

Texas A&M University Hydrologic Modeling Inventory
Model Description Form
June 2007

Name of Model: ILSD Illinois Least-Cost Sewer System Design Model

Model Type: ILSD is an event based model through simulation of rainfall-runoff process and discrete differential dynamic programming (DDDP) to determine the system least- design of sewers in a network for urban watershed.

Model Objective(s): Least-cost optimal design of sewer sizes and slopes in a network system with design rainfall as input.

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Model Structure or Mathematical Basis: Watershed: catchments drain into manholes; manhole numbers representing sewer network; sewer length; ground elevation at manhole; size of catchments; size or percentage area of pervious and impervious surfaces of each catchment; SCS soil type for pervious surface.

_Rainfall: Input hydrographs or with IDE which can be a single hyetograph or different hyetographs for design of different sewers.

_Runoff: Runoff is simulated through time-area method and hydrograph timeshift method

_Design Constraints: Minimum soil cover of sewers, flow velocity restrictions, acceptable risk if the risk-based design option is used

Model Parameters:

Spatial Scale Employed in the Model: Unrestricted watershed size

Temporal Scale Employed in the Model: Event based model with time discretization specified by user or computed in model by default

Input Data Requirements: network layout, Manning's n for pipes; Min & max soil cover; costs for pipe, excavation, manholes; design rainfall, drainage areas, impervious areas, flow-path lengths, slopes, soil data

Computer Requirements: PC

Model Output: Runoff hydrographs (optional) and diameter and end elevation of sewers

Parameter Estimation / Model Calibration:

Model Testing and Verification: Compared favorably with the rational method and other sewer design models

Model Sensitivity:

Model Reliability:

Model Application / Case Studies:

Documentation: Yen, B.C., Cheng, S.T., Jun, B-H., Voorhees, M.L., and Wenzel, Jr., H.G., (1984). "Illinois Least-Cost Sewer System Design Model: ILSD-1 & 2 User's Guide." Research Report 188, Water Resources Center, University of Illinois at Urbana-Champaign

Other Comments: