

**CITY OF LEBANON**  
**Storm Drainage Master Plan**

**CHAPTER 12**

**12.0 OPERATION AND MAINTENANCE**

Operation and maintenance is as critical to the success of Lebanon's storm drainage system as the planning, engineering and quality of construction combined. Urban drainage systems do not maintain themselves as do natural rivers and streams. Without proper maintenance, the best designed project soon becomes ineffective.

A drainage system which is not properly maintained will look unsightly, will result in annual complaints from the citizens most effected and will not be there when it is truly needed. Most poorly maintained drainage systems can function to some degree when subjected to the typical annual storm events experienced in the Willamette valley. The real problems occur when the system is subjected to the design storm event or even a lesser but significant event. Silted pipes and catch basins, brush or debris clogged ditches, broken or deteriorated drainage facilities and swampy areas of standing water are some of the results of poor drainage maintenance. The impact can be public inconvenience, minor property damage, major property damage or even physical hazard or loss of life.

Drainage maintenance requires proper planning and funding. In this chapter, the existing drainage maintenance will be reviewed and evaluated. A proper level of maintenance will be recommended which will result in emergency and preventive maintenance levels adequate to allow the system to function as it was originally designed.

**12.1 EXISTING MAINTENANCE AND OPERATIONS**

**12.1.1 Drainage Budgeting and Accounting**

The City of Lebanon drainage maintenance budget and maintenance effort has varied over the years. Prior to the 1988-89 budget year, Storm Drainage maintenance was not identified as a separate maintenance function. Drainage was part of the Street and Sewer maintenance sections. In the 1988-89 budget, Section (Department) 559, Storm Drainage, was established within the Public Works Maintenance Division. For the first time, storm drainage maintenance was defined as a full, stand alone program.

At this writing, it is near the end of the 1990-91 budget year. This is the third year of 559 budget account, Storm Drainage. The initial 1988-89 year, a total of \$25,774.45 was budgeted for Storm Drainage as follows:

Personal Services -	\$15,774.32
Materials and Services -	9,471.56
Capital Outlay -	<u>558.57</u>
<b>Total</b>	<b>\$25,774.45</b>

In the following year this amount was increased to a total of \$70,966 with no capital outlay (\$50). The majority of this increase was in personal services with a corresponding increase in materials and supplies. Ninety nine percent of the amount budgeted last year was appropriated for drainage in the current budget.

To fund the initial establishment the storm drainage section in the budget, the original budget was funded through a transfer from the Streets Fund. The Streets Fund receives most of its revenue from dedicated highway revenues (gas tax). In the second years drainage budget (1989-90), the street fund participation was reduced by approximately half while the total budget was nearly tripled. The new funding level, \$70,966 per year was determined to be the most cost effective level to keep the pipes and ditches operating as designed and to correct the lack of maintenance of the past.

To provide the remaining funds for this expanded program, an amount of \$49,313 was transferred from the General Fund. The remaining budget was provided by the Streets Fund, interest on investment and the ending balance carryover. Under this second years budget, the General Fund provided 65% of the total revenue for drainage.

In the current budget, 1990-91, General Fund revenues were reduced from \$49,300 to \$25,600. Once again, the Streets Fund was used as the primary source of funding for drainage. During the election of November 1990, the voters of Oregon passed Ballot Measure 5, placing a limitation on property taxes, one of the primary sources of revenue for the General Fund. This tax limitation law will have a significant impact on the City of Lebanon. Use of the General Fund for funding drainage was eliminated in the drafting of the 1991-92 budget.

The preliminary 1991-92 budget has reduced the level of drainage maintenance by approximately \$22,000 or 31%. Maintenance staff feels this funding level is below a preventive maintenance level and the drainage system may once again slip into a retrograde position, with deterioration exceeding maintenance.

The above detail was presented as general drainage budget background but primarily it illustrates the vulnerability of the drainage maintenance budget to the budget process. Lebanon's drainage system is a utility very much like the sewerage and water systems. It provides an urban public works service which is critical to the public health and safety. It is therefore critical that the operation and maintenance of the drainage system receive adequate and stable dedicated funding.

### 12.1.2 Drainage Task Accounting

Over the past three years, the Maintenance Division has developed a refined cost accounting system that captures the man-hours and costs of all significant tasks or activities undertaken within the Division. Accounting is now kept on 147 activities. The work on individual activities are then assigned, or grouped, into 36 major functions or "projects". One of these projects is Storm Drainage. Approximately 24 of the activities are commonly associated with storm drainage. Following are representative examples of the most common drainage activities which are currently in use by the City:

- 303 Manhole installation/repair
- 304 Manhole cover replacement
- 305 Storm line cleaning
- 306 Storm line repair/replacement
- 307 Catch basin cleaning
- 308 Vector control (rats)
- 309 Vector control (insects)
- 318 Ditch line\drainage way cleaning
- 319 Culvert cleaning
- 320 Mowing ditch lines\drainage ways
- ... and many more

Each maintenance employee completes a daily time sheet upon which he records:

- Project number - one of 36 major functions or projects
- Activity number - the specific type of work accomplished
- Source code - the City Department or P. W. Division /Sect. from which the work was funded.
- Manhours - time in hours

The data from these time sheets can be tabulated by computer to generate management reports to assist managers in the budgeting and operation to the storm drainage maintenance program. The consultant team has reviewed this accounting system and find it quite adequate for the needs of the City of Lebanon. It is consistent with the systems used by much larger Oregon cities and is appropriate for Lebanon.

Although the data is being captured in the individual time sheets and entered into the computer, the programming of the data base needs more work to allow the Department Head and Maintenance staff to extract needed management data from an on-line system. Currently, requested reports can be produced by clerical staff at significant effort. This causes the managers to make limited use of the available data. It is recommended that user-friendly programming be developed such that the desired reports can be easily be brought up on a computer screen for review and printed out as needed.

Examples of typical management reports which may be extracted from the available data base includes:

- **Labor** The first report would manhour detail by activity for any specific day, week, month or the year to date. If these data were on line, up to date information would be instantly available after the daily time sheets are posted. On line access is where the real value of the accounting system is realized. Budgeted manpower figures should be posted beside the actual for easy comparison. Labor in manhours was selected as the most critical report because it makes up the majority of the drainage budget. Managing labor is therefore, key to the cost effective management of storm drainage maintenance.
- **Activities** In accessing the data base, a very simple request to allow a manager to review of the activities which are being charged, will assist supervisors and managers in determining if the accounts are being properly being used by field staff. Activity numbers are often not understood or appreciated by field personnel. They will often learn a few of the most common numbers and use them for everything. This quick review will assist the supervisors in improving the data input into the accounting system (the original time sheet).
- **Manpower with materials and equipment** This report will provide a complete picture of the effort and cost of each activity.
- **Charges made by a specific individual for a given period of time summarized by activity** Again this is not necessarily a report needed every month, but if an online menu would allow this type of sort, it can be of real use to the manager and employee.
- There are many more sorts of the data base that could be available through an on line menu. The specific reports would be based on the needs of the individuals. Flexibility should be available to allow new sorts of the data resulting in other reports as needed.

In summary, the chart of activities and source codes seem quite appropriate for Lebanon's drainage management needs. Flexibility exists to add new items as needed which allow the system to grow with the city and changes in computers and management methods. No changes are recommended in the activity or source codes.

There is one element of information missing from the maintenance accounting system, units of production. Some effort is now being expended in identifying work production and monitoring the progress toward completing identified goals. This is being done to some extent independent of the cost accounting system by the Maintenance Superintendent. It is suggested that this be incorporated into the cost accounting system.

### 12.1.3 Units of Production

The rate at which manpower expended completes planned goals of accomplishment is one definition of production. Monitoring the number of manhours expended on a given activity is a way of measuring the work accomplished in the activity area. How effectively these manhours were utilized in completing tasks, is missing from the review.

Production can be measured in many ways. The purpose of this section of the report will be to explore how this concept can be extended to storm drainage. Units of production are used to provide the worker, the supervisor and the manager with a method of knowing how cost effectively the work is being accomplished. These units measure actual accomplishment, not just hours spent on the task. In drainage maintenance they may include; number of catch basins cleaned, feet of ditch cleaned, feet of pipe cleaned, number of catch basin grates repaired/replaced, catch basins constructed, manholes repaired, etc.

The following example is offered to illustrate the concept of production:

#### Catch basin cleaning -

It is possible to measure the work expended in catch basin cleaning by reviewing the hours spent cleaning basins. This will tell the manager where the men were working but does not tell him how well the crew is meeting the goal of say, cleaning 1,000 basins in one year within a budget of 200 manhours. Program or production budgeting will develop the unit of production as "Catch Basins Cleaned". The required rate of production will be 1000 catch basins divided by 200 manhours or 5 catch basins per manhour. Knowing this the supervisor of the catch basin crew can monitor on a daily, weekly or at least biweekly, how the work is progressing toward the budgeted goal. If the daily time sheets are not posted to the system each day, daily data must be hand collected and tabulated by the supervisor. This summarizing can be relative simple when tabulated on an occasional individual case basis once the concept of production units is in place.

From the above example it is apparent that the success of this concept of budget and management control is dependent upon the selection of the proper unit of production and the establishment of challenging yet realistic production goals.

Local experience plus a good deal of common sense is needed. Workers, supervisors and managers alike will embrace the concept if it is used in a positive way to challenge and stimulate staff at all levels to constantly work to get more done with the funds available. It is also a very positive help in presenting programs to the City Council and Budget Committee.

It should be recognized that we are working with goals. Situations can arise where they can be exceeded or not fully met, therefore some flexibility is needed. Setting goals is the first step in meeting goals. Online computer monitoring will easily demonstrate how goals are being met, allowing the information to be used while the work is still underway and a midcourse correction will still be effective.

#### 12.1.4 Accounting Structure

To utilize the production measurement techniques described above, it will be necessary to integrate units of production into the accounting system. This effort must start with the time sheets or a parallel daily report by each designated lead man or supervisor where the number of units produced each day is recorded. Generally the activity number selected for recording time worked will fix the units of production needed to be recorded. As in the example above, if John Doe fills out his daily time sheet using activity number 307, catch basin cleaning, he should also record the crews production in number of catch basins cleaned that day. Where the work was accomplished by a two man crew, only the lead man will record the production (to avoid duplication). The supervisor or Maintenance Superintendent may wish to post production, equipment and materials to the job on a separate form from the employees daily time sheet.

Table 12.1 provides an example of how the total accounting system can come together for Lebanon Storm Drainage Maintenance. The table is offered to stimulate thought and should be modified as desired by the Maintenance Superintendent and Department Head. The table shows activities and costs to illustrate the use of production based accounting. The actual activities and costs are not intended to be complete or to be recommended values for Lebanon. Much effort will be required to develop the specific items to eventually be include on the table. The units of production are labeled "Performance Standard" on the table and can best be developed by the maintenance management staff who will use them. The values on the table may be used as a starting point but most will change as the program is developed. The appendix contains some representative forms from the City of Salem for reference.

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### 12.1.5 Drainage Maintenance Level

Over the three years that storm drainage has been budgeted as a separate entity, the funding level has fluctuated. The total drainage maintenance budget has varied as follows:

1988-89	\$25,774
1989-90	\$70,966
1990-91	\$70,022
1991-92 (approximate proposed)	\$48,000

Drainage maintenance is a critical Public Works function. As the city grows, drainage will become an even larger public concern and need. Funding is needed at a level where cost effective preventive maintenance is occurring. Cost effective preventive maintenance is a level where the drainage system can handle storm events as designed and the system is not loosing ground to deterioration. The natural deterioration of the facilities will not result in correction projects which exceed the cost of regular annual maintenance (annual maintenance which would eliminate the need for the corrections).

Lebanon has a drainage system which is somewhat unique. The entire city has little slope and therefore little grade or pipe/ditch slope to convey storm drainage water. There is an unusual number of open ditches which are critical elements of the drainage system. The flat grades result in siltation which plugs the pipes and culverts and fills in the ditches. This silt and accompanying debris must be removed on a regular basis or the capacity of the system is reduced resulting in flooding and property damage.

Three years of active drainage maintenance has not overcome the effects of the many years of under funding prior to this program. The current program provides the following level of maintenance:

- 303 Manhole installation/repair - 1 or 2 manholes per year.
- 305 Storm line cleaning - emergency cleaning only.
- 306 Storm line repair/replacement - as needed. Only a few per year.
- 307 Catch basin cleaning - 100% cleaned per year past 2 years. This will drop to 20% per year in 1991-92 plus dry wells.
- 308 Catch basin installation - 3 to 5 per year.
- 309 Catch basin grate repair - 1-2 weeks per year
- 315 Closed circuit TV pipe inspection - used now for sewers. Plan to use for storm drains in future.
- 316 Vector control (rats) - occasional live trap nutria & muskrat.
- 317 Vector control (insects) - no program. Is needed.
- 320 Mowing ditch lines\drainage ways - Program badly needed. Past two years mowing completed where access available.

As was mentioned earlier, comparing Lebanon's drainage maintenance level with other cities

is difficult because of the unique flat grades of the system. No comparable recent data was available from the Bureau of Governmental Research (which is closing its doors on July 1, 1991). Information collected from other cities proved of little value. The City of Salem has a \$170,000 storm drainage maintenance program which is also heavily geared toward cleaning open channels and catch basins.

In general, the \$70,000 funding level for the past two years has allowed most of the normal critical annual drainage activities to be completed and some effort made toward correcting the deterioration of the past. As an example, many of the open ditches were too soft and swampy to operate mowing equipment until late summer or fall which resulted in vegetation growing to an unsightly size clogging the drainage and making later mowing very difficult. Over the past two years, several of the ditches have been lined with heavy rock allowing equipment to operate in the spring. Many catch basins, manholes and deteriorated pipe have been repaired or replaced. It is strongly recommended that this \$70,000 level of funding be continued for approximately five years. Following this period of repair and correction, the level can be reduced to approximately \$60,000 per year.

## 12.2 RECOMMENDATIONS

1. Secure a stable funding source for storm drainage maintenance. It is strongly recommended that the drainage utility be considered as the primary funding source for both maintenance and capital improvements. A minimum base maintenance funding level of \$60,000 per year is recommended. Special needs and a \$10,000 five year funding surcharge can be funded by transfers from the Streets Fund, SDC or the other sources.
2. The cost accounting set up for drainage provides an excellent base but should be expanded to provide online computer management reporting and a provision for measuring production.
3. The drainage maintenance funding level provided for the past two years (\$70,000) was at an ideal level for Lebanon at this time. This level provides 80% of one full time position, two seasonal temporary summer workers and the equipment and materials needed to support them. This level could be continued for a period of approximately 5 years then reduced to \$60,000. Capital improvement funds should be budgeted by the Engineering Division.

CITY OF LEBANON  
STORM DRAINAGE MANAGEMENT

## SAMPLE MAINTENANCE MANAGEMENT PLAN

LEBSDP1

ACTIVITY NUMBER	DESCRIPTION	WORK QUANTITY	UNIT	PERFORMANCE STANDARD (PER CREW DAY)	CREW DAYS	LABOR HOURS	LABOR COST	EQUIPMENT COST	MATERIALS COST	TOTAL
303.0	MANHOLE INSTALATION/REPAIR	2	each	1.0	2.0	64.0	1792.0	716.8	197.1	2705.9
304.0	MANHOLE COVER REPLACEMENT	12	each	16.0	0.8	6.0	168.0	67.2	18.5	253.7
305.0	STORM LINE CLEANING	1700	In ft	1700.0	1.0	32.0	896.0	358.4	98.6	1353.0
306.0	STORM LINE REPAIR/REPLACEMENT	250	In ft	100.0	2.5	80.0	2240.0	896.0	246.4	3382.4
307.0	CATCH BASIN CLEANING	500	each	80.0	6.3	100.0	2800.0	1120.0	308.0	4228.0
308.0	CATCH BASIN INSTALLATION	4	each	2.5	1.6	51.2	1433.6	573.4	157.7	2164.7
309.0	CATCH BASIN GRATE REPAIR	50	each	10.0	5.0	80.0	2240.0	896.0	246.4	3382.4
310.0	ROOT CONTROL (ROOT SAW)	300	In ft	200.0	1.5	48.0	1344.0	537.6	147.8	2029.4
311.0	ROOT CONTROL (CHEMICAL)	1000	In ft	1000.0	1.0	32.0	896.0	358.4	98.6	1353.0
312.0	MANHOLE INSPECTION	10	In ft	20.0	0.5	16.0	448.0	179.2	49.3	676.5
313.0	LINE LAMPING	4000	In ft	2000.0	2.0	48.0	1344.0	537.6	147.8	2029.4
314.0	DRYWELL CLEANING	20	each	4.0	5.0	120.0	3360.0	1344.0	369.6	5073.6
315.0	TV PIPE INSPECTION	3000	In ft	1000.0	3.0	72.0	2016.0	806.4	221.8	3044.2
316.0	VECTOR CONTROL (RATS)	10	acre	5.0	2.0	16.0	448.0	179.2	49.3	676.5
317.0	VECTOR CONTROL (INSECTS)	15	acre	15.0	1.0	8.0	224.0	89.6	24.6	338.2
318.0	DITCH LINE/DRAINAGE WAY CLEANING	6600	In ft	300.0	22.0	528.0	14784.0	5913.6	1626.2	22323.8
319.0	CULVERT CLEANING	600	In ft	200.0	3.0	96.0	2688.0	1075.2	295.7	4058.9
320.0	MOWING DITCH LINES/DRAINAGE WAYS	100	miles	4.0	25.0	200.0	5600.0	2240.0	616.0	8456.0
321.0	SPRAYING DITCH LINES/DRAINAGE WAYS	4	miles	1.0	4.0	32.0	896.0	358.4	98.6	1353.0
324.0	SMOKE TESTING	3000	In ft	3000.0	1.0	32.0	896.0	358.4	98.6	1353.0
<b>TOTALS</b>					<b>90.1</b>	<b>1661.2</b>	<b>46513.6</b>	<b>18605.4</b>	<b>5116.5</b>	<b>70235.5</b>

NOTE: THE ACTIVITIES AND COSTS ABOVE ARE PROVIDED AS AN EXAMPLE OF A MANAGEMENT PLAN. THEY ARE NOT RECOMMENDED FOR LEBANON BUDGETING.