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a graphic standard for metro maps

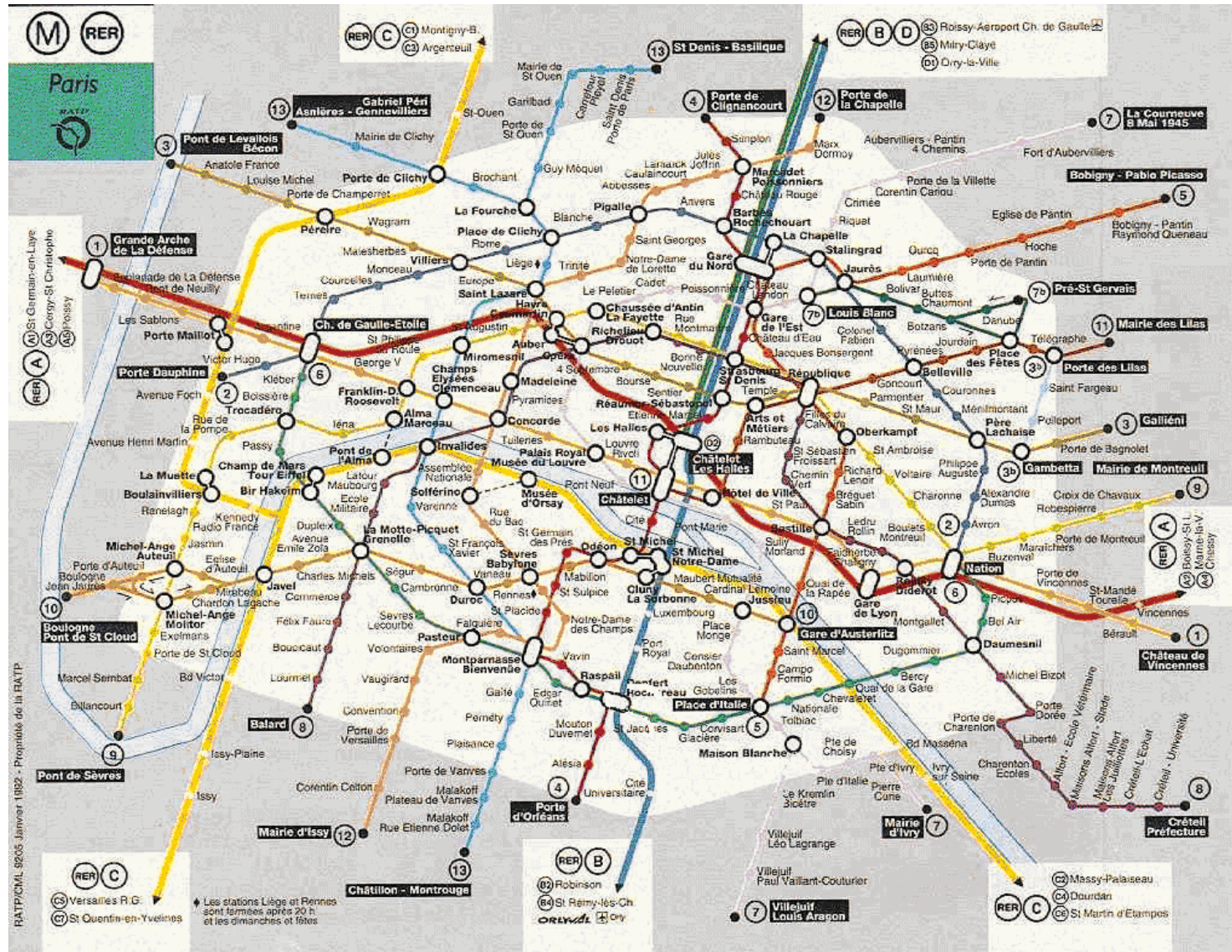
Jug Cerović architect

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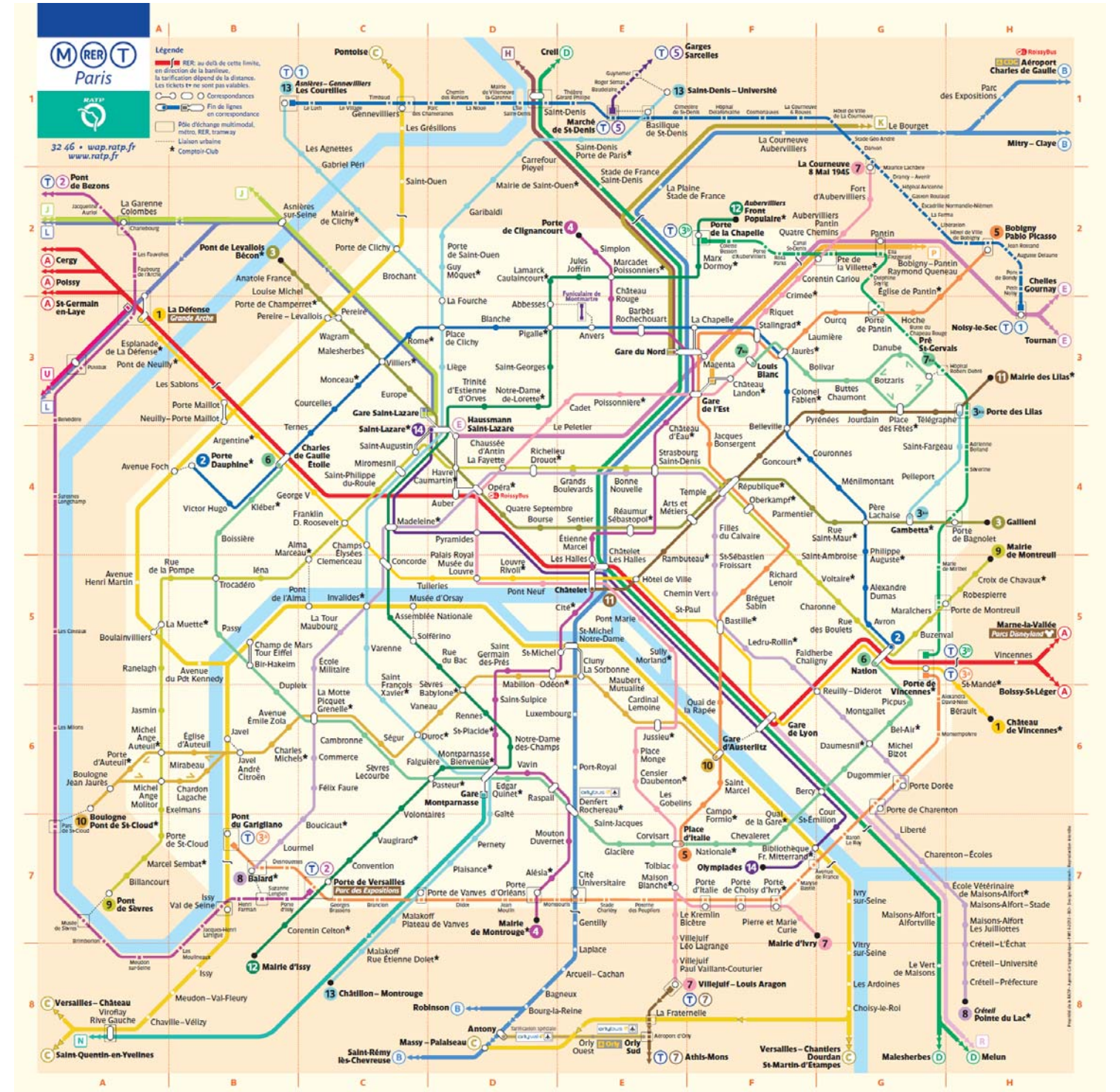
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Paris

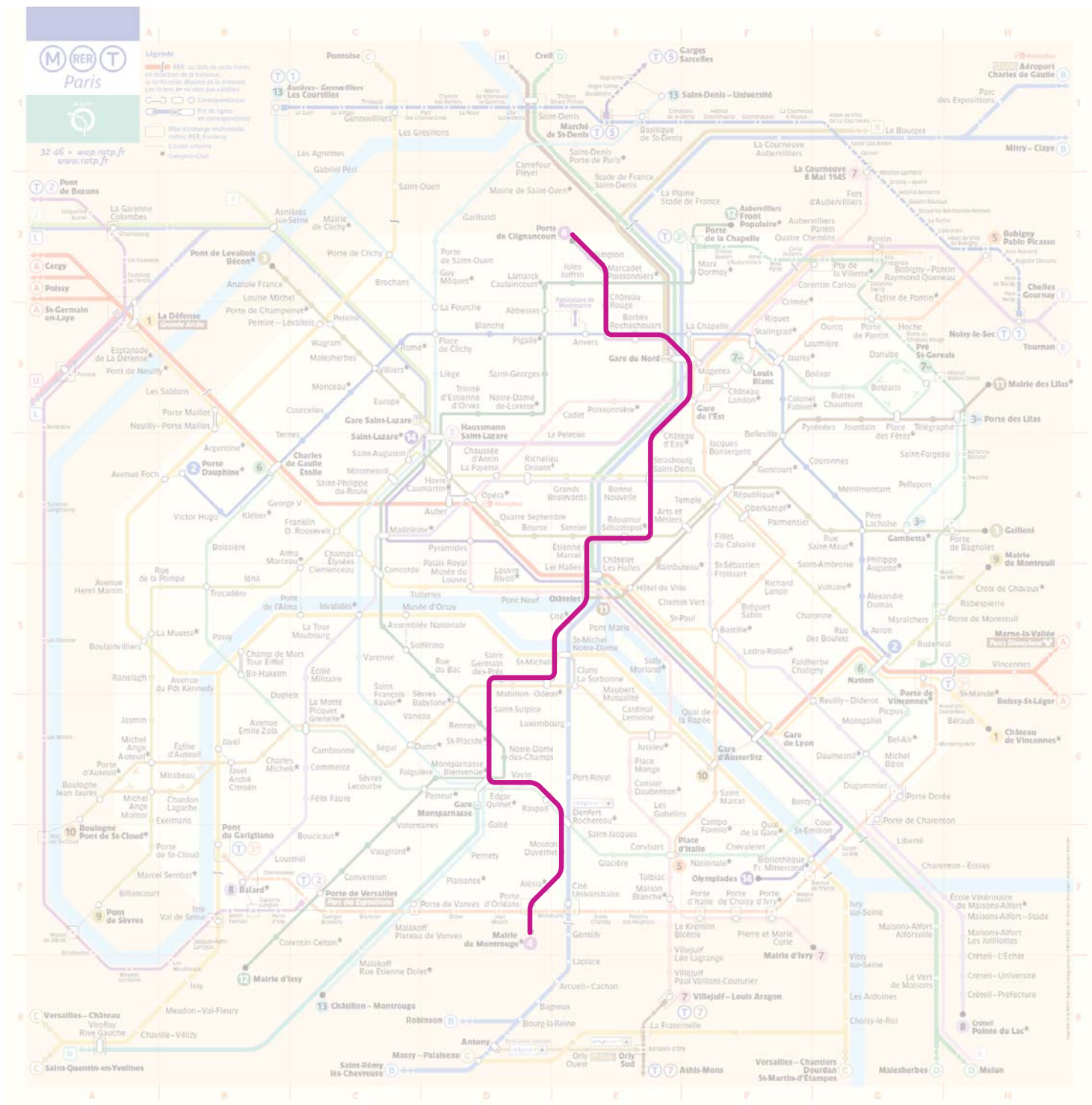


RATP OFFICIAL MAP 1990s

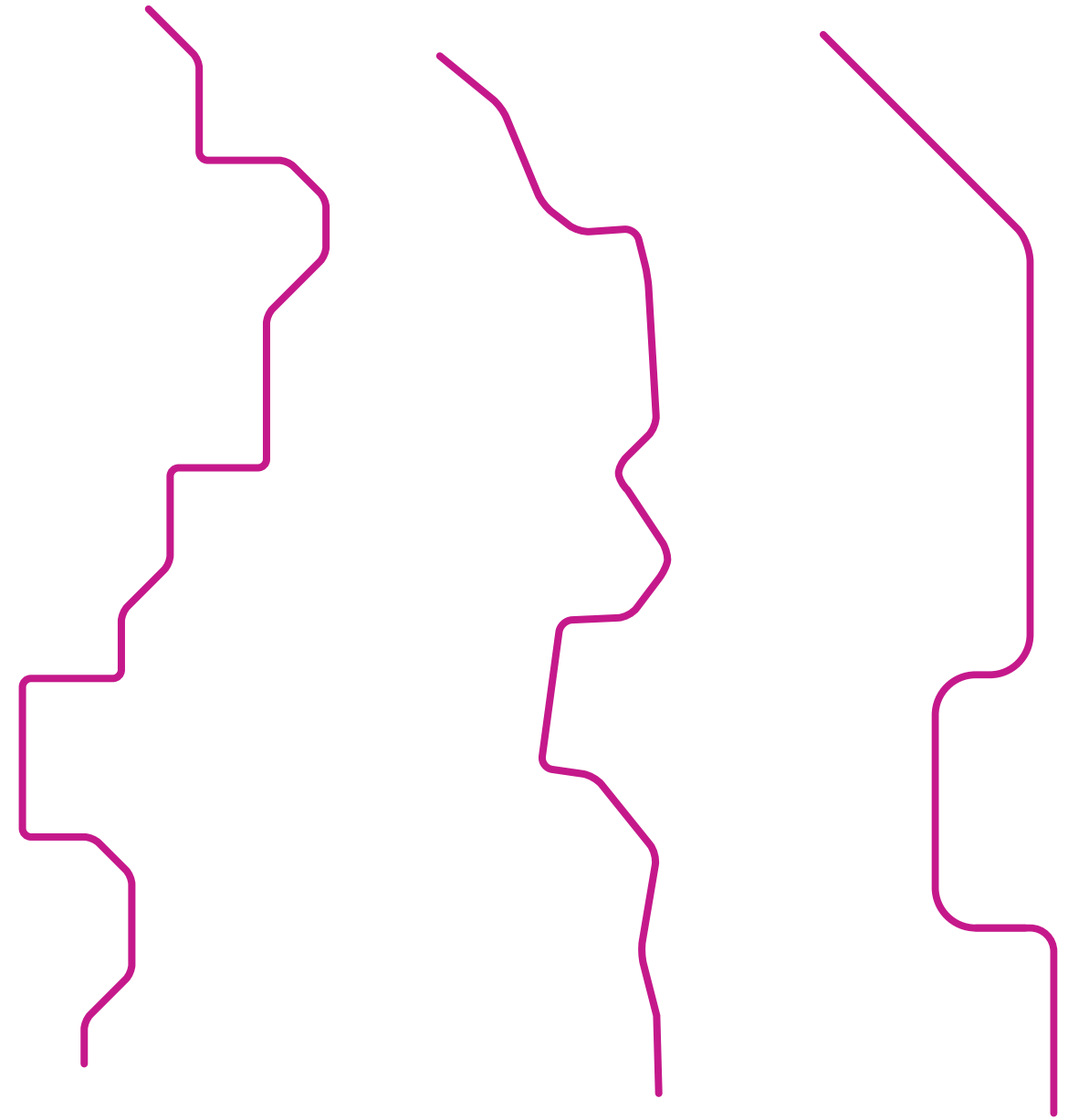


RATP OFFICIAL MAP 2000s

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OFFICIAL RATP MAP



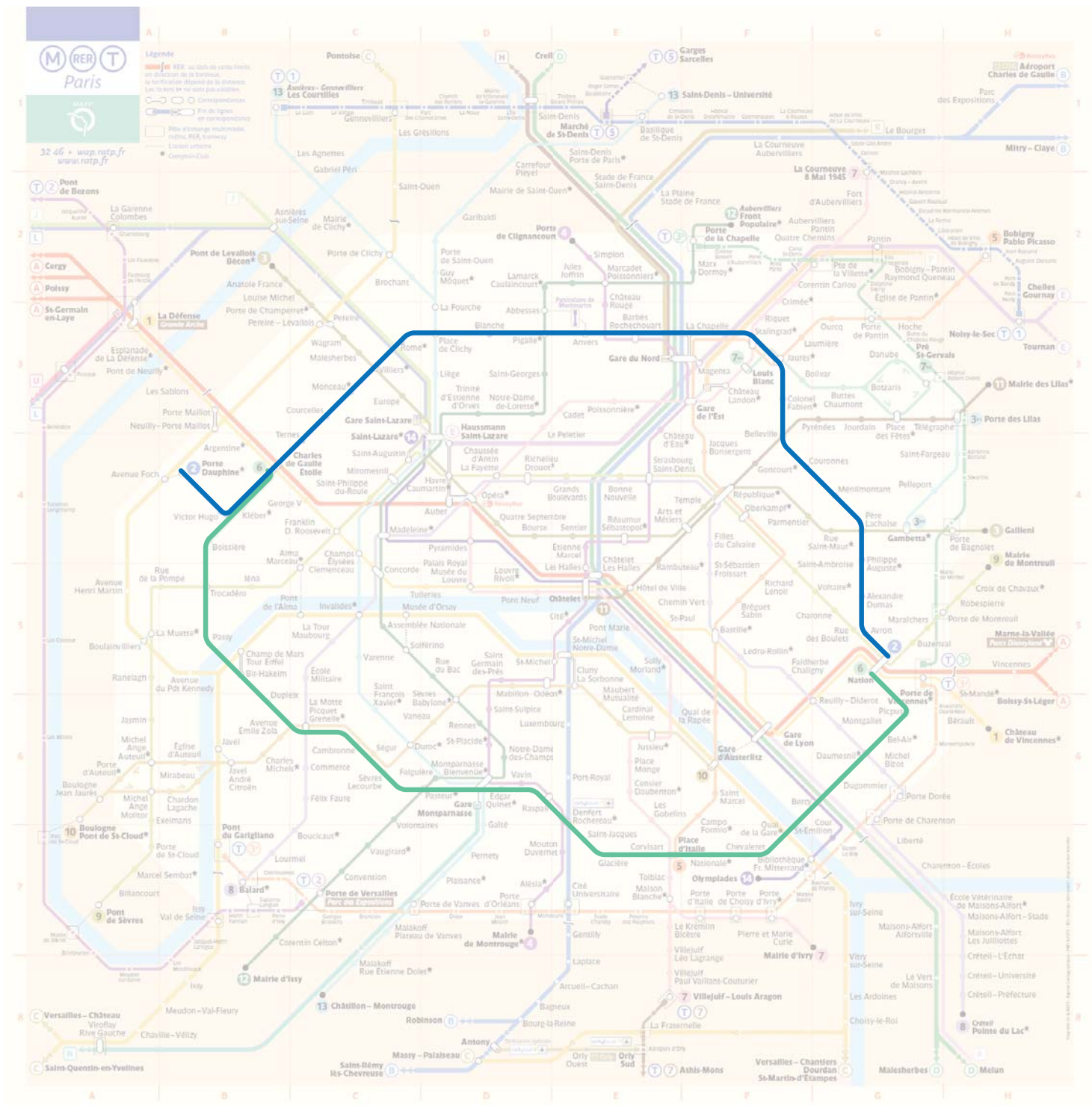
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LINE 4

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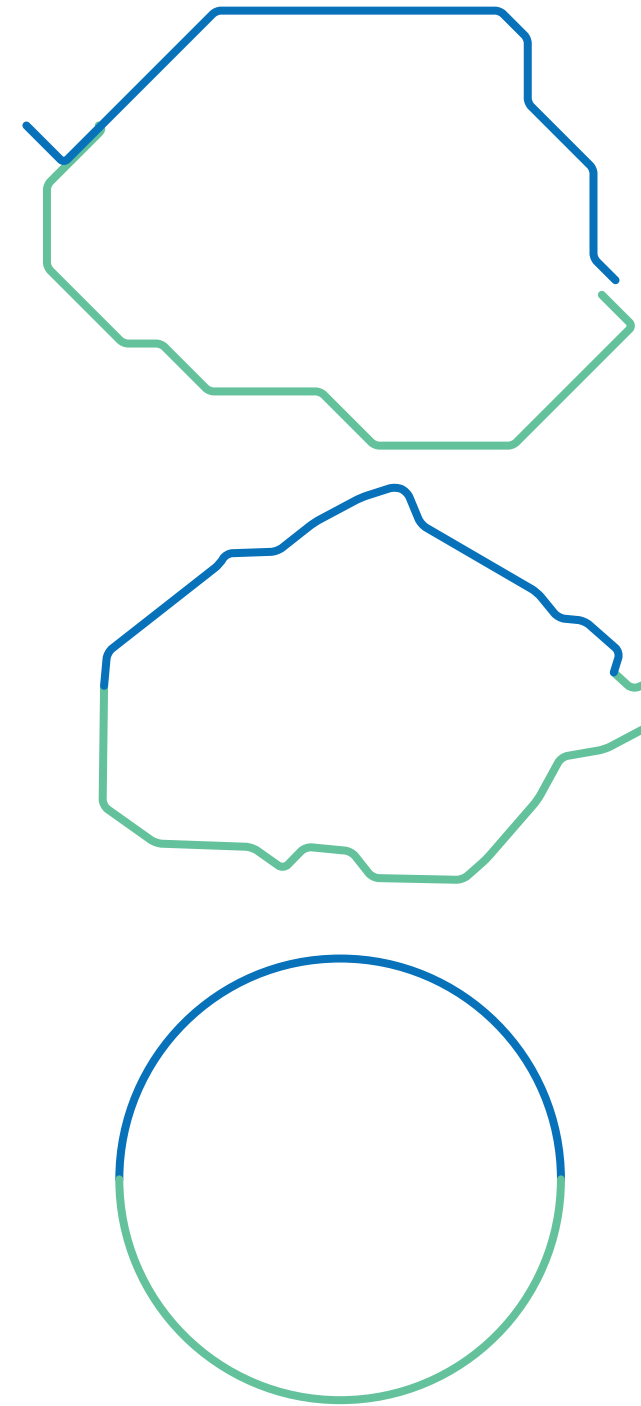


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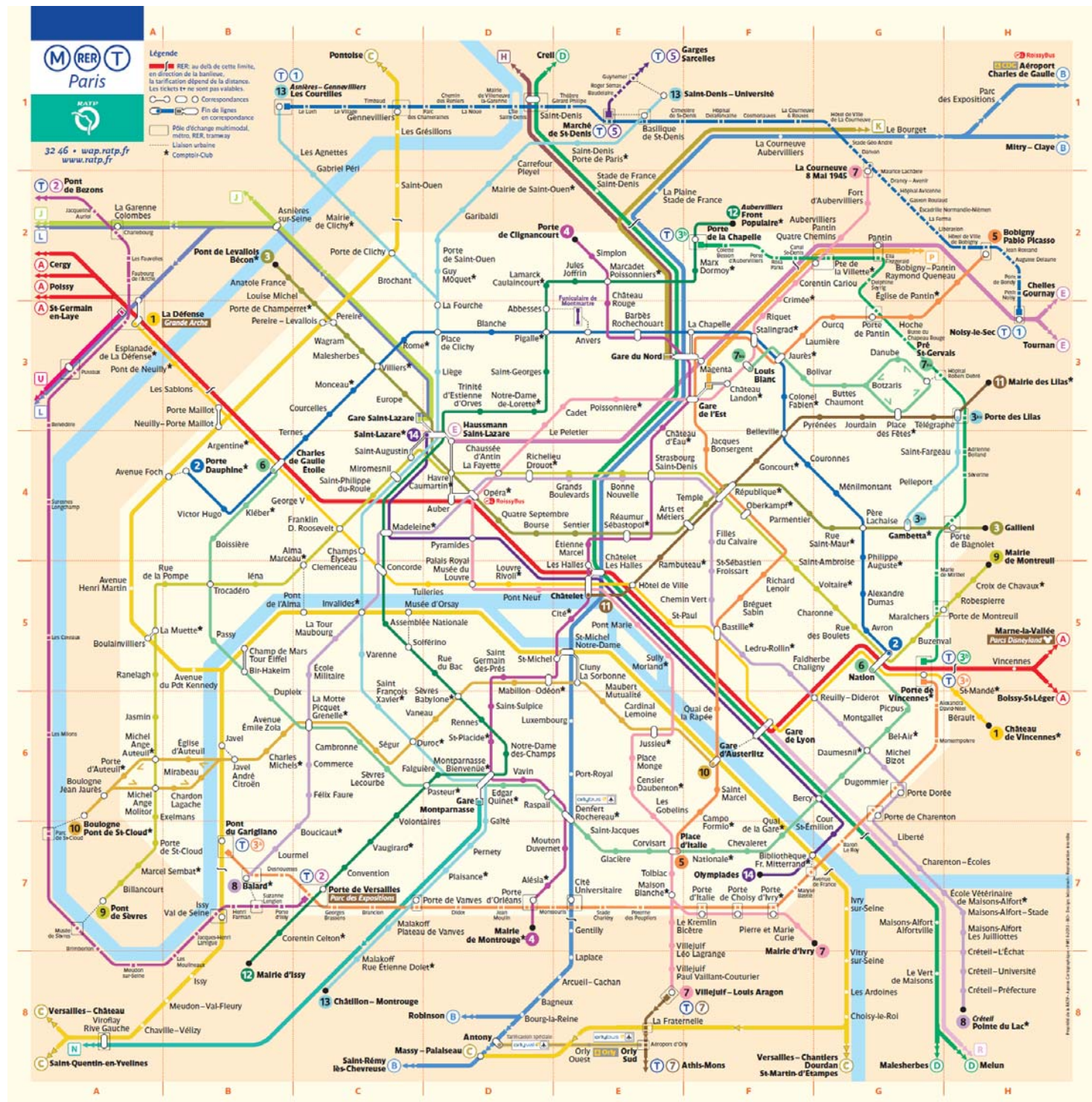
GEOGRAPHICAL

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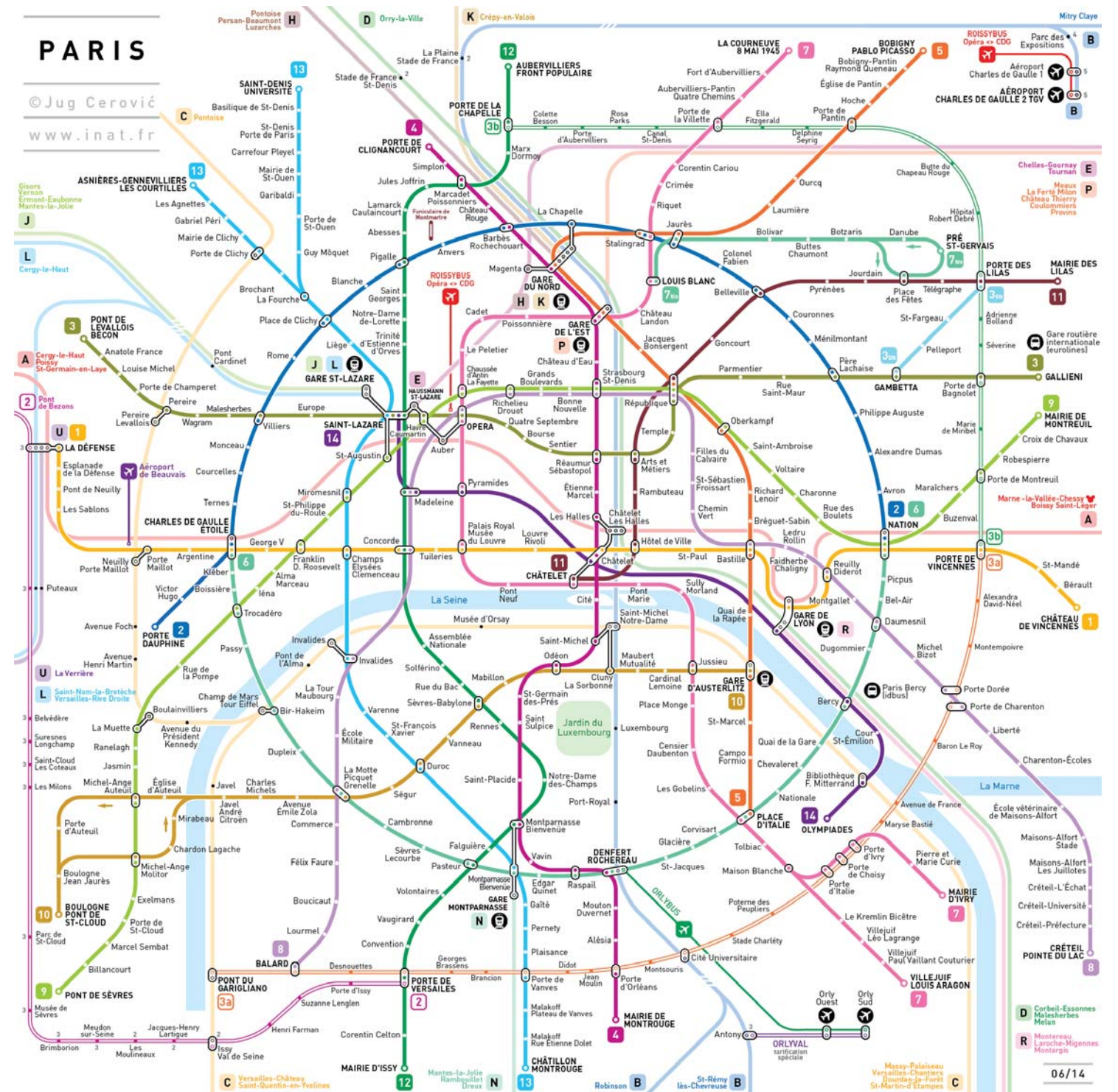


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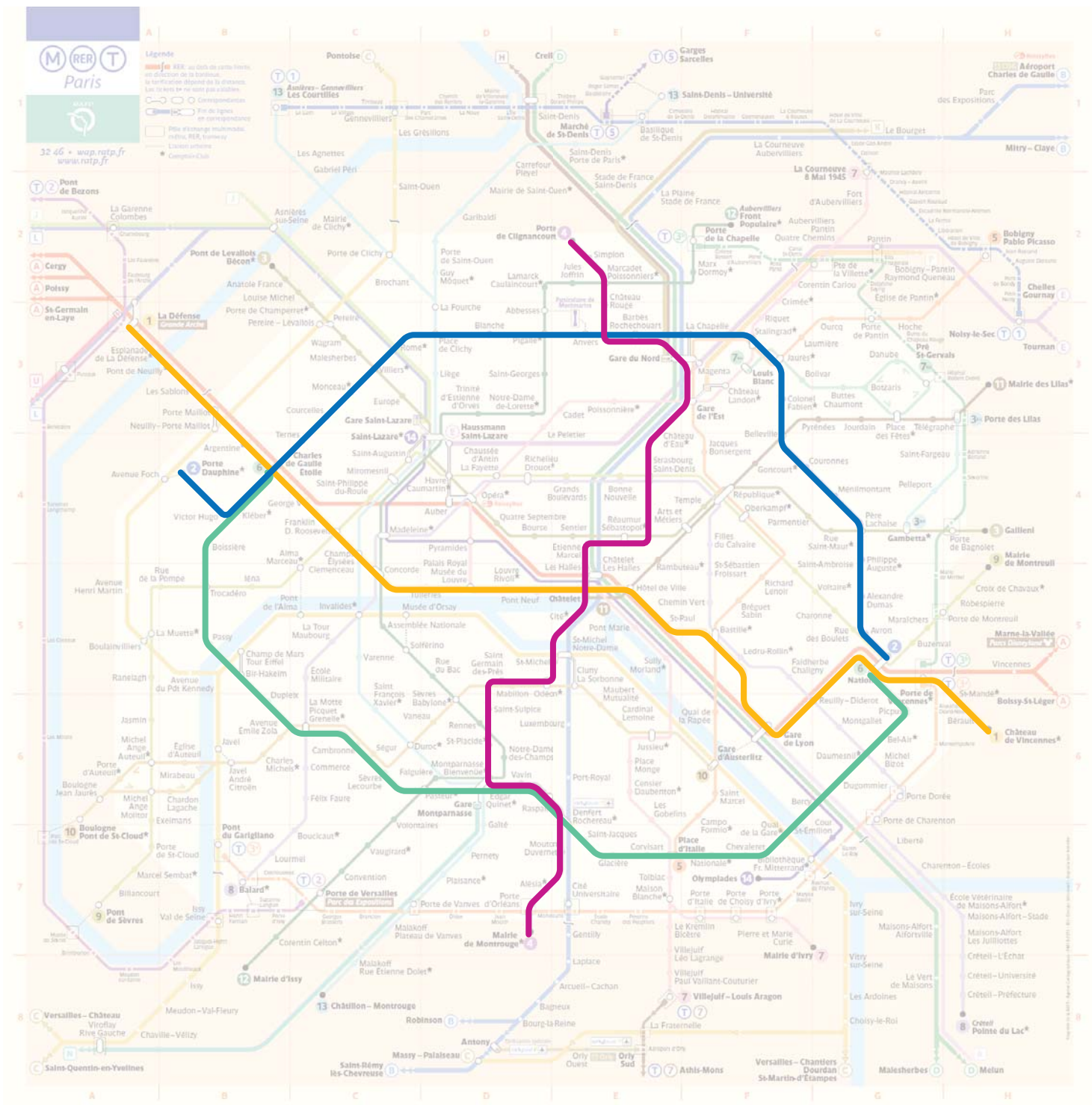


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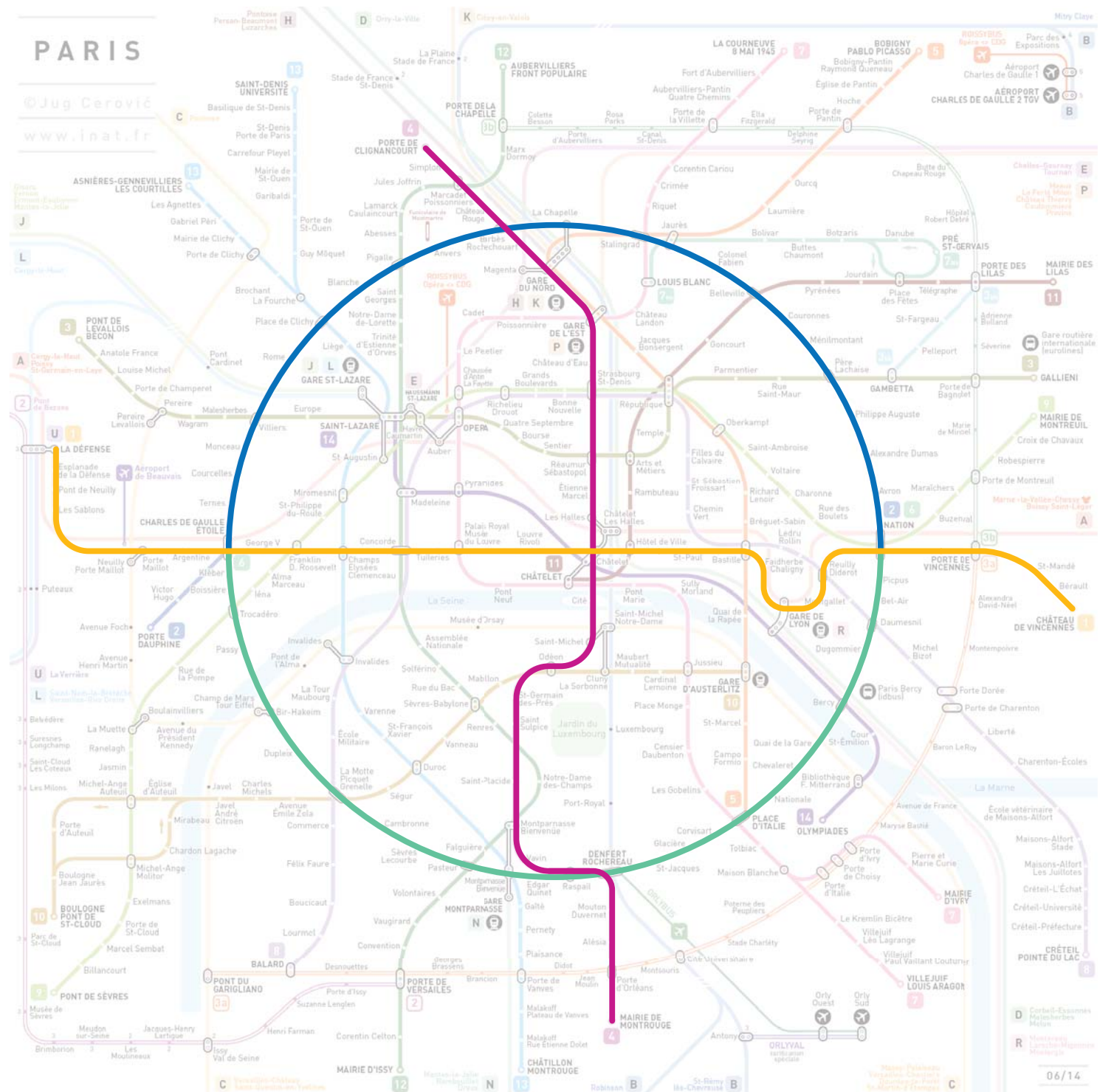


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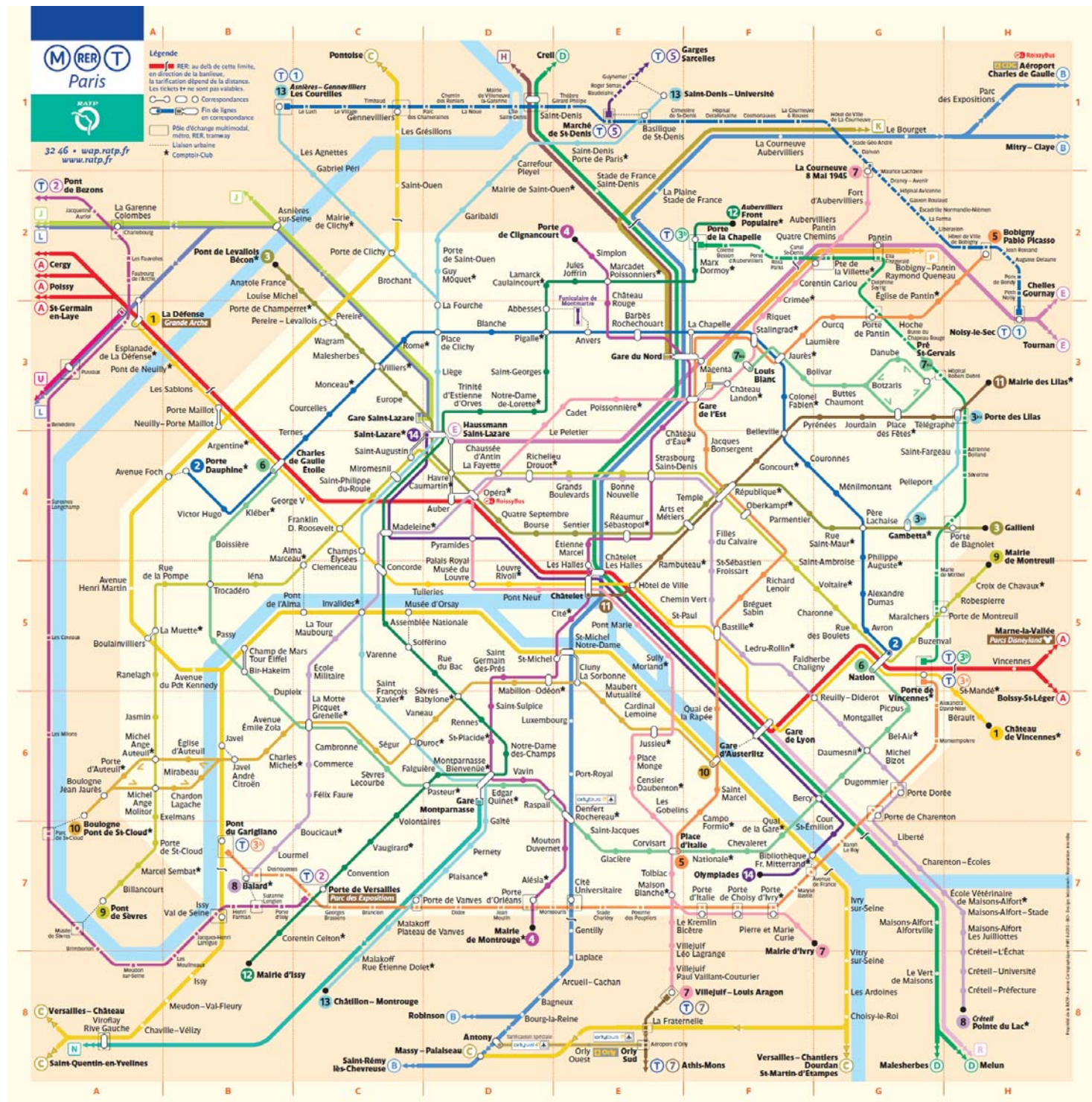


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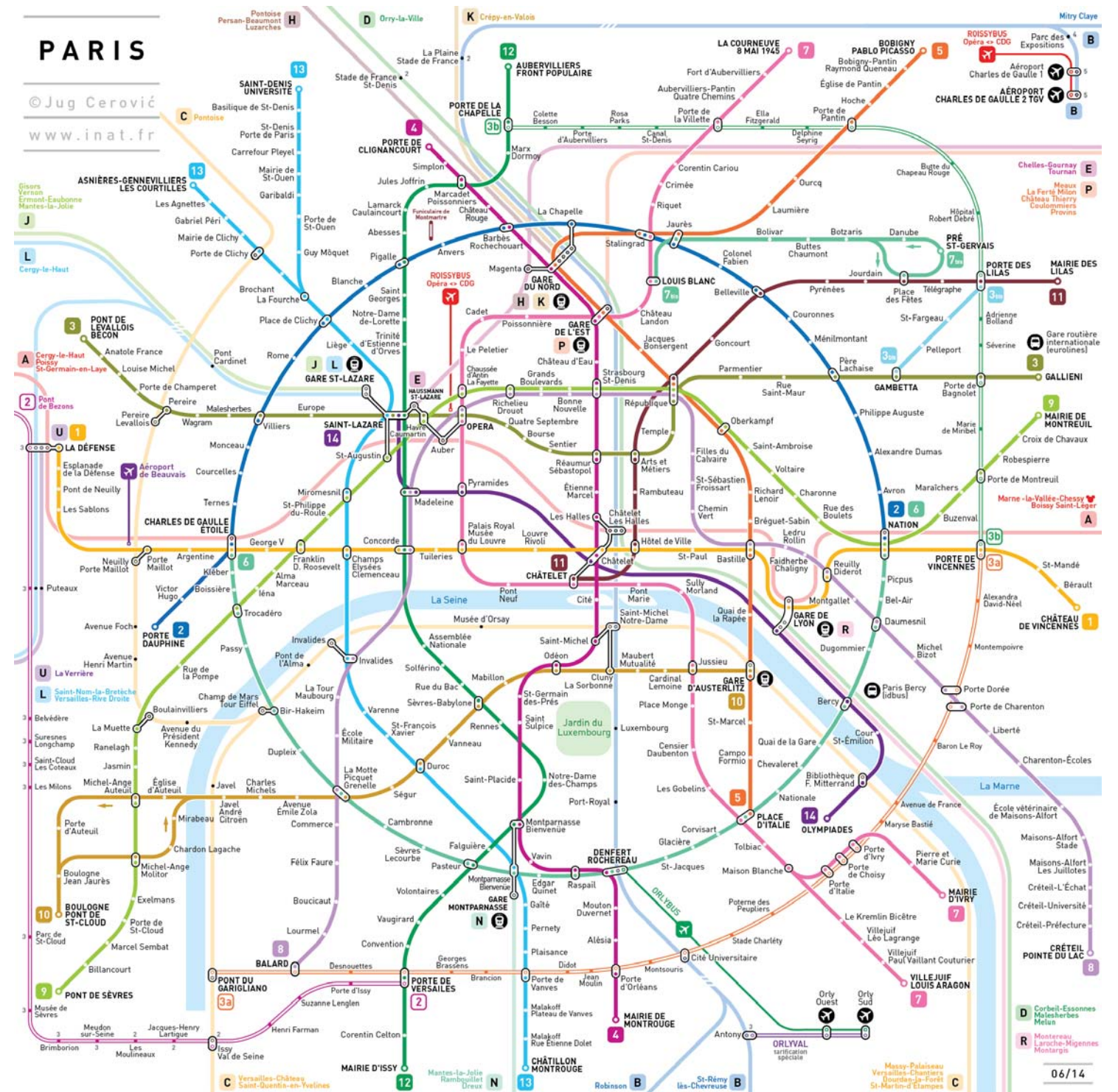


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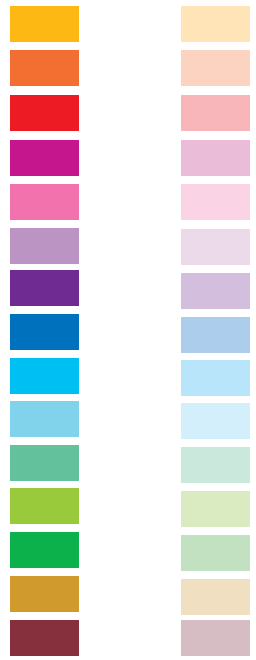


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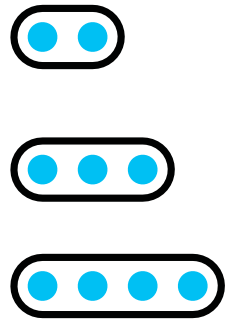


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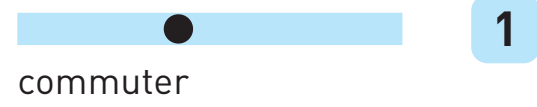
line colors



transfer stations



metro



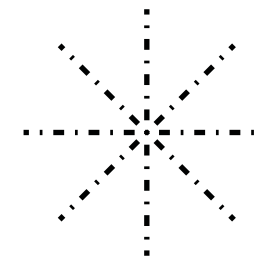
commuter



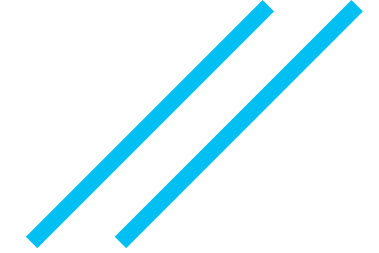
light rail



bus



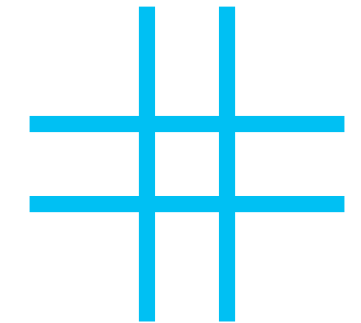
fixed angles



parallel lines

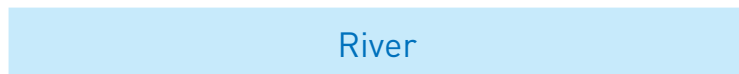


curved kinks

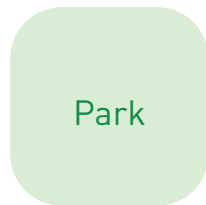


grid and symmetry

geographic features

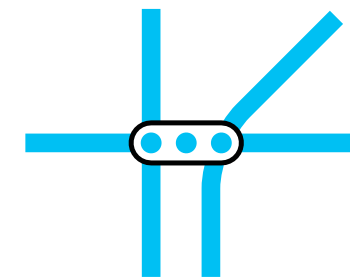


River

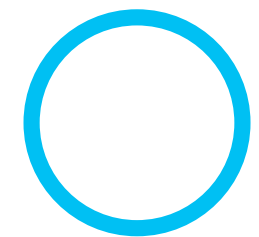


Park

icons



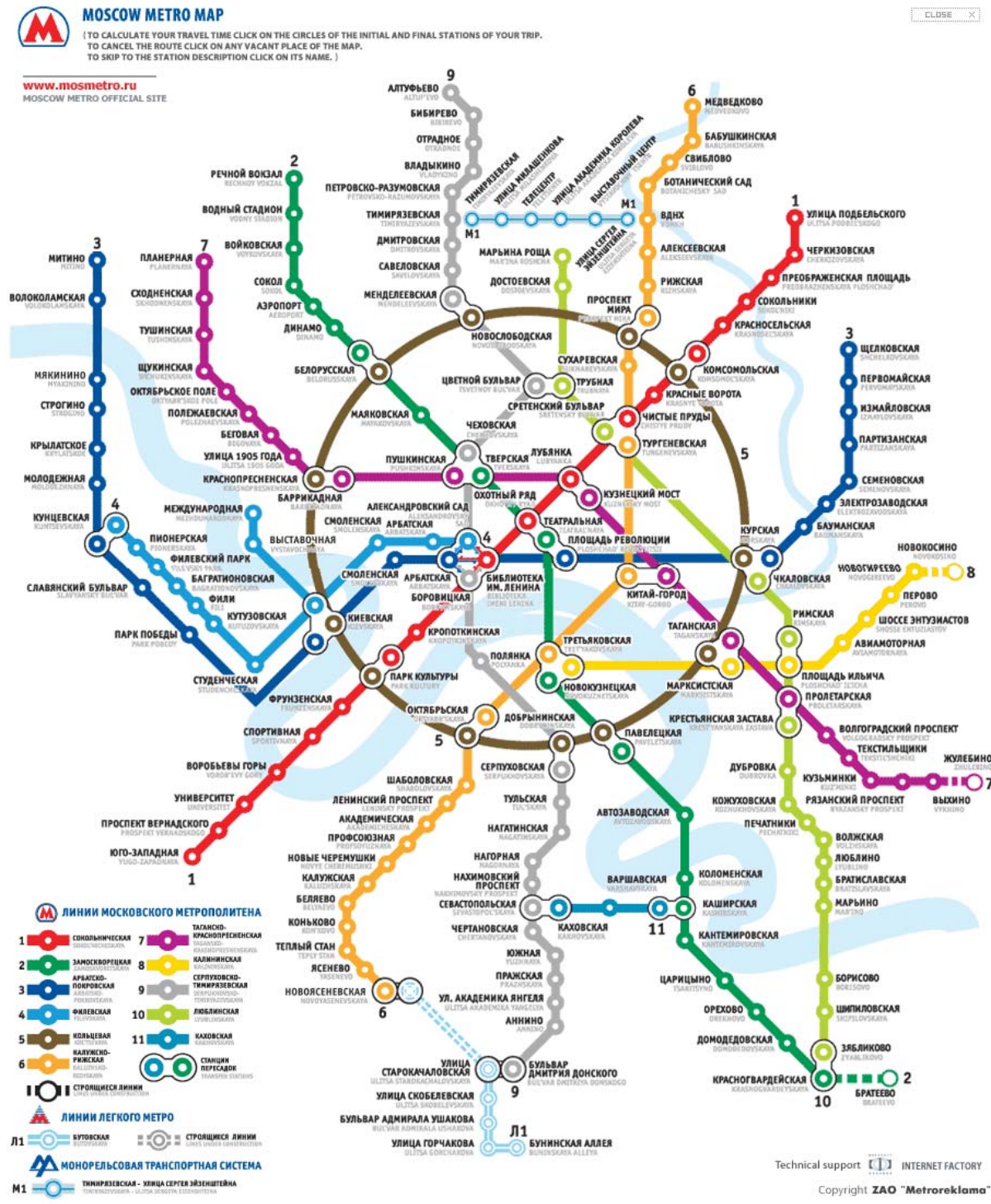
transfer station positioning



symbolic shapes

INAT ELEMENTS

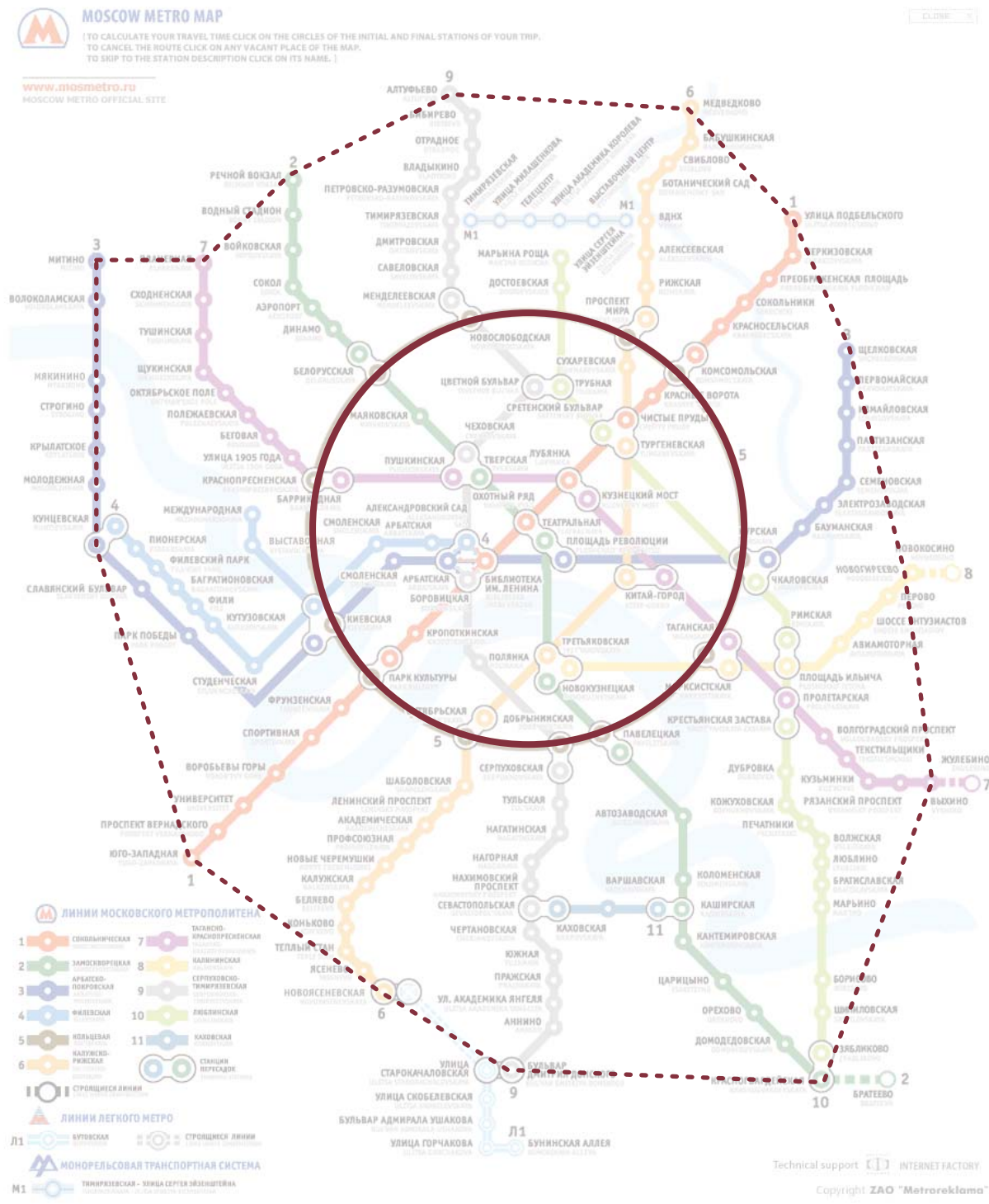
INAT SYNTAX



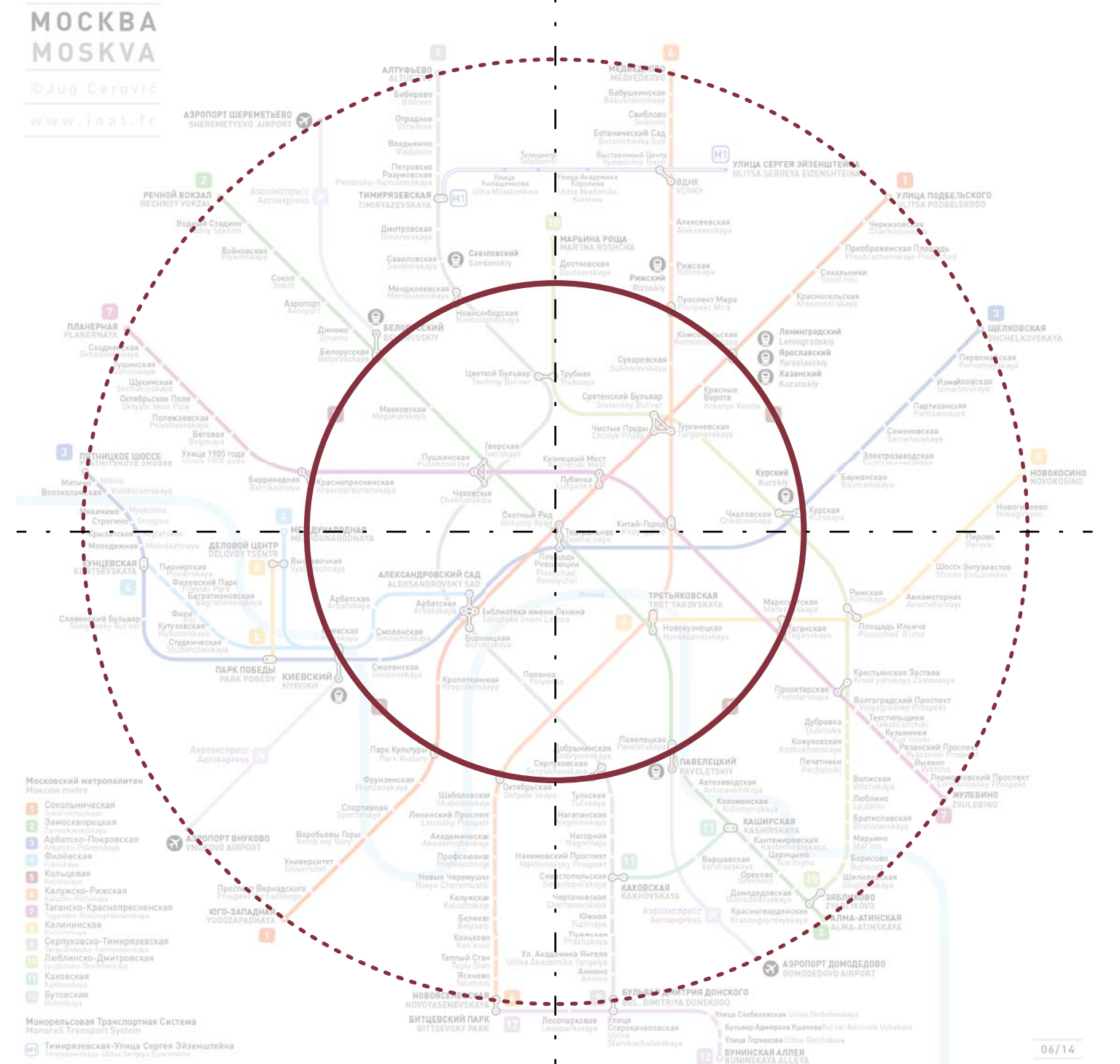
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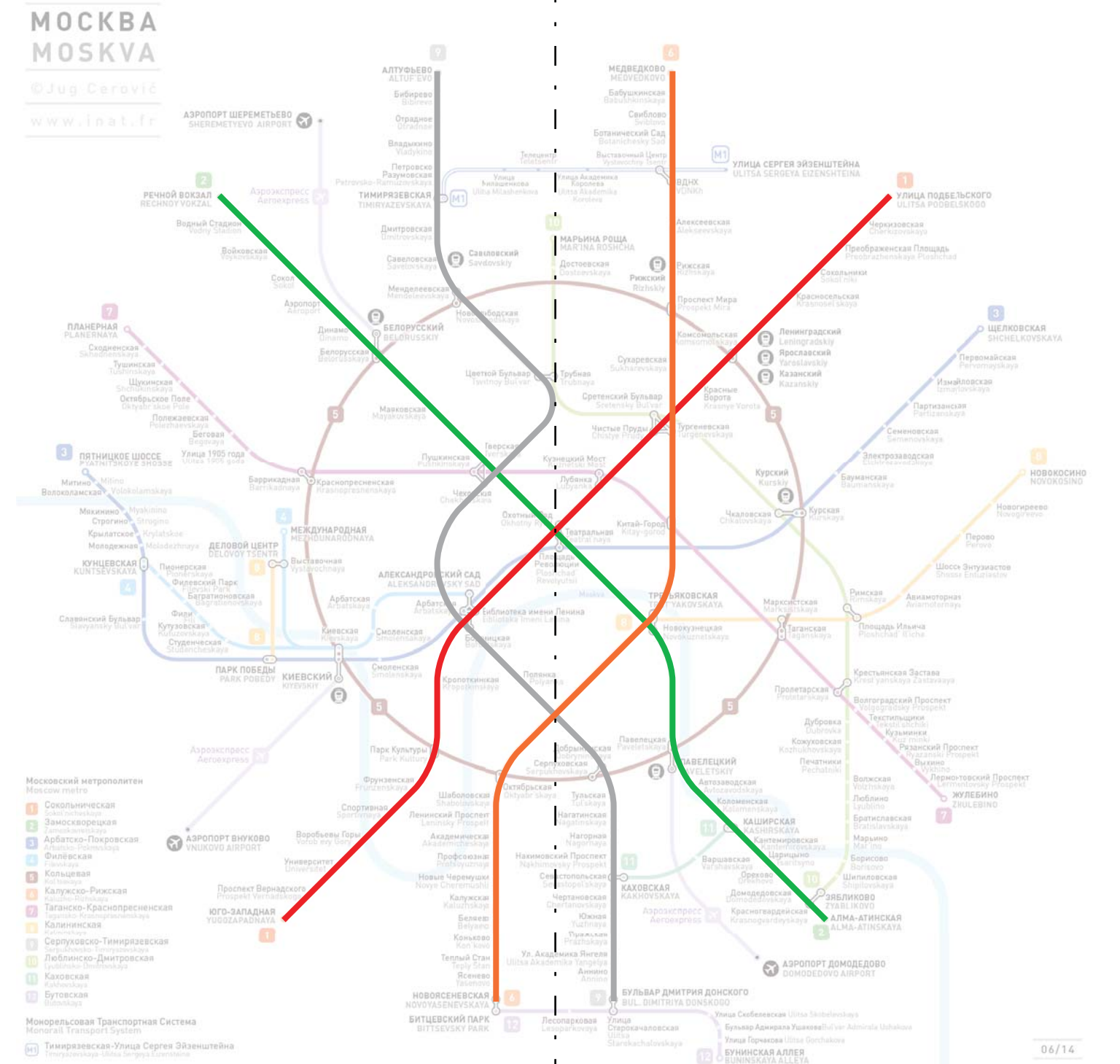
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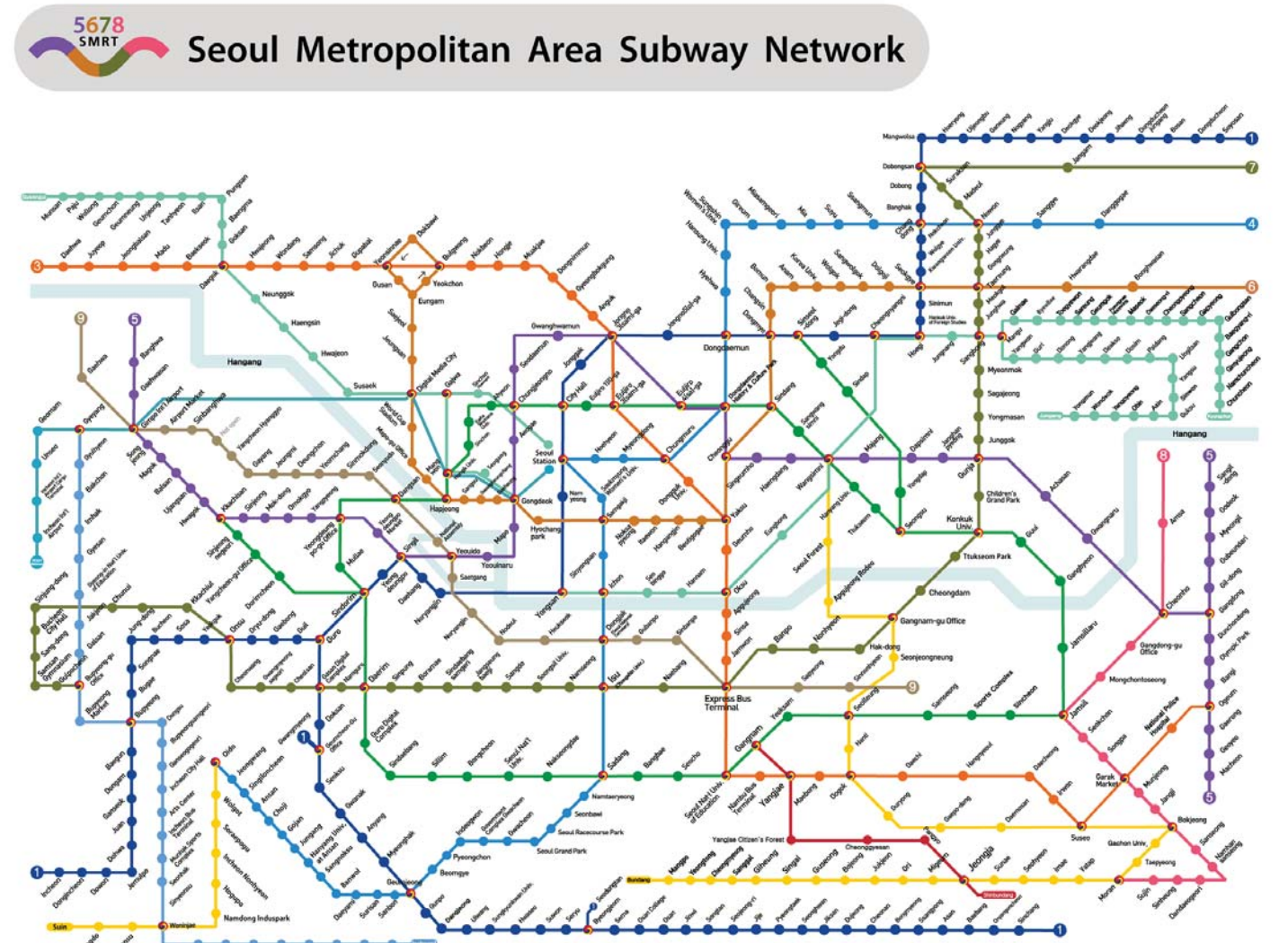
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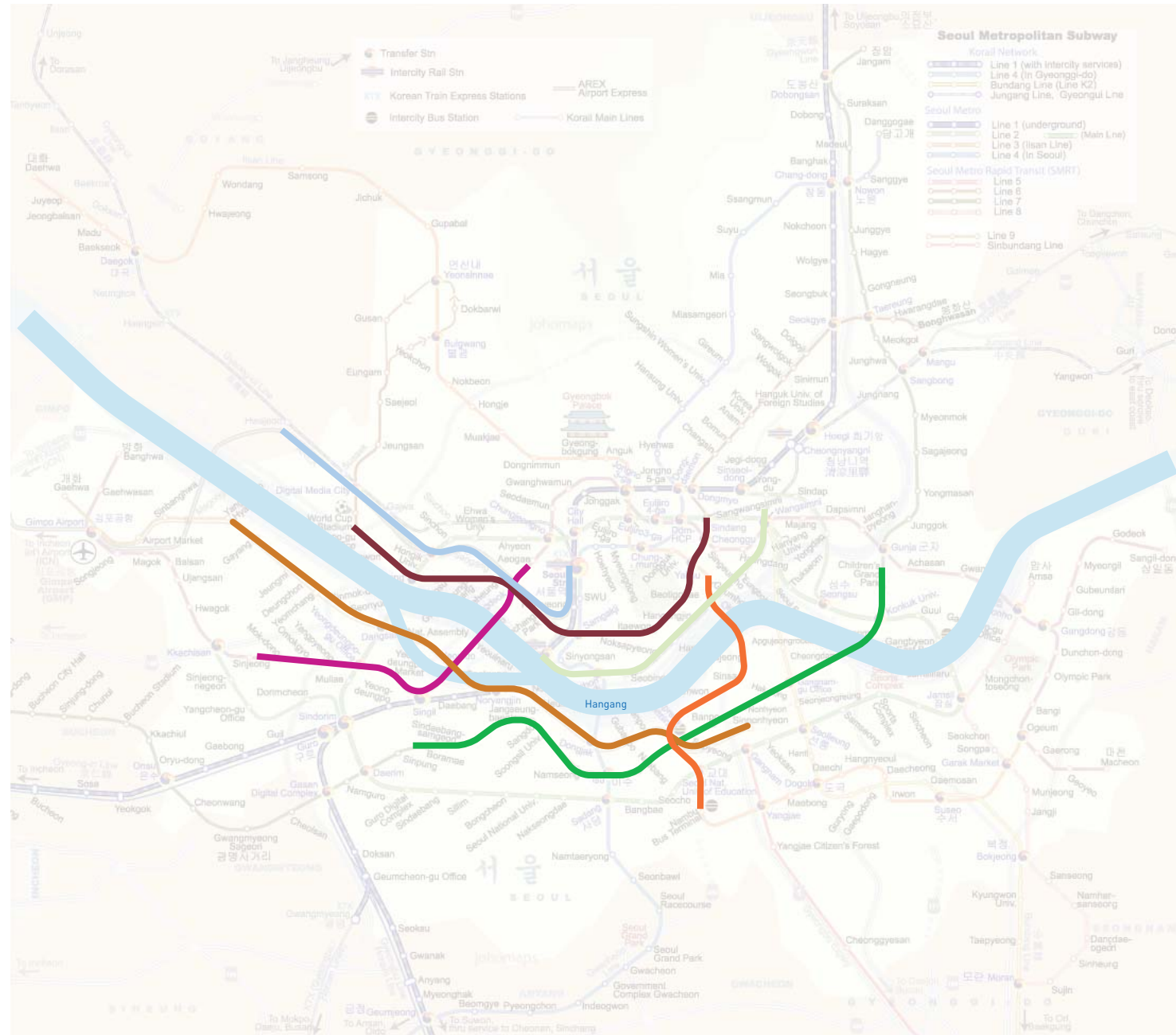
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GEOGRAPHIC MAP



OFFICIAL MAP

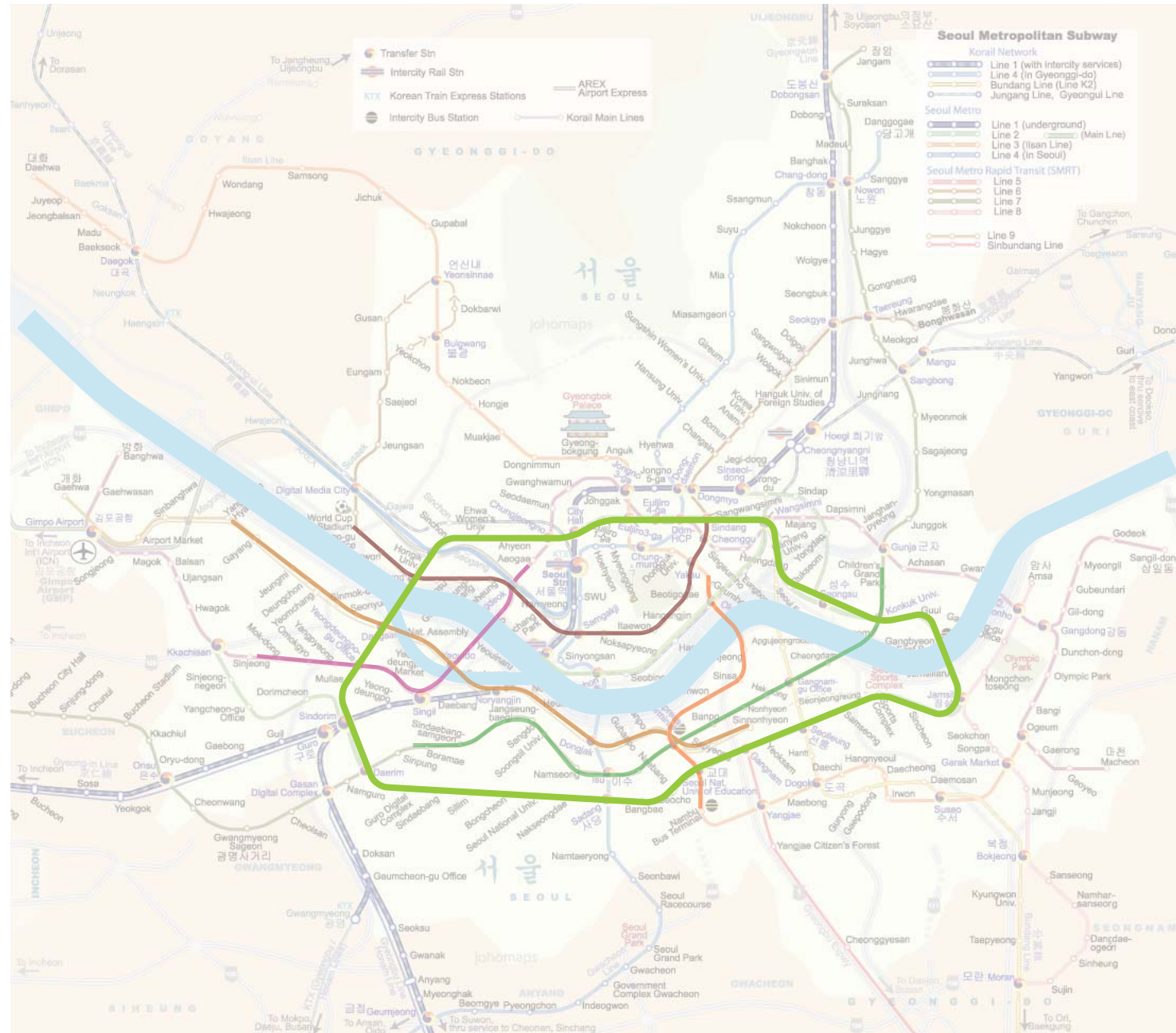


GEOGRAPHIC MAP

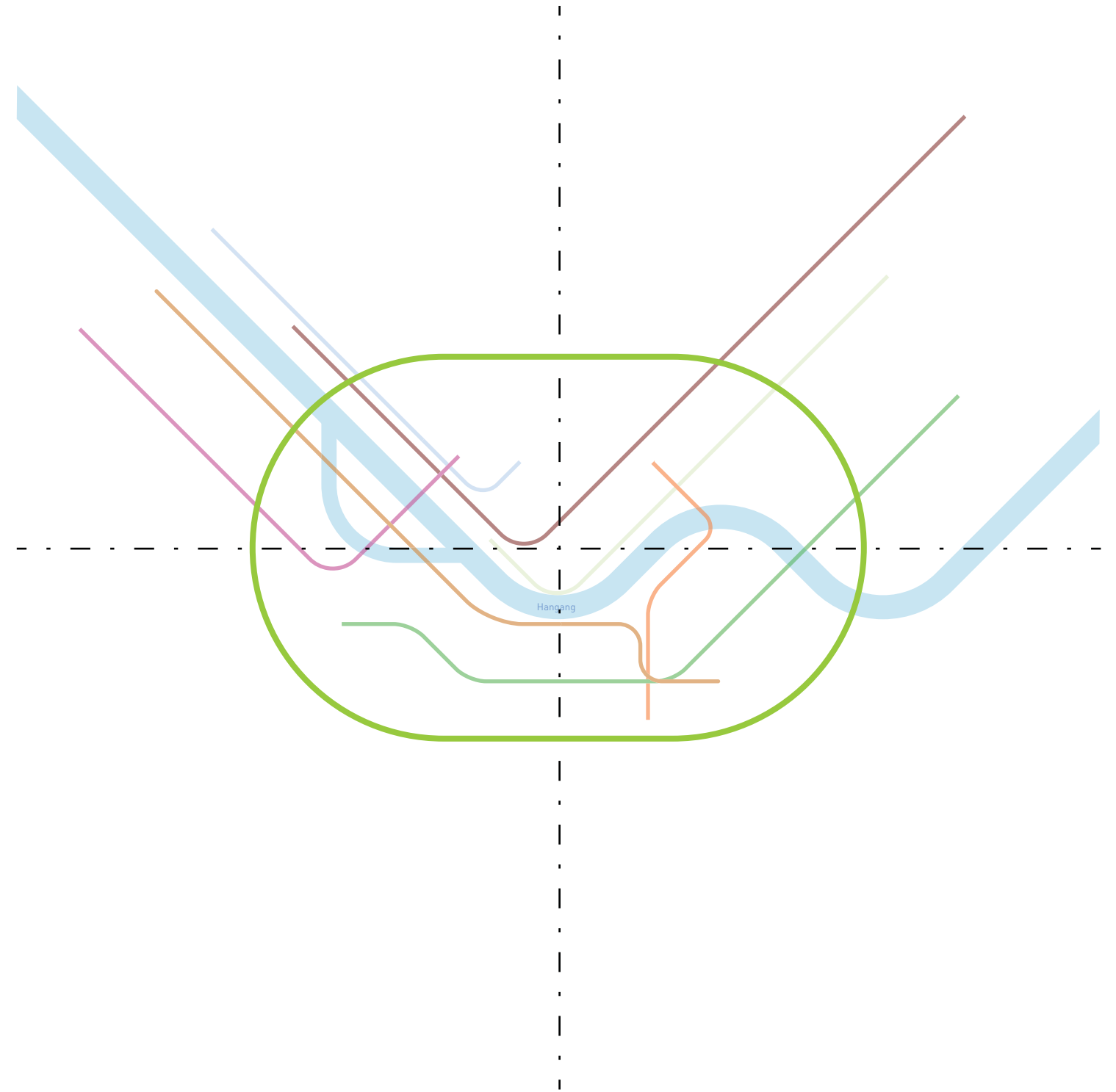


HAN RIVER VALLEY

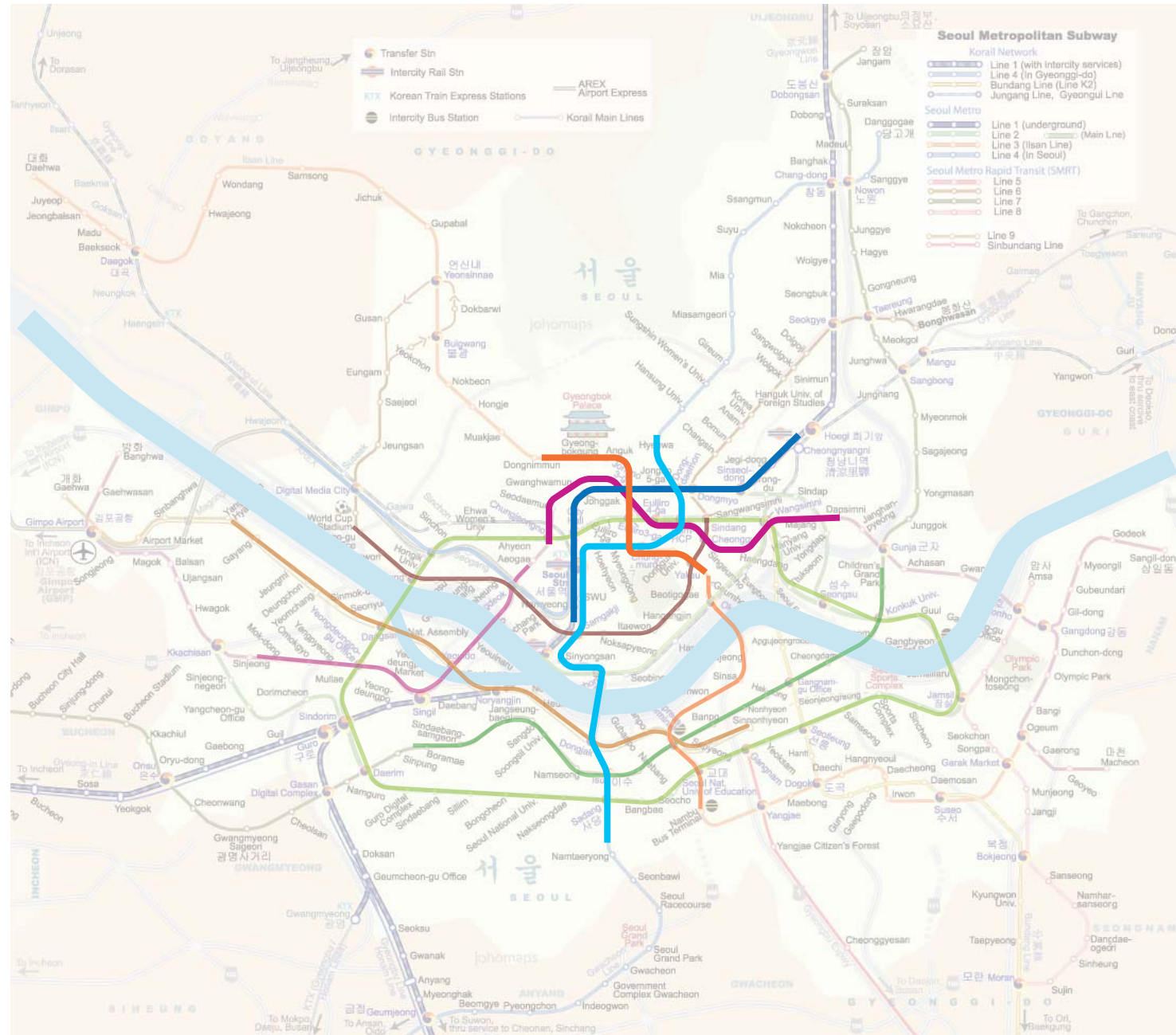
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GEOGRAPHIC MAP



CENTRALITY



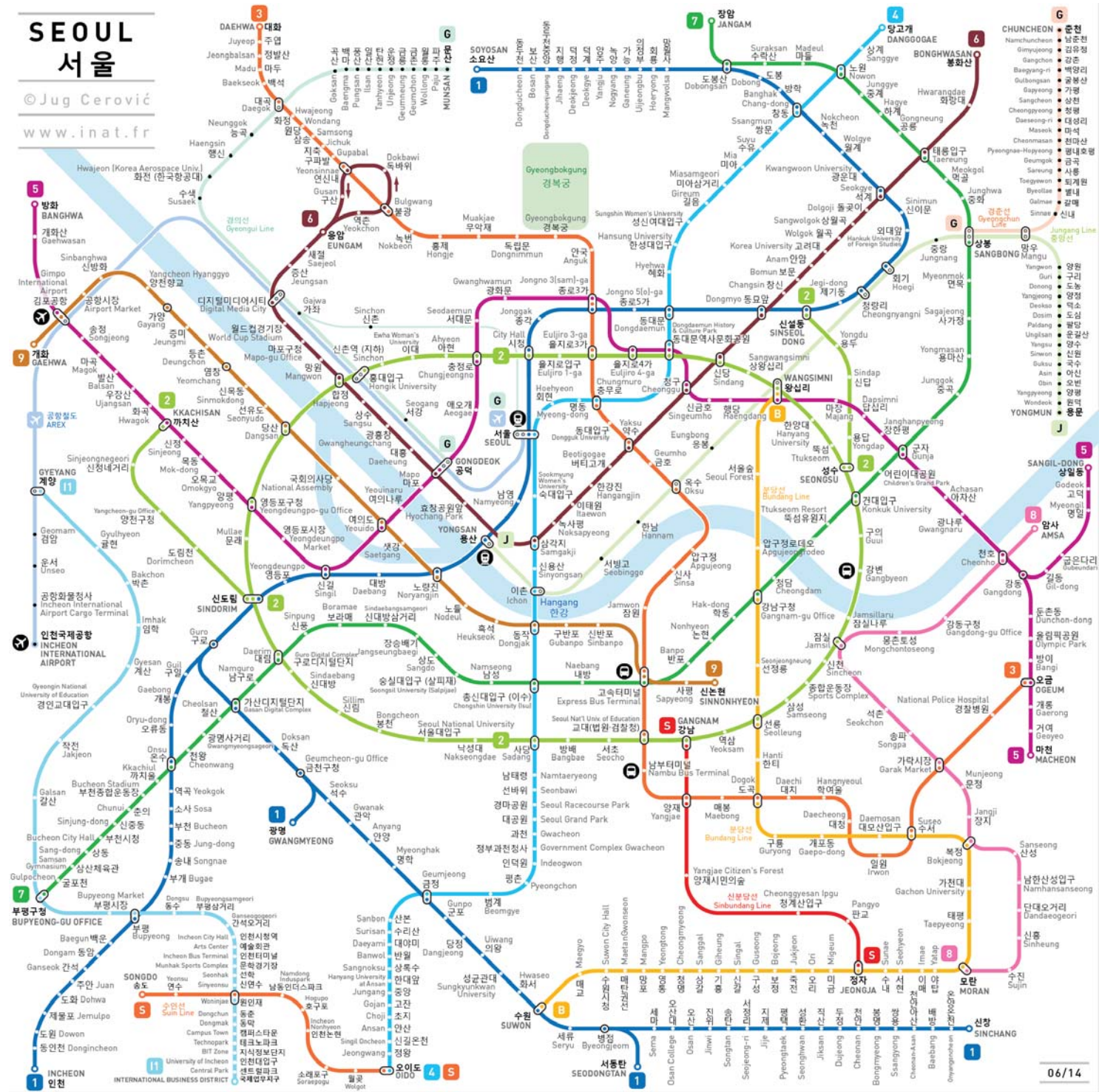
GEOGRAPHIC MAP



DOWNTOWN GRID

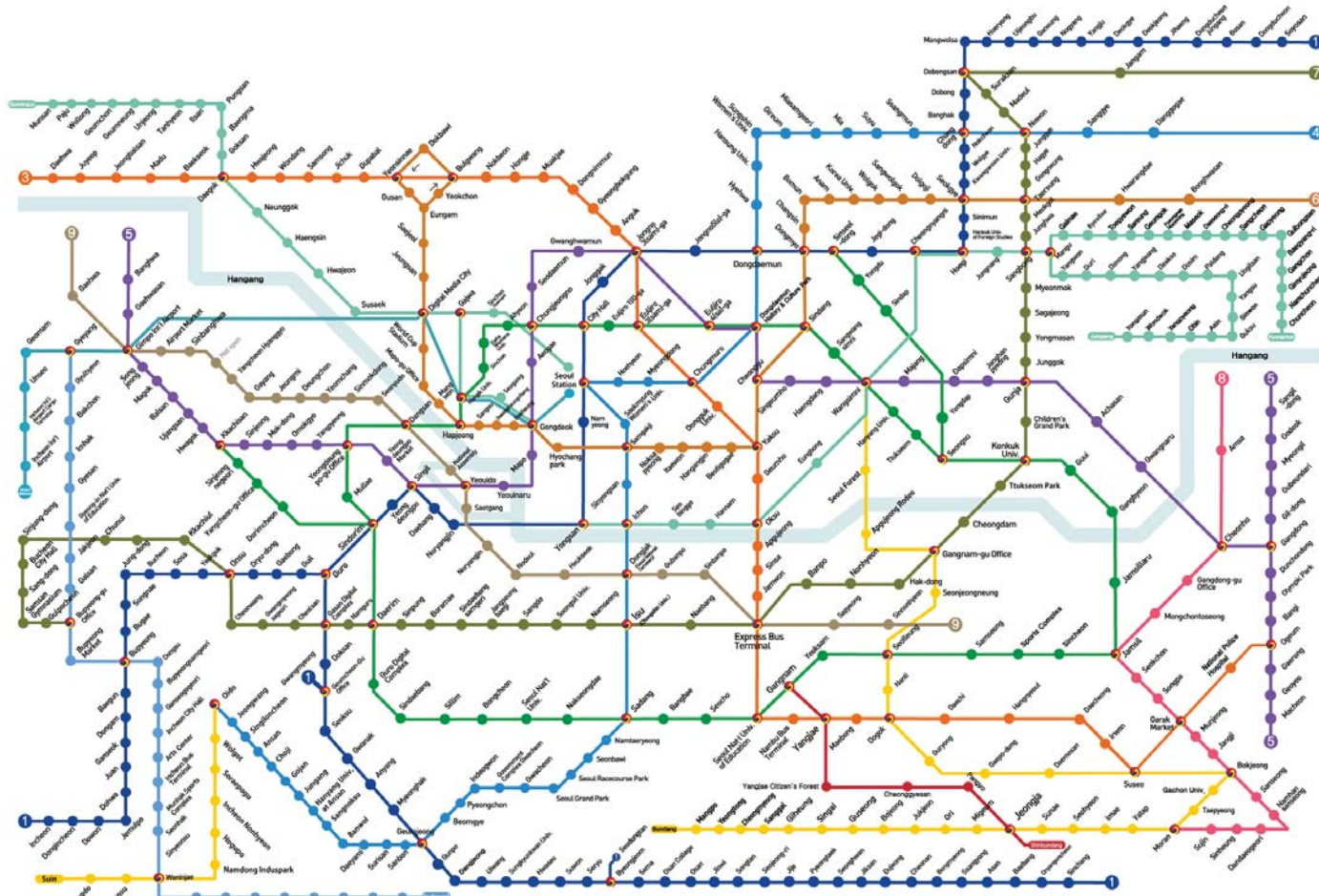


GEOGRAPHIC MAP



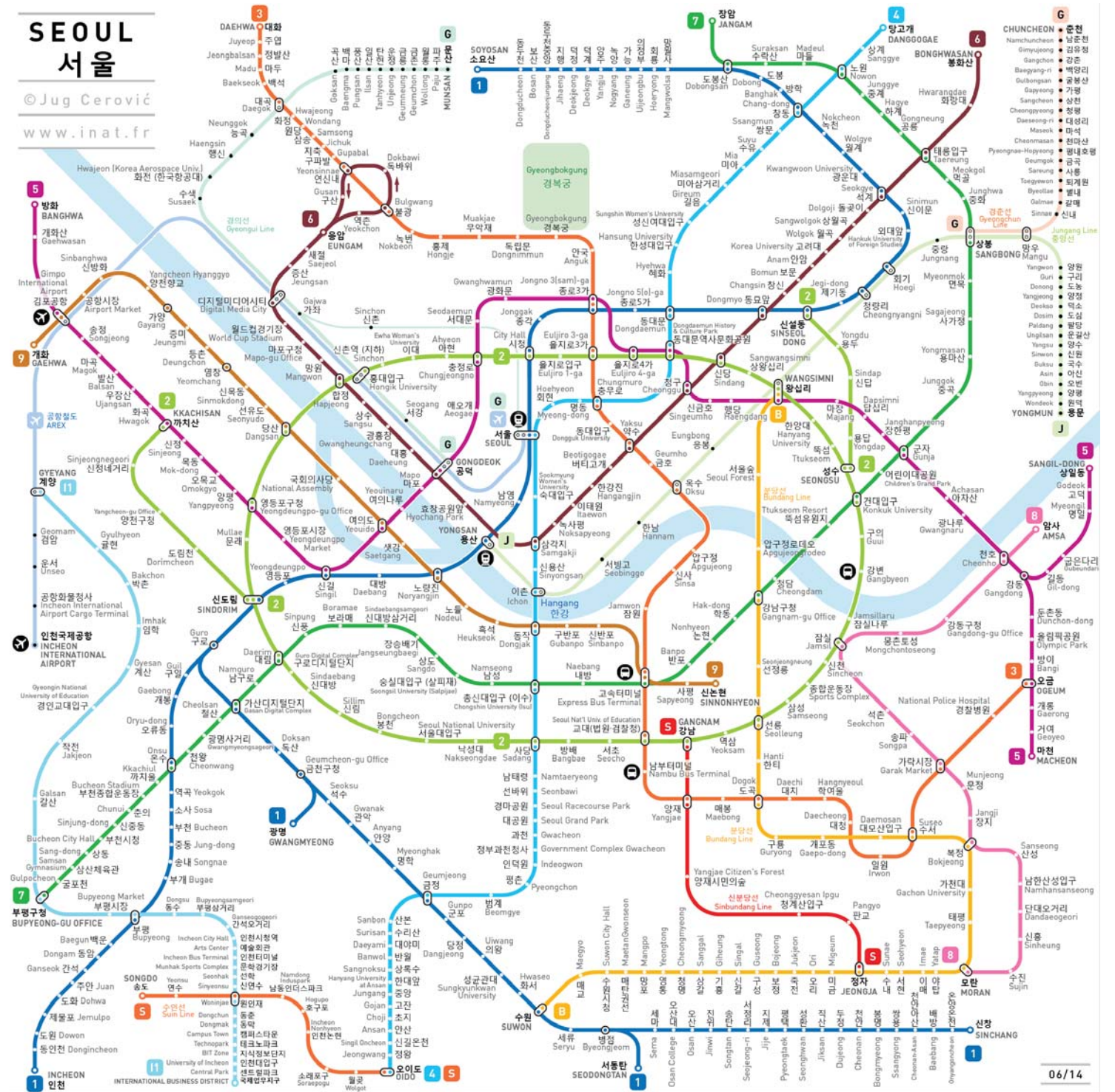
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5678 SMRT Seoul Metropolitan Area Subway Network



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SEOUL 서울
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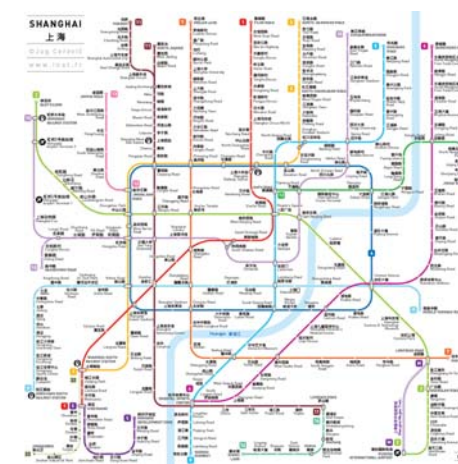
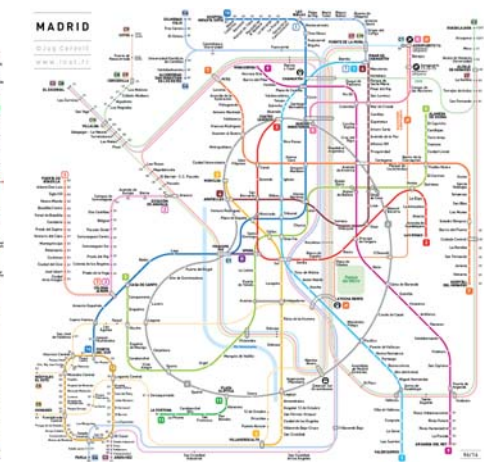


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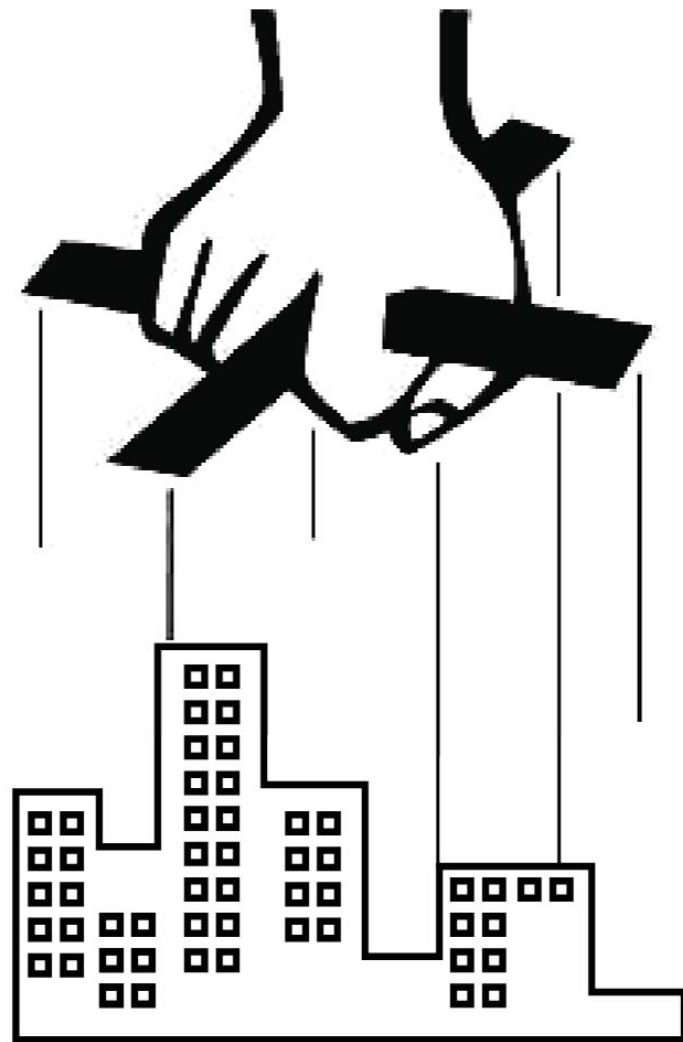
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for metro maps

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- Beijing
- Berlin
- Delhi
- Hong Kong
- Istanbul
- London
- Madrid
- Mexico
- Moscow
- Mumbai
- New York
- Paris
- Seoul
- Shanghai
- Shenzhen
- Tokyo





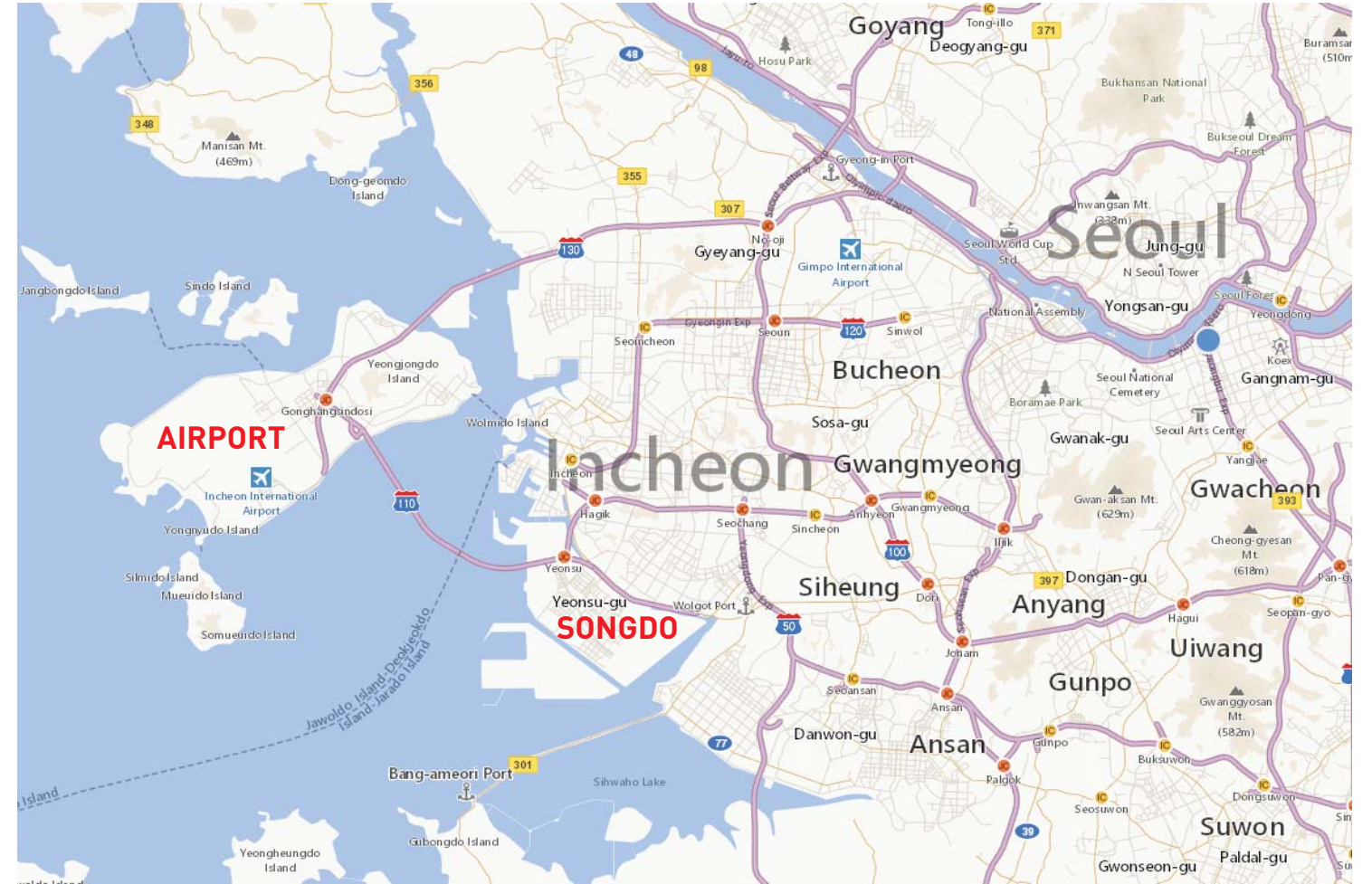




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Map and mind

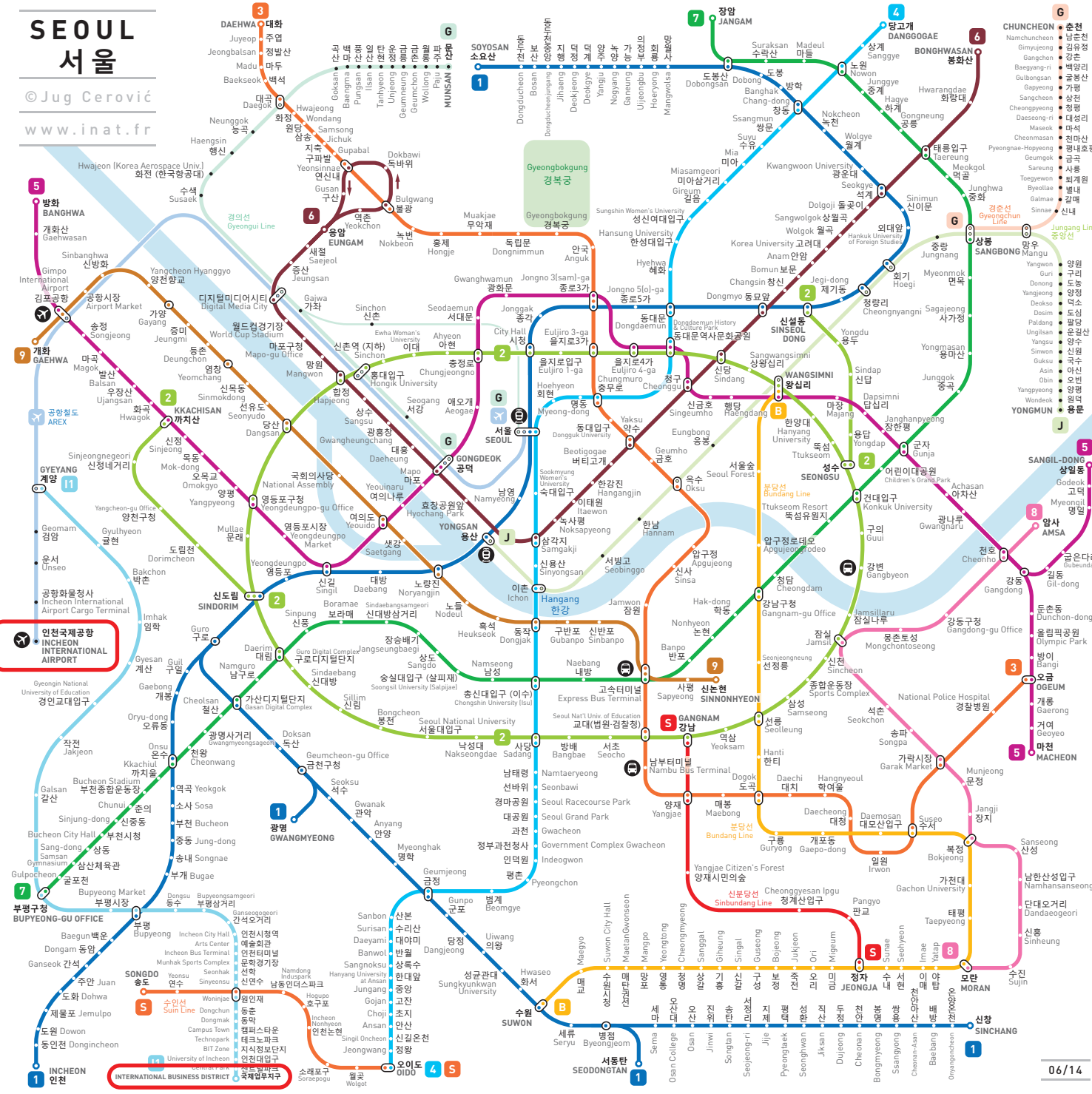


SONGDO



SEOUL-INCHEON

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Map and mind

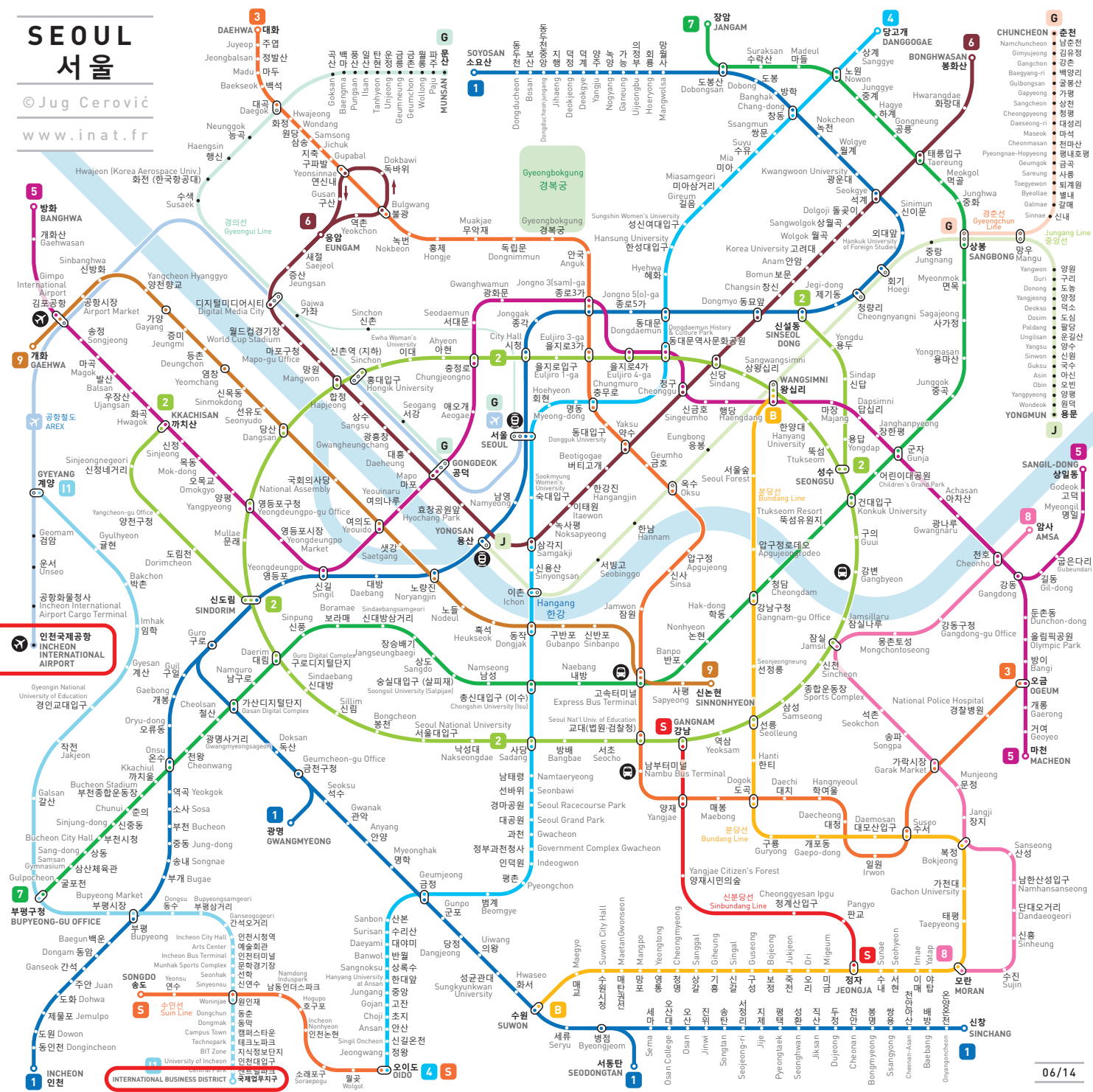


SCHEMATIC MAP

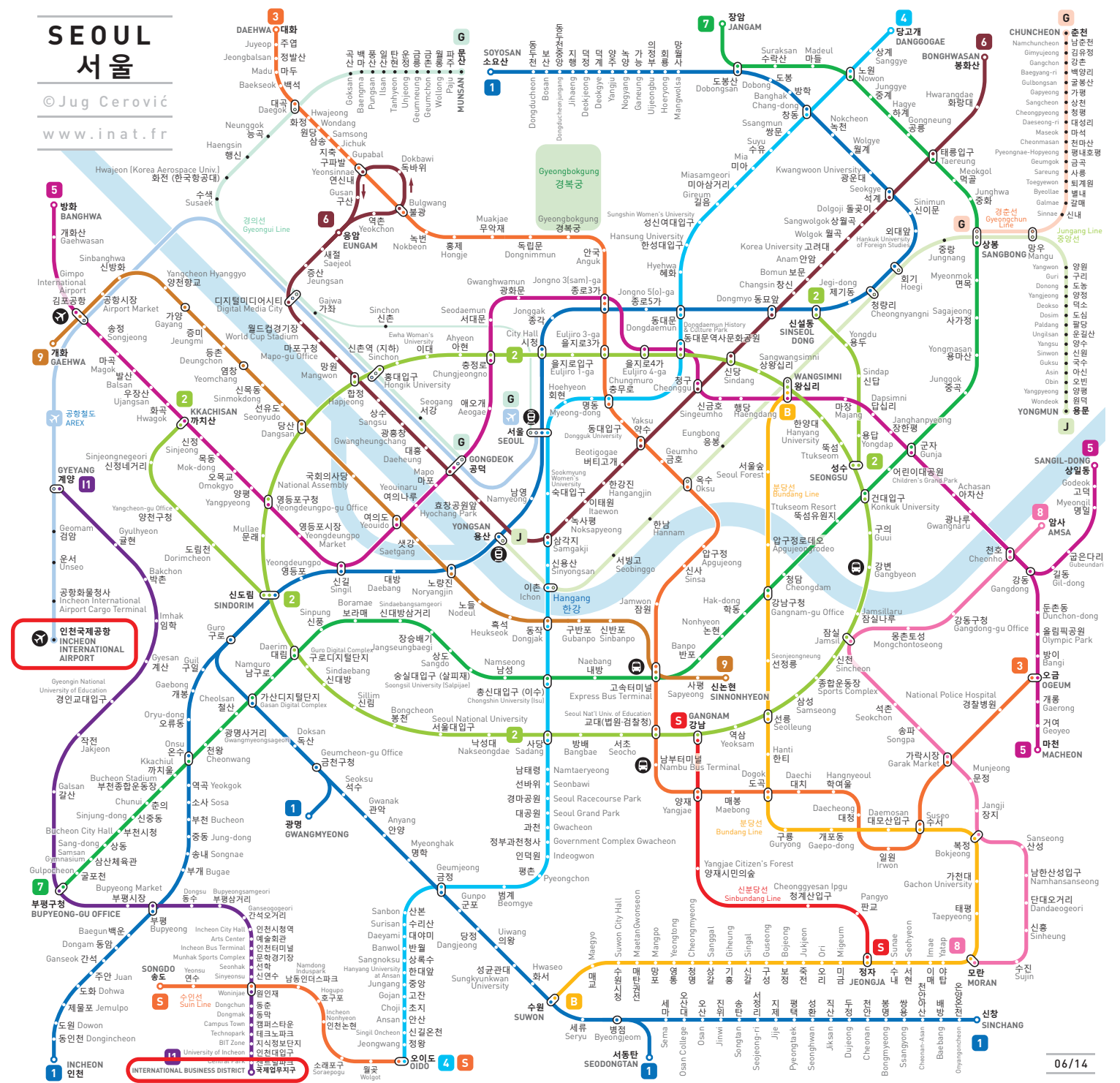


GEOGRAPHIC MAP

Map and mind

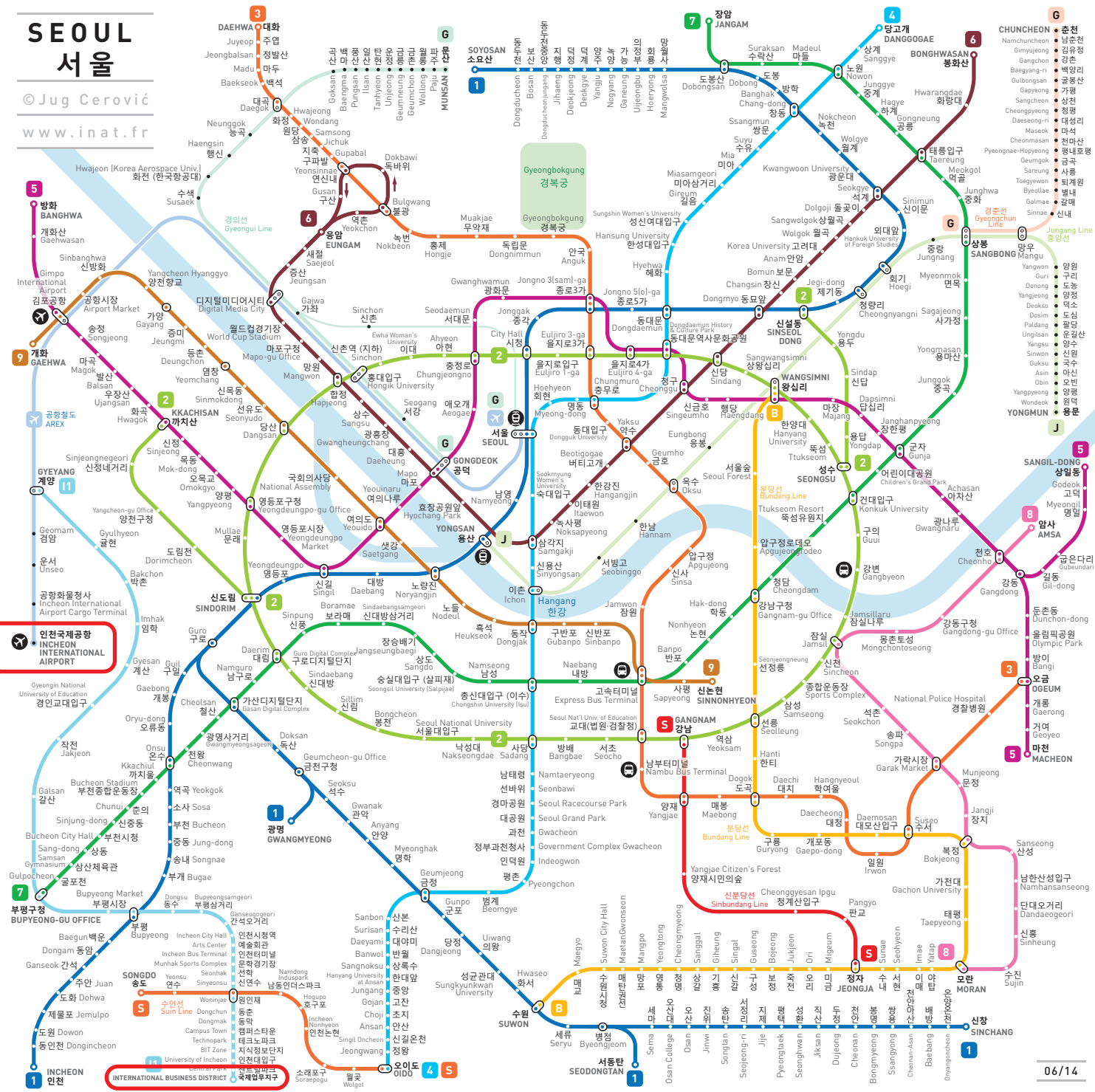


INCHEON LINE 1 COLOR

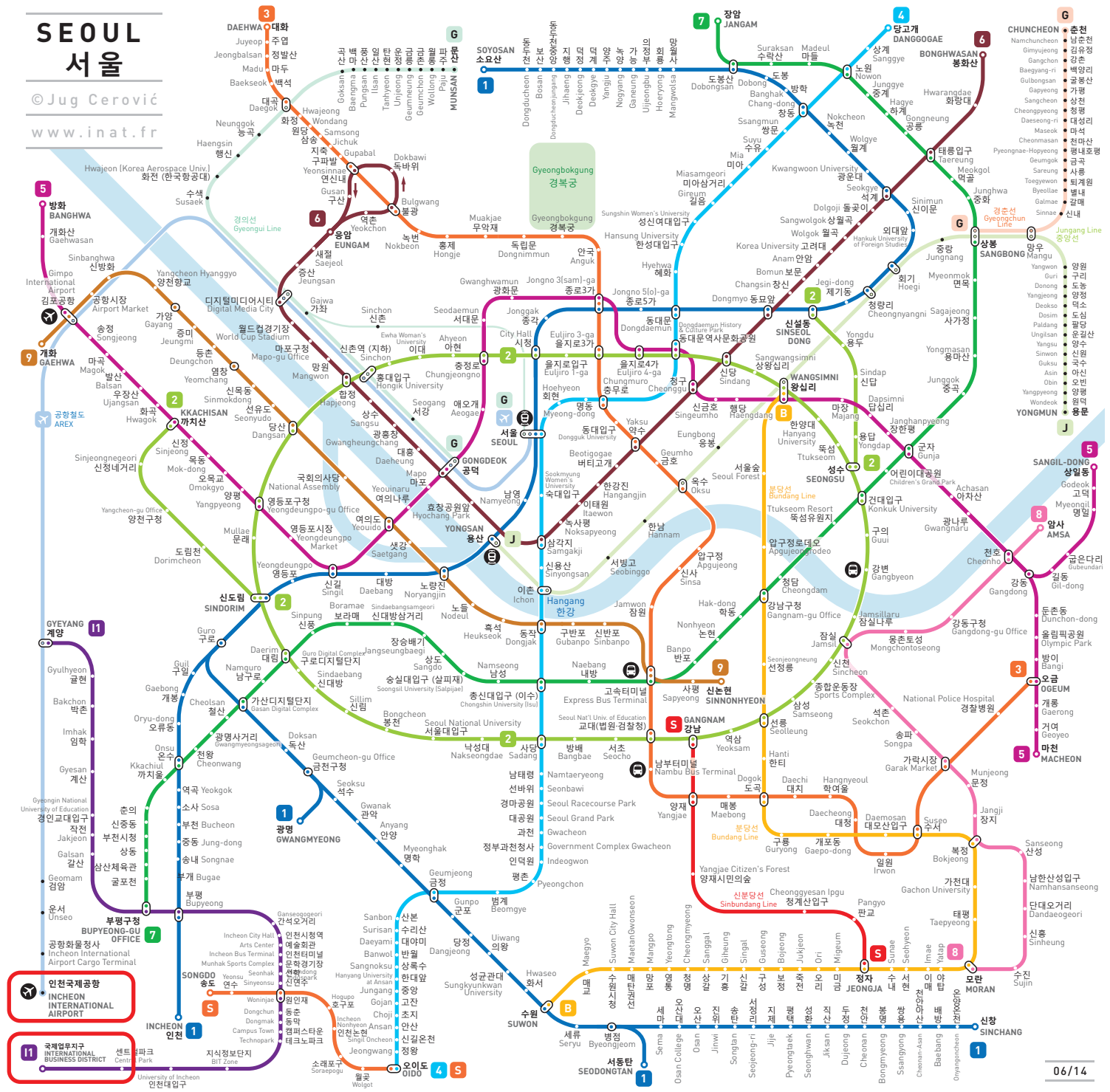


INCHEON LINE 1 COLOR

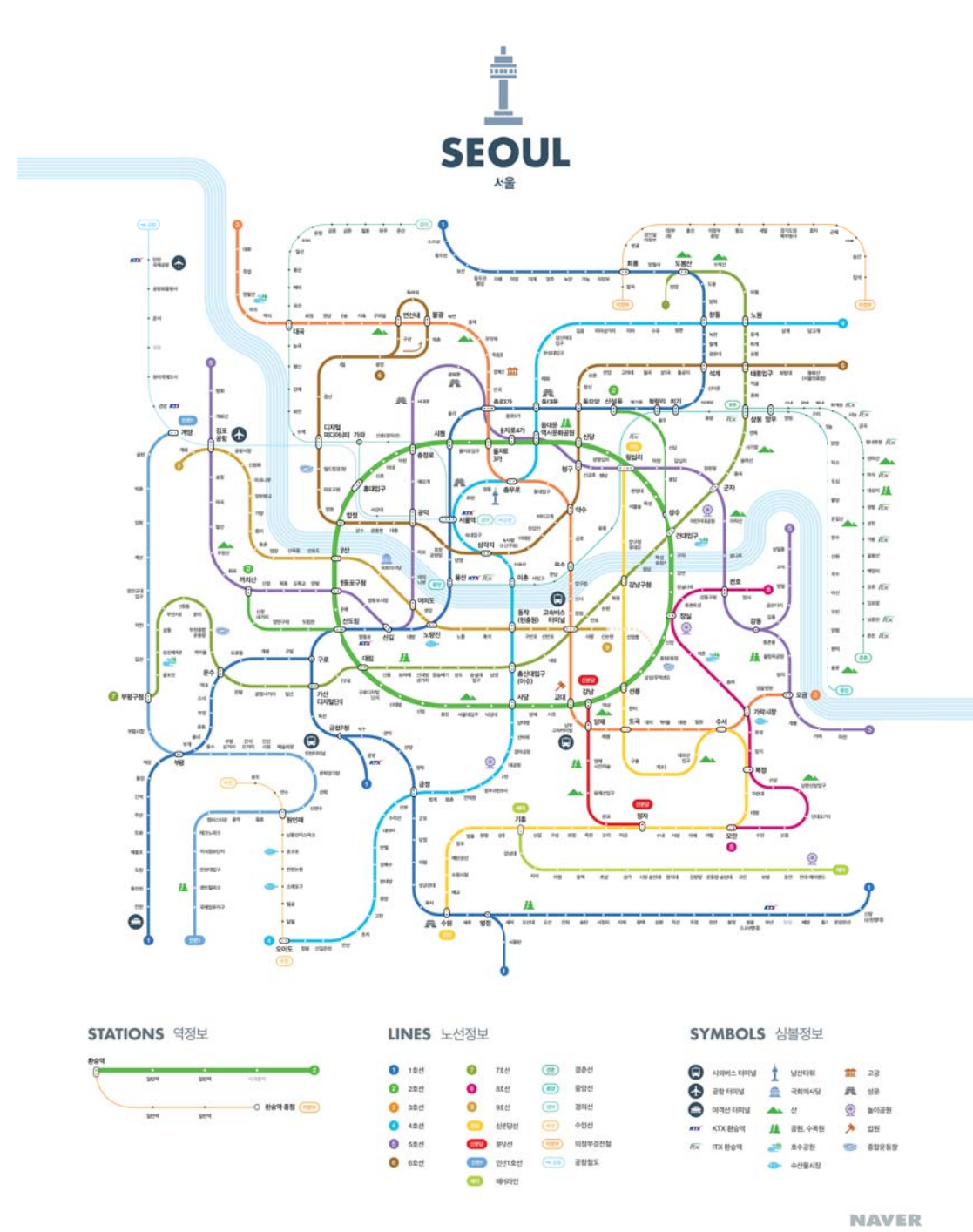
Map and mind



AIRPORT POSITION



AIRPORT POSITION



WORK PLAN

October-November 2014

	ARCHITECTURE		USER EXPERIENCE		
	map draft and specifications	analysis and guidelines			week 42 - October
	guidelines comments and approval	consistency check			week 43 - October
	consistency corrections	design suggestions			week 44 - October
	design suggestions applying and feedback	design suggestions	general UX features review and suggestions	general UX questions	week 45 - November
Meeting in Seoul	common work on architecture design issues		UX workshop in Seoul		week 46 - November
			specific features review and suggestions	general features applying and feedback	week 47 - November
			specific features review and suggestions	specific features applying and feedback	week 48 - November
	NAVER	INAT	INAT	NAVER	

MAP ARCHITECTURE GUIDELINES

COMPONENTS

- Lines
- Stations
- Labels
- Symbols
- Geography
- Color
- Text

METROPOLITAN

- Urban Layout
- Center
- Urban continuity
- Periphery
- Geography

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LINES

• Transport category

Metro		18pt
Commuter		4pt
Light rail		4pt
Under construction		opacity 20%, dashed 12,482pt

• Service patterns

Several lines have different service patterns (local, express...):
 Metro line 1
 Metro line 9
 AREX
 Gyeongchun line (ITX)
 Some limited service on Gyeongui line terminate at Seoul station instead of Gongdeok.
 We should think about the opportunity to show or not those particularities. This point will be developed more in detail in the UX work package.

SUGGESTIONS

Metro:		20pt	Metro Lines 1 - 9 Bundang Line Shinbundang Line Incheon Line 1 Suin Line
Commuter:		5pt	AREX Jungang Line Gyeongchun Line Gyeongui Line
Light rail:		20pt 10pt white	U Line Everline

Metro or commuter?
 Metro line 1, Bundang Line, Shinbundang Line, Suin line, Incheon Line 1 could also be classified as commuter (they serve far away suburbs or do not enter central Seoul). Nevertheless they are used and perceived just as regular metro lines and should be shown as such.

Line 2
 Metro Line 2 should be represented the same way as all other metro lines. It is equal in use and perception to the other lines, its particular ring configuration doesn't justify per se a different treatment. A clearly outstanding stylized shape should be sufficient to emphasize its particularity and importance.

Commuter lines
 All commuter lines (save AREX) could have the same color. They can be perceived as a single line with different services and branches, just as Metro line 1 (and are scheduled to be connected in the future at Yongam). The actual colors are similar enough that a unique color for all would simplify lecture.

Light rail
 Light rail lines should have a particular signage. They have much less capacity and lower frequency than metro or commuter and that information should be made available on the map.

Bus Lines
 If a bus line is someday considered relevant enough to be shown on the map a dedicated symbol should exist for it.

MAP ARCHITECTURE GUIDELINES

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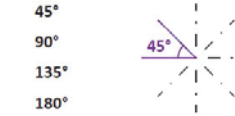
METROPOLITAN

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LINES

• Angles



• Curves



SUGGESTIONS

Angles are all right, clear and precise.

The number of curves should be limited to 2, 3 or 4. Line 2 can be an exception.

1/4 circle
 R=10, R=7.5, R=5, R=2.5, R=0, R=0, R=0, R=0

1/8 circle
 R=10, R=15, R=10, R=5, R=10, R=12, R=6

MAP ARCHITECTURE GUIDELINES

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- Periphery
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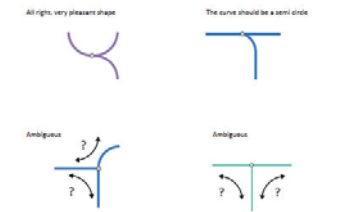
LINES

• Parallel lines

	Width between axes	25pt
	Blank space	1pt
	Width between axes	22pt
	Blank space	4pt
	Width between axes	20pt
	Blank space	9pt
	Width between axes	21pt
	Blank space	17pt

Parallel curves:
 The innermost curve (L2) is offset by a distance equivalent to the width between lines' axes.

• Branches



SUGGESTIONS

	Line width	20pt
	Width between axes	30pt
	Blank space	10pt
	Line width	20pt/5pt
	Width between axes	30pt
	Blank space	20pt
	Line width	5pt
	Width between axes	30pt
	Blank space	25pt

Between axes width is equal to twice that of thickest line category. Then minimal blank space is equal to half the width of thickest line category.

Identical width between axes for all cases allows for easy change of line category (example: Commuter to Metro) without modifying the drawing structure.

Branches must separate from the trunk line in a way to show the possible direct routes without ambiguity.

MAP ARCHITECTURE GUIDELINES

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STATIONS

• Common

Metro		Disk ø=10,7pt White
Commuter		Disk ø=10,7pt Grey RGB 85,85,85
Light rail		none
Under construction		none

• Terminal



• Transfer



The dimensions of the station are strictly correlated to the number of lines serving it. Each line is represented by a disk of the line's color. Disks are equally spaced along the station stroke. Lines must run through their respective disk's center.

Station rounded stroke:
 Width: White 26pt, Black 34pt
 Length: ~25 (2L), ~31pt (3L)
 Disk ø=11,4pt

SUGGESTIONS

Station disks should be enlarged and dimensions rounded.

Metro		Disk ø=14pt White
Commuter		Disk ø=14pt Grey RGB 85,85,85
Light rail		Disk ø=14pt Color of the line

If we consider that a line represent an existing service then lines should not extend past the last station since no service exists there.

Easily identifying a terminal station is critical to the user since it provides him with most necessary information: the directions and the line number/name. Therefore a terminal station should be clearly visible and distinct from common stations. Terminal transfer stations are fine as they are now.

Transfer station dimensions should be based on lines inter-axes width and common station size.

Station rounded stroke width:
 Black: 2 x metro line = 40pt
 White: 3/4 black = 30pt

Station length:
 Distance between extreme disks centers (lines' axes if parallel as in example on the left)
 30pt (2 Lines), 60pt (3L), 90pt (4L)
 Disk ø=common station ø=14pt

MAP ARCHITECTURE GUIDELINES

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LABELS

- Line category
 - Metro: height: 60pt, length depends on text. Examples: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20.
 - Commuter: Examples: 20, 21, 22.
 - Light rail: none.
- Position
 - Whenever possible the label is on the line axis. If not it is separated from the line by the station name.

SUGGESTIONS

Labels can be uniformed based on the largest one in use (ARX). Text should be bolded.

A new label is required for light rail. Definitive label size will be adapted during the UX design.

The axis principle works well overall. On terminals with several lines maybe the labels should be grouped since they are all related to the same station name.

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SYMBOLS

- Facilities: Examples of various facility icons.
- Transport Services:
 - KTX
 - ITX
- Transport Hubs:
 - Bus
 - Airplane
 - Ship

SUGGESTIONS

Very nice icons, sharp and attractive, they work very well.

Simple and clear, very well. ITX of "Service patterns".

A rail icon for the main train stations may come handy, even though KTX icon exists. Maybe combine both for users who don't know what KTX stands for.

The transport icons may very well do without colored disks, they would share the mood of the other symbols.

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GUIDELINES: COMPONENTS

MAP ARCHITECTURE GUIDELINES

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GEOGRAPHY

- River:
 - Color
 - Size
 - Pattern
 - Angles
 - Curves
- Sea: None.
- Position: Distance rivers/lines.
- Interaction: River crossing.

SUGGESTIONS

Confusion with lines must be avoided.

Some day the sea may appear on the map, it is necessary to define its characteristics.

Lines need to be away from the river by at least 20pt.

No stations on water. Lines should be more differentiated from water.

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METROPOLITAN
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Center
Urban continuity
Periphery
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COLOR

- Lines: A series of colored vertical bars representing different line colors.
- Geography: A light blue horizontal bar.
- Symbols: A series of colored vertical bars representing different symbol colors.

SUGGESTIONS

Visually impaired > UX work package

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MAP ARCHITECTURE GUIDELINES

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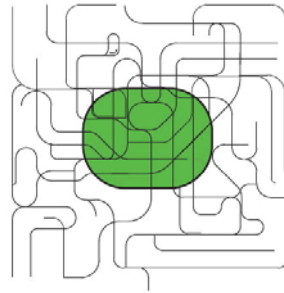
METROPOLITAN

Urban Layout

- Center
- Urban continuity
- Periphery
- Geography

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URBAN LAYOUT



There are 2 clearly identified fields on the map:

• Center

CENTRAL ZONE (Green)

This is the area where most transfer stations are located

- Distances are close to reality
- Angles are close to reality

• Periphery

PERIPHERAL ZONE

- No distance information
- Angles do not correspond to reality

SUGGESTIONS



New intermediate zone:

URBAN CONTINUITY (Red)

- Relative position of transfer and terminal stations to each other is respected

The red zone encompasses the continuously urbanized area bordering Line 2, the northern City extension and the South-Western Bucheon-Incheon zone.

This zone should translate the reality of continuously urbanized territory and connections within it on the map.

MAP ARCHITECTURE GUIDELINES

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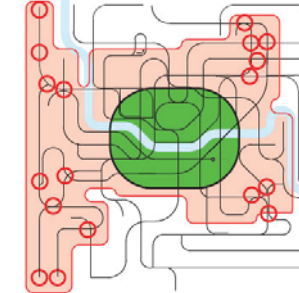
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URBAN CONTINUITY



New intermediate zone:

URBAN CONTINUITY (Red)

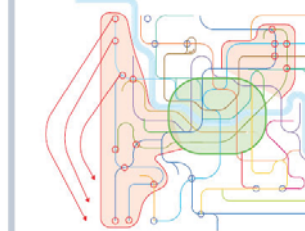
- Relative position of transfer and terminal stations to each other is respected

SUGGESTIONS



The Red zone should translate the reality of continuously urbanized territory on the map. It works already well for the North-East zone, less so in the South-West.

The possibility of a transit line on Incheon Bridge must be contemplated.



The Airport Maglev should be added to the map.

MAP ARCHITECTURE GUIDELINES

COMPONENTS

- Lines
- Stations
- Labels
- Symbols
- Geography
- Color
- Text

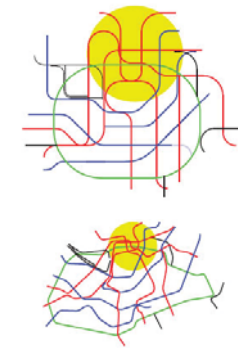
METROPOLITAN

Urban Layout

- Center
- Urban continuity
- Periphery
- Geography

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CENTER



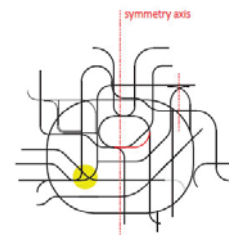
This is the area where most transfer stations are located

- Distances are close to reality
- Angles are close to reality

- 5 North-South lines are constrained to vertical axes.
- 4 East-West lines are mostly horizontal.
- Major bends are drawn with large radius semi circles
- Ring Line 2 has a simplified regular shape
- Downtown grid (yellow disk) is enlarged

- A vertical symmetry axis is emphasized

SUGGESTIONS

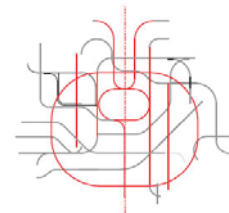


- Vertical constraint works well

- Symmetry axis should be centered and even more emphasized

- Yellow area (triangle) to be enlarged

- Large semi circles are aesthetically very pleasant and add character, use them more.



MAP ARCHITECTURE GUIDELINES

COMPONENTS

- Lines
- Stations
- Labels
- Symbols
- Geography
- Color
- Text

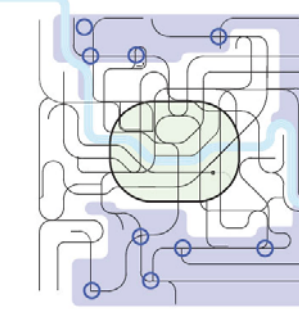
METROPOLITAN

Urban Layout

- Center
- Urban continuity
- Periphery
- Geography

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PERIPHERY

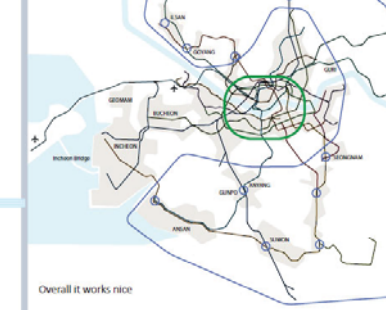


PERIPHERAL ZONE

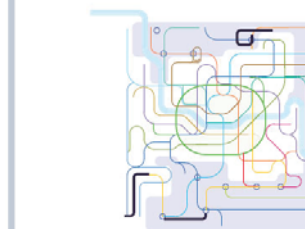
This area represents the distant periphery where very few transfer stations exist. The lines are completely schematized.

- No distance information
- Angles do not correspond to reality

SUGGESTIONS

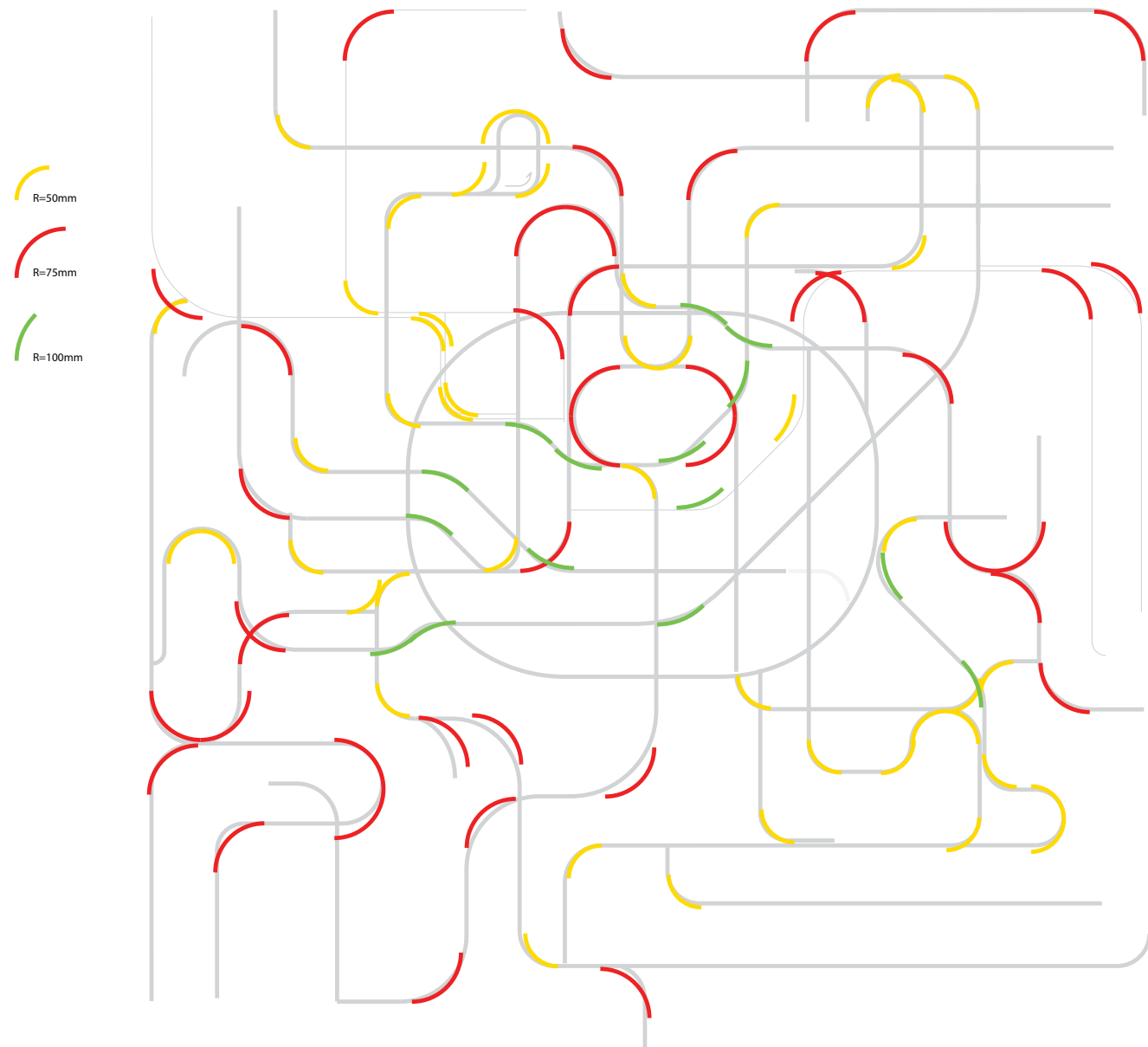


Overall it works nice



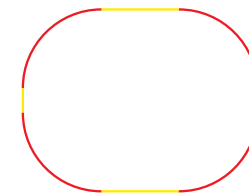
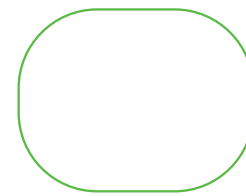
Suin Line prolongation to Suwon: Anyang-Suwon-Ansan triangle can be emphasized

U line layout: the line passes between Gansung and Uijongbu. No connection but close proximity to Jungang station

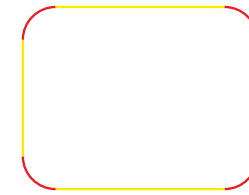


CURVE RADIUS

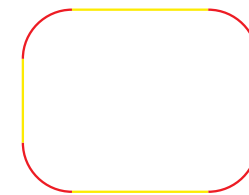
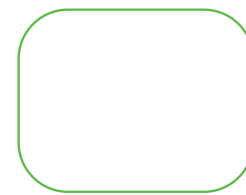
ACTUAL



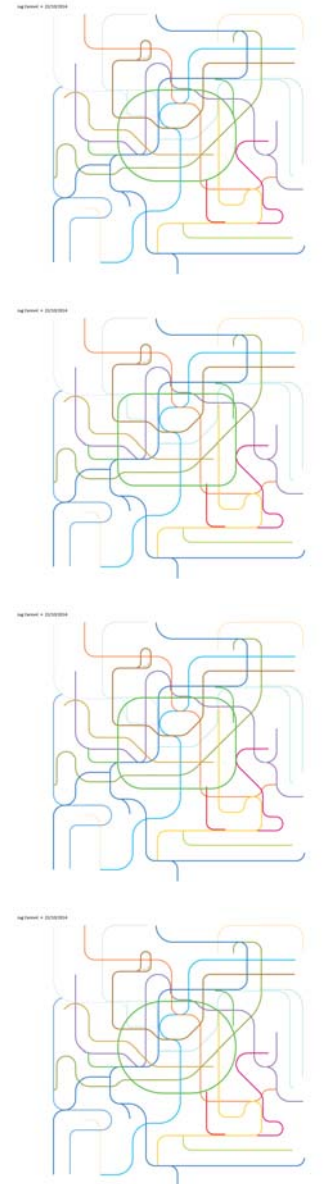
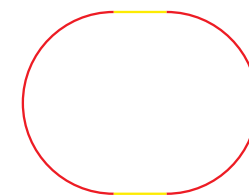
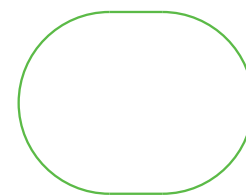
CURVE R=100



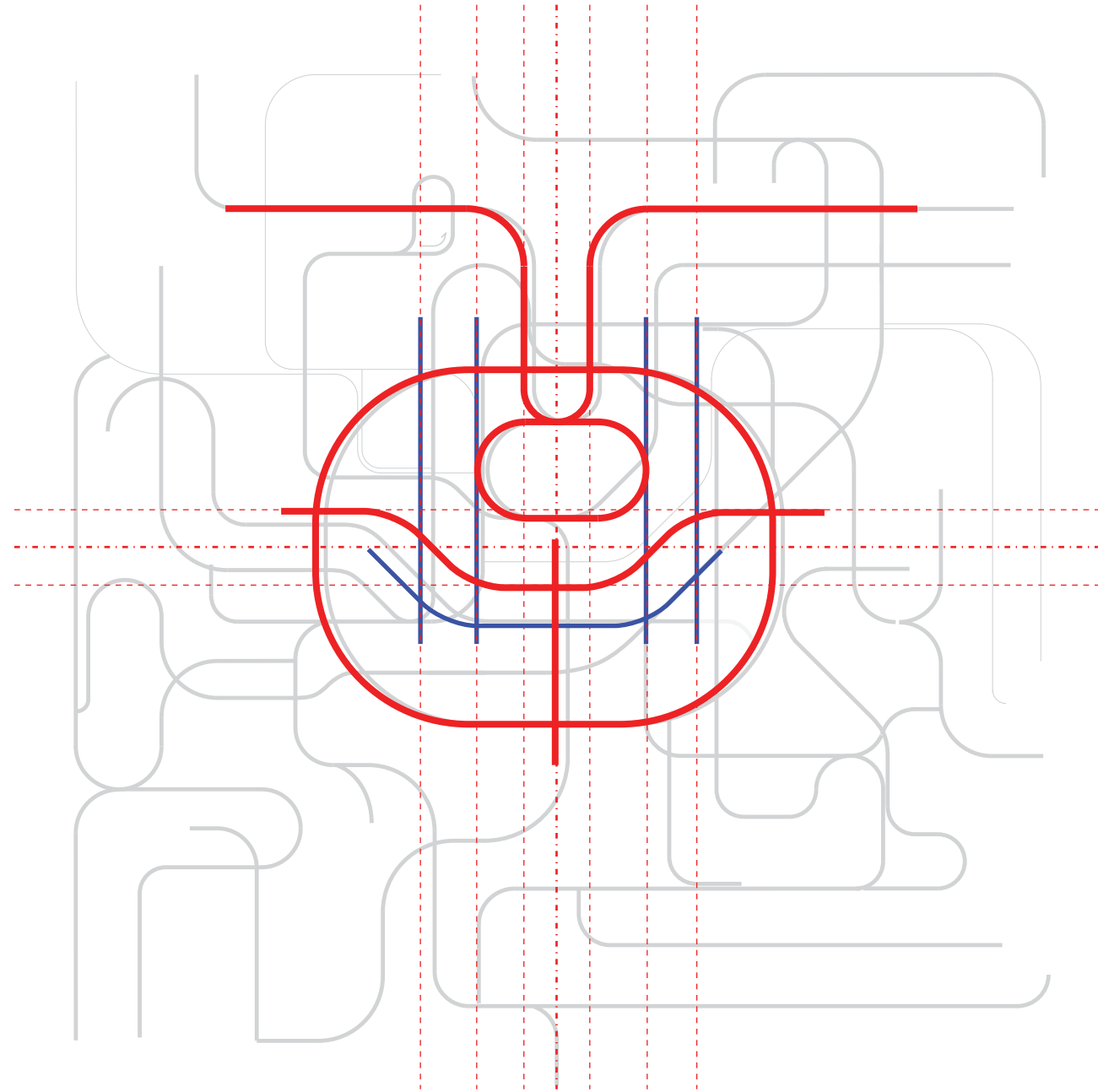
CURVE R=150



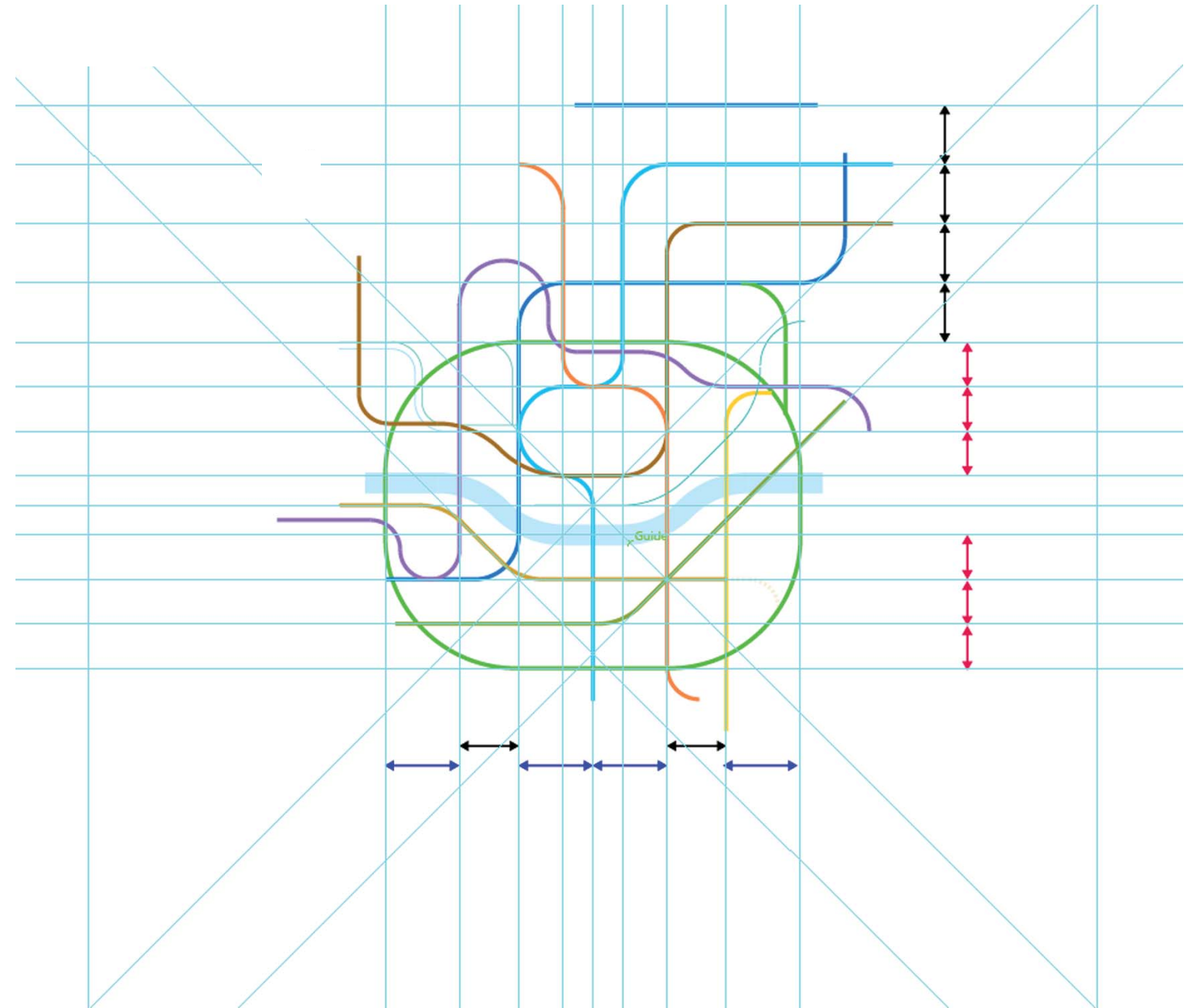
SEMI-CIRCLES



RING LINE



SYMMETRY

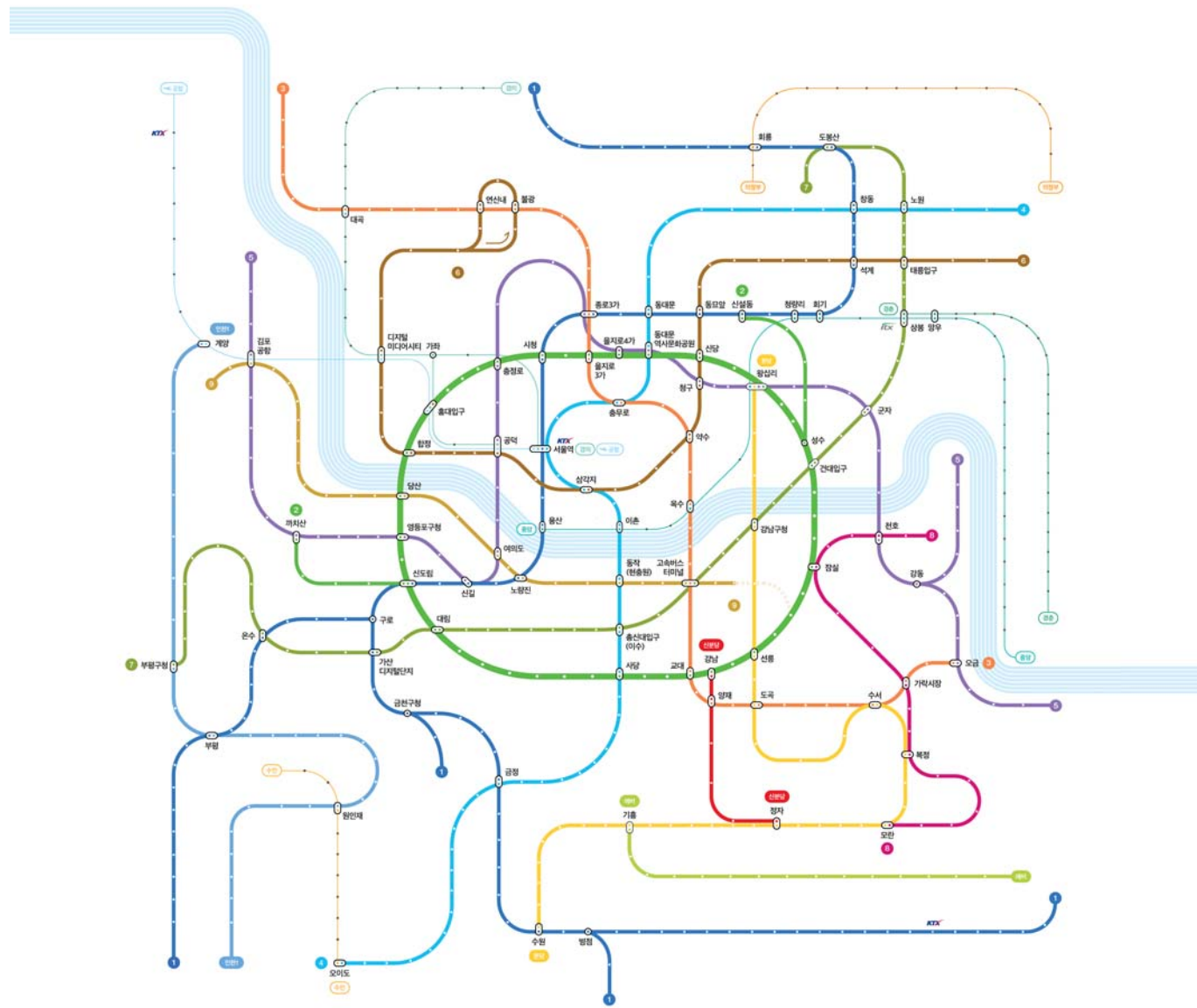


BALANCE

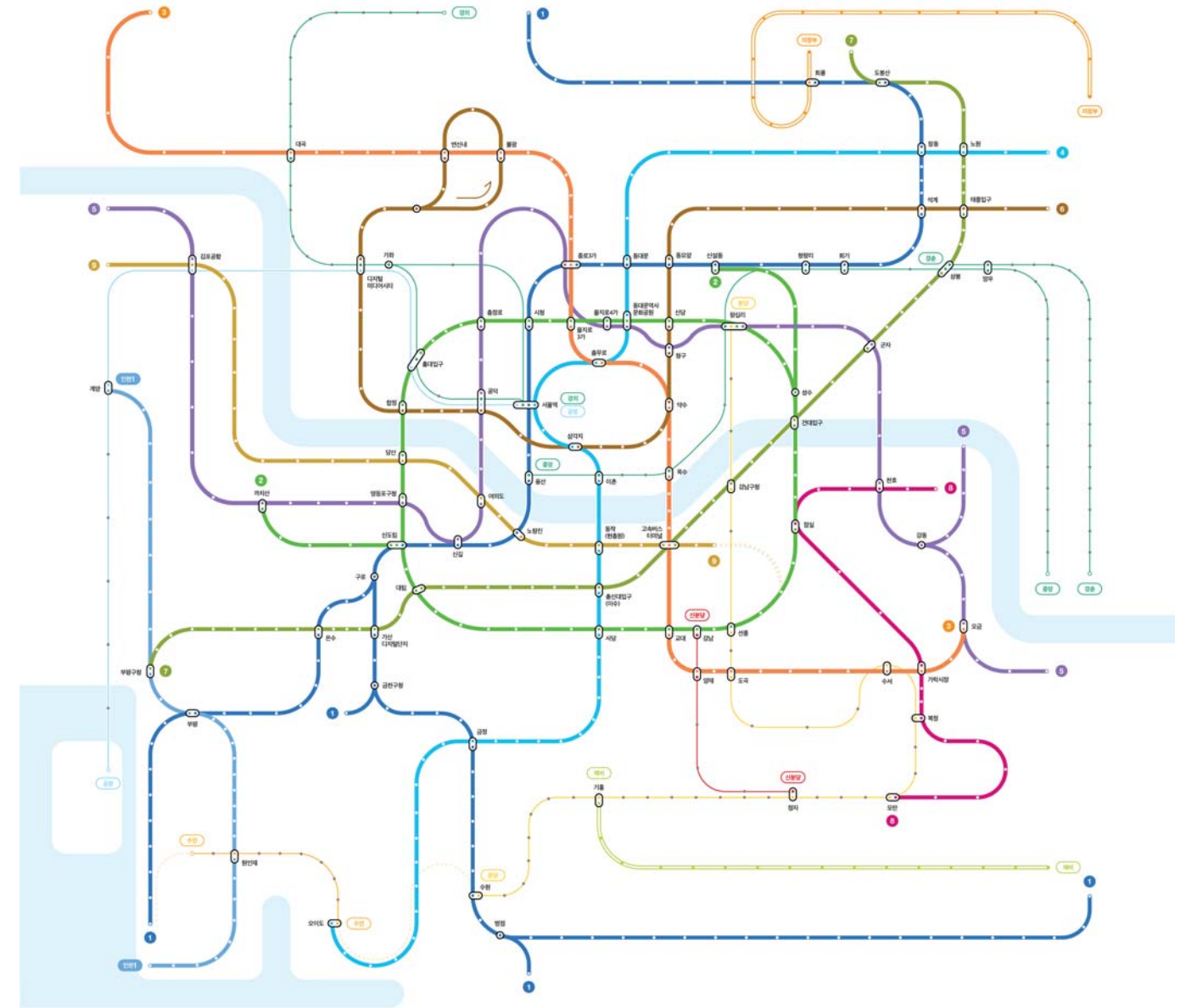


ICON CATEGORIES

ICON COLORS



VERSION 1

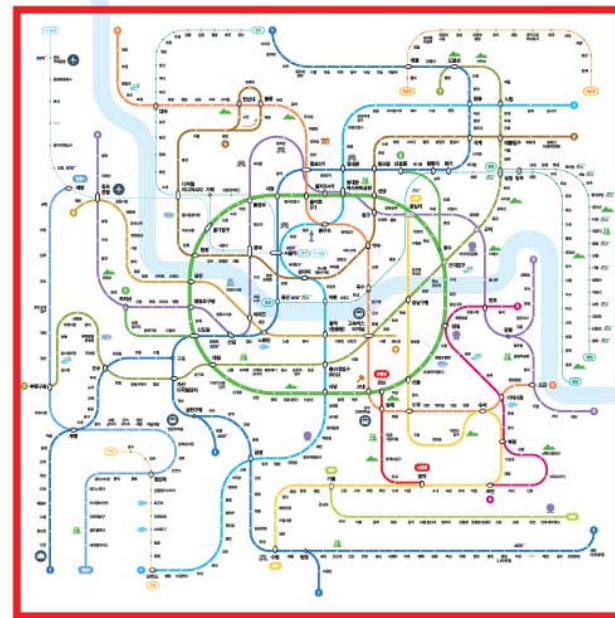


VERSION 2

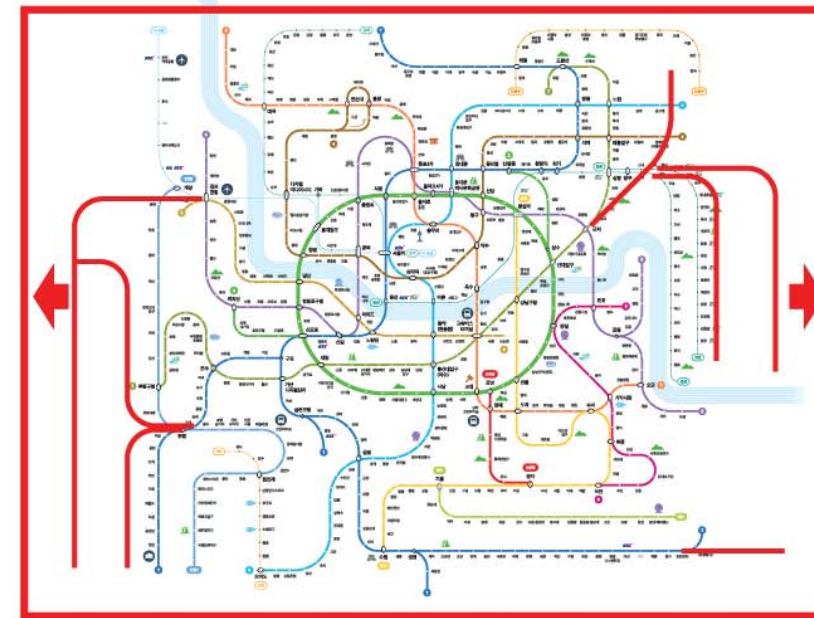
RECTANGULAR MAP LAYOUT

Urban consistency

Square map layout



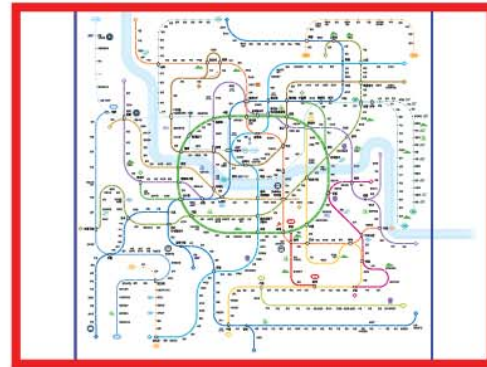
Rectangular map layout



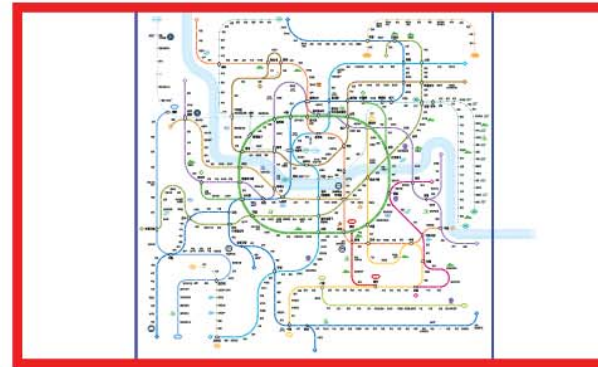
The rectangular layout provides more room for peripheral zones.

RECTANGULAR MAP LAYOUT

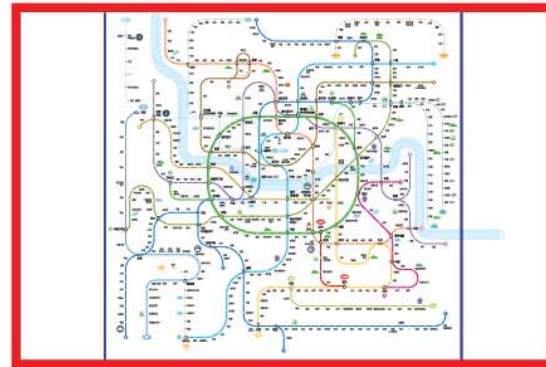
Proportion



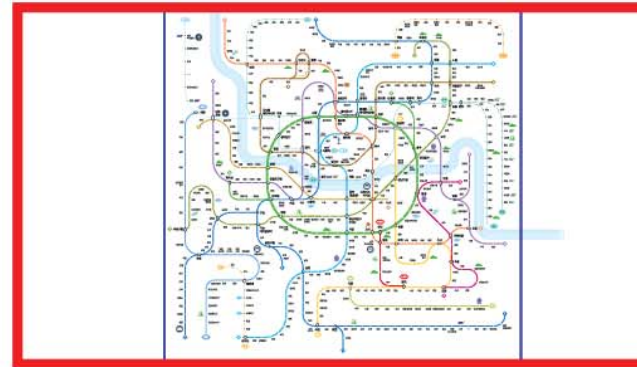
4:3



5:3



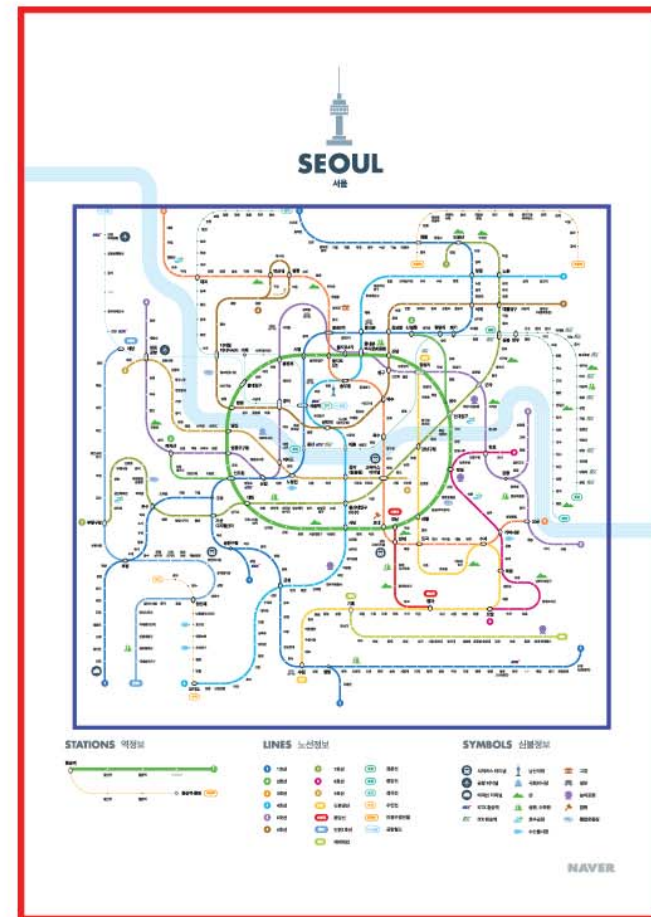
3:2



16:9

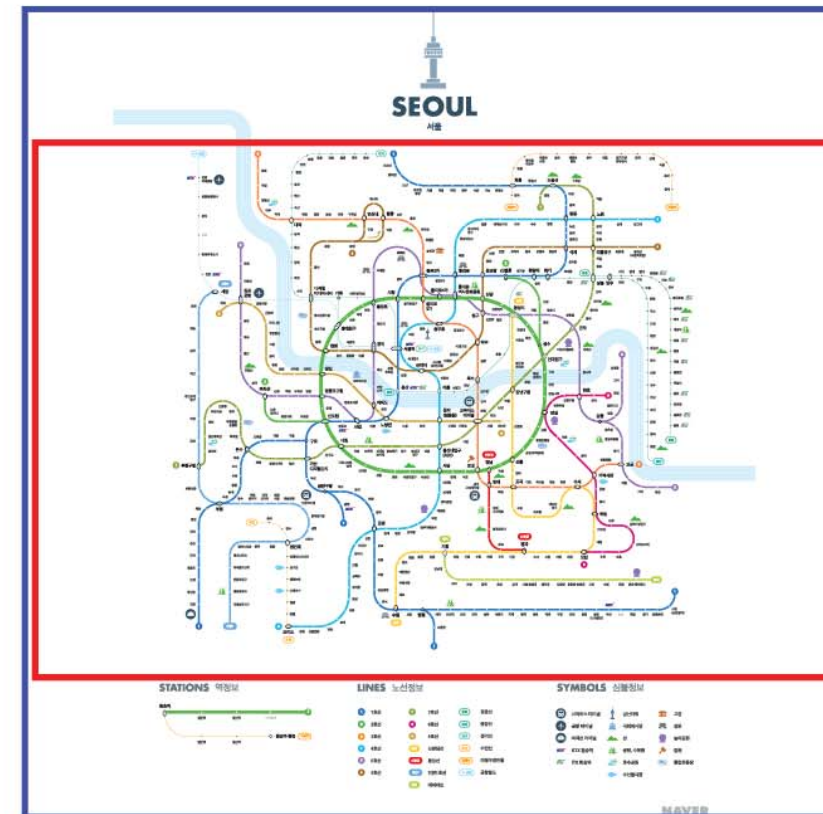
RECTANGULAR MAP LAYOUT

Legend layout



Current

Map: Square
Legend: Rectangle

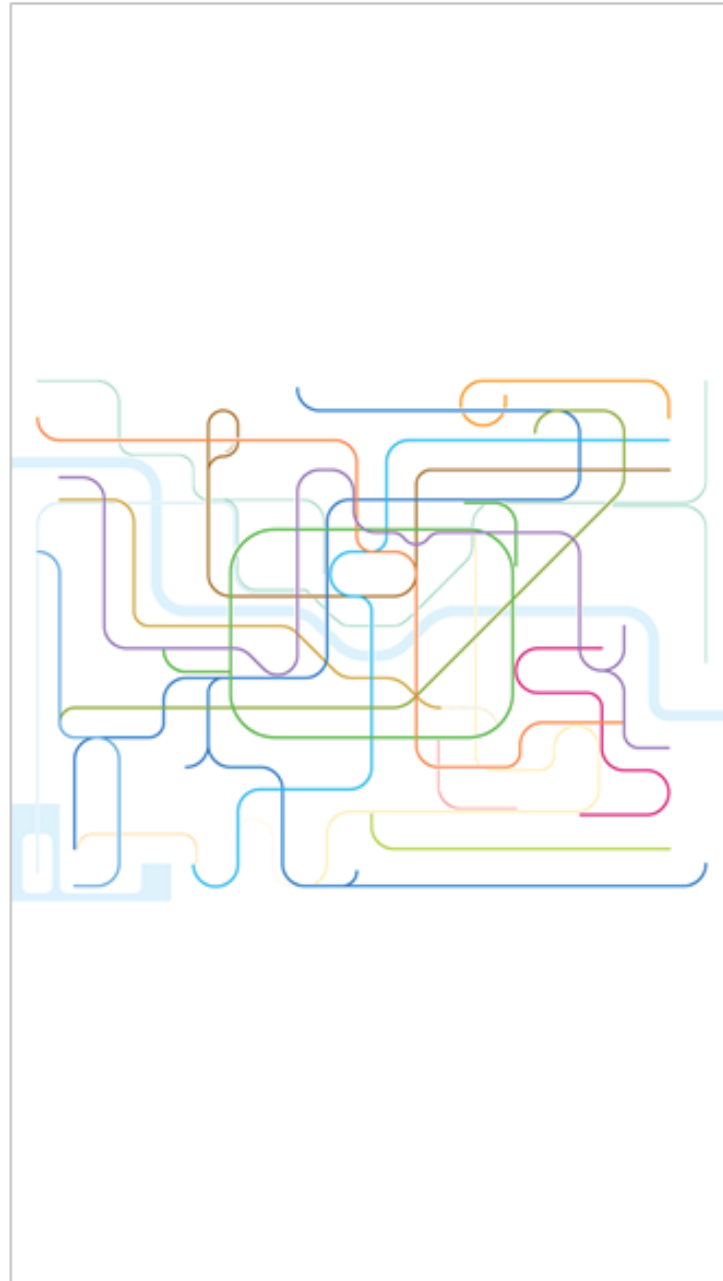


Suggestion

Map: Rectangle
Legend: Square

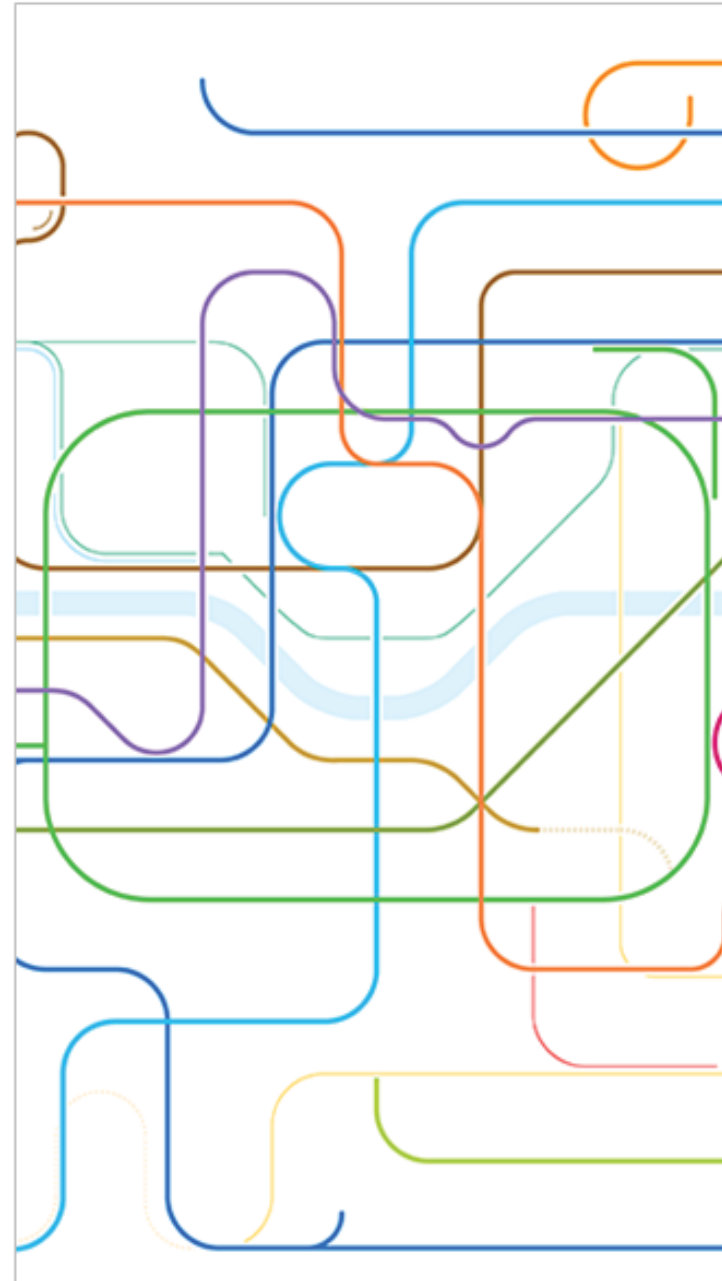
1. Entire Map

-Text is very small.



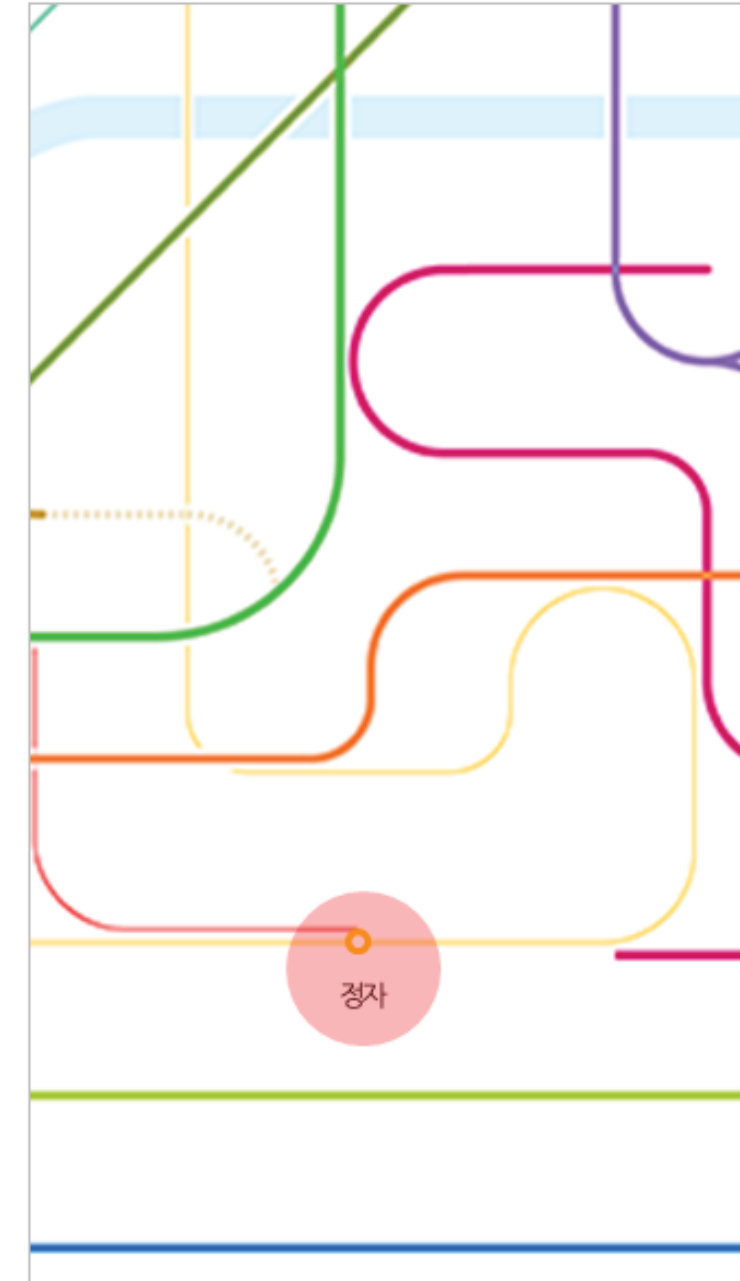
2. green line

-Text is Small,
-User should zoom in/out to find their location.



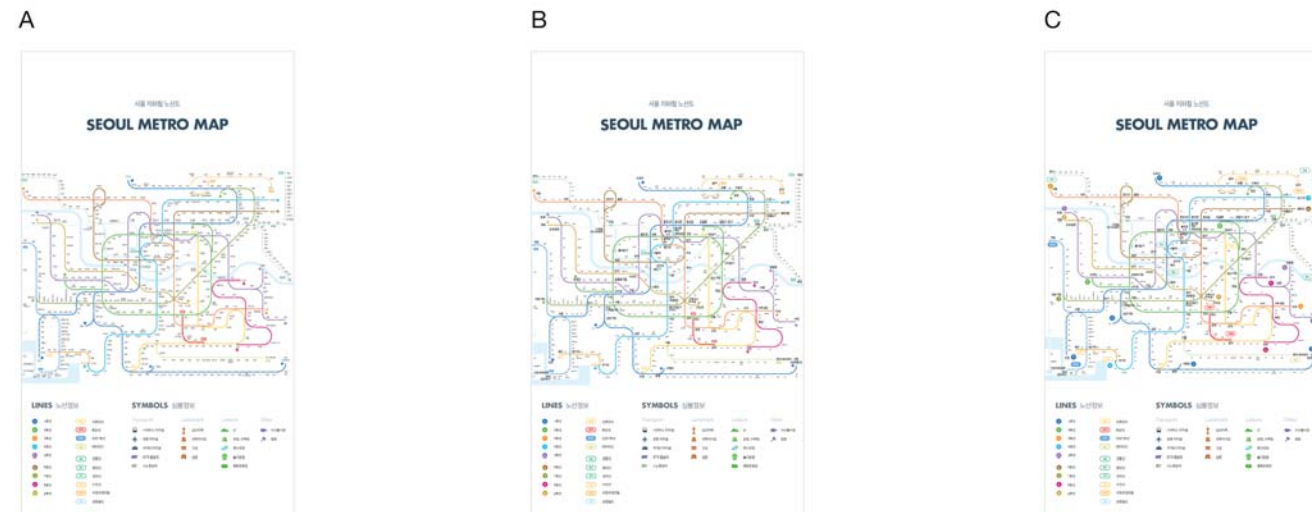
3. Personal map

-Difficult to view the entire map.



ENTRY ZOOM LEVELS

Font Test
All Level

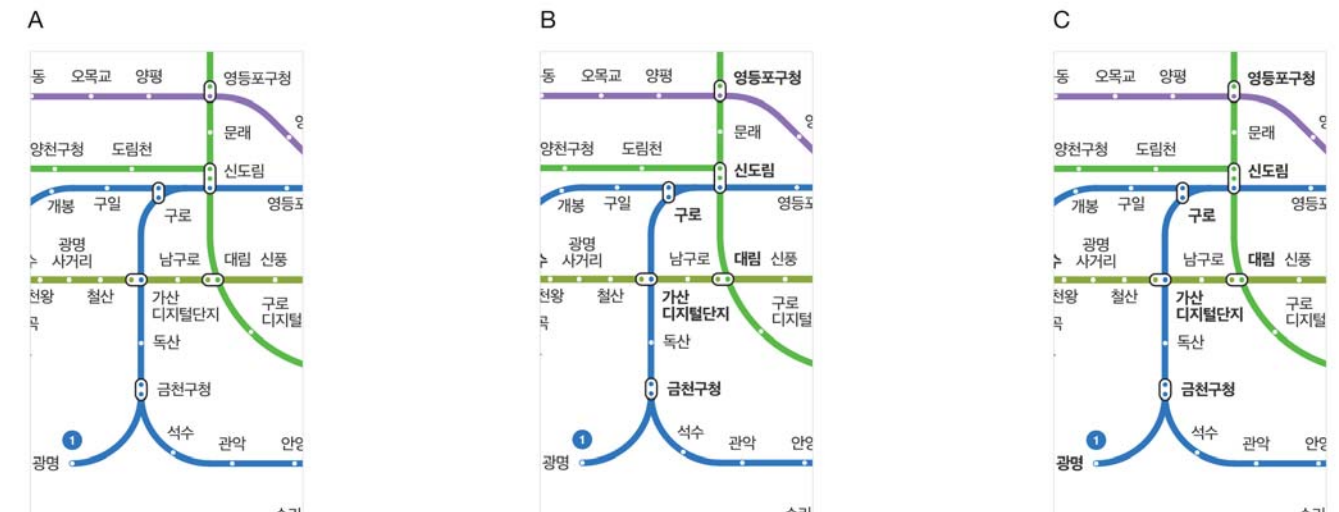


Last 48pt Medium
Transfer 48pt Medium
Normal 48pt Medium
Number normal

Last 70pt ExtraBold
Transfer 70pt ExtraBold
Normal 30pt Medium
Number normal

Last 70pt ExtraBold
Transfer 70pt ExtraBold
Normal 30pt Medium
Number x2

Font Test
Zoom Level



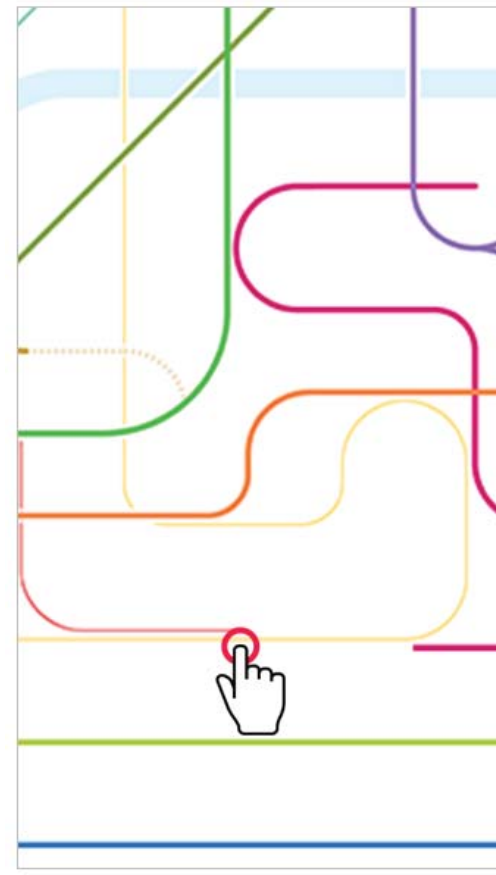
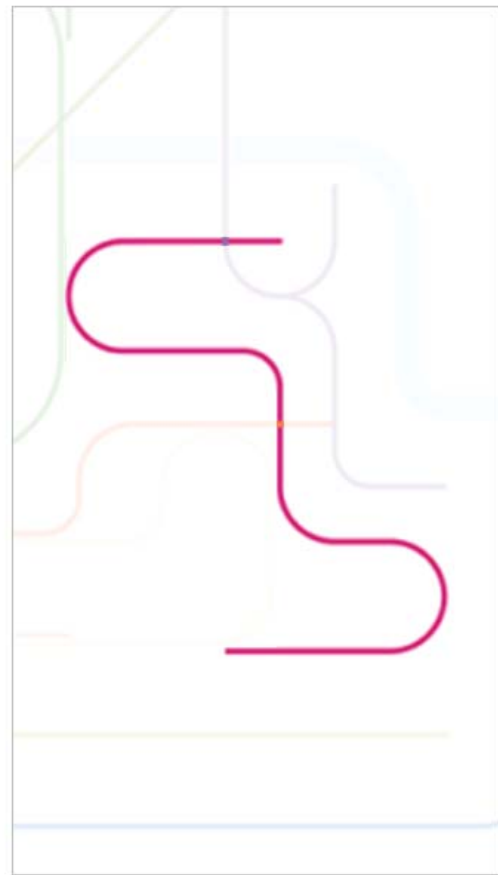
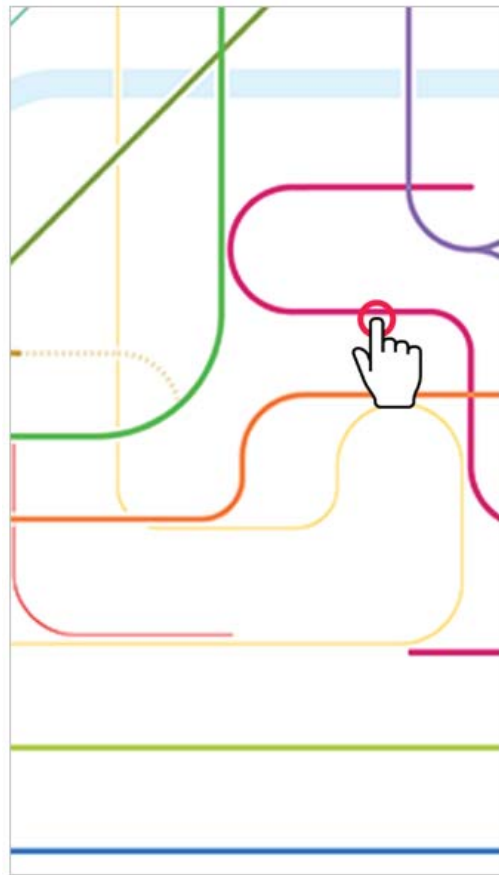
Last 48pt Medium
Transfer 48pt Medium
Normal 48pt Medium
Number normal

Last 48pt Medium
Transfer 48pt ExtraBold
Normal 48pt Medium
Number normal

Last 48pt ExtraBold
Transfer 48pt ExtraBold
Normal 48pt Medium
Number normal

FONT SIZE: OUTER ZOOM

FONT SIZE: INNER ZOOM

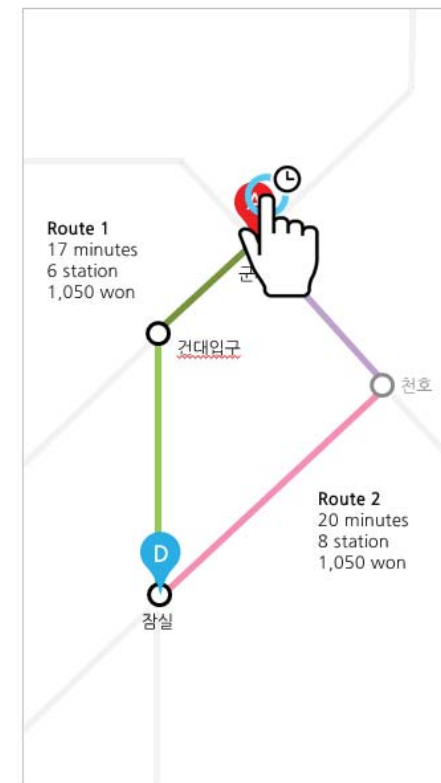


LINE SELECTION

STATION SELECTION



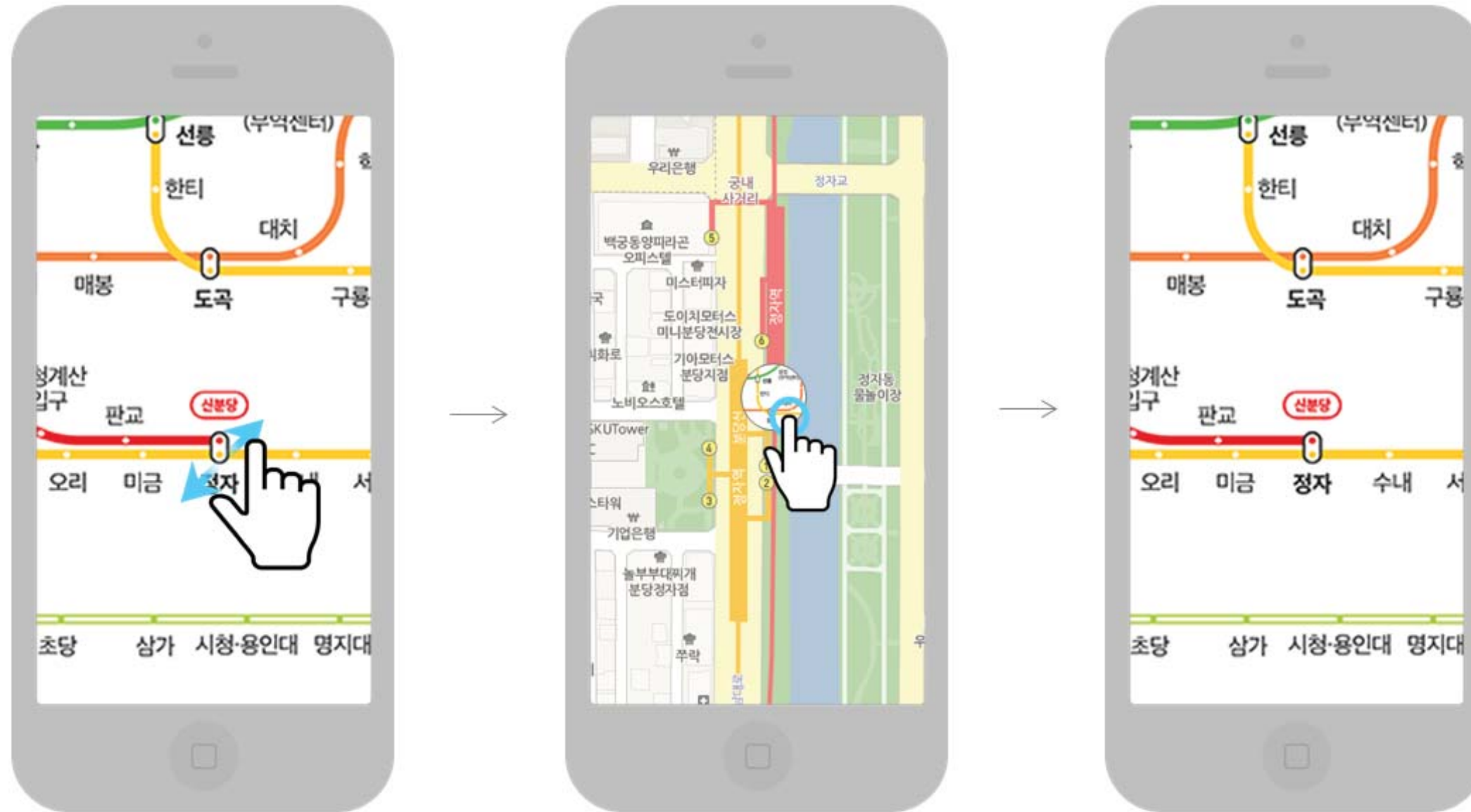
ROUTING



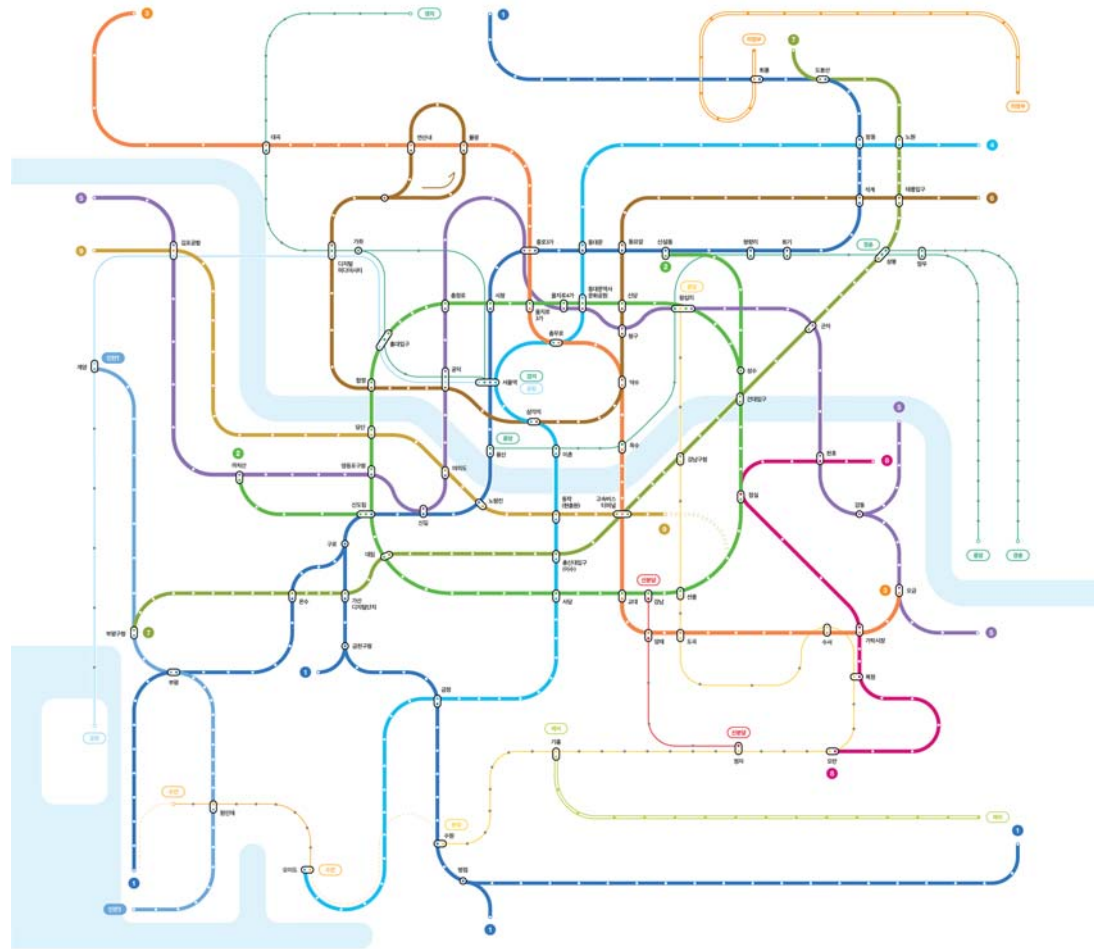
Changing station
→



ROUTING INTERACTION

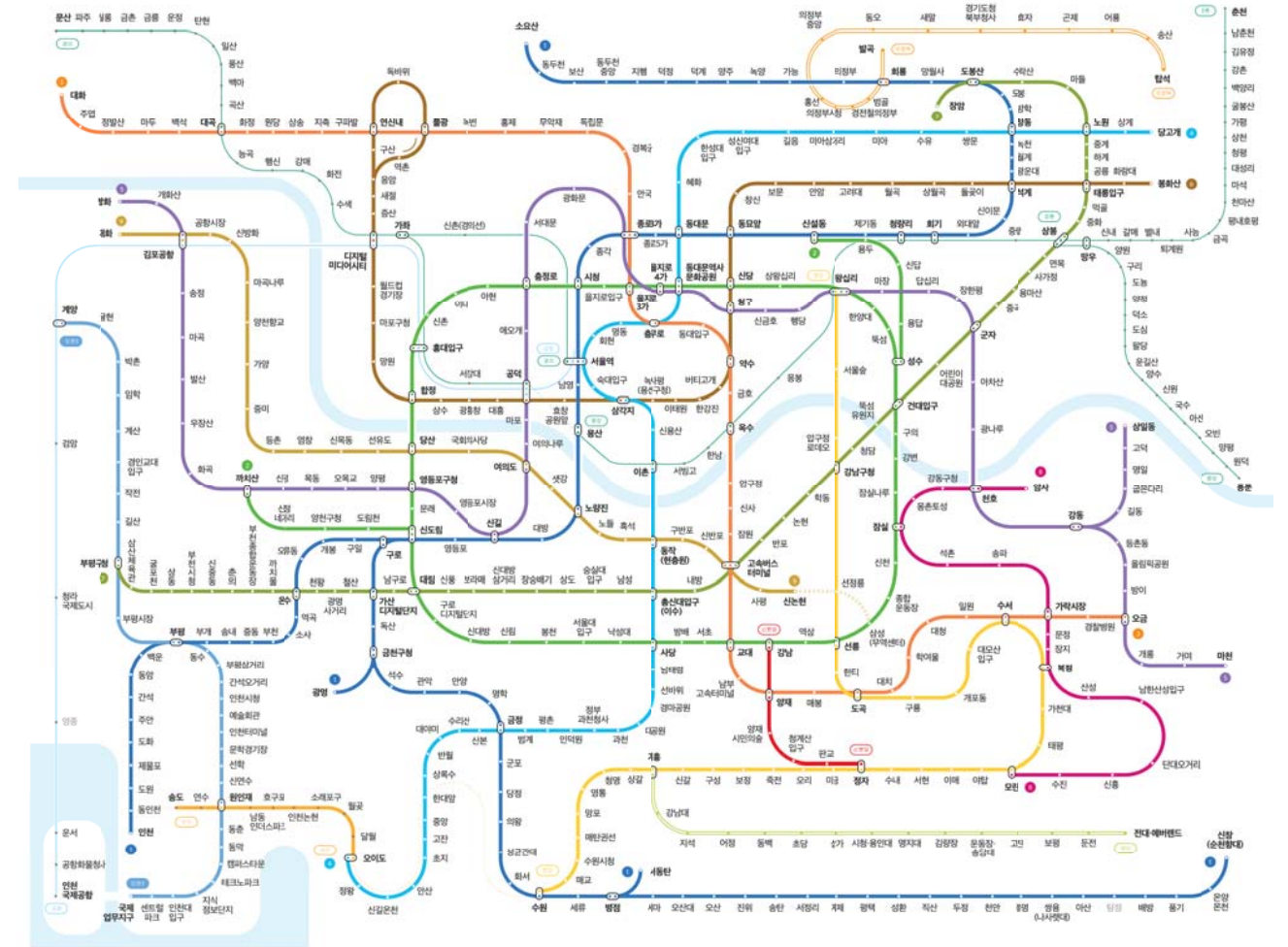


MAP MODE CHANGE



VERSION 2

서울 지하철 노선도
SEOUL METRO MAP



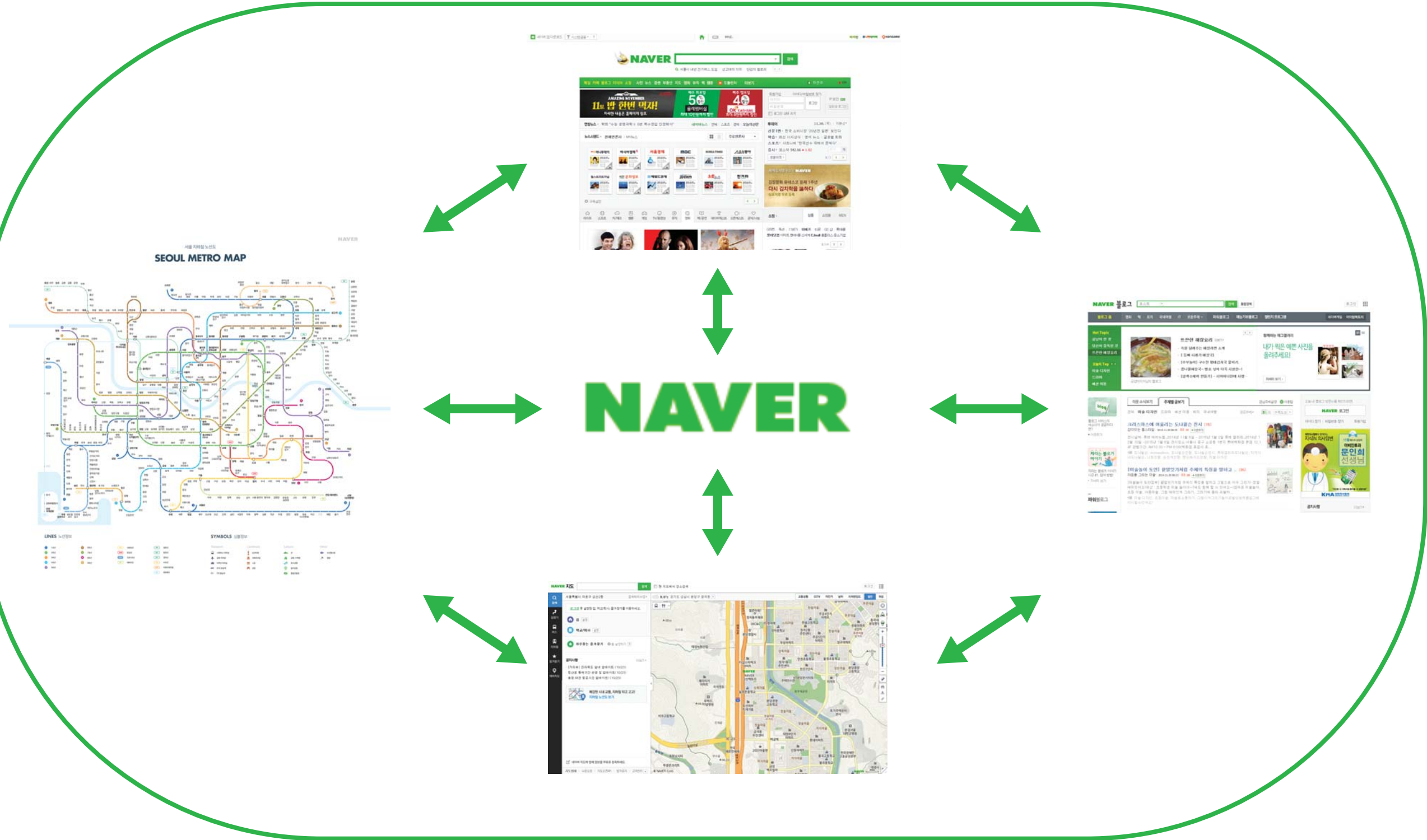
LINES 노선정보

- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| ● 1호선 | ● 4호선 | ● 5호선 | ● 6호선 | ● 7호선 | ● 8호선 | ● 9호선 | ● 10호선 | ● 11호선 | ● 12호선 | ● 13호선 | ● 14호선 | ● 15호선 | ● 16호선 | ● 17호선 | ● 18호선 | ● 19호선 | ● 20호선 | ● 21호선 | ● 22호선 | ● 23호선 | ● 24호선 | ● 25호선 | ● 26호선 | ● 27호선 | ● 28호선 | ● 29호선 | ● 30호선 | ● 31호선 | ● 32호선 | ● 33호선 | ● 34호선 | ● 35호선 | ● 36호선 | ● 37호선 | ● 38호선 | ● 39호선 | ● 40호선 | ● 41호선 | ● 42호선 | ● 43호선 | ● 44호선 | ● 45호선 | ● 46호선 | ● 47호선 | ● 48호선 | ● 49호선 | ● 50호선 |
|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|

SYMBOLS 심볼정보

- | | | | |
|----------|-------|-------|-------|
| 시외버스 터미널 | 랜드마크 | 산 | 수산물시장 |
| 공항 터미널 | 국회의사당 | 공원수목원 | 지하철역 |
| 지역선 터미널 | 교교 | 휴수원 | 버스 |
| KTX 환승역 | 광장 | 놀이공원 | 종합운동장 |
| ITX 환승역 | | 휴양지 | |

VERSION 3



!NAT

a graphic standard for metro maps

Jug Cerović architect

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