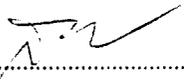


THESIS TITLE        CONDITIONS FOR LOCAL AND GLOBAL MINIMUM COSTS  
                          IN PIPE NETWORKS - A CASE STUDY

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THESIS ADVISORY COMMITTEE :

  
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#### **ABSTRACT**

This study reports the behavior of minimum cost ( $C_{min}$ ) against pipe sizes for a loop pipe network comprising five pipes forming two loops with one supply node and three demand nodes. The pipe network is shown in Figure 1.

It is found that  $C_{min}$  occurs when minimum number of pipes (three pipes) are used to convey water from supply node to demand nodes as shown in Figure 2.

However , two more ways to convey water from supply node to demand nodes using three pipes are possible as shown in Figures 3 and 4. Out of all these three possibilities , the one in figure 2 yields the minimum cost .

It may not be desirable to have minimum cost pipe network that changes itself from loop to branch . To have pipe network that maintain loop but also has minimum cost , we can assign small diameter pipes to the (supposedly) removed pipes and find the remaining pipes' diameters . This is shown by an example that is more complicate than the one in the case study .

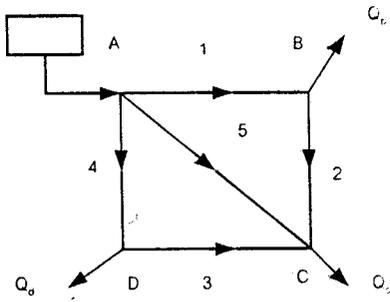


Figure 1 : The case study pipe network

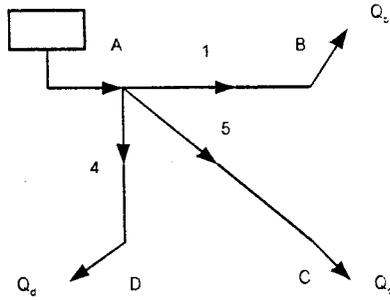


Figure 2 : Alternative 1 cost 2,931 bath

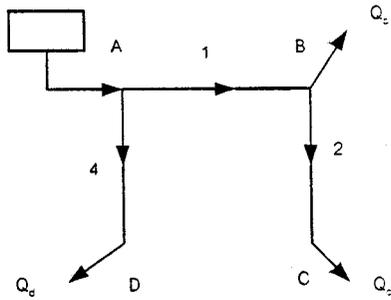


Figure 3 : Alternative 2 cost 3,277 bath

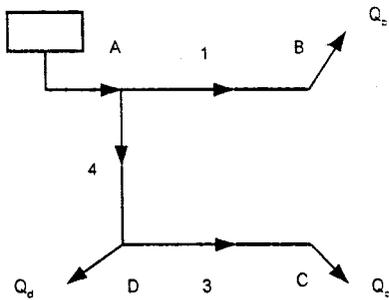


Figure 4 : Alternative 3 cost 3,683 bath