A COST ANALYSIS OF SINGLE AND SEPARATE SEWERAGE TREATMENT FACILITIES FOR THE CITY OF TILLAMOOK AND THE HIGHWAY 101 NORTH SANITARY DISTRICT

A Report Prepared For

City of Tillamook
County of Tillamook
Highway 101 North Sanitary District

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INTRODUCTION

This paper presents capital cost estimates for a single and two separate sewerage treatment facilities to serve the City of Tillamook and the Highway 101 North Sanitary District. These estimates demonstrate that the total capital cost of a single treatment facility is less than the total costs of separate City and District facilities; they further show that both the City and District can benefit from a single facility designed to meet their needs jointly. Therefore, we recommend that (1) the future level of development in the Highway 101 North Sanitary District be determined prior to the final design of an expanded and rehabilitated City treatment facility, and (2) some cooperative arrangement between the City and District be established to permit the construction of a single facility to serve their treatment needs jointly.

The paper is divided into three sections. The first section supplies background and justification for the paper. The second section presents the cost estimates and the assumptions on which they are based. The third section states our conclusions and recommendations.

BACKGROUND

The Highway 101 North Sanitary District was organized to secure adequate sewerage services for the businesses and residences just north of the City of Tillamook. The District has studied various alternative solutions to its problems, including connection to the City of Tillamook sewerage system. In 1973 the City denied the District's request to connect, citing the critical

situation within their existing system as well as the uncertain physical and cost impacts of bringing the District on-line. Since then the State Emergency Board has granted the City $25,000 to finance an area sewerage study by CH_2M-Hill, and the District has retained Hogan & Olhausen, P.C., Loveland, Colorado to assist them in obtaining adequate sewerage facilities.

Although these firms have not yet completed work, their preliminary analyses and findings suggest that (1) the City of Tillamook must substantially expand and rehabilitate its existing treatment facility to meet EPA's 1977 discharge standards, and (2) a separate facility to serve existing District businesses and residences would cost about $93,000 (see Table 1). These findings provide the stimulus for this paper. For, if the expansion in City facilities were to exceed City needs sufficiently to permit service to the District as well, perhaps both City and District could benefit. Further, since the capacity of a treatment facility can be more economically increased before than after its construction, the cost differences between separate and single facilities merit special attention during the planning period. This paper therefore seeks to establish in a preliminary fashion whether a single treatment facility would be less costly than separate City and District facilities.

COST ESTIMATES

Capital cost estimates for alternative sewerage treatment facilities to serve the City of Tillamook and the Highway 101 North Sanitary District are presented in Table 1. Cost estimates are given for separate and joint City

and District facilities designed to meet EPA's 1977 discharge standards and sized to handle predicted 1995 City and District sewage volumes.

Since cost estimates are always based on certain assumptions, several comments concerning the estimates in Table 1 are appropriate here. First, 1995 City sewage volume exclusive of infiltrated waters is predicted to be 2.95 MGD (million-gallons-per-day), and City capital costs for separate and single facilities have been estimated for plants sized to handle the predicted 1995 City sewage volume. However, if the City does not correct its existing and anticipated infiltration problems, a facility with a capacity much larger than 2.95 MGD would have to be constructed to satisfy EPA discharge standards, and City (but not District) capital costs could substantially exceed those given in Table 1.

Second, capital cost estimates have been made for facilities appropriately sized to serve three different levels of future development within the District. This was done to establish whether different public policy decisions with respect to District development could affect the relative desirability of separate versus joint facilities. The three development alternatives and their respective associated 1995 sewage volumes are as follows: (1) existing development only - 0.03 MGD; (2) limited future development (i.e., fill-in development to northern end of present development) - 0.05 MGD; and (3) full future development (i.e., full non-agricultural development of District) - 0.10 MGD.[1]

Third, the capital cost estimates in Table 1 are for sewerage treatment facilities only; they do not include any costs for a collection system within

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[1]Of course, to the extent that significant ground water infiltration is anticipated within the District, these volumes should be increased, and the District cost estimates in Table 1 revised upwards.

the District. Presently available information suggests that District collection costs would be about the same with either single or separate treatment facilities, and therefore these costs have not been considered in the cost analysis of this paper. Of course, if future studies by CH_2M-Hill and/or Hogan & Olhausen establish that District collection system costs do vary among the alternatives considered here, single facility costs for the District should be increased (decreased) by the increase (decrease) in such costs.

Fourth, the allocation of single facility capital costs between the City and District is made according to marginal cost allocation principles. This requires users to share capital costs on an equivalent basis related to (a) their use of the facility and (b) the benefits they receive from using a single facility rather than separate facilities. Each user is credited with costs of providing the marginal (i.e., last) unit of treatment capacity. The remaining costs (= total facility costs minus the accumulated marginal costs for all users) are shared among users according to the benefits they derive from the single facility, benefits being measured by the respective costs of separate facilities that are not incurred if a single facility is constructed.[2]

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[2]Single facility capital costs were allocated to the District and City according to the following formula:

$$C_i = (MC_{\Sigma v_i})\ (v_i) + (a_i/\Sigma a_i)[TC-(MC_{\Sigma v_i})\ (\Sigma v_i)]$$

where C_i = capital costs allocated to the District or the City

$MC_{\Sigma v_i}$ = marginal cost of single treatment facility (point estimate)

v_i = predicted 1995 waste volumes for the District or the City

Σ = sum District and City

a_i = total capital cost of separate treatment facility

TC = total capital cost of single treatment facility

Finally, the cost estimates in Table 1 are preliminary estimates in early 1975 prices. These estimates would be subject to revision as inflation proceeds and as more detailed studies by CH_2M-Hill and Hogan & Olhausen are completed.

CONCLUSIONS AND RECOMMENDATION

Conclusions

1. The City and District can both benefit from a waste treatment facility designed to meet their needs jointly. Table 1 shows that the total capital cost of a single treatment facility is less than the total costs of separate facilities. City cost savings would be about $20,000 and would not vary significantly with the level of future development in the District. District cost savings from a cooperative arrangement with the City would be about $40,000 or more with limited future development in the District. With full future development, District cost savings from a joint facility would undoubtedly greatly exceed the $6,000 estimate given in Table 1, but presently available data did not allow us to estimate this cost saving accurately. (Our best guess, however, is that these savings would be $40-50,000).

2. The cost savings associated with a treatment facility to serve the City and District jointly can be realized only if a decision concerning future development in the District is made prior to determining the design capacity of the new facility.

Recommendations

We recommend that (1) the future level of development in the Highway 101 North Sanitary District be determined prior to the final design of an expanded and rehabilitated City treatment facility, and (2) some cooperative arrangement between the City and District be established to permit the construction of a single facility to serve their treatment needs jointly.

Table 1: Capital Cost Estimates for Alternative Sewerage Treatment Facilities for the City of Tillamook and the Highway 101 North Sanitary District (1975 dollars)

	District Development Alternatives	Treatment Facility Alternatives	Total Costs of Alternative Facilities, and Cost Savings of Single Facility		
			Highway 101 North District	City of Tillamook	Total
1.	Existing Development Only	Separate	93,000	2,550,000	2,643,000
		Single	40,000	2,530,000	2,570,000
			53,000	20,000	73,000
2.	Limited Future Development	Separate	≥93,000	2,550,000	≥2,643,000
		Single	54,000	2,529,000	2,583,000
			≥39,000	21,000	≥ 60,000
3.	Full Future Development	Separate	>93,000	2,550,000	>2,643,000
		Single	87,000	2,528,000	2,615,000
			> 6,000	22,000	> 28,000

Sources: D. Kenneth Ford, An Economic Analysis of Sewerage Services in Tillamook, Oregon, unpublished Masters of Science thesis, Oregon State University, November 1975; and Hogan & Olhausen, P.C. Proposed Sanitation Sewer Collection System and Wastewater Treatment Facility for Highway 101 North Sanitary District, a preliminary report dated June 9, 1975, p. 6.

Note: The inequalities in this table are intended to indicate that actual costs and cost savings would probably exceed the amounts the inequalities precede.