

Research for making the guideline to promote the water cycle in provincial city developing project		
Whole term	1997.10-1998.3	
<p>(Purpose)</p> <p>Reclaimed wastewater use and rainwater use are to be promoted in order to suppress the increasing water demand with development of provincial cities. The use of sewage heat and rainwater heat should also be promoted, which will be the efficient reuse of urban internal energy. The guideline for smooth introduction of effective water reuse and energy use in developing new cities was made in this study. The following studies were planned in 1997.</p> <ol style="list-style-type: none"> 1) Establishment of the installation plan for reclaimed wastewater use 2) Establishment of the installation plan for rainwater use 3) Establishment of the plan for heat use from sewage water and rainwater 4) Establishment of the plan for setting the rainwater infiltration facility <p>(Result)</p> <ol style="list-style-type: none"> 1) Establishment of the installation plan for reclaimed wastewater use There are two sources of reclaimed water for reuse. One is the effluent from terminal sewage treatment plant and another is the SESERAGI plant (satellite type advanced waste water treatment facility). Water for toilet flushing, cooling water, landscape water, and snow melting water are considered as the ways to reuse. Water quality standard, utilization amount, and a calculation formula are decided. While developing the calculation formula for designing the reclaimed water treatment system, two types of water source such as effluent from terminal sewage treatment plant and SESERAGI plant are considered. 2) Establishment of the installation plan for rainwater use There are two ways for rainwater reuse. One is the use at private house and another is the use on regional scale. In each case, the first flush runoff should be eliminated and the rainwater is stored at underground. Rainwater can be used as supply water for cooling tower. Here, water quality standard, water collection system, water storage system, and water supply system are examined. Rainwater can be also used as water for toilet flushing, cooling water, landscape water, etc. Running cost was calculated with simulation of rainwater storage and usage. 3) Establishment of the plan for heat use from sewage and rainwater There are two ways to recover sewage heat using heat pump or heat pipe. In using sewage heat, heat needs and available water amount should be understood at first. Then estimate the available sewage heat amount by the year and assume the annual heat supply. Finally know the optimal scale of operation. Rainwater heat is limitedly used for cooling tower. 4) Establishment of the plan for setting the rainwater infiltration facility Rainwater infiltration facility is installed with expectation for groundwater recharge, mitigation of heat-island phenomenon, control of storm water runoff. There are two types of infiltration facility such as diffusion and well types. The diffusion type includes infiltration inlet, infiltration trench, infiltration gutter, permeable pavement, road infiltration inlet, porous media type storage infiltration system, and infiltration basin. The well type includes dry well and wet well. In installing the rainwater infiltration facility, the following three points should be reminded; i) the number of facilities, ii) the precautions around the setting place, and iii) the applicability of each facility. Calculate the infiltration ability and make the infiltration map depending on the actual infiltration field test. <p>(Future agenda)</p> <ol style="list-style-type: none"> 1. Utilization of reclaimed wastewater To try to expand the utilization of reclaimed wastewater and to reduce treatment cost. 2. Utilization of rainwater To promote the utilization of rainwater not only in small scale but also in large scale in developing areas. Regarding sewage water and rainwater heat use, fixed charge should be reduced to increase the utilization factor. 3. Rainwater infiltration facility To reduce maintenance cost for clogging prevention or cleaning. Investigation of ground water pollution after infiltration. <p>Funded research by Japan Regional Development Corporation Researchers: Sigeo hirabayashi, Nobuyuki Nakano</p>		
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