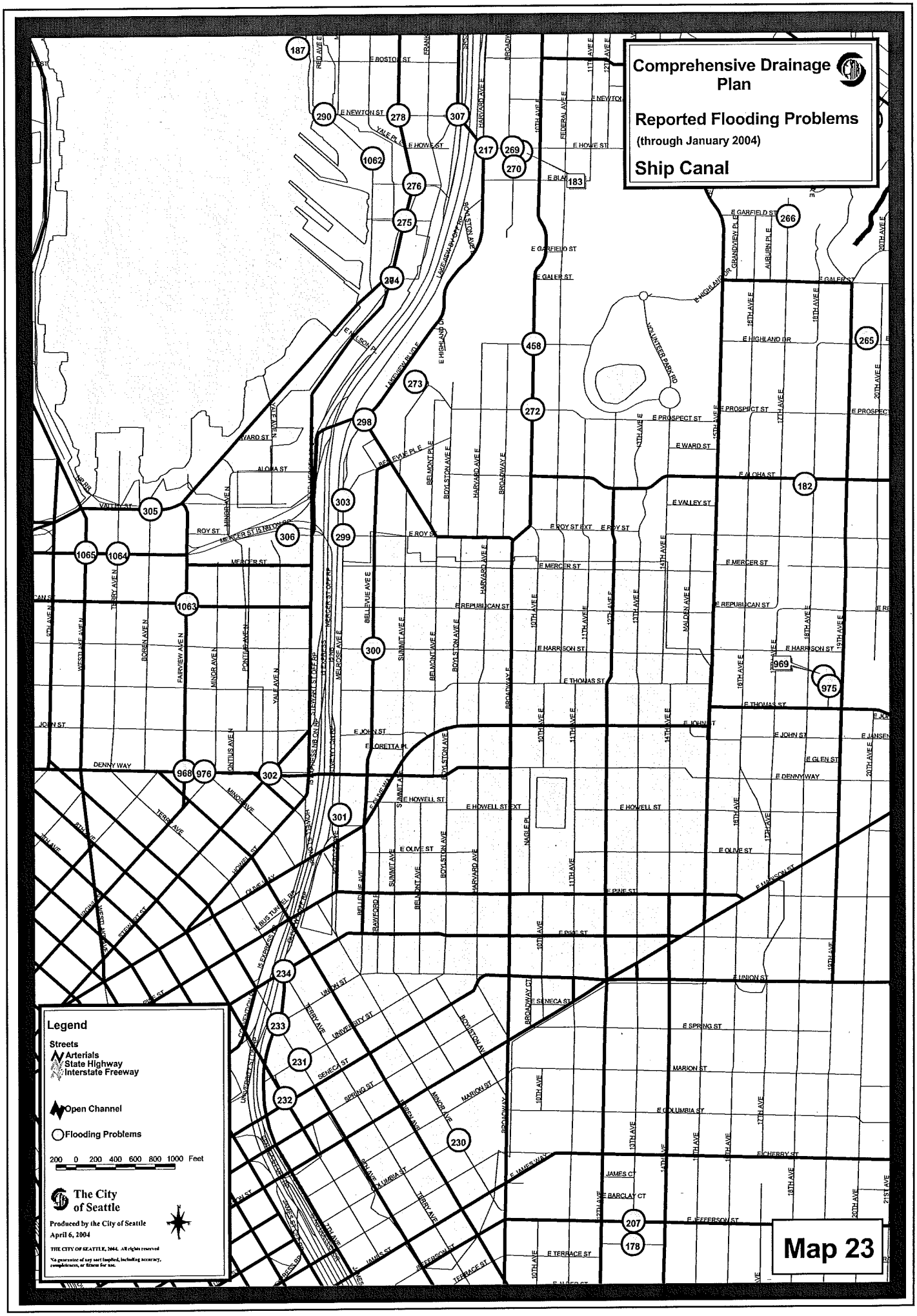

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Ship Canal
Map 19
Map 20
Map 21
Map 22
Map 23
Lake Union
Receiving Waterbody

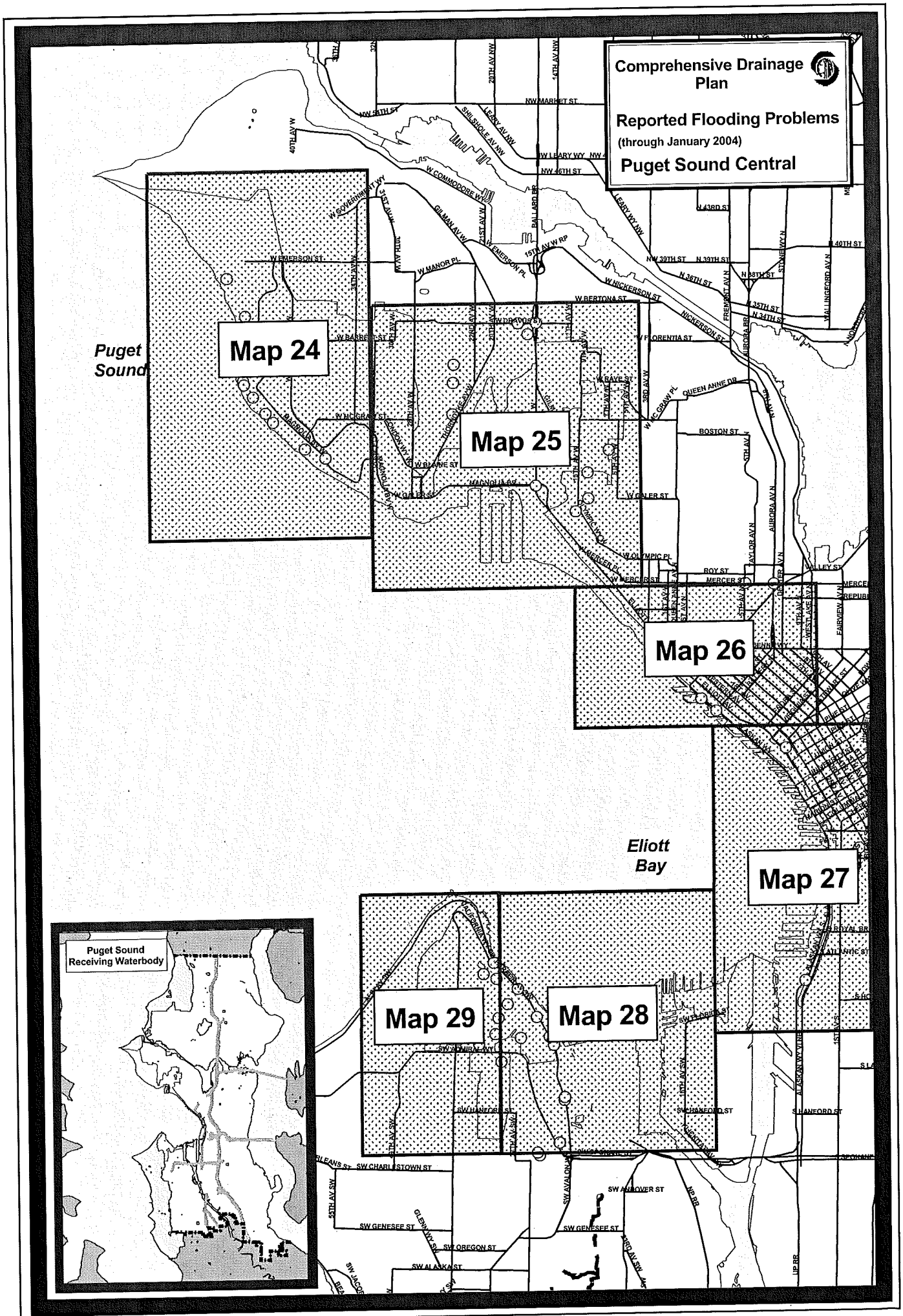

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Ship Canal
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 19
NW 71ST ST
NW 70TH ST
NW CANOE PL
NW SLOOP PL
NW 69TH ST
NW 68TH ST
NW 67TH ST
NW 66TH ST
NW 65TH ST
NW 64TH ST
NW 63RD ST
NW 62ND ST
NW 61ST ST
NW 60TH ST
NW BRYGGER PL
NW 59TH ST
NW 58TH ST
NW 57TH ST
NW 56TH ST
NW MARKET ST
NW 54TH ST
NW 53RD ST
NW 52ND ST
NW 51ST ST
NW 50TH ST
NW 49TH ST
NW 48TH ST
NW BALLARD WAY
NW 45TH ST
NW 43RD ST
NW FERN PL
W HARLEY ST
W GOVERNMENT WAY
W COMMODORE WAY
W JAMESON ST
W MANSELL ST
W ELMORE ST
W THURMAN ST
W NICKERSON ST
W BLEWETT WAY
W EMERSON ST
W RUFFNER ST
W GROVER ST
W BERTONA ST
W DRAVUS ST
W BARRETT ST
BALLARD RD
CHITTENDEN LOCKS TR
156
1007
1060
419
155
154
188
469
470
462
466
471
455
472
461
460
1068
454
463
447

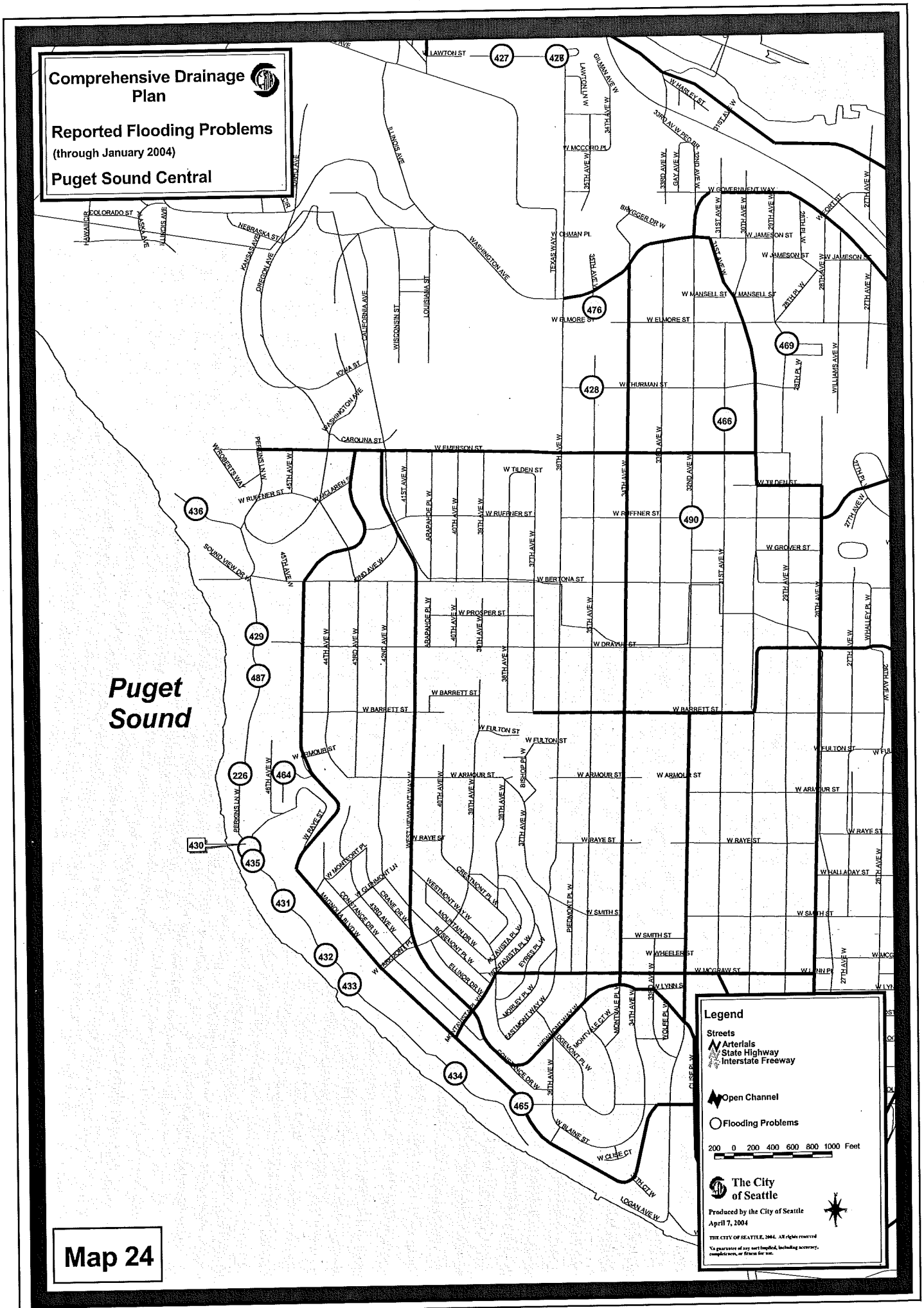

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Ship Canal
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 20

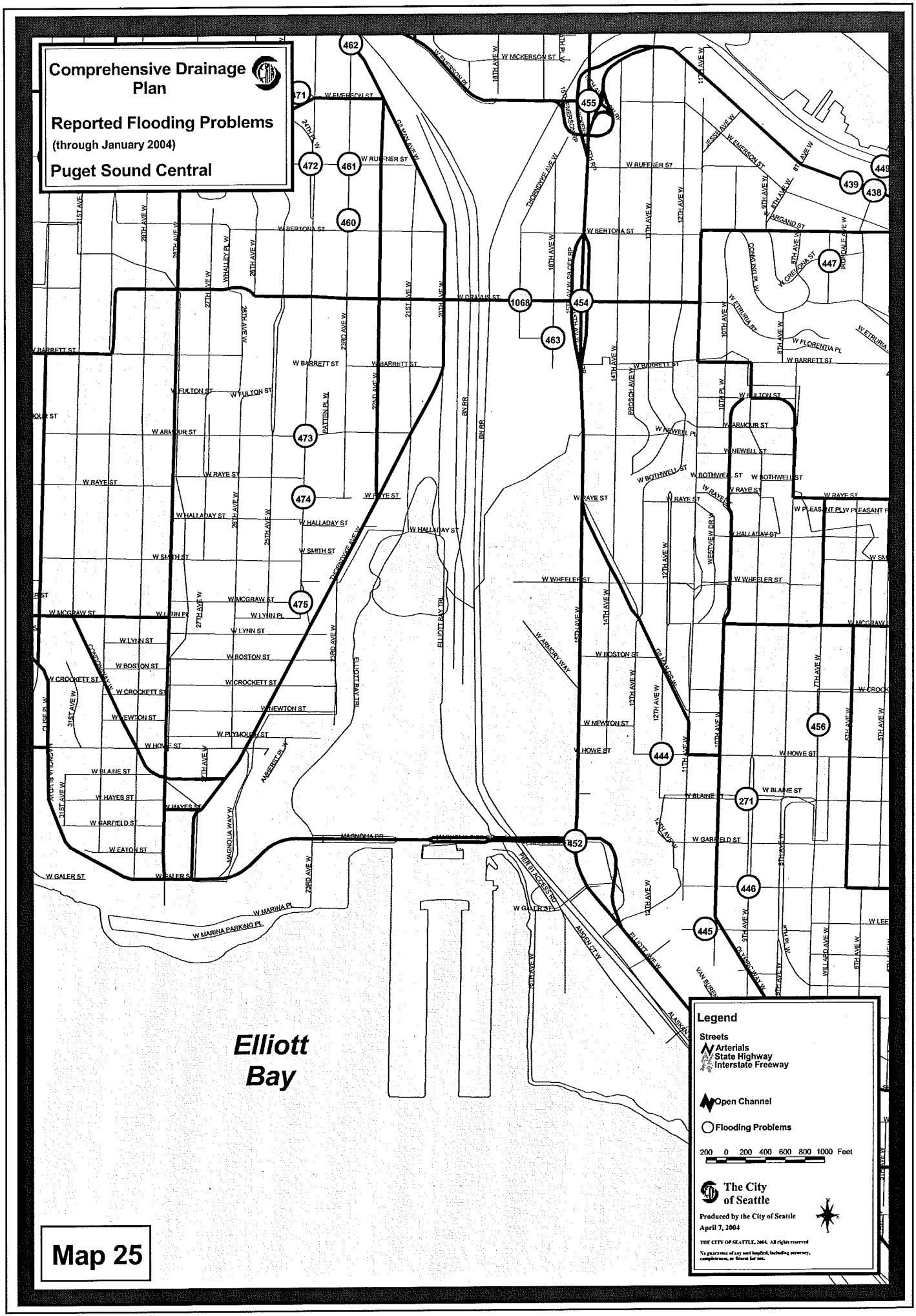

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Ship Canal
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2002. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 21

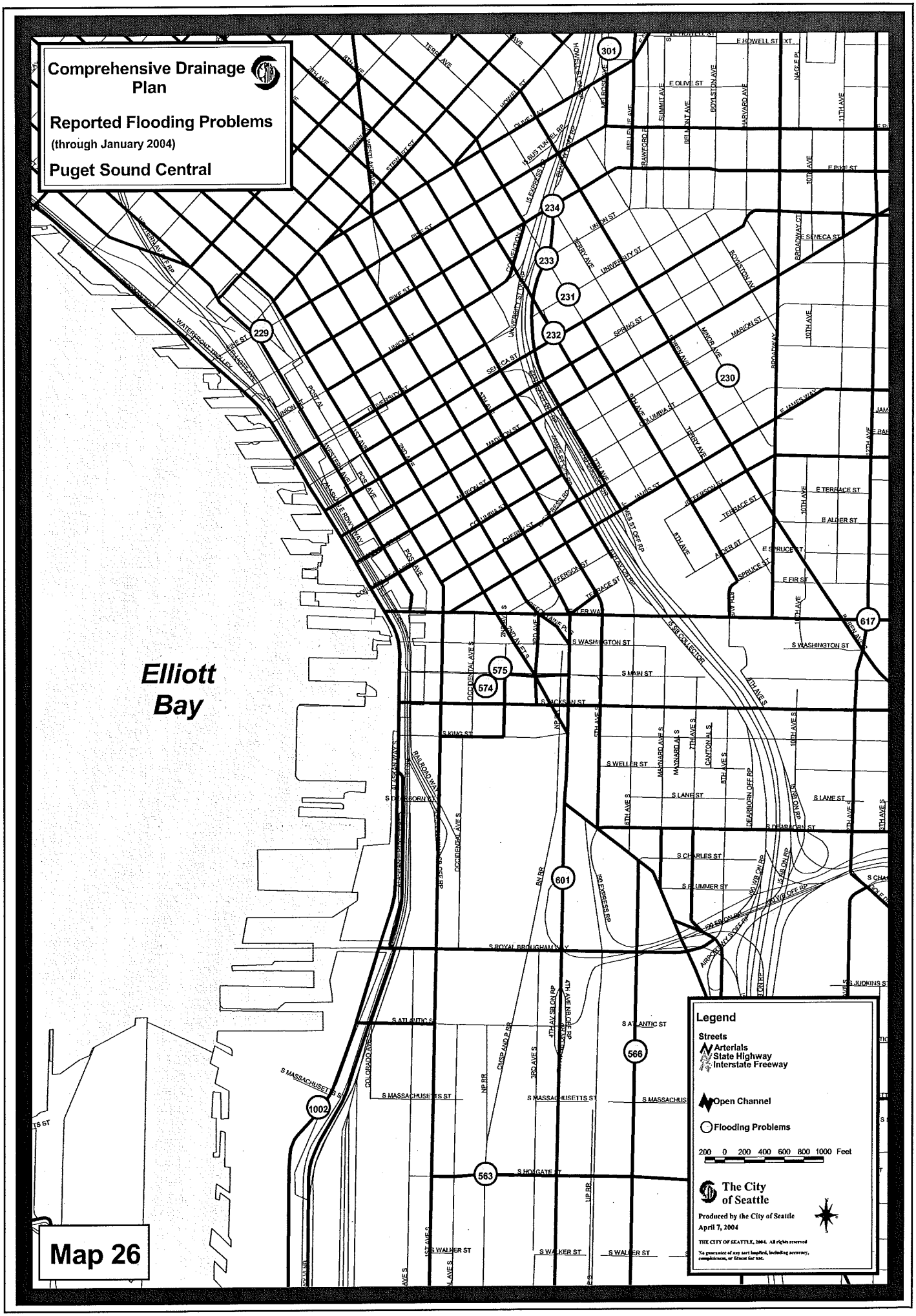

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Ship Canal
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2003. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 22

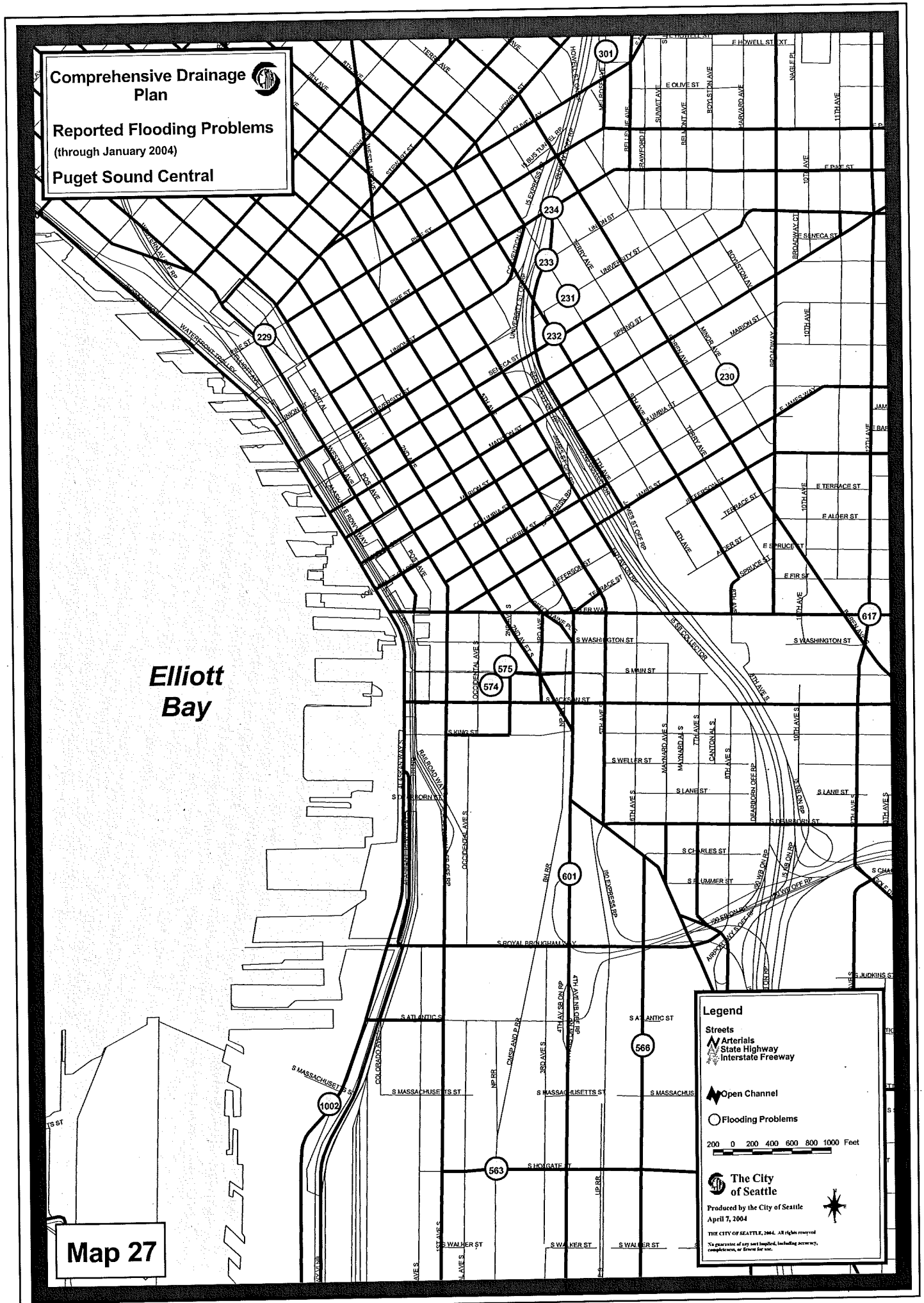

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Ship Canal
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 23


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound Central
Map 24
Map 25
Map 26
Map 27
Map 28
Map 29
Puget Sound
Eliott Bay
Puget Sound Receiving Waterbody


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound Central
Puget Sound
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 24


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound Central
Elliott Bay
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 25


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound Central
Elliott Bay
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 26

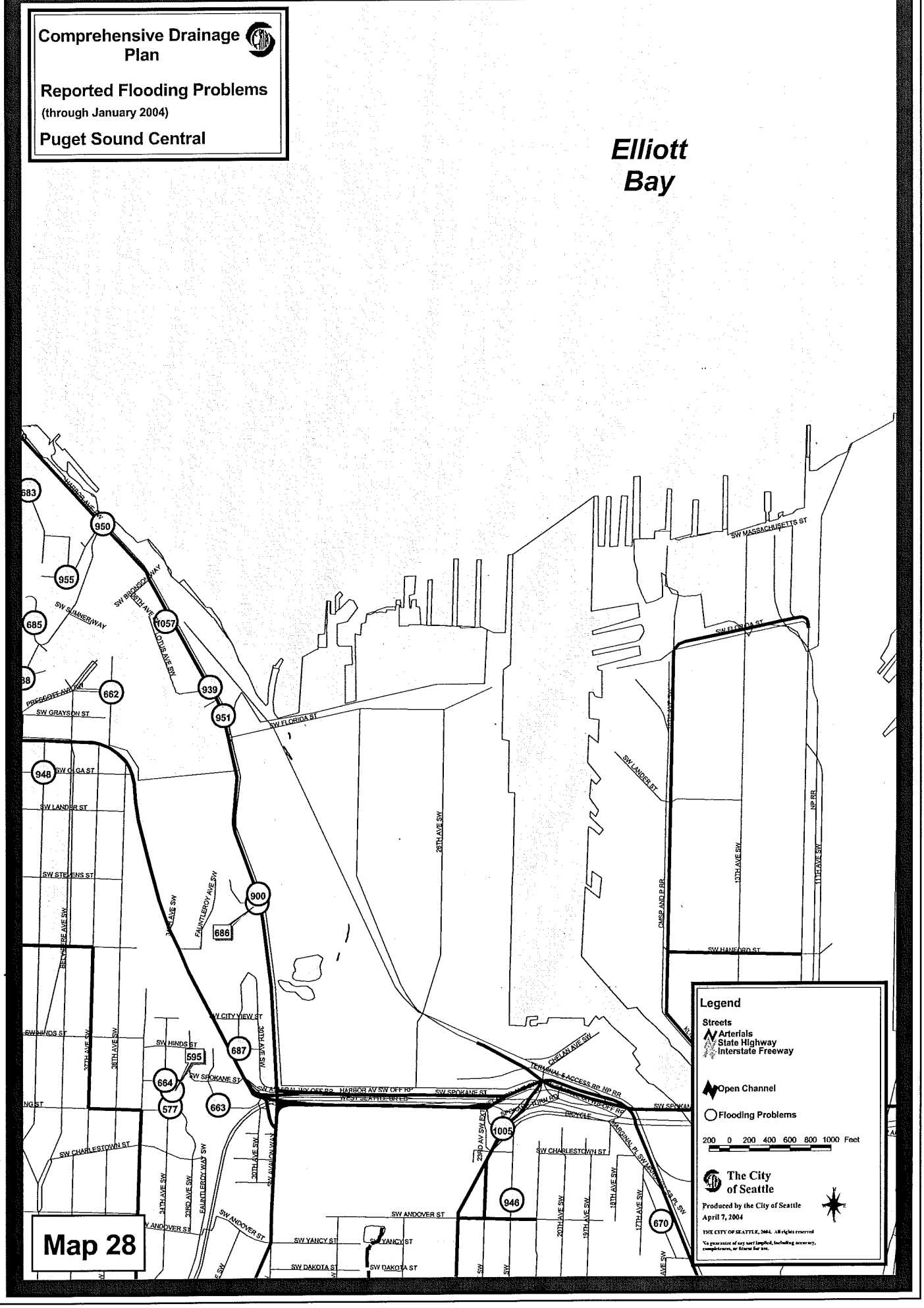

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound Central
Elliott Bay
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 27

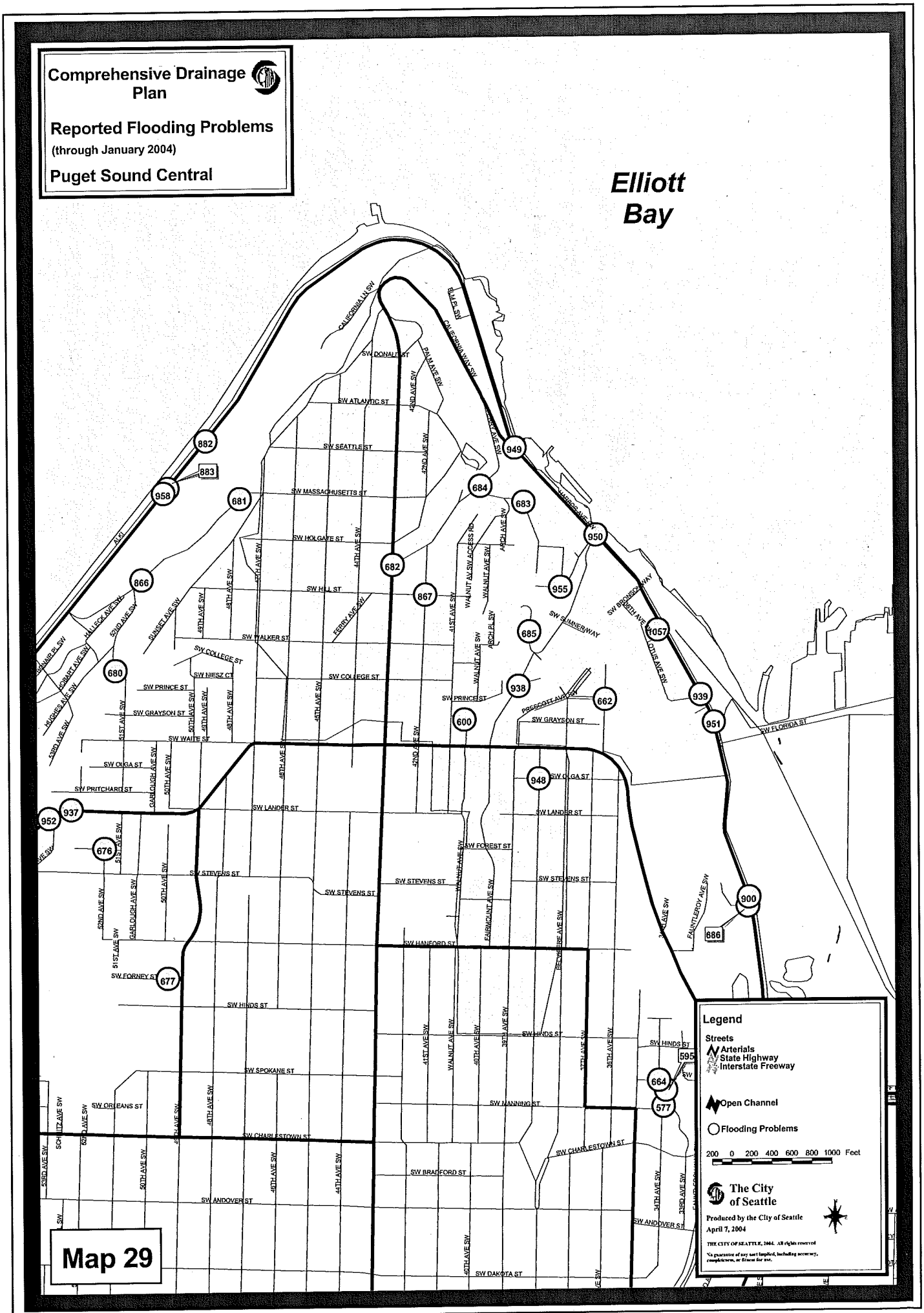
Comprehensive Drainage Plan

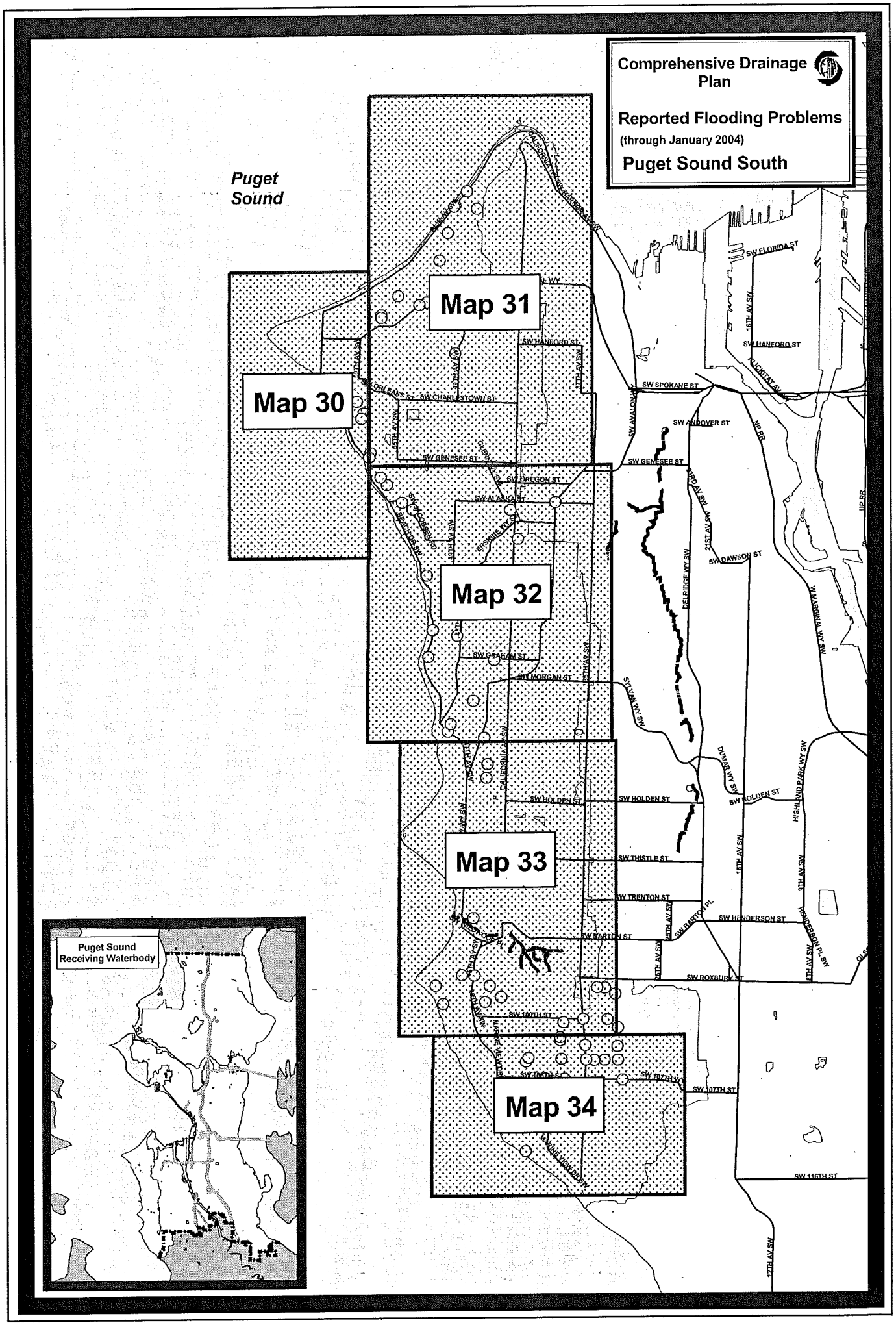
Reported Flooding Problems

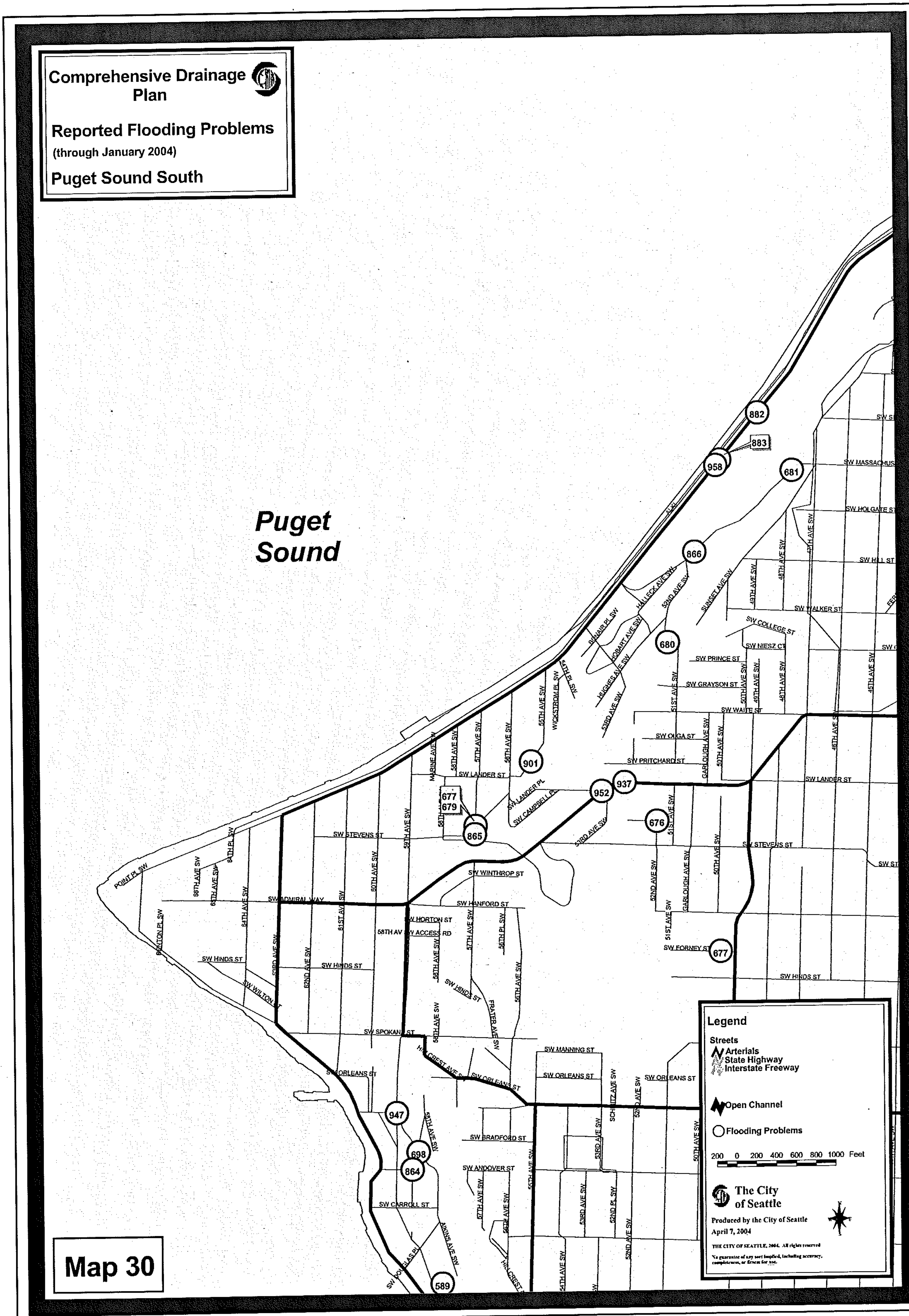
(through January 2004)

Puget Sound Central




Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound Central
Elliott Bay
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
Map 29


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound South
Puget Sound
Map 30
Map 31
Map 32
Map 33
Map 34
Puget Sound Receiving Waterbody
SW HANFORD ST
SW CHARLESTOWN ST
SW GENESEE ST
SW OREGON ST
SW ALASKA ST
SW GRAHAM ST
SW MORGAN ST
SW HOLDEN ST
SW THISTLE ST
SW TRENTON ST
SW BARTON ST
SW HENDERSON ST
SW ROXBURY ST
SW 100TH ST
SW 107TH ST
SW 116TH ST
SW SPOKANE ST
SW ANDOVER ST
SW DAWSON ST
SW FLORIDA ST
SW AVALON WY
DEL RIDGE WY SW
SYLVAN WY SW
DUMAR WY SW
HIGHLAND PARK WY SW
W MARGINAL WY SW
16TH AV SW
9TH AV SW
12TH AV SW
NP RR
UP RR

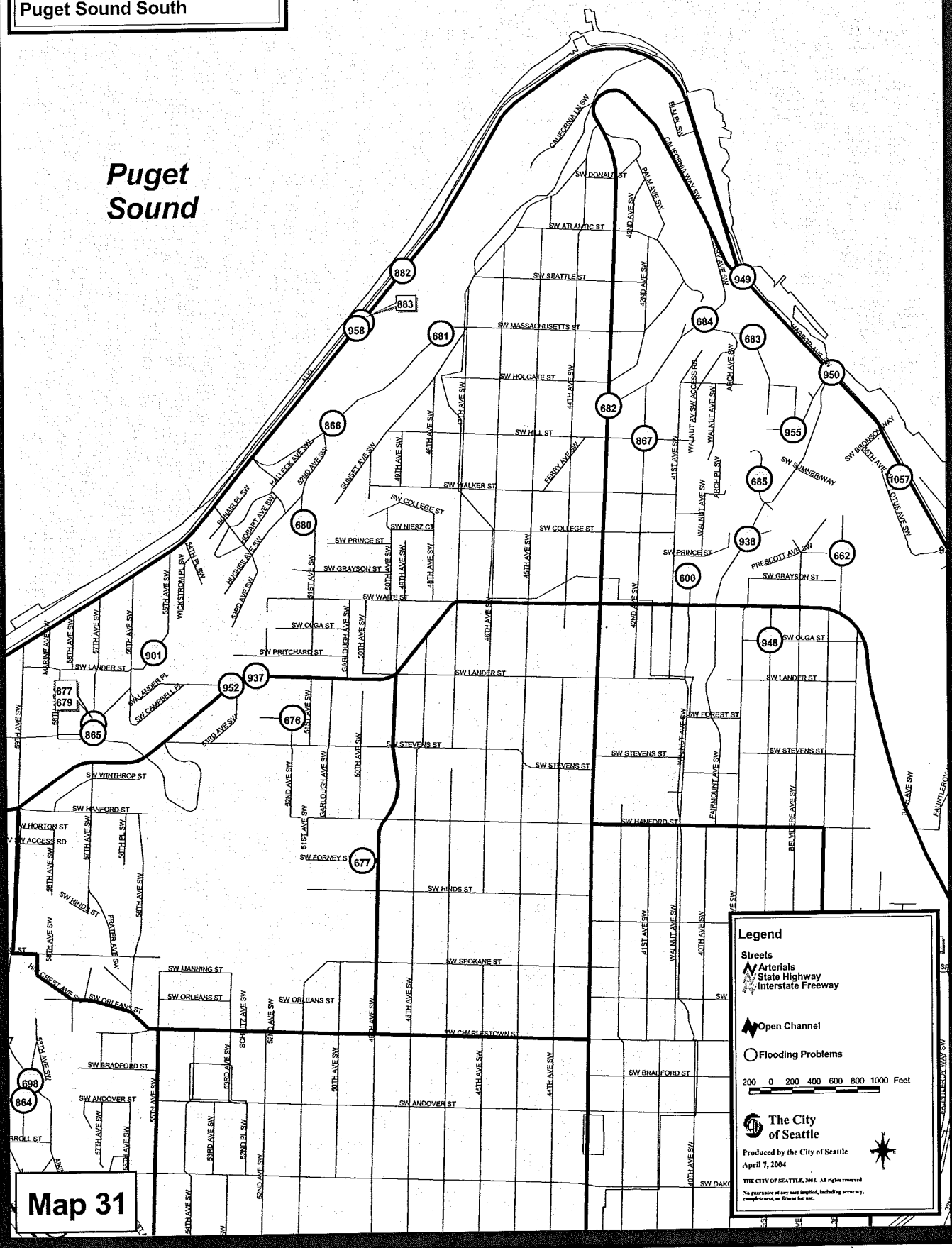

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound South
Puget Sound
Map 30
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
882
883
958
681
866
680
901
952
937
677
679
865
676
677
947
698
864
589
SW MASSACHUS
SW HOLGATE ST
SW HILL ST
SW WALKER ST
SW COLLEGE ST
SW NIESZ CT
SW PRINCE ST
SW GRAYSON ST
SW WAITE ST
SW OLGA ST
SW PRITCHARD ST
SW LANDER ST
SW LANDER PL
SW CAMPBELL PL
SW STEVENS ST
SW WINTHROP ST
SW ADMIRAL WAY
SW HANFORD ST
SW HORTON ST
SW ACCESS RD
SW HINDS ST
SW WILTON CT
SW SPOKANE ST
SW ORLEANS ST
SW MANNING ST
SW BRADFORD ST
SW ANDOVER ST
SW CARROLL ST
SW FORNEY ST
POINT PL SW
BENTON PL SW
MARINE AVE SW
WICKSTROM PL SW
HALLECK AVE SW
SUNSET AVE SW
HOBART AVE SW
HUGHES AVE SW
BONAIR PL SW
GARLOUGH AVE SW
FRATER AVE SW
HILLCREST AVE SW
ALKI

Comprehensive Drainage Plan

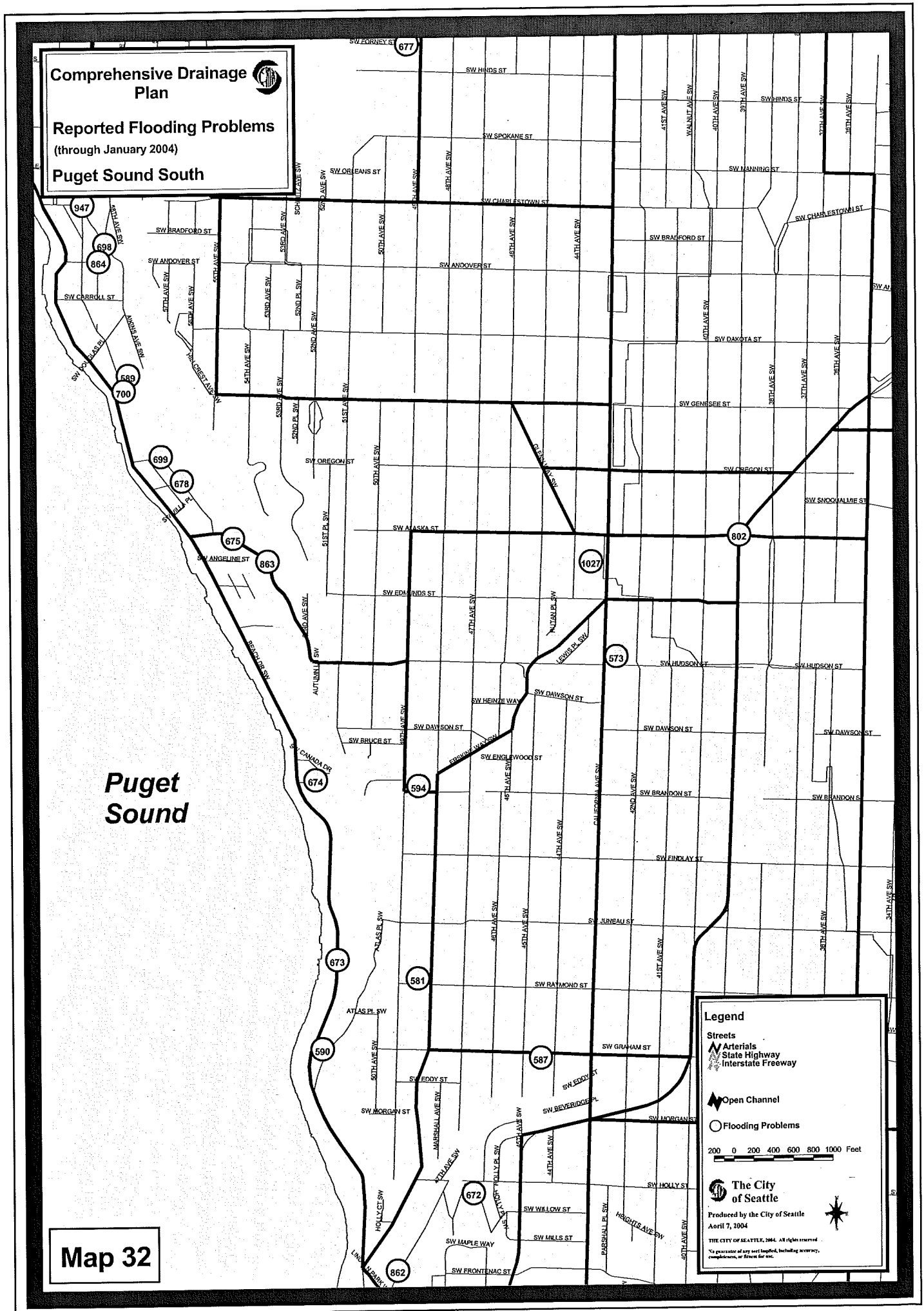
Reported Flooding Problems

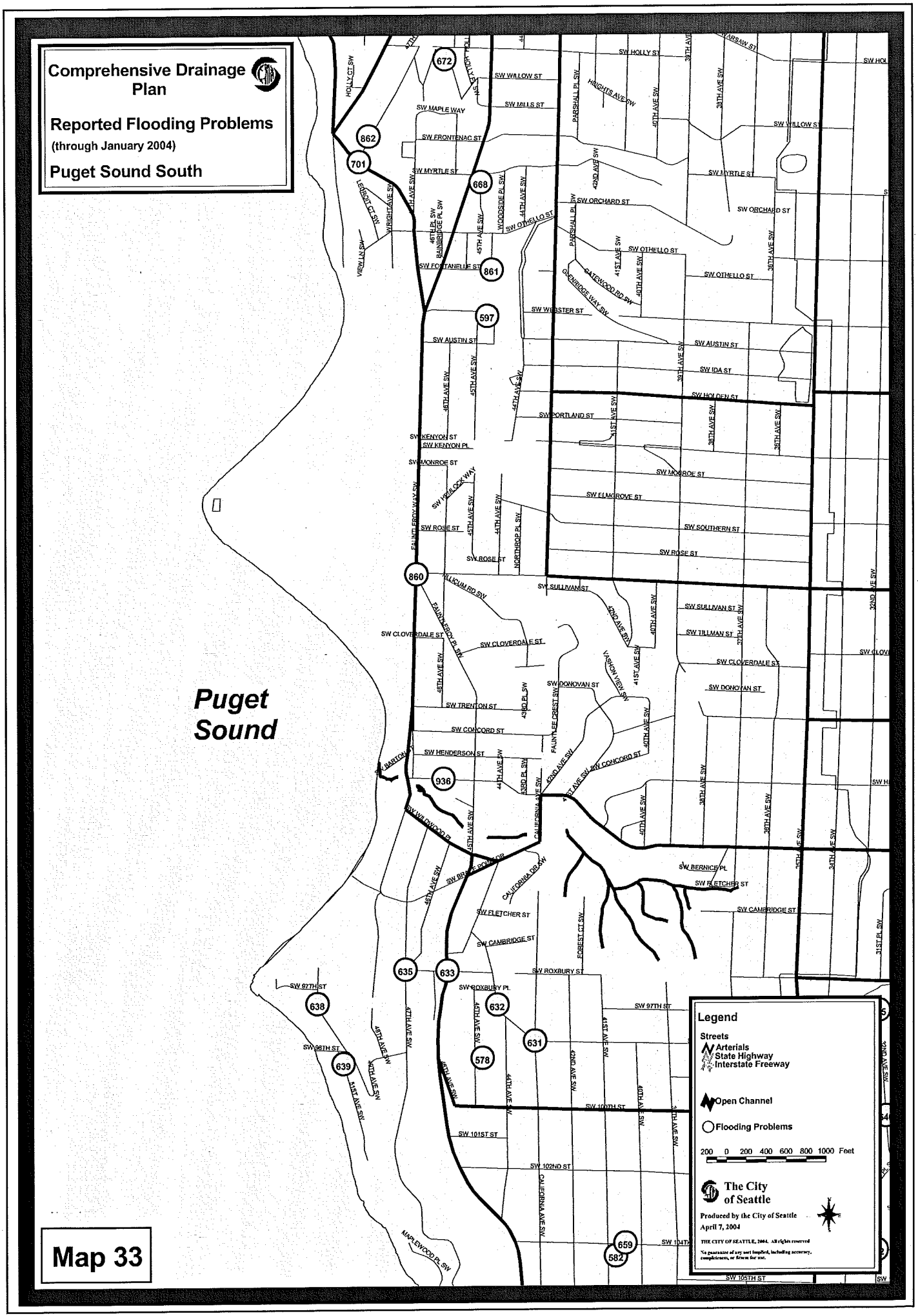
(through January 2004)

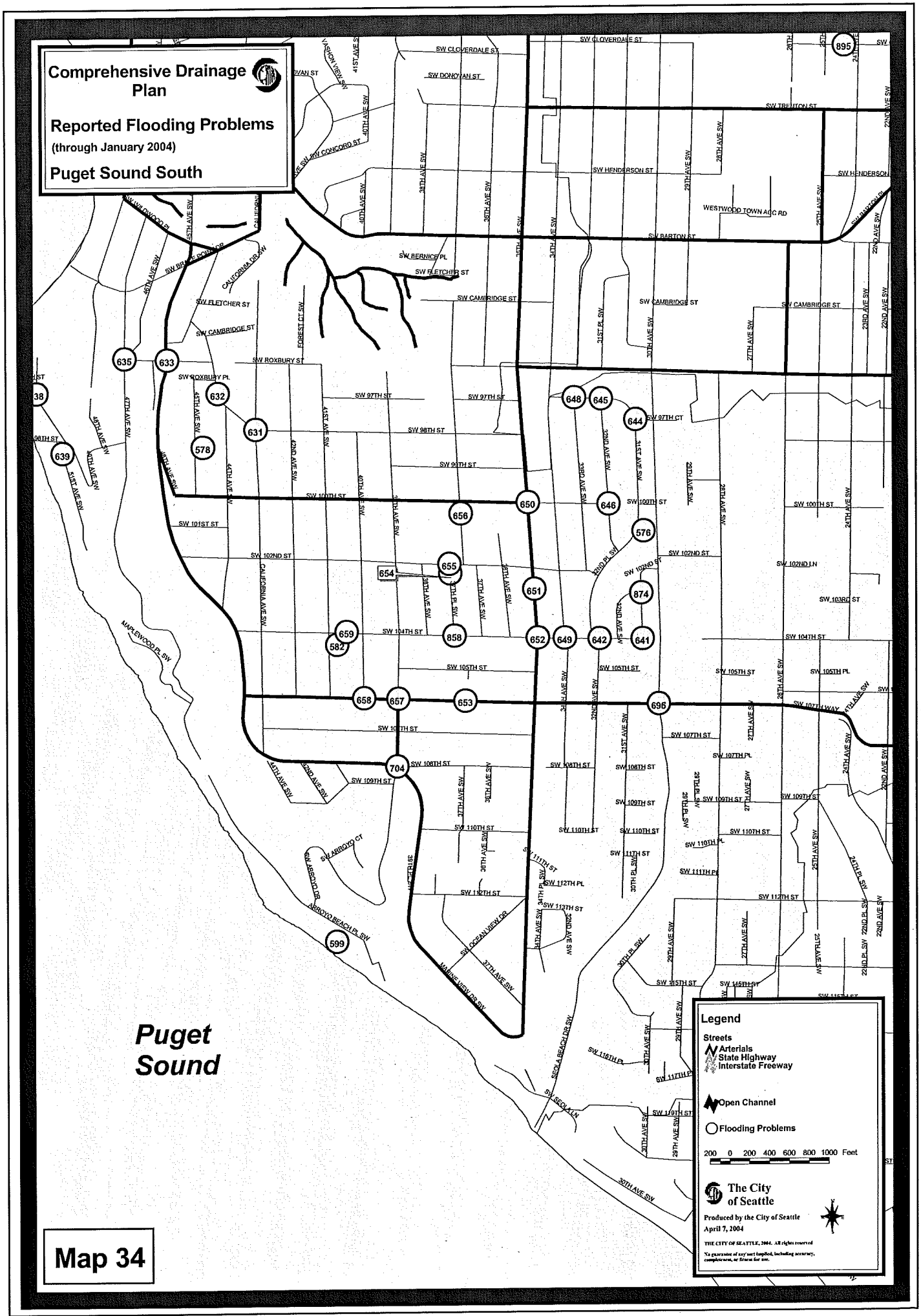
Puget Sound South

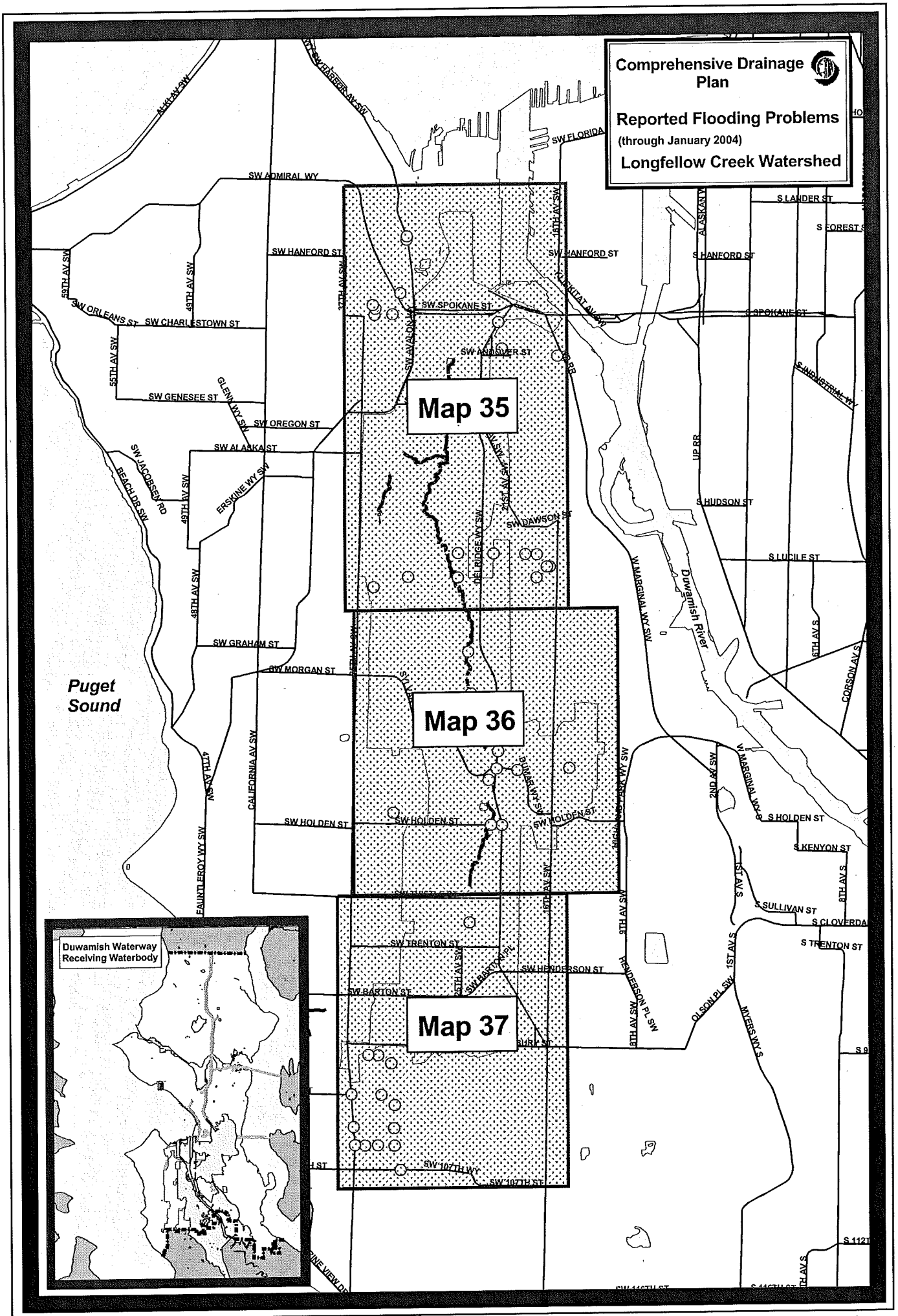


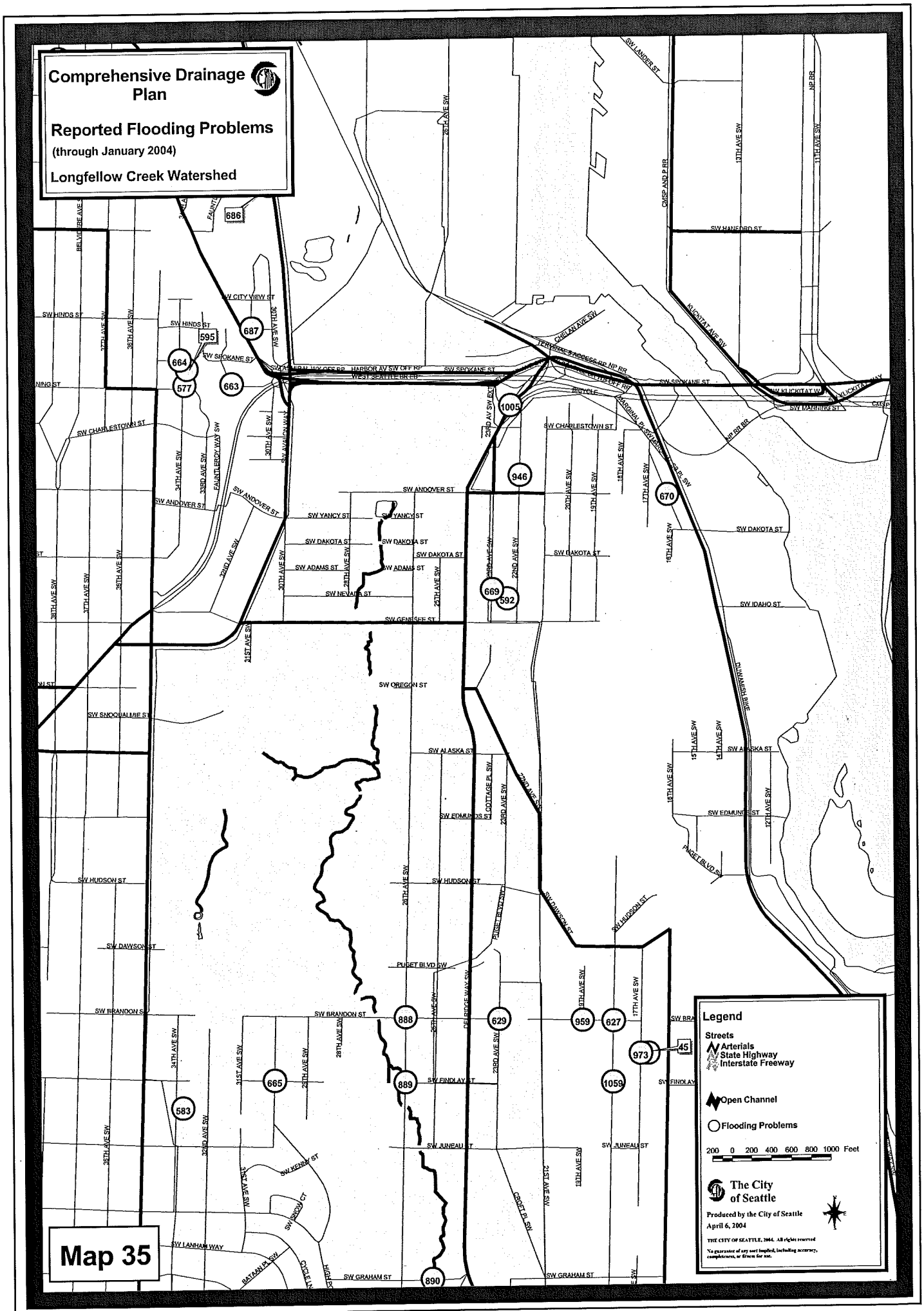
Map 31

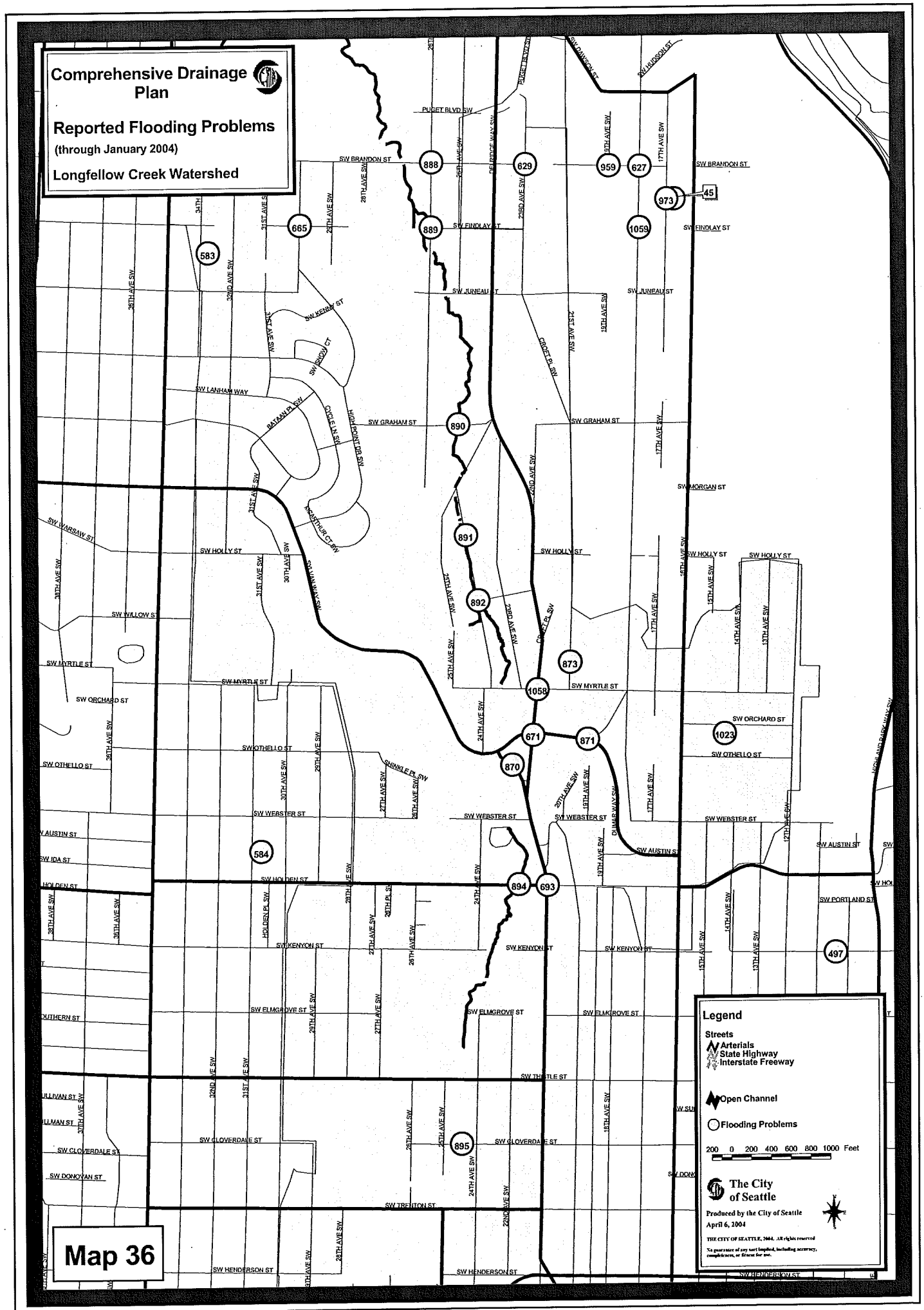

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound South
Puget Sound
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
Aoril 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 32
SW FORNEY ST
SW HINDS ST
SW SPOKANE ST
SW ORLEANS ST
SW MANNING ST
SW CHARLESTOWN ST
SW BRADFORD ST
SW ANDOVER ST
SW CARROLL ST
SW DAKOTA ST
SW GENESEE ST
SW OREGON ST
SW SNOQUALMIE ST
SW ALASKA ST
SW ANGELINE ST
SW EDMUNDS ST
SW HUDSON ST
SW DAWSON ST
SW HEINZE WAY
SW BRUCE ST
SW ENGLEWOOD ST
SW BRANDON ST
SW FINDLAY ST
SW JUNEAU ST
SW RAYMOND ST
SW GRAHAM ST
SW EDDY ST
SW MORGAN ST
SW BEVERIDGE PL
SW HOLLY ST
SW WILLOW ST
SW MILLS ST
SW MAPLE WAY
SW FRONTENAC ST
SW CANADA DR
BEACH DR SW
ATLAS PL SW
HOLLY CT SW
HOLLY PL SW
PARSHALL PL SW
HEIGHTS AVE SW
MARSHALL AVE SW
AUTUMN LN SW
LEWIS PL SW
GLENN WAY SW
HILLCREST AVE SW
AIKINS AVE SW
SCHULTZ AVE SW
CALIFORNIA AVE SW
WALNUT AVE SW
947
698
864
589
700
699
678
675
863
674
673
590
594
581
587
672
862
802
1027
573
677

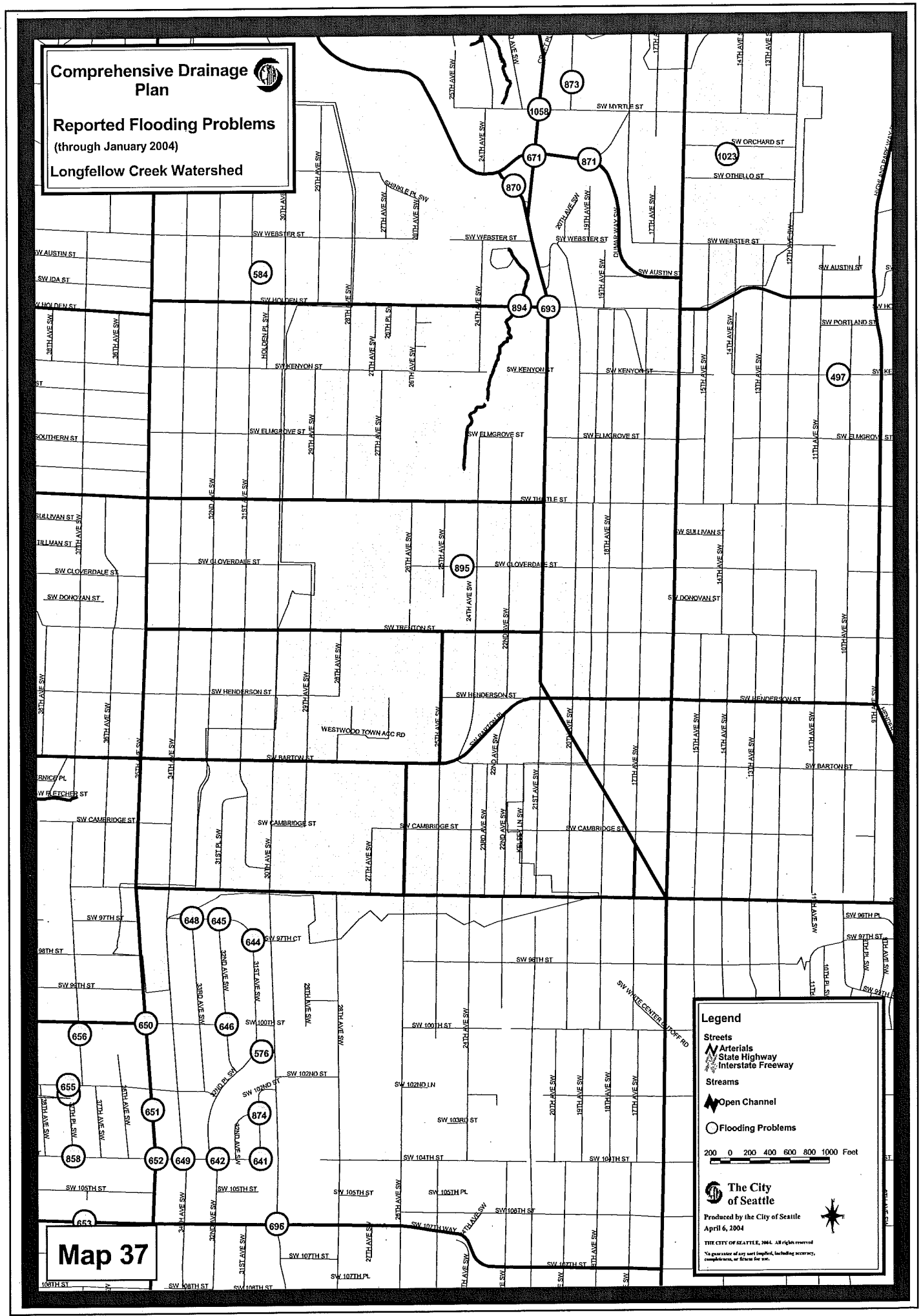

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound South
Puget Sound
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 33
672
862
701
668
861
597
860
936
635
633
638
632
631
639
578
659
582
SW HOLLY ST
SW WILLOW ST
SW MILLS ST
SW MAPLE WAY
SW FRONTENAC ST
SW MYRTLE ST
SW ORCHARD ST
SW OTHELLO ST
SW FONTANELLE ST
SW WEBSTER ST
SW AUSTIN ST
SW IDA ST
SW HOLDEN ST
SW PORTLAND ST
SW KENYON ST
SW KENYON PL
SW MONROE ST
SW ELMGROVE ST
SW SOUTHERN ST
SW ROSE ST
SW SULLIVAN ST
SW TILLMAN ST
SW CLOVERDALE ST
SW DONOVAN ST
SW TRENTON ST
SW CONCORD ST
SW HENDERSON ST
SW BERNICE PL
SW FLETCHER ST
SW CAMBRIDGE ST
SW ROXBURY ST
SW ROXBURY PL
SW 97TH ST
SW 98TH ST
SW 100TH ST
SW 101ST ST
SW 102ND ST
SW 104TH
SW 105TH ST
MAPLEWOOD PL SW
CALIFORNIA AVE SW
FAUNTLEROY WAY SW
FAUNTLEROY PL SW
VASHON VIEW SW
FAUNTLEE CREST SW
GATEWOOD RD SW
GLENRIDGE WAY SW
PARSHALL PL SW
HEIGHTS AVE SW
WOODSIDE PL SW
BAINBRIDGE PL SW
WRIGHT AVE SW
LENROTT CT SW
VIEW LN SW
HOLLY CT SW
FOREST CT SW
CALIFORNIA DR SW
46TH AVE SW
45TH AVE SW
44TH AVE SW
43RD PL SW
42ND AVE SW
41ST AVE SW
40TH AVE SW
39TH AVE SW
38TH AVE SW
37TH AVE SW
36TH AVE SW
35TH AVE SW
34TH AVE SW
32ND AVE SW
31ST PL SW
47TH AVE SW
48TH AVE SW
51ST AVE SW
40TH AVE SW
46TH AVE SW
45TH AVE SW
44TH AVE SW
42ND AVE SW
41ST AVE SW
40TH AVE SW
38TH AVE SW
37TH AVE SW
32ND AVE SW

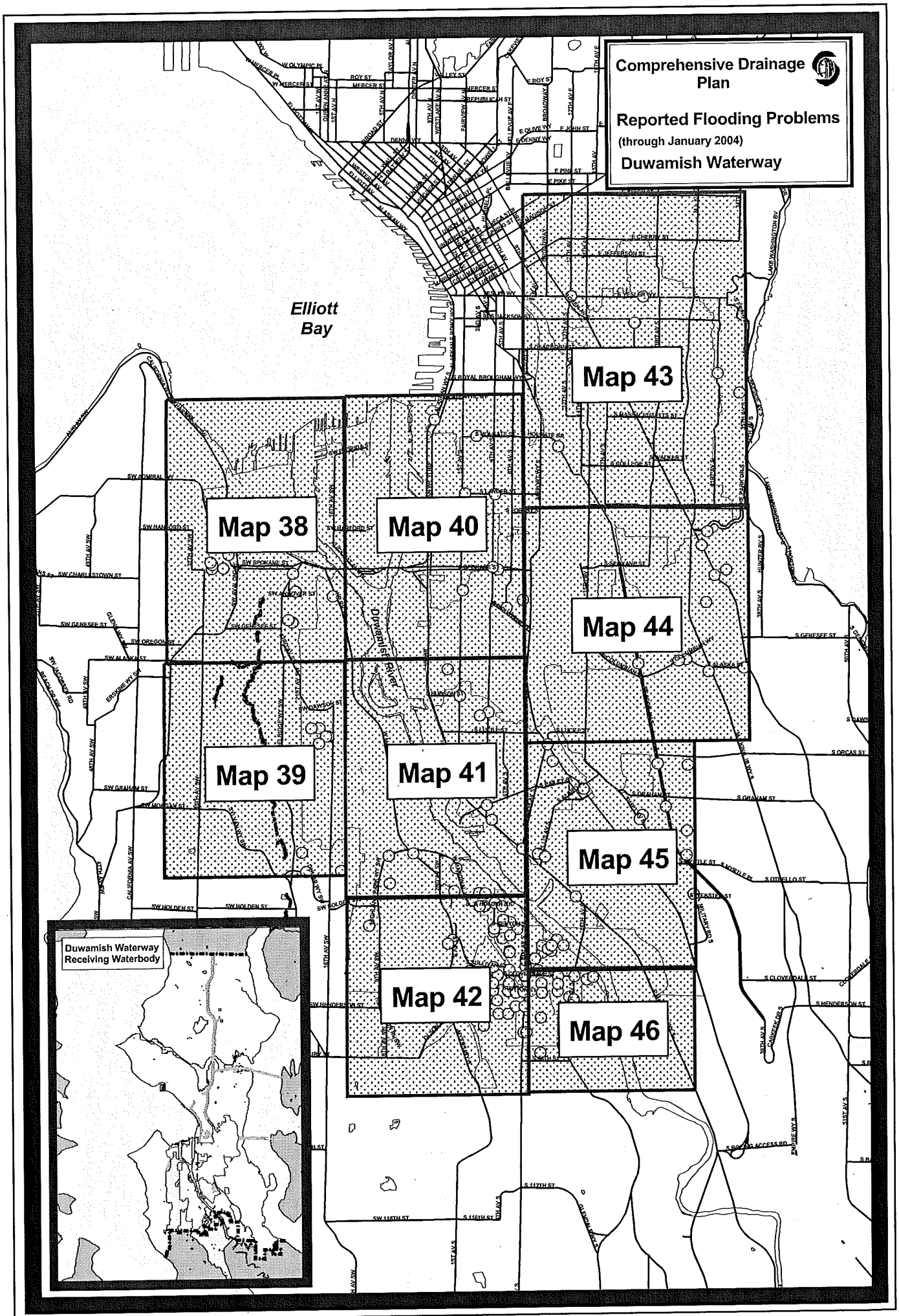

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Puget Sound South
Puget Sound
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 34


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Longfellow Creek Watershed
Map 35
Map 36
Map 37
Puget Sound
Duwamish River
Duwamish Waterway Receiving Waterbody
SW ADMIRAL WY
SW HANFORD ST
SW SPOKANE ST
SW ANDOVER ST
SW ORLEANS ST
SW CHARLESTOWN ST
SW GENESEE ST
SW OREGON ST
SW ALASKA ST
SW JACOBSEN RD
BEACH DR SW
ERSKINE WY SW
SW GRAHAM ST
SW MORGAN ST
SW HOLDEN ST
SW TRENTON ST
SW HENDERSON ST
SW BARTON ST
SW 107TH WY
SW 107TH ST
SW FLORIDA
S LANDER ST
S FOREST ST
S HANFORD ST
S SPOKANE ST
S INDUSTRIAL WY
S HUDSON ST
S LUCILE ST
S HOLDEN ST
S KENYON ST
S SULLIVAN ST
S CLOVERDA
S TRENTON ST
W MARGINAL WY SW
W MARGINAL WY S
UP RR
CALIFORNIA AV SW
FAUNTLEROY WY SW
DUMAR WY SW
HENDERSON PL SW
OLSON PL SW
MYERS WY S
CORSON AV S
1ST AV S
2ND AV SW
8TH AV S
9TH AV SW
16TH AV SW
37TH AV SW
49TH AV SW
55TH AV SW
47TH AV SW
48TH AV SW
59TH AV SW
ALASKAN W
DEL RIDGE WY SW
SW AVALON WY
SW DAWSON ST
SW BARTON PL
SW HARBOR AV SW
ALKI AV SW


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Longfellow Creek Watershed
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 35
SW HINDS ST
SW CITY VIEW ST
SW SPOKANE ST
SW CHARLESTOWN ST
SW ANDOVER ST
SW YANCY ST
SW DAKOTA ST
SW ADAMS ST
SW NEVADA ST
SW GENESEE ST
SW OREGON ST
SW SNOQUALMIE ST
SW ALASKA ST
SW EDMUNDS ST
SW HUDSON ST
SW DAWSON ST
PUGET BLVD SW
SW BRANDON ST
SW FINDLAY ST
SW JUNEAU ST
SW KENNY ST
SW LANHAM WAY
SW GRAHAM ST
SW HANFORD ST
SW IDAHO ST
SW MANNING ST
SW LANDER ST
KLICKITAT AVE SW
DUWAMISH BIKE
CHELAN AVE SW
HARBOR AV SW OFF RP
WEST SEATTLE BR EB
TERMINAL 5 ACCESS RP NP RR
CMSP AND P RR
NP RR
686
687
595
664
577
663
1005
946
670
669
592
888
629
959
627
973
45
665
889
1059
583
890


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Longfellow Creek Watershed
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 36
SW BRANDON ST
SW FINDLAY ST
SW JUNEAU ST
SW GRAHAM ST
SW MORGAN ST
SW HOLLY ST
SW WILLOW ST
SW MYRTLE ST
SW ORCHARD ST
SW OTHELLO ST
SW WEBSTER ST
SW AUSTIN ST
SW HOLDEN ST
SW KENYON ST
SW ELMGROVE ST
SW THISTLE ST
SW CLOVERDALE ST
SW TRENTON ST
SW HENDERSON ST
SW PORTLAND ST
SW LANHAM WAY
SW WARSAW ST
SW IDA ST
SW DONOVAN ST
PUGET BLVD SW
DELRIDGE WAY SW
CROFT PL SW
DUMAR WAY SW
HIGHLAND PARK WAY SW
888
889
890
891
892
873
1058
671
871
870
894
693
895
629
959
627
973
45
1059
665
583
1023
584
497


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Longfellow Creek Watershed
Legend
Streets
Arterials
State Highway
Interstate Freeway
Streams
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 37
SW MYRTLE ST
SW ORCHARD ST
SW OTHELLO ST
SW WEBSTER ST
SW AUSTIN ST
SW HOLDEN ST
SW KENYON ST
SW ELMGROVE ST
SW THISTLE ST
SW CLOVERDALE ST
SW DONOVAN ST
SW TRENTON ST
SW HENDERSON ST
SW BARTON ST
SW CAMBRIDGE ST
SW 97TH ST
SW 98TH ST
SW 100TH ST
SW 102ND ST
SW 103RD ST
SW 104TH ST
SW 105TH ST
SW 107TH ST
SW 108TH ST
SW WHITE CENTER CUTOFF RD
WESTWOOD TOWN ACC RD
1058
873
671
871
870
1023
584
894
693
497
895
648
645
644
650
646
656
576
655
651
874
858
652
649
642
641
653
696

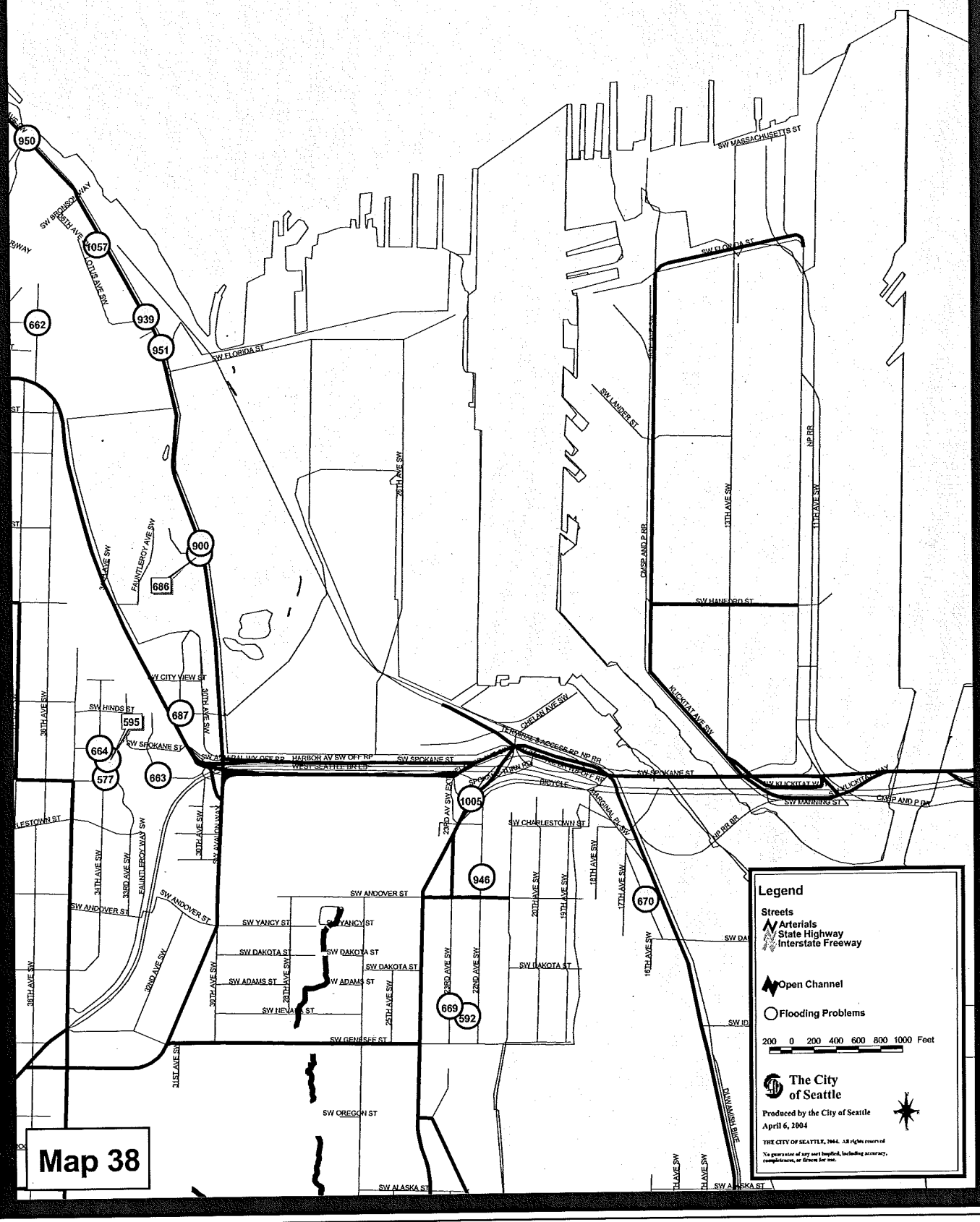

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Duwamish Waterway
Elliott Bay
Map 38
Map 39
Map 40
Map 41
Map 42
Map 43
Map 44
Map 45
Map 46
Duwamish River
Duwamish Waterway Receiving Waterbody

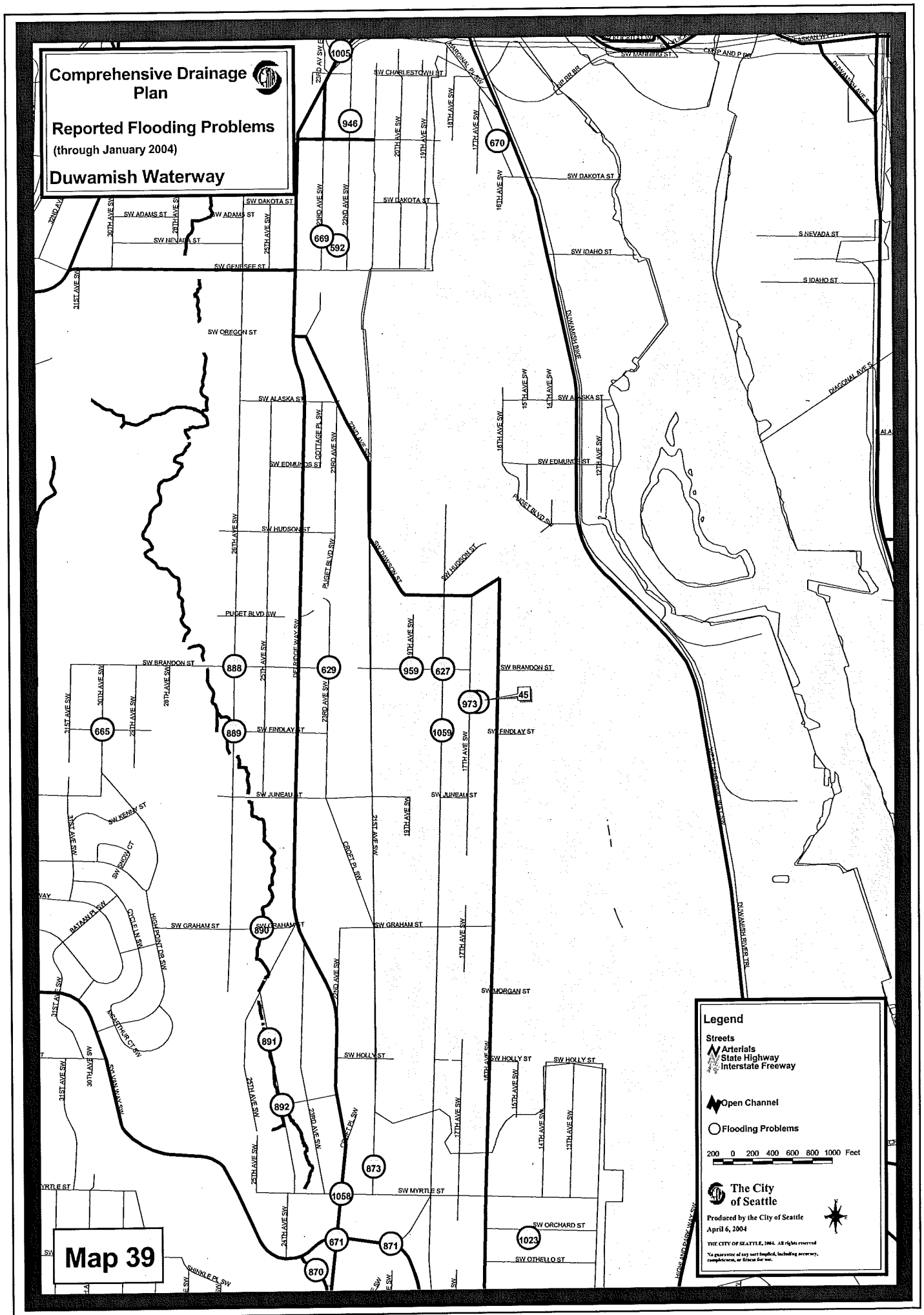
Comprehensive Drainage Plan

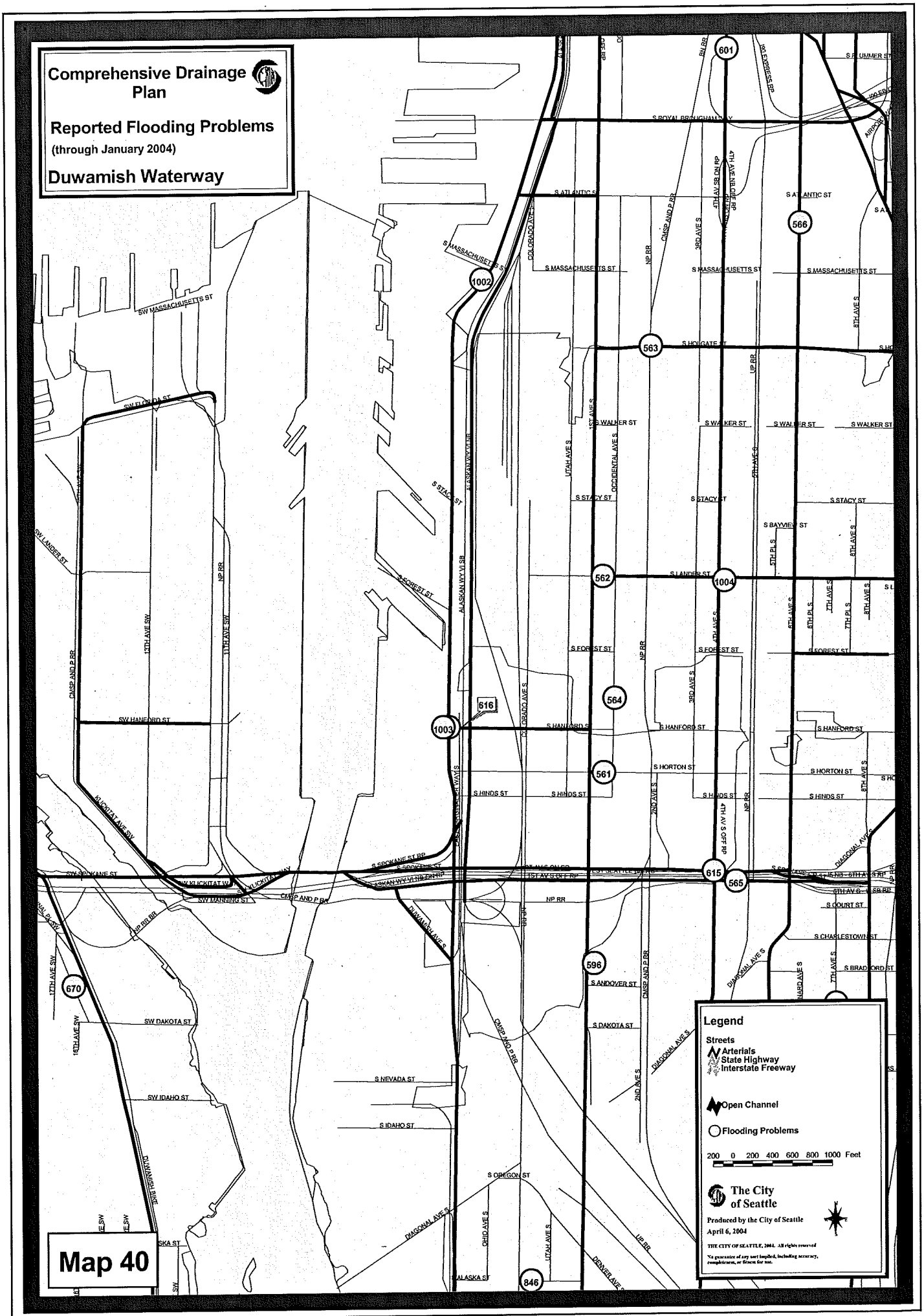
Reported Flooding Problems

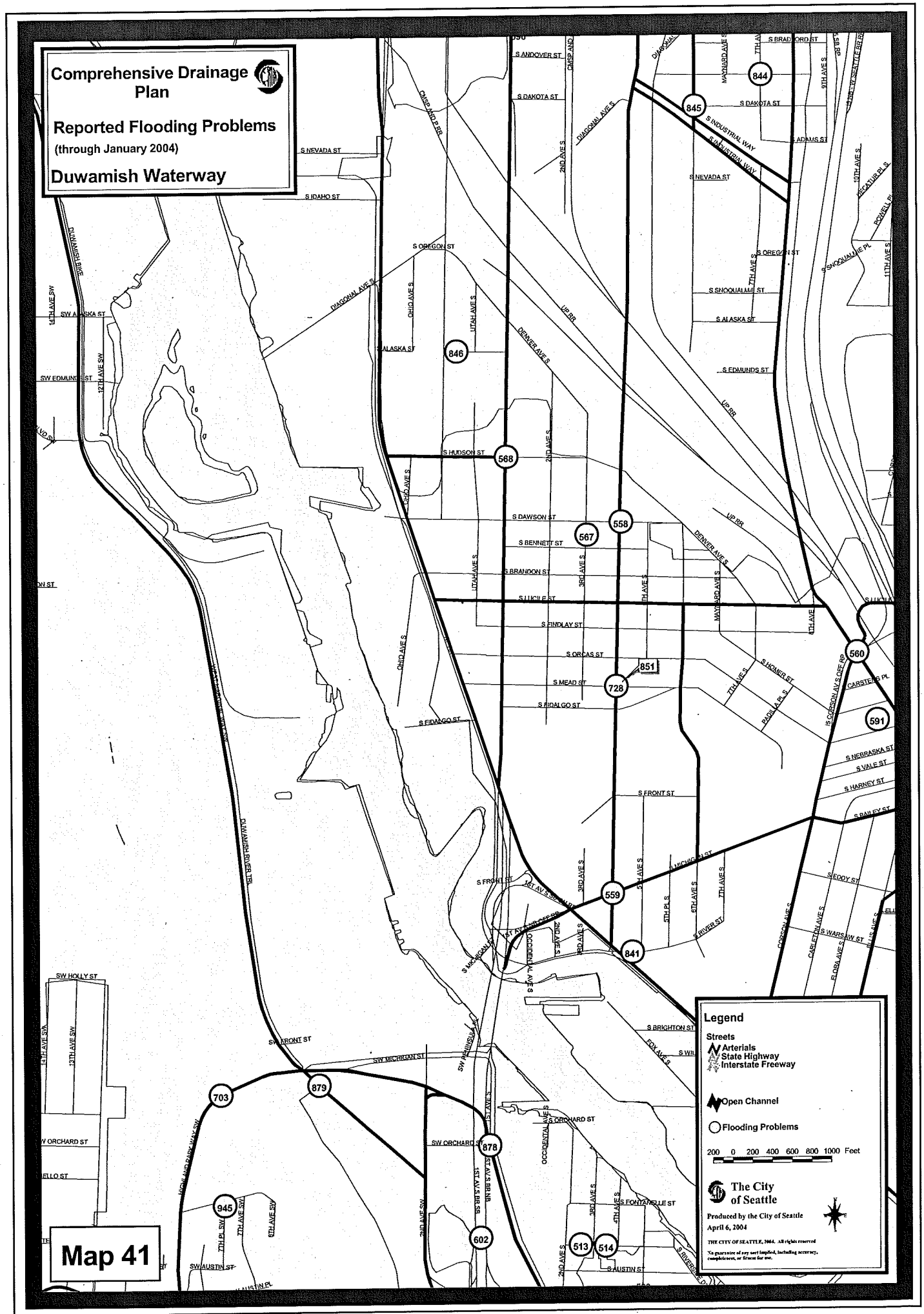
(through January 2004)

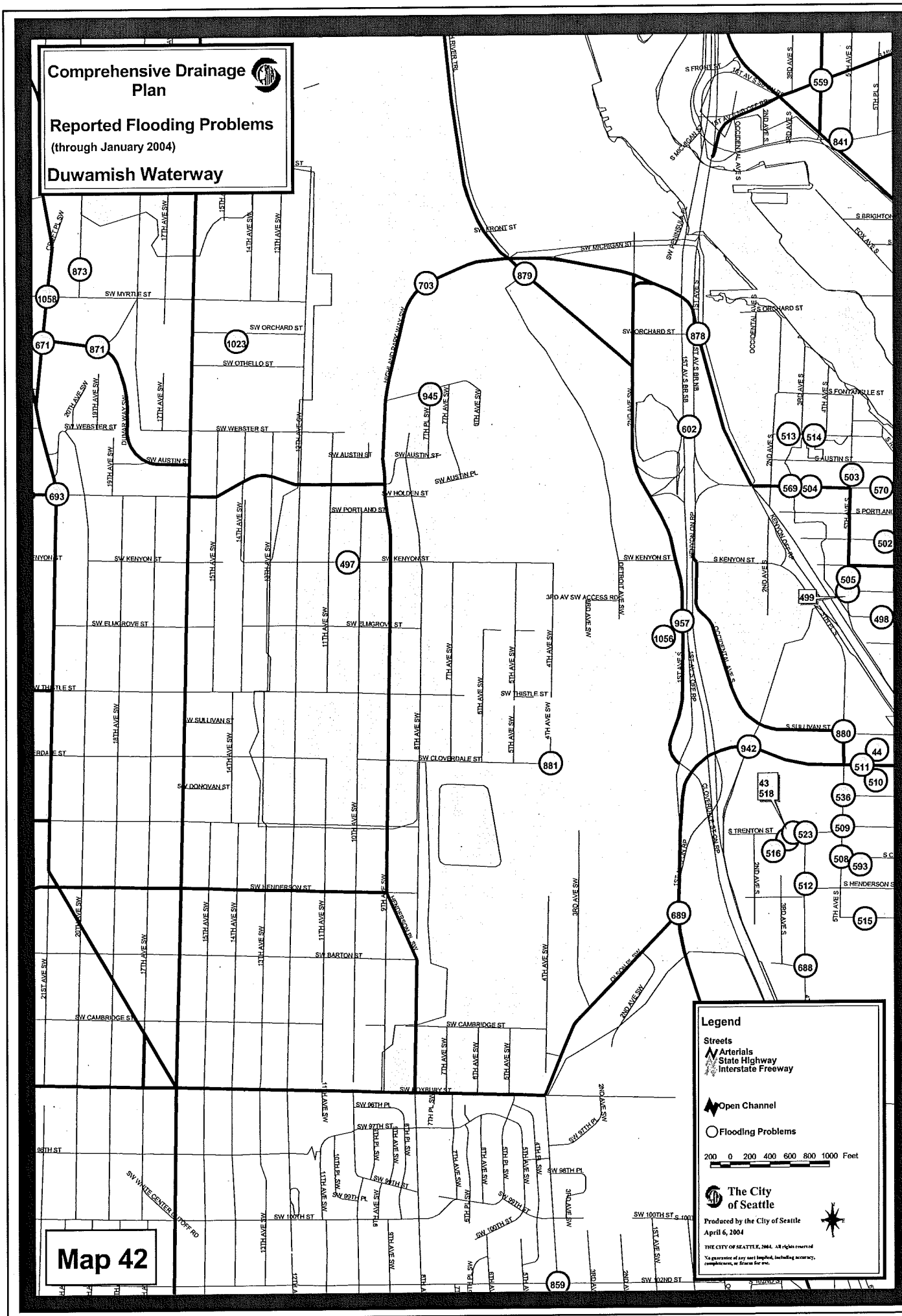
Duwamish Waterway

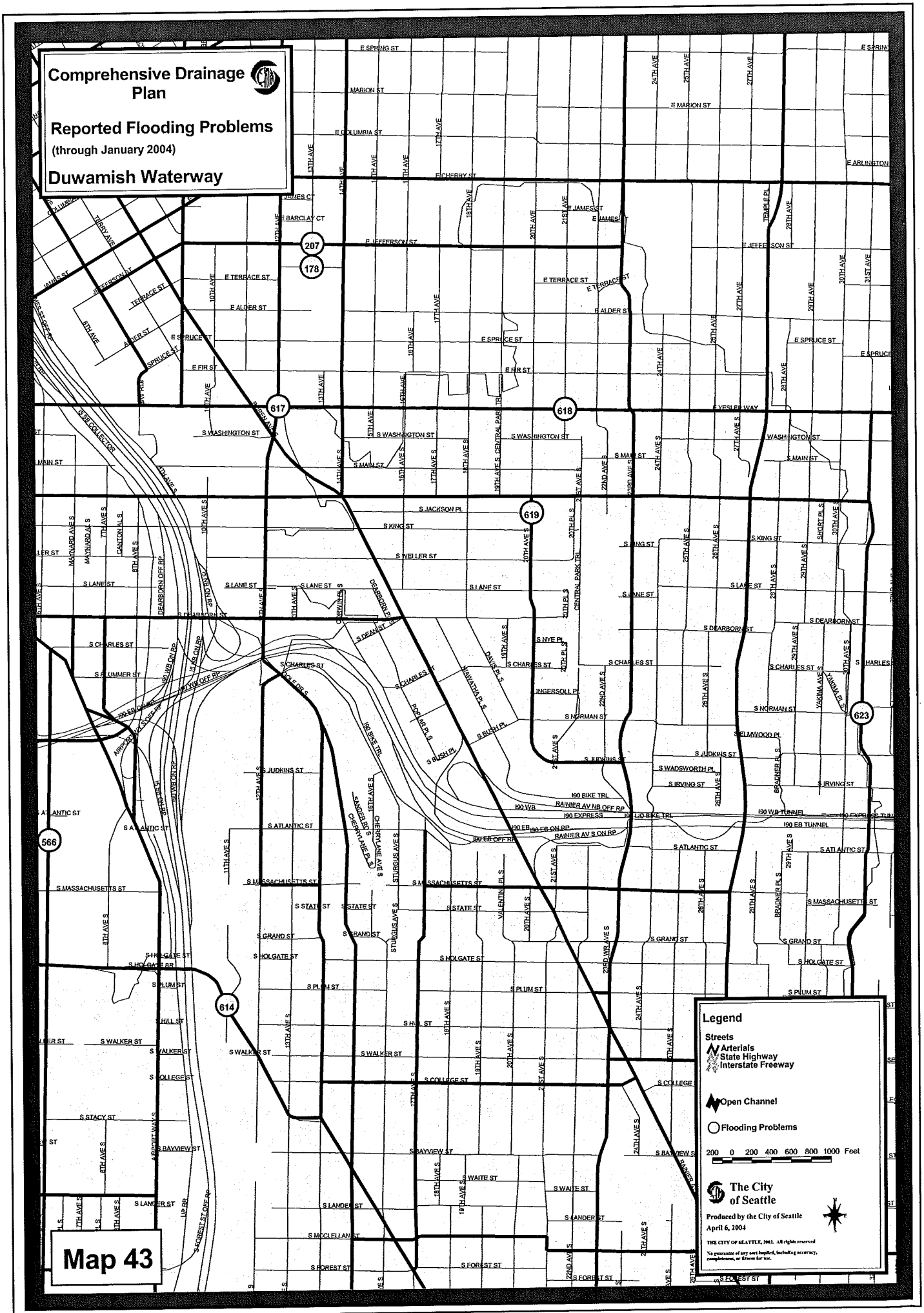


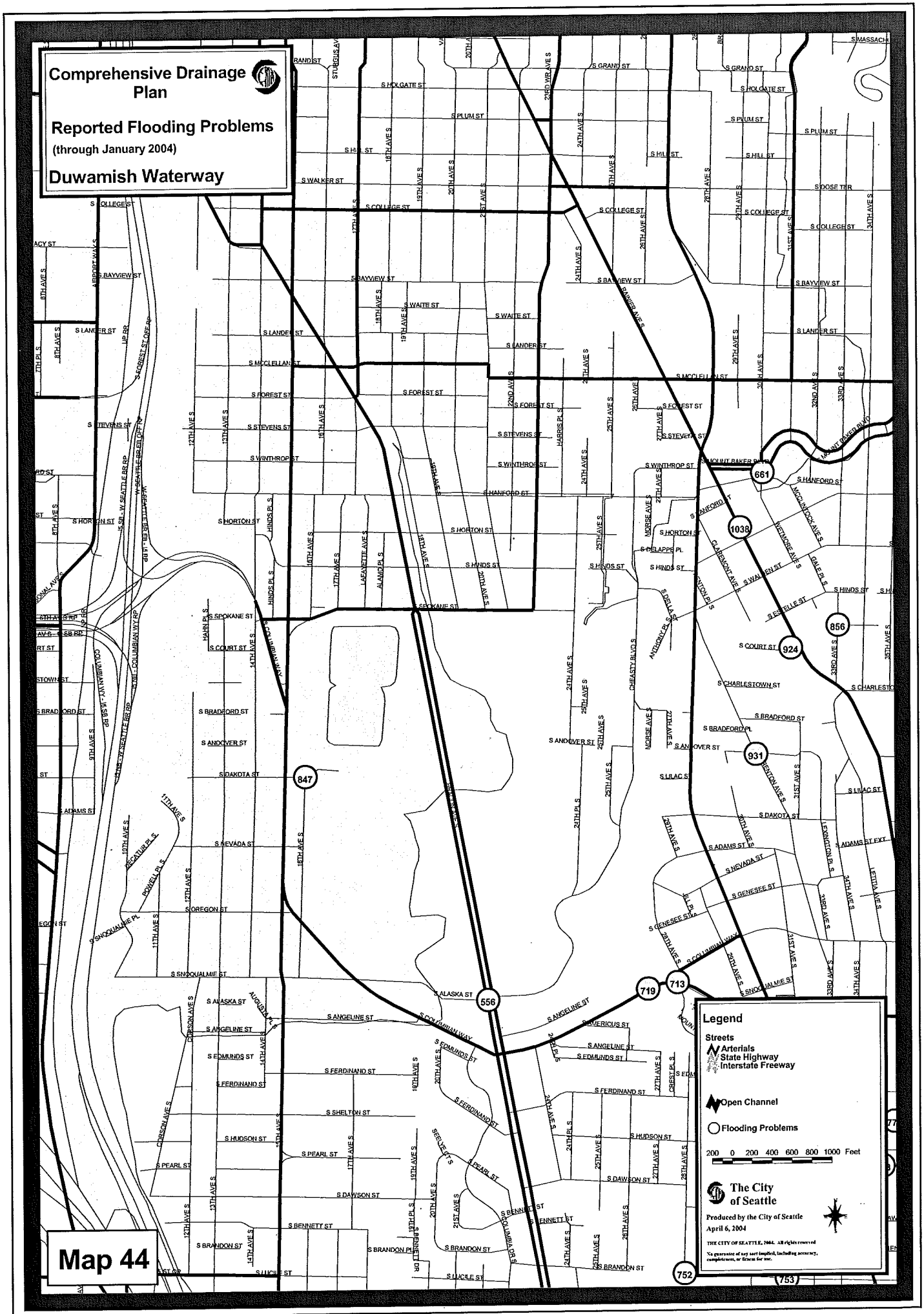

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Duwamish Waterway
Map 39
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
SW CHARLESTOWN ST
SW DAKOTA ST
SW ADAMS ST
SW NEVADA ST
SW GENESSEE ST
SW OREGON ST
SW ALASKA ST
SW EDMUNDS ST
SW HUDSON ST
PUGET BLVD SW
SW BRANDON ST
SW FINDLAY ST
SW JUNEAU ST
SW GRAHAM ST
SW MORGAN ST
SW HOLLY ST
SW MYRTLE ST
SW ORCHARD ST
SW OTHELLO ST
S NEVADA ST
S IDAHO ST
DUWAMISH RIVER
DIAGONAL AVE S
1005
946
670
669
592
888
629
959
627
973
45
665
889
1059
890
891
892
873
1058
671
871
870
1023

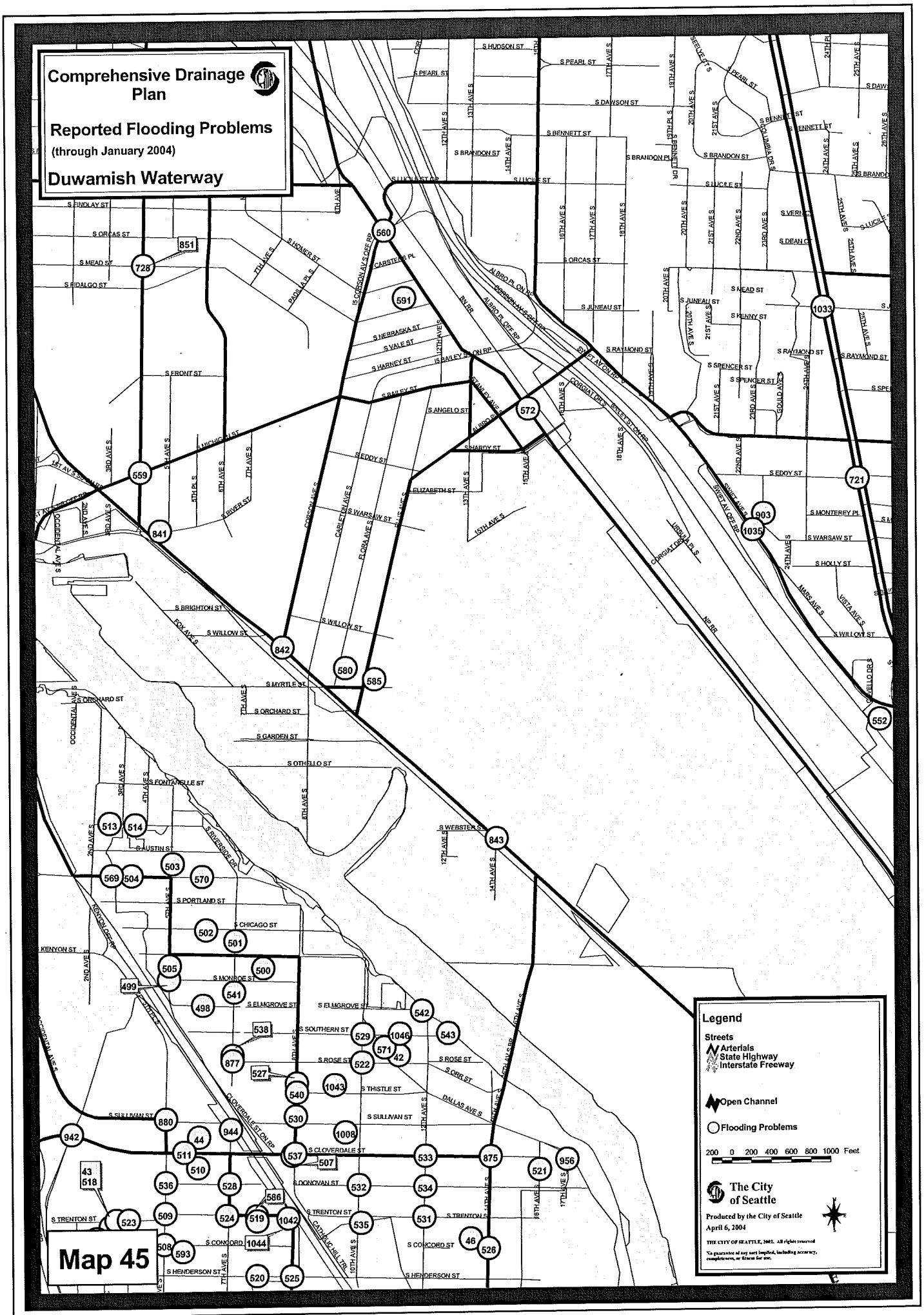

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Duwamish Waterway
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 40
601
566
1002
563
562
1004
564
616
1003
561
615
565
596
670
846
S ROYAL BROUGHAM WAY
S ATLANTIC ST
S MASSACHUSETTS ST
SW MASSACHUSETTS ST
S HOLGATE ST
S WALKER ST
S STACY ST
S BAYVIEW ST
S LANDER ST
S FOREST ST
S HANFORD ST
S HORTON ST
S HINDS ST
SW FLORIDA ST
SW LANDER ST
SW HANFORD ST
SW SPOKANE ST
SW MANNING ST
S SPOKANE ST RP
S COURT ST
S CHARLESTOWN ST
S BRADFORD ST
S ANDOVER ST
S DAKOTA ST
SW DAKOTA ST
S NEVADA ST
SW IDAHO ST
S IDAHO ST
S OREGON ST
S ALASKA ST
ALASKAN WY VI SB
ALASKAN WY VI NB ON RP
DUWAMISH AVE S
DIAGONAL AVE S
DUWAMISH BIKE
CMSP AND P RR
NP RR
UP RR
COLORADO AVE S
UTAH AVE S
OCCIDENTAL AVE S
1ST AVE S
2ND AVE S
3RD AVE S
4TH AVE S
5TH AVE S
6TH AVE S
7TH AVE S
8TH AVE S
5TH PL S
6TH PL S
7TH PL S
8TH AVE S
4TH AV S OFF RP
4TH AV SB ON RP
4TH AVE NB OFF RP
190 EXPRESS RP
13TH AVE SW
11TH AVE SW
17TH AVE SW
16TH AVE SW
NP RR BR
OHIO AVE S
DENVER AVE S
UTAH AVE S

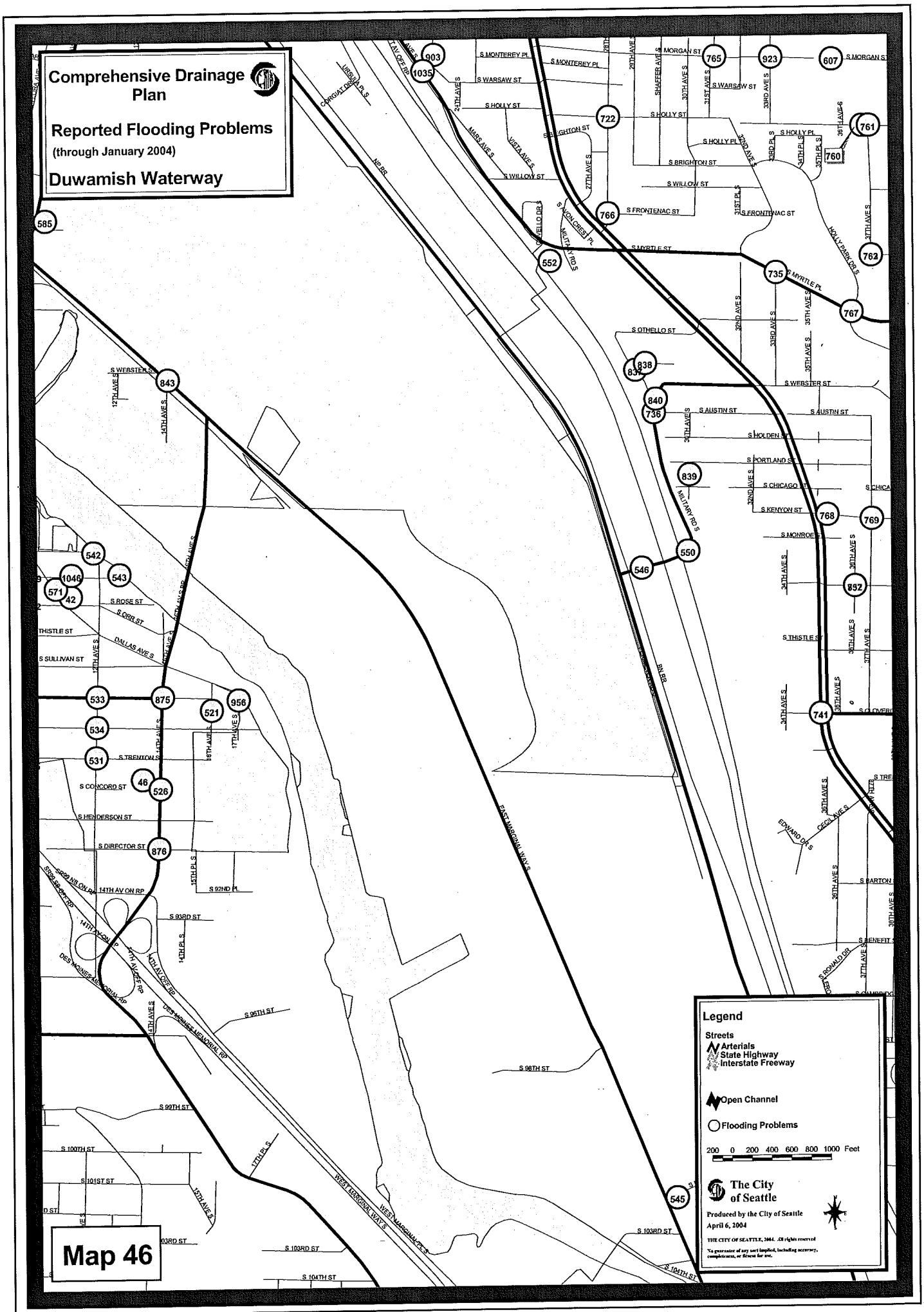

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Duwamish Waterway
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 41
S NEVADA ST
S IDAHO ST
S OREGON ST
S ALASKA ST
S HUDSON ST
S DAWSON ST
S BENNETT ST
S BRANDON ST
S LUCILE ST
S FINDLAY ST
S ORCAS ST
S MEAD ST
S FIDALGO ST
S FRONT ST
S MICHIGAN ST
S RIVER ST
S BRIGHTON ST
S ORCHARD ST
S FONTANELLE ST
S AUSTIN ST
SW FRONT ST
SW MICHIGAN ST
SW ORCHARD ST
SW HOLLY ST
SW EDMUNDS ST
SW ALASKA ST
S ANDOVER ST
S DAKOTA ST
S INDUSTRIAL WAY
S ADAMS ST
S SNOQUALMIE ST
S EDMUNDS ST
S HOMER ST
S NEBRASKA ST
S VALE ST
S HARNEY ST
S BAILEY ST
S EDDY ST
S WARSAW ST
DIAGONAL AVE S
DENVER AVE S
UP RR
DUWAMISH RIVER TRL
DUWAMISH BIKE
HIGHLAND PARK WAY SW
844
845
846
568
567
558
728
851
560
591
559
841
703
879
878
945
602
513
514

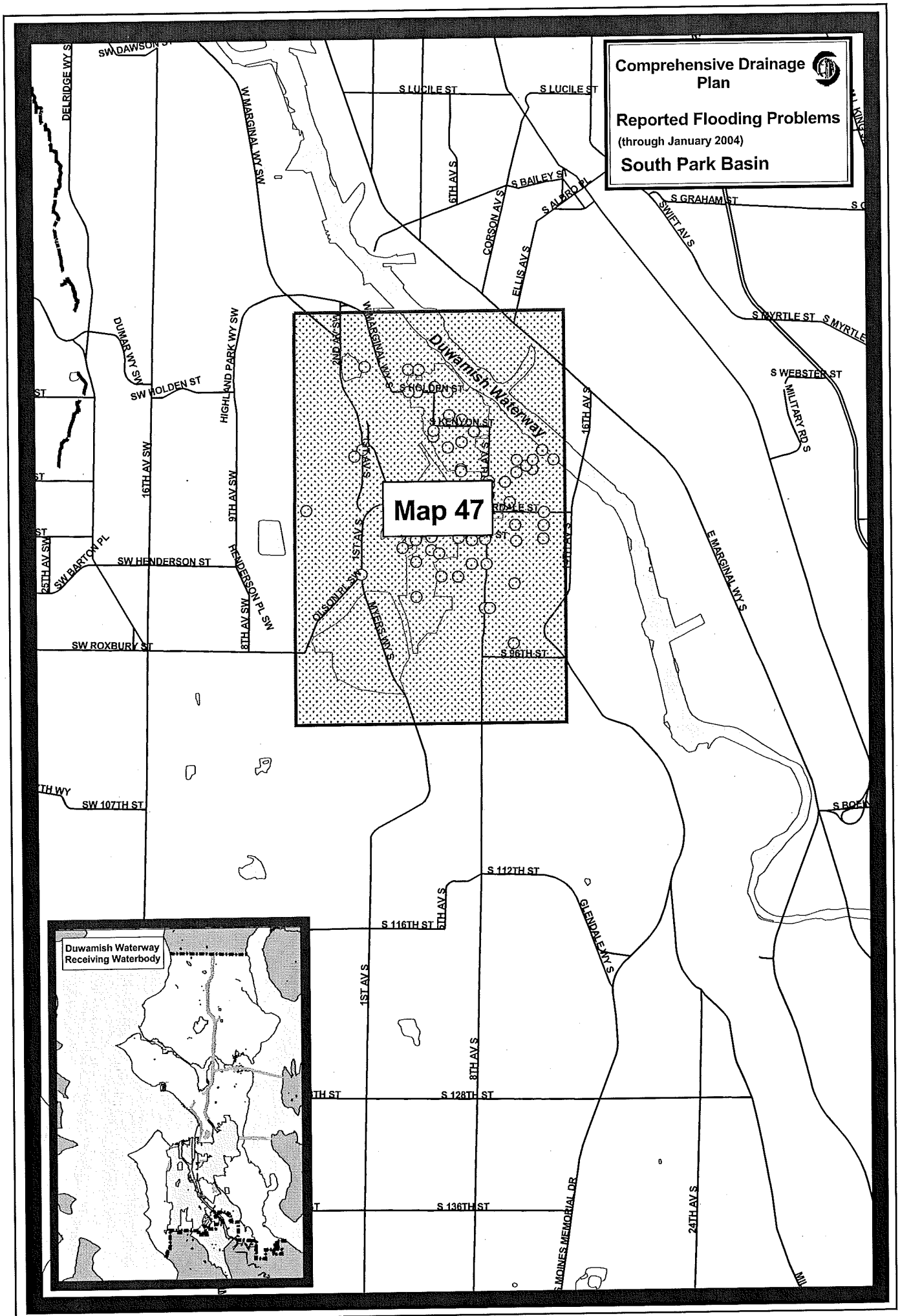

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Duwamish Waterway
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 42
SW MYRTLE ST
SW ORCHARD ST
SW OTHELLO ST
SW WEBSTER ST
SW AUSTIN ST
SW HOLDEN ST
SW PORTLAND ST
SW KENYON ST
SW ELMGROVE ST
SW THISTLE ST
SW SULLIVAN ST
SW CLOVERDALE ST
SW DONOVAN ST
SW HENDERSON ST
SW BARTON ST
SW CAMBRIDGE ST
SW ROXBURY ST
SW 96TH PL
SW 97TH ST
SW 98TH PL
SW 99TH ST
SW 100TH ST
SW 102ND ST
SW WHITE CENTER OUTOFF RD
SW MICHIGAN ST
SW FRONT ST
S FRONT ST
S ORCHARD ST
S FONTANELLE ST
S AUSTIN ST
S PORTLAND
S KENYON ST
S SULLIVAN ST
S TRENTON ST
S HENDERSON ST
S BRIGHTON
HIGHLAND PARK WAY SW
DUMAR WAY SW
KENYON OFF RP
CLOVERDALE ST ON RP
DETROIT AVE SW
3RD AV SW ACCESS RD
OCCIDENTAL AVE S
1ST AV S BR NB
1ST AV S BR SB
1ST AV S OFF RP
1ST AV S ON RP
DUSON PL SW
HENDERSON PL SW
SW PENINSULA PL
SW AUSTIN PL
SW 96TH PL
SW 97TH PL
SW 98TH PL
SW 99TH PL
SW 100TH PL
SW 99TH ST
SW 100TH ST
SW 102ND ST
1058
873
671
871
1023
693
703
879
945
878
602
513
514
569
504
503
570
502
505
499
498
497
957
1056
880
942
44
511
510
43
518
536
509
523
516
508
593
512
515
689
688
881
859
559
841

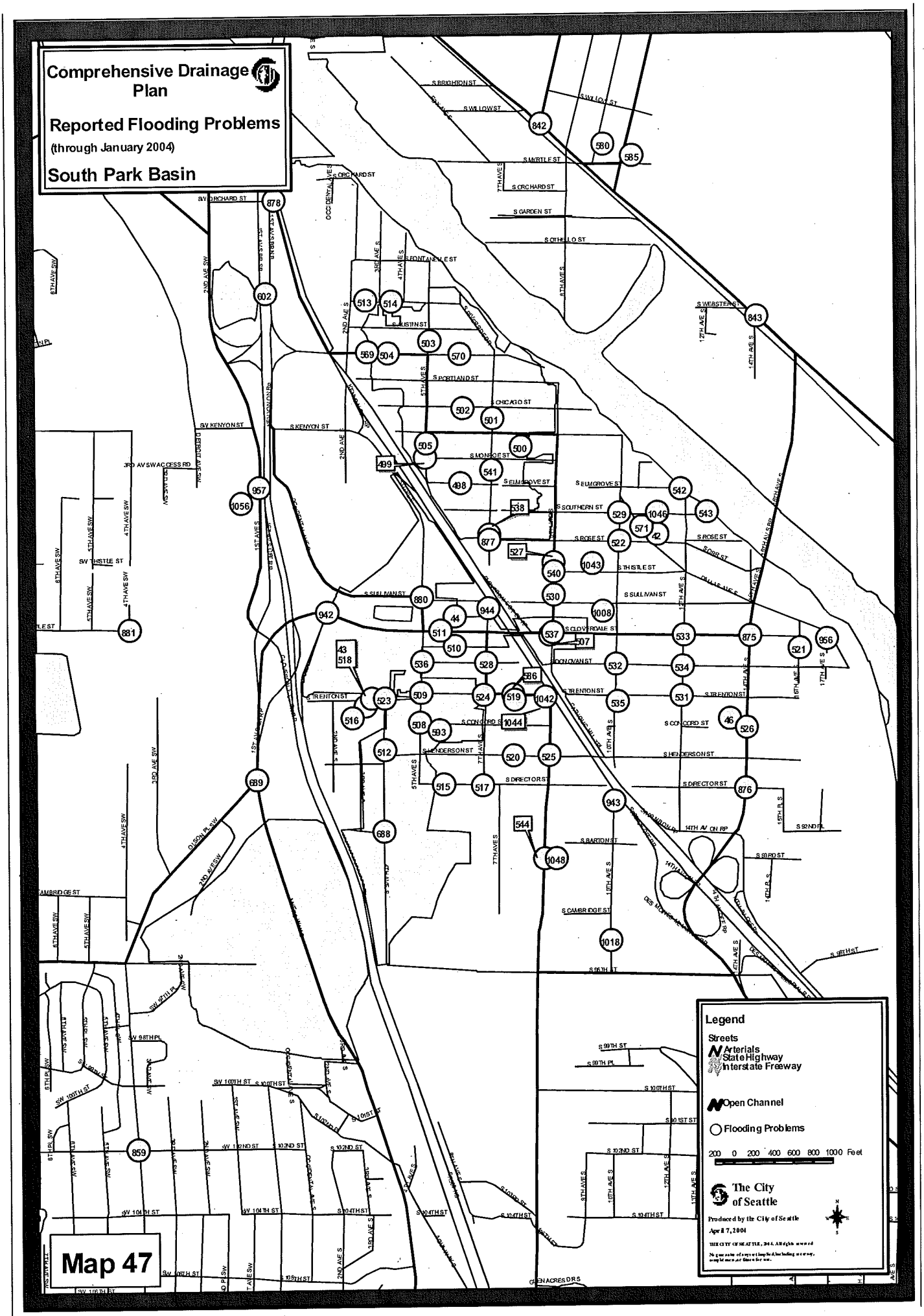

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Duwamish Waterway
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
Map 43

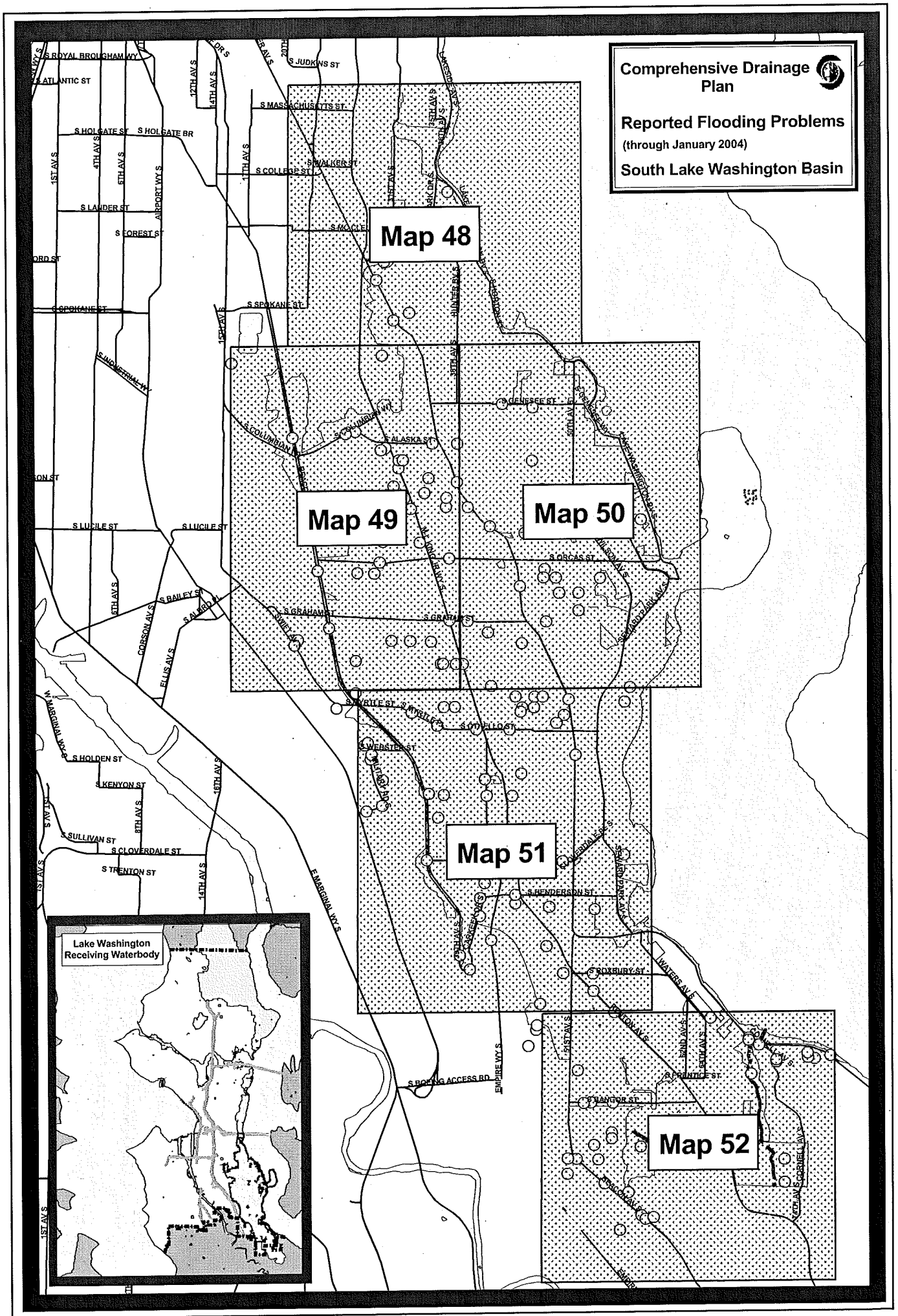

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Duwamish Waterway
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 44

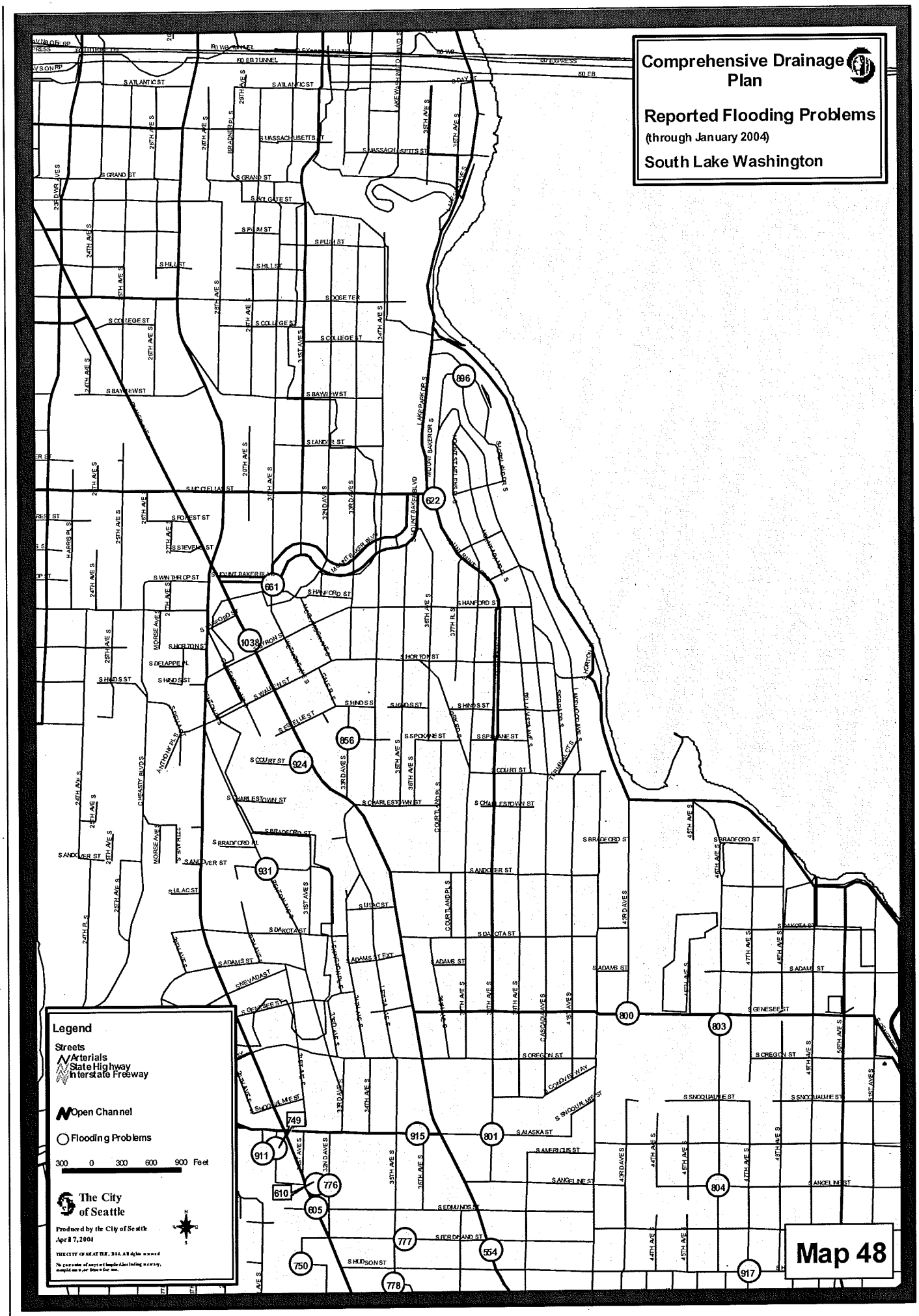

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Duwamish Waterway
Map 45
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2002. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.

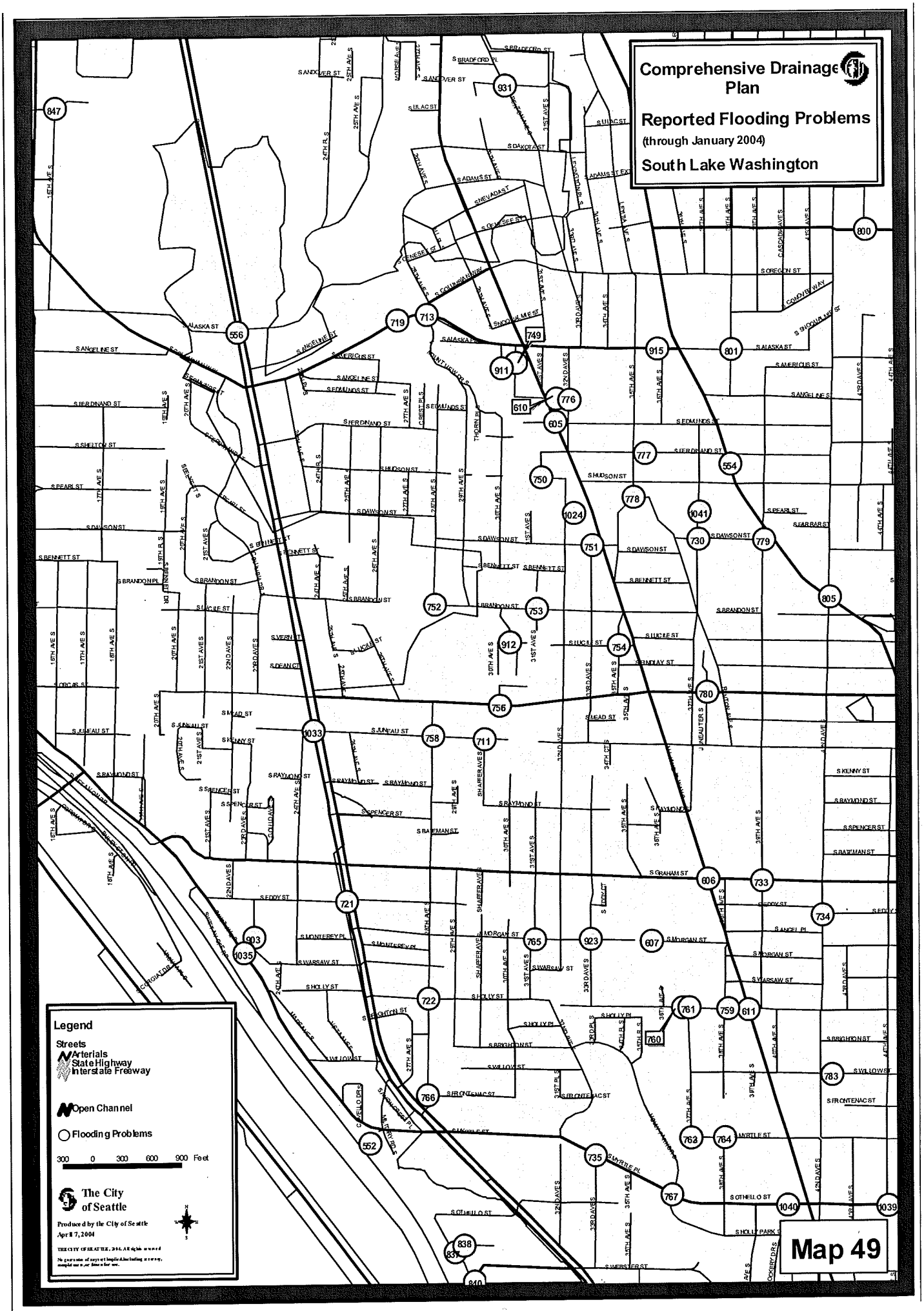

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Duwamish Waterway
Map 46
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
S MONTEREY PL
S WARSAW ST
S HOLLY ST
S BRIGHTON ST
S WILLOW ST
S FRONTENAC ST
S MYRTLE ST
S OTHELLO ST
S WEBSTER ST
S AUSTIN ST
S HOLDEN ST
S PORTLAND ST
S CHICAGO ST
S KENYON ST
S MONROE ST
S THISTLE ST
S ROSE ST
S ORR ST
DALLAS AVE S
S SULLIVAN ST
S TRENTON ST
S CONCORD ST
S HENDERSON ST
S DIRECTOR ST
S 92ND PL
S 93RD ST
S 96TH ST
S 98TH ST
S 99TH ST
S 100TH ST
S 101ST ST
S 103RD ST
S 104TH ST
S BARTON
S BENEFIT
EAST MARGINAL WAY S
WEST MARGINAL WAY S
WEST MARGINAL PL S
DES MOINES MEMORIAL RP
14TH AV ON RP
14TH AV OFF RP
MILITARY RD S
HOLLY PARK DR S
NP RR
BN RR
903
1035
765
923
607
722
761
760
766
762
552
735
767
838
840
736
839
768
769
550
546
852
843
542
543
1046
571
42
533
875
521
956
534
531
46
526
876
741
545

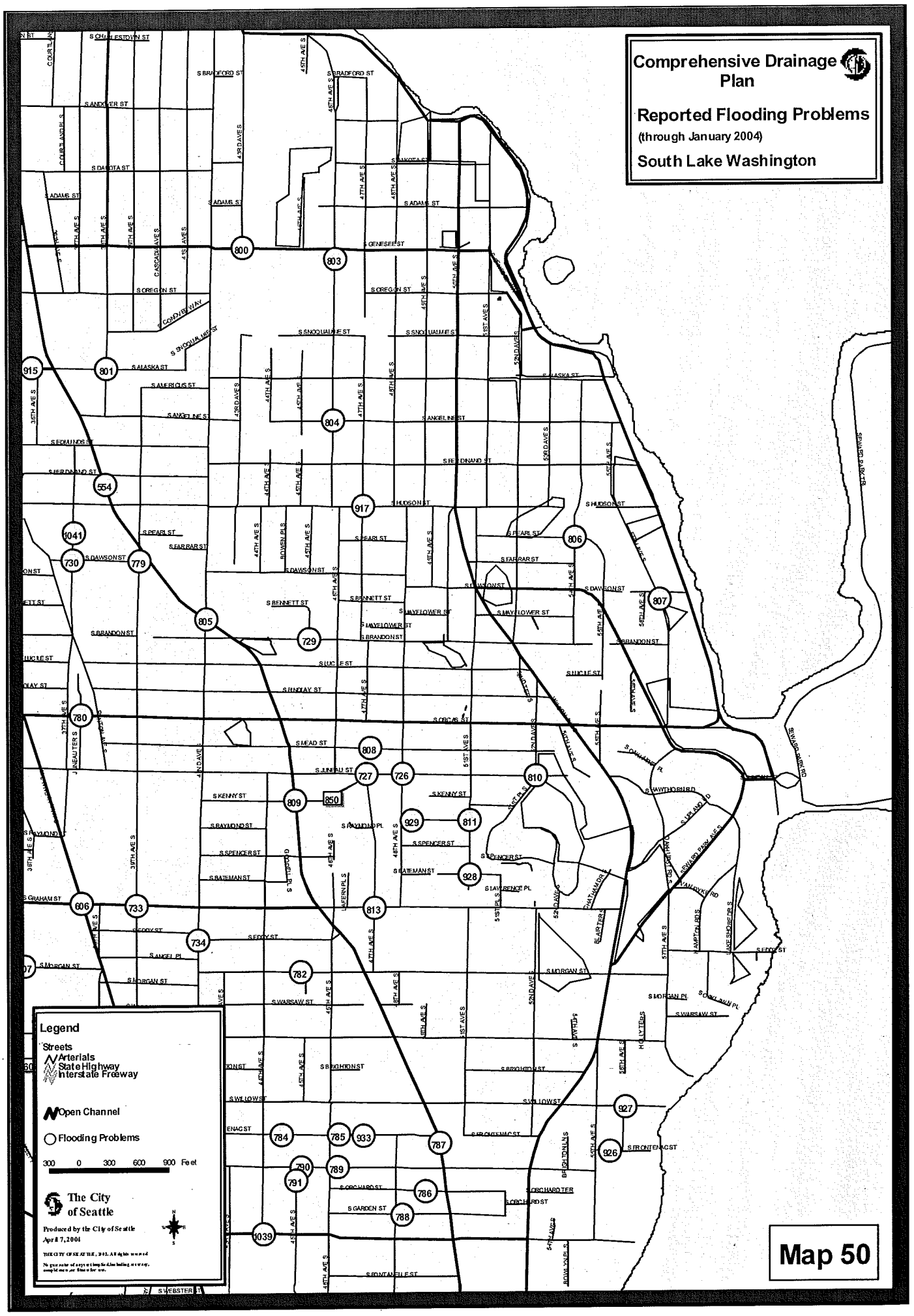

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
South Park Basin
Map 47
Duwamish Waterway
Duwamish Waterway Receiving Waterbody
SW DAWSON ST
DELRIDGE WY S
W MARGINAL WY SW
S LUCILE ST
6TH AV S
S BAILEY ST
CORSON AV S
S ALBRO PL
S GRAHAM ST
SWIFT AV S
ELLIS AV S
S MYRTLE ST
S WEBSTER ST
MILITARY RD S
DUMAR WY SW
SW HOLDEN ST
HIGHLAND PARK WY SW
2ND AV SW
S HOLDEN ST
S KENYON ST
16TH AV S
16TH AV SW
9TH AV SW
1ST AV S
SW BARTON PL
SW HENDERSON ST
HENDERSON PL SW
OLSON PL SW
MYERS WY S
8TH AV SW
SW ROXBURY ST
S 96TH ST
E MARGINAL WY S
SW 107TH ST
S 112TH ST
S 116TH ST
GLENDALE WY S
S 128TH ST
S 136TH ST
S MOINES MEMORIAL DR
24TH AV S

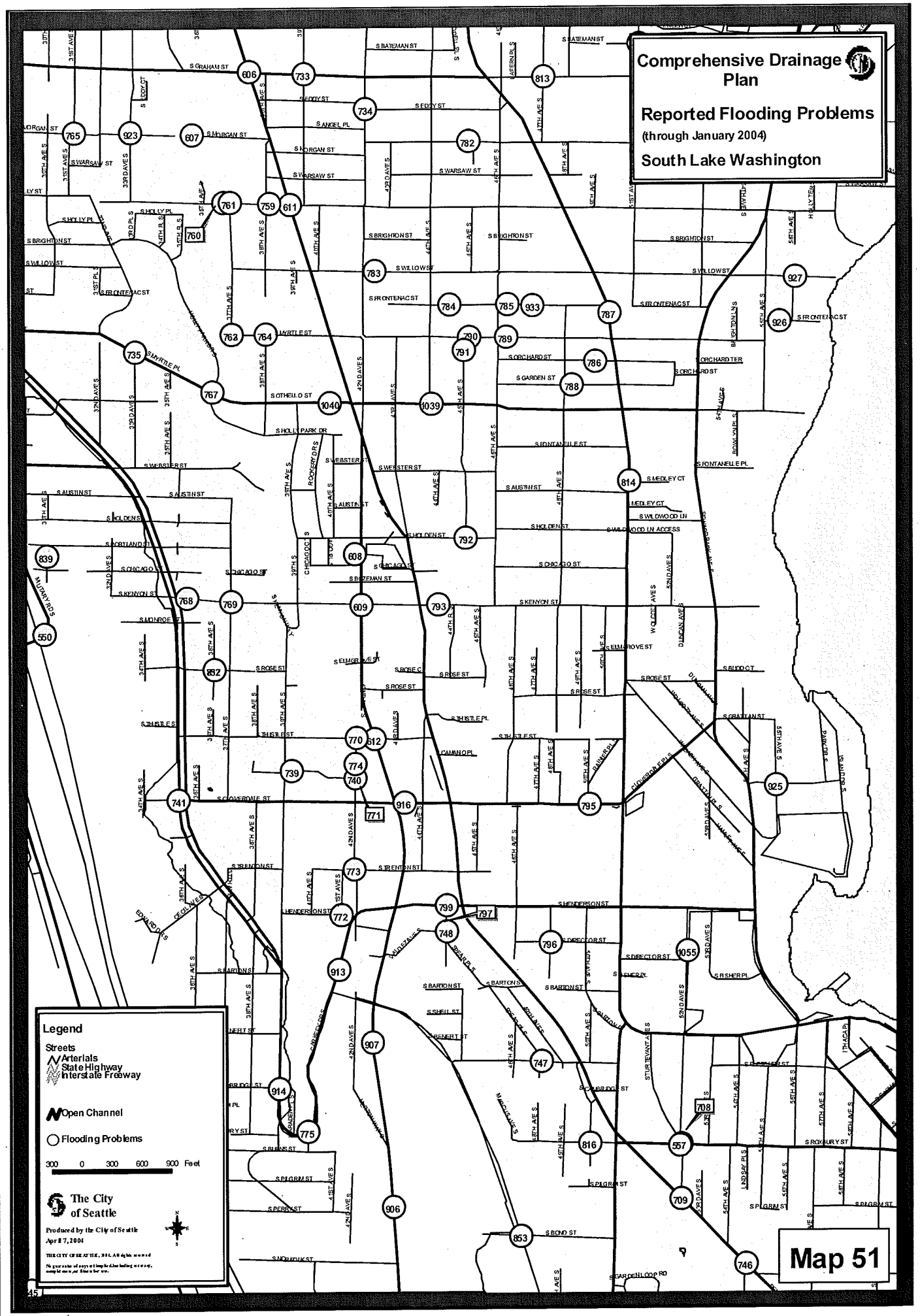

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
South Park Basin
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
Map 47

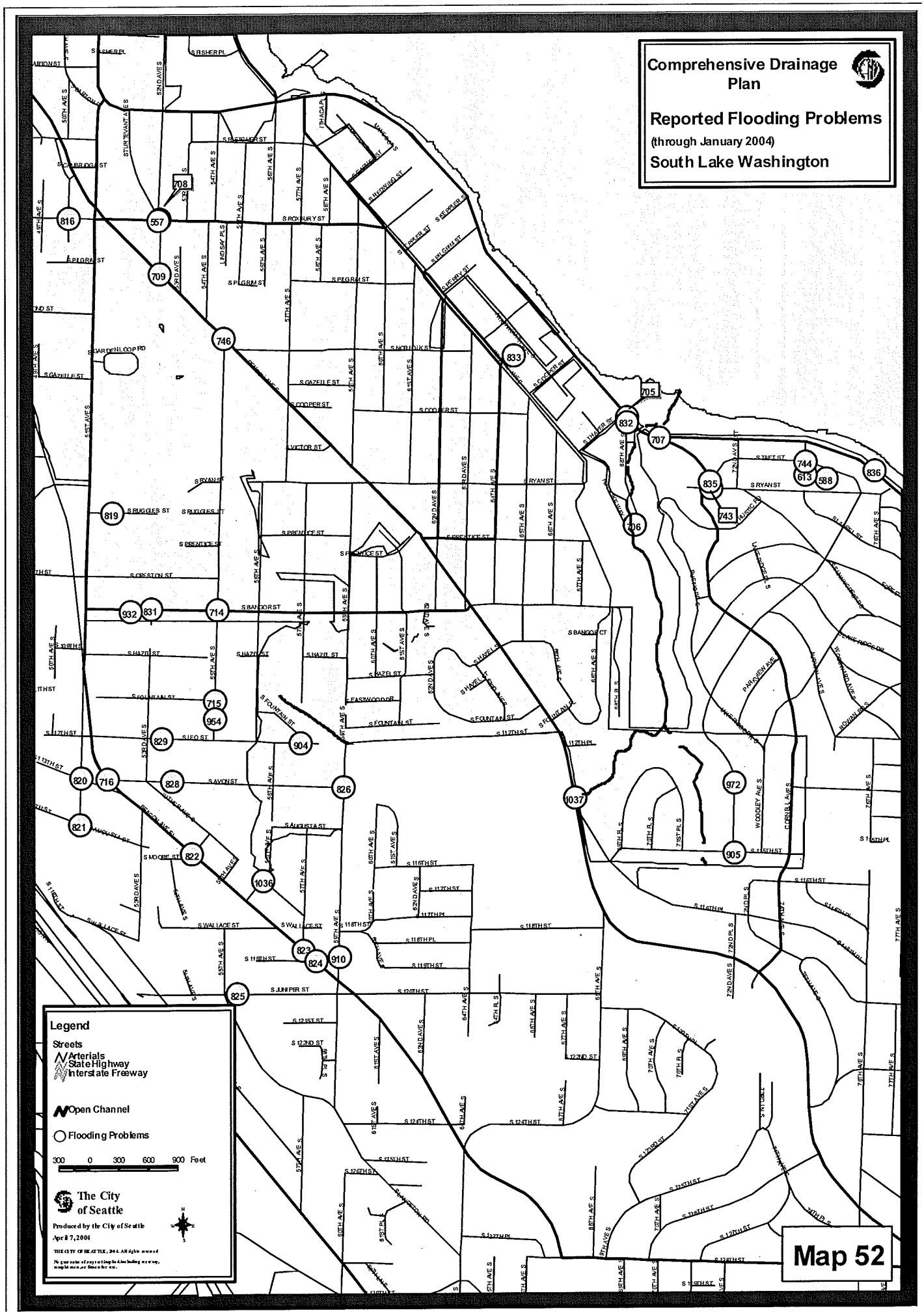

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
South Lake Washington Basin
Map 48
Map 49
Map 50
Map 51
Map 52
Lake Washington Receiving Waterbody
S ROYAL BROUGHAM WY
S ATLANTIC ST
S HOLGATE ST
S HOLGATE BR
S LANDER ST
S FOREST ST
S SPOKANE ST
S INDUSTRIAL WY
S LUCILE ST
S BAILEY ST
S HOLDEN ST
S KENYON ST
S SULLIVAN ST
S CLOVERDALE ST
S TRENTON ST
S MASSACHUSETTS ST
S COLLEGE ST
S WALKER ST
S JUDKINS ST
S GENESEE ST
S ALASKA ST
S ORCAS ST
S GRAHAM ST
S MYRTLE ST
S OTHELLO ST
S WEBSTER ST
S HENDERSON ST
S ROXBURY ST
S BOEING ACCESS RD
S PRENTICE ST
S BANGOR ST
E MARGINAL WY S
W MARGINAL WY S
EMPIRE WY S
WATERS AV S
CORSON AV S
ELLIS AV S
AIRPORT WY S
1ST AV S
4TH AV S
6TH AV S
8TH AV S
12TH AV S
14TH AV S
16TH AV S
17TH AV S
15TH AV S
38TH AV S
50TH AV S
51ST AV S
52ND AV S
54TH AV S
HUNTER BV S
LAKE WASHINGTON BV S
SEWARD PARK AV S
CORNELL AV S

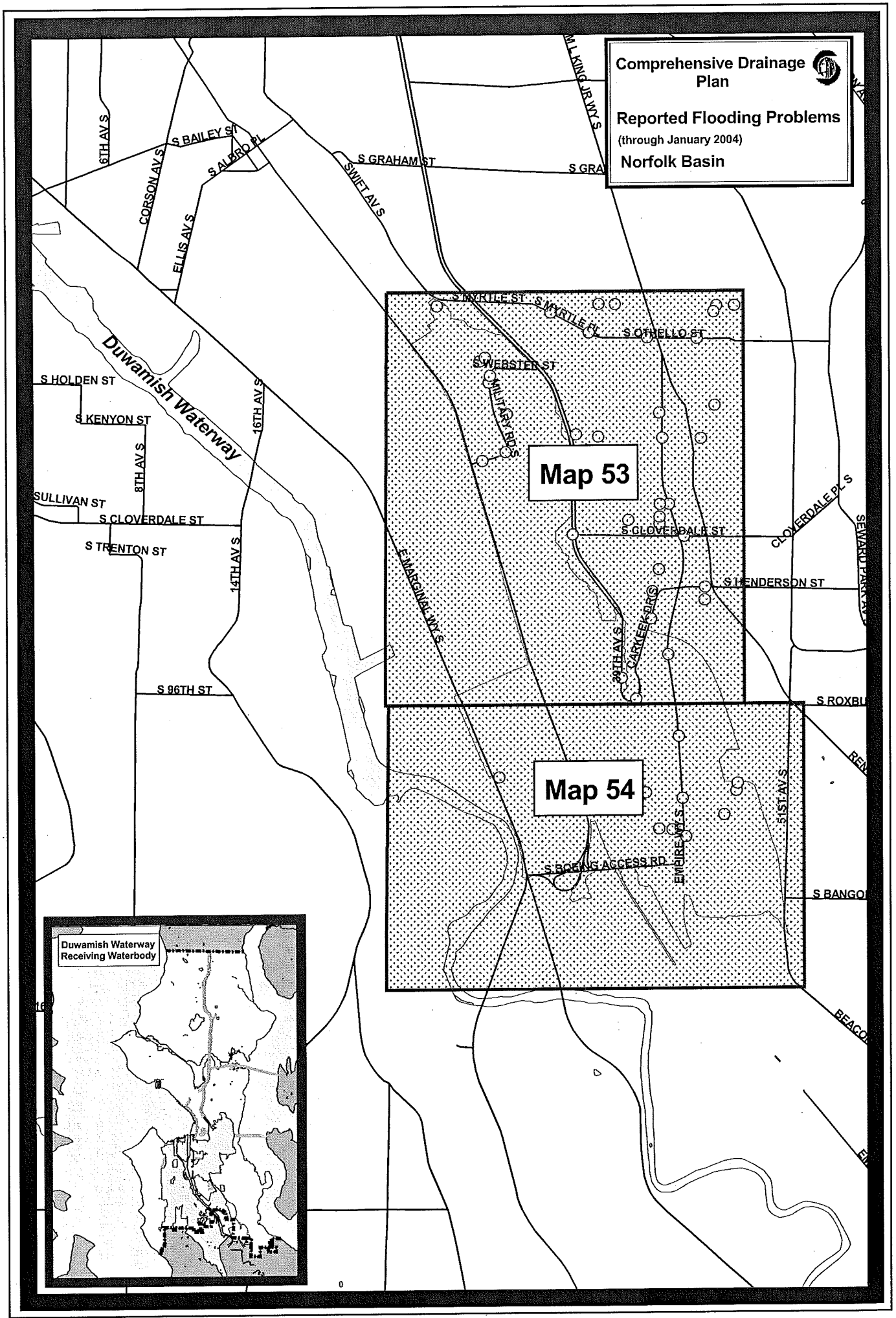

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
South Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
300 0 300 600 900 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
Map 48

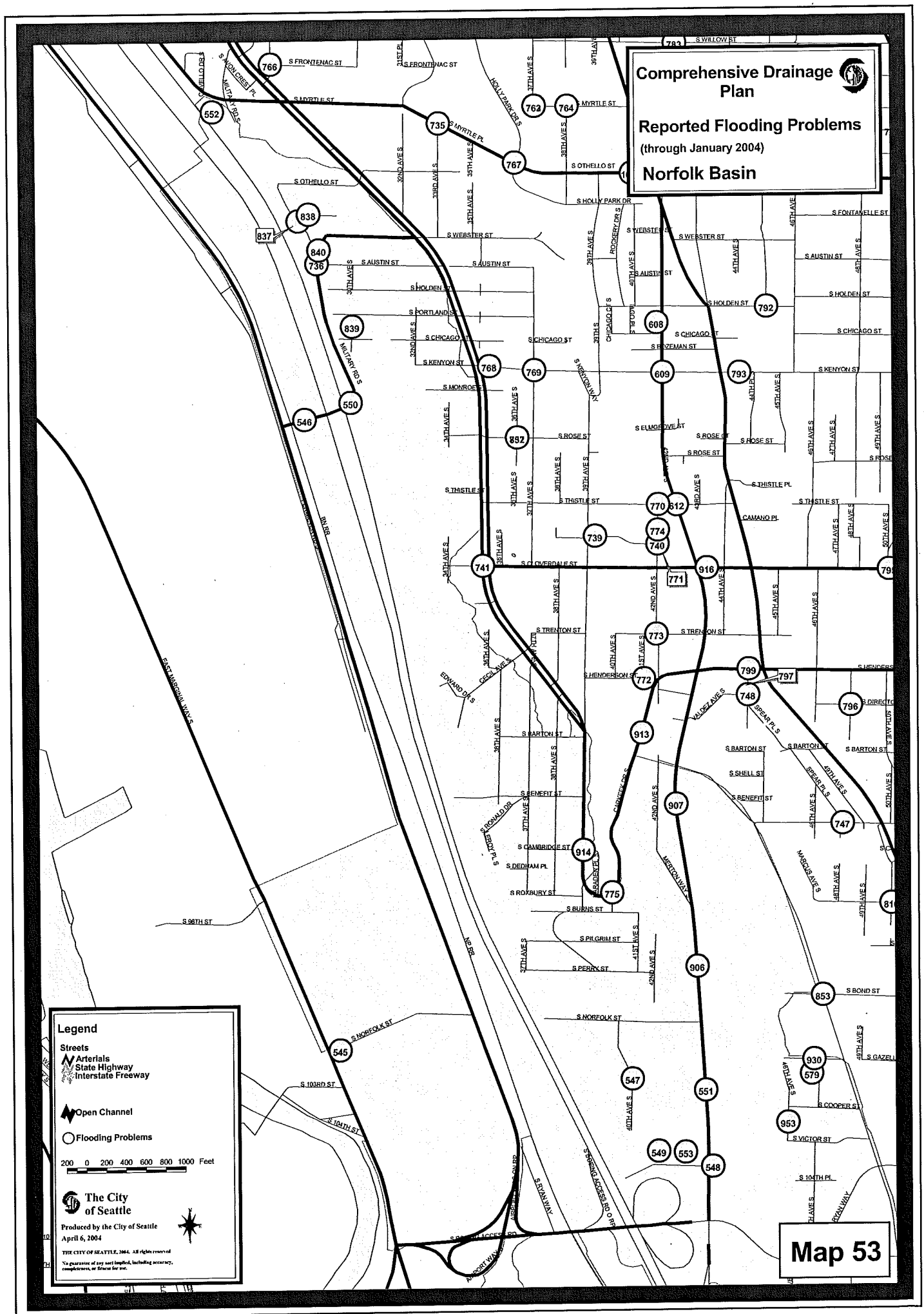

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
South Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
300 0 300 600 900 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
Map 49

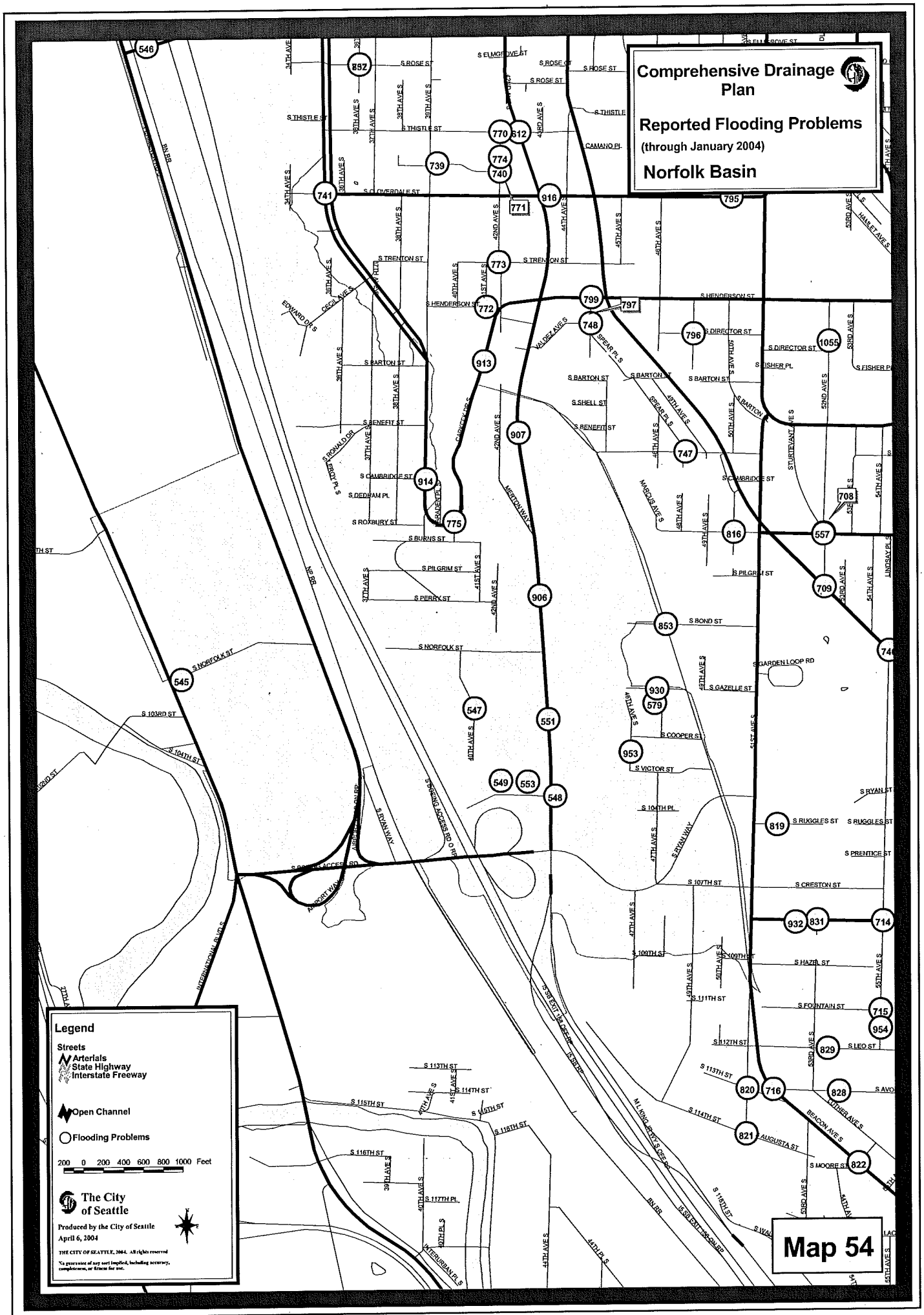

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
South Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
300 0 300 600 900 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
Map 50

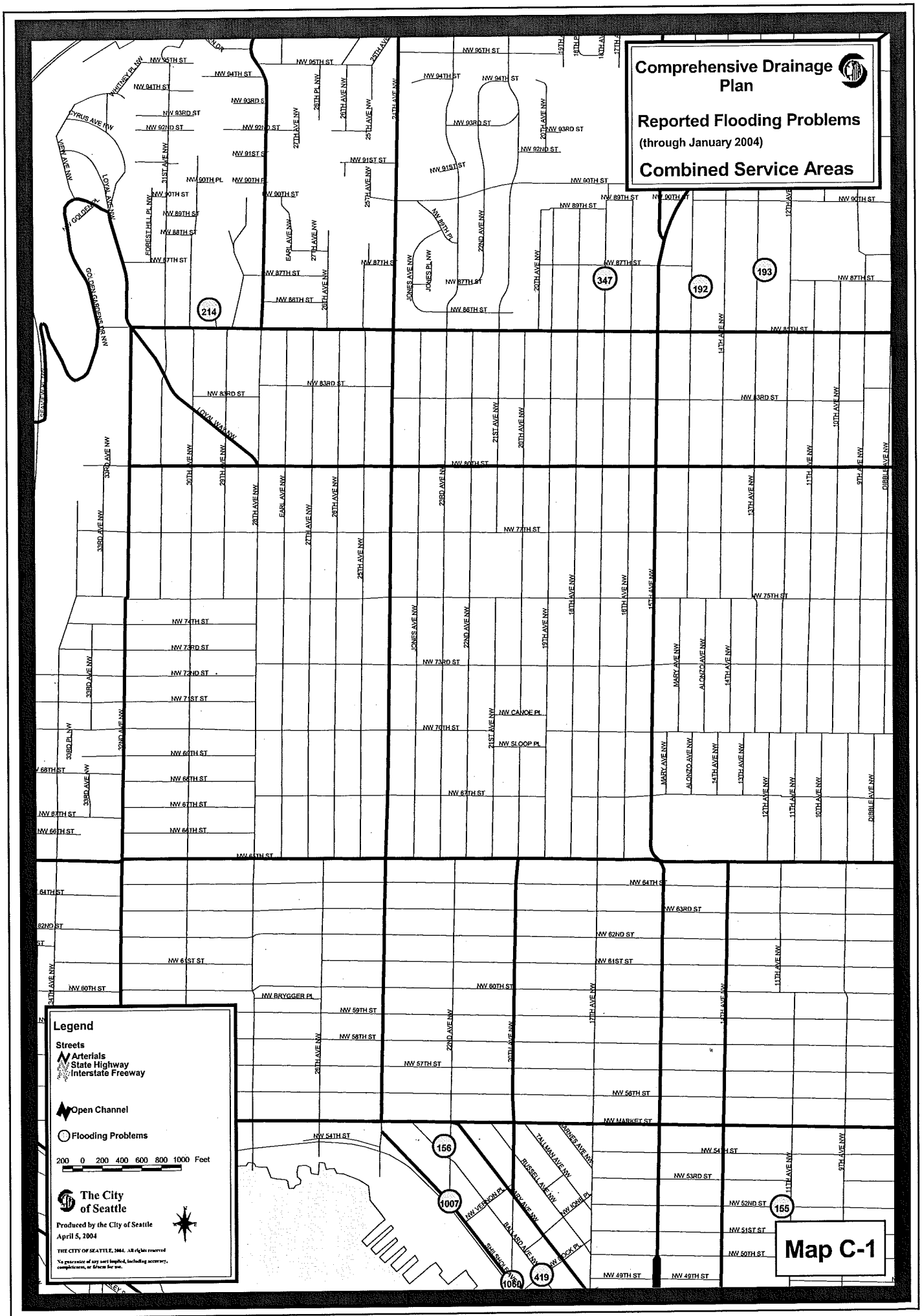

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
South Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
300 0 300 600 900 Feet
The City of Seattle
Produced by the City of Seattle
Apr 27, 2004
Map 51

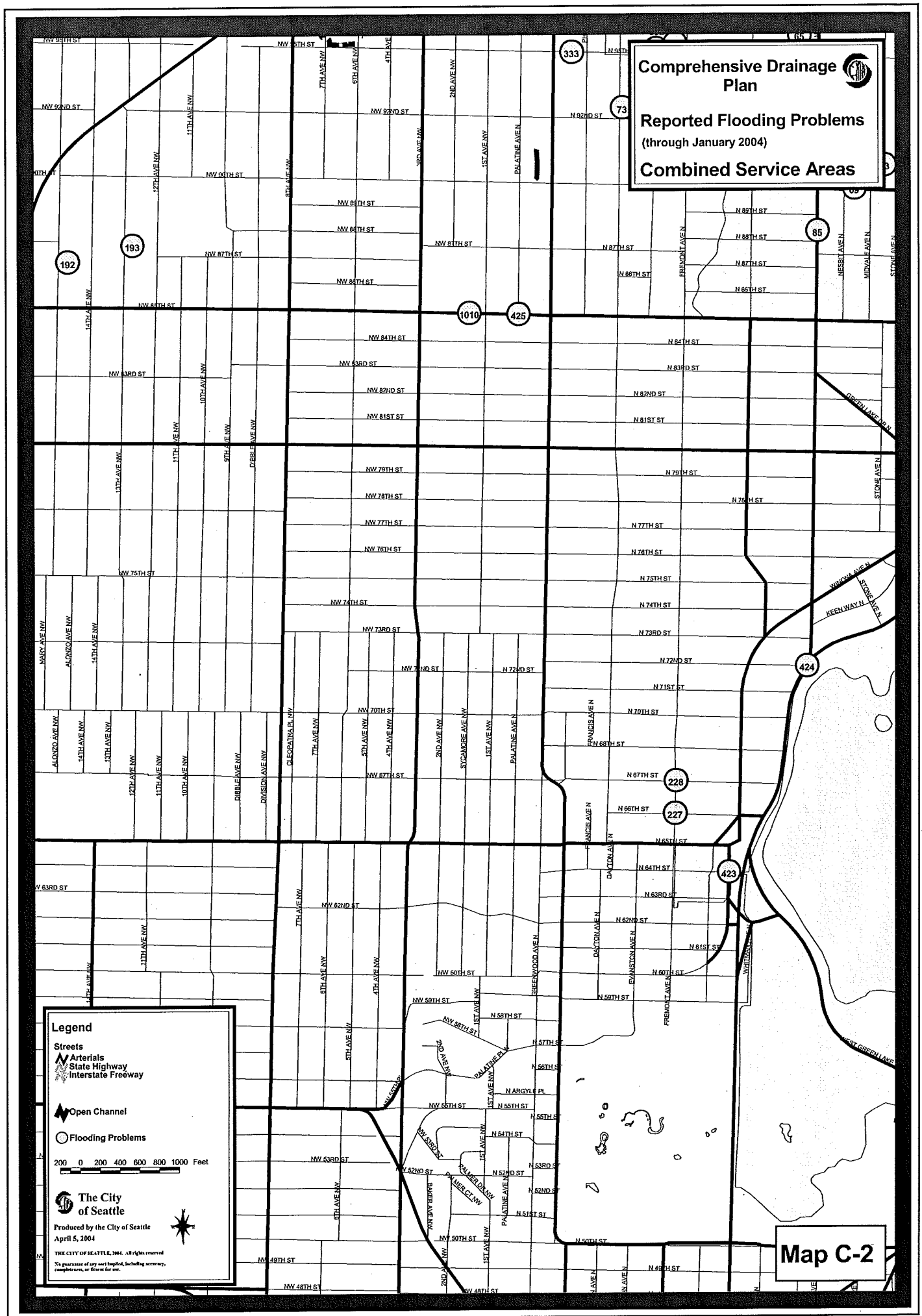

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
South Lake Washington
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
300 0 300 600 900 Feet
The City of Seattle
Produced by the City of Seattle
April 7, 2004
Map 52

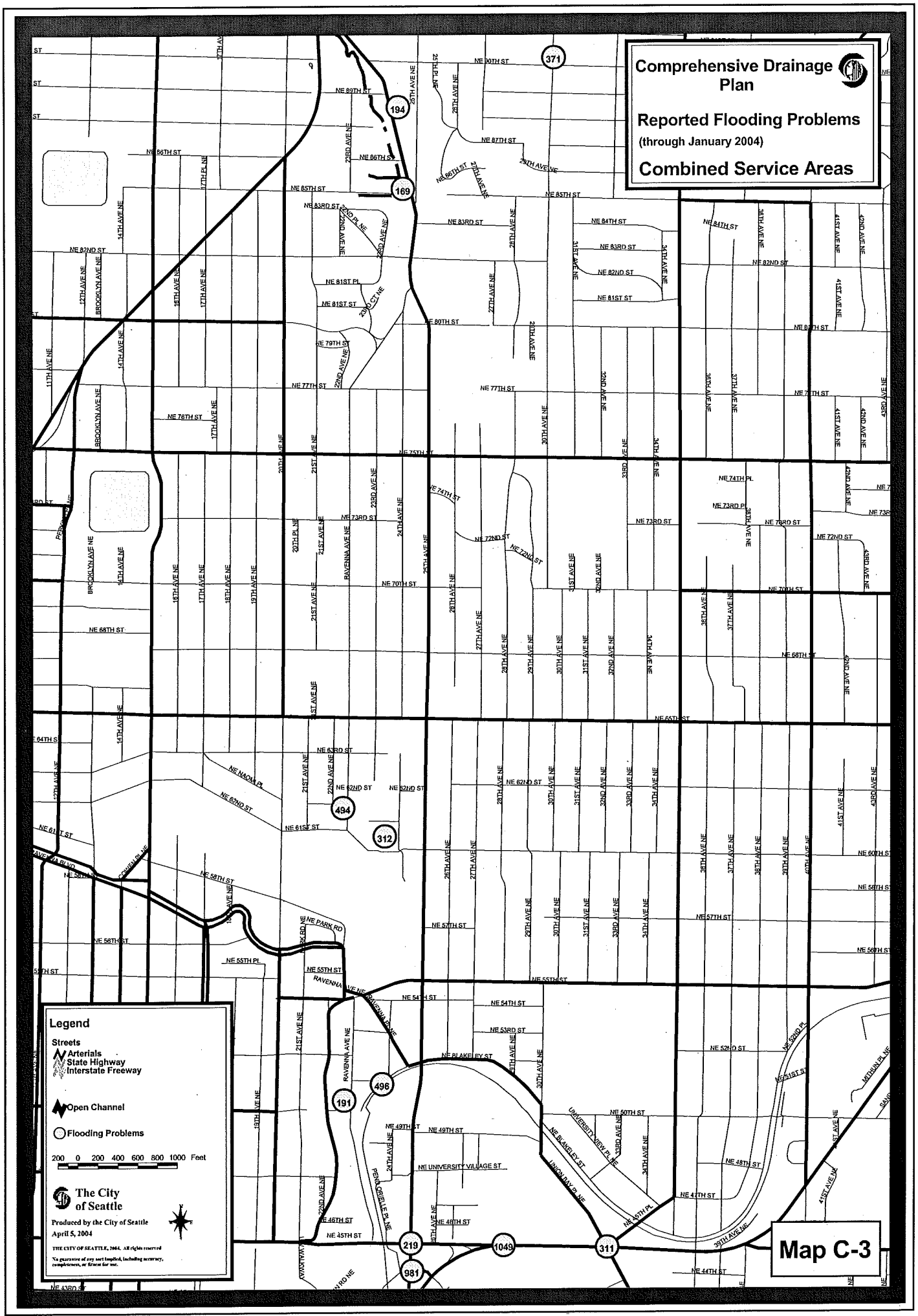

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Norfolk Basin
Map 53
Map 54
Duwamish Waterway
Duwamish Waterway Receiving Waterbody
6TH AV S
CORSON AV S
S BAILEY ST
S ALBRO PL
ELLIS AV S
S GRAHAM ST
SWIFT AV S
S HOLDEN ST
S KENYON ST
8TH AV S
SULLIVAN ST
S CLOVERDALE ST
S TRENTON ST
16TH AV S
14TH AV S
S 96TH ST
S MYRTLE ST
S MYRTLE PL
S OTHELLO ST
S WEBSTER ST
MILITARY RD S
E MARGINAL WY S
39TH AV S
CARKEEK DR S
S HENDERSON ST
CLOVERDALE PL S
SEWARD PARK AV S
S ROXBU
51ST AV S
EMPIRE WY S
S BOEING ACCESS RD
S BANGO
BEACO

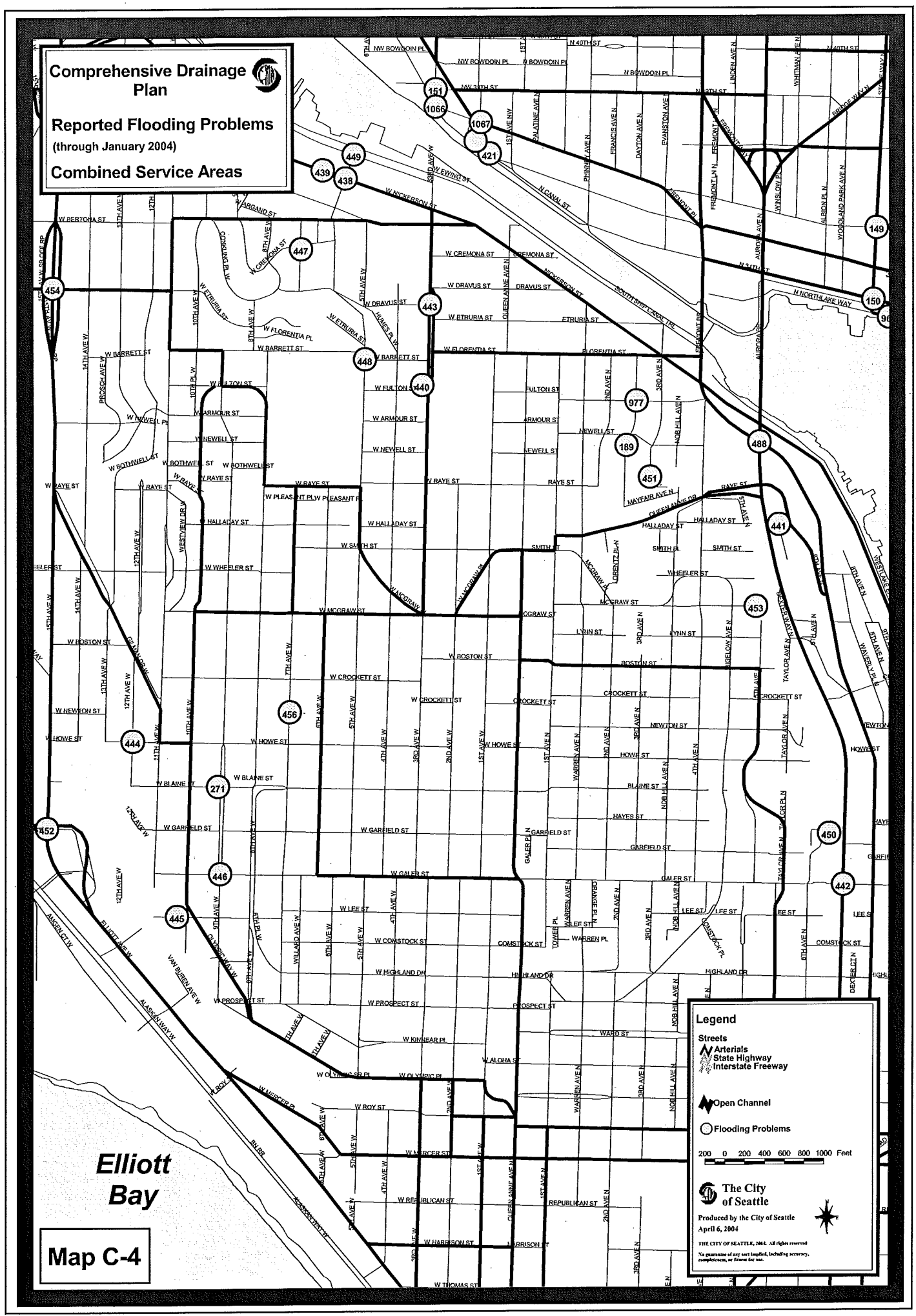

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Norfolk Basin
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved.
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 53

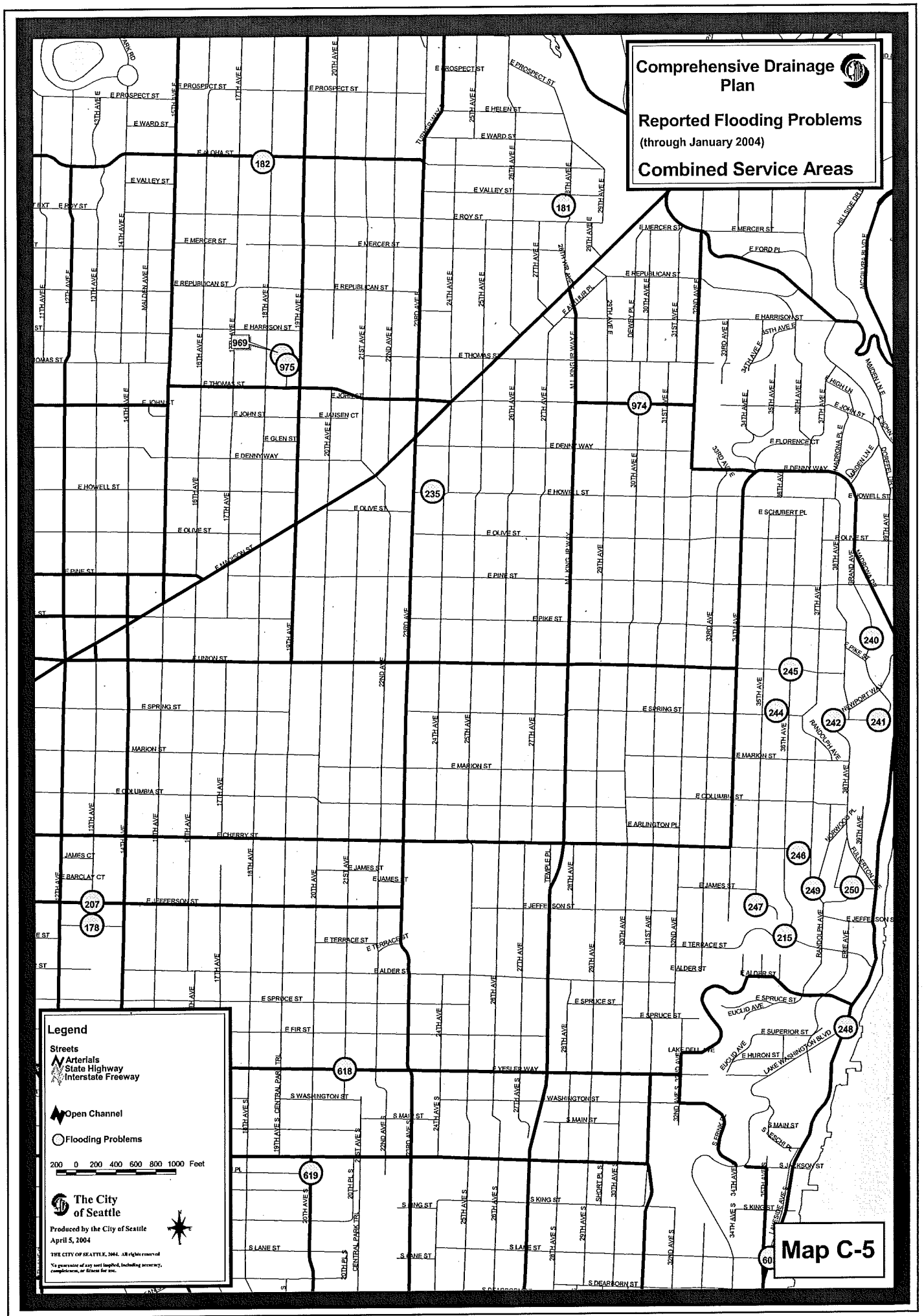

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Norfolk Basin
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map 54

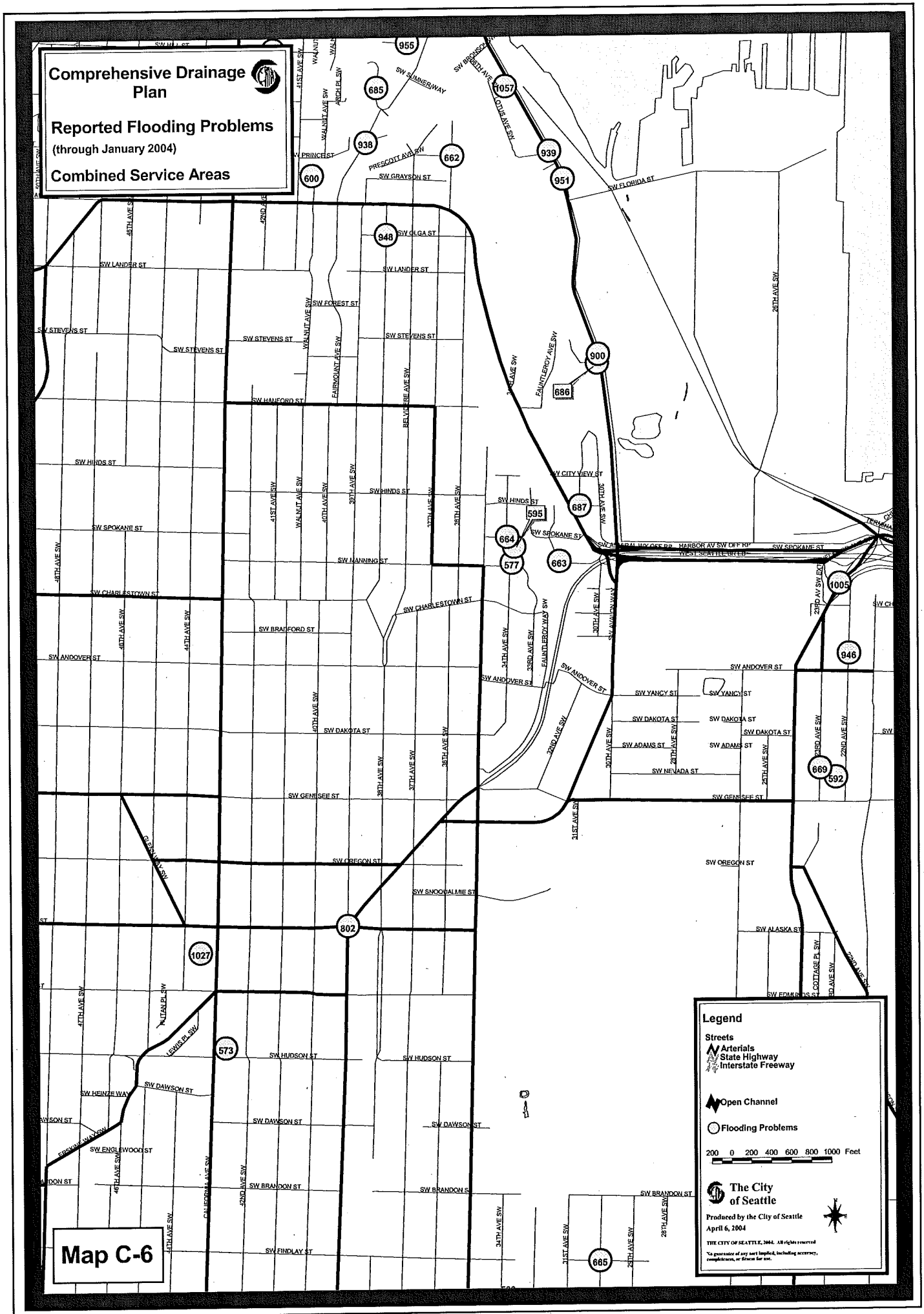

Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Combined Service Areas
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 5, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map C-1
214
347
192
193
156
1007
1060
419
155
NW 95TH ST
NW 94TH ST
NW 93RD ST
NW 92ND ST
NW 91ST ST
NW 90TH ST
NW 89TH ST
NW 88TH ST
NW 87TH ST
NW 86TH ST
NW 85TH ST
NW 83RD ST
NW 80TH ST
NW 77TH ST
NW 75TH ST
NW 74TH ST
NW 73RD ST
NW 72ND ST
NW 71ST ST
NW 70TH ST
NW 69TH ST
NW 68TH ST
NW 67TH ST
NW 66TH ST
NW 65TH ST
NW 64TH ST
NW 63RD ST
NW 62ND ST
NW 61ST ST
NW 60TH ST
NW 59TH ST
NW 58TH ST
NW 57TH ST
NW 56TH ST
NW MARKET ST
NW 54TH ST
NW 53RD ST
NW 52ND ST
NW 51ST ST
NW 50TH ST
NW 49TH ST
NW BRYGGER PL
NW CANOE PL
NW SLOOP PL
NW VERNON PL
NW IONE PL
NW DOCK PL
LOYAL WAY NW
GOLDEN GARDENS DR NW
CYRUS AVE NW
VIEW AVE NW
LOYAL AVE NW
WHITNEY PL NW
FOREST HILL PL NW
EARL AVE NW
JONES AVE NW
JONES PL NW
MARY AVE NW
ALONZO AVE NW
DIBBLE AVE NW
TALLMAN AVE NW
RUSSELL AVE NW
BALLARD AVE NW
SHILSHOLE AVE
33RD AVE NW
32ND AVE NW
30TH AVE NW
29TH AVE NW
28TH AVE NW
27TH AVE NW
26TH AVE NW
25TH AVE NW
24TH AVE NW
23RD AVE NW
22ND AVE NW
21ST AVE NW
20TH AVE NW
19TH AVE NW
18TH AVE NW
17TH AVE NW
16TH AVE NW
15TH AVE NW
14TH AVE NW
13TH AVE NW
12TH AVE NW
11TH AVE NW
10TH AVE NW
9TH AVE NW
31ST AVE NW
26TH PL NW
25TH PL NW
24TH AVE NW
20TH AVE NW
19TH AVE NW
18TH AVE NW
17TH AVE NW
16TH AVE NW
15TH AVE NW
12TH AVE NW
11TH AVE NW
10TH AVE NW
9TH AVE NW
DIBBLE AVE NW
33RD PL NW
33RD AVE NW
32ND AVE NW
24TH AVE NW
26TH AVE NW
27TH AVE NW
28TH AVE NW
29TH AVE NW
30TH AVE NW
31ST AVE NW
22ND AVE NW
21ST AVE NW
20TH AVE NW
19TH AVE NW
18TH AVE NW
17TH AVE NW
16TH AVE NW
15TH AVE NW
14TH AVE NW
13TH AVE NW
12TH AVE NW
11TH AVE NW
10TH AVE NW
9TH AVE NW
DIBBLE AVE NW
MARY AVE NW
ALONZO AVE NW
BARNES AVE NW
TALLMAN AVE NW
RUSSELL AVE NW
MARY AVE NW
BALLARD AVE NW
SHILSHOLE AVE
NW VERNON PL
NW IONE PL
NW DOCK PL


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Combined Service Areas
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 5, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map C-2


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Combined Service Areas
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 5, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map C-3
371
194
169
494
312
496
191
219
1049
311
981


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Combined Service Areas
Elliott Bay
Map C-4
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Combined Service Areas
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 5, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map C-5


Comprehensive Drainage Plan
Reported Flooding Problems
(through January 2004)
Combined Service Areas
Legend
Streets
Arterials
State Highway
Interstate Freeway
Open Channel
Flooding Problems
200 0 200 400 600 800 1000 Feet
The City of Seattle
Produced by the City of Seattle
April 6, 2004
THE CITY OF SEATTLE, 2004. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
Map C-6
SW SUMNER WAY
SW PRINCE ST
PRESCOTT AVE SW
SW GRAYSON ST
SW FLORIDA ST
SW OLGA ST
SW LANDER ST
SW FOREST ST
SW STEVENS ST
SW HANFORD ST
SW HINDS ST
SW CITY VIEW ST
SW SPOKANE ST
SW MANNING ST
SW CHARLESTOWN ST
SW BRADFORD ST
SW ANDOVER ST
SW YANCY ST
SW DAKOTA ST
SW ADAMS ST
SW NEVADA ST
SW GENESEE ST
SW OREGON ST
SW SNOQUALMIE ST
SW ALASKA ST
SW EDMUNDS ST
SW HUDSON ST
SW DAWSON ST
SW HEINZE WAY
SW ENGLEWOOD ST
SW BRANDON ST
SW FINDLAY ST
FAUNTLEROY AVE SW
FAUNTLEROY WAY SW
HARBOR AV SW OFF RP
WEST SEATTLE BR LB
GLENN WAY SW
LEWIS PL SW
ERSKINE WAY SW
CALIFORNIA AVE SW
955
685
1057
938
662
939
951
600
948
900
686
687
595
664
577
663
1005
946
669
592
802
1027
573
665

APPENDIX D

Program Area Prioritization Schemes

Contents:

Stormwater and Flood Control Prioritization

Landslide Mitigation Prioritization

Water Quality Prioritization

Habitat Prioritization

Stormwater and Flood Control Prioritization

Project Prioritization Scheme for Stormwater and Flood Control Program

Objective:

Prioritize proposed stormwater conveyance capital improvement projects with respect to the goals of the Stormwater and Flood Control Program. After this process, the city will use a separate, integrated prioritization scheme to rank projects from all the program areas in the Drainage Program. The results of this prioritization scheme can also provide information for scheduling projects.

Goals:

- Provide a prioritization scheme that is simple and easy to apply to a variety of types of projects.
- Use the prioritization scheme from the 1995 comprehensive drainage plan as a basis and incorporate methods, needs, and goals identified since then.
- Make this a quantitative scheme so that the process is less subjective than in previous years.
- Consider the priority that SPU gives to protecting against flooding of each service area type (arterials, residential structures, non-building property, etc.).
- Reflect the goals and values of SPU's mission as stated in the comprehensive drainage plan and other programs (neighborhood plans, watershed action plans, community objectives, etc.).

Method:

Use a systematic, weighted point system to evaluate the priority for implementing each project based on its service area type and on several other evaluation criteria defined by SPU. Each project receives a low, medium, or high rating for the service area type and for each of the other evaluation criteria.

The primary factor in this prioritization is the service area type affected by flooding. This scale is called the "service type factor."

Other evaluation criteria include:

- Flood control (extent of flooding and frequency of flooding)
- Infrastructure management
- Implementation/phasing ability
- Cost/benefit and funding
- Customer service
- Consistency with other city programs
- Environmental stewardship
- Special considerations.

To rank a project, each evaluation criterion is first given a score of 1, 2, or 3 (reflecting low, medium or high, respectively). However, these evaluation criteria are not considered equally and some of the criteria are considered more important. To account for this, the evaluation criteria are also given a weight value that is applied to its score. Once all of criteria have been "evaluated" (given a score of 1, 2, or 3) and "weighted" (multiplied by the weighting factor), the results are added together to yield a raw score. Finally, this raw score is multiplied by the service area factor to achieve that project's overall score. After the projects have been scored, they are ranked by their overall scores. The projects with the highest scores are the highest priority projects.

It is recognized that projects will not always be implemented in the order of highest overall score. There will be situations where other factors affect when a project can be implemented. For example, a high priority project may be delayed because of difficult property acquisition issues or difficult permitting issues. Another example may occur when a lower priority project is located directly downstream of a higher priority project. In this situation, there could be potential negative impacts by implementing the upstream higher priority project first because it could result in higher flows downstream and worsen the downstream problem.

Service Type Factor:

The service type factor reflects the relative importance that SPU gives to protecting against flooding in the different service area types. The service area types and their relative weights are as follows:

Residential buildings	1.0
Critical services	1.0
Major transportation routes	0.7
Commercial/industrial buildings	0.7
Nonarterials	0.5
Roadway shoulder	0.2
Non-building flooding	0.1

If a project would solve a flooding problem that affecting multiple service areas, the highest service type factor is used. For example, if a project eliminates a flooding problem that affects residential buildings and a non-arterial street, that project would receive a service type factor of 1.0.

Evaluation Criteria:

This section includes descriptions of each of the evaluation criteria that SPU has defined. Table 1 lists the criteria and the issues that should be considered when evaluating them. Table 2 explains the scoring system (evaluation considerations and weighting factors) for the evaluation criteria.

Table D-1

Stormwater Conveyance Evaluation Criteria

Flood Control: Improved protection from flooding is divided into two separate criteria, one that considers the extent and severity of flooding and one that considers the frequency of flooding. Projects that protect health and safety are ranked higher than projects that protect against property damage. Also, projects that affect a larger area or address problems that are pervasive in an area such as a neighborhood should be ranked high. These criteria and their considerations include:

- Extent of Flooding: Number of locations flooded; improves public safety; improves property protection.
- Flood Frequency: Reduces in the frequency of flooding.

Infrastructure Management: This criterion considers the degree to which the project improves the capacity, reliability, or integrity of the system. Considerations include whether the project:

- Improves system capacity, reliability, and integrity
- Responds to documented deficiencies
- Significantly reduces risks to health, life, or property
- Is critical to system operation or is a required predecessor of other projects
- Improves operation of the drainage system and/or reduces operation and maintenance costs
- Links with other public or private projects
- Updates and/or replaces obsolete or unsafe facilities
- Considers risk and consequence of failure of the project.

Consistency with Overall Program Objectives: This criterion considers the degree to which a project meets the overall program objective to "protect people and prevent roads and property from flooding" and its consistency with the legal limitations on the way public utility funds must be used. Considerations include:

- Degree to which the project is determined to have a direct linkage to drainage infrastructure capacity, condition, and availability
- Project's dependence on and relation to other types of public or private improvements
- The types of legal authority or directive under which the projects are initiated.

Implementation/Phasing Ability: This criterion gives priority to projects that can be implemented more easily or that can potentially be constructed in phases. Considerations include:

- Ease of project implementation (considering funding, permits, property acquisition issues, coordination with other department/agencies)
- Ability to phase the project (implement projects in financially affordable phases; achieve system improvements while maintain system integrity).

Customer Service: This criterion looks at the project from a city-wide customer service standpoint and considers whether the project:

- Provides increase value and satisfaction for customers
- Benefits a significant number of customers
- Provides a geographic balance of improvements within the city
- Balances special interest group input with the benefits to the general public

- Considers aesthetics and quality of life.

Environmental Stewardship: This criterion evaluates consistency with SPU's environmental goals and considers whether the project:

- Balances environmental and operation costs
- Is consistent with SPU's environmental objective to protect habitat and improve water quality
- Mitigates documented environmental impacts
- Reduces SPU's regulatory liabilities
- Promotes environmental stewardship.

Consistency with Other City Programs: This criterion evaluates consistency with objectives set by other city plans and programs including:

- Neighborhood plans
- Watershed action plans
- Community and environmental objectives
- City comprehensive plan and land use regulations
- Regulations and other legal considerations.

Special Considerations: This criterion can be used as a tie breaker and should consider aspects of the project factors not considered in other criteria. For example, this criterion can consider what other benefits the project would provide in terms of achieving the overall objectives and direction of the drainage program.

Table D-2 – Evaluation Criteria and Scoring					
Criterion	Definition or Intent	Weighting Factor	Score		
			1 (Low)	2 (Medium)	3 (High)
Extent of Flooding	Considers magnitude of flooding problem. Emphasizes health and safety over protection of property	1.0	1 property or road area affected	1 to 4 properties or road areas affected	5 to 9 properties or road areas affected, or a "neighborhood" problem
Frequency of Flooding	Considers how often flooding occurs and emphasizes problems that occur more frequently	1.0	Infrequent flooding (approx. >10-yr)	Moderate (approx. 2-yr to 10-yr)	Frequent (approx <2-yr)
Infrastructure Management	Considers degree to which the project improves system capacity, reliability, and integrity	1.0	Consider degree of improvement of system capacity, reliability, and integrity; and reduction of potential for loss of life or property. Score low, medium, or high. See Table 1 for additional considerations		
Consistency with Overall Program Objectives	Considers degree to which a project meets overall program objective to "protect people and prevent roads and property from flooding" and consistency with the legal limitations on how public utility funds must be used.	0.7	Low degree of confidence in meeting program objectives; low link between problem and drainage infrastructure	Moderate degree of confidence in meeting program objectives; partial link between problem and drainage infrastructure	High degree of confidence in meeting program objectives; clear link between problem and drainage infrastructure
Implementation/ Phasing Ability	Credits projects that can be implemented more easily or that have the potential to be implemented in phases	0.7	More difficult to implement. Little to no opportunity for phasing	Moderate difficulties expected for implementation. Some opportunity for phasing	Few difficulties expected for implementation. Phasing easily incorporated into project
Customer Service	Considers project from a city-wide customer service standpoint (factors such as public interest, geographic balance, quality of life, etc.)	0.5	Minimal public interest; does not reflect geographic balance	Moderate public interest	Strongly backed by public; promotes geographic balance; benefits significant number of customers
Environmental Stewardship	Considers consistency with SPU's environmental goals	0.5	Minimal benefit to meeting SPU habitat and water quality goals	Moderate benefit to meeting SPU habitat and water quality goals	High benefit to meeting SPU habitat and water quality goals
Consistency with Other City Programs	Considers consistency with other City objectives	0.5	Consider the consistency of the project with neighborhood plans, watershed action plans, community and environmental objectives, City comprehensive plan and land use regulations, regulations and other legal considerations. Score low, medium, or high		
Special Considerations	Provides some flexibility in considering other factors	0.5	Consider other project factors and opportunities that are not considered above. Consider benefits the project would provide in terms of achieving overall objectives and direction of the drainage program. Score low, medium, or high		
Note: The details provided in the high, medium, and low categories are examples provided for guidance. Engineering judgment should be used when scoring projects for each criterion.					

Landslide Mitigation Prioritization

Landslide Mitigation Ranking and Prioritization Criteria

The scoring system that was adopted for the rating of the landslide mitigation projects has its background in the rockfall rating systems of the Colorado and Oregon departments of transportation. The rockfall rating systems were adapted to landslide hazards for work on the national highway system in the Andes of Peru and for highways and railroads in the western United States. This system uses a logarithmic progression, from 3 to 81 points, to score the criteria at each site. Because not all criteria are of equal importance, a weighting factor is assigned to each criterion that reflects its importance to the city. The weighting factors range from 1 to 4. For example, the highest weighting factor (wf) is 4 for public safety. A more detailed explanation of the application of this ranking and prioritization system can be found in *Seattle Landslide Study Prioritization Report, Seattle, Washington*, prepared for Seattle Public Utilities by Shannon & Wilson, 2000.

Nine criteria comprise the rating matrix for the potential landslide mitigation projects. They represent the impacts that can be incurred by a landslide, the characteristics of a landslide, and factors related to implementing the mitigation and are described below.

Landslide Features: The level of hazard of a landslide area is partially determined by the physical characteristics of the landslide. Three physical criteria were deemed most influential in ranking the landslide areas throughout the city.

- Likelihood of failure - an estimate of the recurrence interval in between landslide events on an adjacent section of slope. The more often a section of slope has failed in the past, the more likely it is that it will fail in the future, so therefore the higher the likelihood that it may cause harm to facilities or people on or adjacent to the slope.
- Size of failure - the approximate volume of material that may move in a single landslide event. A larger landslide is likely to cause more damage to facilities, block streets, or injure people than small surficial landslides.
- Existing slope modification by the city - measure of the disturbance of the subject hillside and whether any engineering works have been performed to enhance stability. If a slope is disturbed and has not been stabilized, it has a much higher likelihood of failure than a slope that has been left undisturbed.

Impact Features: The level of hazard to the city and to the public is also determined by the people and facilities that could be impacted by landslide activity.

- Public Safety - measure of the relative risk to the public in terms of individuals and/or living structures in the path of landslide debris.
- Inconvenience to people, freight and commerce - the approximate length of time that they could expect to be blocked by a landslide; until full functionality would be restored to the public.
- Criticality of city facility - a measure of relative importance of the city street (based on average daily traffic) and buried utility pipes (based on the diameter of the pipeline). It

could also include critical building facilities, such as hospitals, fire stations and police stations; however, a survey of the city did not indicate that any of these were located in landslide-prone areas.

- Vulnerability of city-owned facilities to being impacted by a landslide - the degree to which the facility is or is not in the direct path of the landslide and whether protective measures have been implemented to protect the facility from the landslide.
- Vulnerability of city-owned facilities to have an impact on other facilities or worsen the situation if it failed - the likelihood of the event to affect the size or risk of the failure and whether protective measures have been implemented to protect the facility.

Other Factors:

- Potential for cooperation on projects - measure of the potential to leverage funds in a slope stabilization project. If more parties, such as other city departments, other jurisdictions or private property owners, are involved in the mitigation of a landslide, the costs can be shared, making it more likely that the project can be funded and constructed.
- Maintenance necessary for full functionality - an approximation of the annual maintenance costs required for the project once it has been constructed.

Potential projects to be included in the 2004 Comprehensive Drainage Plan were elicited from three lists: 1) 50 sites from SPU's Seattle Landslide Study Prioritization Report, 2) 24 sites from SDOT's Slope Reconnaissance for 24 High-Priority Arterial Street Segments, and 3) 35 additional sites where SPU utilities are located in landslide-prone areas. Of these 109 sites in the city, 36 contain SPU utilities that are considered to be at risk from landslides.

The range of scores for the 36 sites was 315 to 1,467, the average was 819, and the median was 803 points. After evaluating the distribution of the prioritization scores, the high priority was chosen to be those projects that scored 900 points or more. The medium priority projects were defined as those scoring between 700 and 900 points. Low priority projects scored 699 points or less.

Criticality Ranking of Potential City Landslide Projects Relating to City-Owned Facilities and Properties.

Criteria	Definition or Intent	Weighting Factor	Score			
			3	9	27	81
Public safety	Relative risk to the public	4	No people in path of debris *(Blockage of non-arterial streets and/or no residential units in path)*	Single person occasionally in path of debris *(Blockage of non-arterial streets and/or no residential units in path)*	Few people in path of debris on regular basis *(Blockage of minor arterial streets and/or 3-10 residential units in path)*	Large concentration or constant presence of people in path of debris *(Blockage of principal arterial streets and/or more than 10 residential units in path)*
Inconvenience to people, freight and commerce	Length of time before full functionality and services are restored	3	Rarely inconvenient	Blockage of passage for 1-4 hours	Blockage of passage for 5-24 hours	More than one day blockage
Criticality of city facility	How critical the facility is to delivery or access of public services	3	No city facilities present except for streets w/≤ 1k ADT	Unoccupied facilities and no lifeline services (e.g. 1k< ADT ≤ 5k SD ≤15", SS/CS ≤8")	Facility periodically occupied or slight change in interruption of public services (e.g. W ≤18, 8"< SD ≤36", 15"< SS/CS ≤24", 5k< ADT ≤15k)	Critical facility for lifeline services (e.g .>15k ADT, SD >36", SS/CS >24", W >18)
Vulnerability of city-owned facility	Potential for a city-owned facility to be impacted and protective measures in place	3	Remote chance of impact	Directly in path and adequate protective measures in place	Directly in path and minor protective measures in place	Directly in path and no protective measures in place
	Potential for a city-owned facility to affect the size/potential for failure and the protective measures in place	3	No effect on potential slide	Minor effect on size/potential slide and adequate protective measures in place	Some potential for affecting the size/potential for failure and minor protective measures in place	Likely to affect the size/potential for failure and no protective measures in place
Likelihood of failure	Potential recurrence interval between slide events	3	>100 years	50-99 years	10-49 years	<10 years
Size of failure	Approximate amount of material that may move in an event	2	<5 cu yds	6-99 cu yds	100–999 cu yds	>1,000 cu yds
Existing slope modification by the city	Modification of the slope by the City	2	Undisturbed	Disturbed but engineered	Slightly disturbed and not engineered	Disturbed and not engineered
Potential for cooperation (goodwill, innovation) on projects (public & private)	Potential to leverage funds	1	Single department responsible for repair/mitigation	Two departments willing to repair/mitigate site	Two departments plus private property owners willing to repair/mitigate site	Three departments plus private property owners willing to repair/mitigate site
Maintenance necessary for full functionality	Annual maintenance costs required to restore full functionality	1	≤$1,500	$1,500-$2,999	$3,000-$14,999	>$15,000
Cost/benefit analysis	Evaluation of project life cycle costs vs. potential damage costs if project not implemented	<1 or >1				

ADT = average daily traffic SD = storm drain SS = sanitary sewer CS = combined sewer W = water main

Water Quality Prioritization

Water Quality Program Prioritization Criteria

Program-specific criteria used to rank individual projects and programs selected for implementation are described in Table D-1 below.

Table D-1. Water Quality program and project evaluation criteria

Prioritization Criteria	Applicability Project	Applicability Program
Effectiveness in alleviating a known problem: The following factors are considered when evaluating whether a specific project or program meets the overall objective of targeting known water quality problems and activities:		
▪ Targets specific water/sediment quality problem	X	X
▪ Reduces pollution in area tributary to high priority receiving water body	X	X
▪ Targets specific pollution-generating activity with high level of impact		X
▪ Ability to remove or reduce concentrations of known problem chemicals	X	X
Analysis supports ongoing efforts: Credits activities that are needed for development or maintenance of the overall Water Quality Program. Types of activities that are considered include:		
▪ Needed for program development (e.g., drainage basin boundary delineation, code revisions to clarify City pollution prevention authority)		X
▪ Essential business analysis (e.g., maintaining rating curves for flow monitoring stations)		X
▪ Research and development of information needed to guide future policy and programs (e.g., testing performance of new technologies for treating stormwater)	X	X
Regulatory requirement or identified in approved plan: Accounts for projects and programs that are either required by code/permit or have already been evaluated through another process such as:		
▪ Projects triggering code requirement	X	
▪ NPDES permit requirements	X	X
▪ SPU basin plan or watershed action plan	X	X
Community interest/acceptance: The following factors are considered when evaluating whether a specific project or program will satisfy community interests:		
▪ Ability of project to address community concerns for aquatic health, safety, and aesthetics	X	
▪ Ability of program or project to meet community-identified need or provide meaningful stewardship opportunity		X
Multi-purpose use: This criterion credits projects that serve more than one function:		
▪ Flood control projects that incorporate water quality features	X	
▪ Stormwater treatment to support a habitat restoration project	X	

Prioritization Criteria	Applicability Project	Program
***Cost effectiveness/ease of implementation and maintenance*:** Credits projects and programs that can be implemented more easily and projects that will be easy to maintain. Considerations include:		
▪ Ability to complete using existing resources/leverage with other ongoing work		X
▪ Availability of outside funding (grants, cost sharing with other agencies)	X	X
▪ Frequency of required maintenance	X	
▪ Ability of DWD field crews to maintain (e.g., special equipment needs, access)	X	

Habitat Prioritization

Habitat Program Prioritization Criteria

Program-specific criteria used to rank individual projects and programs selected for implementation are described in Table D-1 below.

Table D-1. Habitat program and project evaluation criteria

Prioritization Criteria	Applicability	
	Project	Program
Priority Species: Identifies whether a project or program benefits a priority aquatic species, such as a federally listed species (i.e. Chinook), candidate and/or state priority species (i.e., coho)	X	X
Biological effectiveness: Credits activities that support biological functions of aquatic systems, such as increasing habitat complexity, distribution, connectivity and/or contributes to genetic diversity; and protecting and improving habitat critical to an important salmon life stage.	X	X
Natural Processes: Protects, improves and/or removes impacts to important land or water processes and features that produce and sustain habitat, such as creation of flood plains and removing riprap.	X	X
Analysis supports ongoing efforts: Credits research activities that are needed for development or maintenance of the overall Habitat Program. It includes essential monitoring (e.g., spawning surveys, stream surveys) and research needed for program development (e.g., improved understanding of to manage storm flows to reduce impacts to aquatic life).		X
Regulatory requirement or identified in approved plan: Accounts for projects and programs that are either required by code/permit or have already been evaluated through another process such as:		
▪ Early Action Response agreed to by Council/Mayor or intergovernmental group	X	X
▪ Specifically required as part of legal settlement, adopted HCP, actively enforced law, etc	X	X
Community interest/support: The following factors are considered when evaluating whether a specific project or program will satisfy community interests:		
▪ Identified in an approved watershed plan and/or neighborhood plan		
▪ Ability of project to address community concerns for safety and aesthetics	X	
▪ Ability of project or program to meet community-identified need or provide meaningful stewardship opportunity		X
Multi-purpose use: Project or program directly benefits Habitat, as well as other City efforts (conveyance, water quality, landslide protection, etc.):	X	X
Outcome and effect: Credits projects and programs where the proposed outcome and effect are predictable and measurable. Projects and programs with uncertain outcomes require additional study before they can be implemented.	X	X
Cost effectiveness/ease of implementation and maintenance: Credits projects and		

Prioritization Criteria	Applicability	
	Project	Program
programs that can be implemented more easily and projects that will be easy to maintain. Considerations include:		
▪ Ability to complete using existing resources/leverage with other ongoing work		X
▪ Availability of outside funding (grants, cost sharing with other agencies)	X	X
▪ Frequency of required maintenance	X	
▪ Ability of DWD field crews to maintain (e.g., special equipment needs, accessibility)	X	

APPENDIX E

Financial Program

E.1 Drainage Funding of Financial Policy Requirements

Chapter 10 discusses a series of Drainage and Wastewater Fund (DWF) financial policy targets which were adopted separately from the Comprehensive Drainage Plan. Most of these targets impose a requirement for revenue in addition to that needed to pay for operating expenses, and thus impact the drainage revenue requirement. The financial policy or combination of policies resulting in the greatest revenue requirement is called the "binding constraint". During most of the planning period, the binding constraint is the sum of cash used to fund capital programs and to maintain targeted cash balances.

Current DWF financial policies, adopted by City Council in mid-2003, require a significant increase in DWF cash balances and in the amount of operating cash which is targeted toward the funding of the capital improvement program. The policies provide for a gradual improvement in cash-related targets, with the requirement that DWF will fully meet adopted targets by 2007.

Formal policy targets are adopted for DWF as a whole. There are no specific targets for the drainage program or wastewater program. Table E-1 presents the current and 2010 projected contribution by the drainage and wastewater programs to cash balance and CIP cash financing targets.

Table E-1. DWF line of business cash financing and cash balance summary

(in millions of nominal $s)	2004	2010
Drainage		
YE Cash	$3.1	$1.5
Cash Financed CIP	$1.9	$6.5
% of Drainage CIP	12%	25%
Wastewater		
YE Cash	$3.9	$7.7
Cash Financed CIP	$2.9	$6.8
% of WW CIP	12%	25%
Fund		
YE Cash	$7.0	$9.3
Cash Financed CIP	$4.8	$13.2
% of DWF CIP	12%	25%

E.2 Alternative Funding Tools

SPU has identified several alternative funding tools which could potentially be used in addition to, or in some cases, as an alternative to current funding mechanisms. These include:

- Partnership opportunities/Integrated Drainage Plans (IDPs)
- Local Improvement Districts (LIDs)
- Voluntary Service Agreements
- Location-Specific Rates
- Connection Charges
- Development Charges

With the exception of IDPs, none of the tools noted above are currently being used to fund the drainage system. Following is a more detailed description of each tool.

E.2.1 Partnership Opportunities / Integrated Drainage Plans (IDPs)

IDPs are area-wide plans that respond to opportunities arising out of major development projects. IDPs typically involve a partnership between SPU and private/public developers to co-locate facilities that meet developer requirements with facilities that further the city's drainage goals. Major development projects may include:

- Urban center development
- Major transportation
- Civic projects

These projects may be funded in part or whole by voluntary contributions from developers/agencies to meet infrastructure or compliance requirements.

Advantages

- Can lower facility costs, provide recreational amenities, and locate facilities that would otherwise be difficult to site.

Disadvantages

- It is generally not possible to anticipate opportunities in advance.
- Some opportunities arise before SPU would otherwise be prepared to act, and can increase near-term expenditures.

Applicability to Drainage

Several partnership opportunities are included in the financial program of the Comprehensive Drainage Plan, such as the joint effort by SPU and Seattle Housing Authority (SHA) to integrate natural drainage systems in the SHA High Point Revitalization Plan's subdivision. Project. SPU expects to pursue such opportunities in the future, though they are not generally expected to reduce costs from those contained in the Comprehensive Drainage Plan.

Policy and Implementation Issues

Partnership opportunities are addressed on an ad hoc basis to take advantage of the mutual interest of developers and the city. Policy-level review of individual opportunities occurs during of approval of individual agreements and adoption of the Drainage CIP.

E.2.2 Utility Local Improvement Districts (ULIDs)

A Utility Local Improvement District (ULID) is a method for financing utility capital projects. A ULID can be created to pay for a project that benefits affected properties. Property owners are assessed for the project up to the amount of the special benefit they receive, but for no more than the project cost. This "amount of special benefit" is defined as the increase in fair market value of each property due to the project. The ULID formation process requires acceptance by defined percentages of affected property owners and contains mechanisms for an affected property owner to protest the assessment.

Advantages

- Generates new revenues without general rate increases.
- Provides a vehicle to address neighborhood interests that exceed normal utility levels of service.
- Can be structured to share project cost between property owners and the city.
- Payments can be deferred for seniors and low income owners by placing a lien on property rather than requiring annual payments.

Disadvantages

- Can be controversial and may fail due to lack of community support.
- If the project cost exceeds the special benefit, the amount fundable through a ULID will not cover the entire project cost.
- Total costs for the project are higher than an equivalent CIP project due to ULID administration costs.

- ULID revenues are not available until construction is complete, so interim (ie. rate) financing is required.

Applicability to Drainage

A ULID is not very applicable to a drainage-only project unless the current drainage situation is affecting property values, or the finished project includes additional benefits such as the aesthetics of Seattle's natural drainage projects. Street Edge Alternative Streets (SEA Streets) type drainage projects comprise about $16.8 million of the projects in the Comprehensive Drainage Plan.

Policy and Implementation Issues

In Seattle, ULIDs are most likely to be useful for financing Natural Drainage System projects. To evaluate the feasibility of a ULID, a next step is to evaluate how much property values are increased by these projects. If these projects do not have a significant impact on property values, it may be uneconomical to pursue ULID financing. The property value impact of natural drainage system projects can be analyzed by appraising properties in areas that are candidates for these projects.

Additional administrative costs would need to be included in the operating budget in order to develop individual ULIDs.

E.2.3 Voluntary Service Agreements

Seattle's Stormwater Code requires new and re-development to incorporate certain stormwater management features. Such features reduce impacts on the drainage system and the natural environment. Economies of scale may make it cheaper for SPU to build additional facilities that serve many developing properties instead of requiring each development to manage storm water on-site. SPU could enter into voluntary agreements with property owners to provide an enhanced level of service and thereby satisfy code-required stormwater management off-site.

Advantages

- Should reduce societal cost of storm water management through economies of scale.
- Complete facility maintenance is more likely at a centralized facility.
- Well-sited centralized storm water facilities can serve as a recreational and an aesthetic amenity for a community.

Disadvantages

- Probably does not increase net revenues – new revenues offset the cost of larger (i.e. more expensive) drainage facilities

- Centralized stormwater facilities may be difficult to site, particularly for large facilities or in areas with existing development.
- Care needs to be taken to satisfy regulatory requirements.
- If facilities are built in advance of voluntary service agreements, rate revenues would have to support the cost of excess central capacity built to accommodate later voluntary service agreements.

Applicability to Drainage

Voluntary service agreements can be structured for drainage services. Because the Comprehensive Drainage Plan focuses on defining and achieving basic drainage service levels, no costs or revenues associated with voluntary service agreements appear in this plan. Voluntary service agreements would increase the cost of the CIP, and this increased cost would be offset by agreement revenues.

Policy and Implementation Issues

Additional policy and procedure refinement are desired to implement voluntary service agreements. Such efforts would increase ratepayer costs in the near term. In the long term, this may reduce societal costs of development through economies of scale, but probably not enough to significantly affect the level of drainage rates.

E.2.4 Location-Specific Rates

A higher level of service is provided in some areas than in others. As a result, customers in the areas with higher service pay for this service through higher rates. For example, downtown electricity rates are higher than rates in the rest of Seattle to reflect the extra cost of undergrounding the downtown electrical system.

Advantages

- Allows different levels of service where desirable.

Disadvantages

- Administrative burden of tracking the extra cost of the higher level of service.
- Can be perceived as unfair if the reason for the higher rate is not immediately obvious.

Applicability to Drainage

Increased levels of drainage service may not be obvious to customers. For example, the effect of detention and water quality facilities may not be obvious to customers upstream of the facilities, even though the facilities mitigate the surface water flows caused by these customers. Such rates might be useful if certain drainage basins are

particularly costly to serve because of especially high detention and water quality treatment requirements, or because of inordinate expense in siting required facilities.

Policy and Implementation Issues

In order to implement location-specific rates, the city would have to determine that it was desirable to provide different levels of drainage service to different areas of the city, and that it was desirable to create a rate structure that reflected these differences in level of service. SPU would need to develop new methods of tracking and allocating drainage costs in order to support rates that vary by location.

E.2.5 Connection Charges

When a customer connection to an SPU utility is modified, it is possible to levy a connection charge, which is separate from any permitting, installation or other fee-for-service charge. The purpose of the connection charge is to assign an equitable share of the infrastructure cost of the utility system to that customer.

Advantages

- Connection charges are authorized by State law to aid water and wastewater utilities and are common industry practice throughout Washington (and other states as well).
- The applicable charge could be identified at the time the project is reviewed for infrastructure requirements (i.e., permitting).
- Owner-developers contribute to the cost of the existing and future infrastructure that will serve them.

Disadvantages

- May be perceived to conflict with other financing sources such as ULIDs.
- Must be considered in the context of customers who are served by natural drainage features and may not have a "connection" to a specific separated or storm sewer.

Applicability to Drainage

Stormwater connection charges are authorized by state law.

Policy and Implementation Issues

Policy questions about how to implement connection charges in each of the areas served by different types of drainage infrastructure must be resolved. Additional data is required in order to determine reasonable "triggers" for levying connection charges. The current project to use photogrammetry to determine the impervious surface area

of all parcels in Seattle will provide the baseline for an analysis of triggers. Resulting connection charges will need to be integrated with drainage rates. At this time, it is not possible to estimate potential revenues generated by connection charges.

Because SPU provides water, wastewater, and stormwater services, any policy decision made with respect to stormwater connection charges may have consequences for SPU's water and wastewater lines of business.

E.2.6 Latecomers' Agreements

Latecomers' agreements partially reimburse a property owner who invests in drainage infrastructure with fees paid by other property owners who benefit from this infrastructure when they develop their properties later. The purpose of the latecomers' agreement is to reduce the cost to the first developer of installing infrastructure required by their development, but including capacity to serve other future development.

Advantages

- May increase the likelihood of development in specific circumstances (those where the cost of installing new drainage infrastructure may "make or break" a project). Since the first developer fronts the whole cost of the infrastructure and is "paid back" only if other development occurs within a specific timeframe, it is unusual that latecomers' agreements will affect a project's economics.
- May improve social equity by forcing individuals who benefit from a piece of infrastructure within a specific timeframe to pay a share of the infrastructure cost.

Disadvantages

- Significant administrative costs are borne by the city to enter into latecomers' agreements, and to track and monitor them over their term (up to 25 years).
- It is not easy to identify which properties benefit from a drainage improvement and need to be included as part of an agreement. Determination can involve extensive surveying, analysis and negotiation.
- Construction costs must be determined and allocated to properties before construction begins. The developer has an incentive to over-estimate project costs, and there is little means for the utility to prove that the projected costs are too high. Over-estimation results in excessive latecomer shares.
- Latecomers' agreements are formal contracts requiring the administrative burden of assistance from the city attorney and approval by ordinance. Because this makes them slow, they are infrequently requested.

Applicability to Drainage

Latecomers' agreements for stormwater services are authorized but not required by state law.

Policy and Implementation Issues

SPU believes that there is very little benefit of latecomers' agreements in Seattle's built environment. Ratepayers would bear a significant cost to administer a latecomers' agreement program.

E.2.7 Low Interest Loans and Grants

Various organizations and agencies maintain grant and low-interest loan programs. These programs are generally intended to provide incentives for activities promoted by these organizations. Where loans and grants can be used to supplant normal rate and debt financing tools, they lower the cost of service to rate payers.

Advantages

- Loans and grants can provide significant discounts to rate payers compared to normal rate and debt financing tools.
- Successful loan and grant applications can demonstrate SPU's willingness to innovate in delivering services.
- It is straightforward to integrate grant and loan financing into SPU's financing program.

Disadvantages

- Organizations provide incentives to change utility behavior, but not to pay for core utility services. This means that grants and loan opportunities are limited, and will not provide a large source of financing for the overall utility program.
- Ratepayers bear the cost of developing both successful and unsuccessful grant and loan applications, as well as the administrative costs of city approval.

Applicability to Drainage

In recent years, SPU has been very successful in securing grants and loans for various projects.

Policy and Implementation Issues

SPU intends to continue applying for grants and loans where they support SPU's drainage mission and priorities.

E.3 Debt-to-Asset Ratio and Debt Service Coverage Discussion

Debt financing of drainage capital improvement projects under the Comprehensive Drainage Plan impacts key DWF financial statistics, namely debt service coverage and the debt-to-assets ratio.

Figure E-1 presents the historical DWF debt-to-asset ratio, by year, as well as the projected ratio assuming the Comprehensive Drainage Plan spending assumptions. The financial policy cap on the debt-to-asset ratio is 70 percent.

Annual drainage system capital expenditures grew from under $8 million in 1998 to over $20 million in 2003 as extensive drainage infrastructure was installed throughout the city. Annual wastewater capital spending increased by a comparable amount during the same period. Nearly all of this infrastructure was funded with debt. Consequently, the DWF debt-to-asset ratio rose by almost 30 percent over the past five years.

In the period between 2004 and 2010, SPU projects that the debt-to-asset ratio will continue to grow. However the growth is expected to be at a slower rate than in prior years as SPU funds DWF infrastructure with an increasing percentage of operating revenue.

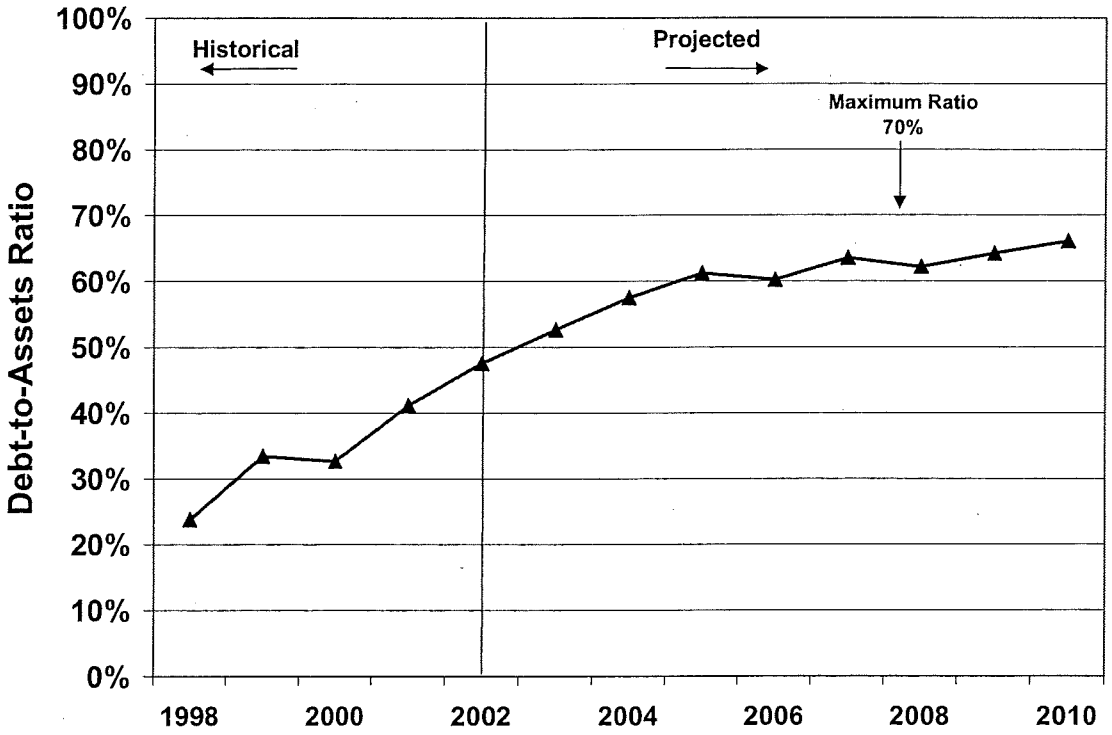


Figure E-1. DWF past and projected debt-to-asset ratio.

Figure E-2 presents historical annual DWF debt service coverage (DSC), as well as projected coverage under the Comprehensive Drainage Plan spending assumptions. The minimum recommended coverage under DWF's financial policies is 1.8 times, while DWF bond covenants require a lower coverage requirement of 1.25x. The higher financial policy target of 1.8x helps ensure that SPU will always meet the 1.25x requirement.

DSC for DWF has historically been much higher than financial policy or bond covenant requirements. However, debt outstanding has increased significantly in recent years because of major investments in drainage and wastewater infrastructure. This increase in debt, combined with lower than forecast wastewater revenues over the past few years, have brought the DSC down much closer to DWF targets. SPU projects a spike in DSC in 2007 due to the ramp up of cash funded capital improvement projects to the 25 percent financial policy target. Once cash funding targets are achieved, SPU projects that revenue will grow at a slower rate, and the DSC will gradually decline to approximately pre-2007 levels.

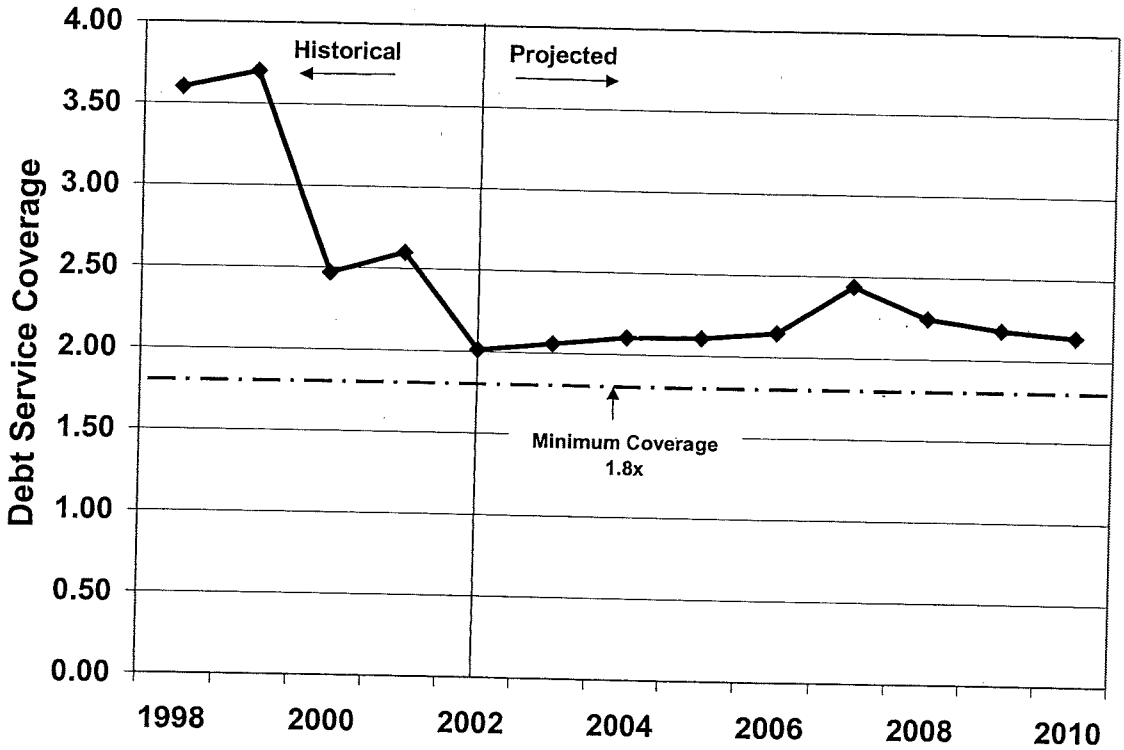


Figure E-2. DWF past and projected debt service coverage ratio.

E.4 Allocation of Fund Expense between Drainage and Wastewater Lines of Business

DWF combines the revenue and cost streams of the drainage line of business and of the wastewater line of business, which are funded through separate rates collected from different ratepayer bases. Although the revenue streams are distinct, all capital and operating expenses are budgeted for the Drainage and Wastewater Fund as a whole. Consequently, expenses must be allocated to each line of business (drainage and wastewater) in order to determine separate revenue requirements for rate setting purposes.

Drainage and wastewater capital projects are budgeted and tracked separately within the SPU financial system. O&M expense, on the other hand, is budgeted on a functional (i.e., engineering branch, resource planning branch, etc.) rather than programmatic (i.e., drainage, wastewater) basis. As each function supports both drainage and wastewater to varying degrees, operational expense must be allocated between drainage and wastewater at the budget activity level. SPU Financial Planning has developed a series of allocators designed to assign cost, by budget activity, to each line of business. Debt service expense is allocated based on each line of business' respective share of forecasted revenue bond issues. Allocation of tax expense is based on forecasted revenue.

Figure E-3 presents each line of business' share of the total 2004 DWF operating budget.

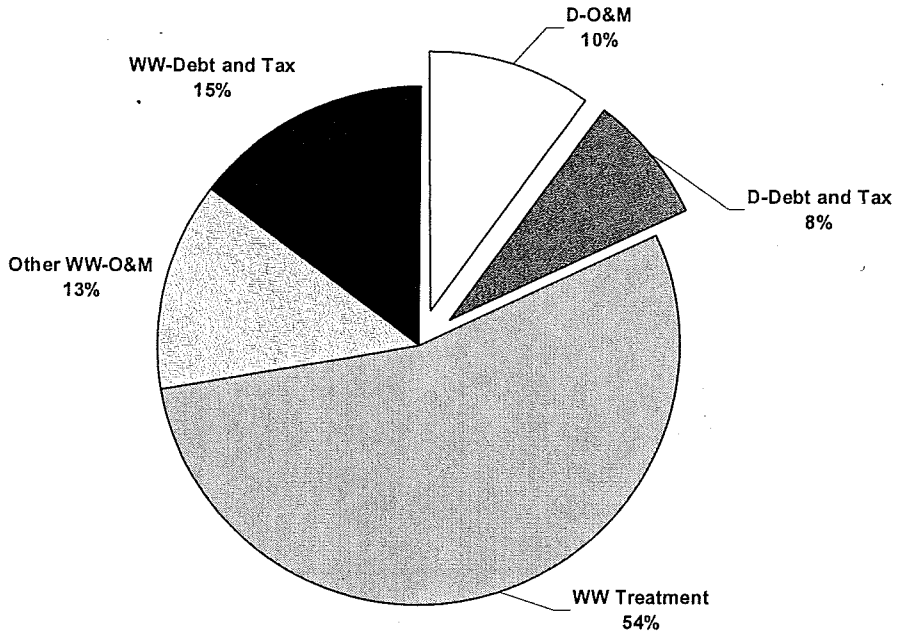


Figure E-3. Drainage and wastewater fund 2004 O&M budget.

In 2004, drainage-related expense is expected to account for approximately 18 percent of total budgeted DWF operating expense. Wastewater treatment payments to King County are the single largest budgeted DWF expense, accounting for 54 percent of total DWF budgeted operating expenditures in 2004. This expense is allocated 100 percent to the wastewater line of business.

E.5 Current Drainage Cost Allocation

E.5.1 Drainage Customer Classes & Characteristics

The allocation process described above assigns a dollar value, or "cost-of-service", to the amount of total DWF operating expenses which must be recouped through drainage fees. A percentage of the total drainage cost of service must then be assigned to each customer class.

There are two broad customer classes served by the drainage line of business: residential customers and commercial customers. Commercial customers are further divided into six rate classes which correspond to different levels of development, as measured by the percentage of impervious surface on the tax parcel. For the most part, drainage costs are allocated to each customer class based on the flow of runoff expected from the property in each class. A small percentage of costs are allocated based on the total number of parcels in a customer class.

Customer characteristics by rate class are presented below. A description of each customer characteristic follows after the table.

Table E-2. Drainage customer characteristics by class.

Customer Class	% Impervious	# of Parcels	% Total Parcels	Total Flow	% Total Flow
Residential	36-65	**137,111**	**72%**	**11,354**	**50%**
Commercial		**53,035**	**28%**	**11,328**	**50%**
Open Space	0-2	131	0%	135	1%
Undeveloped	0-15	7,592	4%	943	4%
Light	16-35	175	0%	65	0%
Moderate	36-65	465	0%	803	4%
Heavy	66-85	1,461	1%	803	4%
Very Heavy	86-100	43,211	23%	8,580	38%
Total		**190,146**	**100%**	**22,681**	**100%**

Parcel and acreage data is from drainage billing system records as of June 2003.

Percent Impervious

Impervious areas are covered by impervious surfaces (any hard or impermeable surface that is not green, grassy, growing vegetation or landscaped). Examples of impervious surfaces are pavement, blacktop, rooftops, parking lots, and patios. Impervious surface is used in the calculation of the run-off coefficient assigned to each customer class.

Number of Parcels

The number of parcels is defined as the number of King County tax parcels within Seattle city limits. The number of parcels is used to allocate Customer Costs.

Total Flow

Total flow approximates stormwater run-off that from the property into the public drainage system. It is calculated by multiplying total acreage by a run-off coefficient. The run-off coefficient is calculated based on the concept that 95 percent of precipitation falling on impervious surface will flow into the drainage system, but only 10 percent of precipitation falling on pervious surface flows into the drainage system. The greater the percentage of total parcel surface which is impervious, the greater the run-off coefficient. Total flow is used to allocate flow-related costs.

E.5.2 Allocation of Expense to Customer Class

In 2004, 56.5 percent of total budgeted drainage operating expenses were allocated to residential customers and 43.5 percent to commercial customers. Table E-3 provides a summary of the different classes (types) of drainage expense and their percentage contribution to total drainage expense in 2004. Following this table is a description of each cost classification and the methodology used for allocating expense between customer classes.

Table E-3. Drainage expense classification summary.

Expense Class	2004 Cost	% of Total Cost
Habitat/Landslide	4,277,319	16%
Service	10,561,246	39%
Customer-related	621,717	2%
Taxes	3,151,177	12%
Capital & Other	8,300,630	31%
Total	$ 26,912,089	100%

Habitat and Landslide Expense

Habitat and landslide costs are the costs incurred by the drainage system to mitigate the direct effects of stormwater on aquatic environment, improve water quality, and to protect drainage infrastructure from landslides.

Between 1999 and 2003, these costs were allocated exclusively to the residential rate class. During the 2004 rate process, City Council approved an SPU proposal to allocate these costs based on flow across the entire ratepayer base. This change in allocation methodology will be phased in between 2004 and 2006. Beginning in 2007, these costs will be allocated solely on the basis of flow.

Allocation of habitat and landslide costs is discussed in further detail below in Section E.6.

Customer Costs

Customer costs include payments to King County for the administration of the drainage billing system and SPU customer service support of the drainage line of business. These costs represented about two percent of the Drainage O&M budget in 2004. Each tax parcel in the city receives an equal allocation of customer costs.

Service Costs

Service costs are expenses associated with managing stormwater run-off volumes and their impact on the environment. These costs include infrastructure maintenance and repair (pipes, culverts, detention systems, etc.), regulatory oversight, water quality monitoring, and support services. These costs are allocated based on total flow.

Taxes

The city's business and occupations tax (10 percent of revenue) and State and other taxes (approximately 2 percent of revenue) are allocated based on each customer class' respective share of the revenue requirement after allocating all other costs.

Capital and Other

Capital and Other, which includes debt service, cash contribution to the CIP, and cash balance requirements, is allocated based on total flow.

E.6 Allocation of Habitat and Landslide Expense

E.6.1 History

Prior to 1999, all drainage expenses were allocated to ratepayers based on total flow. In the late 1990's, the drainage program significantly expanded its activities,

particularly in the areas of habitat and landslide protection. Damage to drainage and wastewater infrastructure caused by landslides during the mid-late 1990's and increasing regulatory requirements under the National Pollution Discharge Elimination System (NPDES) permits) were the primary drivers of this programmatic expansion. In 1999, the city departed from past practice and began to allocate expenses associated with habitat and landslide programs exclusively to the residential rate class. The decision to allocate these expenses exclusively to residential customers was based on the perception that residential areas of the city received the greatest benefit from these programs.

During the 2004 rates process, the city revised this allocation approach and returned to allocating the costs of all drainage infrastructure and drainage programs on the basis of expected runoff.[1] This change was implemented in order to: a) improve consistency (and therefore customer equity) in the allocation of the costs of physical infrastructure system-wide; and b) to simplify allocation of this expense over time.

E.6.2 Consistent Allocation Basis

Drainage services in Seattle are provided by three different types of infrastructure: combined sewers, a separated stormwater collection system, and an informal system of ditches and culverts. Different areas of the city are served by different types of drainage infrastructure, and it is highly likely that the infrastructure types vary significantly in their cost. In fact, the cost of drainage services provided by combined sewers system are largely paid by wastewater rates and not drainage rates at all.

The allocation of drainage costs prior to 1999 served to equalize the cost of drainage services across the city. It provided a mechanism to collect drainage fees from properties served by the combined sewer system and the informal drainage system. Since the costs of these types of infrastructure were either paid through wastewater rates or were very inexpensive, the drainage fees charged to these properties would otherwise have been quite low, and the fees charged to properties served by separated storm sewers much higher.

Habitat and landslide costs are being incurred to improve, protect, maintain and mitigate the effects of the city's drainage system, just as pipe replacement costs are being incurred to support these same service goals. SPU decided that it is inconsistent to single out one class of customers to pay a certain set of expenses when the overall allocation strategy rests on sharing the costs of very different kinds of drainage infrastructure between customers purely on the basis of the total flow.

---

[1] The residential customer class share of this expense will be reduced over three years, beginning in 2004, with the objective that all customer classes will pay an amount proportionate to their respective share of total flow by 2006.

E.6.3 Simplification of Cost Allocation Administration

The shift in 1999 to a benefits-received basis for allocating habitat and landslide costs to residential customers was largely based on the physical location of the projects at that point in time (predominantly residential areas of the city). Since 1999, major projects, such as the habitat restoration of Longfellow Creek, have been located in mixed industrial, commercial, and residential areas of the city. The monitoring of capital and operational expense associated with these projects by geographic area would be required to periodically reassess whether the cost allocation should be adjusted. This type of assessment would be extremely difficult because SPU's financial system tracks expense functionally and not geographically. In addition operational expense data is not grouped programmatically (i.e. no specific expense category exists for habitat or landslide related operational expense.

APPENDIX F

City Council Resolution 29774—Landslide Program Guidance

City of Seattle Legislative Information Service

Information updated as of May 3, 2004 3:01 PM

Resolution Number: 29774

A RESOLUTION adopting policies to guide the development of City programs relating to landslides.

Date introduced/referred: Jun 8, 1998
Date adopted: Jun 22, 1998
Status: ADOPTED
Vote: 9-0

Committee: Utilities and Environmental Management
Sponsor: PAGELER

Index Terms: STATING-POLICY, LANDSLIDES, FINANCE

Text

A RESOLUTION adopting policies to guide the development of City programs relating to landslides

WHEREAS, since the winter storms of 1996-97 the City has undertaken extensive study of issues surrounding landslides; and

WHEREAS, earlier this year the City Council adopted Resolution 29694 proposing principles to guide the City's goals and policy framework for actions relating to landslide damage; and

WHEREAS, through a series of public workshops, many citizens of Seattle have offered comments and suggestions to help the City develop programs to deal with the issues raised by landslides and the threat of landslides; and

WHEREAS, City departments have developed a series of proposed programs presented to the Council in a paper entitled Landslide Policies for Seattle; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF

SEATTLE, THE MAYOR CONCURRING, THAT:

The City departments with responsibilities for activities and programs concerning landslide areas are directed to propose programs to the City Council to fulfill the following policy objectives. A report on these programs, including those to be proposed as part of the 1999-2000 Biennial Budget shall be made to a Committee of the City Council in September 1998.

2. The City should take the following actions concerning information, education and enforcement:

The City should formalize its system of inter-departmental coordination to assure that all departments are working together during times of response to and recovery from disaster.

The City should develop a program to inform property owners about their location in landslide prone areas and the availability of information and education about their responsibilities, possible hazards, and best management practices. The City should explore options for contracting the development and provision of such education.

The City should provide information about sources of financial assistance and should provide liaison services for citizens seeking aid from federal agencies.

The City should evaluate the extent to which its current policies and regulations address the following concerns and whether amendments are needed. In developing amendments, the City will consider the GMA requirement to protect critical areas and will include the best available science.

allowing or requiring landowners in landslide-prone areas to maintain property, or take reasonable measures on property, to minimize hazards to themselves and adjacent owners;

for regulations concerning subdivisions and short plats, balancing the public interest in preserving goundwater flows, in preventing sedimentation and other harms relating to landslide prone areas and steep slopes, and in reasonable development of property, including the following concerns:

whether lots to be created may contain areas of landslide-initiation that could damage adjacent new or existing lots;

whether stabilization should be required in such circumstances, or whether the proposed lot configuration should be denied;

whether acquisition of property by non-profit conservation agencies, preservations easements or similar devices for reducing landslide related risks should be encouraged;

whether covenants or other restrictions regarding stabilization should be recorded with the plat.

E. The City should identify a dispute resolution mechanism for addressing disputes among neighbors and between residents and the City, and should ensure that information on this dispute resolution mechanism is provided to the public.

3. The following policies should direct the development of City programs concerning landslide areas.

Concerning improvements to non-arterial streets primarily in residential areas:

The cost of development and maintenance of infrastructure - both

streets and utilities - along city streets other than arterials has traditionally been shared between the City and private property owners. In general, this sharing of cost should continue.

The City should devise a system to enable the upgrading of existing infrastructure in areas where streets and utilities, particularly drainage systems, could more effectively meet the challenges of hillside areas subject to landslide. The system should have the following components:

A method to create geographic districts, throughout which cost could be shared;

A set of appropriate standards for street improvements and drainage infrastructure, designed to meet the particular challenges and circumstances of specific locations;

A windshield survey of areas in which landslides have occurred and where streets and infrastructure may not meet minimum standards;

A determination of areas where gaps between appropriate standards and existing street and infrastructure development exists; and

A system to determine the order in which improvements can be funded. Priorities should be set using a number of factors, the most important of which should be any demonstrable threat to life or personal safety.

Other factors should include the extent of public use of roadways; access to property; the community's ability to develop plans and/or financial support; identification of improvements in a Neighborhood Plan; the extent of the City's property ownership; overall availability of funds.

The City should devise a program to convene community groups and facilitate their efforts to upgrade streets and infrastructure; provide staff and engineering support to such districts; and make available a menu of possible designs for improvements.

The City's regulations governing new subdivision and short platting should reflect reasonable requirements for access, drainage and other utility services that meet standards for landslide-prone areas and fully serve the needs of any new lots to be created and do not further increase gaps between city standards and services already provided in the nearby area.

The City's regulations governing new subdivision and short platting should address the issue of permitting development and requiring extensive on-site infrastructure that is engineered to withstand landslides in areas where gaps between City standards and existing infrastructure already exist.

The City should re-evaluate the program adopted in 1997 to require statements from permit recipients concerning possible non-availability of utility service and access and should recognize that eliminating either utility service or access would be a highly unusual measure to be considered only under extreme circumstances.

Concerning improvements to protect purely public property, including arterial streets and City-owned property:

G. The City should undertake an inventory of existing public facilities where repair or replacement because of landslide activity has been required, where repair or replacement has been identified in a neighborhood plan, or where other factors indicate it may be warranted.

H. The City should continue to address maintenance and repair of existing infrastructure to reduce long-term costs.

I. City Departments should determine those facilities for which significant reductions in expenditure could be realized by preventive investment over incident-by-incident reactions.ity Departments should work together to create a program of risk assessment and management of public facilities which are put at risk by the operation of natural forces, initially landslides.

J. City Departments should together undertake a formal assessment of risks and opportunities for select facilities, and prepare a strategic plan for annual investment over the next five to ten years.

Adopted by the City Council the _____ day of _____, 1998, and signed by me in open session in authentication of its adoption this _____ day of _____, 1998.

_____
President of the City Council

THE MAYOR CONCURRING:

_____

Paul Schell, Mayor

Filed by me this _____ day of _____, 1998.

_____
City Clerk
(Seal)

author/jck

H:
6/22/98
V #3

APPENDIX G

Environmental Checklist for 2004 Comprehensive Drainage Plan

SEATTLE PUBLIC UTILITIES

ENVIRONMENTAL CHECKLIST

This checklist has been prepared for the proposed City of Seattle 2004 Comprehensive Drainage Plan (CDP). The CDP is a non-project planning document, which as a whole aims to maintain, manage, plan, and construct drainage systems to safeguard public health and property and control flooding while protecting streams, lakes, and Puget Sound. Implementation of the CDP will involve the development and implementation of a series of drainage programs and capital improvement projects designed to address drainage needs throughout the city. Although no specific projects or programs will be implemented directly as a result of adoption of the CDP, this checklist attempts to address the types of anticipated projects and programs that may result from implementation of the CDP.

A. BACKGROUND

A1. Name of proposed project, if applicable:
City of Seattle 2004 CDP

A2. Name of applicant:
Chuck Clarke, Director, Seattle Public Utilities

A3. Address and phone number of applicant and contact person:
Chuck Clarke, Director
Seattle Public Utilities
700 Fifth Avenue, Suite 4900
Seattle, WA 98104

A4. Date checklist prepared:
May 12, 2004

A5. Agency requesting checklist:
Seattle Public Utilities

A6. Proposed timing or schedule (including phasing, if applicable):
The Seattle Public Utilities (SPU) 2004 CDP is a programmatic planning report that documents the assessment of current environmental conditions and needs related to surface water runoff and impacts throughout the SPU drainage program service area. A framework to prioritize and address currently identified needs is presented, along with general recommendations on how to allocate revenues collected from drainage fees paid throughout the city to meet specific program goals and service levels. A recommended service level and associated spending plan are proposed for Drainage Program activities for the next six years (2005-2010), within the context of financial considerations projected over a sixteen year planning horizon (through year 2020).

A7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal?
The CDP is the vehicle for defining and committing to levels of service that the Drainage Program will strive to achieve, and will be updated periodically, at the discretion of the director of SPU. Supporting policies and procedures will be developed and updated as needed, rather than awaiting the next CDP update cycle.

While broad program directions will be determined through the adoption of the 2004 CDP, individual projects and more specific program choices will be determined through ongoing, periodic reviews by SPU's Asset Management Committee as well as the annual City budget process. All programs and projects must be included in a Council-approved capital improvement program and undergo internal review by SPU's Asset Management Committee before being approved for implementation.

A8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

A large body of existing scientific and environmental information, comprising published and unpublished data, analyses, and literature, provided a scientific basis for the analysis and development of environmental components of the CDP. These include the 1995 CDP, 1999 Drainage Policy Plan, various watershed action plans, basin hydraulic studies and drainage problem inventory, and the City of Seattle Comprehensive Plan. The CDP contains a bibliography that references these documents.

In addition, two technical reports are being developed in part to support the implementation of the CDP, the Draft Baseline Water and Sediment Quality Characterization Report and a "State of the Waters" report.

The Draft Baseline Water and Sediment Quality Characterization Report was prepared for SPU by Herrera Environmental Consultants in July 2003. The report compiles and analyzes water and sediment quality data in order to identify water quality needs and problem areas in the City. The report includes a characterization of existing water quality conditions, a description of any significant gaps in the water quality data, and an assessment of stormwater treatability in the City based on measured concentrations of selected pollutants. When finalized (expected in mid 2004), this report will be available to the public through SPU.

The second report is a "State of the Waters" report for the City of Seattle. This report is currently under development, and is intended to be a summary report of the water quality and aquatic habitat conditions of major waters in the City of Seattle. Based on the current proposed schedule, this report should be available to the public in mid to late 2004.

A9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

The CDP, to which this SEPA checklist applies, deals with the drainage component of SPU. No other applications for governmental approvals directly affecting the property covered are known to be currently pending. A comprehensive plan for the wastewater component of SPU is being developed separately and subsequently to this CDP.

A10. List any government approvals or permits that will be needed for your proposal, if known.

The Seattle City Council is expected to approve the CDP. Programs and projects that result from the CDP must comply with applicable federal, state, and local regulations. On a project-by-project basis, Capital Improvement Projects that implement the CDP will require certain federal, state and local government approvals or permits, including SEPA review as applicable, before any ground disturbing work is allowed to proceed. CDP Appendix B, *Information on Key Permits Required for City Capital Improvement Projects*, identifies key permits that may be required for Drainage

Program projects under the proposal.

A11. Give brief, complete description of your proposal, including the proposed uses and the site of the project. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The proposal (the 2004 CDP) is primarily a planning document, which as a whole aims to maintain, manage, plan, and construct drainage systems to safeguard public health and property and control flooding while protecting streams, lakes, and Puget Sound.

This proposal represents an update to SPU's 1988 and 1995 CDPs, reflecting updated, citywide perspectives on surface water management for Seattle. Whereas the majority of SPU's past work focused on alleviating major flooding problems that damaged property or threatened public safety, this CDP charts a broader course for surface water management that comprehensively combines infrastructure needs, public safety and mobility, and aquatic resource protection. The CDP proposes a framework and spending plan for management in the areas of stormwater and flood control, protection of Seattle's aquatic resources (water quality and aquatic habitat), and landslide mitigation, as well as for operating programs and field operations and maintenance functions.

The intention of the CDP is to guide SPU in the delivery of the drainage services to:

- Manage stormwater to protect property damage to residences and businesses and ensure that drainage problems do not affect access to or functionality of critical services such as hospitals, fire stations, and schools
- Address flooding on major transportation routes (arterial roads)
- Address flooding on residential roads (nonarterials)
- Protect and enhance creek, shoreline, and lake aquatic resources from the direct adverse impacts of SPU's drainage system, using science-based projects to achieve habitat and water quality protection and improvement
- Provide aggressive pollution prevention programs such as business inspections, source control, and public outreach
- Operate a robust water quality monitoring program to identify problem areas and provide feedback on the effectiveness of management decisions in protecting and enhancing aquatic resources
- Help the city comply with regulatory permit requirements or other legal obligations.
- Protect drainage and wastewater infrastructure from the effects of landslides, and reduce the potential for landslides associated with insufficient city drainage systems.

Implementation of the CDP will involve the development and implementation of a series of drainage programs and capital improvement projects designed to address drainage needs throughout the city. The proposed CDP program and project work will be prioritized to strive to:

- Help maintain and ensure proper functioning of Seattle's existing drainage infrastructure
- Provide drainage improvements where needed to meet target service levels
- Mitigate direct stormwater runoff impacts on aquatic receiving waters (e.g., lakes, creeks, wetlands, and shorelines) resulting from operation of the drainage system
- Minimize the risk of city drainage infrastructure contributing to or being impacted by landslides

Some examples of the type of programs that could result from the proposal are shown

in Table 1. All programs must first undergo internal review by SPU's Asset Management Committee and through the budget approval process before being approved for implementation; therefore this list provides only examples of typical program types consistent with the CDP recommendations. For additional examples of possible programs, or types of programs, see the CDP.

Table 1. Examples of Types of 2004 CDP Programs

Stormwater and Flood Control
Continue and improve maintenance of existing stormwater facilities.
Increase public outreach and education through mailer inserts, newspaper announcements, etc., to educate the public on stormwater maintenance activities that citizens can participate in to reduce flooding.
Expand existing efforts to include flow monitoring and modeling activities to evaluate impacts and identify solutions for controlling flow to aquatic resources.
Develop a program to support ongoing efforts for natural drainage system projects, education, technical studies, monitoring, and staff support.
Continue existing maintenance practices, and enhance stormwater and flood control related maintenance efforts (e.g., ditch and catch basin cleaning, drainage infrastructure inspections) to achieve a higher level of maintenance service.
Build upon reported-flooding-problems database to track and guide evaluation and implementation of the stormwater and flow control CIP.
Landslide Mitigation
Continue programs for public education and outreach related to landslide mitigation.
Enhance the Landslide Mitigation Program CIP to include operation and management of landslide projects.
Continue operations and maintenance activities related to landslide prevention and mitigation.
Aquatic Resource Protection (Water Quality and Habitat)
Expand and enhance the existing public education and outreach programs to promote citywide water quality and habitat efforts, and provide water quality and habitat improvement messages.
Participate with Ecology in the ongoing Total Maximum Daily Load process in regulated waterbodies.
Improve capability of responding to citizen inquiries regarding water/sediment issues in Seattle.
Improve and coordinate flow, water quality, and habitat monitoring efforts.
Partner with other resource agencies on regional habitat issues to maximize resources.
Modify the basin planning process to incorporate and integrate habitat, water quality, and flow assessments along with drainage into ongoing and future plans.
Support and fund applied scientific research on urban creeks and receiving water bodies to fill crucial gaps in knowledge.
Provide geographic information system support by developing and maintaining GIS mapping data coverage for habitat in urban creek and receiving water body areas.

Representative examples of type of projects that could result from the proposal are shown in Table 2. All candidate projects must first undergo internal review by SPU's Asset Management Committee before being approved for implementation through the budget approval process; therefore this list provides only examples of typical project types. Individual projects would also undergo SEPA review and permitting as applicable. For additional examples of possible projects see the CDP.

Table 2. Examples of Types of 2004 CDP Projects

Stormwater and Flood Control
Install Natural Drainage Systems in strategic and appropriate locations.
Install drainage system improvements in key areas where existing systems are damaged, undersized, or nonexistent.
Build surface water improvements, such as berms, catch basins, and subsurface drains in key areas where street flooding has occurred.
Purchase flooded properties and construct storage or detention systems to reduce flows.
Construct pump stations to pump flows into large receiving systems during heavy rainfall events.
Install conveyance and infiltration prototypes within a traditionally designed street right of way. Install porous materials on streets and sidewalks on a pilot-test basis.
Landslide Mitigation
Plan, design, and implement projects that protect drainage infrastructure from damage from landslides.
Improve stability of steep slopes in appropriate situations to protect public services and public safety by constructing such facilities as retaining walls, catchment walls, or groundwater control systems.
Aquatic Resource Protection (Water Quality and Habitat)
Repair damaged storm drain lines associated with water quality problems.
Construct water quality facilities in coordination with City projects (e.g., Seattle Department of Transportation projects).
Perform stream restoration work such as: installation of boulders and large woody debris, bank reshaping, barrier removal, and invasive plant removal and riparian planting.
Improve degraded shoreline areas associated with creek mouths.

A12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The location of the proposal is Seattle, Washington. Seattle has a land area of 84 sq mi (217 sq km), and is located at latitude: 47° 39' North and longitude: 122° 17' West. Projects implemented under the CDP may occur generally anywhere within Seattle's city limits. Maps showing potential project areas are provided in the CDP. Answers to questions throughout this checklist assume the City of Seattle to be the site for the proposal.

Map 1-2 of the CDP shows the areas of Seattle served by the stormwater drainage system, distinguished by drainage basins associated with four major receiving water bodies: Duwamish Waterway, Lake Washington, Puget Sound and Lake Union/Ship Canal. The drainage basins associated with the first three water bodies extend outside City limits; however, any information and recommendations included in the CDP only apply within City limits. There are no known creeks that drain areas within the City of Seattle but discharge outside the city limits. Portions of Hamm Creek are a possible exception, but this has not been confirmed.

B. ENVIRONMENTAL ELEMENTS

Note: This information is presented for the City of Seattle 2004 CDP. The CDP is a non-project planning document, which aims to maintain, manage, plan, and construct drainage systems to safeguard public health and property and control flooding while protecting streams, lakes, and Puget Sound. Implementation of the CDP will involve the development and implementation of a series of drainage programs and capital improvement projects designed to address drainage needs throughout the city. Although no specific projects or programs will be implemented directly as a result of adoption of the CDP, this checklist attempts to address the types of anticipated projects and programs that may result from implementation of the CDP. Likewise, any projects developed supporting association with of the CDP will still have to obtain any necessary environmental permits and approvals.

B1. Earth

a. General description of the site:

☑ **Flat** ☐ **Rolling** ☑ **Hilly** ☑ **Steep Slopes** ☐ **Mountains**
☐ **Other:**

Seattle is located on a series of hills and intervening valleys in the Puget Sound lowlands.

b. What is the steepest slope on the site (approximate percent slope)?

Slopes in Seattle range from 0 percent to over 40 percent. The steepest slopes occur primarily on the sides of the major hills in the city, including Queen Anne Hill, Capitol Hill, West Seattle, and Magnolia.

c. What general types of soils are found on the site (for example, clay sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

As a highly urbanized area, native soils in Seattle have been extensively altered. Remaining native soils are found primarily in those areas of the city that have not been disturbed by development. Three general soil types predominate in the area: 1) artificial fill 2) alluvial soils, and 3) Alderwood series soils.

Extensive areas of the city are built on artificial fill that was derived from a variety of sources. These areas include the land areas along the fringes of Puget Sound, including portions of the Seattle waterfront, an extensive area south of Pioneer Square and west of Beacon Hill, and the Duwamish River valley bottom.

Alluvial soils occur in stream and river valleys. Alluvial soils are typically fine-grained clayey or silty loams with a high organic content in some areas. Alluvial soils are typically associated with a shallow water table.

Native soils in upland areas in the Seattle area are predominantly Alderwood series soils.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe:

Unstable soils occur primarily in two contexts. The first context is steep slope areas where a combination of shallow groundwater and glacial sediments

deposited in layers exhibiting contrasting permeability result in a high risk of landsliding. The second context is areas of artificial fill or alluvial soils where unengineered fill material or fine-grained and/or organic soils coupled with a shallow water table may lead to the potential for soil liquefaction during earthquakes. Areas where these conditions may exist have been mapped by the City as critical areas and are generally described in c. above.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

Because this is a non-project action, no specific grading or filling activities are known at this time. Grading and filling could occur in association with anticipated future drainage projects and programs including: installation of new drainage facilities below ground, and installation of instream and shoreline habitat features. For example, installation of drainage facilities could result in site grading to install a pipe or ditch, as well as possible filling to install a culvert or to improve a roadway berm or pond embankment. Instream or shoreline habitat work could include the placement of logs or boulder in creeks or along shoreline areas. Grading could occur to expand floodplains or shallow shoreline areas. In general, the amounts of grading or filling that would be required for the individual projects proposed to meet the needs identified in the CDP are modest (typically several hundred cubic yards or less). The source of fill would be identified during final design, permitting, and construction contracting of individual projects.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe:

Although no specific projects are proposed as part of the CDP, implementation of many of the candidate projects proposed to meet the needs identified in the CDP would involve grading activities. These activities would expose soils, and subsequent erosion could occur. As described in section h. below, the City's Stormwater, Drainage, and Grading Control Code contains requirements for best management practices (BMPs) that must be implemented to control erosion from construction sites. In addition, many of the potential projects under consideration in the CDP are designed to mitigate for existing erosion problems.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

No specific projects are included in this proposal, and the non-project CDP covers the entire City of Seattle, which is a highly urbanized area. Most of the candidate projects discussed in the CDP would take place within street rights of way, which are already primarily impervious surface. Therefore, after construction many areas will remain primarily impervious surface. However, the majority of the potential projects and programs under consideration in the CDP are designed in part to mitigate for existing impervious areas. Because of this, no new impervious surface is expected to result from projects associated with the CDP.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any.

All work resulting from the CDP is subject to the requirements of Seattle's Stormwater, Grading and Drainage Control Code (SMC 22.800-22.808), Side Sewer Code (SMC 21.16), and Director's Rules. Seattle's Director's Rules are binding rules concerning land use, construction, housing, and other codes

administered by the Department of Planning and Development (DPD). They are adopted according to the Administrative Code of the City of Seattle (SMC Section 3.06.040). The City's Stormwater Management Plan includes guidelines and BMPs designed to manage stormwater and control runoff impacts during and after construction, thereby controlling and reducing erosion of soils.

B2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction <u>and</u> when the project is completed? If any, generally describe and give approximate <u>quantities</u> if known.

No specific projects are proposed as part of the CDP. However, implementation of the candidate projects proposed to meet the needs identified in the CDP could involve temporary emissions during construction. These would include typical amounts of dust from grading activities and exhaust (carbon monoxide, sulfur, particulate) from construction equipment. Each individual project would be subject to applicable emission control requirements. Ongoing operation of the drainage system does occasionally involve odors, such as those associated with polluted runoff or algal growth. Because the proposal is a planning document, the "completion" date is not fixed. Regardless, implementation of the proposed projects and programs are expected to reduce odor concerns and are not expected to result in any new emissions.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

There are no known off-site sources of emissions or odor that would affect this proposal.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

During construction of any projects associated with the CDP recommendations, impacts to air quality would be reduced and controlled through implementation of standard federal, state, and local emission control criteria and Seattle construction practices. These could include: spraying areas of exposed soil with water for dust control, regular street cleaning and reducing exhaust emissions by minimizing vehicle and equipment idling. Part of the overall intent of the CDP is to improve water quality conditions, which will also control some potential sources of odors.

B3. Water

Note: This information is presented for the City of Seattle 2004 CDP. The CDP is a non-project planning document, which aims to maintain, manage, plan, and construct drainage systems to safeguard public health and property and control flooding while protecting streams, lakes, and Puget Sound. Any impacts to waters associated with potential projects and programs recommended in the CDP would be expected to outweigh the benefits proposed in the plan.

a. Surface:

(1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If so, describe type and provide names. If appropriate, state what stream or river or water body it flows into.

The majority of Seattle is located within the Lake Washington/Cedar/ Sammamish Watershed (Watershed Resource Inventory Area [WRIA] 8). The Duwamish Waterway and Elliott Bay, located in southwestern Seattle, are part of the Green/Duwamish and Central Puget Sound Watershed (WRIA 9). Seattle is characterized by a wide variety of surface water features including marine areas, rivers, lakes, and creeks. Each type is briefly summarized below. Additional details are provided in Map 1-2 of the CDP and described in detail in the CDP.

Marine: Seattle's west side is situated adjacent to the Puget Sound, a major marine embayment.

Rivers: Portions of south Seattle drain to the lower reaches of the Duwamish River (called the Duwamish Waterway). The river receives flow from the South Park basin, Norfolk basin, Longfellow Creek and other smaller urban creeks, and drains to Elliott Bay in south Puget Sound.

Lakes: Freshwater lakes and ponds, within or adjacent to the City, include the Lake Union/Ship Canal system, which links Lake Washington and Puget Sound through the Hiram Chittendon Locks. Other freshwater lakes include Green, Haller, and Bitter lakes in the north half of the City (also located in the in the Lake Union/Ship Canal drainage basin). Seattle also contains a large number of small ponds and wetlands.

Creeks: Runoff from Seattle's landscape drains to creek systems of varying size. Major creeks in the western regions of the city drain directly to Puget Sound and include Pipers and Fauntleroy creeks. Longfellow Creek is a main creek in the southwest portion of the City that drains to the Duwamish Waterway. Thornton Creek, Taylor Creek, and other smaller creeks drain runoff from the eastern portions of the city to Lake Washington. There are no known creeks that drain areas within the City of Seattle but discharge outside the city limits. Portions of Hamm Creek are a possible exception, but this has not been confirmed.

(2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If so, please describe and attach available plans.

The proposal will result in programs and projects to maintain or improve stormwater conveyance, aquatic habitat, and landslide conditions throughout the metropolitan area. Lists of the types of programs and projects that could result from the proposal are presented in section A11 of this checklist. Some of this work will occur over, in, or adjacent to (within 200 feet) the described surface waters bodies, all of which perform drainage functions within the project area. Essentially all projects and programs are targeted at the protection or improvement of waterways.

(3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate

the area of the site that would be affected. Indicate the source of fill material.

The non-project CDP itself will not result in any filling or dredging. The amount of fill or dredge material that would be placed in or removed from surface water or wetlands as a result of the recommendations contained in the CDP would vary considerably depending on the specific project under consideration. For projects considered as a direct implementation of the CDP, fill or dredge amounts are unlikely to exceed several hundred cubic yards. All individual projects would be subject to additional environmental permitting. Examples of potential projects are discussed briefly below.

Fill: Defined as *Any material that has the effect of replacing an aquatic area with dry land or of changing the bottom elevation of a waterbody.* Potential fill material could be placed in surface waters as a result of instream habitat restoration work. For example, the logs or boulders could be installed within a stream to improve habitat diversity and stream stability.

Dredge: Defined as *Material that is excavated or dredged from waters of the U.S.* Stream restoration work could involve the removal of sediment accumulations from various sections of Seattle streams.

(4) Will the proposal require surface water withdrawals or diversions? If so, give general description, purpose, and approximate quantities if known.

The CDP itself will not result in any surface water withdrawals. Expected withdrawals or diversions of surface water associated with individual projects associated with this CDP would be limited to temporary diversions of surface water during construction of instream aquatic resource protection or stormwater control projects (see Table 2 above).

(5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

Major streams and the Duwamish River have associated 100-year floodplains. Some of the actions resulting from the CDP, for example aquatic resource protection and stormwater control projects and programs, will occur in or near these waterbodies. Where activities occur within or immediately adjacent to streams or rivers, they will be in the 100-year floodplain.

(6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

The CDP will promote projects to reduce flooding where drainage infrastructure is insufficient. In some instances, this could result in the creation of new outfalls to improve conveyance of ponded stormwater. In these instances, this would involve a new discharge of potentially polluted stormwater to a surface water during construction and operation of the new outfall. However, protective measures would be taken to reduce or eliminate the sources of pollutants associated with this type of project.

In general, the proposal will reduce the discharge of waste materials to surface waters through projects and programs aimed at protecting water resources. The 2004 CDP involves the management of surface water runoff in an urban area, which includes the discharge of surface water runoff to surface waters. Given the highly developed nature of Seattle, these discharges often contain pollutants typical of runoff from urban areas. For example, oils and greases from roadway areas, fertilizer from landscaped areas and residences, heavy metals from various urban sources, etc. Overall, the CDP is designed to reduce and mitigate for these types of ongoing discharges.

In addition, many areas of the City are served by combined sewers, which carry both sanitary sewage (or wastewater) and stormwater runoff. In large storm events, combined sewers may overflow into a receiving water body through a combined sewer overflow discharge point. This results in combined stormwater and raw wastewater discharges to surface waters. Part of the objective of this proposal (the 2004 CDP) is to reduce and mitigate for these ongoing discharges.

b. Ground:

(1) Will ground water be withdrawn, or will water be discharged to ground water? If so, give general description, purpose, and approximate quantities if known.

The proposal will recommend projects designed to maintain or improve stormwater conveyance, aquatic habitat, and landslide conditions throughout the metropolitan area. Lists of the types of programs and projects that could result from the proposal are presented in section A11 of this checklist. Some of this work will require below-ground work and may result in the need for temporary dewatering to maintain dry construction conditions. In addition, some stormwater management projects will focus on utilizing infiltration of stormwater, but only in situations where soils and slope are conducive to infiltration. Landslide mitigation projects often involve permanently drawing down the localized groundwater level to help stabilize landslide prone areas. All projects will require their own environmental permitting and approval.

(2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: domestic sewage; industrial, agricultural, etc.). Describe the general size of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

There are no known sources of waste material discharged into the ground associated with this proposal.

c. Water Runoff (including storm water):

(1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include <u>quantities</u>, if known).

Where will this water flow? Will this water flow into other waters? If so, describe.

See also B3.a above.

The proposal will result in projects and programs designed to maintain or improve stormwater conveyance, aquatic habitat, and landslide conditions throughout the metropolitan area. The proposal will permanently affect existing stormwater runoff conditions throughout the city. The proposal also recommends individual projects that will temporarily result in stormwater runoff from construction sites that may drain to any of the surface water bodies described previously, or to the sanitary sewer system. All projects will be subject to the conditions outlined in A10 and B1.h above.

(2) Could waste materials enter ground or surface waters? If so, generally describe.

Typical residential waste materials that enter drainage systems or the ground, such as soap from car washing, motor oil leaks, exhaust residue, etc., will not be increased by this proposal. The proposal aims to reduce sources of waste materials entering waterways.

Waste resulting from construction activities for projects proposed as part of the CDP would not be increased or decreased compared to existing construction activities.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

The CDP is primarily a planning document, which as a whole aims to maintain, manage, plan, and construct drainage systems to safeguard public health and property and control flooding while protecting streams, lakes, and Puget Sound. In general, water quality projects under this proposal will be designed to minimize the impact of pollutants on receiving waters. Projects that control runoff through the use of surface swales will be carefully designed to prevent any possible impacts to groundwater. Any projects that result from the proposal will also be subject to the conditions outlined in A10 and B1.h above.

B4. Plants

a. Check types of vegetation found on the site:

☑ Deciduous trees (check types): ☑ alder ☑ maple ☑ aspen ☑ other: various ornamentals
☑ Evergreen trees (check types): ☑ fir ☑ cedar ☑ pine ☑ other: various ornamentals
☑ Shrubs
☑ Grass
☐ Pasture
☐ Crop or grain
☑ Wet soil plants (check types): ☑ cattail ☑ buttercup ☑ bullrush ☑ skunk cabbage ☑ Other: various native and exotic rushes, sedges, grasses, and non-herbaceous plants

☑ Water plants (check types): ☑ water lily ☑ eelgrass ☑ milfoil ☑ Other:
☑ Other types of vegetation: various other vascular and non-vascular plants

b. What kind and amount of vegetation will be removed or altered?

CDP programs and projects may involve removal or alteration of vegetation. Vegetation in the rights of way is limited, and typically comprises non-native and/or landscape species. CDP related construction projects that disturb vegetation in the right of way would restore vegetation following construction activity, according to City of Seattle standard construction practices. CDP generated programs and projects, undertaken to enhance aquatic habitat and associated riparian corridors or shorelines, will remove inappropriate local vegetation and invasive species. These areas will be restored with the planting of native species and other appropriate vegetation that will benefit fish and wildlife in the area.

c. List threatened or endangered species known to be on or near the site.

The proposal will result in programs and projects throughout the city of Seattle. White-top aster (Aster curtus) is a federal species of concern known to occur in King County, with suitable habitat occurring in Seattle (grasslands and savannah).

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

See b above. Habitat for white-top aster is limited within the city limits, and implementation of the CDP is unlikely to affect this species.

B5. Animals

a. Checkmark any birds and animals that have been observed on or near the site or are known to be on or near the site:

Birds:	☑ hawk ☑ heron ☑ eagle ☑ songbirds ☑ other: osprey, peregrine falcon, purple martin
Mammals:	☑ deer ☐ bear ☐ elk ☑ beaver ☑ other: California sea lion
Fish:	☑ bass ☑ salmon ☑ trout ☑ herring ☑ shellfish ☑ other: various freshwater and marine species

b. List any threatened or endangered species known to be on or near the site:

The proposal will result in programs and projects throughout the city of Seattle. The following federal and state listed animal species may be present either within Seattle or in the vicinity of the city.

Likely to occur:

- Bald eagle (*Haliaeetus leucocephalus*) – federal threatened, state threatened. This species nests at several locations within the city of Seattle.
- Orca (*Orcinus orca*) – state endangered. On April 3, 2004, the Washington State Department of Fish and Wildlife Commission voted to

approve listing the Puget Sound population of orca as a state endangered species. Approximately 83 individuals in three pods inhabit Puget Sound during some or all of the year.

- Marbled murrelet (*Brachyramphus marmoratus*) – federal threatened, state threatened. This species forages in nearshore areas of Puget Sound.
- Chinook salmon (*Oncorhynchus tshawytscha*) – federal threatened. This species occurs throughout Puget Sound and in the Duwamish Waterway and Lake Union/Ship Canal system.
- Bull trout (*Salvelinus confluentus*) – federal threatened. This species transits through Puget Sound, the Duwamish Waterway, and the Lake Union/Ship Canal system.

May occur, but unlikely to occur:

- Humpback whale (*Metaptera novaeangliae*) – federal endangered, state endangered. On rare occasions, this species enters Puget Sound and stays for a short period of time.
- Stellar sea lion (*Eumetopias jubatus*) – federal threatened, state threatened. This species is present in Puget Sound, and annually juveniles are observed near Shilshole Bay. However, in general it is rarely seen in the nearshore areas adjacent to Seattle, and there are no known haul-out sites near the City.
- Leatherback sea turtle (*Dermochelys coriacea*) – federal endangered, state endangered. NOAA Fisheries has identified this species as potentially occurring in Puget Sound, but there are no known occurrences in the nearshore areas adjacent to Seattle.

c. Is the site part of a migration route? If so, explain.

Seattle is an upland corridor for bald eagles traveling to and from foraging areas in Puget Sound or Lake Washington. Marbled murrelets winter on marine waters and nest in late successional/old growth forests during late spring and summer. They make daily trips to the ocean and nearshore areas to gather food.

Bull trout, chinook, and coho salmon use the Puget Sound nearshore as a migration corridor. Anadromous fish migrate through Seattle creeks, the Duwamish River, and the Ship Canal;/Lake Union/Lake Washington system on their way to the ocean and upon their return to freshwaters for spawning.

Seattle is within the migration routes of many migratory bird species.

d. Proposed measures to preserve or enhance wildlife, if any:

The CDP will involve numerous programs and projects (see A11) with the intended outcome of preserving and enhancing aquatic resources throughout Seattle. These programs and projects will have beneficial impacts on fish and wildlife in the proposal area. Some of these programs and projects are designed to engage citizens and residents in better public stewardship of urban creeks and shorelines, to improve water quality by decreasing the amount of pollutants released to surface waters, to control flows that exacerbate erosion and diminish habitat quality, and to improve vegetation in the riparian corridors of creeks and shorelines of Seattle. All of these programs and projects will help preserve and enhance wildlife and habitat throughout the city of Seattle. During construction, wildlife will be preserved and protected by conformance with applicable environmental reviews, approvals and permits (see A10).

B6 Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

The proposal will not require any supplementary energy to operate.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

The proposal does not involve building structures or planting vegetation that would block access to sunlight used for solar energy on adjacent properties.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

Not applicable (see item a. above)

B7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe:

Small amounts of materials likely to be present during construction of a given project include gasoline and diesel fuels, hydraulic fluids, oils, lubricants, solvents, paints and other chemical products. A spill of one of these chemicals could potentially occur during construction as a result of either equipment failure or worker error. Contaminated soils, sediments or groundwater could also be exposed during excavation. If disturbed, contaminated substances could expose construction workers and potentially other individuals in the vicinity through blowing dust, stormwater runoff, or vapors.

The development of new surface detention facilities or the implementation of other projects that could result in new areas of standing water could increase areas suitable for mosquito-breeding. This in turn could slightly increase the potential for mosquito-borne illnesses, such as West Nile Virus. Nonetheless, the likelihood is extremely small that implementation of the CDP would lead to a discernable increase in mosquito-borne illnesses, in part because the City, in February 2003, adopted and is now implementing an Integrated Pest Management Plan for Mosquito Control that addresses "managing the risks to human health and the environment from mosquito-borne diseases and mosquito control options in City operations."

(1) Describe special emergency services that might be required.

Possible fire or medic services could be required during construction, as well as possibly during maintenance of the completed project.

(2) Proposed measures to reduce or control environmental health hazards, if any:

A Health and Safety plan will be submitted by the contractor before construction work commences. Construction workers will have had 40-hour OSHA Health and Safety Training for working in potentially contaminated areas.

A spill control plan will be developed to control spills on construction sites. Any contaminated soils will be excavated and disposed of in a manner consistent with the level of contamination, in accordance with Federal, state and local regulatory requirements, by a qualified contractor(s) and/or City staff.

b. Noise

(1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?
Noises that exist in the area will not affect the proposal.

(2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.
Noise levels in the vicinity of construction of a given project would temporarily increase during construction activities. Short-term noise from construction equipment will be limited to the allowable maximum levels of City of Seattle's Noise Control Ordinance (SMC Chapter 25.08).

Noise from construction equipment may occur between the hours of 7 am and 9 pm weekdays, and 9 am to 9 pm weekends during construction.

After completion of the project, occasional noise from equipment used for on-going routine maintenance and repair will occur, but would be limited to 7am to 9pm weekdays and 9am to 9pm weekends.

(3) Proposed measures to reduce or control noise impacts, if any:
On projects arising from this proposal, construction equipment will be muffled in accordance with the applicable laws. SMC Chapter 25.08, which prescribes limits to noise and construction activities, will be fully enforced while any project is under construction.

B8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?
The CDP covers projects that may occur throughout the area within the Seattle city limits. Seattle's land area of 84 square miles is developed with a mixture of residential, commercial, and industrial uses. Seattle's population in 2000 was 563,374, with a population density of 6,736 people per square mile. Seattle is bordered on two sides by large bodies of water: Lake Washington to the east and Puget Sound to the west. To the south, the city of Tukwila and White Center (unincorporated King County) abut Seattle with mixed industrial and residential land uses (Tukwila) and residential and commercial uses (White Center). Seattle is bordered on the north by primarily suburban residential and commercial land uses in the city of Shoreline.

b. Has the site been used for agriculture? If so, describe.
The site has not been used for large-scale agriculture in recent history.

c. Describe any structures on the site.
Seattle is developed with a wide range of structures, from single-family

residences to high-rise structures to large industrial structures.

d. Will any structures be demolished? If so, what?

Individual projects under the plan may require demolition of some structures, but none are identified at this time.

e. What is the current zoning classification of the site?

The proposal covers all zones in the city of Seattle. Zoning in Seattle includes a range of residential, commercial and industrial designations. Zoning designations are found in Seattle's Land Use Code, Title 23 of the Seattle Municipal Code. The zones are listed below, followed by their abbreviation.

Designation	Abbreviation
Residential, Single-family 9,600	SF 9600
Residential, Single-family 7,200	SF 7200
Residential, Single-family 5,000	SF 5000
Residential Small Lot	RSL
Residential, Multifamily, Lowrise Duplex/Triplex	LDT
Residential, Multifamily, Lowrise 1	L1
Residential, Multifamily, Lowrise 2	L2
Residential, Multifamily, Lowrise 3	L3
Residential, Multifamily, Lowrise 4	L4
Residential, Multifamily, Midrise	MR
Residential, Multifamily, Highrise	HR
Residential-Commercial	RC
Neighborhood Commercial 1	NC1
Neighborhood Commercial 2	NC2
Neighborhood Commercial 3	NC3
Seattle Cascade Mixed	SCM
Commercial 1	C1
Commercial 2	C2
Downtown Office Core 1	DOC1
Downtown Office Core 2	DOC2
Downtown Retail Core	DRC
Downtown Mixed Commercial	DMC
Downtown Mixed Residential	DMR
Pioneer Square Mixed	PSM
International District Mixed	IDM
International District Residential	IDR
Downtown Harborfront 1	DH1
Downtown Harborfront 2	DH2
Pike Market Mixed	PMM
General Industrial 1	IG1
General Industrial 2	IG2
Industrial Buffer	IB
Industrial Commercial	IC

f. What is the current comprehensive plan designation of the site?

Because the proposal encompasses the whole city, it includes all designations in the Seattle Comprehensive Plan. This includes the residential, commercial and industrial designations, as well as a designation for Urban Centers and a designation for Urban Villages. These designations can be found in the Seattle Comprehensive Plan, adopted on July 25, 1994 and last updated on December 9, 2002.

g. If applicable, what is the current shoreline master program designation of the site?

The CDP would result in programs and projects that would be implemented throughout the city. The Seattle Shoreline Master Program implements the policies and provisions of the Shoreline Management Act and the Shoreline Goals and Policies of the Seattle Comprehensive Plan by regulating development of the shorelines of the City. The Shoreline Goals and Policies are part of the Land Use Element of Seattle's Comprehensive Plan. SMC Title 23, Land Use Code, Chapter 23.60 identifies the following Shoreline District designations in Seattle: Conservancy Navigation Environment, Conservancy Preservation Environment, Conservancy Recreation Environment, Conservancy Management Environment, Conservancy, Urban Residential Environment, Urban Stable Environment, Urban Harborfront Environment, Urban Maritime Environment, Urban General Environment, and Urban Industrial Environment.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

Because the CDP applies to the entire city, it follows that all of the critical area categories designated by the city of Seattle Environmentally Critical Areas Policies and regulated and mapped in SMC Chapter 25.09, are present in the project area. The official Land Use Map of the City of Seattle contains overlays identifying the general boundaries of all known environmentally critical areas within the city, which reference Seattle's Environmentally Critical Areas Maps to determine the general boundaries of each environmentally critical area. Seattle identifies the following categories of environmentally critical areas.

1. Geologic Hazard Areas, including known and potential landslide-prone areas. Potential landslide areas are based on a combination of geologic, topographic and hydrologic factors, including the presence of springs or groundwater seepage, over fifteen (15) percent slopes which certain soil characteristics, steep slopes of forty (40) percent average slope or greater, any slope area potentially unstable as a result of rapid stream incision or stream bank erosion. Also included are liquefaction-prone areas, which lose substantial strength during earthquakes.

2. Flood-prone Areas, including areas that would likely be covered with or carry water as a result of a one hundred (100) year storm, or that would have a one (1) percent or greater chance of being covered with, or of carrying, water in any given year based on current circumstances or maximum development permitted under existing zoning. This includes areas identified on the Seattle Floodplain Development Ordinance, FEMA maps, streams identified by the Washington State Department of Fisheries' Catalog of Washington Streams, and areas with drainage problems known to SPU.

3. Riparian Corridors, including all areas within one hundred (100) feet measured horizontally from the top of the bank, or if that cannot be determined, from the ordinary high water mark of the watercourse and water body, or a one-hundred (100) year floodplain as mapped by FEMA, as regulated by the Seattle Floodplain Development Ordinance. Riparian corridors do not normally include those artificial drainage areas intentionally created from grass-lined swales, canals, detention facilities, wastewater treatment facilities, and landscape amenities.

4. Wetlands, including those areas that are inundated or saturated by surface

water or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway.

5. Fish and Wildlife Habitat Conservation Areas, including areas (and corridors connecting them) that have been identified by the Washington State Department of Wildlife as priority habitat and species areas or urban natural open space habitat areas; all bodies of water that provide migration corridors and habitat for fish, especially salmonids, including Lake Washington, Lake Union and the Lake Washington Ship Canal, Duwamish River, and that portion of Elliott Bay within the City's jurisdiction; commercial and recreational shellfish areas and kelp and eelgrass beds; and areas which provide habitat for species of local importance.

6. Abandoned Landfills, including those abandoned solid waste landfills identified by the Seattle-King County Health Department in their 1986 Abandoned Landfill Toxicity/Hazard Assessment Project, additional sites identified by public or historical research, and areas within one thousand (1,000) feet of methane-producing landfills.

i. Approximately how many people would reside or work in the completed project?

The proposal does not include any residential or commercial development; therefore no people will reside or work in the completed project.

j. Approximately how many people would the completed project displace?

It is not anticipated that any residential structures would be displaced at this time. However, individual projects under the CDP would evaluate whether potential impacts to or acquisition of private property might be desirable under certain circumstances and on a very restricted basis.

k. Proposed measures to avoid or reduce displacement impacts, if any:

No measures are proposed to avoid or reduce displacement impacts. All development under the proposal would comply with Seattle Land Use and Shorelines regulations.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

All programs and projects resulting from this proposal will be evaluated by SPU's Asset Management Committee prior to approval, and will comply with federal, state, and local requirements.

B9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

This project does not involve the construction of any housing units.

b. **Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.**

It is not anticipated that any residential structures would be displaced at this time. However, individual projects under the CDP would evaluate whether potential impacts to or acquisition of private property might be desirable under certain circumstances and on a very restricted basis.

c. **Describe proposed measures to reduce or control housing impacts, if any:**

No measures are proposed to avoid or reduce displacement impacts. All development under the proposal would comply with Seattle Land Use and Shorelines regulations, as well as Seattle Housing Office policies.

B10. Aesthetics

a. **What is the tallest height of any proposed structure(s), not including antennas? What is the principal exterior building material(s) proposed?**

Structures resulting from the proposal would comprise retaining walls, drainage pipes, inlets, manholes, catch basins, surface and subsurface stormwater control facilities (such as ponds, vaults, filters, swales, and subsurface drains), ditches, and culverts. Building materials include concrete, and steel, as well as natural materials such as earth, rock, and wood. Boulders, large wood debris (logs) or engineered logjams could be placed in some streams. Drainage structures are generally located at or below grade. All facilities are subject to height restrictions of Seattle Zoning Code.

b. **What views in the immediate vicinity would be altered or obstructed?**

Below grade installations would not alter or obstruct views. Drainage facilities installed at surface level might be visible, but of a height that would not obstruct existing territorial views. Native vegetation and trees may be planted along riparian corridors, which may over a long period, grow to appreciable height. However, the majority of Seattle creeks are located in ravines, and as such, plantings along the riparian corridor are unlikely to obstruct territorial views.

c. **Proposed measures to reduce or control aesthetic impacts, if any:**

Aesthetic impacts resulting from programs or projects arising from the CDP would be reduced or controlled through conformance with Seattle Land Use Code and the Director's Rules. Seattle's Director's Rule 13-92 documents landscape standards that are required of development projects in order to "mitigate adverse impacts of a project such as height, bulk and scale, to buffer incompatible uses, to provide screening, to increase the amount of permeable surfacing and thereby reduce drainage problems and to enhance the beauty of our city." In addition, several of the programs proposed by the CDP are designed to enhance aquatic resources and riparian corridors, and would result in more naturalistic creeks and creek areas, considered aesthetically pleasing to many citizens.

B11. Light and Glare

a. **What type of light or glare will the proposal produce? What time of day would it mainly occur?**

The proposal will not produce any light or glare. (See B7(b) regarding

construction limitations.)

b. Could light or glare from the finished project be a safety hazard or interfere with views?

Not applicable (see item a. above)

c. What existing off-site sources of light or glare may affect your proposal?

Not applicable (see item a. above)

d. Proposed measures to reduce or control light and glare impacts, if any:

Not applicable (see item a. above)

B12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

The City of Seattle operates and maintains a large number of city parks, trails, gardens, playfields, swimming pools, and community centers. In addition to these public facilities, public and privates schools, outdoor associations and commercial businesses provide Seattleites with a variety of organized recreational facilities and activities such as school athletic programs, hiking and gardening groups, and private health clubs and golf courses. Seattle is particularly rich in recreational opportunities that are based on the natural features of the area. Seattle's many parks and shorelines offer an abundance of recreational opportunities, including water contact recreational activities, such as swimming, wading, snorkeling, and diving; the water-related and non-water-related recreational activities such as walking, hiking, playing, observing wildlife and connecting with nature; and recreational activities, such as fishing and non-commercial shellfish harvesting, that involve consumption of natural resources.

b. Would the proposed project displace any existing recreational uses? If so, describe.

The proposal would not permanently displace existing recreational uses. CDP programs or projects that involve protection or restoration of aquatic resources, for example those that involve restoration and/or revegetation of areas along urban shorelines or riparian corridors, could result in temporary displacement of localized recreational activities while new plants are allowed time to take root and become established.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

The CDP programs and projects designed to improve water quality, aquatic habitat, and riparian corridor conditions for fish and wildlife, will also enhance water-dependent recreational activities for humans -- fishing, swimming, and boating. People also use riparian corridors for non-water dependent recreational activities such as bird and wildlife watching, walking and jogging. These recreational activities will be enhanced by development of diverse and productive riparian corridors, creating more naturalistic refuges within Seattle's highly urbanized environment. CDP programs include environmental learning and stewardship opportunities for residents, many of whom consider opportunities to be active in nature as a satisfying recreational outlet.

B13. Historic and Cultural Preservation

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

There are a number of landmarks, properties, or districts in Seattle that are listed on, or proposed for, national, state, and local preservation registers. In addition, while Seattle today comprises a highly urbanized and developed area, it is also an area with potential for Native American cultural artifacts. Implementation of projects generated under the CDP has the potential to result in impacts to historic and cultural resources.

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

See B13.a above.

c. Proposed measures to reduce or control impacts, if any:

The potential for disturbance of cultural, archaeological or historic sites will be considered by SPU prior to implementation of any specific projects that result from the proposal, and appropriate measures will be taken to avoid and/or mitigate impacts. As specified in the City of Seattle 2003 Standard Specifications http://www.cityofseattle.net/util/engineering/pdfspecs.htm - 1-07.5(6) - relating to archaeological and historic preservation, if artifacts, skeletal remains, or other archaeological resources (as defined under RCW 27.53.040) are discovered during the project, work in that area shall be suspended until permission to proceed has been obtained from the State Historic Preservation Officer or some other qualified authority. Decisions regarding appropriate mitigation and further action will be made at that time.

B14. Transportation

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

Seattle has dense grids of urban streets (residential and arterials) that provide connections to major routes, including I-5 and State Route 99, which run north and south through the city, and I-90 and State Route 520, which connect Seattle to points east across Lake Washington.

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

King County Metro and Sound Transit operate a dense network of bus routes within the city. Those routes, by and large, follow arterial streets throughout Seattle.

c. How many parking spaces would the completed project have? How many would the project eliminate?

The proposal is not expected to alter the number of parking spaces in the area.

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

The proposal is not expected to involve new roads or streets. However, projects

resulting from the proposal are intended to reduce flooding/improve flood control, and as such, these improvements will have beneficial effects on use of the right of way.

e. **Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.**
Projects resulting from the proposal could occur in the vicinity of the railroad lines running through Seattle south of Pioneer Square, in the South Lake Union Area, and along the western edge of the City. Projects could also occur in the vicinity of water transportation in the Lake Union/Ship Canal.

f. **How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.**
The number of vehicular trips and peak volumes are not expected to change as a result of this proposal.

g. **Proposed measures to reduce or control transportation impacts, if any:**
Limited transportation impacts within the rights of way may temporarily result from work deriving from the proposal. Construction projects will require submittal of a traffic control plan for approval by the City, which will be in force during periods of construction.

B15. Public Services

a. **Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.**
The proposal will have no impact on the need for public services, beyond gradual expansion of drainage services to provide the proposed projects and programs contained in the CDP.

b. **Proposed measures to reduce or control direct impacts on public services, if any.**
Not applicable (see a. above)

B16. Utilities

a. **Check utilities currently available at the site, if any:** ☐ **None**
☑ **electricity** ☑ **natural gas** ☑ **water** ☑ **refuse service**
☑ **telephone** ☑ **sanitary sewer** ☑ **septic system**
☐ **other:**

b. **Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.** ☐ **None**
The CDP is developed, implemented, and managed by SPU in coordination with other city departments and divisions on a case-by-case, as needed basis. The projects and programs resulting from the CDP may include a range of stormwater management utilities including catch basins, culverts, drainage lines, detention ponds and vaults, stormwater treatment facilities, etc. Section A11 provides examples of the type of projects that could result from the proposal.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: Chuck Clarke Date: 5/5/04

Chuck Clarke, Director, Seattle Public Utilities

D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(do not use this sheet for project actions)

Note: The City of Seattle 2004 CDP is a non-project planning document. Implementation of the CDP will involve the development and implementation of a series of drainage programs and capital improvement projects designed to address drainage needs throughout the city. However, no specific projects or programs will be implemented directly as a result of adoption of the CDP. The following sections address the programmatic components of the plan and do not discuss the specifics of potential projects or programs (e.g., construction activities) that may result in associated with adoption of the CDP.

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

As outlined in Section A11 above, the 2004 CDP is primarily a planning document, which as a whole aims to maintain, manage, plan, and construct drainage systems to safeguard public health and property and control flooding while protecting streams, lakes, and Puget Sound. The proposal as a whole will not result in increased impacts to the environment but rather will result in a net improvement in environmental conditions. Benefits to the environment would occur at a slower rate if the CDP were not implemented.

The proposal could result in a slight increase in discharges of stormwater to surface waters through a plan to reduce flooding, and thereby better convey stormwater runoff away from roadways and buildings and to receiving waters. No increase in emissions to air, production, storage, or release of toxic or hazardous substances; or production of noise are expected to occur under the proposal.

Proposed measures to avoid or reduce such increases are:

In addition to proposals to reduce flooding (and therefore potentially increase discharges to surface waters), the CDP includes plans and approaches for managing stormwater in Seattle's urban environment in a manner that reduces flow-related impacts to receiving waterbodies. Therefore, the plan as a whole includes measures to avoid or reduce the impacts of increased stormwater discharges to surface waters. Measures to reduce impacts associated with increased flows caused by correction of flooding efforts will be determined on a case-by-case basis. In general, the City is dedicated to protecting sensitive receiving waterbodies and does not plan to route stormwater runoff from flood-prone areas to sensitive systems without adequate mitigation and protective measures. In addition, projects will be constructed and maintained in a manner that protects land and water resources. Any strategies under this plan that use surface swales or infiltration as a means of managing storm water will be developed in consultation with the appropriate regulatory agencies, and will be carefully monitored for proper performance.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Among other items, the plan aims to protect and improve aquatic conditions in streams, lakes, and Puget Sound. The proposal as a whole will not result in increased impacts to the environment but rather will result in a net improvement in environmental conditions. Minimal benefits are expected for plants, with the exception of riparian area improvements including invasive vegetation removal and planting of native riparian vegetation.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

No impacts to plants, animals, fish, or marine life are expected to result from the proposal, therefore no protective measures are proposed. However, the plan as a whole does target the protection of fish and marine life in particular, with additional attention to the protection and conservation of riparian plants and native vegetation associated with surface waterbodies. In addition, individual projects must also comply with applicable environmental permits and regulations.

3. How would the proposal be likely to deplete energy or natural resources?

The proposal will not have a negative impact on energy or natural resources.

Proposed measures to protect or conserve energy and natural resources are:

The proposal will not have a negative impact on energy or natural resources therefore no protective measures are proposed.

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

The proposal as a whole aims to maintain, manage, plan, and construct drainage systems to safeguard public health and property and control flooding while protecting streams, lakes, and Puget Sound. The proposal would protect and improve environmentally sensitive areas wherever feasible and would strive to minimize the effects of urbanization on these areas.

Proposed measures to protect such resources or to avoid or reduce impacts are:

The proposal will not have a negative impact on these resources therefore no protective measures are proposed.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

The proposal encourages that shoreline areas be protected and improved to provide aquatic habitat function and benefits where feasible. The proposal does not make any other suggestions for uses or changes to shoreline areas.

All suggestions are intended to be consistent with other existing plans, however recommendations for protection and improvement of shoreline areas and other aquatic habitat areas (e.g., streams and riparian areas) are generally inconsistent with plans to develop shoreline areas.

Proposed measures to avoid or reduce shoreline and land use impacts are:

Among other items discussed previously, the proposal itself contains recommendations to avoid and reduce shoreline impacts citywide. No specific recommendations are proposed to avoid or reduce land use impacts associated with the reduction of developable land caused by City purchase of land for the purposes of habitat protection.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

The proposal will have no impact on the need for public services, beyond gradual expansion of drainage services to provide the proposed projects and programs contained in the CDP.

Proposed measures to reduce or respond to such demand(s) are:

As outlined in the Financial Plan portion of the CDP (Chapter 10), the proposal includes plans to gradually increase SPU's service levels to support the proposed expansion of drainage programs.

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

The proposal is consistent with, and supports all local, state, or federal laws or requirements for the protection of the environment.

[Statutory Authority: RCW 43.21C.110. 84–05–020 (Order DE 83–39), § 197–11–960, filed 2/10/84, effective 4/4/84.]