

Thermische studie van 12 betondoorsneden

De evolutie en de verdeling van de temperatuur in 12 betondoorsneden werden onderzocht met behulp van de software SAFIR®.

1. Thermische eigenschappen van het beton

- Soort granulaat : kalksteen
- Volumieke massa : 2500 kg/m³
- Vochtgehalte : 1.5%, hetzij 37.5 kg/m³
- Convectiecoëfficiënt van de blootgestelde oppervlakken : 25W/m²K
- Relatieve emissiviteit : 0.7
- λ -waarde beton volgens onderste grens in figuur 3.7 van NBN EN 1992-1-2

2. Modelleren van de doorsnede in de software SAFIR®

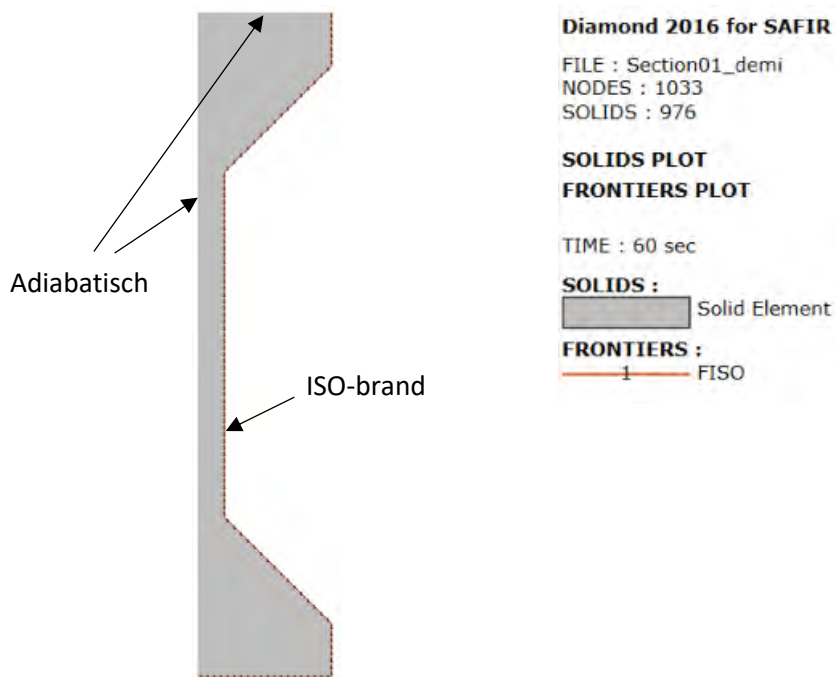
Er werd rekening gehouden met de symmetrie van de doorsnede en de thermische blootstelling. Enkel een halve doorsnede werd gemodelleerd.

De temperatuurcurve wordt aan de onderzijde van de onderflens en aan de zijvlakken van de doorsnede aangebracht. De bovenzijde van de bovenflens is adiabatisch, evenals de verticale symmetrieas van de doorsnede. Dit wordt geïllustreerd in Figuur 1.

De toegepaste temperatuurcurve is de genormaliseerde temperatuur/tijd-curve (ISO 834), waarvan de vergelijking wordt gegeven door :

$$\theta_g = 20 + 345 \log_{10}(8t + 1)$$

met θ_g de gastemperatuur in °C en t de tijd in minuten.



Figuur 1 : Illustratie van de omtrek van de doorsnede aan brand blootgesteld

3. Voorstelling van de resultaten

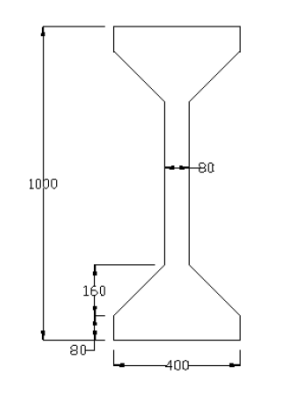
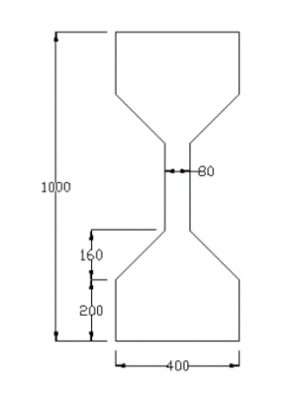
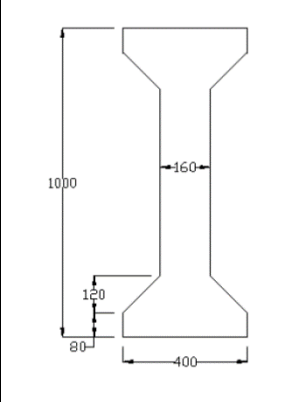
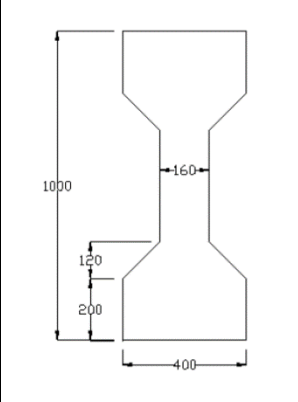
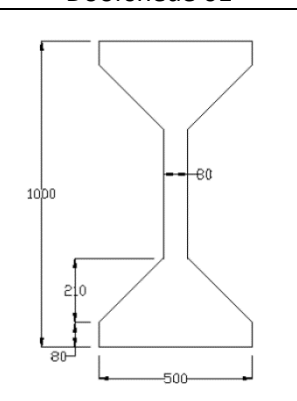
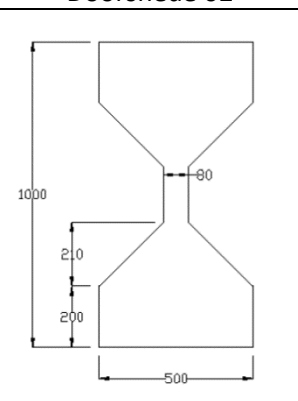
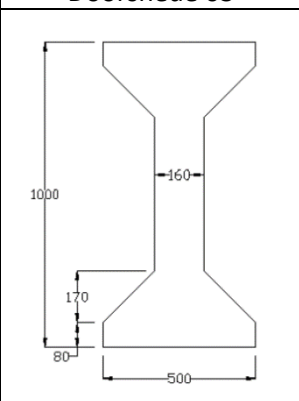
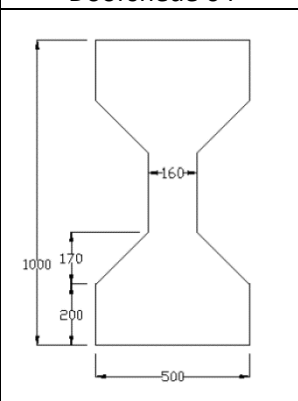
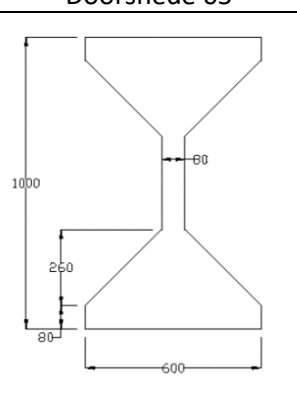
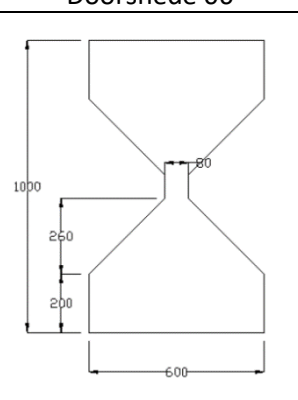
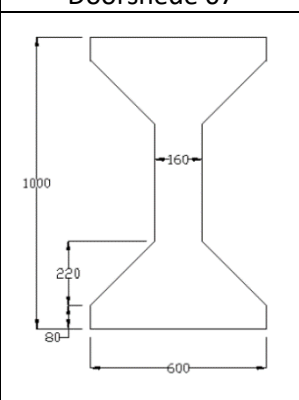
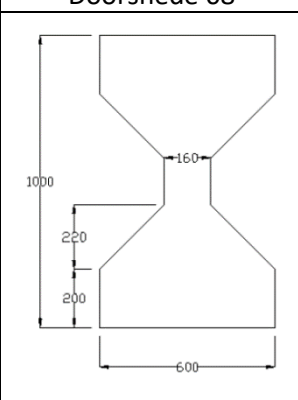
Voor elke doorsnede wordt de verdeling van de temperatuur in de doorsnede gegeven na 60, 90, 120 en 240 minuten.

Voor elke doorsnede en voor elke tijdsduur wordt de verdeling van de temperatuur gegeven in 3 zones :

- de bovenflens en het begin van het lijf;
- het midden van het lijf;
- de onderflens en het begin van het lijf.

De temperatuur wordt gegeven in elke knooppunt van de doorsnede. Voor het raster werd bij elke doorsnede een maaswijdte van 10 mm gebruikt.

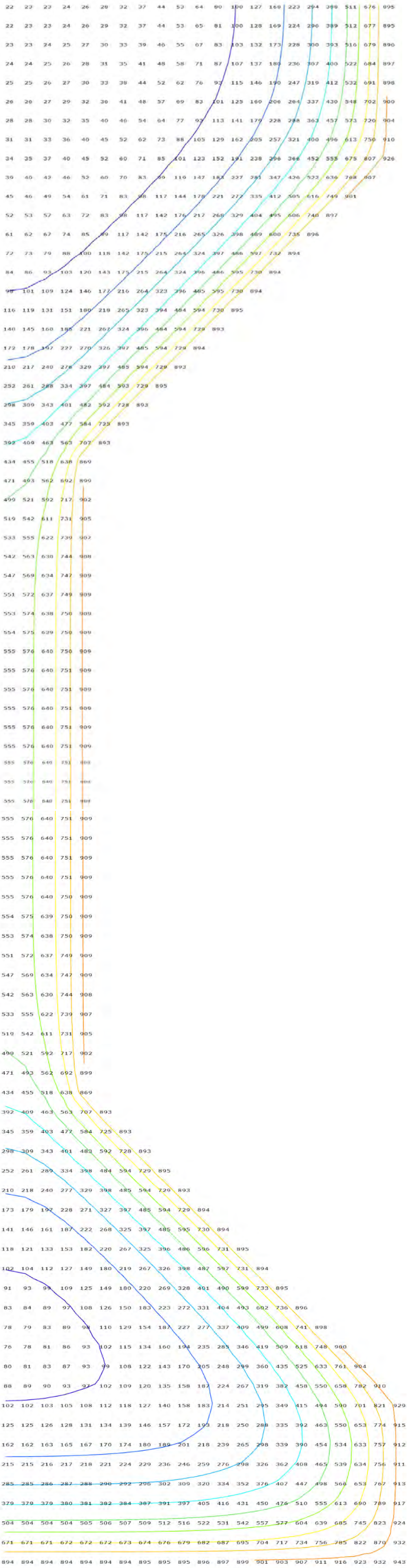
De bestudeerde doorsneden en hun benaming staan vermeld in Tabel 1.

			
Doorsnede 01	Doorsnede 02	Doorsnede 03	Doorsnede 04
			
Doorsnede 05	Doorsnede 06	Doorsnede 07	Doorsnede 08
			
Doorsnede 09	Doorsnede 10	Doorsnede 11	Doorsnede 12

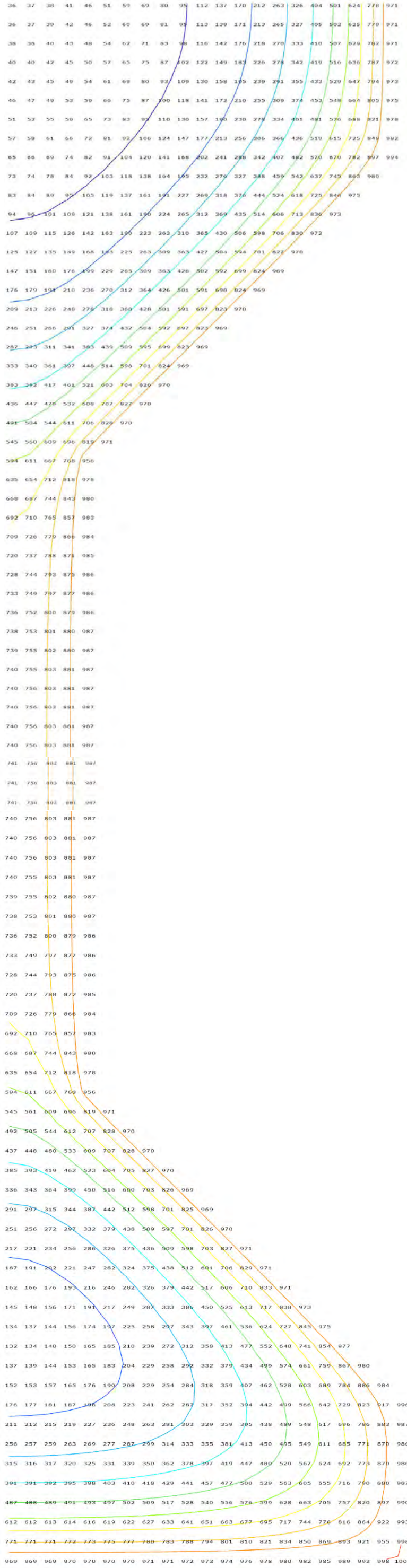
Tabel 1 : Bestudeerde doorsneden

Doorsnede 01

60 minuten

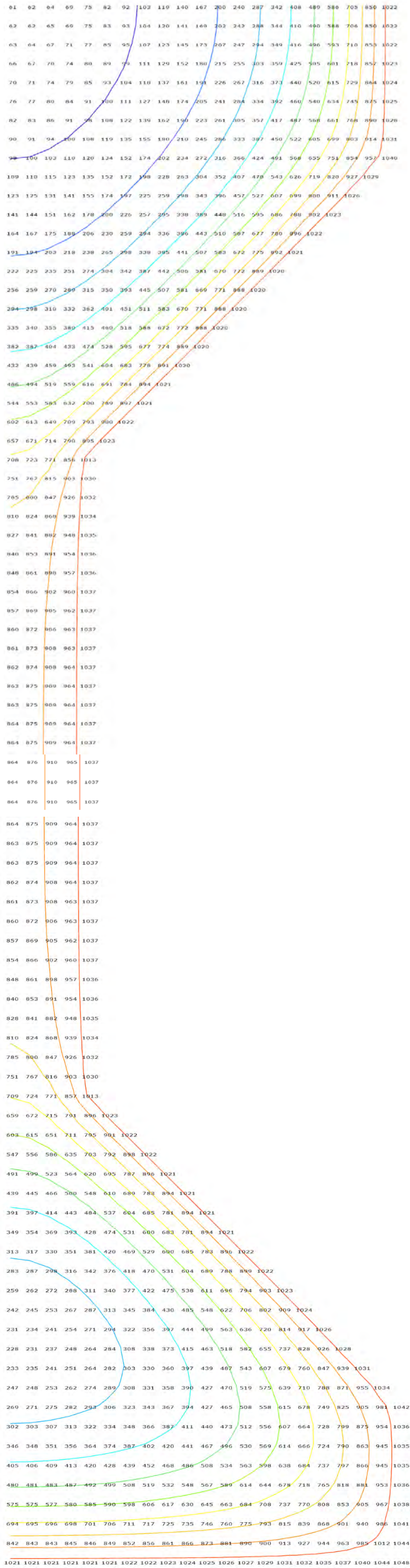


90 minuten



Doorsnede 01

120 minuten

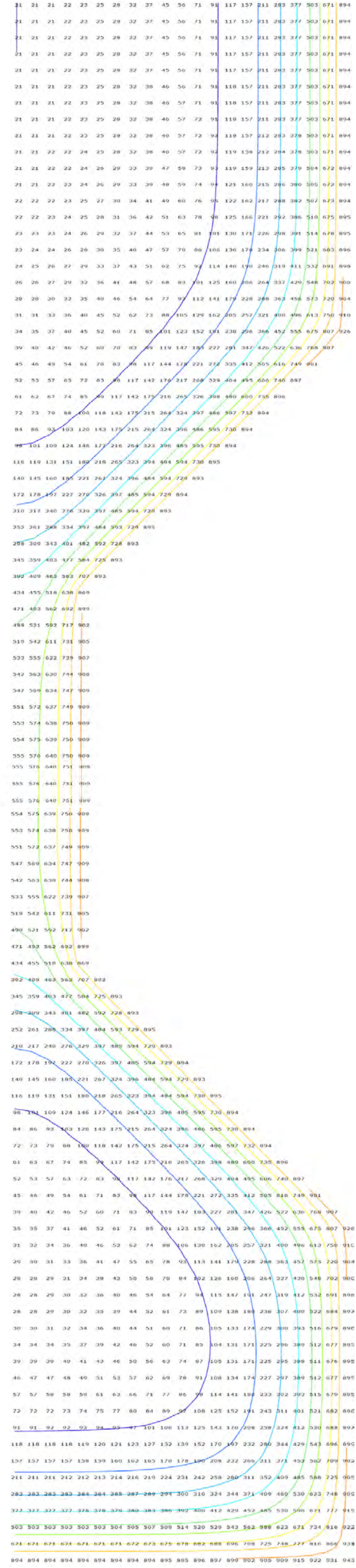


240 minuten

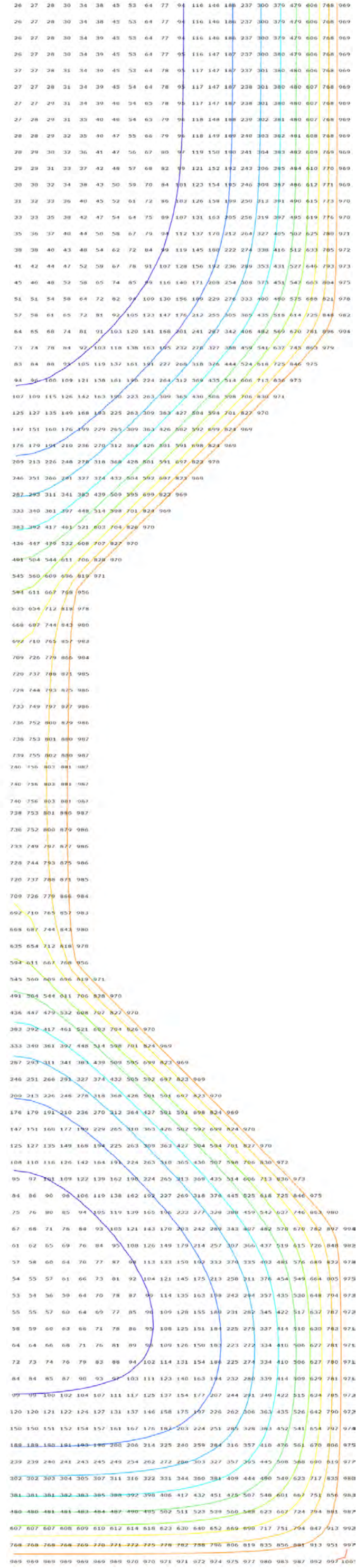


Doorsnede 02

60 minuten



90 minuten



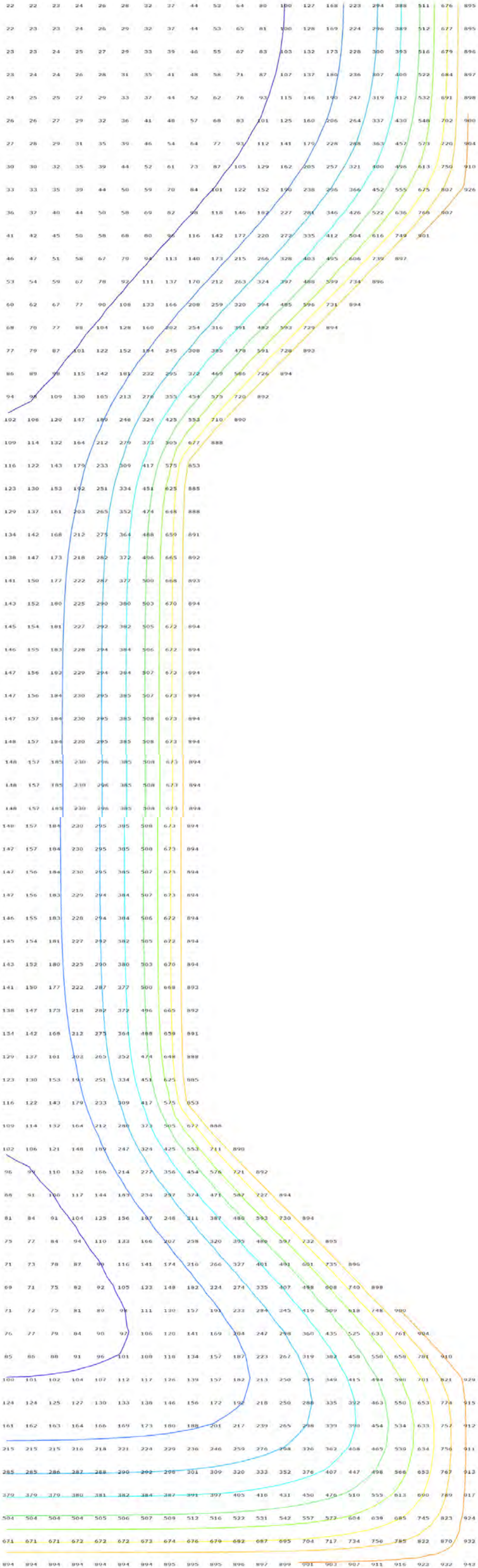
Doorsnede 02

120 minuter

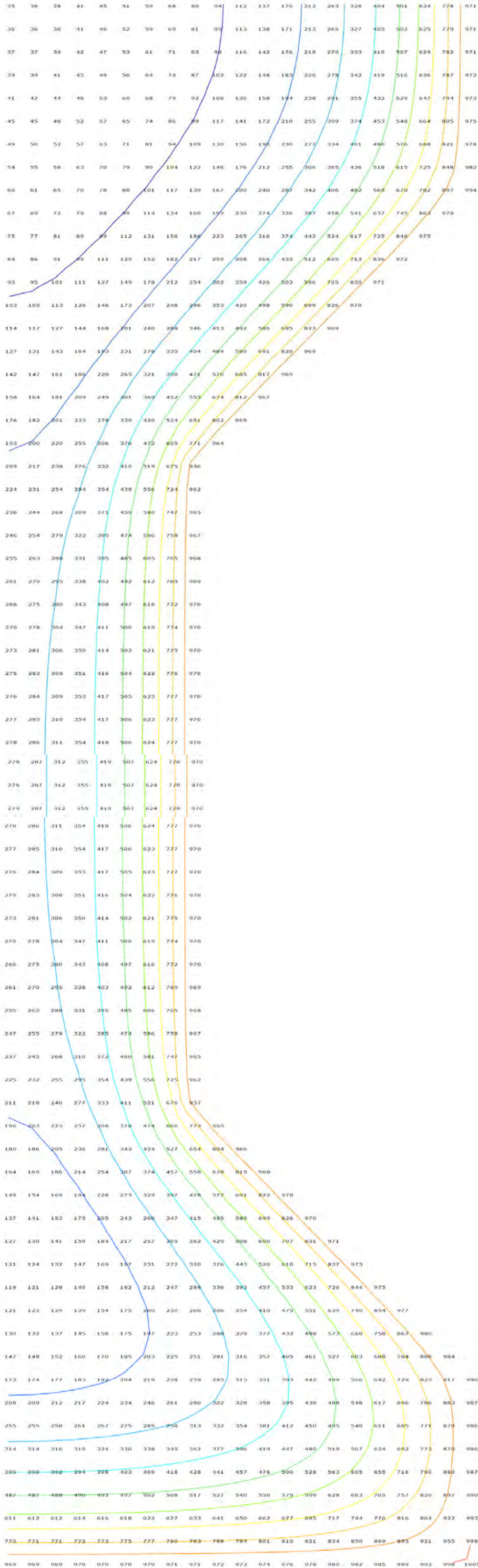
240 minuter

Doorsnede 03

60 minuten

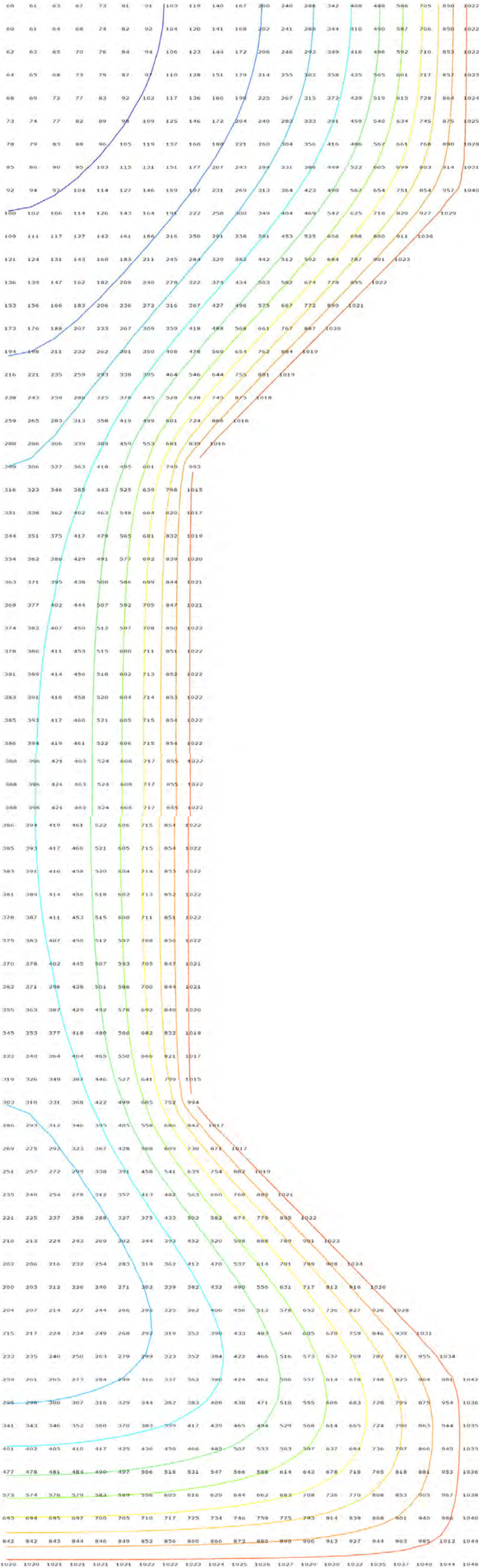


90 minuten

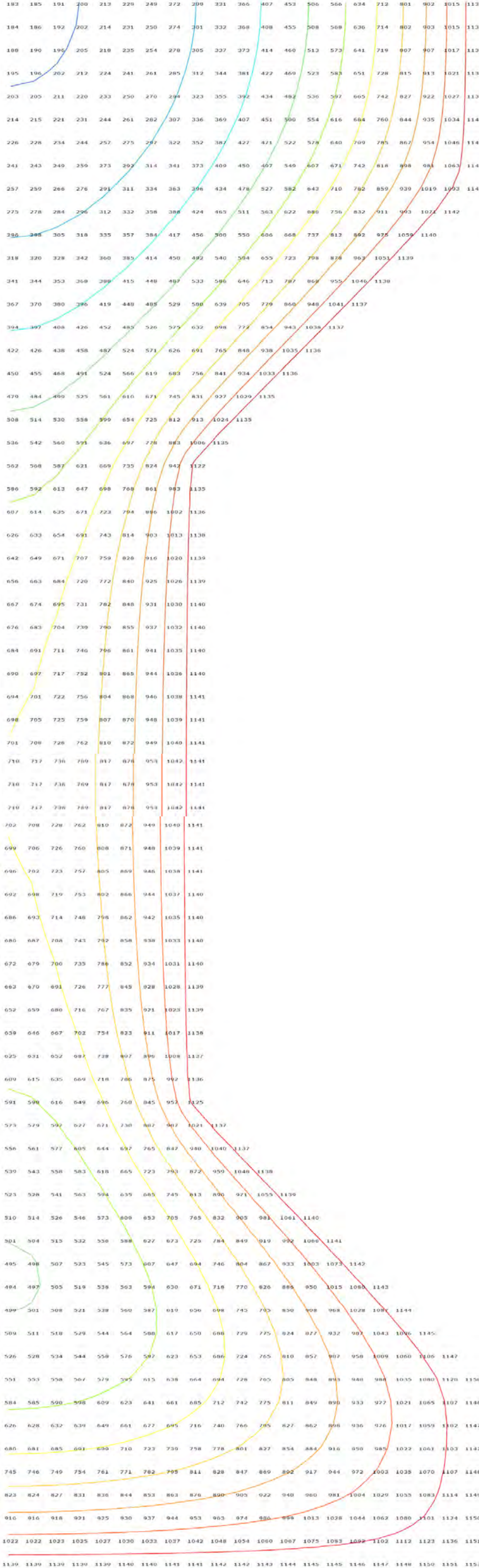


Doorsnede 03

120 minuten

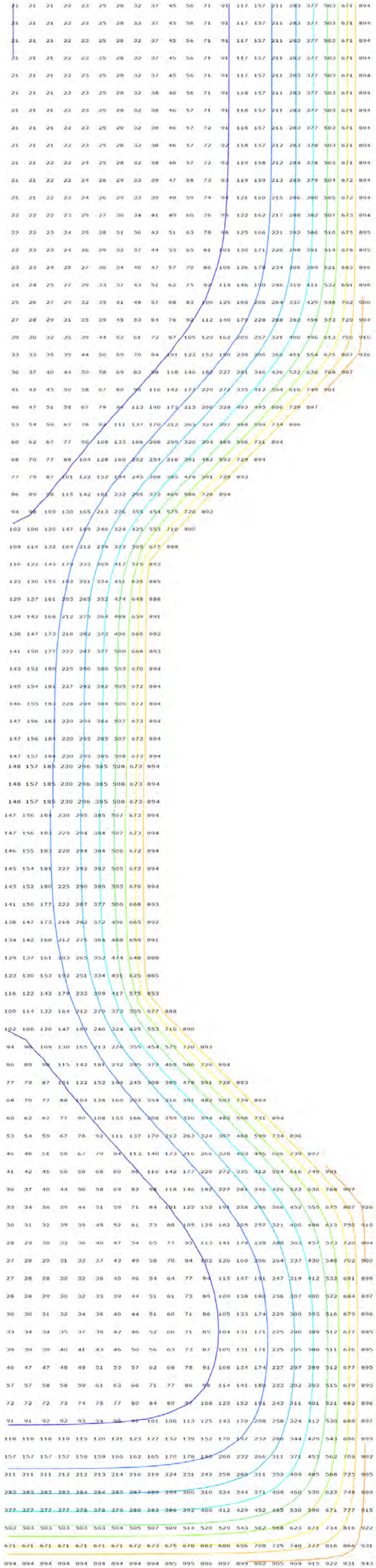


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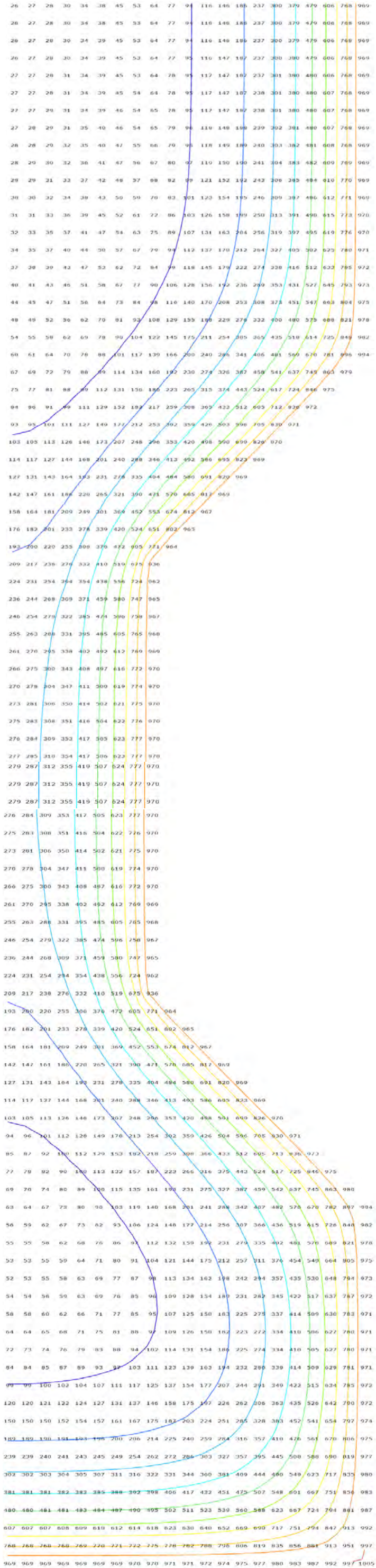


Doorsnede 04

60 minuten

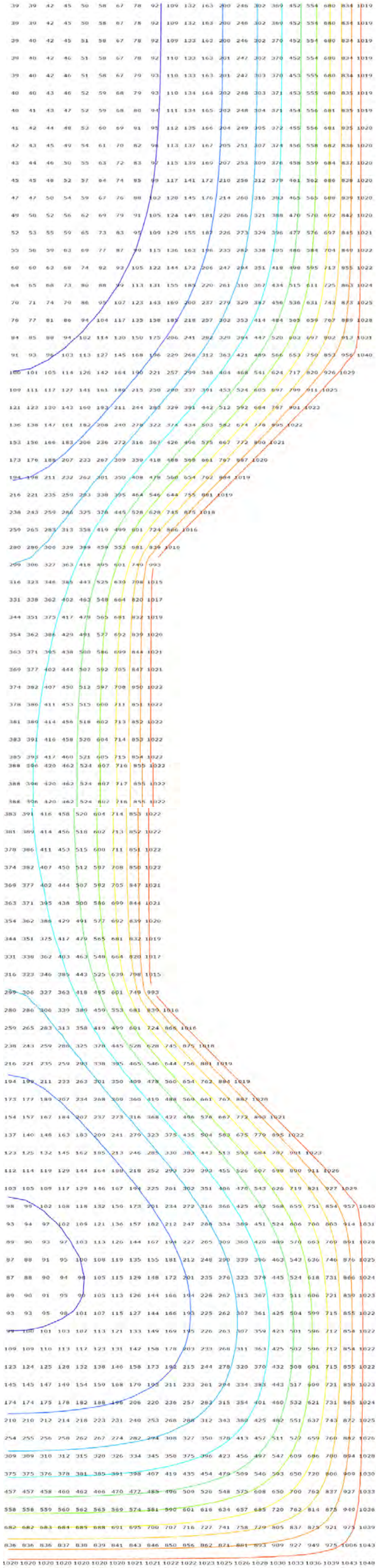


90 minuten

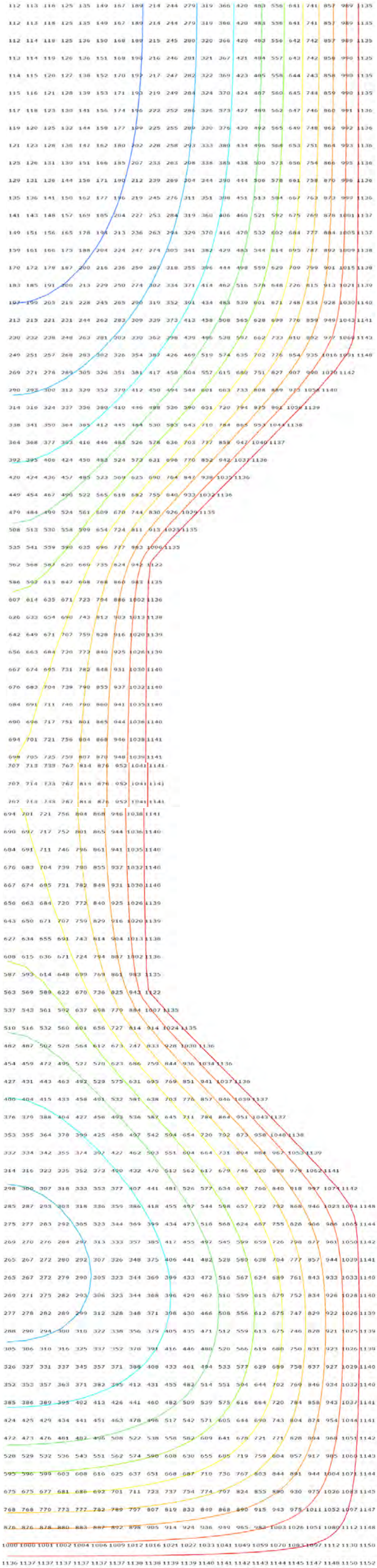


Doorsnede 04

120 minuten

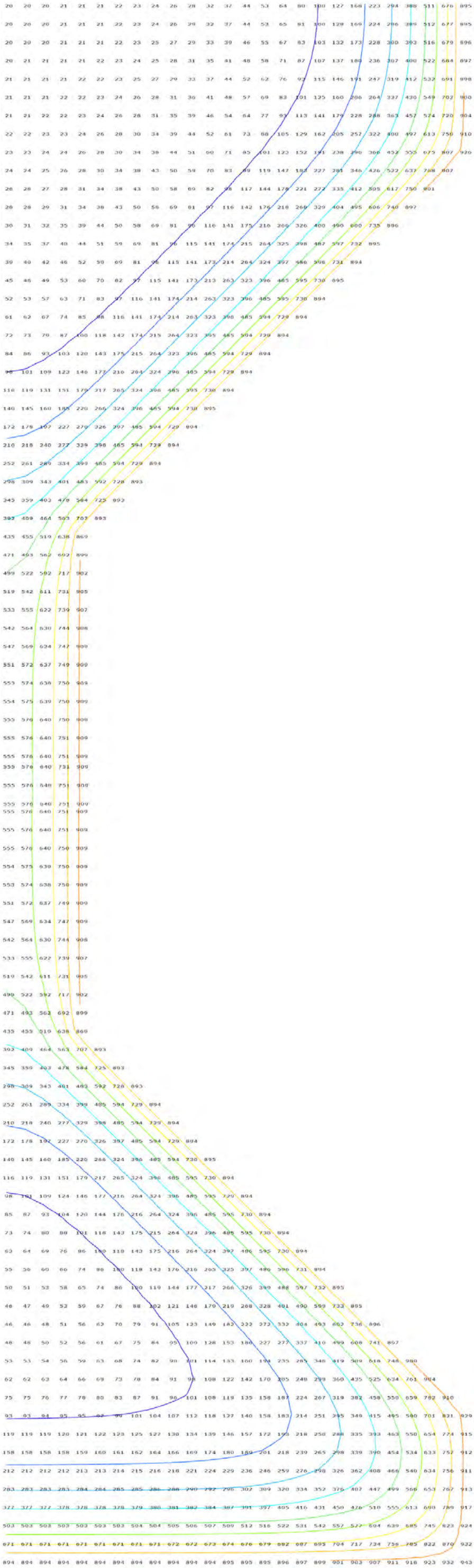


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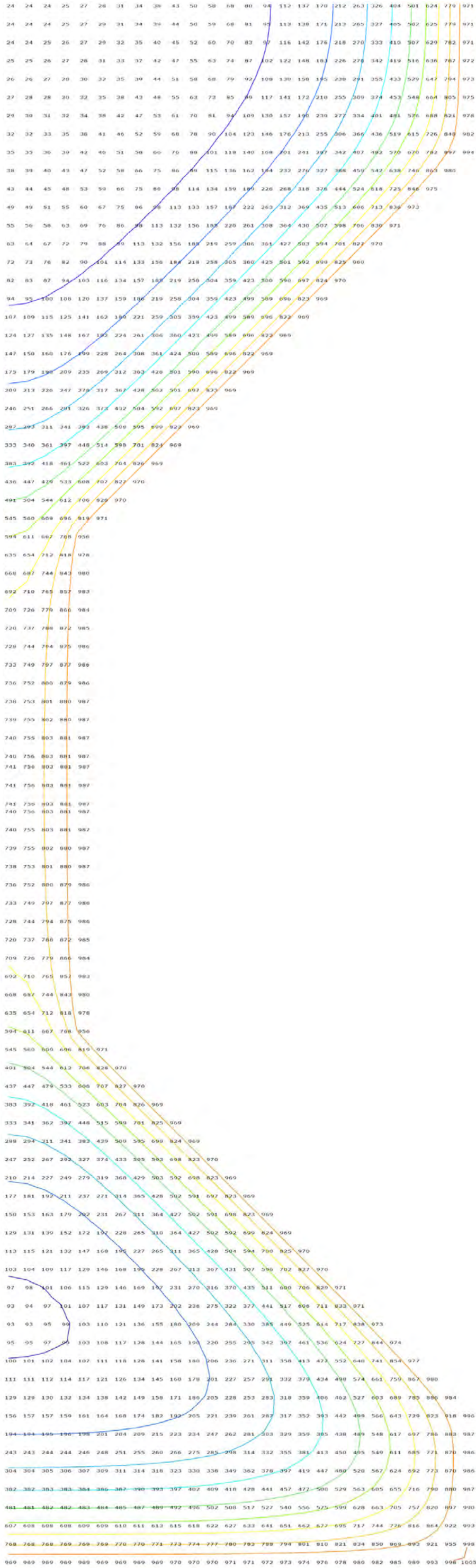


Doorsnede 05

60 minuten



90 minuten



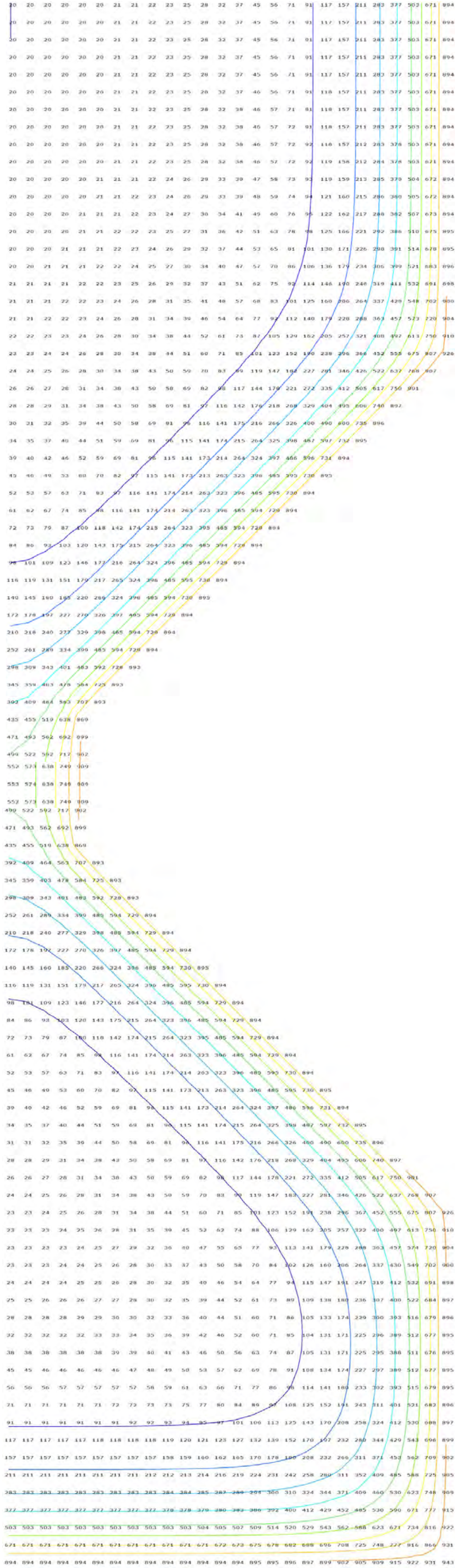
Doorsnede 05

120 minuter

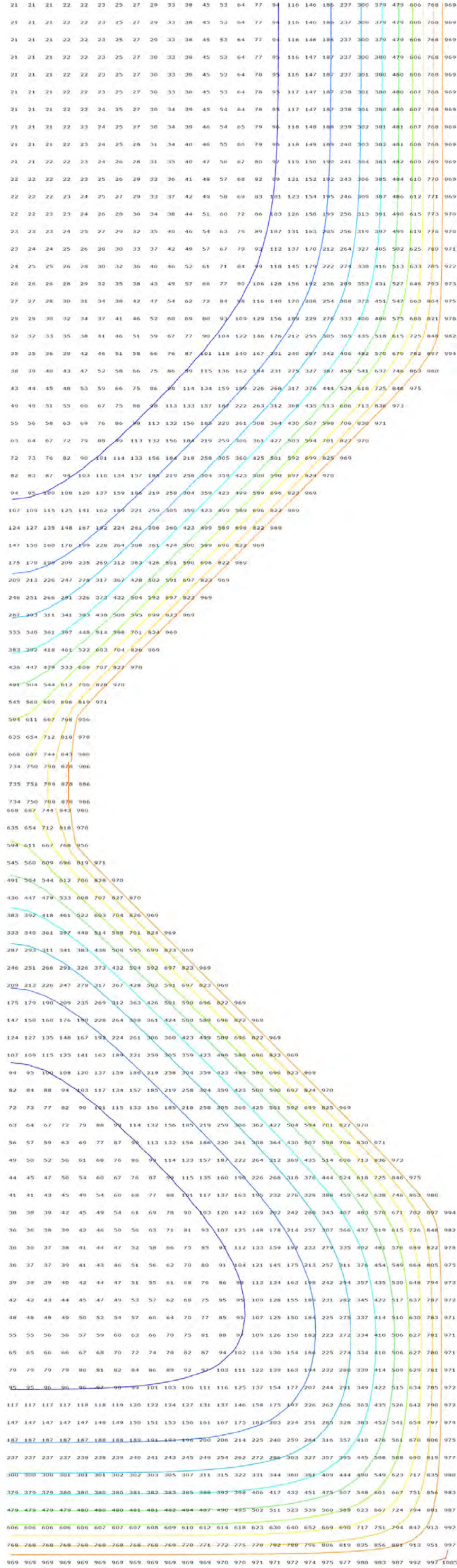
240 minuter

Doorsnede 06

60 minuten

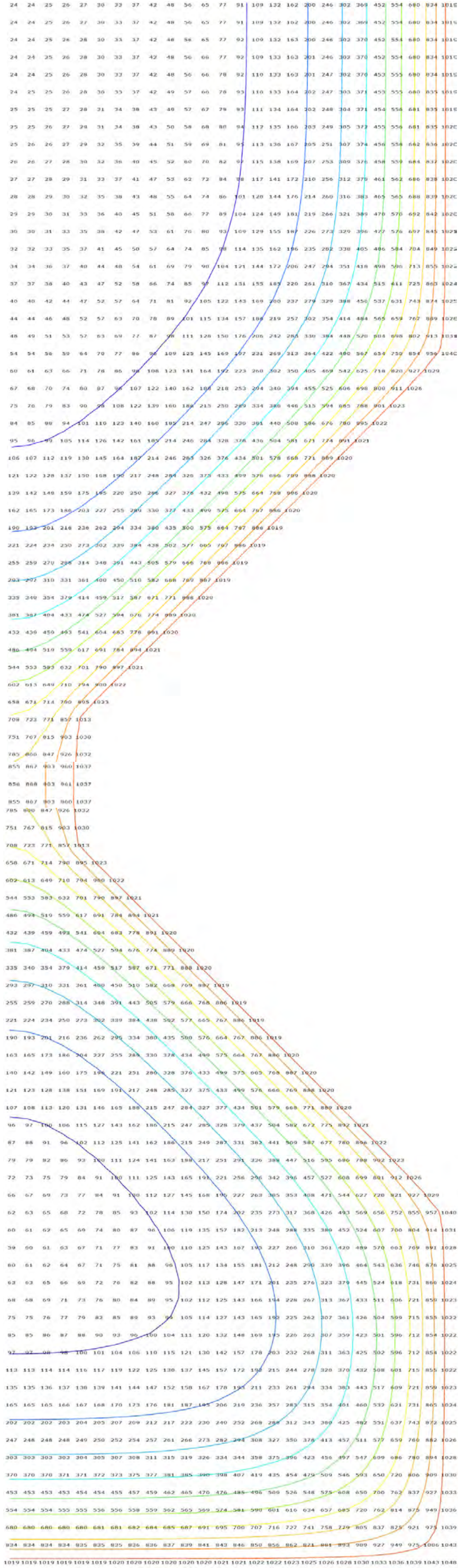


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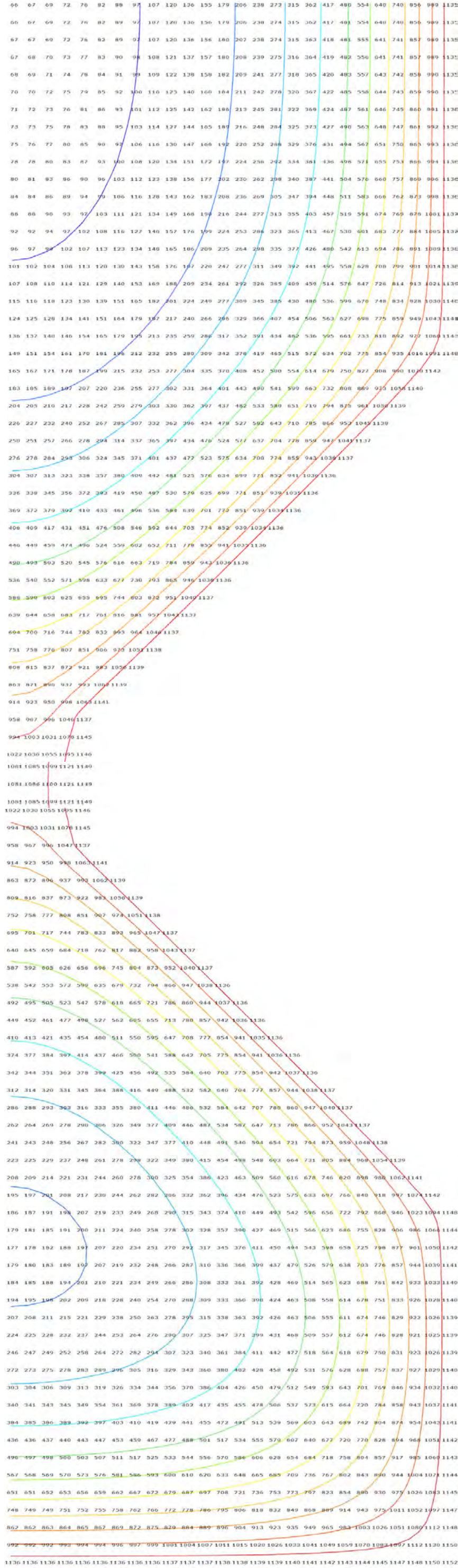


Doorsnede 06

120 minuten

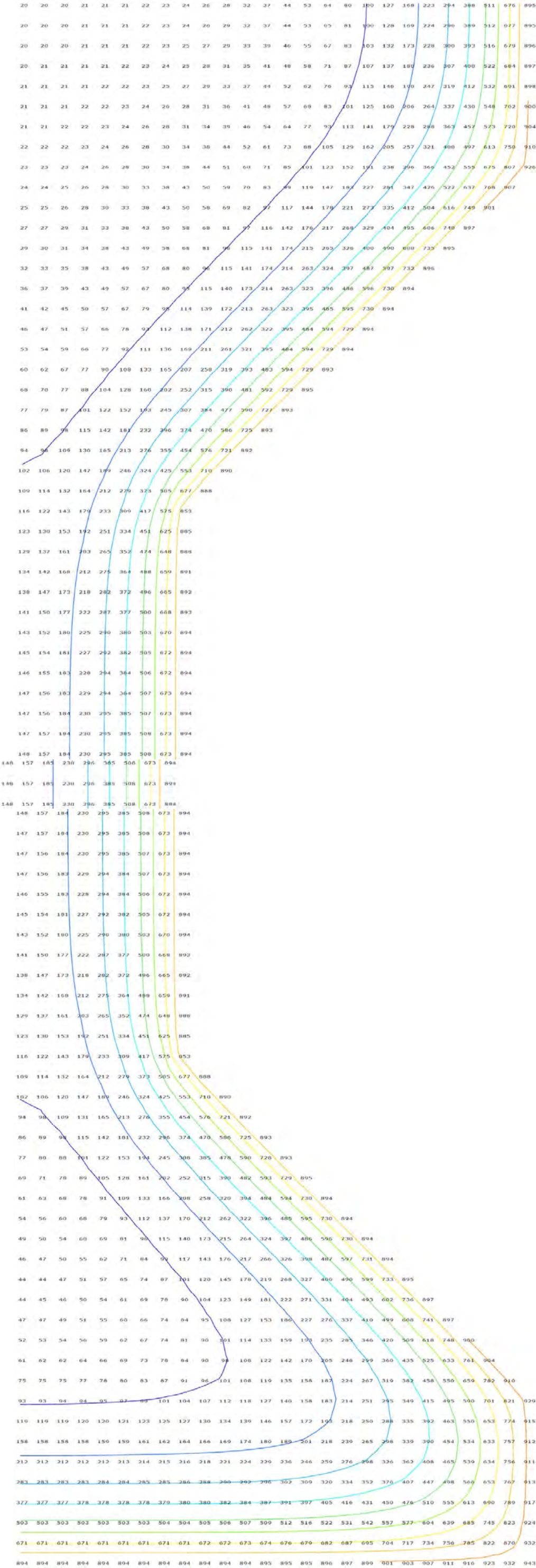


240 minuten

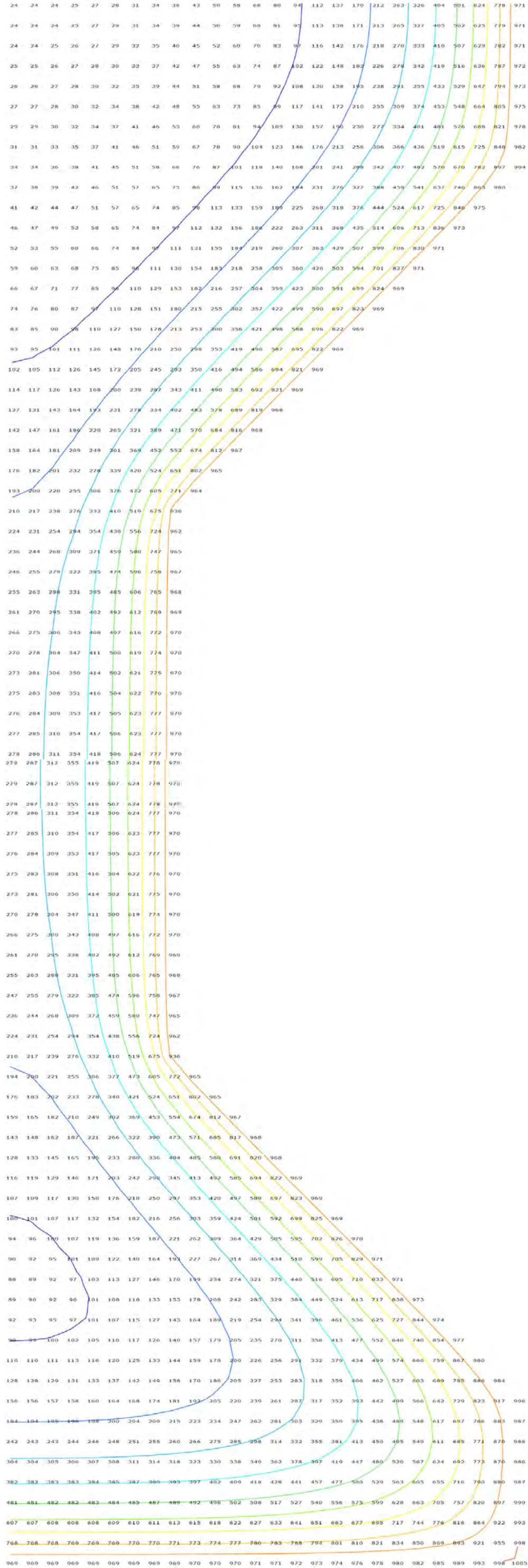


Doorsnede 07

60 minuten

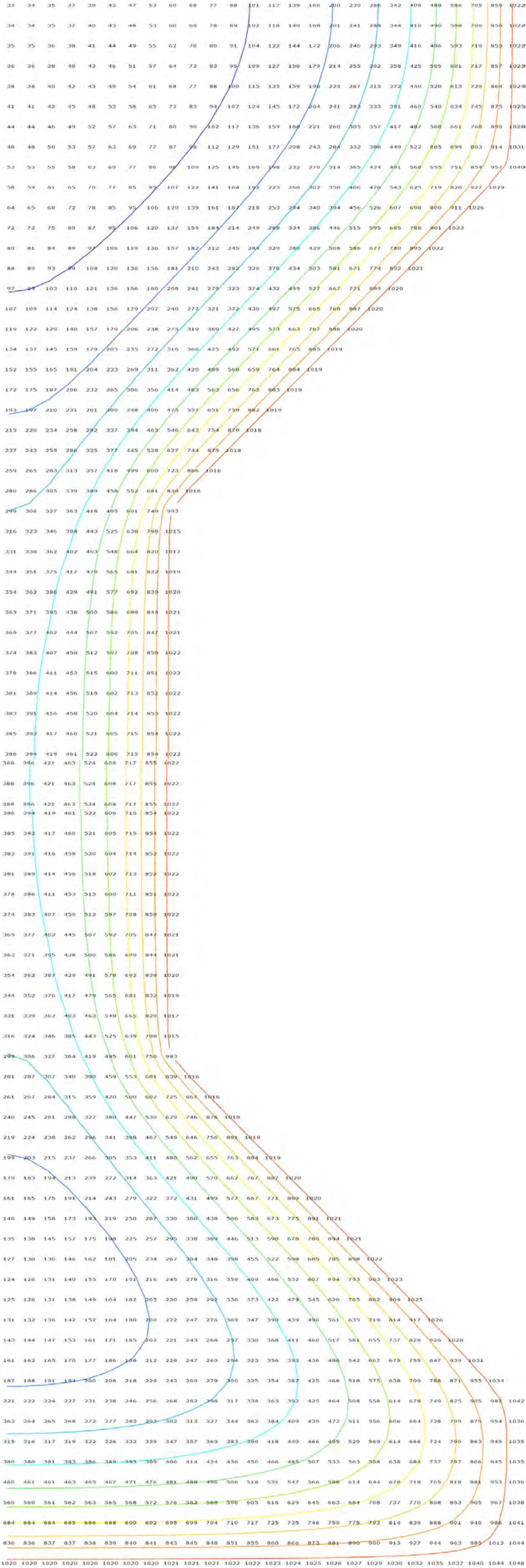


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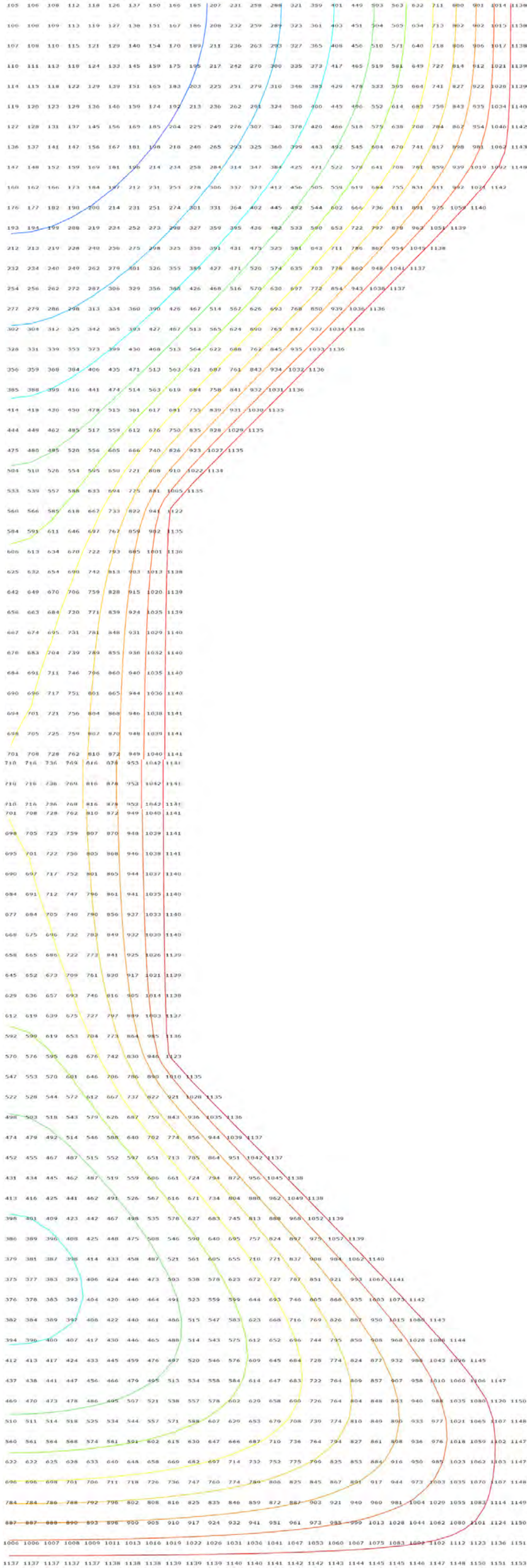


Doorsnede 07

120 minuten



240 minuten



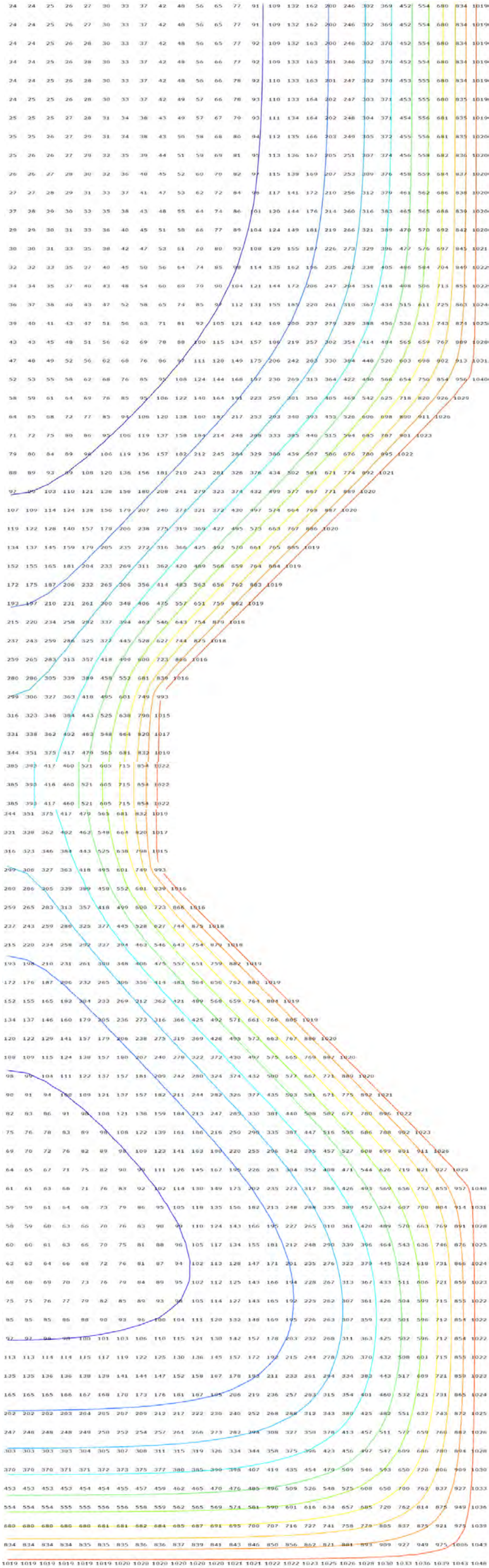
Doorsnede 08

60 minuter

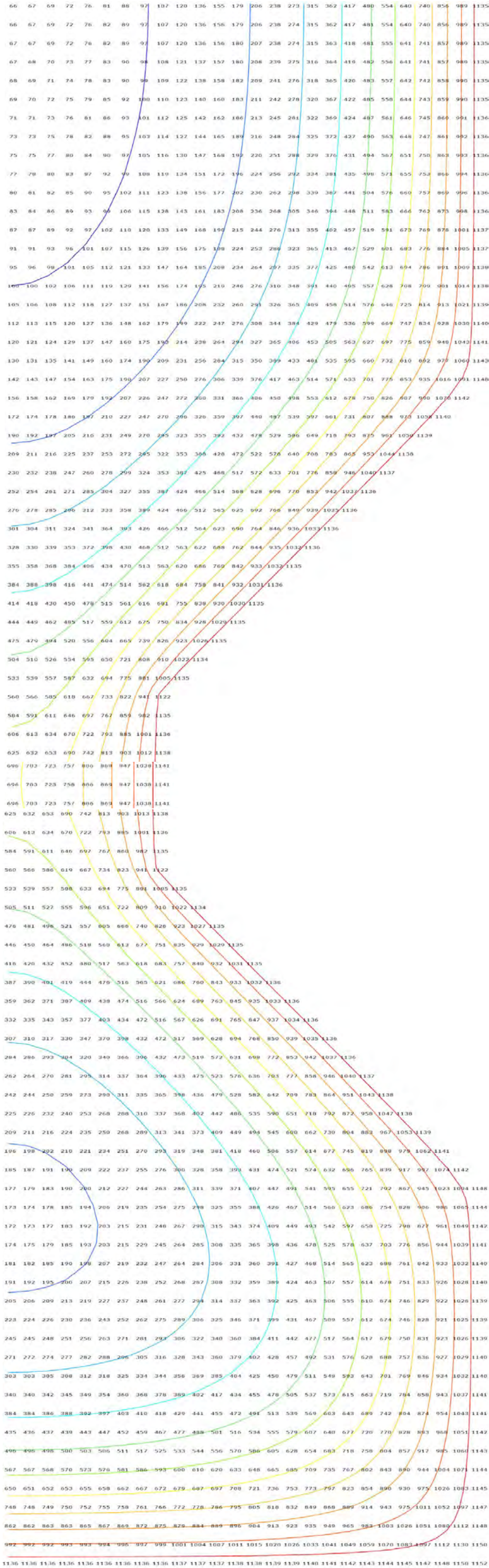
90 minuter

Doorsnede 08

120 minuten

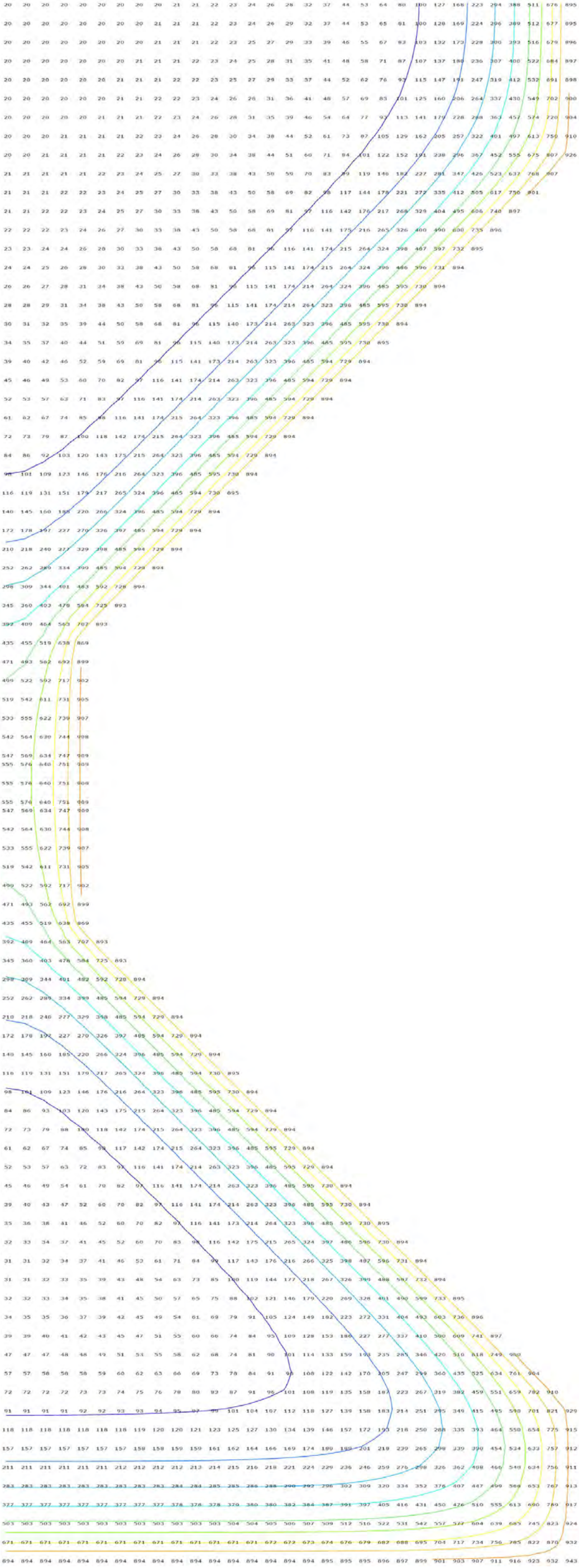


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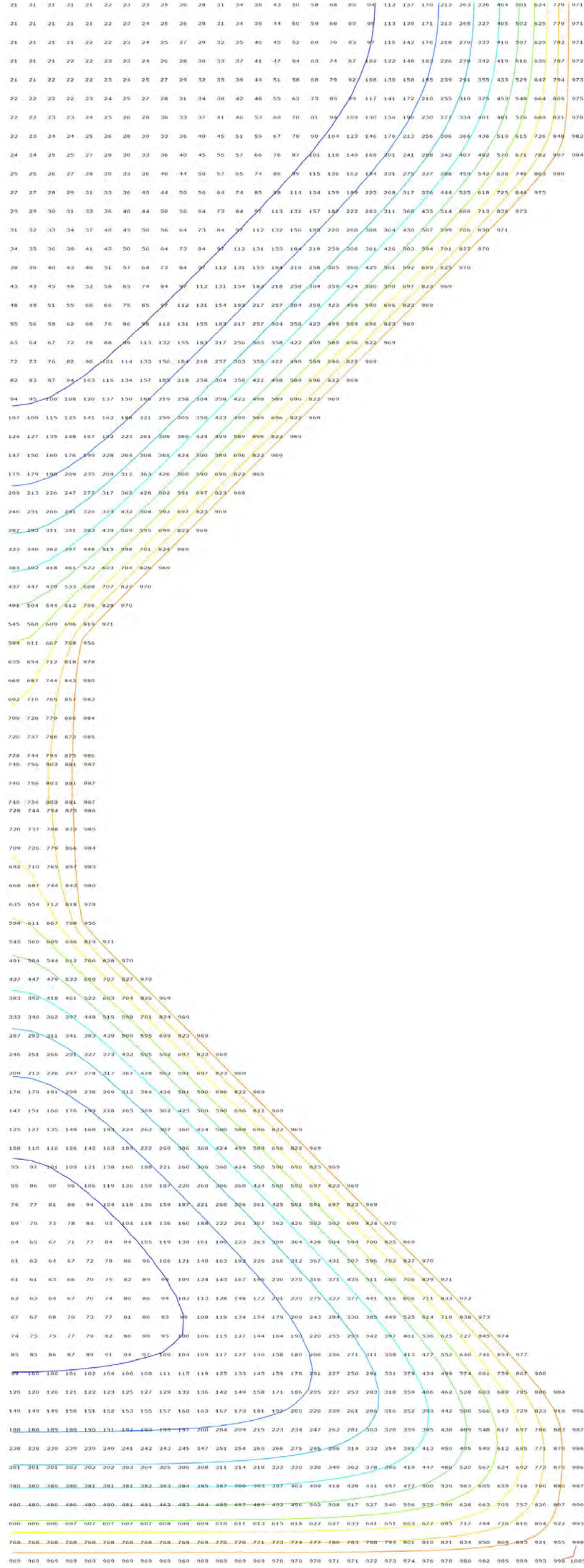


Doorsnede 09

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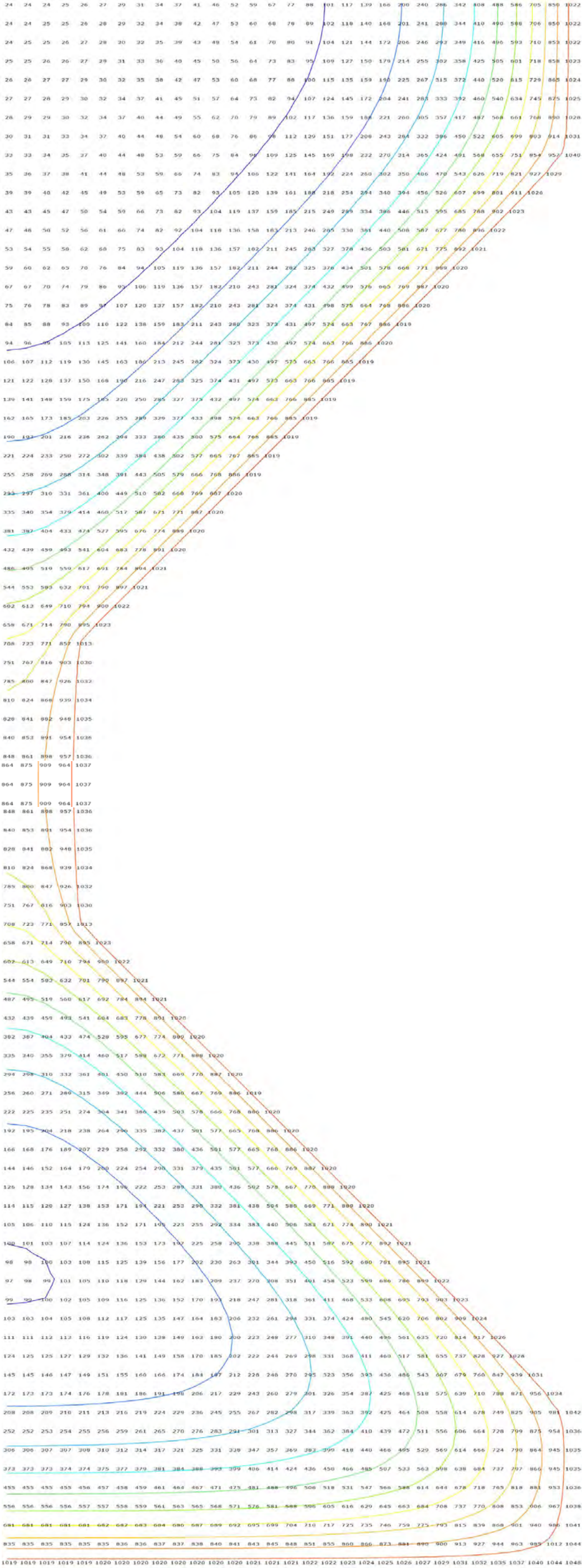


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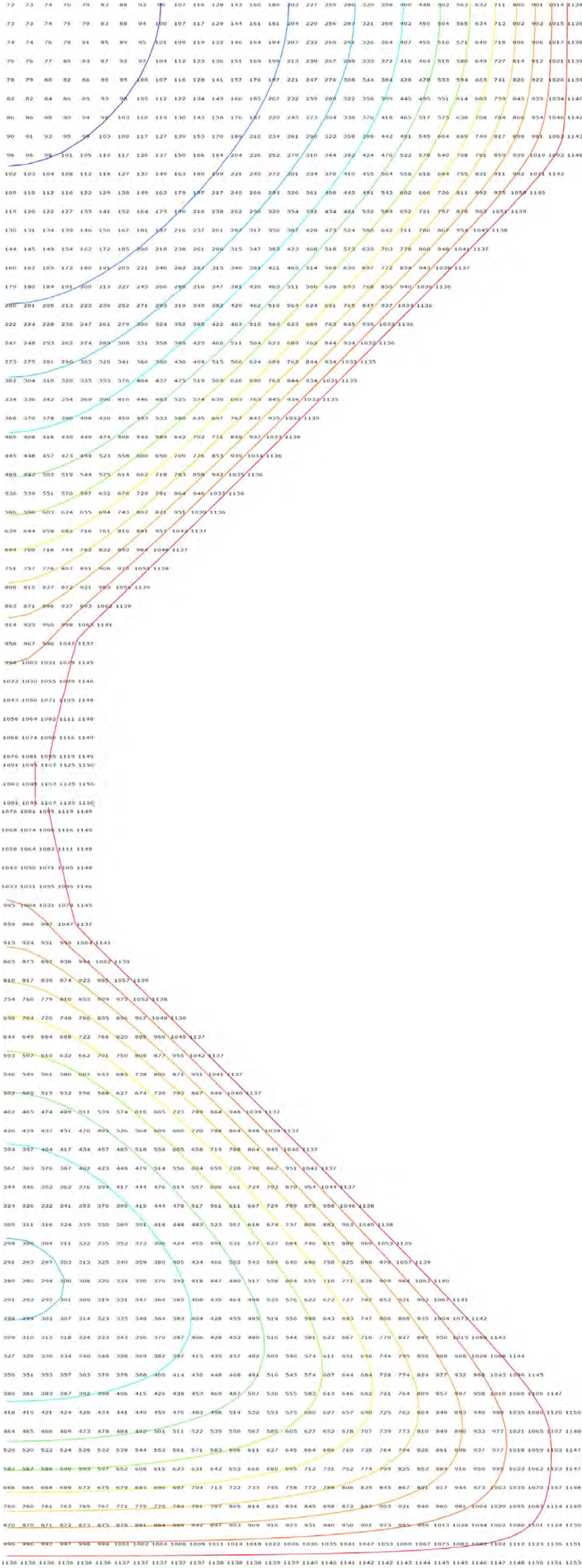


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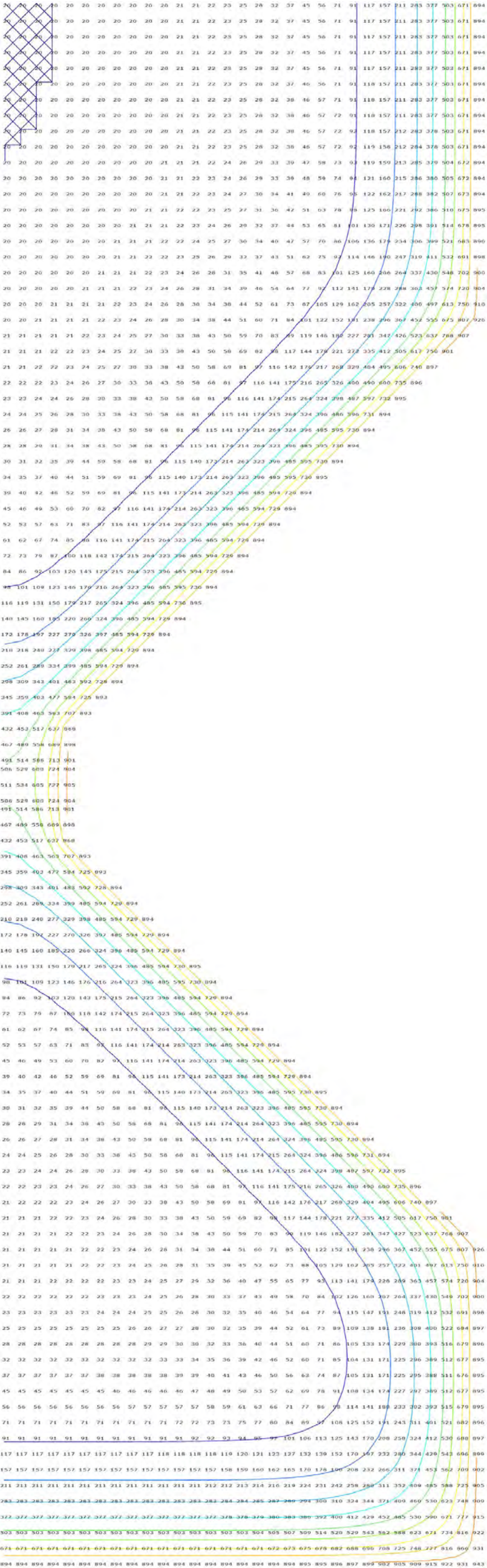


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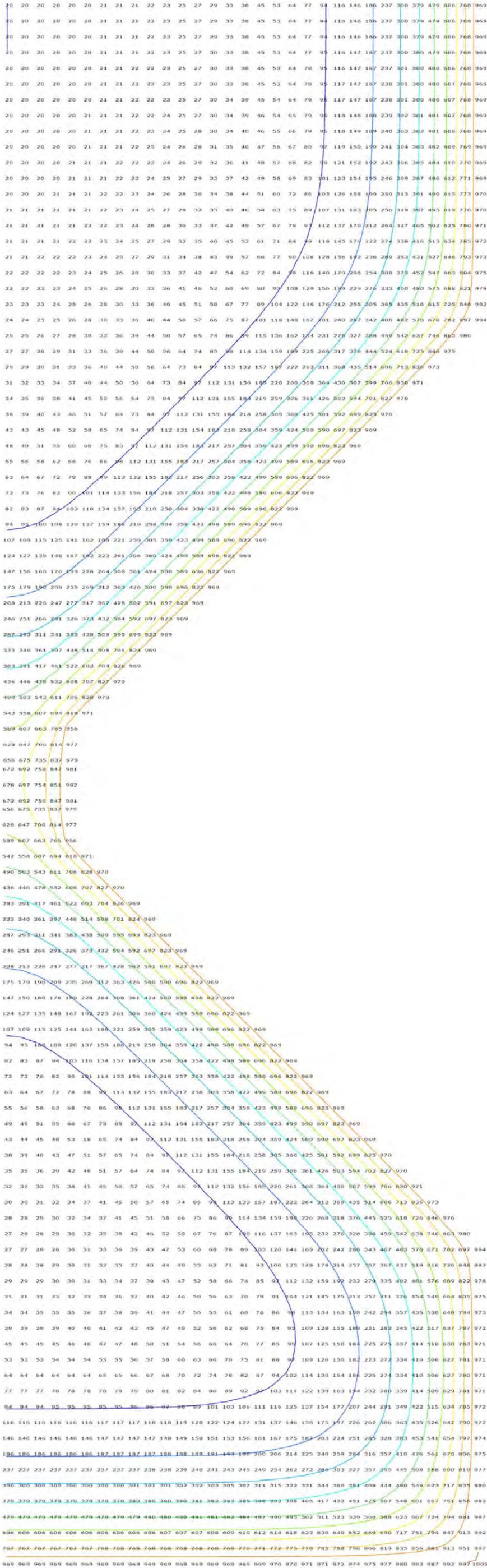


Doorsnede 10

60 minuten

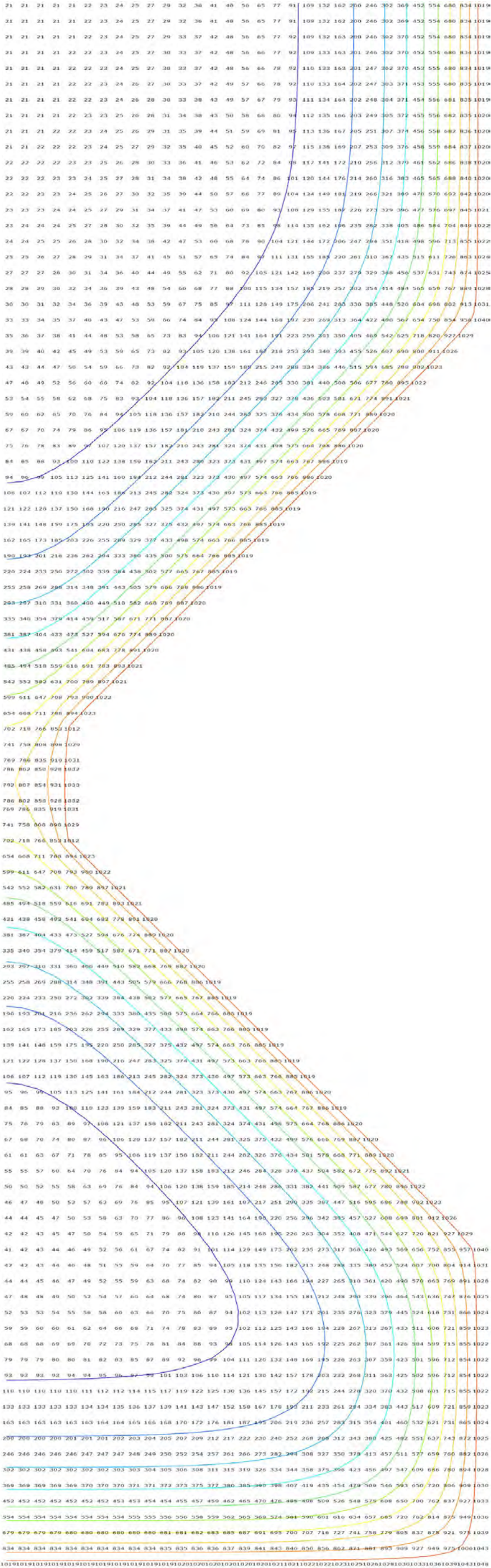


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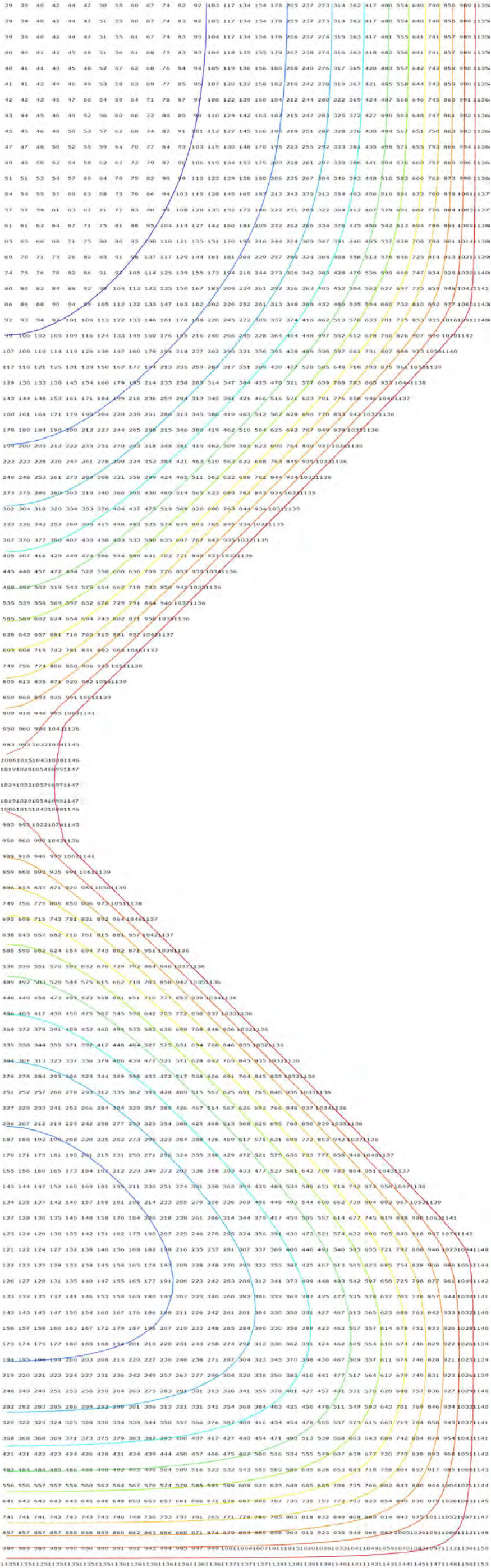


Doorsnede 10

120 minuten

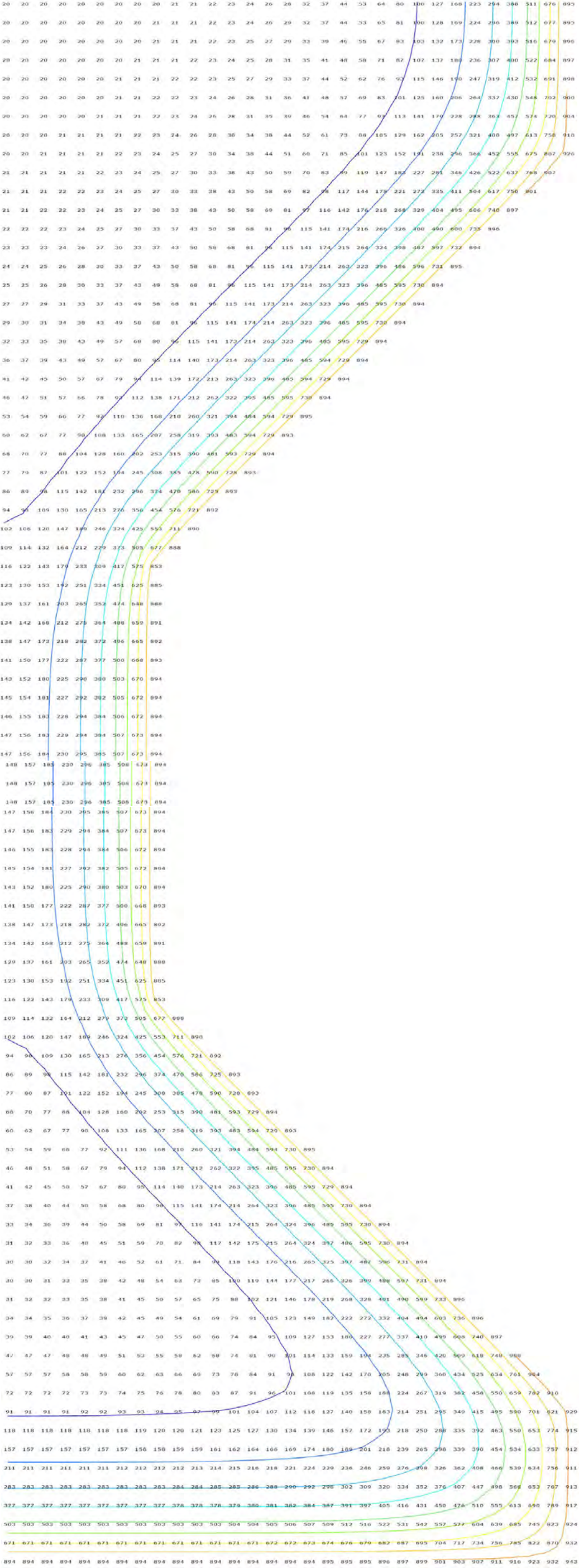


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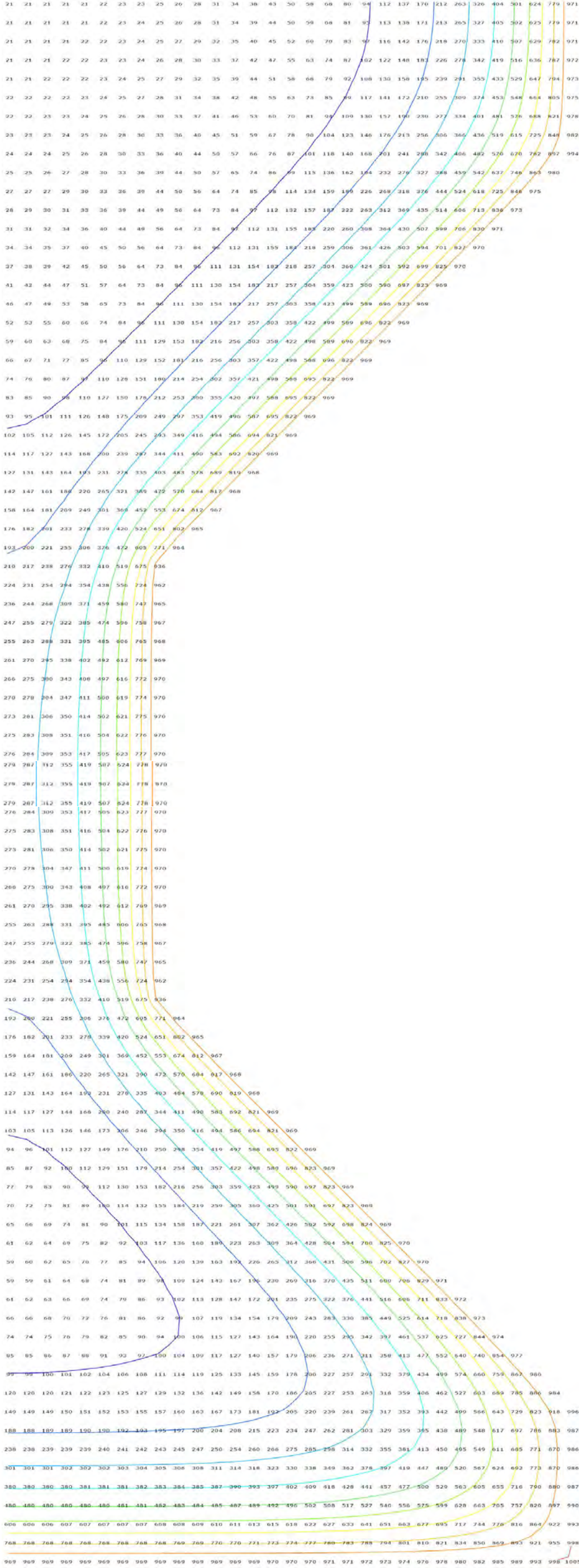


Doorsnede 11

60 minuten

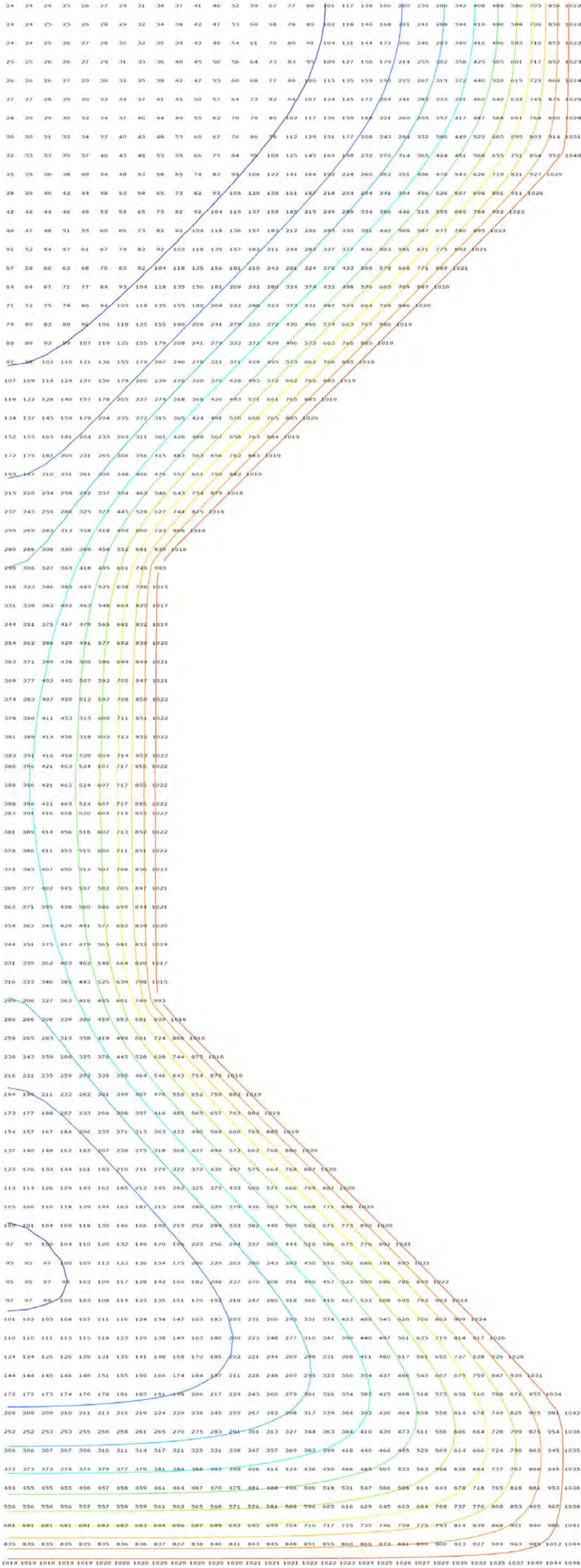


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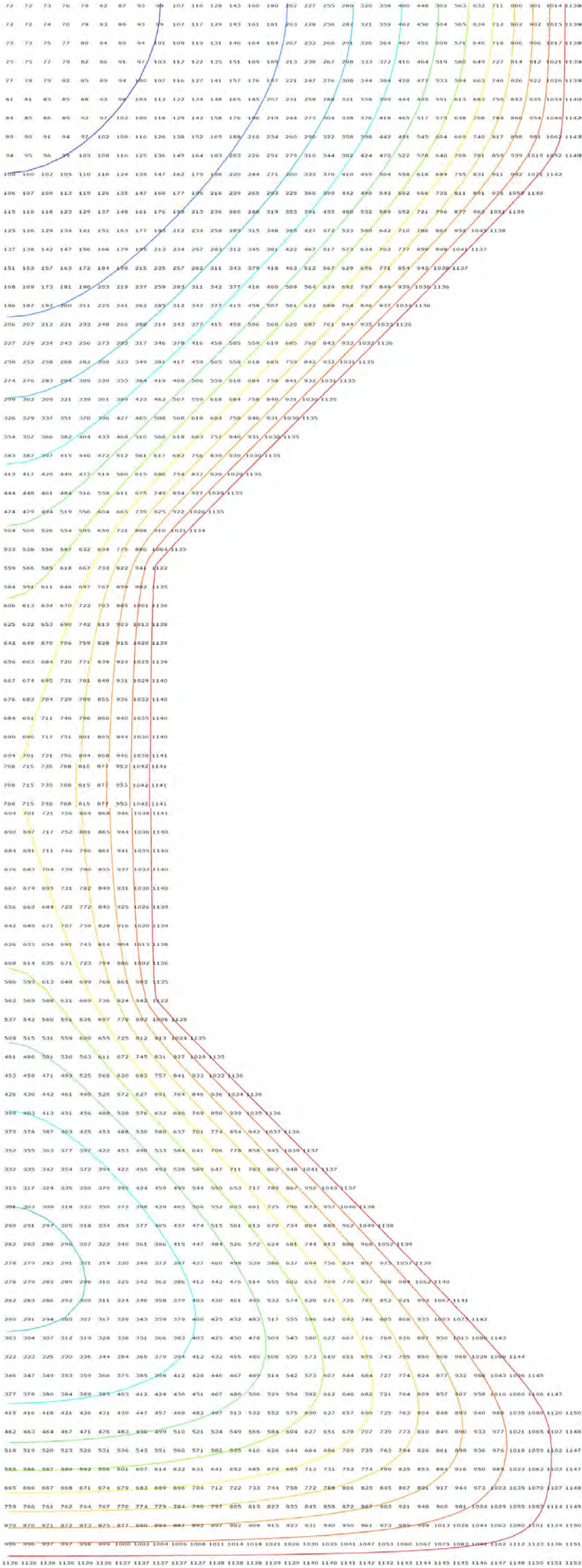


Doorsnede 11

120 minuten



240 minuten



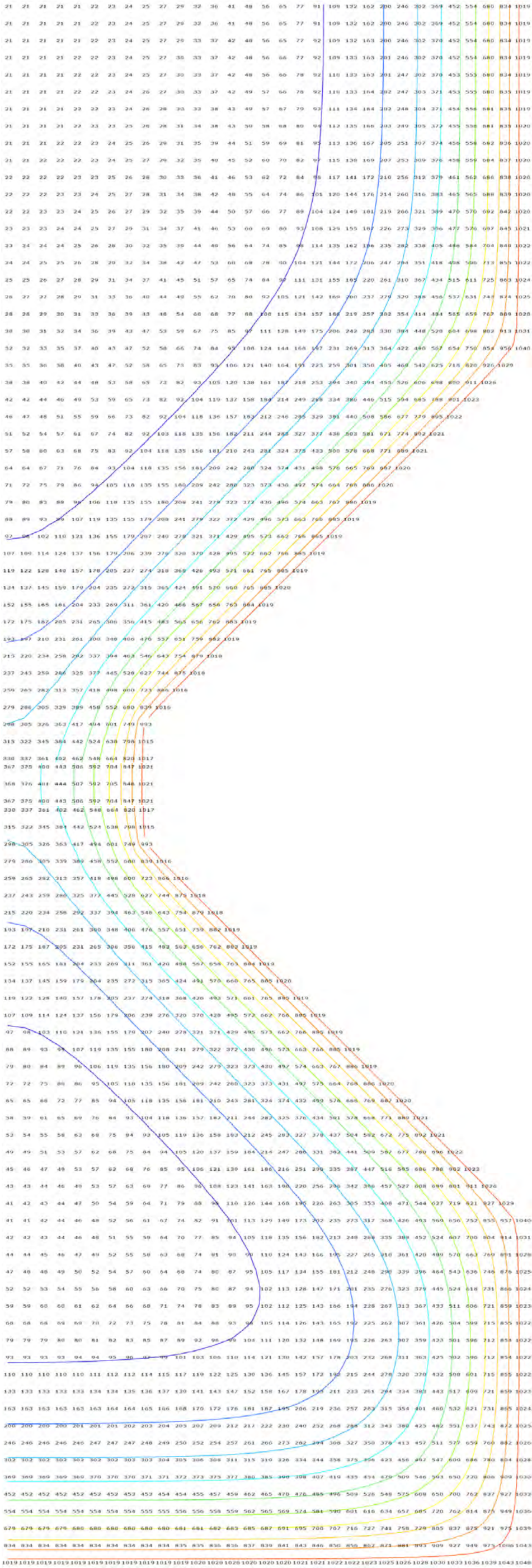
Doorsnede 12

60 minuten

90 minuten

Doorsnede 12

120 minuten



240 minuten

