

1 BILL NO. 259

2 A BILL  
3 FOR  
AN ORDINANCE

ORDINANCE NO.  
94- 277

4 AMENDING THE CITY OF KEIZER MASTER SEWER PLAN  
5 BY ADOPTING THE MASTER SEWER PLAN UPDATE DATED  
6 DECEMBER 1993 (AMENDING ORDINANCE NOS. 87-077  
7 AND 92-238)

8  
9 The City of Keizer ordains as follows:

10 Section 1. FINDINGS. The City of Keizer adopts the findings set forth  
11 in Exhibit "A" attached hereto and by this reference incorporated herein.

12 Section 2. ADOPTION OF THE MASTER SEWER PLAN UPDATE.  
13 The City of Keizer hereby adopts the Master Sewer Plan Update dated December  
14 1993 (hereinafter "1993 Update") as set forth in Exhibit "B" attached and by this  
15 reference incorporated herein, and such 1993 Update is hereby made a part of  
16 the Keizer Comprehensive Plan in connection with facilities planning.

17 Section 3. AMENDMENT OF ORDINANCE NOS. 87-077 AND  
18 92-238. Ordinance No. 87-077 (Keizer Comprehensive Plan) and Ordinance  
19 No. 92-238 (Master Sewer Plan Update - Basin 36) are hereby amended by the  
20 addition of the Master Sewer Plan Update (December 1993).

21 Section 4. OFFICIAL RECORD. One copy of the 1993 Update  
22 referenced above shall be marked "Official Text" and kept on file in the office  
23 of the City Recorder.

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25 ///

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27 ///

1 - ORDINANCE NO. 94- 277

**LIEN, HOBSON & JOHNSON**

Attorneys at Law  
4855 River Rd. N.  
Keizer, Oregon 97303  
(503) 390-1635

1 Section 5. SEVERABILITY. If any section, subsection, sentence,  
2 clause, phrase, or portion of this Ordinance is for any reason held invalid or  
3 unconstitutional by any court or board of competent jurisdiction, such portion  
4 shall be deemed a separate, distinct, and independent provision and such holding  
5 shall not affect the validity of the remaining portions hereof.

6 Section 6. EFFECTIVE DATE. This Ordinance being necessary for the  
7 immediate preservation of the public health, safety, and welfare, an emergency  
8 is declared to exist and this Ordinance shall take effect immediately upon its  
9 passage.

10 PASSED this 21st day of March, 1994.

11 SIGNED this 21st day of March, 1994.

12  
13

Al Miller, Council President  
Mayor

14  
15

Gracy H. Davis  
City Recorder

16 824MCOK2.001

## EXHIBIT "A"

### Findings Regarding the Adoption of the Master Sewer Plan Update (December 1993) (See criteria set forth at Keizer Zoning Ordinance 4.15)

The City of Keizer finds that:

1. Pursuant to the criteria in Keizer Zoning Ordinance Section 4.15(a), the 1993 Update complies with the statewide land use goals and related administrative rules as follows:

#### **GOAL 1: CITIZEN INVOLVEMENT**

Public hearings were conducted on this matter and review and adoption proceedings were consistent with local land use regulations.

#### **GOAL 2: LAND USE PLANNING**

The 1993 Update amends the Keizer Comprehensive Plan. The adoption proceedings were conducted in a manner consistent with the requirements of the Keizer Comprehensive Plan, Keizer Zoning Ordinance, and applicable state law.

#### **GOAL 3: AGRICULTURE LAND**

This goal does not apply as the 1993 Update does not involve land designated or zoned for agricultural use.

#### **GOAL 4: FOREST LANDS**

This goal does not apply as the 1993 Update does not involve land designated or zoned for forestry uses.

#### **GOAL 5: OPEN SPACES, SCENIC AND HISTORIC AREAS, AND NATURAL RESOURCES**

This goal does not apply as the 1993 Update will not affect any open spaces, scenic and historic areas, or natural resources.

#### **GOAL 6: AIR, WATER AND LAND RESOURCES QUALITY**

This goal is met as the 1993 Update will maintain air, water and land resources quality.

## **GOAL 7: AREAS SUBJECT TO NATURAL DISASTERS AND HAZARDS**

This goal does not apply as the 1993 Update will not affect any areas subject to natural disasters or hazards.

## **GOAL 8: RECREATIONAL NEEDS**

This goal does not apply as the 1993 Update will neither enhance or detract from recreational needs.

## **GOAL 9: ECONOMIC DEVELOPMENT**

The 1993 Update may improve the economy of the Keizer area in that housing, and therefore population will increase thereby drawing businesses to the Keizer area.

## **GOAL 10: HOUSING**

The 1993 Update will assist in meeting this goal in that, when completed, the sewer improvements will provide for additional housing development within the urban growth boundary.

## **GOAL 11: PUBLIC FACILITIES AND SERVICES**

This goal is directly addressed by the 1993 Update as the 1993 Update provides a timely, orderly and efficient arrangement of public sewer facilities and services for both and rural development.

## **GOAL 12: TRANSPORTATION**

This goal does not apply as the 1993 Update will not affect the transportation system.

## **GOAL 13: ENERGY CONSERVATION**

This goal does not apply as the 1993 Update will not affect energy conservation.

## **GOAL 14: URBANIZATION**

This goal is beneficially affected by the 1993 Update in that the nature of the sewer improvements called for in the 1993 Update leads to orderly and efficient transition from rural to urban land uses.

## **GOAL 15: WILLAMETTE GREENWAY**

This goal does not apply as none of the provisions of the 1993 Update will affect the Willamette Greenway.

## **GOALS 16, 17, 18 AND 19: ESTUARINE RESOURCES, COASTAL SHORELANDS, BEACHES AND DUNES, AND OCEAN RESOURCES**

These goals do not apply as Keizer is not located in an ocean shoreland area.

The following findings relate to the criteria found in Keizer Zoning Ordinance (KZO) Section 4.15:

2. The 1993 Update conforms with the Keizer Comprehensive Plan (KCP) goals, policies and intent, particularly with regard to the goals involving public facilities (KCP, page 53). One such policy is the planning and development of a timely, orderly and efficient arrangement of public facilities. In addition, the 1993 Update will meet the policy of reducing the amount of public subsidy for public utilities. [KZO 4.15(b)].

3. Public need is best satisfied by the adoption of the 1993 Update in that it provides for public facility needs and fits within the goals and policies of the Keizer Comprehensive Plan. [KZO 4.15(c)].

4. The 1993 Update will not adversely affect the health, safety and welfare of the community, but rather will enhance such goals. [KZO 4.15(d)].

5. The criteria listed at Keizer Zoning Ordinance 4.15(e) is not applicable. Such criteria involves site-specific development and whether public facilities, services and transportation networks are in place. This Plan Update is not a site-specific one.

Findings with regard to this Ordinance are based on all written and oral testimony received at the City Council hearings on this matter. Such testimony includes, but is not limited to, staff reports, and other written documents submitted in connection with this Ordinance. This evidence is incorporated by this reference as if fully set forth herein.

824MCOK2.001

CITY OF KEIZER  
MASTER SEWER PLAN UPDATE

Prepared

by

WILLIAM I. PETERSON ENGINEERING CONSULTANTS, INC.

December 1993

(3rd DRAFT)

WIP Stamp

(draft 12-15-93)

## EXECUTIVE SUMMARY

The purpose of the report is to provide an update to the City of Keizer existing master sewer plan by addressing the sanitary sewer needs, existing and future, of the City of Keizer.

The existing sewer system in the City of Keizer was divided into forty-one (41) basins for analysis. (See Exhibit A). The models of the basins were designed from available as-built information from construction plans. The models were run through a computer program called "HYDRA" with initial design parameters based on consultation with the City of Salem Public Works Department. Nineteen (19) basins showed some theoretical failure using the peaking method of analysis. The failed basins were then subject to further computer analysis. Seven (7) basins were determined to be of significant concern. The City of Salem has monitoring devices in three of these basins. The other four (4) basins should be monitored as equipment and labor become available. The design parameters used in the model analysis were conservative and there are no reports of actual failures within the Keizer system. The City of Salem reports the condition of the system appears to be good with no reported areas of major deficiencies. Problems are not anticipated in the six basins of significant concern because of the conservative design parameters used in the Hydra models.

Future development will require the continuation of building additional sewer lines in Basin 36 that lies to the north and northeast of the City. Six (6) basins have vacant land for future development but Basin 36 is of major importance because of the ongoing development within the basin. The other basins should develop without any additional major sanitary sewer construction. The system as designed in Exhibit B should be sufficient for the full development of Basin 36.

A fully developed Hydra model of Basin 36 indicates surcharging in the "interim" 21 inch line between McNary Estates and the interceptor in Lockhaven. As Basin 36 develops over the next several years the available capacity in the existing "interim" 21 inch line will be used up. It will be necessary to extend the existing 36 inch line ending in McNary Estates to the Willow Lake Treatment Plant. In addition, a trunk line should be built from the O'Neil - N. River Road line to service the Chemawa Activity Center. The timing of these lines is dependent upon the rate at which Basin 36 develops and the need for sewer service to the CAC. The cost of each of these lines has been included in this report for financing purposes.

The City of Salem is currently conducting a new Sewer System Evaluation Study (SSES). This study will include a determination of where additional capacity in the overall system should be added.

The current method of assessing developing property on an acreage basis should be continued to pay for the Clear Lake system and other trunk lines. The current charge, approximately \$2,700 per acre, should be increased by a separate action of the City of Keizer.

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## CHAPTER 1 - INTRODUCTION

### AUTHORIZATION

The authorization for this study can be found in a letter dated February 20, 1990, from James Nightengale, Public Works Manager, City of Keizer, to Mr. Frank Mauldin, P.E., Director of Public Works, City of Salem, Oregon.

### PURPOSE/OBJECTIVE

The purpose of this master sewer plan update is to guide the future development and maintenance of the Keizer sanitary sewer system. This update, when adopted, becomes a part of the City of Keizer's Comprehensive Plan by reference.

Objectives include:

- Establishment of design criteria that considers topography, area, land use, waste water flow, infiltration and inflow.
- Investigation of possible areas of deficiencies in the existing system.
- Preparation of sewer line designs to areas currently without sewers.
- Preparation of cost estimates for the trunk line system and establishing priorities for the recommended improvements.

### SCOPE

The sanitary sewer Master Plan Update includes the following elements:

- Review of the study area physical environment including geography, population, topography, soils and land use.
- Determination of factors that affect the design of the trunk system such as basin size, population, per capita waste water flows, topography, land use, infiltration, inflow, and other pertinent data.
- Review of existing facilities in the Keizer system and identification of deficiencies in the existing system.
- Recommended integration of proposed new facilities into the existing system.

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A basin by basin review of projected flows and the effect of projected loadings on the existing system.

- Recommended modifications to the existing systems.
- Cost estimates for recommended improvements.
- Funding recommendations for financing improvements.

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## CHAPTER 2 - STUDY AREA PHYSICAL ENVIRONMENT

### GEOGRAPHY, POPULATION AND TOPOGRAPHY

This Keizer Master Sewer Plan Update covers an area of approximately 4,400 acres within the urban growth boundary of the City of Keizer. The City of Keizer (City) forms the northern boundary to the City of Salem. The City's western boundary is the Willamette River and the eastern boundary is the Salem-Keizer Parkway. Clear Lake Road is the approximate northern boundary.

The City has an estimated population of 23,437 people (July 1992 census).

The City is relatively flat to gently rolling with few minor exceptions along the Labish Ditch, Claggett Creek, Willamette River Bank, and steeper slopes north of the City and west of Wheatland Road down into the Willamette River basin.

The topography of the undeveloped areas is gently rolling, draining primarily in a westerly direction. The north portion of the City rests on a plateau area without any major pronounced drainage ways. The elevations of the areas yet to be serviced range from a low of 120 to a high of 185 feet (msl).

### SOILS

Soil types in the undeveloped areas are tabulated below. These are of interest in the design of sewers because they affect both the cost of the initial construction and the design allowances for infiltration and inflow (I/I) used to select pipe sizes for any proposed collection system. Infiltration is the amount of ground water entering a pipe through joints, porous walls, or breaks. Inflow is the amount of surface water entering the system, usually directly, such as incorrectly installed catch basins or drain pipes.

| Soil Type  | Depth to Ground Water | Permeability    |
|------------|-----------------------|-----------------|
| Woodburn   | > 30"                 | 0.63 - 2.0"/hr  |
| Amity      | 6-12"                 | 0.63 - 2.0"/hr  |
| Willamette | > 72"                 | 0.63 - 2.0"/hr  |
| Concord    | > 72"                 | 0.06 - 2.0"/hr  |
| Dayton     | > 72"                 | 0.06 - 0.63"/hr |
| Cloquato   | > 72"                 | 0.63 - 2.0"/hr  |
| Newburg    | > 72"                 | 2.0 - 6.3"/hr   |
| Chehalis   | > 72"                 | 0.63 - 2.0"/hr  |

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To the east of River Road lies the Woodburn-Amity-Willamette association: Dominantly level to rolling, somewhat poorly drained silt loam over silty clay loam.

The northern city areas west of River Road N. are Concord-Dayton-Amity association: Nearly level, poorly drained and somewhat poorly drained silt loams over silty clay, clay, and silty clay loam.

The western portion of the city limits are Cloquato-Newberg-Chehalis association: Well drained silty clay loams to sandy loams, on flood plains.

The common factor to all three groups is the surface soils have very slow permeability and are considered very poor for supporting septic tanks.

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## CHAPTER 3 - EXISTING FACILITIES

### GENERAL OVERVIEW

The Keizer sewer system utilizes the City of Salem's 72 - 75 inch interceptor as the main trunk line. In addition to the interceptor, the collection system currently requires the use of six separate pump stations. The original system was completed in 1968 and many additions have been made to the system since it began operation.

The collection system is constructed primarily of rubber ring concrete pipe. Newer sections of the system are constructed using P. V. C. or truss joint pipe.

The building of I-305 Freeway (Salem Parkway) created a jurisdiction problem. Some sewers flow from city to city passing under the parkway. (See Basins 23 and 24 on the basin map, Exhibit A.) In one case, the sewer flows from the City of Keizer through the City of Salem to the service district of Marion County (but within the City of Salem's urban growth boundary) and back through the City of Salem and into the City of Keizer. (See Basin 30 on Exhibit A.)

### RECENT DEVELOPMENTS

The following is a discussion of noteworthy sanitary sewer development since 1984. An 8 inch sanitary sewer line was extended up Wheatland Road with two pump stations in 1987 to the Clear Lake area. This line solved failing septic system problems in the Clear Lake area. New sewer developments occurred in the following areas; Rivercrest, Willow Lake, Apple Tree, McNary Estates, Timber View, Fir Crest, Orchard Crest, The Meadows, Stonehedge, Rim Rock, and Zachris Court.

A 12 inch north - south line was built west of Windsor Island Road in 1991.

The McNary pump station near the intersection of N. River Road and Wheatland Road was removed by constructing a portion of the 36 inch Lower Labish trunk to a 21 inch interim trunk that was constructed along the route of McClure Street. All of the Middle Labish, Meadows, and lower portion of the O'Neil trunk lines have been completed. (See Exhibit B).

### LAND USE AND AGE OF SEWER SYSTEMS

The developed portion of the study area has approximately 3,077 acres receiving sewer service. Single family residences using 2,455 acres, multi-family residences using 310 acres and commercial/industrial using 312 acres, see Table 3-1.

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BASIN ACREAGE BY LAND USE

TABLE 3-1

| BASIN | ACRES |      |       |       | BASIN   | ACRES  |       |       |        |
|-------|-------|------|-------|-------|---------|--------|-------|-------|--------|
|       | LDR   | MHDR | C     | TOTAL |         | LDR    | MHDR  | C     | TOTAL  |
| 1     | 14.3  | 0.0  | 0.0   | 14.3  | 24      | 37.3   | 4.1   | 0.0   | 41.4   |
| 2     | 6.3   | 0.0  | 0.0   | 6.3   | 24S*    | 0.0    | 0.0   | 36.8  | 36.8   |
| 3     | 0.0   | 0.8  | 2.2   | 3.0   | 25      | 53.1   | 4.0   | 5.9   | 63.0   |
| 4     | 20.9  | 4.0  | 0.0   | 24.9  | 26      | 1.9    | 0.0   | 0.0   | 1.9    |
| 5     | 5.5   | 17.9 | 15.3  | 38.7  | 27      | 61.7   | 0.0   | 1.4   | 63.1   |
| 6     | 18.2  | 0.0  | 0.0   | 18.2  | 28      | 98.1   | 3.5   | 0.0   | 101.6  |
| 7     | 0.0   | 3.3  | 4.8   | 8.1   | 29      | 31.0   | 1.6   | 2.2   | 34.8   |
| 8     | 14.8  | 1.5  | 3.3   | 19.6  | 30      | 27.2   | 20.3  | 0.0   | 47.5   |
| 9     | 21.9  | 0.0  | 0.0   | 21.9  | 30A     | 301.4  | 9.2   | 49.9  | 360.5  |
| 10    | 0.0   | 3.0  | 9.5   | 12.5  | 31      | 42.7   | 3.6   | 0.0   | 46.3   |
| 11    | 0.7   | 2.6  | 0.0   | 3.3   | 32      | 45.6   | 6.5   | 17.8  | 69.9   |
| 12    | 102.9 | 0.0  | 0.0   | 102.9 | 33      | 184.8  | 17.7  | 28.1  | 230.6  |
| 12A   | 12.8  | 0.0  | 0.0   | 12.8  | 34      | 99.6   | 25.3  | 14.2  | 139.1  |
| 13    | 0.0   | 0.0  | 7.8   | 7.8   | 34A     | 15.1   | 44.5  | 34.9  | 94.5   |
| 14    | 50.6  | 4.6  | 11.8  | 67.0  | 35      | 95.4   | 11.4  | 0.0   | 106.8  |
| 15    | 0.0   | 0.0  | 5.4   | 5.4   | 36A     | 107.0  | 0.0   | 0.0   | 107.0  |
| 16    | 18.8  | 37.8 | 82.7  | 139.3 | 36      | 486.9  | 5.8   | 0.0   | 492.7  |
| 17    | 0.0   | 2.6  | 0.0   | 2.6   | 37      | 9.0    | 0.0   | 0.0   | 9.0    |
| 18    | 1.3   | 0.0  | 0.0   | 1.3   | 38      | 0.0    | 23.6  | 0.0   | 23.6   |
| 19    | 46.3  | 14.2 | 0.0   | 60.5  | 39      | 13.0   | 0.0   | 0.0   | 13.0   |
| 20    | 2.3   | 0.0  | 0.0   | 2.3   | 40      | 156.3  | 0.0   | 0.0   | 156.3  |
| 21    | 17.8  | 7.2  | 3.1   | 28.1  | 40A     | 53.4   | 13.5  | 11.5  | 78.4   |
| 22    | 14.6  | 0.0  | 0.0   | 14.6  | 41      | 22.8   | 4.1   | 0.0   | 26.9   |
| 23    | 142.1 | 11.9 | 0.0   | 154.0 | Sub Tot | 2466.3 | 310.0 | 613.9 | 3390.2 |
| 23S*  | 11.0  | 0.0  | 265.3 | 276.3 | Less S* | 11.0   | 0.0   | 302.1 | 313.1  |
|       |       |      |       |       | TOTAL   | 2455.3 | 310.0 | 311.8 | 3077.1 |

S\* - ACRES IN SALEM

(draft 12-15-93)

Approximately 2,379 acres were developed prior to 1970, 426 acres were developed from 1970 to 1979, and 272 acres developed from 1980 to the present, see Table 3-2.

BASIN ACREAGE BY AGE OF SANITARY SEWER

TABLE 3-2

| BASIN | ACRES         |              |                |        | BASIN   | ACRES         |              |                |         |
|-------|---------------|--------------|----------------|--------|---------|---------------|--------------|----------------|---------|
|       | PRIOR TO 1970 | 1970 TO 1979 | 1980 AND AFTER | TOTAL  |         | PRIOR TO 1970 | 1970 TO 1979 | 1980 AND AFTER | TOTAL   |
| 1     | 14.30         |              |                | 14.30  | 24      | 41.40         |              |                | 41.40   |
| 2     | 6.30          |              |                | 6.30   | 24S*    | 36.80         |              |                | 36.80   |
| 3     | 3.00          |              |                | 3.00   | 25      | 63.00         |              |                | 63.00   |
| 4     | 24.90         |              |                | 24.90  | 26      | 1.90          |              |                | 1.90    |
| 5     | 38.70         |              |                | 38.70  | 27      | 63.10         |              |                | 63.10   |
| 6     | 18.20         |              |                | 18.20  | 28      | 101.60        |              |                | 101.60  |
| 7     | 8.10          |              |                | 8.10   | 29      | 34.79         |              |                | 34.79   |
| 8     | 19.58         |              |                | 19.58  | 30      | 47.50         |              |                | 47.50   |
| 9     | 15.90         |              | 6.00           | 21.90  | 30A     | 174.79        | 166.79       | 18.90          | 360.48  |
| 10    | 12.49         |              |                | 12.49  | 31      | 46.28         |              |                | 46.28   |
| 11    | 3.31          |              |                | 3.31   | 32      | 69.90         |              |                | 69.90   |
| 12    | 90.20         | 10.10        | 2.58           | 102.88 | 33      | 197.50        | 33.05        |                | 230.55  |
| 12A   | 12.80         |              |                | 12.80  | 34      | 139.08        |              |                | 139.08  |
| 13    | 7.80          |              |                | 7.80   | 34A     | 94.51         |              |                | 94.51   |
| 14    | 67.00         |              |                | 67.00  | 35      | 96.20         | 10.60        |                | 106.80  |
| 15    | 5.40          |              |                | 5.40   | 36      | 153.00        | 144.50       | 195.16         | 492.66  |
| 16    | 139.30        |              |                | 139.30 | 36A     | 107.00        |              |                | 107.00  |
| 17    | 2.60          |              |                | 2.60   | 37      | 8.99          |              |                | 8.99    |
| 18    | 1.30          |              |                | 1.30   | 38      | 23.55         |              |                | 23.55   |
| 19    | 57.96         | 2.50         |                | 60.46  | 39      | 13.00         |              |                | 13.00   |
| 20    | 2.30          |              |                | 2.30   | 40      | 124.61        | 31.70        |                | 156.31  |
| 21    | 28.10         |              |                | 28.10  | 40A     | 28.64         | 27.25        | 22.49          | 78.38   |
| 22    | 14.60         |              |                | 14.60  | 41      |               |              | 26.90          | 26.90   |
| 23    | 154.00        |              |                | 154.00 | Sub Tot | 2617.18       | 500.89       | 272.03         | 3390.10 |
| 23S*  | 201.90        | 74.40        |                | 276.30 | Less S* | 238.10        | 74.40        | 0.00           | 312.50  |
|       |               |              |                |        | TOTAL   | 2379.08       | 426.49       | 272.03         | 3077.60 |

S\* - ACRES IN SALEM

(draft 12-15-93)

The areas already receiving sewer service contains 6,743 sanitary sewer connections. Residential has 6,291 connections, multi-family 263 connections, and commercial 189 connections, according to the City's sewer billing records as of June 24, 1993.

## PERFORMANCE

The present sewer collection system is operating satisfactorily. The City of Salem provides maintenance of the system on a routine basis. Some sections of the system receive more attention than others. Pump stations require continual attention and are performing adequately.

The City of Salem interceptor running through Keizer has one designated overflow manhole. It is located in the Albertson's parking lot off North River Road near Claggett Creek. It is the last designated overflow manhole along the system.

The problem of grease build-up noted in the 1984 Sanitary Sewer Update report has been solved. No serious problems from grease build-up within the City have been noted by the Salem shop personnel.

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## CHAPTER 4 - DESIGN METHODOLOGY

### HYDRA

The study has been done using the "HYDRA Storm and Sanitary Sewer Analysis Software" developed by Pizer Incorporated.

"Hydra" is a computer program that may be used to analyze existing collection systems or design new gravity lines, pump stations, and pressure sewers. The model performs the many hydraulic calculations involved in design or analysis. Considerable data is needed to model a collection system including; pipe sizes, lengths, slopes, materials, sanitary flow estimates, infiltration, inflow or other non-sanitary flows, basin population and factors affecting variations in flow. Once modeled, Hydra produces a report describing the system and the flows, depths and remaining capacity in each length of sewer in the basin. If calculated flow exceeds the capacity of the pipe Hydra reports a "surcharge" condition signaling a possible capacity problem. Sanitary sewer flows vary from day to day, hour to hour and minute to minute. Two common ways to account for this variation include the "Peaking Factor" method and the "Diurnal Curve" method. Hydra permits the use of either method and will produce different results depending on which method is used. The City of Salem prefers to use the peaking factor method of analysis.

### BASINS

The City of Keizer's sanitary sewer system was divided into 41 separate basins for the purpose of this study. Each basin was given a number for identification purposes. Each basin was sequentially numbered starting at the southern city limits of Keizer and assigning each basin a number by the discharge point entering the interceptor that runs generally to the north through the City of Keizer. Thus, Basin #1 is the first basin to discharge into the interceptor from the southern city limits and Basin 41 is the last. (See Exhibit A).

Basins having pump stations were assigned a number and the same number followed by an A. The number without an A is the part of the basin prior to the flow entering the pump station and the number followed by an A is the portion of the basin after the flow leaves the pump station. (Example: Basin 12 contains flow before the pump station. Basin 12A contains the flow after the pump station.)

### DESIGN PARAMETERS

Each existing basin was assigned modeling information in accordance with design parameters agreed to by the City of Salem. See City of Salem letters dated June 15, 1992, (Exhibit C) and May 20, 1992, (Exhibit D).

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Design parameters used for analysis were as follows:

|   |            |
|---|------------|
| Domestic average Gallons Per Capita Per Day                         | 75 gpcd    |
| City of Salem Peaking Factor  | 3.2 to 1.6 |
| Infiltration/Inflow (I/I) Allowances:<br>(Groundwater Infiltration) |            |
| Sewers built prior to 1970  | 6000 gpad  |
| Sewers built during 1970 to 1979                                    | 3000 gpad  |
| Sewers built from 1980 to the present                               | 1500 gpad  |

gpcd = gallons per capita per day

gpac = gallons per acre per day

#### Residential Densities (City of Keizer Comprehensive Plan)

|                            |                   |
|----------------------------|-------------------|
| Single Family              | 11.76 persons/Ac. |
| Multi Family               | 23.4 persons/Ac.  |
| Industrial Area Equivalent | 55.5 persons/Ac.  |

Diurnal Curve Data is based on City of Keizer water consumption records.

### POPULATION AND AREA

The City's total area is composed of approximately 4,400 acres.

The model "Hydra" sanitary sewer runs contain a total of approximately 3077 acres. Approximately 2,455 acres are low density residential housing. Approximately 310 acres are multi-family housing. Approximately 312 acres are industrial and/or commercial use. Each land use was assigned population figures based upon the comprehensive plan.

### METHODS

All open space (creek bottom, river bank, public facilities) were initially included when calculating acreage in an individual model basin. These open areas were assigned a 11.76 person per acre figure. This is the most conservative approach. Maximum infiltration and population are generated in the model computer basin runs. Actual population will very likely be smaller in most basins than assumed in the modeling.

Small basins were analyzed by checking the last or next to last length of pipe to determine pipe capacity. If this pipe had adequate capacity, no further analysis was calculated.

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Flow commands used in basin models having pump stations were determined by analyzing pump sizes and pump operating times.

Individual areas within the basin were broken down by the age of the sanitary sewer system within the basin to assign proper groundwater infiltration assumptions.

All initial Hydra runs were made using the peaking factor method rather than the diurnal curve method. Basin models capable of handling design flows based upon the agreed upon conservative design parameters using the peaking factor method were considered adequate and needed no further study.

Basins found to exceed the flows allowed for existing pipe sizes were examined more closely. In some cases, original as-built maps were consulted to obtain an accurate data base. Basins with problems using the peaking factor method were analyzed again using the diurnal curve method. The diurnal curve method is the recommended method by Pizer (creator of the Hydra program) for accuracy.

The basins with theoretically failed links at an I/I of 6,000, 3,000, and 1,500 based upon the age of the system using the peaking factor method were then analyzed using an I/I of 1,300 using the peaking factor method.

(draft 12-15-93)

## CHAPTER 5 - EXISTING FACILITIES HYDRA ANALYSIS

### INDIVIDUAL BASIN ANALYSIS

BASIN 1 contains 14.3 acres all zoned low density residential (LDR) and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 168. The basin has no pipe (link) failures.

BASIN 2 contains 6.3 acres all zoned LDR and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 74. The basin has no link failures.

BASIN 3 contains 3.0 acres with .8 acres zoned medium & high density (MHDR), 2.2 acres zoned commercial (C) and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 139. The basin has no link failures.

BASIN 4 contains 24.9 acres with 20.9 acres zoned LDR, 4.0 acres zoned MHDR and all developed prior to 1970. The basin contains river bank acres included in the model's counted acres with a 11.76 people per acre density. The basin is fully developed and has a total sanitary population of 339. The basin has no link failures.

BASIN 5 contains 38.7 acres with 5.5 acres LDR, 17.9 acres MHDR, 15.3 acres C, and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 1,334. Links 11 (between the City of Salem's designated manholes [M/H's] number 45-486-052 and 45-486-053) and 14 (between M/H's 45-486-020 & 45-486-050) show failures using the peaking (PEA) method. The largest, link 11, is registering 110% of pipe capacity. Using the same data with the diurnal curve (DIU) method, link 11 reveals the pipe is performing at 80.5% of capacity. No further action is recommended.

BASIN 6 contains 18.2 acres all zoned LDR and all developed prior to 1970. The basin contains river bank included in the model's counted acres. The basin is fully developed and has a total sanitary population of 214. The basin has no link failures.

BASIN 7 contains 8.1 acres with 3.3 acres MHDR, 4.8 acres C, and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 344. The basin has no link failures.

BASIN 8 contains 19.6 acres with 14.8 acres LDR, 1.5 acres MHDR, 3.3 acres C, and all developed prior to 1970. The basin contains river bank included in the model's counted acres. The basin is fully developed and has a total sanitary population of 391. The basin has no link failures.

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BASIN 9 contains 21.9 acres all zoned LDR. 15.9 acres were developed prior to 1970 and 6.0 acres were developed since 1979. The basin is fully developed and has a total sanitary population of 258. The basin has no link failures.

BASIN 10 contains 12.5 acres with 3.0 acres MHDR, 9.5 acres C, and all developed prior to 1970. The basin is not fully developed. The basin has 4.2 acres zoned MHDR and 6.4 acres zoned C that are vacant. This vacant land was included as developed in the model Hydra run. The basin has a total sanitary population of 598. The basin has no link failures.

BASIN 11 contains 3.3 acres with 0.7 acres zoned LDR, 2.6 acres zoned MHDR, and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 70. The basin has no link failures.

BASIN 12 has a pump station located on Rivercrest close to Denny and is divided into two parts. Basin 12 contains flow prior to the pump and Basin 12A contains flow after the pump.

BASIN 12 contains 102.9 acres all zoned LDR. 90.2 acres were developed prior to 1970, 10.1 acres were developed from 1970 to 1979, and 2.6 acres were developed after 1979. The basin contains approximately 27 acres of river bank not included in the Hydra model. The basin is fully developed and has a total sanitary population of 1,209. A slight surcharge exists in links 7 and 8 (between M/H's 42-490-013 & 42-490-017) at full flow conditions, however, the model invert elevations in this area may not be correct since links 7 and 8 are reported to be considerably flatter than normally allowed. This small surcharge condition is considered negligible and no modification of the system is recommended.

BASIN 12A contains 12.8 acres all zoned LDR and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 150. This basin is downstream from the Rivercrest Pump Station, which has a rated capacity of 1.02 cfs when both pumps are running. It is unlikely both pumps are ever called on to operate at the same time, we used that condition as a FLO command at the beginning of our run of Basin 12A. The Hydra analysis of 12A indicates a surcharge condition will exist (between M/H's 42-490-022 & 45-490-024) when the design parameters are applied to both Basins 12 and 12A. Both basins are fully developed and there have been no reported problems with the basin as it presently exists. The basin should be monitored.

BASIN 13 contains 7.8 acres all zoned C and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 433. The basin has no link failures.

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BASIN 14 contains 67.0 acres with 50.6 acres LDR, 4.6 acres MHDR, 11.8 acres C, and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 1,359. Link number 21 (between M/H's 45-490-033 & 45-490-034) reveals a failure registering 108% of capacity using the PEA method. Using the same data with the DIU method there are no link failures. The same link reveals it is performing at 82% of capacity. No further action is required.

BASIN 15 contains 5.4 acres all zoned C and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 299. The basin has no link failures.

BASIN 16 contains 139.3 acres with 18.8 acres LDR, 37.8 acres MHDR, 82.7 acres C, and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 5,696. The design model reveals substantial surcharging (between M/H's 45-488-049 & 45-490-054) in this basin. It is probable that the commercial flows used in the model will not approach the design flows in this area since most of the businesses are of the light commercial retail category or small commercial offices. There have been no problems reported in this basin. No corrective action is needed at this time.

BASIN 17 contains 2.6 acres all zoned MHDR and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 62. The basin has no link failures.

BASIN 18 contains 1.3 acres all zoned LDR and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 15. The basin has no link failures.

BASIN 19 contains 60.5 acres with 46.3 acres LDR and 14.2 acres MHDR. 43.7 acres were developed prior to 1970 and 2.5 acres were developed from 1970 to 1979. The basin is fully developed and has a total sanitary population of 877. Link number 16 (between M/H's 48-490-031 & 48-490-014) reveals a failure registering 107% of capacity using the PEA method. Using the same data with the DIU method there are no link failures. The same link reveals it is performing at 86% of capacity. No further action is required.

BASIN 20 contains 2.3 acres all zoned LDR and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 27. The basin has no link failures.

BASIN 21 contains 28.1 acres with 17.8 acres LDR, 7.2 acres MHDR, 3.1 acres C, and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 552. The basin has no link failures.

BASIN 22 contains 14.6 acres all zoned LDR and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 172. The basin has no link failures.

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BASIN 23 contains 154 acres in the City of Keizer and an additional 276 acres in the City of Salem. 153.1 acres are zoned LDR, 11.9 acres zoned MHDR, and 265.3 acres zoned C. The basin is not fully developed. Vacant land is available in Salem's industrial park areas. Claggett Creek bottom runs through the middle of the basin. This land was included in the Hydra model as developed land. The total sanitary population is 16,803. The first link reveals surcharging in the PEA method but this is because of the high number of acres put into the first pipe. Links 33 through 42 (between M/H's 48-488-047 & 48-492-049) are showing valid surcharging using the PEA method. The DEI method reveals surcharging in links 33 and 39. The model has a total of 43 links. Problems could occur as vacant industrial land is developed. No action is required at this time.

BASIN 24 contains 41.4 acres in the City of Keizer and an additional 36.8 acres in the City of Salem's urban growth boundary. 37.3 acres are zoned LDS, 4.1 acres are zoned MHDR, and 36.8 acres zoned C. All acres are developed before 1970. The basin is not fully developed. Vacant land is available in the Salem area. This land was included in the Hydra model as C (industrial) acres. The total sanitary population is 2,580. The basin has seven link failures using the PEA method (between M/H's 51-490-010 & 51-490-016 and 51-488-002 & 51-488-003). The DIU method has no failures, a maximum of 97% of pipe capacity being reached in link 16, the second from the last link. The 66 inch by pass goes through this basin. Residential lines enter the 66 inch by pass by Shady Lane and Candlewood. No action is required at this time.

BASIN 25 contains 63.0 acres with 53.1 acres LDS, 4.0 acres MHDR, 5.9 acres C and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 1047. Using the PEA method links 15, 16, 17, and 18 fail (between M/H's 48-492-013 & 48-492-054). The largest failure is link 17 showing the pipe operating at 124.8 per cent of capacity. The model has a total of 19 links. Using the same data with the DIU method there are no link failures. Link 17 is operating at 98.8 percent of capacity. No further action is required.

BASIN 26 contains 1.9 acres all zoned LDS and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 22. The basin has no link failures.

BASIN 27 contains 63.1 acres with 61.7 acres zoned LDS, 1.4 acres zoned C and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 805. The basin has no link failures.

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BASIN 28 contains 101.6 acres with 98.1 acres LDR, 3.5 acres MHDR, and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 1235. Kennedy school grounds are included as LDR in the Hydra model. Claggett Creek runs through the basin, 18 acres of creek bottom was included in the Hydra model. The second to last link (between M/H's 48-492-066 & 48-492-067) reveals a failure with the pipe being at 168% of capacity using the PEA method. Using the same data with the DIU method the same pipe is performing at 143% of capacity.

A model was run deducting almost 18 acres (representing creek bottom) of sanitary commands at 11.76 people per acre. The PEA method registered 140% of capacity in the failed link. The DIU method registered 118% of capacity.

There have been no complaints regarding the system. No further action is recommended.

BASIN 29 contains 34.8 acres with 31.0 acres zoned LDR, 1.6 acres zoned MHDR, 2.2 acres zoned C and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 524. The basin has no link failures.

BASIN 30 has a pump station located on Keizer Road east of the Parkway (City of Salem) and is divided into two parts. Basin 30 contains flow prior to the pump and Basin 30A contains flow after the pump.

BASIN 30 contains 47.5 acres with 27.2 acres zoned LDR, 20.3 acres zoned MHDR and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 795. The basin has no link failures.

BASIN 30A contains 360.5 acres with 301.4 acres zoned LDR, 9.2 acres zoned MHDR, and 49.9 acres zoned C. 174.8 acres were developed prior to 1970, 166.8 acres were developed during the 1970's and 18.9 acres have been developed since 1979. The basin is fully developed and has a total sanitary population of 6,587. The basin has Claggett Creek running along one of its edges. This creek bottom has been included in the Hydra model. The model includes flow from the pump station of 0.98 cfs. This flow causes the last two links in the 8 inch line running down Keizer Road to surcharge (between M/H's 51-494-013 & 48-494-045) before entering a 15 inch line. The model also reveals numerous links surcharging (between M/H's 48-494-032 & 48-496-028) in the 15 inch line running down Chemawa prior to discharging into the interceptor. The City of Salem has placed a flow recording device in manhole #48-494-043 located about four links up the line from the interceptor. When the Chemawa Activity Center (CAC) plans are finalized this basin would be the logical basin to receive the flow from the acres of the CAC lying to the south of Lockhaven Drive. However, the entire flow generated from the CAC could also be taken to Basin 36 according to our Hydra model studies. There have been no complaints from this area but the Hydra model indicates potential problems in peak high water conditions. Further study is needed.

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BASIN 31 contains 46.3 acres with 42.7 acres zoned LDR, 3.6 acres zoned MHDR and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 586. Claggett Creek runs along one side of the basin, the creek bottom acres were included in the Hydra model. The basin has no link failures.

BASIN 32 contains 69.9 acres with 45.6 acres zoned LDR, 6.5 acres zoned MHDR, 17.8 acres zoned C and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 1,678. The basin is located between Faymar Drive and James Street just east of North River Road. The Hydra model indicates surcharging (between M/H's 45-494-058 & 45-496-023) in the 8 inch line using both the PEA and DIU methods of analysis. The line is very flat with link 7 reported as installed at a 0.0002 grade. There have been no complaints about the service of this basin. It is likely the as built information is not accurate and the line is not laid as flat as indicated. No corrective action is recommended.

BASIN 33 contains 230.6 acres with 184.8 acres zoned LDR, 17.7 acres zoned MHDR, and 28.1 acres zoned C. 197.5 acres were developed prior to 1970 and 33.1 acres were developed between 1970 and 1979. The basin is not fully developed with undeveloped land primarily in the Trail Avenue - Lockhaven area. The basin has a total sanitary population of 4,148. The basin has creek bottom, school ground, and a park all of which are included in the Hydra model as LDR. The basin lies east and west of Trail Avenue. A majority of the Wilark Park subdivision and some commercial property are in the basin. The Hydra model indicates surcharging (between M/H's 45-496-017 & 48-498-003) in a 12 inch line using both the PEA and DIU methods of analysis during the last lengths of pipe in the basin prior to the flow entering the interceptor. The model indicates a 15 inch pipe should be installed in the last eight links of pipe before the interceptor to handle the surcharge during peak high water conditions. There are no known complaints about this basin. The City of Salem has installed a monitor in manhole #45-498-002. We are receiving actual flow information for analysis.

BASIN 34 has a pump station located on Elizabeth close to Chemawa Road and is divided into two parts. Basin 34 for flow prior to the pump and Basin 34A contains flow after the pump.

BASIN 34 contains 139.1 acres with 99.6 acres zoned LDR, 25.3 acres zoned MHDR, 14.2 acres zoned C and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 2,550. The Hydra model of this basin has the McNary High School grounds included in its acres as LDR. This basin flows into the Elizabeth pump station. The Hydra model indicates surcharging (between M/H's 45-494-020 & 45-494-013) in a 8 inch line using both the PEA and DIU methods of analysis during the peak design flow in the last four links prior to the pump. There have been no complaints about the service of this basin. After storm visual inspection of the interior of manholes revealed no evidence of surcharge. No corrective action is recommended at this time.

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BASIN 34A contains 94.5 acres with 15.1 acres zoned LDR, 44.5 acres zoned MHDR, 34.9 acres zoned C and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 3,157. This basin flows out of the Elizabeth pump station to the interceptor on N. River Road by Lockhaven. The Hydra model uses a flow of 0.89 cfs from the pump station. The Hydra model indicates surcharging (between M/H's 45-496-014 & 45-494-029) in an 8 inch and 10 inch line using both the PEA and DIU methods of analysis during the peak design flow in the last ten links. There have been no complaints about the service of this basin, however, the line should be monitored so further studies can be made.

BASIN 35 contains 106.8 acres with 95.4 acres zoned LDR and 11.4 acres zoned MHDR. 96.2 acres were developed prior to 1970 and 10.6 acres were developed between 1970 and 1979. The basin is fully developed and has a total sanitary population of 1,388. The Hydra model indicates surcharging (between M/H's 42-496-074 & 42-496-067) in an 8 inch line using both the PEA and DIU methods of analysis during the peak design flow in links 25, 26, 27, and 28. The model has a total of 29 links. There have been no complaints about the service of this basin, however, the line should be monitored so further studies can be made.

BASIN 36 contains 492.7 acres. Acres feeding into the pump station are 107. 385.7 acres are on gravity sewer lines with 379.9 acres zoned LDR and 5.8 acres zoned MHDR. 153.0 acres were developed prior to 1970, 144.5 acres developed between 1970 and 1979, and 195.6 acres developed after 1979. The basin is not fully developed and has a total sanitary population of 4,608. Total acreage within the basin is approximately 1,700 acres but not all is available for development. The basin may contain over 1,100 acres when fully developed with in the urban growth boundary.

The Hydra model reveals surcharging (between M/H's 45-500-012 & 45-500-011 and 45-500-020 & 48-500-065) at the end of the Wheatland Road sub basin. The surcharging exists in a 10 inch line using both the PEA (fifth from last and last three links) and DIU (last three links) methods of analysis during the peak design flow. This surcharging should not become a problem as the sub basin is developed. Presently, the Hydra model is injecting a 0.6 cfs miscellaneous flow to represent the flow created by the Wheatland Road pump station at the beginning of the Wheatland Road sub basin line. As this sub basin is developed the flow from this pump will be diverted to the east into a new gravity line.

The City of Salem has installed two monitoring devices in Basin 36. One device is in the 10 inch line on Wheatland Road, where surcharging is occurring in the Hydra model. This meter is located in manhole #45-500-021. The second device is in an "interim" 21 inch line between McNary Golf Course and the interceptor. This meter is located in manhole #42-498-009. We are currently receiving actual flow data from the City of Salem for analysis. This basin will be covered in more detail in the next chapter.

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BASIN 37 contains 9.0 acres all zoned LDR and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 106. The basin has no link failures.

BASIN 38 contains 23.6 acres all zoned MHDR and all developed before 1970. The basin is fully developed and is composed entirely of mobile home parks and has many lines entering the 72 inch interceptor that runs adjacent to the basin boundary. The total sanitary population is 23.6 acres x 23.4 people per acre or 552. The basin has no link failures.

BASIN 39 contains 13.0 acres all zoned LDR and all developed prior to 1970. The basin is fully developed and has a total sanitary population of 153. The basin has no link failures.

BASIN 40 has a pump station located on Shoreline Drive close to Dearborn and is divided into two parts. Basin 40 contains flow prior to the pump and Basin 40A contains flow after the pump.

BASIN 40 contains 156.3 acres all zoned LDR. 124.6 acres were developed prior to 1970 and 31.7 acres were developed between 1970 and 1979. The basin is fully developed and has a total sanitary population of 1,838. The Hydra model of this basin has river bank acres included in the acres as LDR. This basin flows into the Shoreline pump station. The Hydra model reveals surcharging (between M/H's 42-492-031 & 42-492-004) at peak demand in the last four links of an 8 inch pipe running east down Ventura prior to intersecting another line at Shoreline Drive. After a storm a visual inspection of the interior of manholes revealed no evidence of surcharge. No complaints from the area have been recorded. No action is recommended at this time.

BASIN 40A contains 78.4 acres with 53.4 acres zoned LDR, 13.5 acres zoned MHDR, and 11.5 acres zoned C. 28.6 acres were developed prior to 1970, 27.3 acres were developed between 1970 and 1979, and 22.5 acres were developed after 1979. The basin is fully developed and has a total sanitary population of 1,582. This basin flows out of the Shoreline pump station. A flow of 1.17 cfs was used in the Hydra model. The Hydra model reveals surcharging (between M/H's 42-496-003 & 42-494-033) at peak demand in the last twelve links of 10 inch and 12 inch pipe running north on Windsor Island Road just prior to discharge into the interceptor. After storm visual inspection of the interior of manholes revealed no evidence of surcharge. No complaints from the area have been recorded. A new 12 inch north - south trunk line was completed in 1991 to the west of this basin. Capacity is available to take excess flows, if they develop, from the Windsor Island Road trunk to the new 12 inch trunk. This basin should be monitored.

BASIN 41 contains 26.9 acres with 22.8 acres zoned LDR, 4.1 acres zoned MHDR and all developed after 1979. The basin is not fully developed and has a total sanitary population of 426. The basin has no link failures.

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A second model of Basin 41 including all available undeveloped land reveals no surcharging.

## CONCLUSIONS

In summary, all basins, except 12A, 30A, 33, 34A, 35, 36, and 40A should be capable of handling peak loads without experiencing failures.

Basins 12A, 30A, 33, 34A, 35, 36, and 40A were analyzed using the screen plot hydraulic analysis reports to see if any of the models would surcharge above ground level. Basins 30A, 34A, 35, and 40A had surcharging above ground level. In Basins 30A, 34A, and 40A surcharging occurred in the first links immediately after a pump station because of the flow injected into the model representing the pumps. This surcharging should not occur under actual operating conditions. Basin 35 had surcharging at a link receiving flow from a sub basin into an eight inch line. If actual operating problems occur, increasing the pipe size to twelve inches at the surcharging point would solve the problem. This basin is fully developed and there is no evidence of problems within the basin.

Basins 12A, 30A, 33, 34A, 35, 36, and 40A should be monitored and studied further as actual flow data becomes available. The City of Salem currently has monitors in Basins 30A, 33, and 36.

The results of comparing theoretically failed links using the peaking method to failed links using the diurnal curve method by individual basin with an I/I of either 6,000, 3,000 or 1,500 depending upon the age of the system are contained in Table 5-1.

(draft 12-15-93)

KEIZER SANITARY SEWER ANALYSIS  
BASINS WITH FAILED HYDRA LINKS

TABLE 5-1

| Basin Number | Total Acres | Peaking Factor Failed Link Numbers                                   | Diurnal Curve Failed Link Numbers                 | Total Links |
|--------------|-------------|--|---|-------------|
| 5            | 38.75       | 11 & 14  | 0   | 15          |
| 12           | 102.83      | 7, 8 & 11  | 7 & 8   | 19          |
| 12A@         | 12.76       | 1, 2, 4 & 5  | 1, 2, 4 & 5                                       | 6           |
| 14           | 66.97       | 21   | 0   | 23          |
| 16           | 139.28      | 9, 10, 11, 12, 13 & 14   | 10, 11, 12, 13 & 14                               | 16          |
| 19           | 60.51       | 16   | 0   | 17          |
| 23*          | 430.22      | 1, 33, 34, 35, 36, 37, 38,<br>39, 40, 41, & 42                       | 33 & 39   | 43          |
| 24*          | 78.27       | 2, 4, 5, 6, 7, 8 & 16  | 0   | 17          |
| 25           | 63.01       | 15, 16, 17, & 18   | 0   | 19          |
| 28           | 101.58      | 27   | 27  | 28          |
| 30A@         | 360.45      | 40, 72, 73, 103, 104, 107,<br>108, 113, 114, 115, 116,<br>118, & 120 | 72, 73, 107,<br>108, 113, 114, 115, 116, &<br>120 | 121         |
| 32           | 69.94       | 1, 2, 3, 4, 5, 6, 7, 8 & 9   | 3, 4, 5, 7, 8 & 9                                 | 10          |
| 33@          | 230.65      | 48, 63, 64, 65, 66, 67, 68,<br>69, 70, 71 & 72                       | 48, 66, 67, 68,<br>69, 70, 71 & 72                | 73          |
| 34           | 139.08      | 19, 31, 32, 33 & 34  | 31, 32, 33 & 34                                   | 34          |
| 34A@         | 94.51       | 8, 9, 10, 11, 12, 13, 14,<br>15 & 16                                 | 8, 9, 10, 11, 12, 13, 14,<br>15 & 16              | 17          |
| 35@          | 106.79      | 25, 26, 27, & 28   | 25, 26, 27, & 28                                  | 29          |
| 36@          | 492.7       | 40, 42, 43 & 44  | 43  | 68          |
| 40           | 156.31      | 18, 19, 20 & 21  | 18, 19, 20 & 21                                   | 49          |
| 40A@         | 78.42       | 18, 19, 20, 21, 22, 23, 24,<br>25, 26, 27 & 28                       | 18, 19, 20, 21, 22, 23, 24,<br>25, 26, 27 & 28    | 29          |

\* Includes Salem Acres  
@ Basins of Significant Concern

(draft 12-15-93)

The results of comparing links having previously failed under the peaking method with an I/I of 6,000, 3,000, or 1,500 depending upon the age of the system with the same models run through Hydra using an I/I of 1,300 are contained in Table 5-2.

**KEIZER SANITARY SEWER ANALYSES** **TABLE 5-2**  
**BASINS WITH FAILED PEA LINKS AT I/I OF 6000/3000/1500**  
**COMPARED TO PEA MODELS AT I/I OF 1300**

| Basin Number | Total Acres | Failed Link Numbers Peaking Factor I/I 6000/3000/1500            | Failed Link Numbers Peaking Factor I/I 1300     | Total Links |
|--------------|-------------|--|---|-------------|
| 5            | 38.75       | 11 & 14  | 0   | 15          |
| 12           | 102.83      | 7, 8 & 11  | 0   | 19          |
| 12A@         | 12.76       | 1, 2, 4 & 5  | 1, 2, 4 & 5                                     | 6           |
| 14           | 66.97       | 21   | 0   | 23          |
| 16           | 139.28      | 9, 10, 11, 12, 13 & 14   | 12, 13, & 14                                    | 16          |
| 19           | 60.51       | 16   | 0   | 17          |
| 23*          | 430.22      | 1, 33, 34, 35, 36, 37, 38, 39, 40, 41 & 42                       | 33  | 43          |
| 24*          | 78.27       | 2, 4, 5, 6, 7, 8 & 16  | 0   | 17          |
| 25           | 63.01       | 15, 16, 17 & 18  | 0   | 19          |
| 28           | 101.58      | 27   | 0   | 28          |
| 30A@         | 360.45      | 40, 72, 73, 103, 104, 107, 108, 113, 114,<br>115, 116, 118 & 120 | 72, 73 & 108                                    | 121         |
| 32           | 69.94       | 1, 2, 3, 4, 5, 6, 7, 8 & 9                                       | 7   | 10          |
| 33@          | 230.65      | 48, 63, 64, 65, 66, 67, 68, 69, 70, 71 & 72                      | 72  | 73          |
| 34           | 139.08      | 19, 31, 32, 33 & 34  | 33 & 34   | 34          |
| 34A@         | 94.51       | 8, 9, 10, 11, 12, 13, 14,<br>15 & 16                             | 8, 9, 10, 11, 12, 13, 14,<br>15 & 16            | 17          |
| 35@          | 106.79      | 25, 26, 27 & 28  | 0   | 29          |
| 36@          | 492.7       | 40, 42, 43 & 44  | 0   | 68          |
| 40           | 156.31      | 18, 19, 20 & 21  | 0   | 49          |
| 40A@         | 78.42       | 18, 19, 20, 21, 22, 23,<br>24, 25, 26, 27 & 28                   | 18, 19, 20, 21, 22, 23,<br>24, 25, 26, 27, & 28 | 29          |

\* Includes Salem Acres  
 @ Basins of Significant Concern

(draft 12-15-93)

## CHAPTER 6 - PLANNING

### BASINS NOT FULLY DEVELOPED

Six basins are not fully developed. They are Basins 10, 23, 24, 33, 36, and 41. Basin 10 has a small amount of vacant land along North River Road zoned commercial and multi-family. Basin 23 has vacant land in the City of Salem's industrial parks. Basin 24 has vacant land on the City of Salem's side of the Parkway. Basin 33 has vacant land in the Trail Avenue - Lockhaven area. Basin 41 has vacant land on the far west side of the City of Keizer north of Chemawa. The development of vacant lands in these basins, excluding Basin 36, should not require major sewer construction.

Principal expansion will occur north of the City between Wheatland Road and North River Road (mostly single family residences), east of North River Road the development will be mixed zoning, and north east will be the Chemawa Activity Center. Currently, the land is primarily orchards and farm land. McNary Estates and Staats Lake will also require additional sewer service.

Areas without sanitary service were evaluated based upon the following:

|                            |           |
|----------------------------|-----------|
| Residential Without Sewers | 318 acres |
| CAC Area Without Sewers    | 182 acres |
| Total Area Without Sewers  | 500 acres |

### DEVELOPMENT OF BASIN 36

Basin 36 is of the greatest interest because of its development requiring trunk, collector, and other sewer line construction in the City of Keizer's urban growth boundary.

The Middle Labish Trunk sewer has recently been extended easterly along the Labish ditch, and then northerly to the intersection of North River Road and O'Neil Road.

The proposed system is shown on Exhibit B.

As development occurs it is logical to assume the O'Neil trunk line will continue north up O'Neil Road until it reaches Clear Lake Road. At Clear Lake Road, 8 inch lines to the west and to the east will be required.

An east - west 12 & 10 inch line has recently been built along the northern property line of The Meadows. The Wheatland Road pump station flow will temporarily be diverted to this line, until the O'Neil Road - Clear Lake Road line can pick up the flows from the Wheatland

(draft 12-15-93)

Road and Clear Lake pump stations. This area will be served solely by gravity lines in the future.

A second east - west line will be built from O'Neil Road, along Barnick Road, to Wheatland Road. An 8 inch northerly line off this second east - west line will eventually be built.

A short 8 inch line off O'Neil west on Oppok and another 8 inch line south off Clear Lake Road down Timothy Lane will be required to complete the proposed construction in the northern part of Basin 36.

When the Chemawa Activity Center (CAC) plans are finalized, a trunk line will be needed from the approximately 98 acres (area north of Lockhaven) to the 24 inch portion of the North River Road - O'Neil line. The flow from the remaining 52 acres of the CAC south of Lockhaven can also become a part of Basin 36 according to model Hydra runs.

The area north of Lockhaven on the east end of Staats Lake will be serviced by directly entering the existing interceptor in Lockhaven Drive.

#### **HYDRA ANALYSIS OF THE PROPOSED FULLY DEVELOPED BASIN 36**

The City of Salem has recommended using the following gallons per acre per day volumes in model Hydra computer runs:

- 6,000 gpad for sewers built before 1970,
- 3,000 gpad for sewers built between 1970 and 1979, and
- 1,500 gpad for sewers built in 1980 to the present.

Two possible deficiencies occur in the model Hydra runs for a completely developed Basin 36 using the infiltration and inflow figures recommended by the City of Salem.

The first occurs at the end of the Wheatland Road sub basin before the 10 inch Wheatland Road trunk line enters the 36 inch trunk line around the intersection of Wheatland Road and North River Road.

The peaking (PEA) method using the agreed upon standards indicate that, when the pump station flow is removed and Wheatland Road is fully developed, surcharging may occur in the last three lengths of pipe in the sub basin.

Running the same model using the diurnal curve (DIU) method no surcharging occurs in the last three lengths of pipe. The highest percent of capacity reached in the last three lengths is 93.88%.

(draft 12-15-93)

The City of Salem has placed a monitor, in manhole #45-500-009, in the Wheatland Road trunk line, where this theoretical surcharging is occurring. More accurate projections can be made as actual data on this pipe is generated from the meter. Actual data can be compared to the assumed data being used in the Hydra models.

The second deficiency occurs in the "interim" 21 inch line between McNary Estates and the 75 inch interceptor.

This line is composed of seven lengths of pipe. In both the PEA and the DIU methods of analysis all links are surcharging in the 21 inch line.

The City of Salem has placed a meter in manhole #42-498-009 between the first link and second link of pipe in this line. As true data is received, it can be analyzed with the theoretical Hydra models to make more accurate projections about the potential ultimate capacity in this 21 inch line.

The limited actual flow data received, to date, from the two meters in Basin 36 indicate the I/I figures being used in the basin models are too high.

The "Keizer Area Sanitary Sewer Master Plan Update 1984" document used an Infiltration/Inflow rate of 1,200 gallons per acre per day for new sewer systems and a 2,500 gallons per acre per day for older areas. These Infiltration/Inflow rates for basin modeling in the City of Keizer appear to be relatively accurate.

## CONCLUSION

As Basin 36 develops the available capacity in the existing "interim" 21 inch line will be exceeded. It may be necessary to construct an extension to the existing 36 inch line ending in McNary Estates. The extension would be from McNary Estates to the Willow Lake Treatment Plant. (See Exhibit E, letter from Mauldin, City of Salem, to Mull, May 20, 1993.) When this line will be needed depends upon the rate of development in Basin 36, the need for sewer service to the CAC, and the ultimate land use of the CAC area.

(draft 12-15-93)

## CHAPTER 7 - COST ANALYSIS & FINANCING

### COST ANALYSIS

The collection system illustrated in Exhibit B, including the Middle Labish and Meadows Trunk lines, is expected to cost \$3,752,173. Deducting completed construction, collected assessments and proposed front foot assessments leaves net construction costs of \$1,841,608. These costs are detailed in Table 7-1.

**BASIN 36 - PROJECTED TRUNK SEWER COSTS**

**TABLE 7-1**

| Trunkline Name  | Total Est. Constr. Costs | Assess-able Length l.f. | Assess-able Costs 46.06/lf | Net Trunk Costs       |
|---|--------------------------|-------------------------|----------------------------|-----------------------|
| Extending 36" Trunk Line<br>McNary Estates to Willow<br>Lake Treatment Plant              | \$488,360.00             | \$0.00                  | \$0.00                     | \$488,360.00          |
| Middle Labish Trunk *<br>N. River Dr. to O'Neil Rd.                                       | \$609,640.00             | \$0.00                  | \$0.00                     | Completed             |
| Meadows Trunk *<br>O'Neil Rd. to Wheatland Rd.  | \$282,512.00             | \$2,604.00              | \$119,940.24               | Completed             |
| O'Neil Trunk - Along O'Neil<br>to Clear Lake Rd.<br>Clear Lake Rd.<br>(a-13, a-15 & a-16) | \$472,000.00             | \$4,260.00              | \$196,215.60               | \$275,784.40          |
| Barnick Rd. Trunk<br>East/West Run (b-2 & b-3)  | \$288,300.00             | \$2,700.00              | \$124,362.00               | \$163,938.00          |
| Barnick Rd. Trunk<br>North/South Run (b-1)  | \$81,980.00              | \$1,850.00              | \$85,211.00                | \$0.00                |
| Clear Lake Rd. West Reach (a-9 & a-11)  | \$98,520.00              | \$1,370.00              | \$63,102.20                | \$35,417.80           |
| Clear Lake Rd. East Reach (a-12)  | \$39,500.00              | \$660.00                | \$30,400.00                | \$9,100.00            |
| Timothy Lane Line (a-10)  | \$96,340.00              | \$1,480.00              | \$68,168.80                | \$0.00                |
| Oppek Rd. (a-14)  | \$43,900.00              | \$750.00                | \$34,545.00                | \$0.00                |
| CAC Extension   | \$500,686.00             | \$0.00                  | \$0.00                     | \$500,686.00          |
| Sub Total's   | \$3,001,738.00           | \$0.00                  | \$0.00                     | \$1,473,286.20        |
| Engineering, Survey, & Inspection @ 10%   | \$300,173.80             | \$0.00                  | \$0.00                     | \$147,328.62          |
| Admin., Legal & Contig @ 15%  | \$450,260.70             | \$0.00                  | \$0.00                     | \$220,992.93          |
| <b>Total Estimated Costs</b>  | <b>\$3,752,172.50</b>    | <b>\$0.00</b>           | <b>\$0.00</b>              | <b>\$1,841,607.75</b> |

\* Actual Costs

(draft 12-15-93)

The sanitary sewer facilities recommended in this report are for planning and estimating purposes only. The final design of the sewer systems may provide information indicating that line sizes and slopes will vary from those used in this report. Actual cost may vary at the time of construction.

## FINANCING

It is proposed that the collection system in Exhibit B can be financed through the levying of assessments to the properties benefitted. This may be done by both special and general assessment procedures.

Nearly all the proposed sewers in the O'Neil Road, Barnick Road, Clear Lake Road collection system provide "direct benefit" to the properties along them. That is, they may be used to provide service connections to existing dwellings and homes yet to be built in these areas. Properties, or portions of properties, within 200 feet of these sewers are considered to be so benefitted. Such properties would be expected to pay the cost of an equivalent 8 inch sewer along their entire frontage. The estimated cost of this "special" assessment is calculated to be \$23.03 per front foot.

The Middle Labish Trunk (North River Road - O'Neil) sewer provides service to all of Basin 36. It will also have capacity for, and is designed to serve, the Chemawa Activity Center (CAC) at some future time. The same is true of extending the 36 inch line ending in McNary Estates to the Willow Lake Treatment Plant. Net costs after deducting special assessments and adding reimbursements for excess trunk charges are \$2,178,785. The area involved is composed of 500 acres. An assessment of \$4,358 per acre is recommended.

A summary of these assessments is set forth in Table 7-2.

(draft 12-15-93)

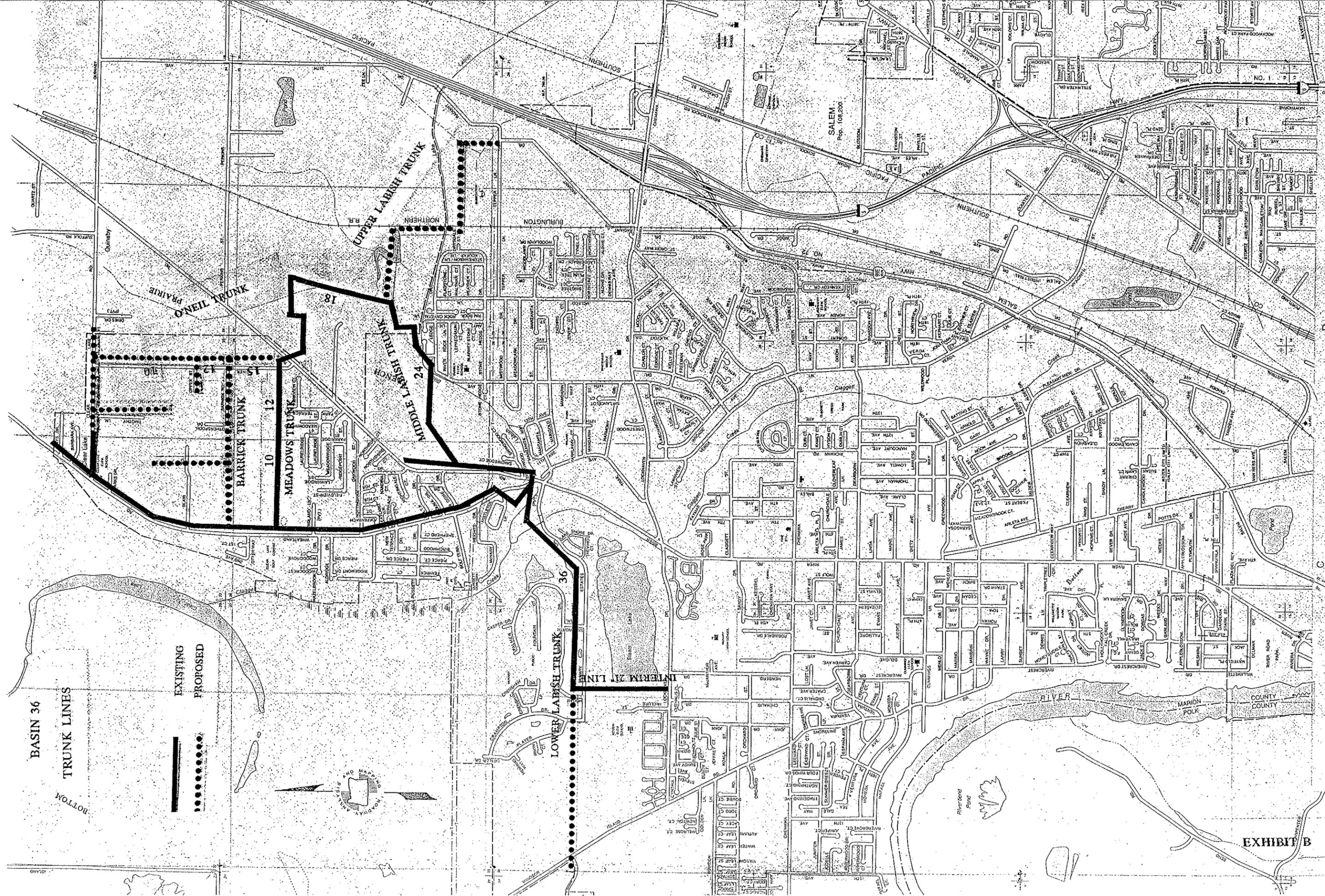
**COSTS TO BE ASSESSED TO FUTURE ACREAGE**

**TABLE 7-2**

|                                       |                |                |
|---------------------------------------|----------------|----------------|
| Clear Lake Total Estimated Costs      |                | \$1,841,608.00 |
| Reimbursement Of Excess Trunk Charges |                | \$337,177.00   |
| Total Costs To Be Assessed            |                | \$2,178,785.00 |
| Total Acres In Areas Without Sewers   |                | 318            |
| Total Acres In CAC                    |                | 182            |
| Total Acres Paying Assessment         |                | 500            |
| Total Costs                           | \$2,178,785.00 |                |
| Total Acres                           | 500            |                |
| Cost Per Acre                         |                | \$4,357.57     |

Estimates contained in the report are subject to refinement and, under State law, final assessments must be calculated based on actual costs at the time of construction.





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**KEIZER**  
 MARION COUNTY  
 6-7-55 R. 3 W. 1  
 POPULATION 21,950  
 MAP JULY 1955

June 15, 1992



CITY  
OF SALEM,  
OREGON

City Hall / 555 Liberty St. S.E.  
Zip Code 97301-3503

Public Works Department  
(503) 588-6211  
FAX (503) 588-6025

Mr. Bill Peterson  
William I. Peterson Engineering, Inc.  
1155 13th Street SE  
Salem OR 97302-0308

SUBJECT: KEIZER SEWER MASTER PLAN

Dear Bill:

At our meeting on May 21, 1992, you requested some additional information to assist you in your development of the Keizer Sewer Master Plan. I hope the following information is satisfactory for your purposes.

- 1) **DIURNAL CURVE VS. PEAKING FACTOR DESIGN:** It is your opinion, based on your conversations with the creator of the HYDRA computer model, that diurnal curves are more appropriate input than peaking factors. We do not have enough available information to create diurnal curves for the entire City, and we have a real need to create and maintain consistency of approach with all of our Master Plans. If not, we risk creating incompatible documents which will not serve their stated purpose of providing a rational basis for design. Our need for consistency is the overriding concern, so we are directing you to use the peaking factor approach in your modeling efforts.
- 2) **KEIZER PUMP STATION #4 (KEIZER ROAD PUMP STATION):** As I understand the gist of our conversation, you are using one cfs for the peak output flow from this station, and it is causing theoretical over-capacity problems downstream. Since the majority of the inflows to the station are coming from Salem, you asked me to research the basis for that one cfs number. The only information I have is over ten years old and is based on outdated assumptions, not actual flows. I will have Ted Cassidy perform a basin study to define the current basin for you, and send you a map. You can then use that map to calculate the expected flows, based on the design criteria we have given you.
- 3) **60 vs. 90 gpcd DRY WEATHER FLOW ASSUMPTION:** The issue is which value is the more appropriate for modeling a single-family residence? Again, this is a consistency issue. As far as I can determine, we previously used several numbers in the range of 60 to 90 gpcd in our sector plans. As we gear up for our overall sewer master plan effort, we will confirm a single value to use. We would like you to use 75 gpcd for your work in Keizer, with our assumption being that a mid-range number like this will not be too far off the final value.
- 4) **SURCHARGING OF LINES:** The question was, is some minor amount of surcharging on a regular basis an acceptable design, and if so, where should we draw the line? In the past, we have been forced by existing conditions to operate portions of our system

EXHIBIT C

Bill Peterson  
June 15, 1992  
Page 2

in a surcharged mode, but we are not willing to deliberately design that in as a common practice. All design and master plan work will be directed toward zero surcharge as the normal operating mode.

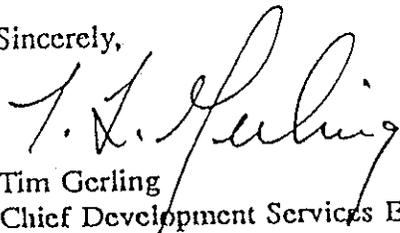
- 5) **INDUSTRIAL FLOWS:** A question was raised regarding the basis for using 5,000 gpAd as a basic allowance for industrial acreage. You feel that it is based on a very heavy water user, such as a cannery, and may not be representative of general industrial use. You have requested that we investigate SILTEC, their water usage, and if possible peak demands. Our feeling is that SILTEC is not a good example of a "heavy" industrial user.

There are some potential dangers for future development in Keizer created by reducing the 5,000 gpAd value. A lower value could create a situation where one true heavy user could absorb all of Keizer's industrial allotment, placing severe limits on the development of their remaining industrial lands. We would recommend that you stay with the current 5,000 gpAd value as a prudent design.

I hope that this information provides the "missing pieces" you require for your efforts in finalizing the Keizer sewer master plan. As you know, there have been several letters written to Keizer, placing restrictions on future development until certain items have been addressed to our satisfaction. This master plan is one piece of that process.

For your information, I am including a copy of the most recent letter from Salem to Keizer which summarizes the major issues. Be aware that we have still not received from Keizer the written assurances we require to approve further development in the North River Road/Wheatland sewer areas. Quite candidly, I am a little puzzled at the delay. I was at the meetings which led to the letter, and I can assure you that the City of Salem has compromised as much as we are going to on these issues. It is now up to Keizer to perform their part of the agreement.

Sincerely,



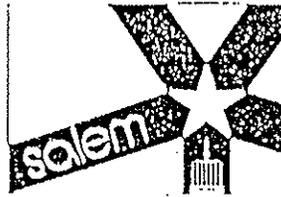
Tim Gerling  
Chief Development Services Engineer

In/c14/lpet2.tim

Enclosure: City of Salem to Keizer Letter

cc: Frank Mauldin, Public Works Director  
Karl Goertzen, City Engineer  
Paul Eckley, Civil Engineer IV  
Dave Siegel, Transportation/Development Services Manager  
Dave Prock, Chief Design Engineer

May 20, 1992



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OF SALEM,  
OREGON

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FAX (503) 588-6025

Mr. Bill Petersen  
William I. Petersen Engineering  
1155 - 13th Street SE  
Salem OR 97302-0308

**SUBJECT: CITY POLICY ON INFILTRATION/INFLOW  
PLANNING AND DESIGN ALLOWANCES**

Dear Mr. Petersen:

The City of Salem Public Works Department policy on Infiltration and Inflow (I/I) allowances has been reviewed in light of some concerns expressed at our May 4, 1992, meeting to discuss the sewer situation in Keizer.

I believe we can now clarify for you the information you need to proceed with your sewer master plan effort.

Most of this information predates my arrival at the City, but I have been able to reconstruct from our files and conversations with staff the following:

The original direction given to Keizer in 1984, and subsequently repeated to you, was to assume I/I rates of 3,000 gallons per acre per day (gpAd) as an average number to be applied to all areas, in the absence of adequate flow monitoring data.

We have reviewed the assumptions which went into that number and discovered some interesting information which is leading us to modify our policy City-wide. The impact should be favorable for Keizer. We have historical flow data for areas in South Salem which are comparable in terms of densities, land use, same type and age of construction, and similar groundwater conditions.

Our direction to you for preparation of the Keizer sewer master plan is to follow our policy and use the following rates:

- 1) Wherever possible, flow assumptions should be based on adequate field data from that area or a similar area. ("Adequate" field data was defined as a minimum of one 5-year storm event.) "Similar" was defined as being the same relative age of construction, population density, land use type, and groundwater conditions.

EXHIBIT D

Bill Peterson  
May 20, 1992  
Page 2

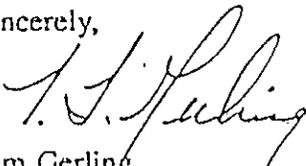
- 2) Where field data is lacking or inadequate, we will adopt a general policy to follow City-wide for consistency. This policy is based on "best available information" and engineering judgement.
  - A) For unsewered areas, and existing systems newer than 1980, we will assume 1,500 gpad.
  - B) For sewerred areas constructed in the 1970s, we will assume 3,000 gpad.
  - C) For sewerred areas constructed in the 1960s, we will assume 6,000 gpad.

From a brief review of the areas in the Keizer basins, it appears the majority of the sewerred area was mid-sixties construction, and the majority of the "thumb" area on the north side is of 1980s vintage or undeveloped.

The implications should be that for the "thumb" phase at least, your assumed flow rates will be significantly reduced, as will the burden on Keizer to increase capacity.

Should you require any clarification, please contact me at 588-6211, and I'll get you an answer.

Sincerely,

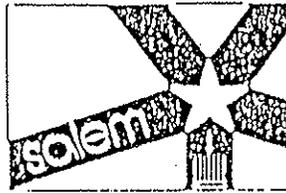


Tim Gerling  
Chief Development Services Engineer

In/c14/billp.tim

cc: Frank Mauldin, Public Works Director  
Dave Siegel, Transportation/Development Services Manager

May 20, 1993



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T.D.D. (503) 588-6013

Wally Mull  
City of Keizer  
PO Box 21000  
Keizer OR 97307

SUBJECT: SALEM/KEIZER INTERCEPTOR AGREEMENTS

Dear Wally:

As we agreed at our April 2, 1993, meeting, I have had staff research the existing inter-city agreements regarding cost-sharing on the major sanitary sewer interceptors.

The current legal agreement, dated December 23, 1988, contains two clauses relating to costs of sewer extensions, excerpted below:

"Keizer agrees:"

(page 6, item 6a and 6b)

"To be responsible for the following capital improvements:

- a) The adding of new sewers and pump station facilities to existing system.
- b) The replacement of undersized sewers and pump stations created by system expansion after the date of this agreement as determined by Salem."

(page 9, item 5):

"The full cost of construction of sewer line extensions exclusive of Salem's interceptors within Keizer shall be borne by Keizer."

A June 12, 1989, letter from Robert Simon to Frank Mauldin addresses updates to the master plan, and was written as Keizer's understanding of the agreements reached:

"The following conditions of the agreement have been developed:"

- "2. Master Plan will study existing 21-inch line and determine a timetable for new trunk sewers downstream from the end of the existing 36-inch trunk. New trunk line construction could include up-sizing the existing 21-inch interim line

EXHIBIT E

Wally Mull  
May 19, 1993  
page 2

with a new parallel line, and participating with the City of Salem in the construction of a larger trunk line, which will increase the capacity of the overall City of Salem collection. Any interim facilities will be constructed at the expense of the City of Keizer. The shared trunk line between the two cities will be based on a "diameter-inch" formula. Length of the shared line will depend on the final decision regarding sizing for the possible parallel trunk line. If a new master plan parallel trunk line is constructed by the City of Keizer prior to construction of a new shared line, the City of Keizer's participation will begin at an equivalent length from the lower end of the existing 36-inch trunk. Funding for new interim lines to be provided by City of Keizer from sewer trunk line funds or from developer fees."

As I recall, your original plan called for the 36-inch trunk line in Keizer to be extended all the way to the Willow Lake Treatment Plant. The 21-inch "interim" connection to the City of Salem interceptor was just that, an interim connection to allow Keizer time to develop funding for the extension of the 36-inch trunk.

Salem will abide by the terms of the letter of agreement quoted above. Keizer has the option to either extend an individual trunk line to Willow Lake, or participate with us in a shared interceptor at such time as Salem constructs that facility.

In terms of your master plan and what will be shown in that document, you do need to show an independent Keizer trunk line to the treatment plant to keep that option open in the future.

Sincerely,



Frank Mauldin

Director Public Works

//c1/FMWALLY.TIM

Attachments: 6/12/89 letter from R. Simon  
12/88 Legal Agreement

cc: Bill Peterson, William Peterson Engineering, Inc.  
Paul Eckley, Chief Utilities Engineer  
Tim Gerling, Chief Development Services Engineer