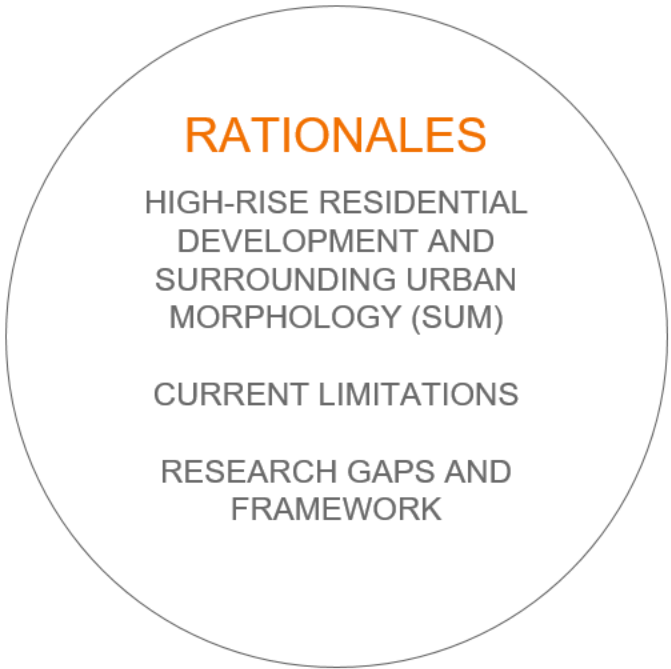
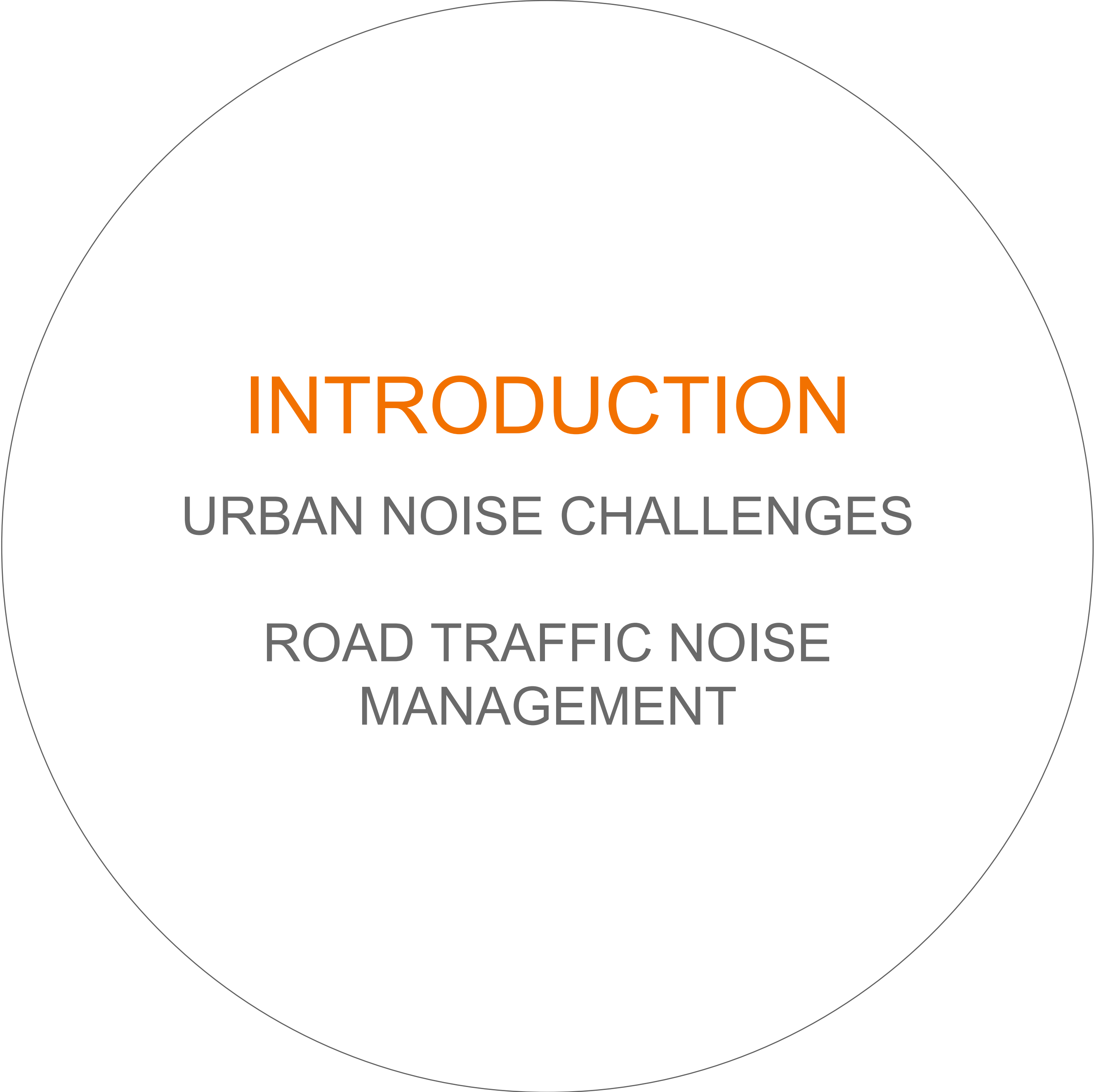


12th international conference
Sustainable Urban Development
“Housing for All: Affordability, Inclusivity, and Sustainability”

The Role of Surrounding Urban Morphology in Road Traffic Noise Attenuation around High-Rise Residential Buildings in Ho Chi Minh City

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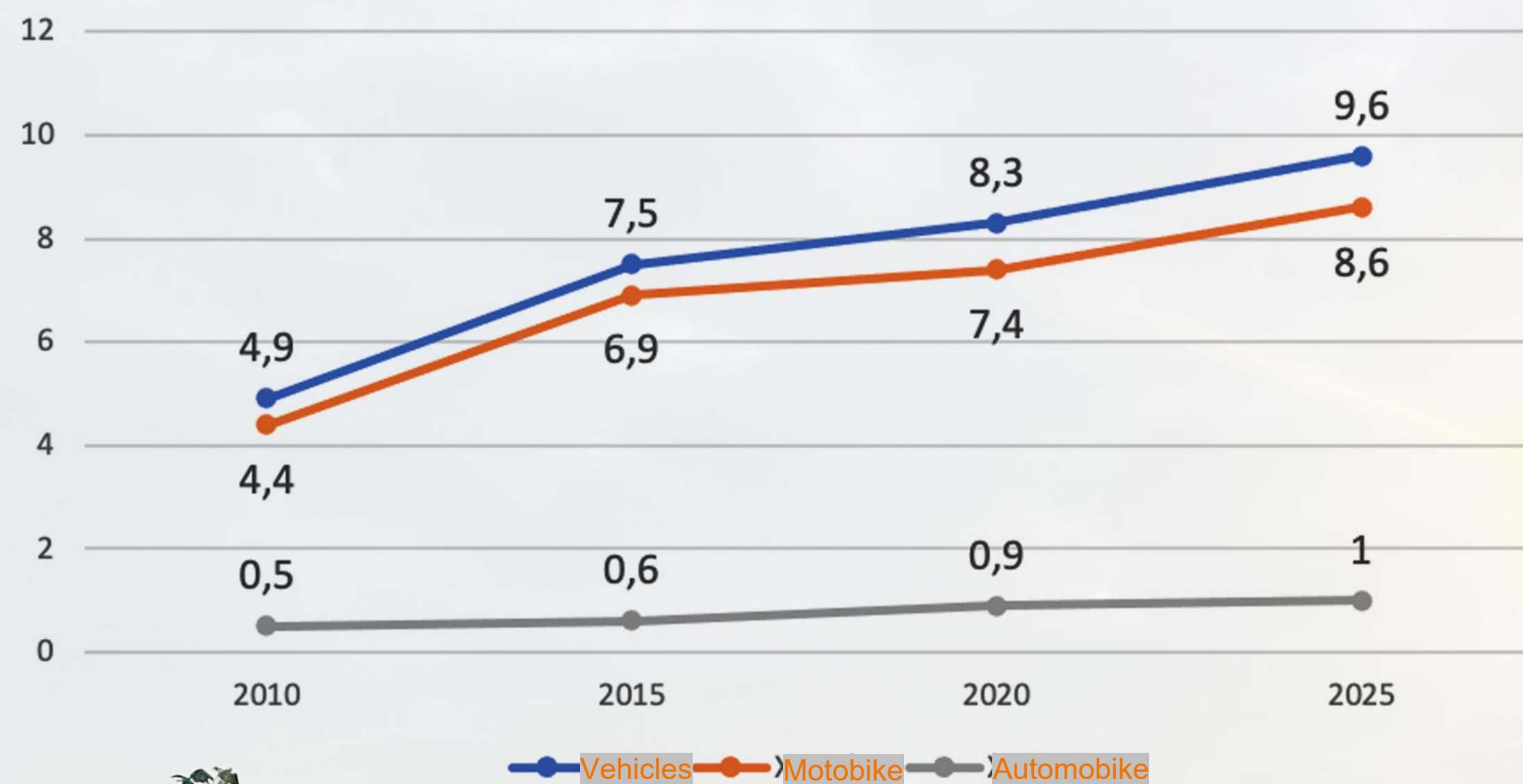


INTRODUCTION

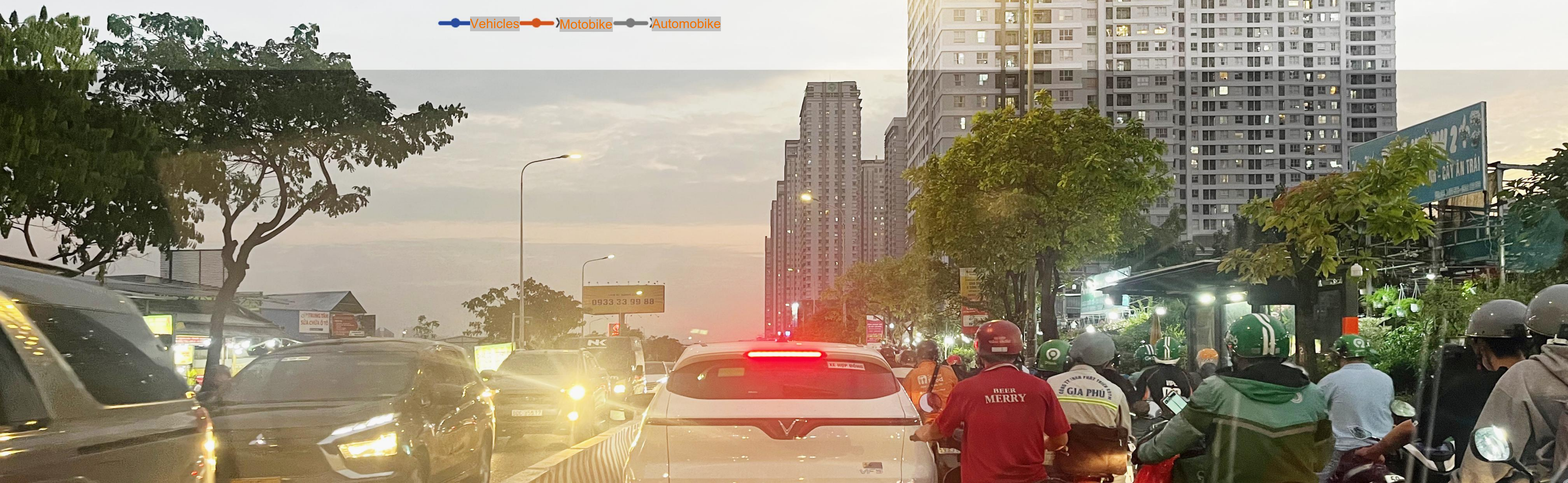
URBAN NOISE CHALLENGES

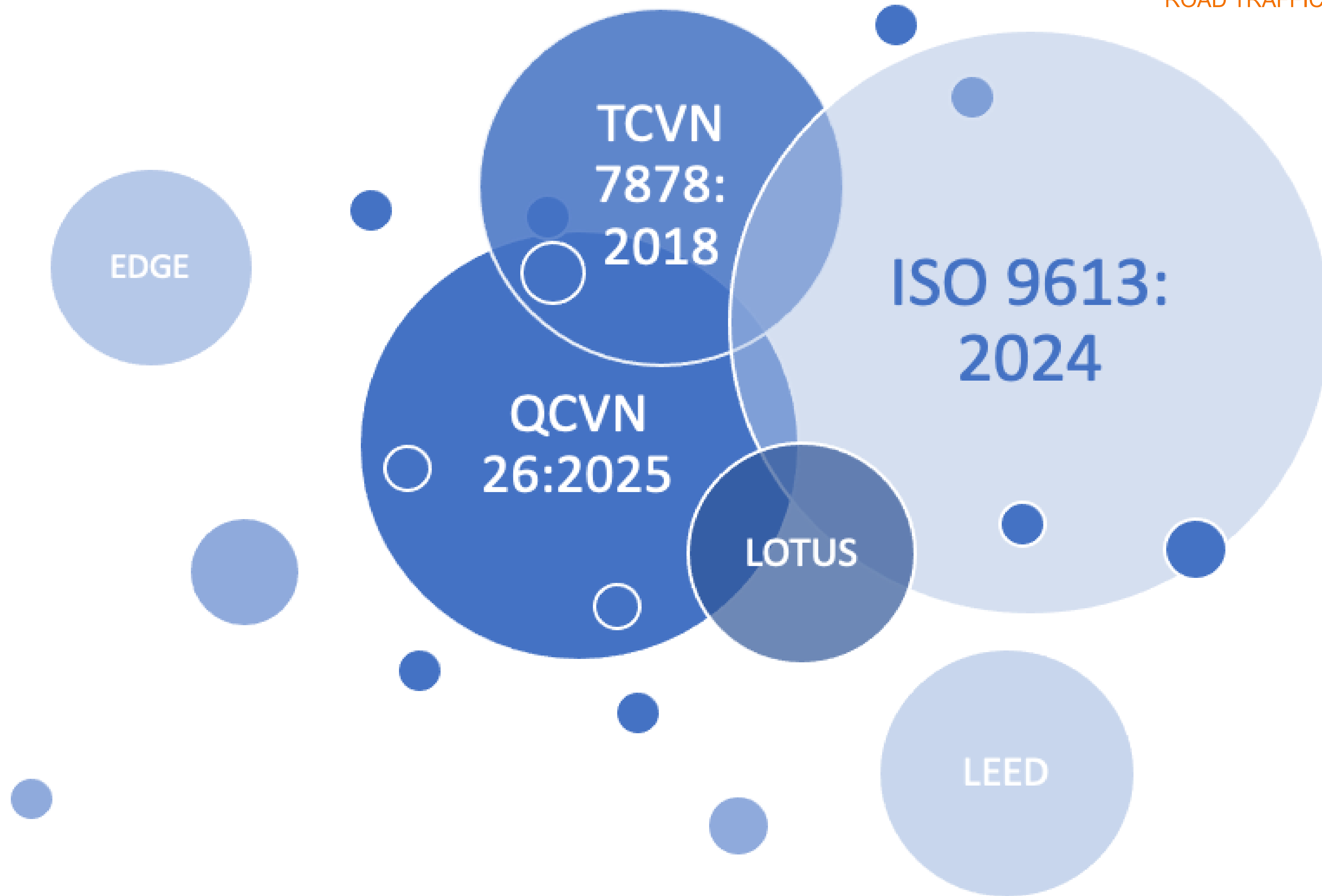
ROAD TRAFFIC NOISE
MANAGEMENT

Mean of transport at Ho Chi Minh City (million of vehicles)



3-15 dB





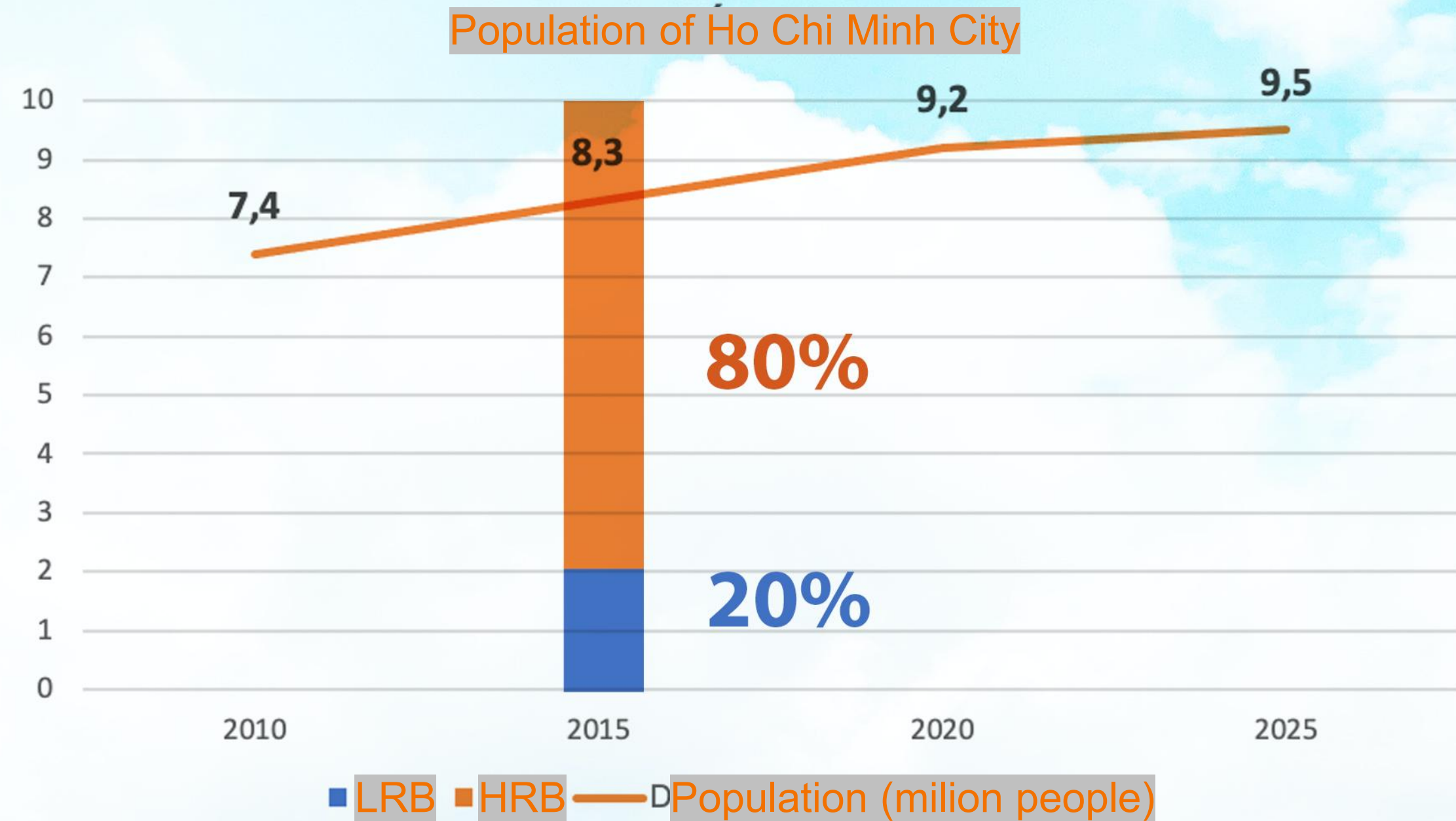
RATIONALES

HIGH-RISE RESIDENTIAL
DEVELOPMENT AND
SURROUNDING URBAN
MORPHOLOGY (SUM)

CURRENT LIMITATIONS

RESEARCH GAPS AND
FRAMEWORK

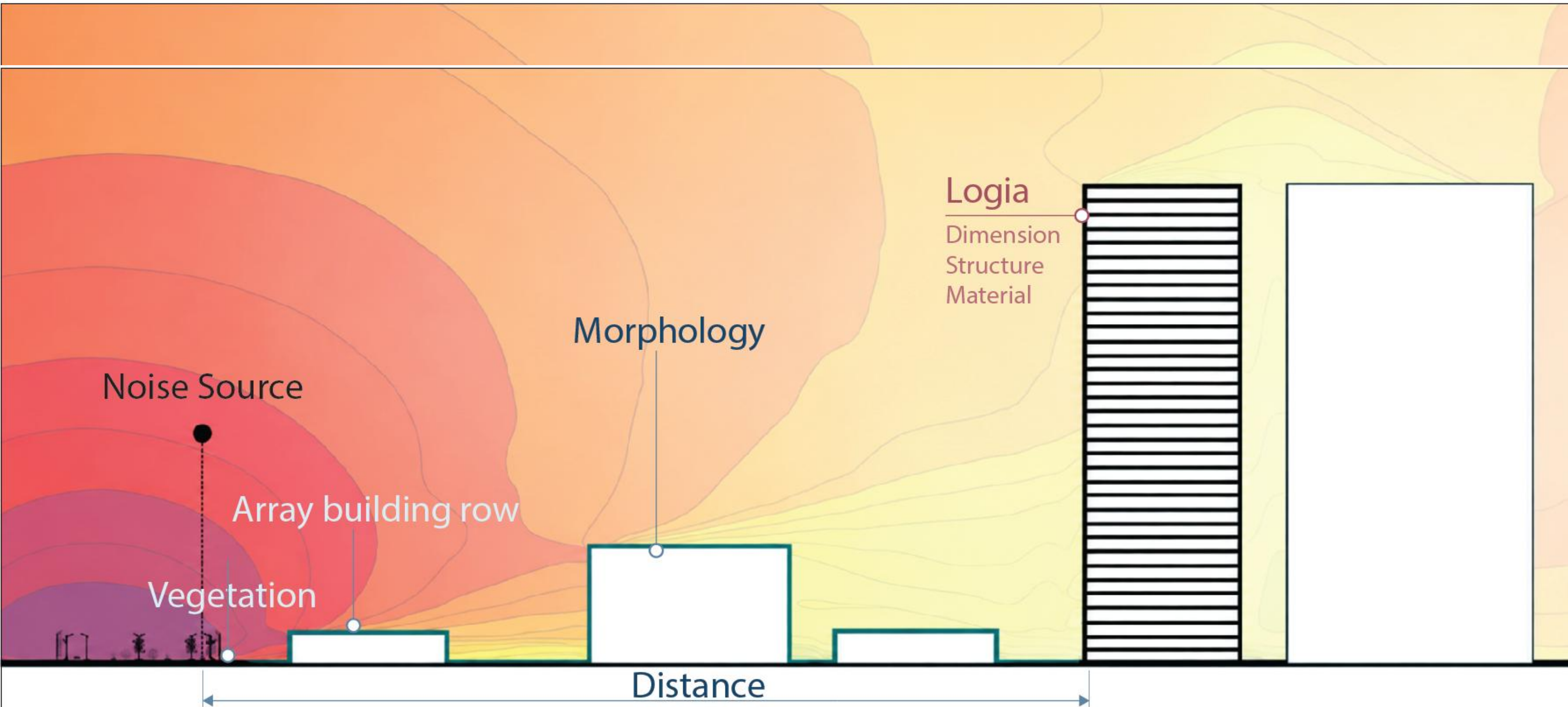
HIGH-RISE RESIDENTIAL BUILDINGS (HRBs)

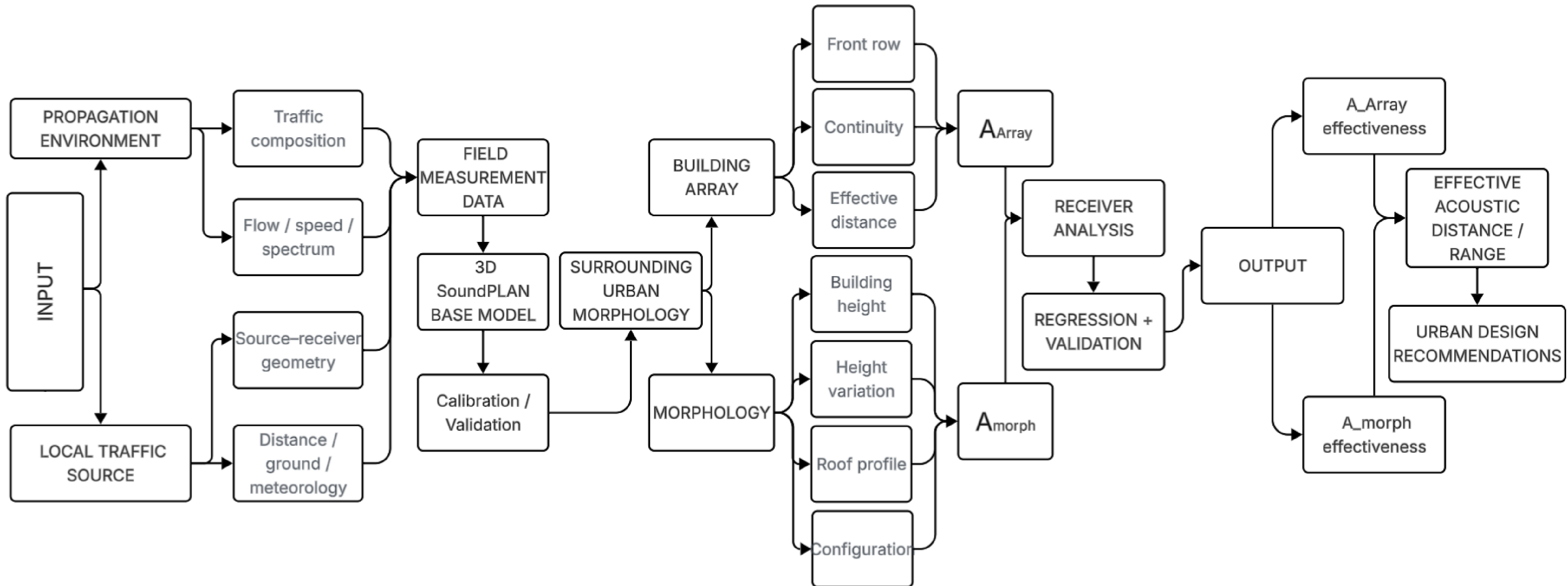


$$A_{Array} = \Delta_{L,Array}, dB$$

$$A_{Morph} = \Delta_{L,Morph}, dB$$

SURROUNDING URBAN
MORPHOLOGY (SUM)

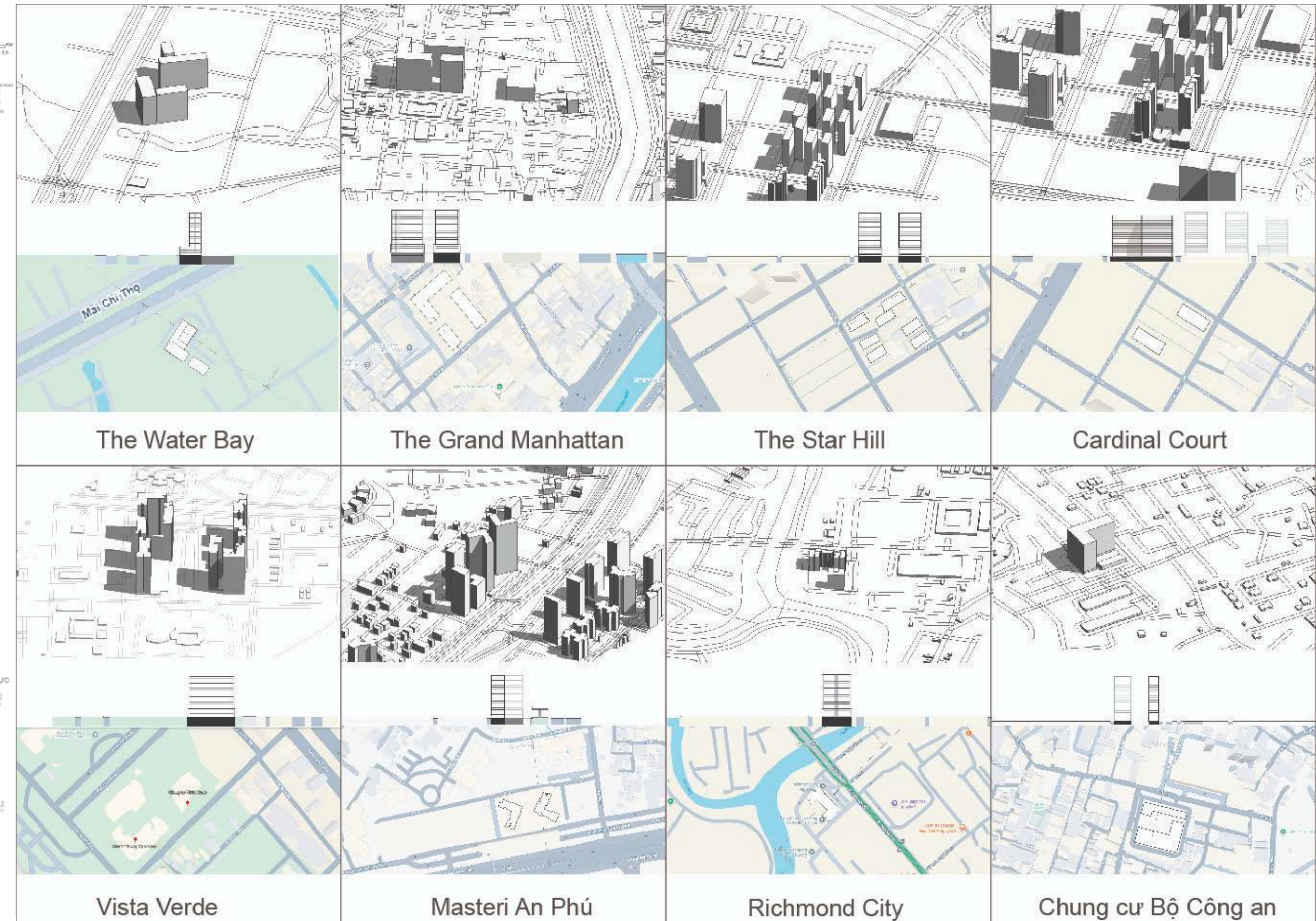
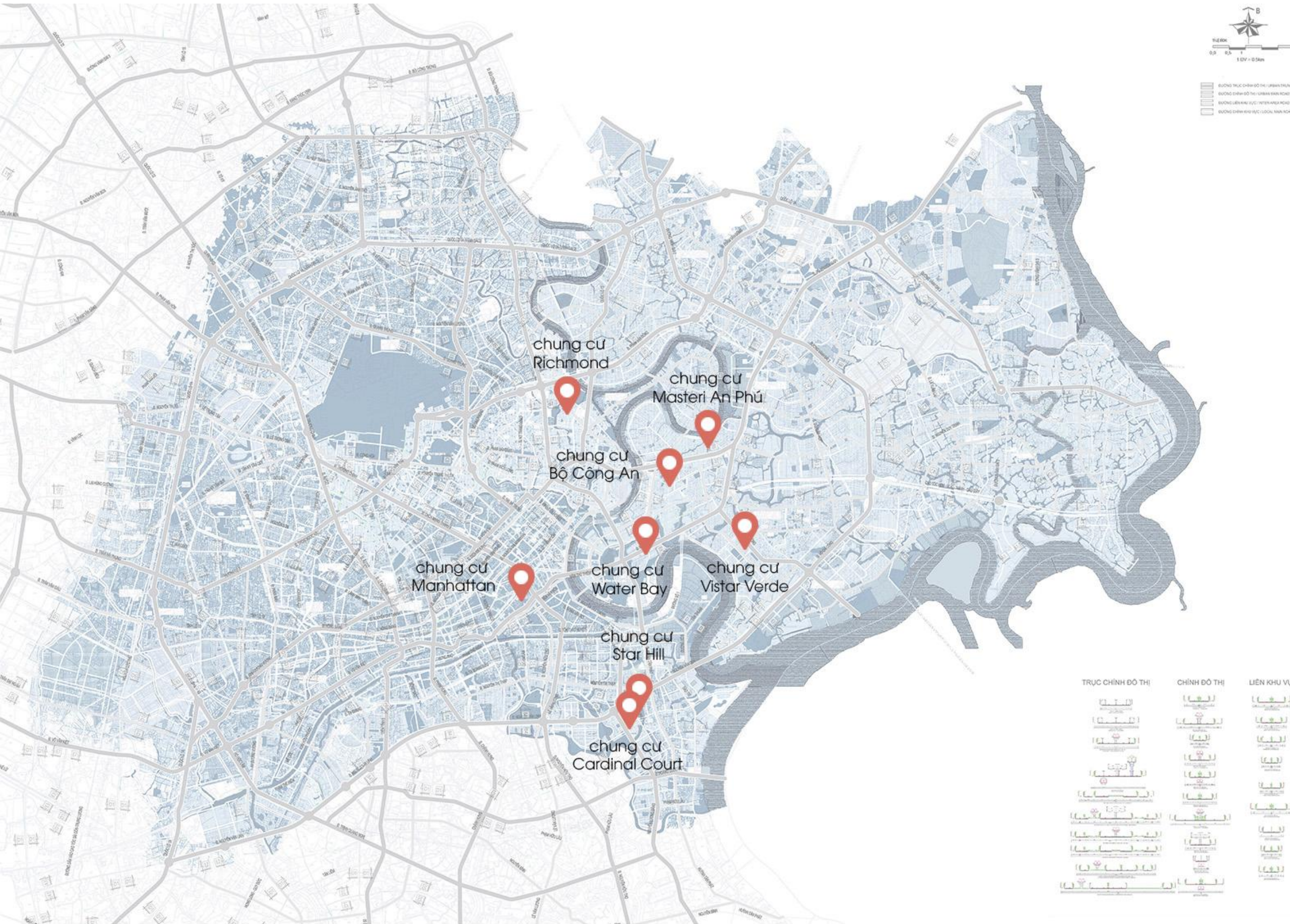




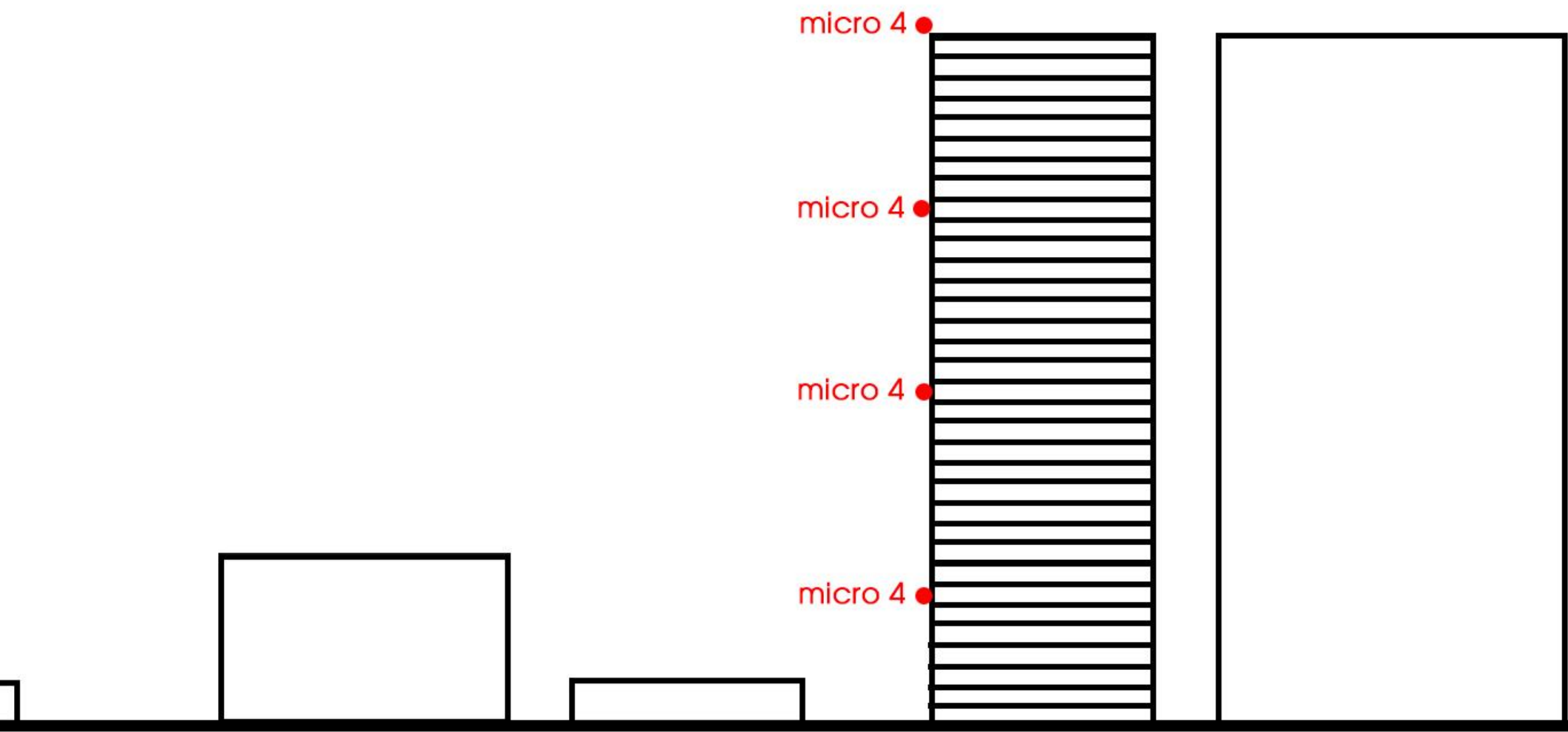
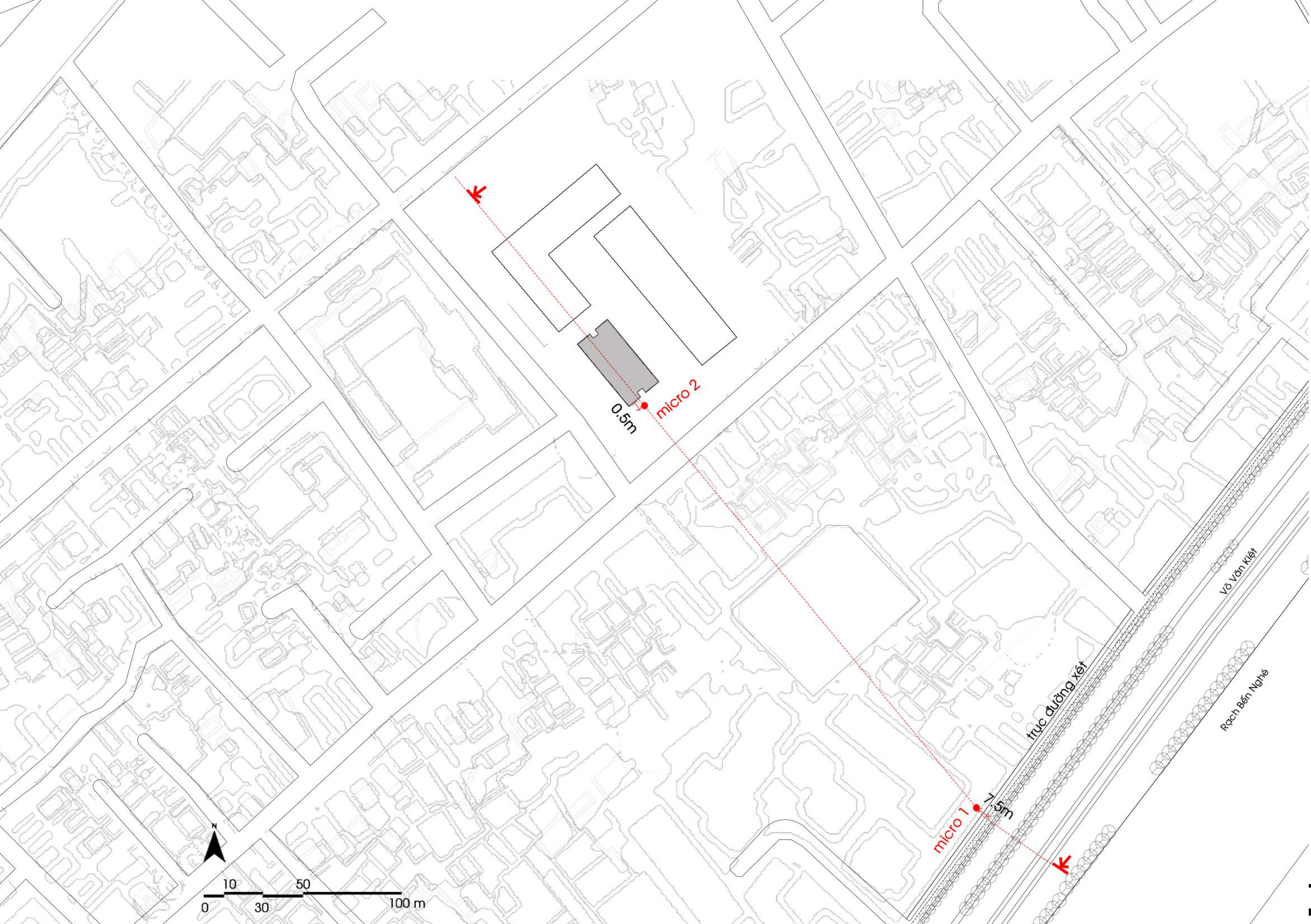


RESEARCH METHODOLOGY

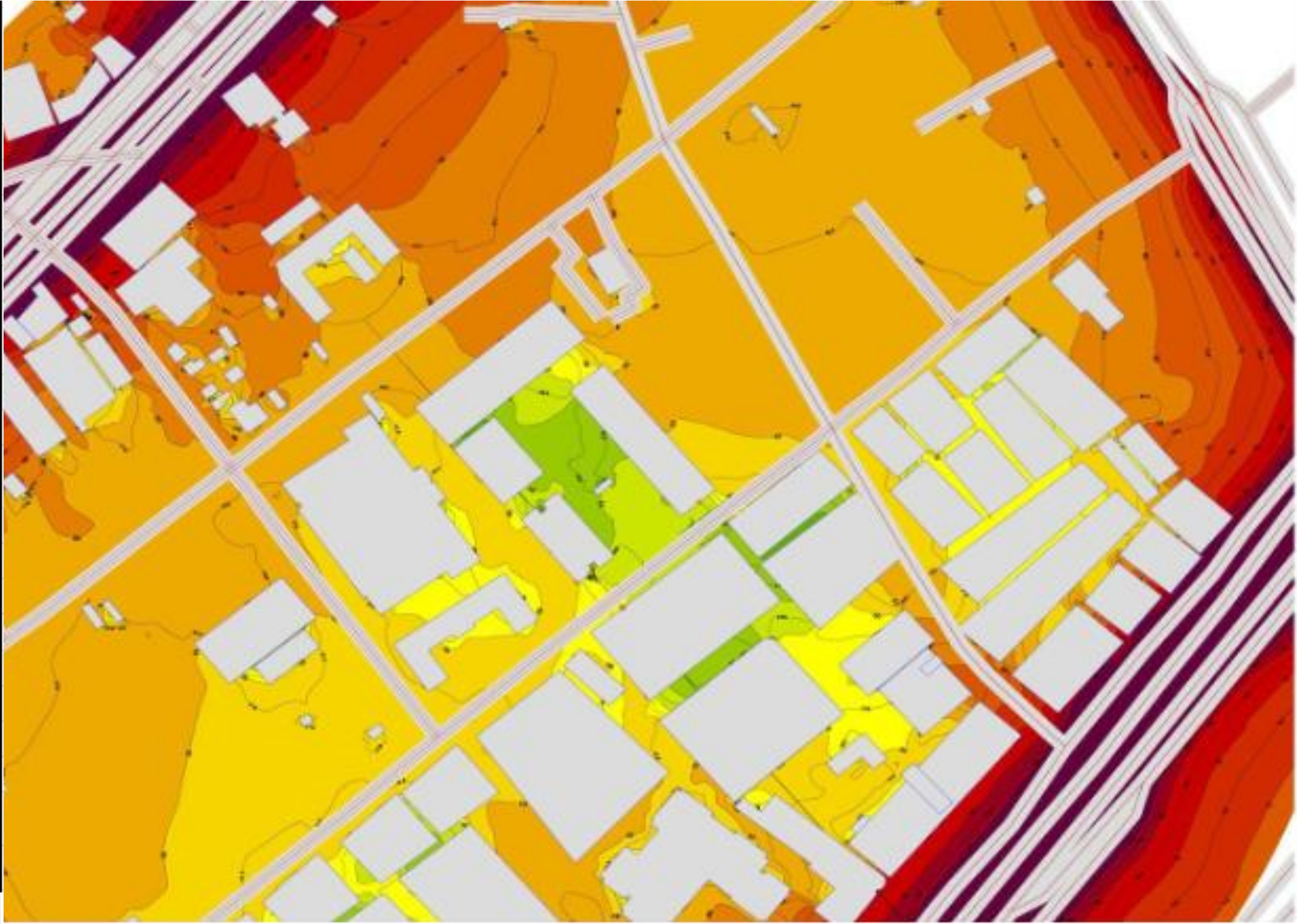
RESEARCH QUESTIONS,
HYPOTHESES, OBJECTIVES,
METHODS, CASE STUDIES,
DATA COLLECTION AND
ANALYSIS



DATA COLLECTION



Standard	SOHO Residence		Dx	1000		ΔTheory		ΔReality		ΔSimulation		
		0		Leq								
ISO 9613-1:1993, CNOSSOS		1	Airborne sound absorption	Distance	209	☐	0, dB	0,00%	0, dB	0,00%	0, dB	0,00%
				Temp°	28							
				Presure	1013							
				R2 Height	7							
				Humidity (%)	78							
ISO 9613-2:2024, CNOSSOS		2	Ground faction	Surface (String)	Asphalt		0, dB	0,00%	0, dB	0,00%	0, dB	
FHWA, CNOSSOS, Van Renterghem		3	Vegetation/ Green	Vegetation (B)	0		0, dB	0,00%	0, dB	0,00%	0, dB	
	☒	Vegetation (H)		0								
		Sound absorption coefficient		0								
ISO 9613-2, FHWA, RLS		4	Barrier	Barrier (°)	0		0, dB	0,00%	0, dB	0,00%	0, dB	
		Barrier (H)		0								
		Barrier (α)		0								
CNOSSOS-E U, Nord2000	Sound Shadow	5	ISO 9613-2:1996	Morp (Ds)	75	☐	13,98 dB	100,00%	13,98 dB	71,51%	14,95 dB	85,58%
			FHWA TNM	Morp (H)*	16,28	☐						
			CNOSSOS-EU (2015)	Morp (Hb)	27	☐						
	Morphology		Nord2000	Morp (Dr)	90	☒			5,57 dB	28,49%	2,52 dB	14,42%
			JIS Z 8737 (Nhật Bản)	N	0,00	☐						
ISO 12354, CNOSSOS		6	Orientation	Orientation (°)	0		0, dB	0,00%	0, dB	0,00%	0, dB	
		7	Result: Δ				13,98 dB		19,56 dB		17,47 dB	
								19,56 ± 1,21 dB				

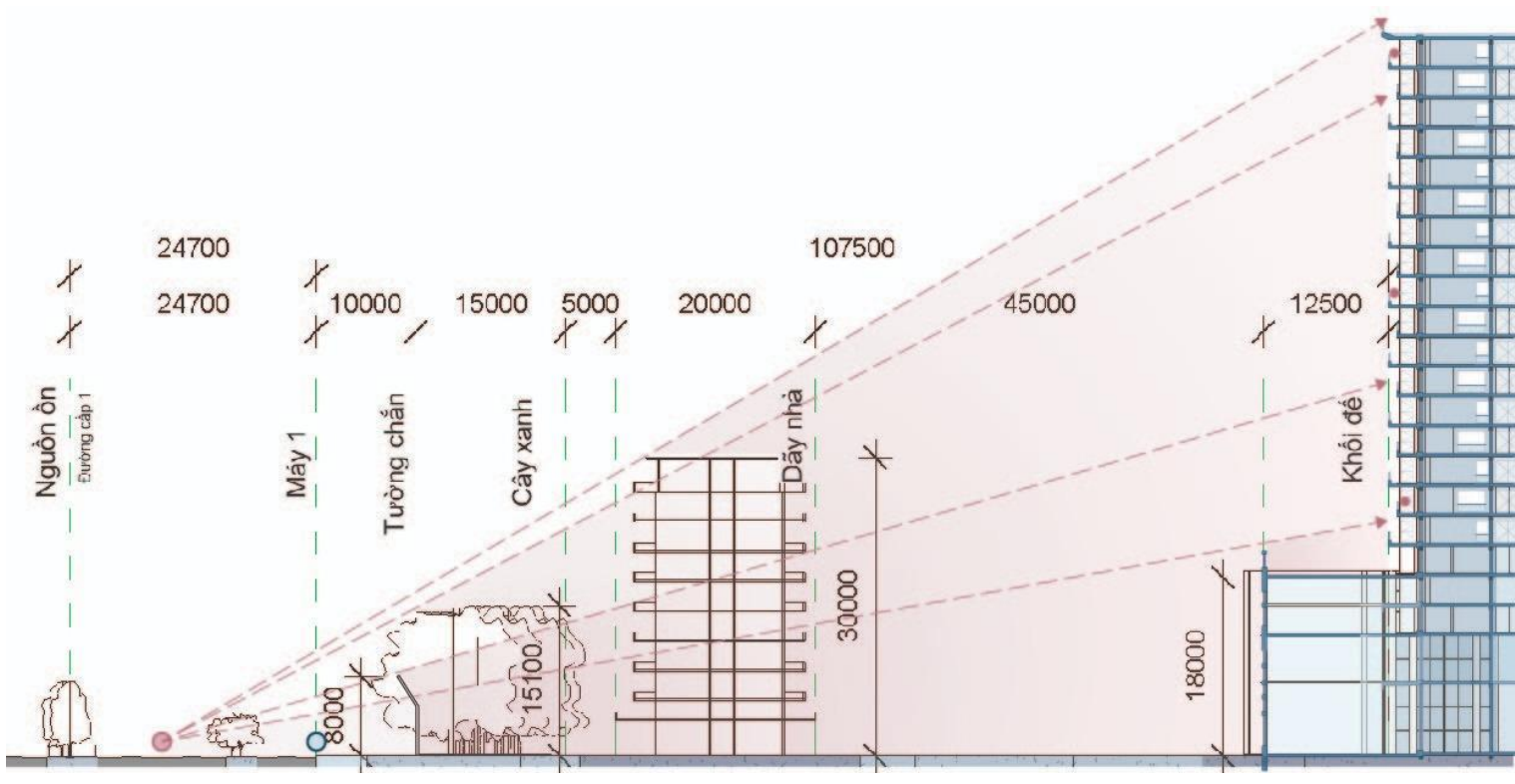
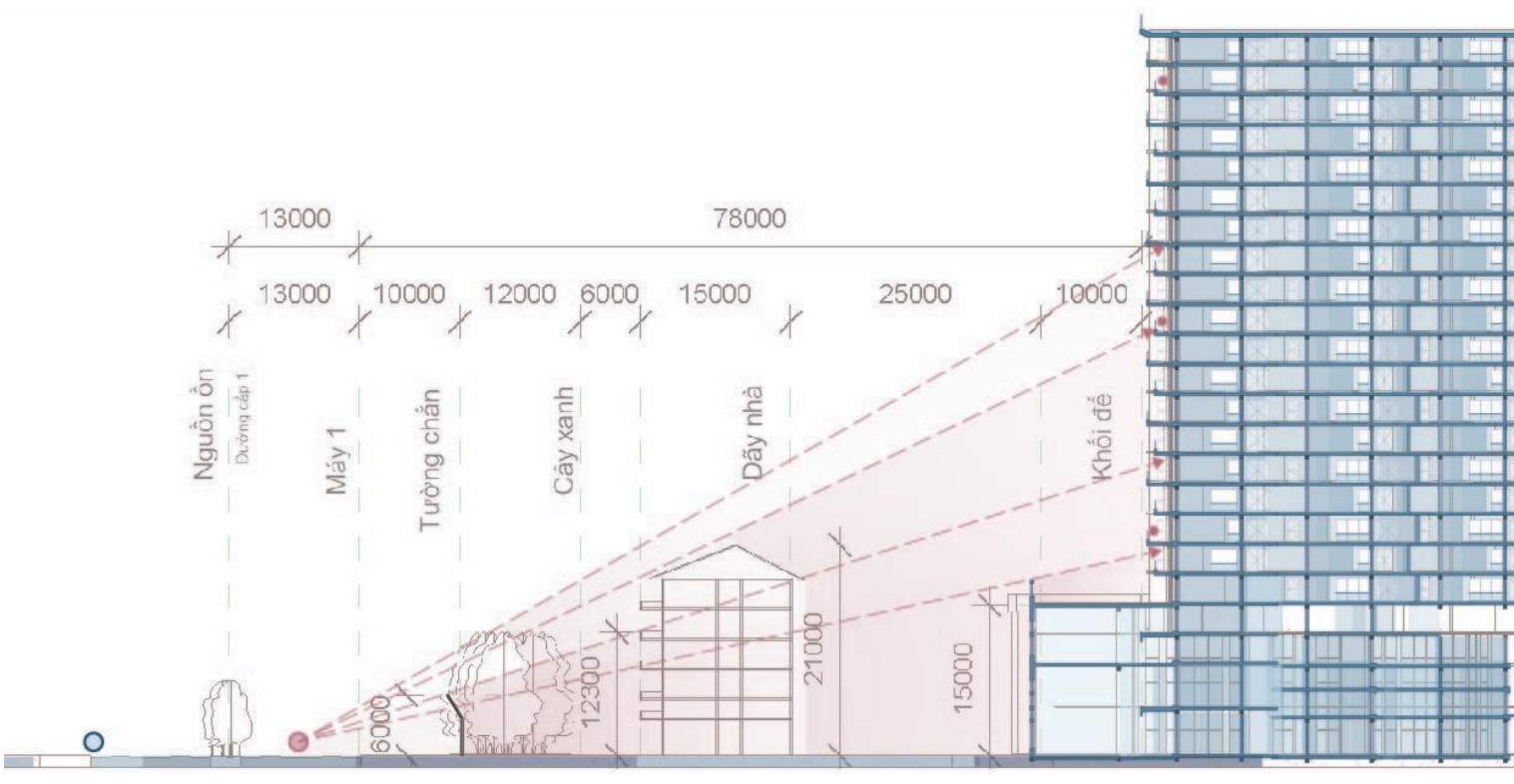
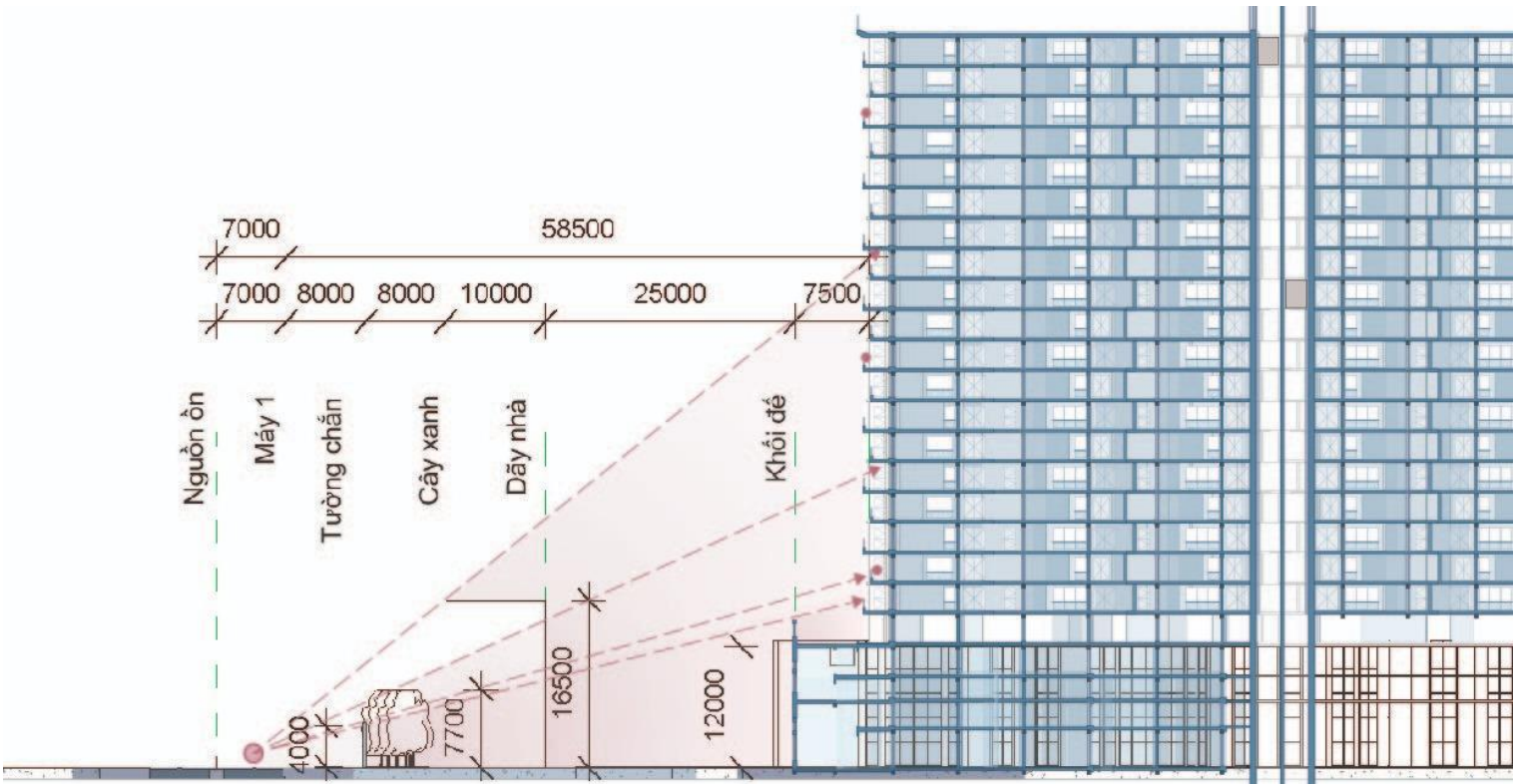
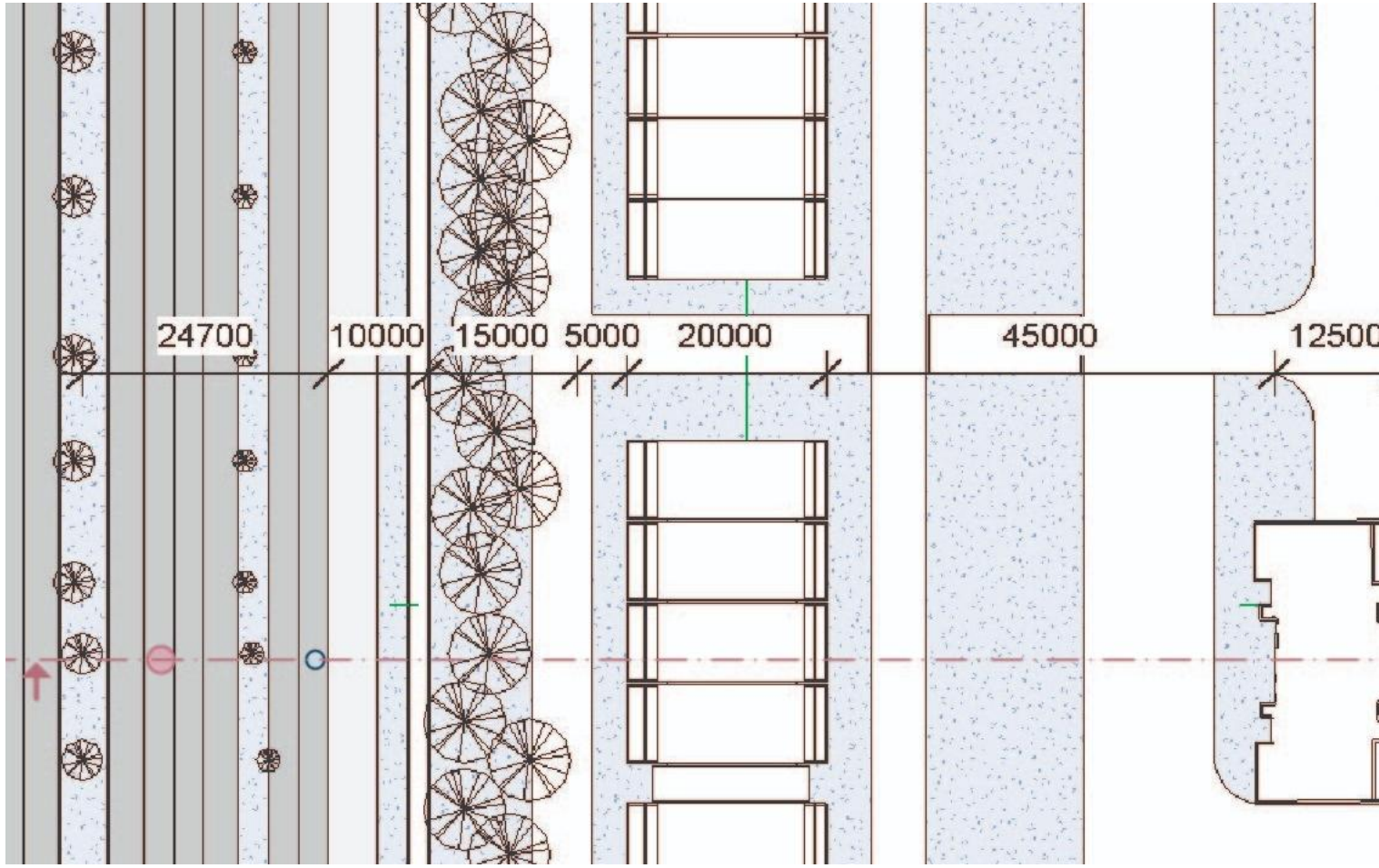
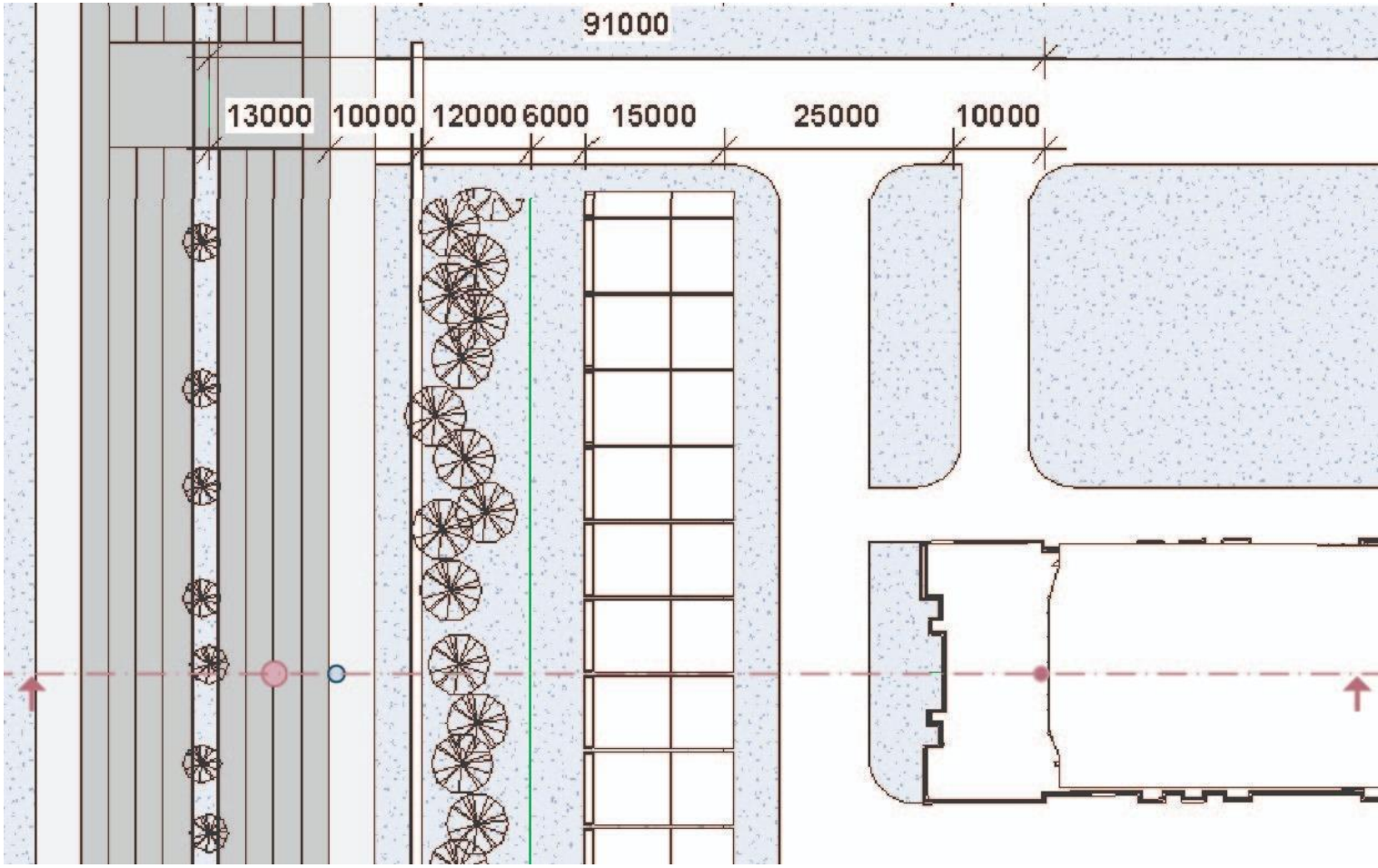
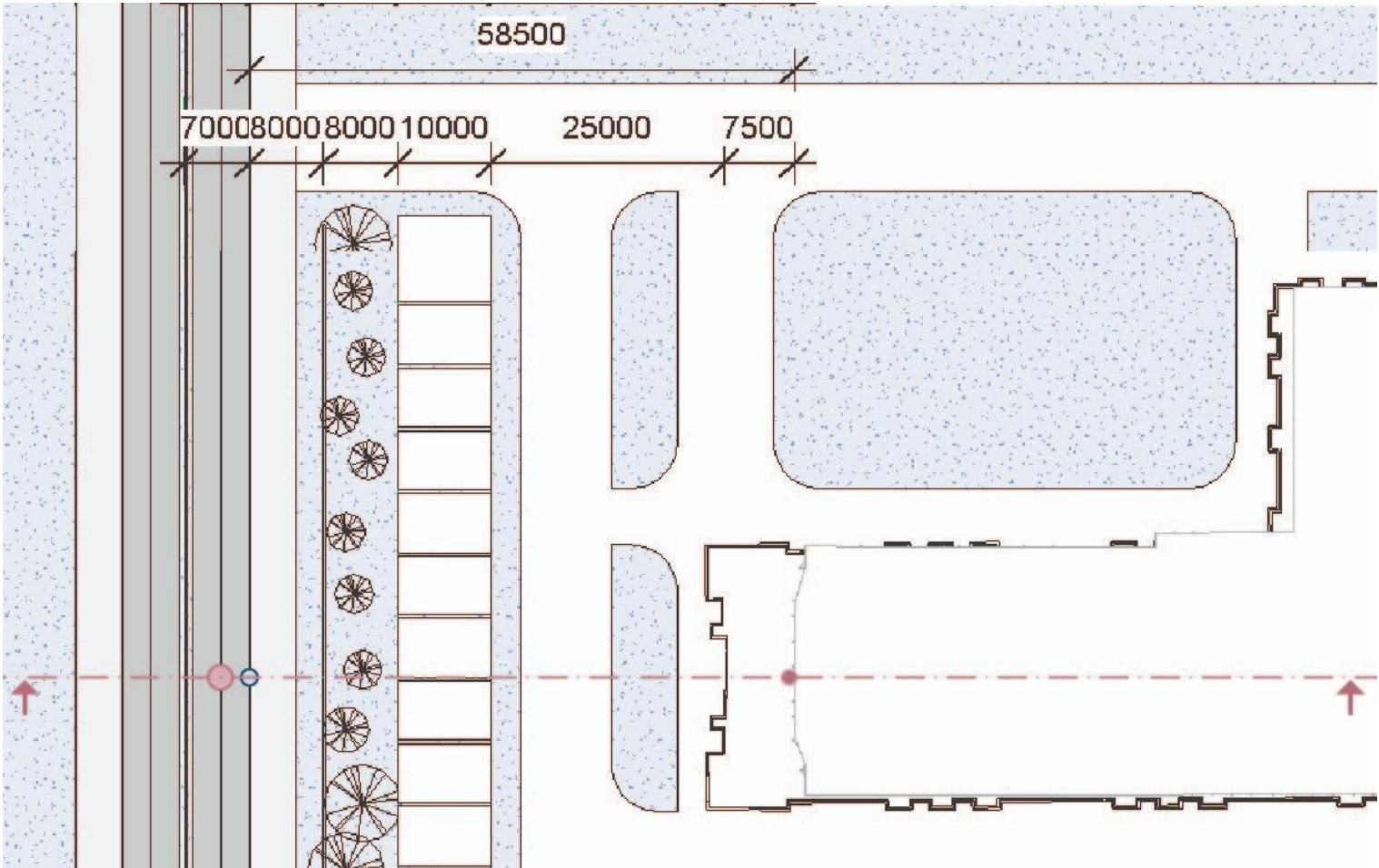


RESULTS

EFFECTIVENESS DISTANCE
FOR HRBs

FAÇADE HRBs SUM
EFFECTIVENESS

EFFECTIVENESS DISTANCE FOR HRBs



Effectiveness distance of surrounding morphology
for level 3 road

58M

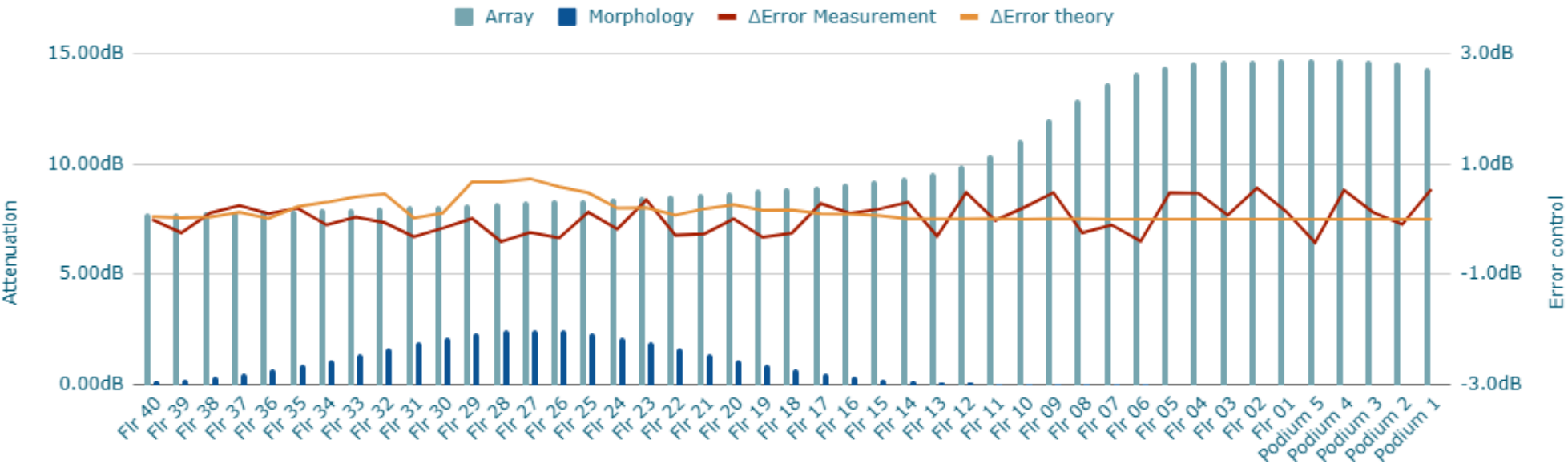
Effectiveness distance of surrounding morphology
for level 2 road

78M

Effectiveness distance of surrounding morphology
for level 1 road

108M

Error control chart



Noise attenuation based on urban Morphology.



Building	SOHO residence	
Floor	Array	Morphology
Flr 40	7.7414	0.1770
Flr 39	7.7746	0.2616
Flr 38	7.8089	0.3747
Flr 37	7.8446	0.5203
Flr 36	7.8817	0.7001
Flr 35	7.9202	0.9131
Flr 34	7.9602	1.1542
Flr 33	8.0018	1.4142
Flr 32	8.0451	1.6794
Flr 31	8.0902	1.9330
Flr 30	8.1372	2.1564
Flr 29	8.1863	2.3316
Flr 28	8.2375	2.4435
Flr 27	8.2910	2.4820
Flr 26	8.3469	2.4435
Flr 25	8.4055	2.3316
Flr 24	8.4668	2.1564
Flr 23	8.5313	1.9330
Flr 22	8.5990	1.6794
Flr 21	8.6704	1.4142
Flr 20	8.7460	1.1542
Flr 20	8.7460	1.1542
Flr 19	8.8263	0.9131
Flr 18	8.9128	0.7001
Flr 17	9.0073	0.5203
Flr 16	9.1137	0.3747
Flr 15	9.2392	0.2616
Flr 14	9.3976	0.1770
Flr 13	9.6139	0.1161
Flr 12	9.9314	0.0738
Flr 11	10.4123	0.0455
Flr 10	11.1172	0.0271
Flr 09	12.0416	0.0157
Flr 08	12.9379	0.0088
Flr 07	13.6454	0.0048
Flr 06	14.1428	0.0025
Flr 05	14.4383	0.0013
Flr 04	14.5944	0.0006
Flr 03	14.6700	0.0003
Flr 02	14.7044	0.0001
Flr 01	14.7197	0.0001
Podium 5	14.7303	0.0000
Podium 4	14.7197	0.0000
Podium 3	14.6930	0.0000
Podium 2	14.6090	0.0000
Podium 1	14.3711	0.0000

CONCLUSIONS

THE CRUCIAL ROLE OF SUM

BUILDING ARRAY AND
MORPHOLOGY

Analysis	Most Effective Design – 10th Floor											
Result	Source	Air	Distance	Ground	Barrier	Vege - tation	Array row	Orienta - tion	Morpho - logy	Logia	Ratio	Shape
Class 1 road	75.00 dB	0.4	10	0.5	5.5	3	5	1.76	1.5	7	1.5	1
Class 2 road	70.00 dB	0.35	8.45	0.4	4	2.3	3	0.8	1	5.5	1	0.7
Class 3 road	65.00 dB	0.3	6.99	0.3	2.8	1.5	2	0.36	0.5	3.8	0.6	0.4
SOHO residence	83.21 dB	10.00	10.00	8.28	0.00	0.00	10.00	10.00	0.63	7.96	0.08	0.00
		1.19	14.22	0.41	0.00	0.00	12.35	3.75	0.03	4.40	-0.01	0.00
		3.26%	39.13%	1.13%	0.00%	0.00%	33.99%	10.33%	0.08%	12.11%	-0.03%	0.00%

THANK YOU FOR YOUR ATTENTION

Questions and Discussion