DEPARTMENT OF TRANSPORTATION

BUREAU OF URBAN AND PUBLIC TRANSPORTATION

DRAINAGE ASSESSMENTS

(By authority conferred on the department of state highways and transportation and the department of agriculture by section 14a of Act No. 51 of the Public Acts of 1951, as added, being S247.664a of the Michigan Compiled Laws)

R 280.1 Definitions.

Rule 1. (1) "Apportionment" means that portion or share of the total cost of a drainage improvement, expressed as a percentage, to be borne by the assessed party by reason of benefits to a state highway or county road.

(2) "Assessment" means the apportionment expressed as a monetary amount.

(3) "County road" means a roadway, including the right-of-way, under the jurisdiction of a county road commission. It includes property contiguous to a roadway owned in fee or easement by the county which is used for highway purposes. It does not include facilities such as garage sites and office buildings that are not contiguous to the highway right-of-way.

(4) "Department" means the Michigan department of highways and transportation.

(5) "Drainage district" means the total area of land contributing storm water runoff to the drain or portion of the drain under consideration.

(6) "Rainfall intensity" means the rate of rainfall in inches per hour.

(7) "Runoff" means that part of the rainfall which drains off the land rather than being absorbed.

(8) "Runoff coefficient" means the ratio of the rate of runoff to the rate of rainfall at an average storm intensity if all the drainage area is contributing.

(9) "State highway" means a roadway, including the right-of-way, under the jurisdiction of the department which is part of a designated system of highways. It includes property contiguous to the highway owned in fee or in easement by the department which is used for highway purposes. It does not include facilities such as garage sites and office buildings that are not contiguous to the highway right-of-way.

History: 1979 AC.

R 280.2 Computation of basic benefits.

Rule 2. (1) Basic benefits for county roads and state highways shall be computed in direct proportion to the pro rata share of storm water from county roads and state highways within the drainage district to the total design storm water runoff from the drainage district.

(2) Storm water runoff quantities (Q) shall be determined for the drainage district by use of the accepted engineering formula, $Q = ciA$, this being the product of the runoff coefficient (c), referred to in table I set forth in R 280.9, the rainfall intensity (i), and the area of the drainage district (A). Rainfall intensity is assumed to be of uniform rate throughout the drainage district.

(3) Storm water runoff quantities (Q) for a county road or a state highway shall be determined by using the same method as that used for the entire drainage district. Computation examples are set forth in R 280.7 and R 280.8.

(4) If the rainfall intensity used in the design of a county road or a state highway drainage facility is not the same as the rainfall intensity used in the design of the enclosed receiving county drain or intercounty drain, the basic benefit computed for the county road or the state highway shall be multiplied by the number which expresses the ratio of the design runoff from the county road or state highway to the design runoff for the receiving county or intercounty drain according to the recurrence interval factors. (See table II set forth in R 280.9.)

History: 1979 AC.

R 280.3 Computation of supplemental benefits.
  Rule 3. (1) Supplemental benefits for county roads   and   state   highways, which shall result from maintenance, improvement, or the   installation   of facilities, structures, or mechanical devices   jointly determined   to   be necessary by the highway jurisdiction and drain commissioner   or drainage board to accommodate or relieve county   road   drainage   or   state   highway drainage, shall be computed in the direct proportion of the estimated cost or the   actual   cost,   if   known,   of   such   maintenance, improvement, facilities, structures, or   mechanical   devices   to   the   estimated construction cost or the actual construction cost, if known, of the   total project.
  (2) Supplemental benefits for county roads   and   state   highways,   which shall result by reason of special   specifications   or   construction conditions required by county highway authorities   and   state highway authorities, shall be computed in the direct proportion of   the   estimated cost or the actual cost, if known, of such special   specifications   or construction conditions to the estimated construction cost or the   actual construction cost, if known, of the total project.

  History: 1979 AC.

R 280.4 Apportionments.
  Rule 4. (1) Apportionments to a county for county road   benefits   and   to the department for state highway benefits shall be   based   on   benefits computed and determined under R 280.2 and R 280.3, except   that   such apportionments shall not include the cost of work   performed   under   R 280.4(2).
  (2) The department or a county road commission may enter into agreements with a drain commissioner or drainage board to   perform   additional   work which is not subject to these rules. Cost of work performed   under   such agreements shall not be included with the assessments to the department or the county road commission.
  (3) A county road commission or the department shall be notified of its apportionments pursuant to Act No. 40 of the Public Acts of 1956, as amended, being S280.1 et seq. of the Michigan Compiled Laws.

  History: 1979 AC.

R 280.5 Assessments.
  Rule 5. (1) Assessments shall be according to the apportioned   ratio   of the total cost of a project.
  (2) If a project is financed by the sale of bonds,   evidence   that   the bonds shall be sold shall be presented with the apportionment notice.
  (3) Fifty percent of the cost of drain assessments against a county   for drainage of county roads shall be paid by the county road commission   from county road funds.

  History: 1979 AC.

R 280.6 Reports.
  Rule 6. Expenditures for county drain assessments shall be   reported   by each county road commission to the state highway commission.   The reports shall be made as of December 31 of each year and shall be   submitted   by March 1 of the following year.

  History: 1979 AC.

R 280.7 Average runoff coefficient; computation examples.
  Rule 7. The following examples demonstrate the   desired   method of computing the average runoff coefficient (A.R.C.)   for   cross-sections commonly employed in the construction of county roads and state highways.
  (a) Cross-section A--dual roadway:

Figure for 280.7

300′ ROW

Consisting of:		Tabulation:
Pavements	2-24′	48′ x 0.90 = 43.2
Paved shoulders	2-10′	20′ x 0.90 = 18.0
Gravel shoulders	2-8′	16′ x 0.50 = 8.0
Berms	216′	216′ x 0.20 = 43.2
	Totals 300′	112.4

Average runoff coefficient: 112.4 ÷ 300′ = 0.375

(b) Cross-section B—urban roadway:
83′ ROW

Consisting of:		Tabulation:
Pavement & C/G	57′	57′ x 0.90 = 51.3
Sidewalks	2-5′	10′ x 0.90 = 9.0
Berms	16′	16′ x 0.20 = 3.2
	Totals 83′	63.5

Average runoff coefficient: 63.5 ÷ 83′ = 0.765

(c) Cross-section C—dual roadway (depressed):
240′ ROW

Consisting of:		Tabulation:
Pavement & C/G	2-53′	106′ x 0.90 = 95.4
Paved median	21′	21′ x 0.90 = 18.9
Paved shoulders	2-9.5′	19′ x 0.90 = 17.1
Berms	94′	94′ x 0.20 = 18.8
	Totals 240′	150.2

Average runoff coefficient: 150.2 ÷ 240′ = 0.626

(d) Cross-section D—rural roadway:
66′ ROW

Consisting of:		Tabulation:
Gravel road	20′	20′ x 0.7 = 14.0
Gravel shoulders	2-5′	10′ x 0.5 = 5.0
Berms	36′	36′ x 0.2 = 7.2
	Totals 66′	26.2

Average runoff coefficient: 26.2 ÷ 66′ = 0.397

History: 1979 AC.

R 280.8 Pro rata share of runoff for county roads and state highways; computation examples.
Rule 8. The computations hereinafter set forth are included to clarify the method by which the pro rata share of runoff for county roads and state highways may be determined.
Formula: Q=ciA Q = runoff c = runoff coefficient i = rainfall intensity
A = area
Rainfall intensity is assumed to be constant throughout the drainage district, according to R 280.2(2), and since the apportionment is based on the pro rata share of the runoff, the rainfall intensity has been deleted from these computations.
(a)   Computation No. 1:

Figure for 280.8 Computation No. 1

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Drainage district ............................................................ 670.00 acres
State highway ROW—dual roadway................................. 17.65 acres
County road ROW—rural type ...................................... 31.23 acres
Remaining lands—agricultural type
    (See subdivision (c))............................................. 621.12 acres
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Find: The pro rata shares of the runoff for state highways, county roads, and re-
    maining lands.

Solution

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State highway ........................... 17.65 A x 0.375 =   6.619 equivalent runoff acres
County roads ............................ 31.23 A x 0.397 =  12.398 equivalent runoff acres
Remaining lands ......................621.12 A x 0.200 = 124.224 equivalent runoff acres
Totals                        670.00 A          143.241 equivalent runoff acres
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Pro rata share for state highways:

$$\frac{6.619}{143.241} = 4.621\%$$

Pro rata share for county roads:

$$\frac{12.398}{143.241} = 8.655\%$$

Pro rata share for remaining lands:

$$\frac{124.224}{143.241} = 86.724\%$$

(b) Computation No. 2:

Figure for 280.8 Computation No. 2

Given:
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    Drainage district ............................................................ 32.00 acres
    State highway ROW—urban type ................................ 6.33 acres
    County road ROW—urban type................................... 1.47 acres
    County road ROW—rural type ................................... 2.78 acres
    Remaining lands—residential type
        (See subdivision (c))........................................... 21.42 acres
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Find: The pro rata shares of the runoff for state highways, county roads, and re-
    maining lands.

Solution

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State highway ............................... 6.33 A x 0.765 =  4.842 equivalent runoff acres
County roads ................................. 1.47 A x 0.765 =  1.125 equivalent runoff acres
County roads ................................. 2.78 A x 0.397 =  1.104 equivalent runoff acres
Remaining lands ..........................21.42 A x 0.500 = 10.710 equivalent runoff acres
Totals                        32.00 A           17.781 equivalent runoff acres
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Pro rata share for state highway:

$$\frac{4.842}{17.781} = 27.231\%$$

Pro rata share for county roads:

$$\frac{1.125 + 1.104}{17.781} = 12.536\%$$

Pro rata share for remaining lands:

$$\frac{10.710}{17.781} = 60.233\%$$

(c) Utilities, railroads, or streets may also be   subtracted   from   the total entitled "remaining lands," and computed on an equitable "c" factor at the discretion of the assessing authority.

R 280.9 Tables.
  Rule 9. The tables referred to in these rules are set forth as follows:

Figure for 280.9

TABLE I

Type of Surface	Runoff Coefficient
Concrete or asphalt pavement	0.8 - 0.9
Commercial and industrial	0.7 - 0.9
Gravel roadways and shoulders	0.5 - 0.7
Residential—urban	0.5 - 0.7
suburban	0.3 - 0.5
Undeveloped	0.1 - 0.3
Berms	0.1 - 0.3
Agricultural—cultivated fields	0.15 - 0.4
pastures	0.1 - 0.4
forested areas	0.1 - 0.4

For flat slopes or permeable soil, lower values shall be used. For steep slopes or impermeable soil, higher values shall be used. Steep slopes are 2:1 and steeper.

TABLE II
Rainfall Intensity Conversion Factors
(Design of Drainage Channels, FHWA, Hydraulic Design Series No. 4)

Duration in Minutes	Factor	Duration in Minutes	Factor
5	2.22	40	0.8
10	1.71	50	0.7
15	1.44	60	0.6
20	1.25	90	0.5
30	1.00	120	0.4

Note: U.S. Weather Bureau says "Rainfall amounts for the 5-, 10-, and 15-minute durations may be obtained by multiplying the 30-minute values by 0.37, 0.57, and 0.72, respectively."

Recurrence Interval Factors
(Design of Drainage Channels, FHWA, Hydraulic Design Series No. 4)

Recurrence Interval in Years	Factor
2	1.0
5	1.3
10	1.6
25	1.9
50	2.2

Storm Rating Based on 50-Year Maximum Rainfall
(Handbook of Steel Drainage and Highway Construction Products, AISI, 2nd Edition)

Storm Rating	One-Hour Maximum Rainfall
1 year	0.428
5 years	0.659
10 years	0.762
25 years	0.898
50 years	1.000
100 years	1.108

History: 1979 AC.