PARK IT, BUT WHERE?

Framework For Identifying Campus Locations For Bicycle Shelter, in UIUC

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RESEARCH SCOPE & OBJECTIVE

Scope

- Finding the optimal long-term bike parking location for the main campus of UIUC.
- Prepare a comprehensive, adaptable and flexible framework and methodology for a new bike long-term parking by doing a pilot study for the UIUC.

Objective

- Making universities and college campus bike friendly.
- Comprehensive framework to analyse and prioritise bike parking location in university campus.
- Promote biking in Students.

ILLINOIS iSEE

Why Students Prefer To Bike ?

- Young adults want to drive less.
- Car is not financially viable options for students.
- Universities promote active transportation.
- University campuses are ideal settings to cultivate a culture of biking through high density, defined boundary and protected environment .
- Covid effect, maintain social distancing while travelling.

BFU Certification Program

512

Universities applied

212

BFUs Certified

THE LEAGUE OF AMERICAN BICYCLISTS since 1880

SILVER level in 2019.

Achieve Gold level by 2027.

Bike to Work day celebration in UIUC campus

BIKE PARKING

SHORT TERM PARKING

- Parking for Less than 2 hours
- Open, unsheltered and unenclosed
- Bike racks, U racks, Bike docks, Bike bollards
- Convenient, accessible and Easy to lock.
- Various economical option are available

LONG TERM PARKING

- Parking for More than 2 hours
- Enclosed, authorised access with security.
- Bike Shelters, Bike lockers, indoor spaces.
- Security, Protection against weather and theft.
- Higher initial cost and higher maintenance cost.

DATA & METHODOLOGY

BICYCLE CENSUS DATA

- Bike Rack Capacity for all campus buildings.
- Bicycle Census Count from 2014 to 2018.
- Bike Theft Data For 2014 – 2021.

❑ **GIS Based Weighted Overlay Model For Finalizing Location**

Data Cleaning & Spatial Join → Reference Grid & Intersect → Scoring & Priority Index

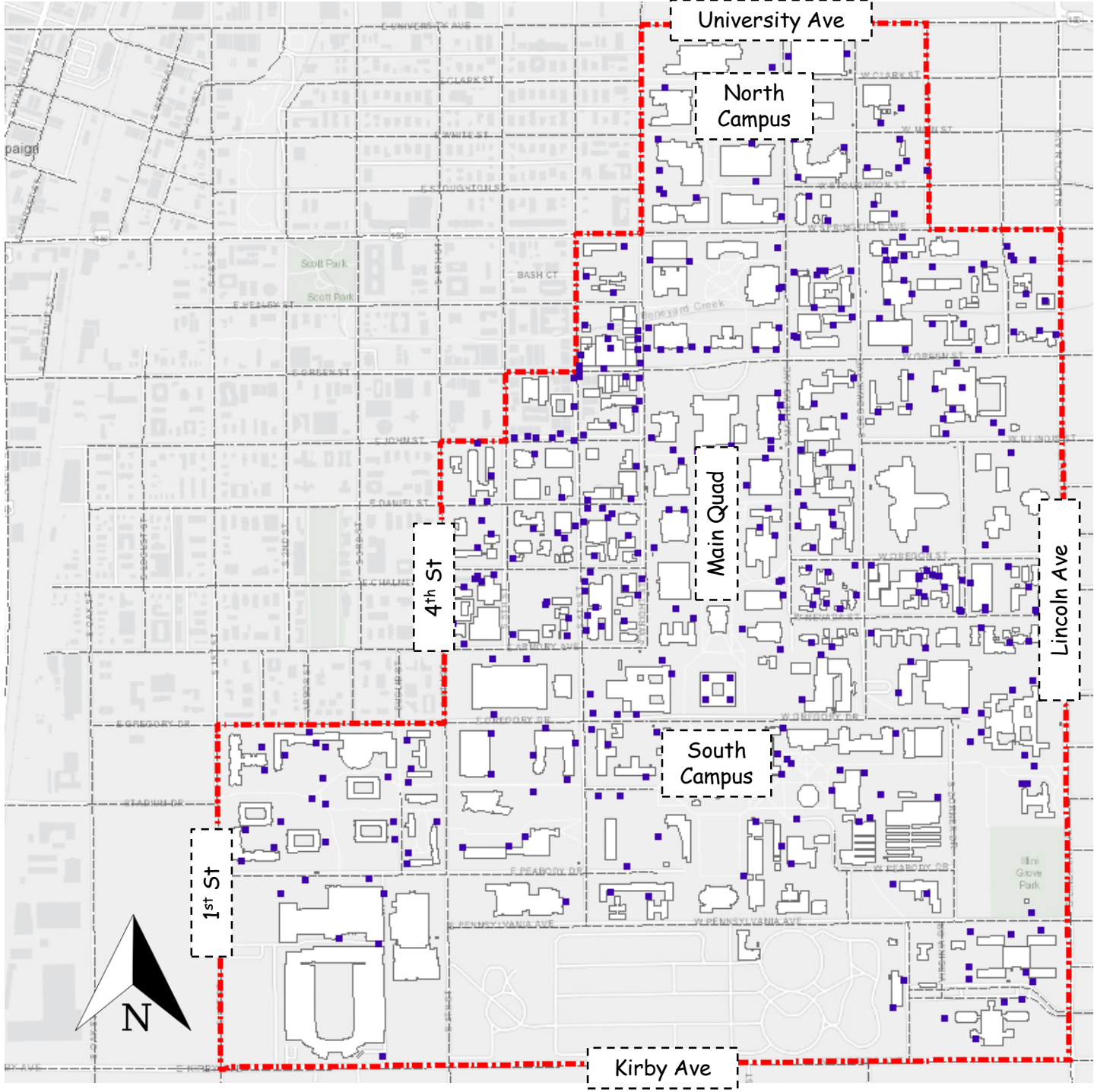
ILLINOIS FACILITIES & SERVICES

BIKE AT ILLINOIS

CAMPUS & BIKE RACK LOCATIONS

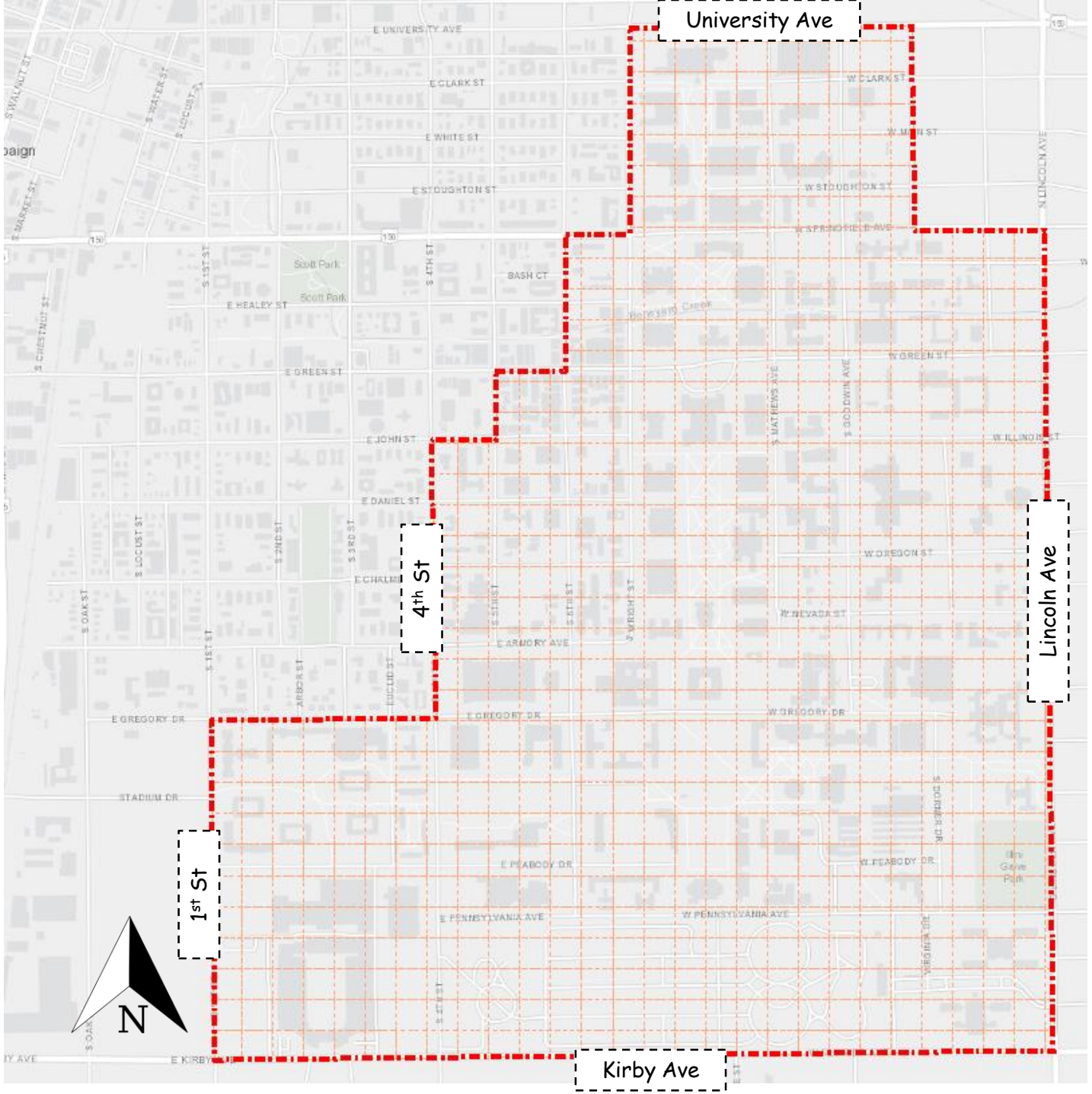
- 354 Buildings in the University District
- 3.6 square miles area
- 15 Colleges & Instruction Units

- More than 1200 Bike Parking racks across the campus.
- More than 5000 bike parking spaces available
- 1 bike parking shelter near Flag Hall



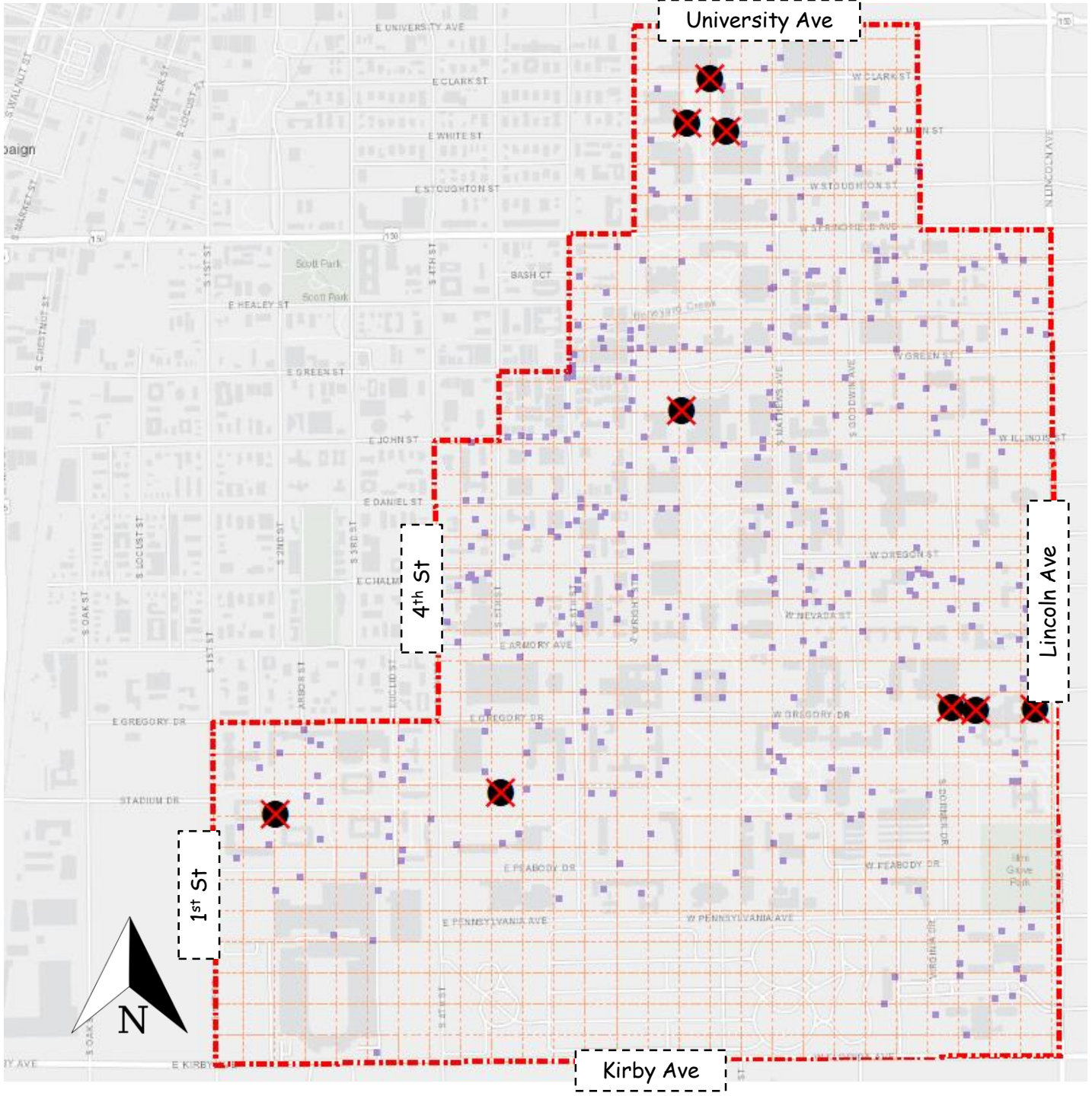
GRID GENERATION FOR CAMPUS

- 200 x 200 sqft grid size covering campus area.
- Optimal to aggregate multiple criteria and corresponding to campus size.
- 700 grids



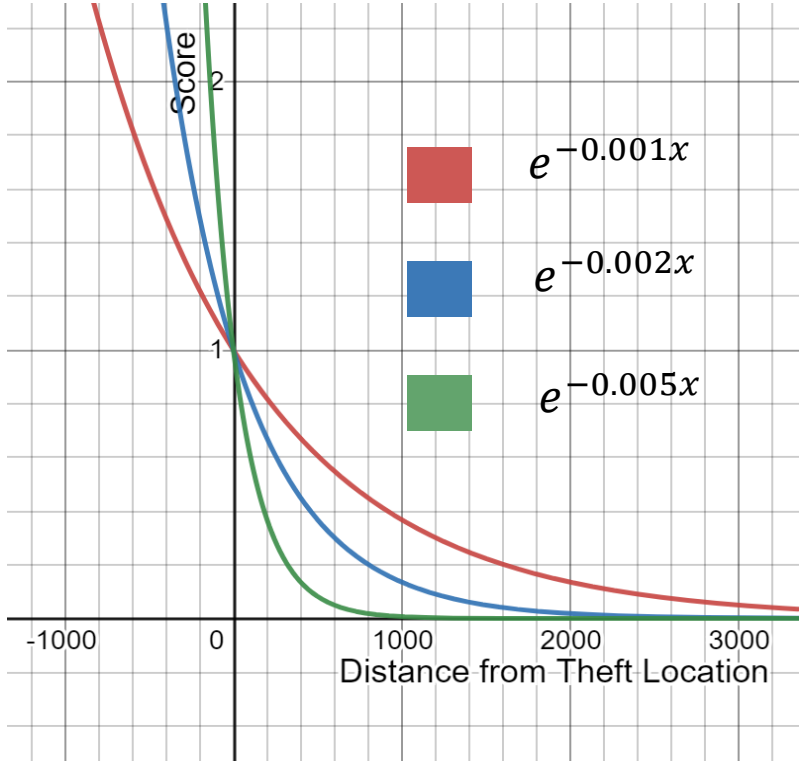
1ST PARAMETER: **BIKE THEFT LOCATIONS**

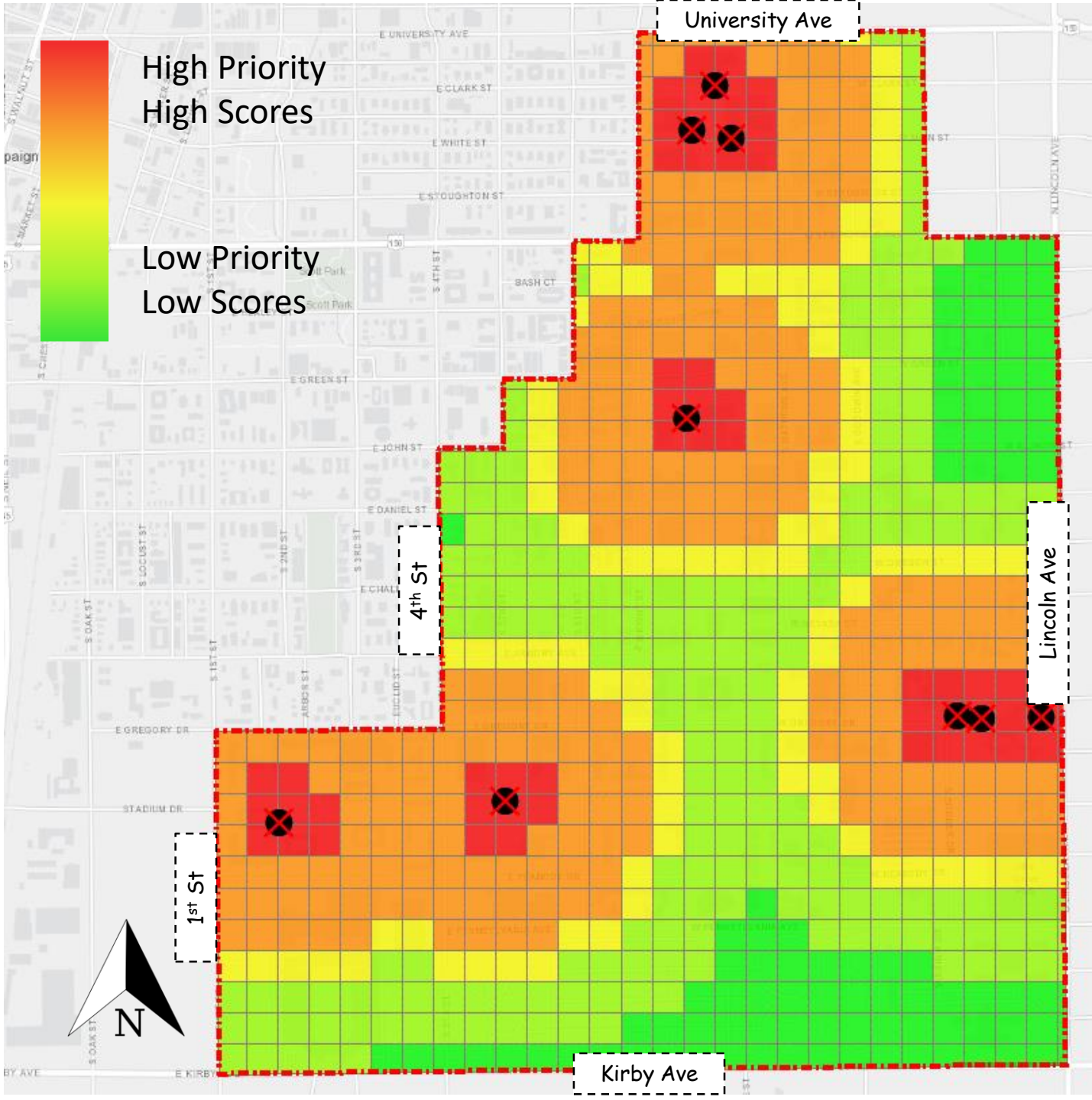
- Top Bike theft areas in UIUC: ECE department, Union, Siebel Centre for Design and CSL
- **Average 65 reported bicycle thefts/year in UIUC.**
- 325 bikes stolen from campus in last 5 years.



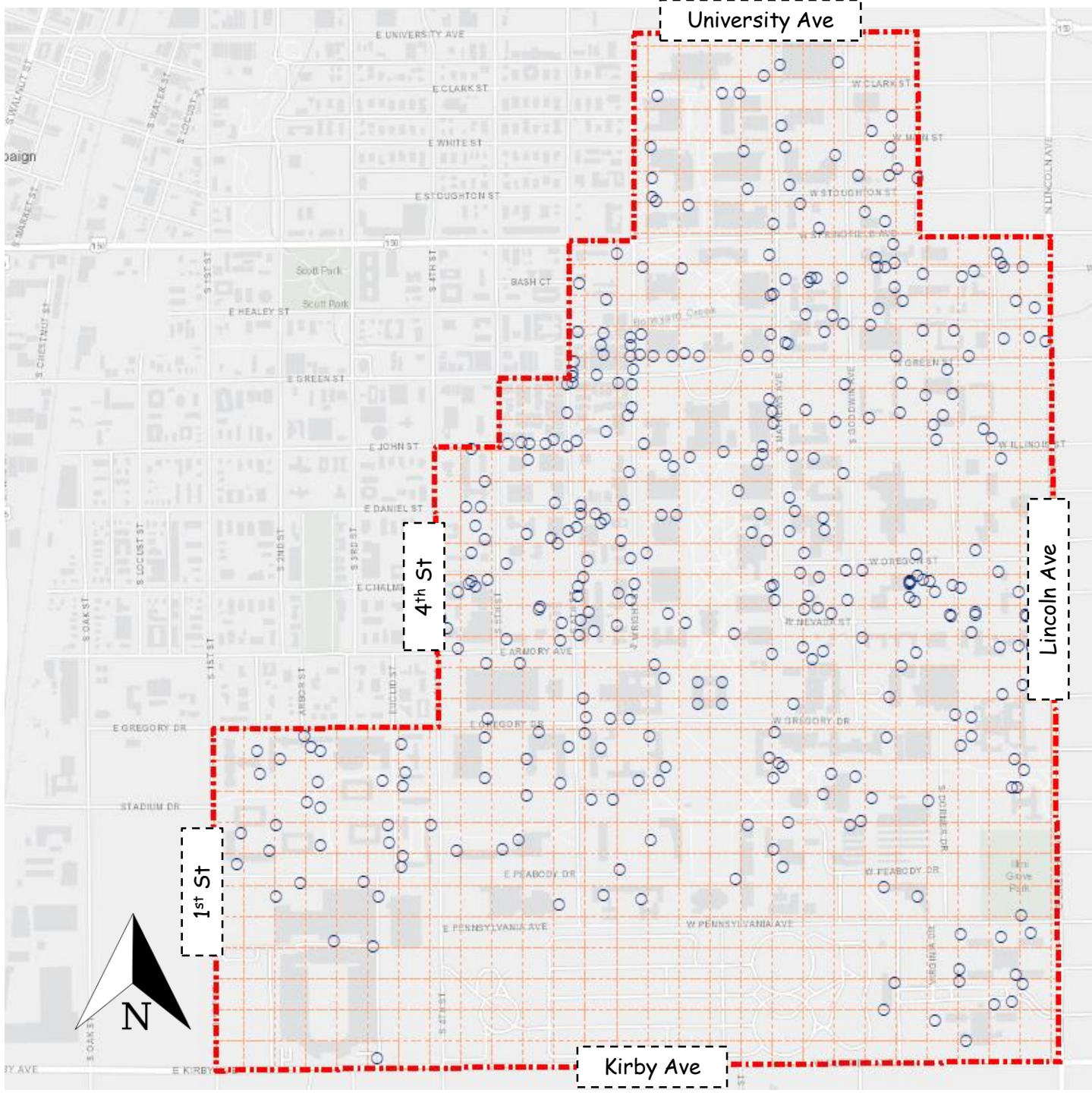
BIKE THEFT SCORING

- Exponential Decay Function



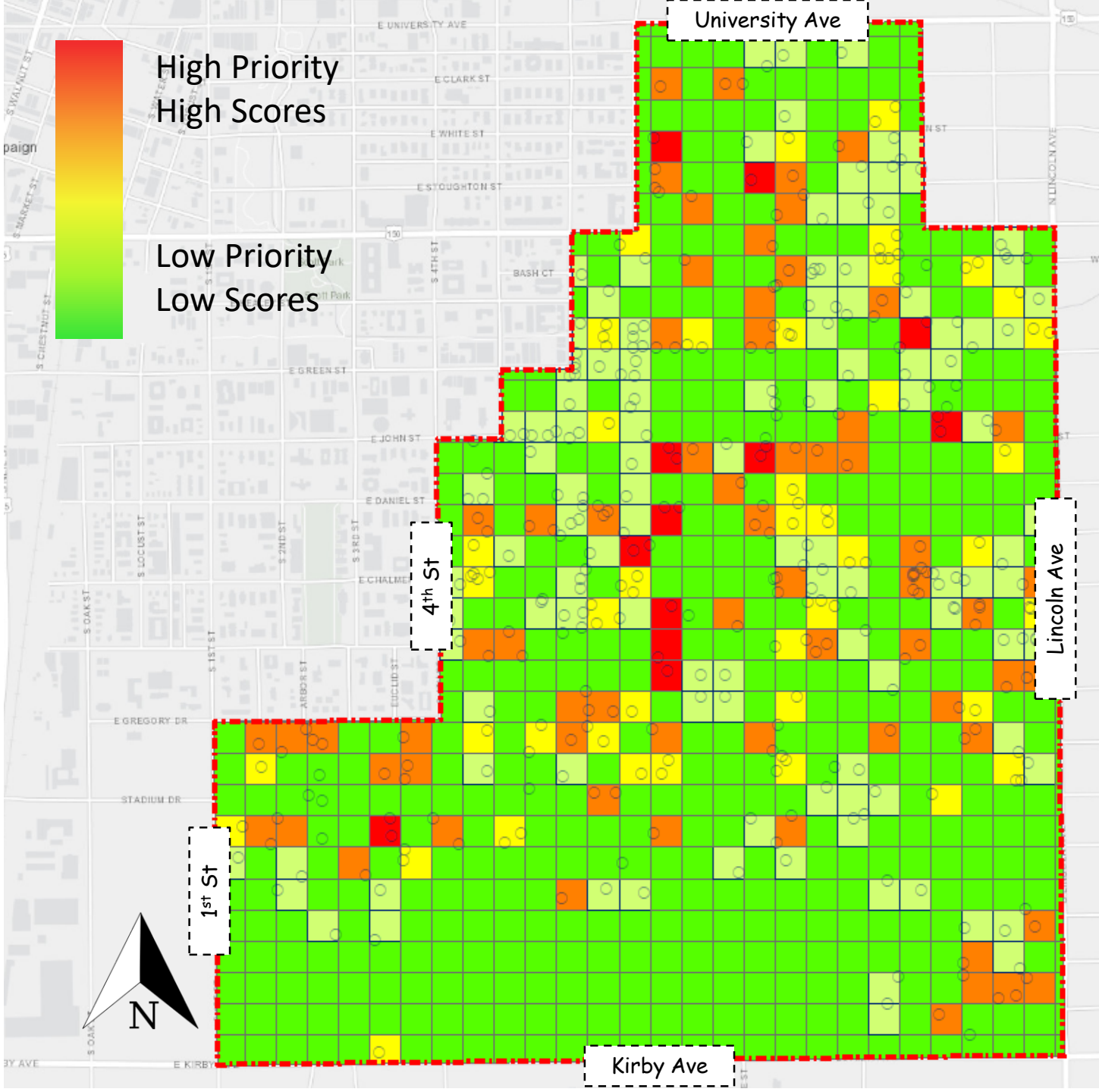


2ND PARAMETER: **BIKE PARKING CAPACITY**



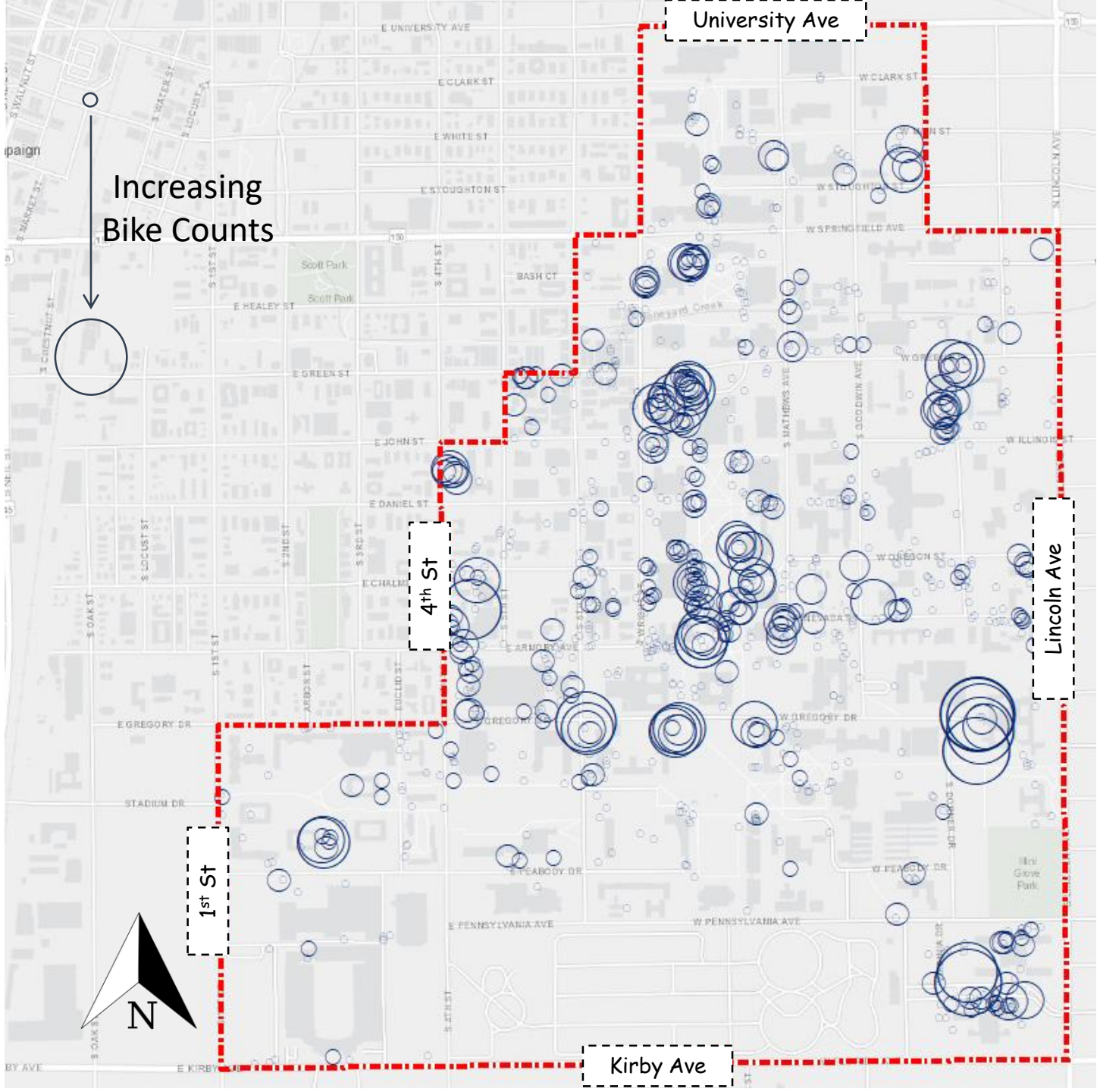
BIKE PARKING CAPACITY SCORING

- Scoring with Linear growth.
- Higher capacity indicates more destinations with higher demand.



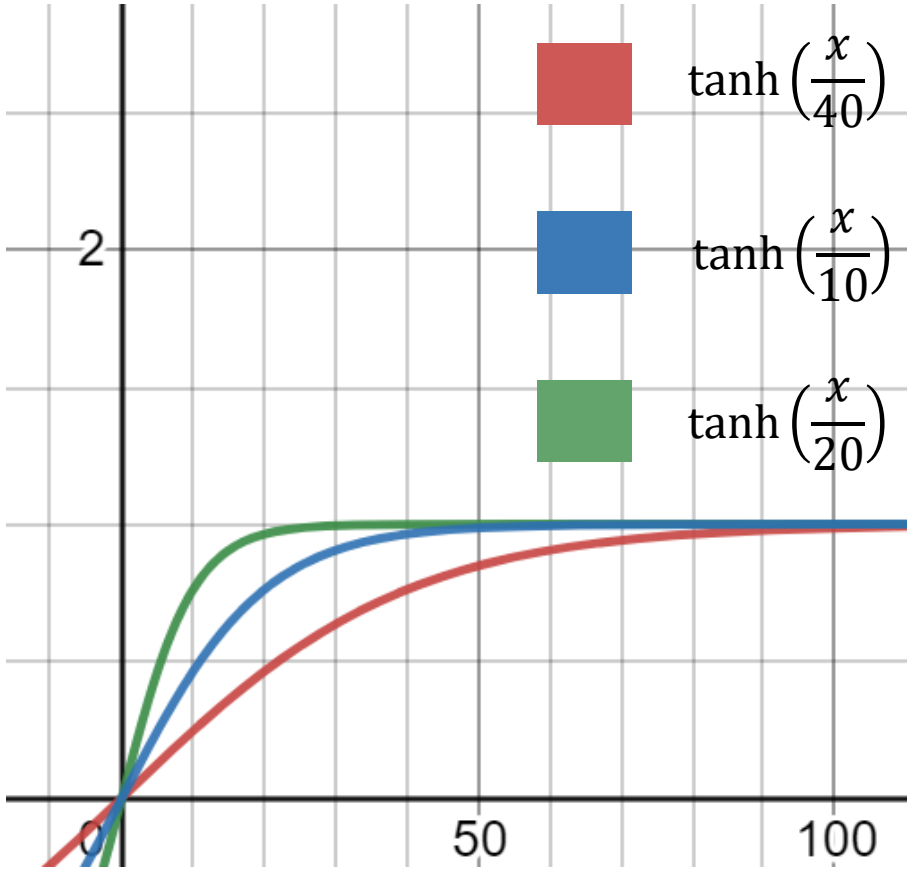
YEARLY BIKE CENSUS COUNT

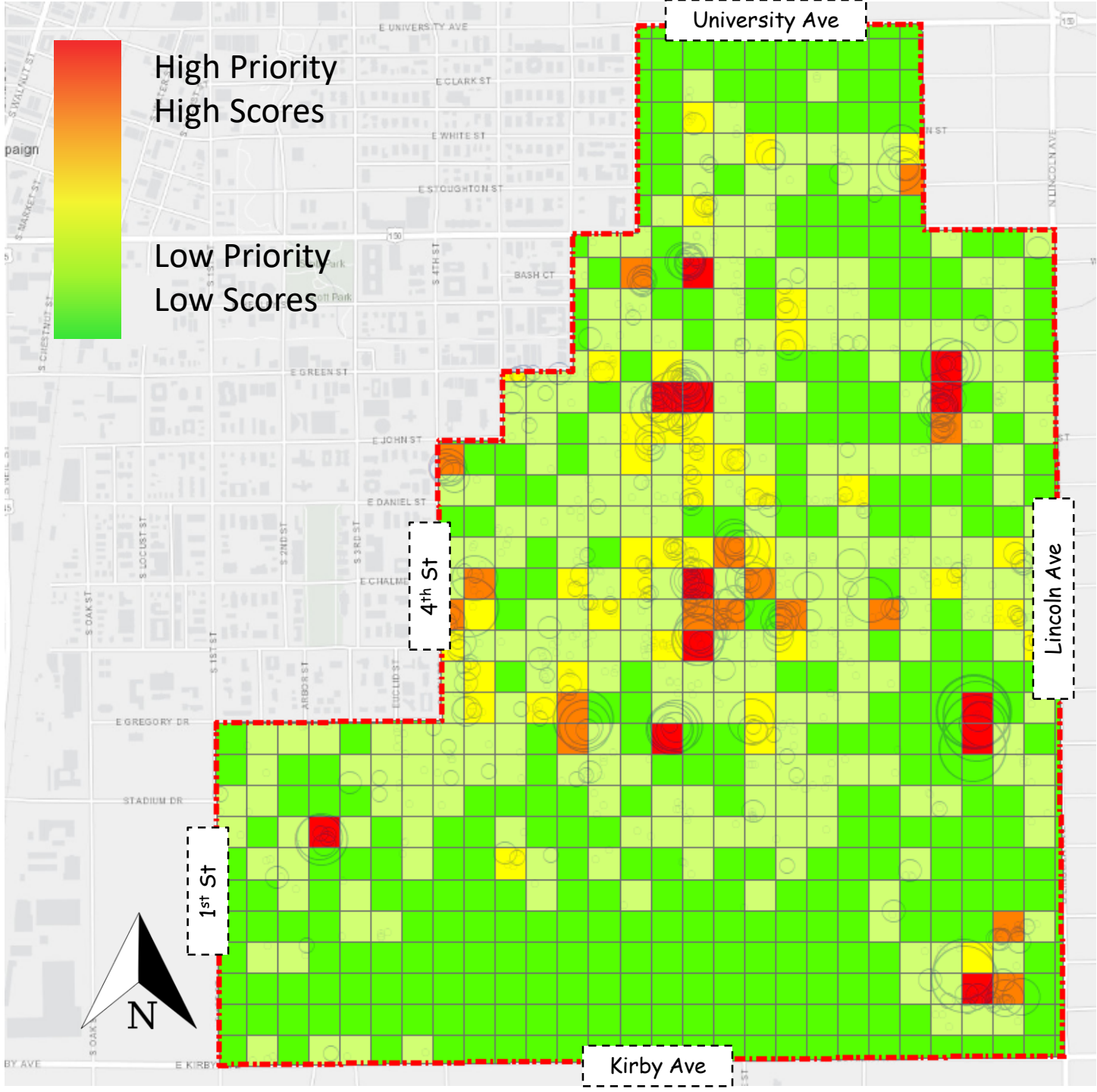
- 2014, 2015, 2016, 2017 & 2018 Bike census data



YEARLY BIKE COUNT ANALYSIS

- Hyperbolic tangent Function : $\tanh(x)$

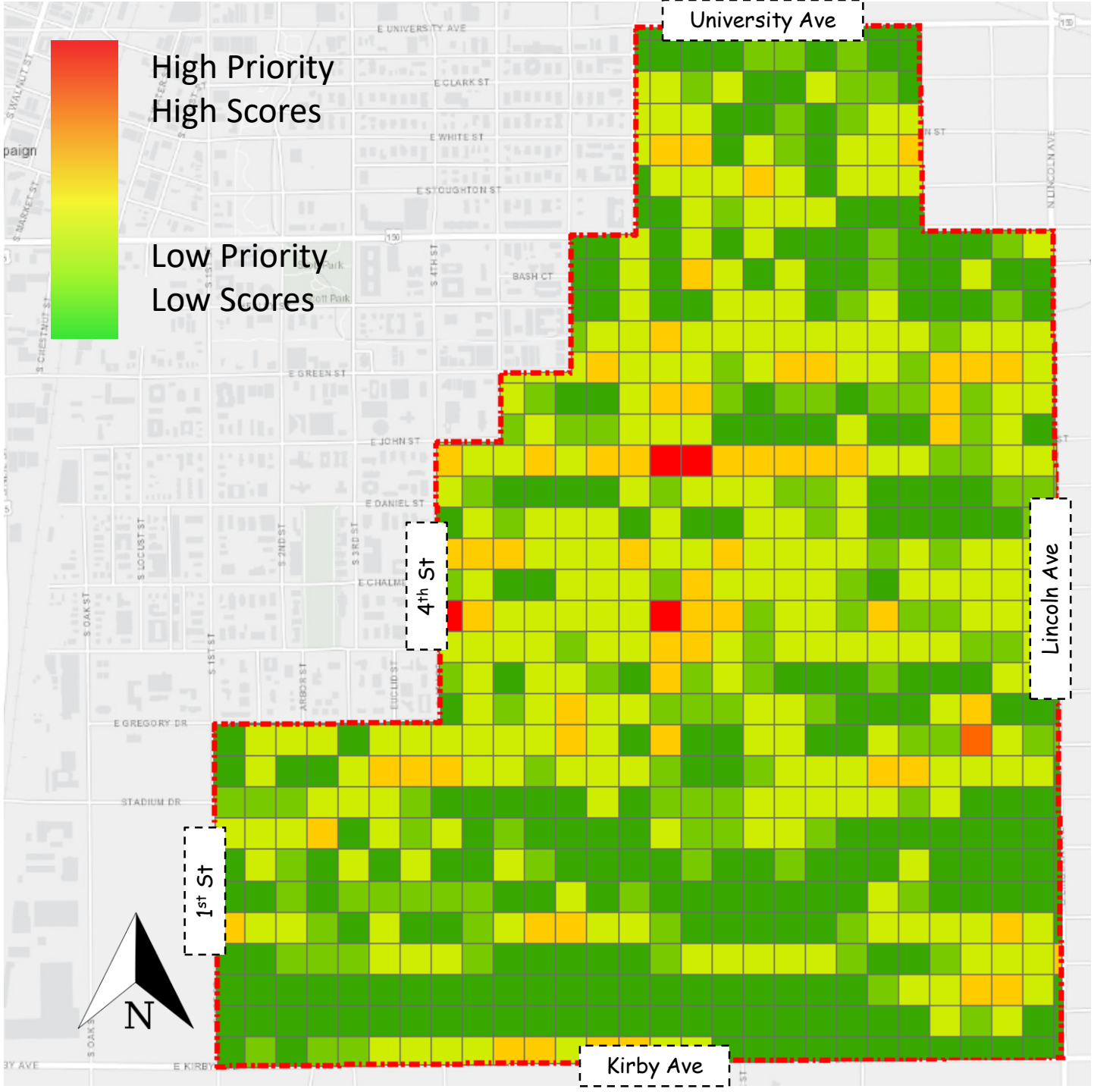




PRIORITY INDEX CALCULATION

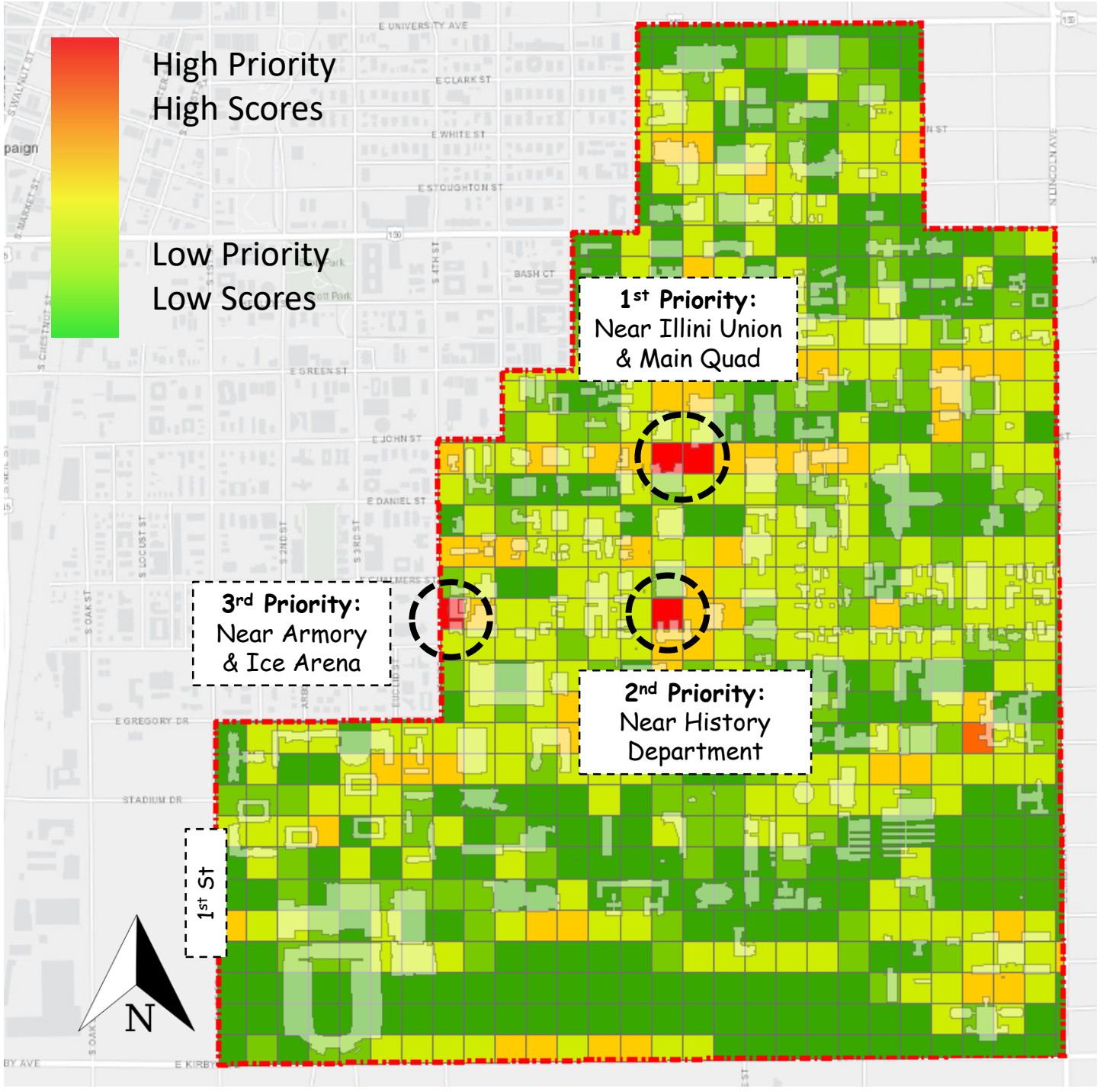
FID	Census Bike Count	Theft Distance (ft)	Parking Rack Capacity	Score Calculation			Score x Weightage			Priority Index (Out of 100)
							30	40	30	
				Bike Count Score	Theft Score	Parking Capacity Score	Bike Count	Theft Score	Parking Capacity Score	
490	6	3	182	0.15	0.99	0.66	4.47	39.45	19.78	**63.70**
491	18	0	88	0.42	1.00	0.32	12.66	40.00	9.57	**62.22**
378	31	5	14	0.65	0.98	0.05	19.49	39.05	1.52	**60.07**
304	98	393	140	0.99	0.14	0.51	29.56	5.62	15.22	**50.39**
643	1	95	210	0.02	0.62	0.76	0.75	24.89	22.83	**48.46**
386	40	94	0	0.76	0.62	0.00	22.85	24.98	0.00	**47.83**
426	11	157	186	0.27	0.46	0.67	8.05	18.20	20.22	**46.47**
520	47	1279	185	0.83	0.00	0.67	24.78	0.07	20.11	**44.95**

PRIORITY MAP BIKE PARKING SHELTER

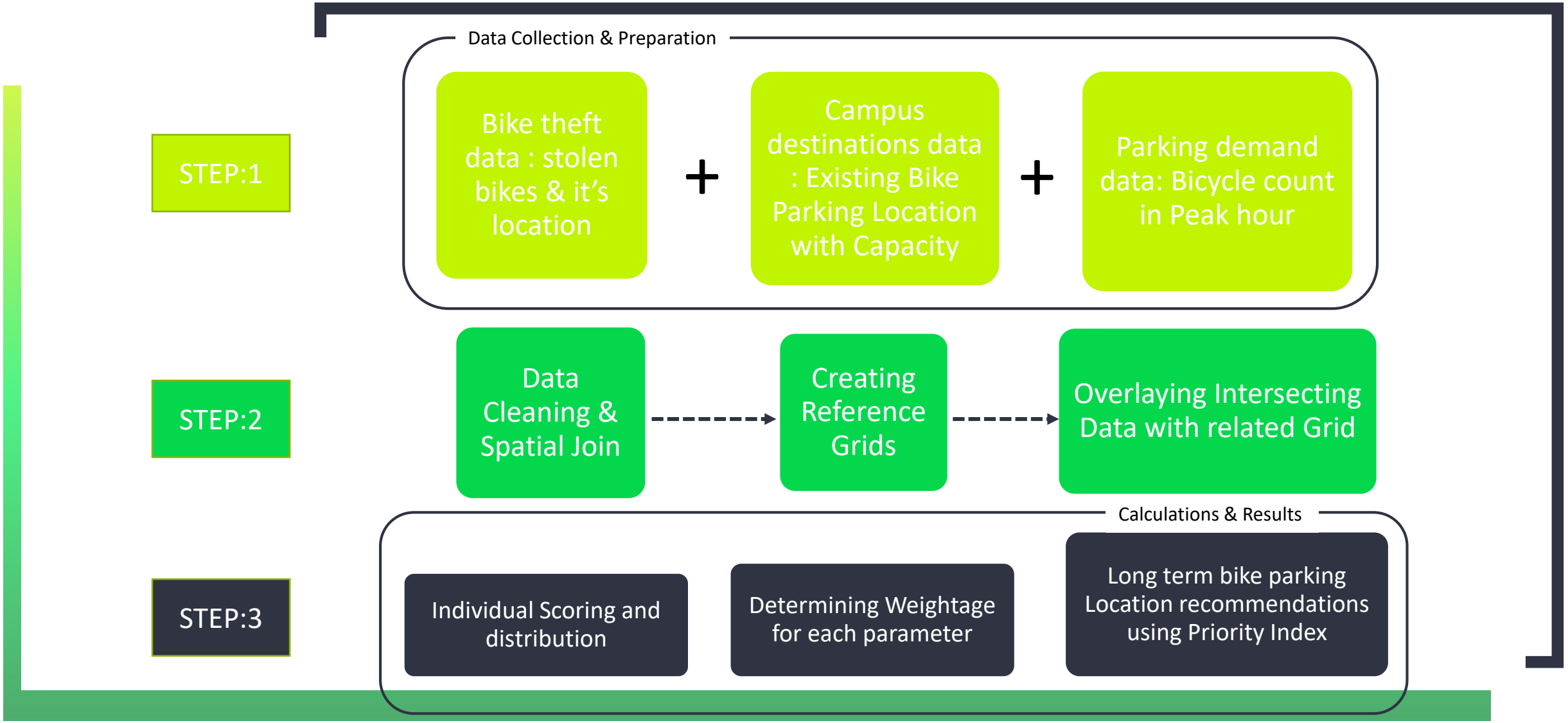


BIKE PARKING SHELTER LOCATION

- Weighted Average for calculating priority Index.
- Further checks: availability for space, surroundings, and Obstructing underground utility location.
- Framework can be used for short term parking location with modification in criteria, weightage and scoring methods.



FRAMEWORK & METHODOLOGY WITH MAIN STEPS



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USA national household travel survey (2017 & 2018)

https://www.bikeleague.org

iCAP Portal of UIUC

Google Images