Minimum Time of Concentration (tc) Setting

MSMA · https://mes100.com/docs/minimum-time-of-concentration-tc-settings/

5 minutes is commonly used as the minimum value for the Time of Concentration. This is due to the storm duration used in the IDF curve equation which is valid between 0.0833 hours (5 minutes) to 72 hours and is referred in Storm Management Manual for Malaysia (MSMA).

2.2.3.2 Empirical IDF Curves

Empirical equation can be used to minimise error in estimating the rainfall intensity values from the IDF curves. It is expressed as

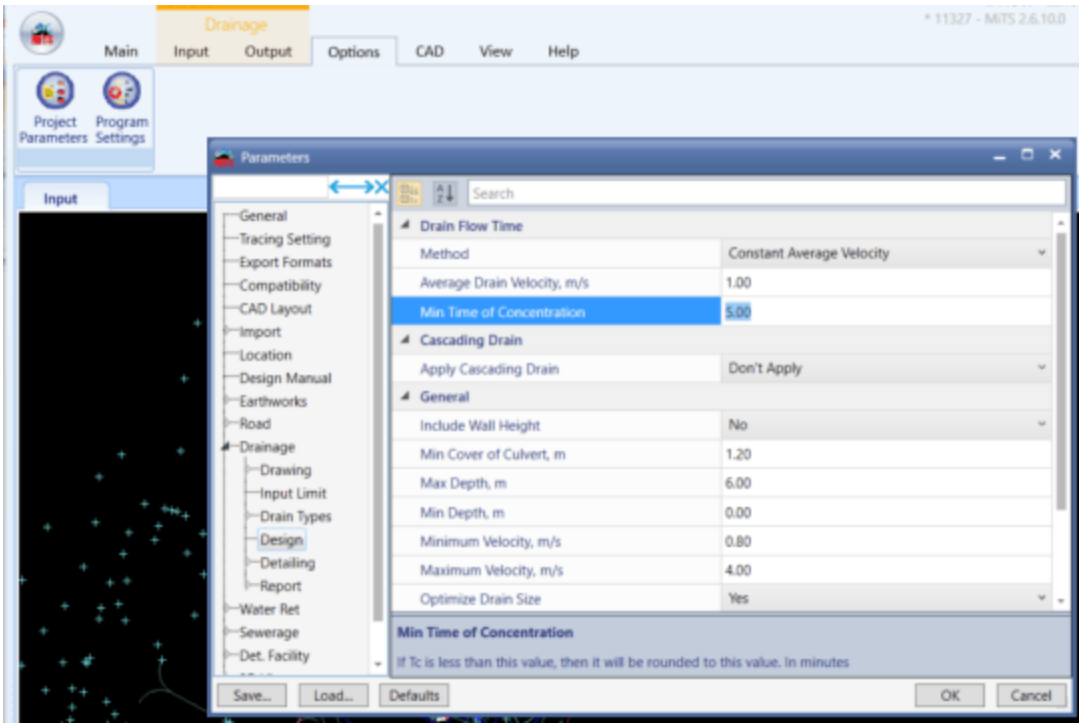
$$i = \frac{\lambda T^{\kappa}}{(d+\theta)^{\eta}} \qquad (2.2)$$

where,

i = Average rainfall intensity (mm/hr);
T = Average recurrence interval - ARI ($0.5 \le T \le 12$ month and $2 \le T \le 100$ year);
d = Storm duration (hours), $0.0833 \le d \le 72$; and
λ, κ, θ *and* η = Fitting constants dependent on the raingauge location (Table 2.B1 in Appendix 2.B).

(Refer to Equation 2.2 in MSMA 2nd Edition)

By reason of that, minimum time of concentration setting is implemented in the MiTS which can be adjusted in the following directory "*Options > Project Parameters > Drainage > Design > Min. Time of Concentration*". This setting is applied to ensure that the tc is always more than the minimum value setting.



However, if your value of duration is less or higher than the range, do exercise your judgement on the validity of the result and confirmation regarding this should be referred to the authorities.

Other supportive reference regarding minimum time of concentration:

MSMA 1

Chapter 14 Flows Estimation and Routing

Chapter 14 provides a table of recommended minimum tc for the different drainage elements.

14.4.4 Time of Concentration for Small Catchments

Although travel time from individual elements of a system may be very short, the total nominal flow travel time to be adopted for all individual elements within any catchment to its point of entry into the stormwater drainage network shall not be less than 5 minutes.

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For small catchments up to 0.4 hectare in area, it is acceptable to use the minimum times of concentration given in Table 14.3 instead of performing detailed calculation.

Table 14.3 Minimum Times of Concentration

Drainage Element	Minimum t_c (minutes)
Roof and property drainage	5
Road inlet	5
Small areas < 0.4 hectare	10

Note: the recommended minimum times are based on the minimum duration for which meaningful rain intensity data are available.

MSMA 2

Chapter 2 Quantity Design Fundamentals

states that the recommended minimum tc is 5 minutes for **roof drainage**.

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The drain flow time equation should be used to estimate t_d for the remaining length of the flow paths downstream. Care should be given to obtain the values of hydraulic radius and friction slope for use in the drain flow time equation. Note that recommended minimum time of concentration for a catchment is 5 minutes which applies to roof drainage.

Chapter 4 Roof and Property Drainage

states that a storm duration of 5 minutes should be adopted for all roofs. (based on Point 1)

Roof Drainage: Drainage systems which are located at the top of property drainage systems.

difficult to define catchments, a conservative approach should be adopted, assuming the largest possible catchments.

4.3.2 Design Average Recurrence Intervals

Roof drainage shall use the ARIs set out in Table 4.1. The critical storm duration of 5 minutes should be adopted for all roofs unless special circumstances justify a longer duration.

Table 4.1: Design ARIs for Roof Drainage

Property Type	Eaves Gutters	Valley and Box Gutters
All buildings	20 year ARI	100 year ARI

Notes :

1. If water can flow back into the building, then overflow measures are required
2. A higher design ARI shall be adopted for buildings located on hillside area

4.3.3 Discharge Estimation

The 5 minute duration 20, 50 and 100 year ARI rainfall intensities for the particular location are obtained from the short-duration rainfall IDF method in Chapter 2, applied at the particular site. If special circumstances justify the use of a longer time of concentration, the rainfall intensity for this time of concentration shall be derived using the methods set out in Chapter 2.

Chapter 1 Design Acceptance Criteria

Based on the Point 1, it does not state for the property drainage, but refers to **Chapter 1,** which mentions that usually 5 minute duration design rainfall of 20, 50, and 100 year ARIs shall be used for the sizing of property drainage components.

Property Drainage: System which transfers runoff from roofs, paved areas and other surfaces of a premise to a suitable outlet or disposal facility.

1.2.3.2 Property Drainage

Property drainage refers to the systems which transfer runoff from roofs, paved areas and other surfaces to a suitable outlet or disposal facility. The system involves gutters, downpipes, drains, pipes, swales and storage and treatment facilities. It shall be the responsibility of the property owner to design infiltration or on-site detention structures or facilities, to limit the amount of stormwater that can be drained to streets or trunk drainage systems, in order to reduce flooding and pollution. Usually, 5 minute duration design rainfall of 20, 50 and 100 year ARIs shall be used for the sizing of property drainage components.

Related



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I'm the Benevolent Dictator for Life for MiTS Software cum Editor of this website. Read more here.

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