



TECHNO-GRAM 007-2016 REVISED



- SUBJECT:** Application of 24-hour rainfall intensity of 8.5 inches versus 7.4 inches in computing discharge for 100-year storm events
- PURPOSE:** The purpose of this Techno-gram is to change the requirements pertaining to 24-hour rainfall intensity of 8.5 inches versus 7.4 inches in computing discharges for 100-year storm events
- SCOPE:** The scope of this Techno-gram is to establish the revised stormwater management requirements as required per the Prince George's County Code, Section, 32-180 and administered through the Prince George's County Department of Permitting, Inspections and Enforcement (DPIE)

The following is a revision to this previously issued Techno-gram 007-2016. This change in rainfall requirements shall apply for all calculations submitted to Prince George's County Department of Permitting, Inspections and Enforcement (DPIE). The 24-hour rainfall intensity of 7.4 inches and Type II rainfall distribution constitutes the historic precipitation standard used in Natural Resources Conservation Service (NRCS) Soil Conservation Service (SCS) Methodology to compute the 100-year discharge in Prince Georges County, Maryland. The original techno-gram issued in February of 2022 required the use of the higher 8.5-inch rainfall intensity for storm drain and stormwater management systems. With the issuance of this techno-gram, the 8.5-inch rainfall intensity shall be used for all systems, including floodplain studies and major culverts and bridges.

DPIE will no longer allow the use of the 24-hour rainfall intensity of 7.4 inches (100-year storm) and the Type II distribution. Similarly, the 24-hour rainfall intensity of 5.3 inches (10-year storm) and 3.3 inches (2-year storm) shall no longer be utilized.

The following 24-hour rainfall intensities shall be utilized based on the current National Oceanic and Atmospheric Administration (NOAA) Atlas 14 precipitation frequency estimates for Central Prince George's County, Maryland, as adopted by NRCS and the local Soil Conservation District. These rainfall intensities shall be utilized in calculations required for 100-year floodplain studies, bridges, major culverts, stormwater management ponds, dam safety analyses, and storm conveyance:

- **100-year storm -- 8.50 inches with the NOAA 'C' Distribution**
- **10-year storm -- 4.93 inches with the NOAA 'C' Distribution**
- **2-year storm -- 3.19 inches with the NOAA 'C' Distribution.**



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For enclosed storm drain systems, culverts, bridges, and open channel storm drain systems, DPIE will require the use of the rainfall intensities identified in the *Prince George's County Stormwater Management Design Manual*, Appendix 8-8 or as described below. These are based on the NOAA Atlas 14 rainfall intensities. The *Prince George's County Stormwater Management Design Manual* requires sizing of culverts as follows:

- Drainage area less than 20 acres (minor culverts) — use Rational Equation and Rainfall Intensities in Appendix 8-8 of the *Prince George's County Stormwater Management Design Manual*.
- Drainage area 20 to 50 acres (between minor and major culverts) — use Rational Equation and Rainfall Intensities in Appendix 8-8 — OR — NRCS Technical Release 20 (TR-20)". If NRCS Technical Release 20 (TR-20)" is utilized, use rainfall intensities as noted above in bold lettering.
- Drainage area 50 acres and larger (major culverts) — use NRCS Technical Release 20 (TR-20)" with rainfall intensities as noted above in bold lettering.
- Engineers shall utilize WIN-TR20 software when modeling watersheds noted above.

Engineers shall implement the following guidance when utilizing previously approved 100-year Floodplain Studies and Delineations.

Starting Water Surface Elevations: For projects that are utilizing a previously approved downstream 100-year floodplain study to establish a starting water surface elevation for a new 100-year floodplain study upstream, the Engineer shall add one (1) vertical foot at the last cross section of the downstream floodplain study.

Delineations:

- **FEMA:** For projects that are utilizing a previously approved FEMA map approved in 2016, the Engineer shall delineate the 100-year floodplain by adding one (1) vertical foot to the base flood elevation (BFE), to adjust for the 7.4-inch versus 8.5-inch rainfall amount and adding another one (1) vertical foot of freeboard, as required by Techno-gram 004-2020. Engineers have the option to rerun the hydrology and hydraulics of a FEMA study, with the 8.50-inch rainfall intensity and Type C storm distribution. If this option is chosen, then the Engineer shall add one (1) vertical foot of freeboard to the adjusted BFE.



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- **Existing County Watershed Studies:** For projects that are utilizing a County watershed study approved prior to the date of this techno-gram, the Engineer shall delineate the 100-year floodplain by adding one (1) vertical foot to the BFE, to adjust for the 7.4-inch versus 8.5-inch rainfall amount. The Engineer shall add another one (1) vertical foot of freeboard, as required by Techno-gram 004-2020, which is required for all watershed studies except for the Anacostia River, Bear Branch, Crow Branch and Beaverdam Creek. Engineers have the option to rerun the hydrology and hydraulics of a County Watershed study, with the 8.50-inch rainfall intensity and Type C storm distribution. If this option is chosen, then the Engineer shall add one (1) vertical foot of freeboard to the adjusted BFE.
- **New County Watershed Studies:** Prince George's County Department of the Environment (DoE) is currently updating the County watershed studies. Once these watershed studies are published, the Engineer shall delineate the 100-year floodplain by adding one (1) vertical foot to the BFE.
- **Consultant Studies:** For projects that are utilizing a previously approved consultant study, the Engineer shall remodel with flow rates using the higher rainfall intensities.

Grandfathering (Floodplain):

- a) If a permit project received a 100-year floodplain delineation approval prior to 2017, this requirement will be implemented, due to the change in FEMA maps and other factors.
- b) If a permit project received a 100-year floodplain delineation approval between 2017 and the effective date of this techno-gram, DPIE will not require a revision to the delineation.
- c) If a permit project submitted a 100-year floodplain delineation between 2017 and the effective date of this techno-gram, DPIE will not require a revision to the delineation. However, after February 1, 2024, these delineations shall be revised to comply with this techno-gram.
- d) All floodplain studies or delineations submitted after the effective date of this techno-gram shall be prepared in accordance with this techno-gram.



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Grandfathering (Culvert and Bridge Sizing):

- a) If a permit project received a technical approval or permit issuance of a culvert or bridge prior to 2017, this requirement will be implemented, due to the change in FEMA maps and other factors.
- b) If a permit project received culvert or bridge permit issuance between 2017 and the effective date of this techno-gram, DPIE will not require a revision to the culvert or bridge size.
- c) If a permit project submitted a culvert or bridge permit between 2017 and the effective date of this techno-gram, DPIE will not require a revision to the culvert or bridge size. However, after February 1, 2024, these culverts or bridges shall be revised to comply with this techno-gram.
- d) All culvert and bridge permits submitted after the effective date of this techno-gram shall be prepared in accordance.

APPROVED BY:

Dawit Abraham

Dawit Abraham, Acting Director
Prince George's County Department of
Permitting, Inspections and Enforcement

July 28, 2023
Date



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"NEW" NOAA ATLAS 14
RAINFALL RATES

NOAA's National Weather Service
Hydrometeorological Design Studies Center
 Precipitation Frequency Data Server (PFDS)

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- Precipitation Frequency (PF)
- PF Data Server
- PF in GIS Format
- PF Maps
- Temporal Distr.
- Time Series Data
- PFDS Perform.
- PF Documents
- Probable Maximum Precipitation (PMP)
- PMP Documents
- Miscellaneous
- Publications
- AEP Storm Analysis
- Record Precipitation
- Contact Us
- Inquiries
- List-server

NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: MD

DATA DESCRIPTION

Data type: Units: Time series type:

SELECT LOCATION

1. Manually:

- a) Enter location (decimal degrees, use "-" for S and W): latitude: longitude:
- b) Select station (click here for a list of stations used in frequency analysis for MD):

2. Use map:

a) Select location (move crosshair or double click)

b) Click on station icon show stations on map

LOCATION INFORMATION:
 Name: Brandywine, Maryland, US*
 Latitude: 38.7144°
 Longitude: -76.9000°
 Elevation: 152 ft*

* source: Google Maps

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES
 WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
 NOAA Atlas 14, Volume 2, Version 3

-

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.356 (0.323-0.392)	0.426 (0.387-0.470)	0.507 (0.460-0.559)	0.566 (0.512-0.624)	0.641 (0.576-0.707)	0.697 (0.622-0.769)	0.752 (0.668-0.832)	0.806 (0.710-0.895)	0.874 (0.762-0.977)	0.928 (0.802-1.04)
10-min	0.569 (0.516-0.626)	0.682 (0.619-0.751)	0.812 (0.736-0.895)	0.906 (0.819-0.998)	1.02 (0.917-1.13)	1.11 (0.991-1.23)	1.20 (1.09-1.32)	1.28 (1.13-1.42)	1.38 (1.21-1.55)	1.46 (1.26-1.64)
15-min	0.711 (0.645-0.782)	0.857 (0.778-0.944)	1.03 (0.931-1.13)	1.15 (1.04-1.26)	1.30 (1.16-1.43)	1.41 (1.26-1.55)	1.51 (1.34-1.67)	1.61 (1.42-1.79)	1.74 (1.52-1.95)	1.83 (1.59-2.06)
30-min	0.974 (0.884-1.07)	1.18 (1.07-1.30)	1.46 (1.32-1.61)	1.66 (1.50-1.83)	1.92 (1.72-2.12)	2.12 (1.89-2.34)	2.31 (2.05-2.56)	2.51 (2.21-2.79)	2.77 (2.41-3.10)	2.97 (2.57-3.34)
60-min	1.22 (1.10-1.34)	1.49 (1.35-1.64)	1.87 (1.70-2.06)	2.16 (1.95-2.36)	2.56 (2.29-2.82)	2.87 (2.58-3.17)	3.19 (2.83-3.53)	3.52 (3.10-3.91)	3.97 (3.46-4.44)	4.34 (3.75-4.87)
2-hr	1.42 (1.29-1.57)	1.73 (1.57-1.91)	2.19 (1.99-2.42)	2.55 (2.30-2.81)	3.06 (2.74-3.37)	3.47 (3.09-3.82)	3.90 (3.45-4.31)	4.36 (3.83-4.83)	5.00 (4.34-5.58)	5.53 (4.74-6.20)
3-hr	1.53 (1.39-1.70)	1.86 (1.69-2.06)	2.36 (2.13-2.61)	2.76 (2.48-3.05)	3.33 (2.98-3.67)	3.79 (3.36-4.19)	4.29 (3.77-4.75)	4.81 (4.19-5.35)	5.57 (4.79-6.22)	6.19 (5.25-6.95)
6-hr	1.87 (1.70-2.08)	2.27 (2.06-2.52)	2.87 (2.59-3.18)	3.36 (3.02-3.73)	4.09 (3.64-4.53)	4.71 (4.16-5.22)	5.38 (4.70-5.98)	6.11 (5.28-6.81)	7.18 (6.10-8.06)	8.08 (6.77-9.13)
12-hr	2.26 (2.03-2.54)	2.73 (2.45-3.06)	3.46 (3.10-3.89)	4.10 (3.65-4.60)	5.06 (4.46-5.67)	5.91 (5.15-6.62)	6.84 (5.90-7.69)	7.89 (6.70-8.89)	9.48 (7.89-10.8)	10.9 (8.88-12.4)
24-hr	2.63 (2.38-2.94)	3.19 (2.89-3.57)	4.12 (3.73-4.61)	4.93 (4.45-5.51)	6.17 (5.53-6.85)	7.27 (6.47-8.04)	8.51 (7.50-9.37)	9.91 (8.64-10.9)	12.1 (10.4-13.2)	13.9 (11.8-15.3)
2-day	3.04 (2.75-3.40)	3.69 (3.34-4.13)	4.76 (4.30-5.31)	5.68 (5.11-6.33)	7.06 (6.32-7.86)	8.27 (7.36-9.18)	9.62 (8.47-10.7)	11.1 (9.72-12.3)	13.4 (11.6-14.9)	15.9 (13.1-17.1)
3-day	3.22 (2.92-3.58)	3.90 (3.54-4.34)	5.01 (4.54-5.57)	5.96 (5.39-6.83)	7.40 (6.64-8.20)	8.65 (7.71-9.57)	10.0 (8.87-11.1)	11.6 (10.2-12.8)	13.9 (12.9-15.4)	15.9 (13.8-17.6)
4-day	3.39 (3.08-3.76)	4.10 (3.73-4.56)	5.26 (4.78-5.84)	6.25 (5.68-6.92)	7.74 (6.96-8.55)	9.03 (8.07-9.95)	10.5 (9.28-11.5)	12.0 (10.6-13.2)	14.4 (12.5-15.9)	16.5 (14.2-18.1)
7-day	3.93 (3.60-4.32)	4.73 (4.35-5.21)	5.99 (5.49-6.58)	7.06 (6.46-7.75)	8.66 (7.87-9.48)	10.0 (9.05-11.0)	11.5 (10.3-12.6)	13.2 (11.7-14.4)	15.7 (13.8-17.1)	17.8 (15.4-19.5)

10-day	4.48 (4.13-4.90)	5.38 (4.96-5.88)	6.71 (6.18-7.33)	7.82 (7.19-8.54)	9.44 (8.63-10.3)	10.8 (9.82-11.7)	12.2 (11.1-13.3)	13.8 (12.4-15.0)	16.1 (14.3-17.5)	18.0 (15.9-19.6)
20-day	6.04 (5.64-6.50)	7.18 (6.70-7.73)	8.69 (8.09-9.35)	9.91 (9.22-10.6)	11.6 (10.8-12.5)	13.0 (12.0-13.9)	14.4 (13.2-15.4)	15.9 (14.5-17.0)	17.9 (16.3-19.2)	19.6 (17.7-21.0)
30-day	7.45 (6.96-7.98)	8.83 (8.25-9.46)	10.5 (9.81-11.3)	11.9 (11.0-12.7)	13.7 (12.7-14.7)	15.2 (14.1-16.2)	16.7 (15.4-17.8)	18.2 (16.7-19.4)	20.3 (18.5-21.7)	21.9 (19.9-23.4)
45-day	9.37 (8.83-9.94)	11.1 (10.4-11.7)	12.9 (12.2-13.7)	14.4 (13.5-15.3)	16.3 (15.3-17.3)	17.7 (16.6-18.8)	19.1 (17.9-20.3)	20.5 (19.2-21.8)	22.3 (20.7-23.7)	23.7 (21.9-25.2)
60-day	11.1 (10.5-11.8)	13.1 (12.4-13.9)	15.2 (14.3-16.1)	16.7 (15.8-17.7)	18.7 (17.6-19.8)	20.2 (18.9-21.3)	21.5 (20.2-22.8)	22.9 (21.4-24.2)	24.6 (22.9-26.0)	25.8 (24.0-27.4)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.

Estimates from the table in csv format:

Main Link Categories:
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US Department of Commerce
 National Oceanic and Atmospheric Administration
 National Weather Service
 National Water Center (formerly OHD)
 1325 East West Highway
 Silver Spring, MD 20910
 Page Author: [HDSC webmaster](#)
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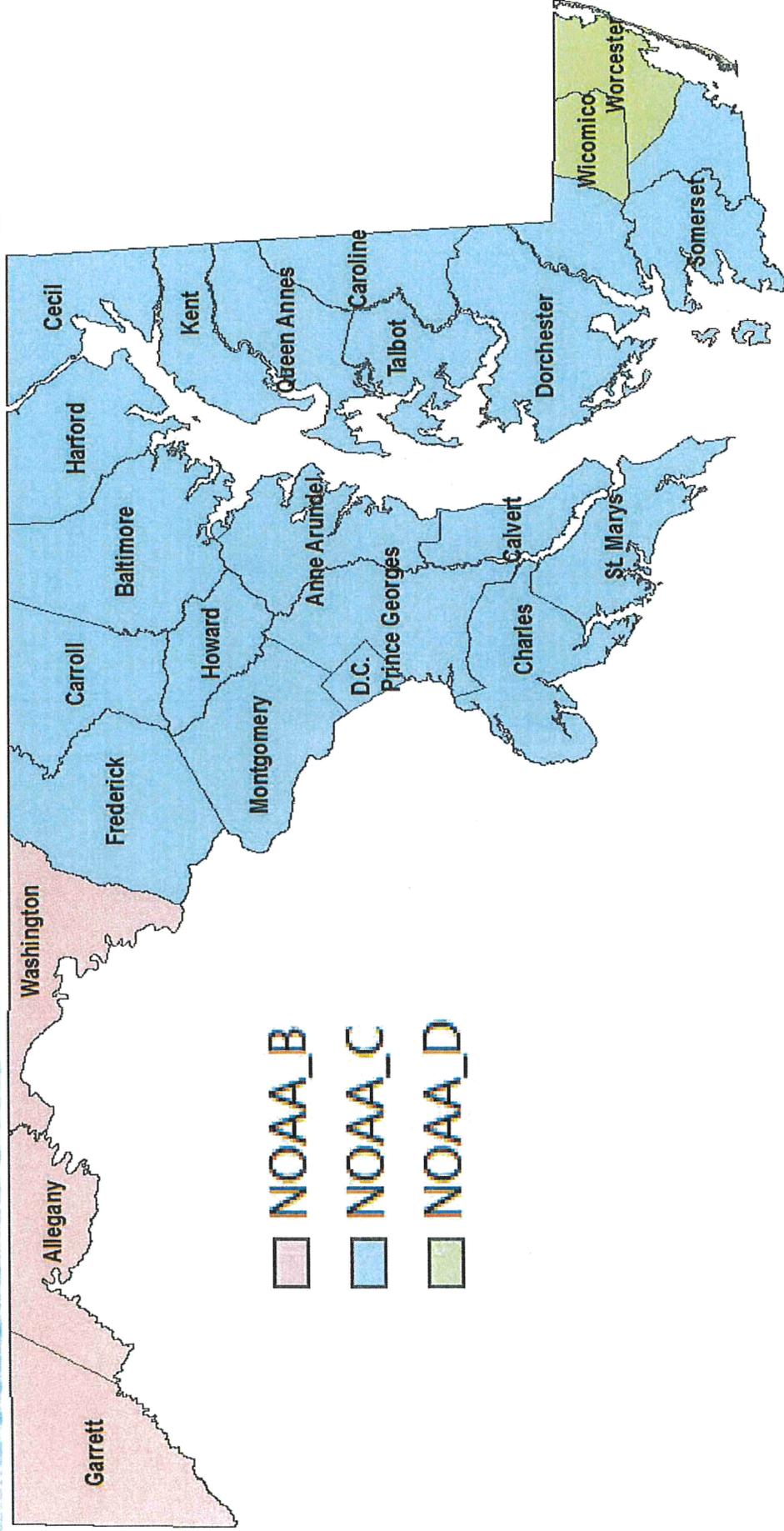


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RAINFALL INTENSITIES
RATIONAL EQUATION
(EXCERPT FROM PRINCE GEORGES COUNTY
STORMWATER DESIGN MANUAL)

New NRCS rainfall distributions based on NOAA 14 data for Maryland



RATIONAL METHOD RAINFALL INTENSITY TABLE

NOAA 14-2004: Intermediate Values from Interpolation (Upper Marlboro 3 NNW: 18-9070)							
PRINCE GEORGE'S COUNTY MARYLAND RAINFALL INTENSITY (INCHES/HOUR)							
DURATION (MINUTES)	RETURN PERIOD (YEARS)						
	1	2	5	10	25	50	100
5.00	4.20	5.04	6.00	6.72	7.56	8.28	8.88
6.00	4.03	4.84	5.76	6.44	7.26	7.93	8.51
7.00	3.86	4.63	5.52	6.17	6.96	7.58	8.14
8.00	3.70	4.43	5.28	5.89	6.66	7.24	7.76
9.00	3.53	4.22	5.04	5.62	6.36	6.89	7.39
10.00	3.36	4.02	4.80	5.34	6.06	6.54	7.02
11.00	3.25	3.89	4.65	5.18	5.86	6.34	6.80
12.00	3.14	3.76	4.50	5.01	5.67	6.13	6.58
13.00	3.02	3.62	4.34	4.85	5.47	5.93	6.36
14.00	2.91	3.49	4.19	4.68	5.28	5.72	6.14
15.00	2.80	3.36	4.04	4.52	5.08	5.52	5.92
16.00	2.74	3.29	3.96	4.44	4.99	5.43	5.83
17.00	2.68	3.22	3.89	4.35	4.91	5.34	5.74
18.00	2.62	3.16	3.81	4.27	4.82	5.25	5.64
19.00	2.57	3.09	3.73	4.19	4.73	5.16	5.55
20.00	2.51	3.02	3.65	4.11	4.65	5.07	5.46
21.00	2.45	2.95	3.58	4.02	4.56	4.98	5.37
22.00	2.39	2.88	3.50	3.94	4.47	4.89	5.28
23.00	2.33	2.82	3.42	3.86	4.39	4.79	5.18
24.00	2.27	2.75	3.34	3.78	4.30	4.70	5.09
25.00	2.21	2.68	3.27	3.69	4.21	4.61	5.00
26.00	2.15	2.61	3.19	3.61	4.13	4.52	4.91
27.00	2.10	2.54	3.11	3.53	4.04	4.43	4.82
28.00	2.04	2.48	3.03	3.45	3.95	4.34	4.72
29.00	1.98	2.41	2.96	3.36	3.87	4.25	4.63
30.00	1.92	2.34	2.88	3.28	3.78	4.16	4.54
31.00	1.90	2.31	2.85	3.24	3.74	4.12	4.49
32.00	1.87	2.28	2.81	3.20	3.70	4.07	4.45
33.00	1.85	2.25	2.78	3.17	3.65	4.03	4.40
34.00	1.82	2.22	2.74	3.13	3.61	3.98	4.35
35.00	1.80	2.19	2.71	3.09	3.57	3.94	4.31
36.00	1.78	2.16	2.67	3.05	3.53	3.89	4.26
37.00	1.75	2.13	2.64	3.01	3.48	3.85	4.21
38.00	1.73	2.11	2.60	2.97	3.44	3.80	4.16
39.00	1.70	2.08	2.57	2.94	3.40	3.76	4.12
40.00	1.68	2.05	2.53	2.90	3.36	3.71	4.07
41.00	1.66	2.02	2.50	2.86	3.31	3.67	4.02
42.00	1.63	1.99	2.46	2.82	3.27	3.62	3.98
43.00	1.61	1.96	2.43	2.78	3.23	3.58	3.93
44.00	1.58	1.93	2.39	2.74	3.19	3.53	3.88
45.00	1.56	1.90	2.36	2.71	3.15	3.49	3.84
60.00	1.20	1.46	1.84	2.13	2.51	2.82	3.13