Phoenix Cool Corridors Research Update

Phoenix UHITS Meeting
April 6, 2021

"Create a network of cool corridors in vulnerable communities to facilitate movement from residents' homes to their places of employment, education and play."
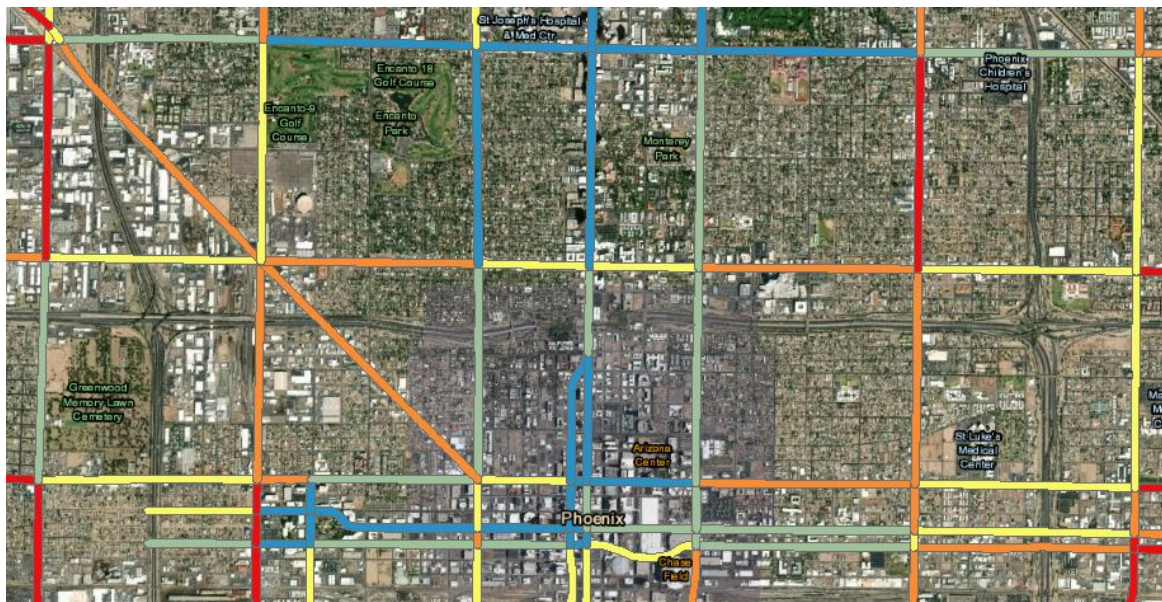
Phoenix 2021-2022 Trial Budget

- **Streets Transportation Department ($1.5M)** - add funding to the Cool Corridors Program, which was developed to align with the Tree and Shade Master Plan to assist with planting 200 trees per mile for a total of 1,800 new trees planted across nine project areas, one in each Council district and citywide.

Research Plan (Phoenix + ASU + Partners)

Cool Corridor Concept Definition

Determine key features of cool corridors (environmental, social, infrastructure, etc.)

Acquire relevant data sets; implement selection algorithm

Identify existing best practices and examples in Phoenix

Propose examples to community, receive feedback

Cool Corridor Prioritization

Determine key characteristics of **neighborhoods** to be prioritized for cool corridors

Acquire relevant data sets; implement prioritization algorithm

Propose prioritized set of neighborhoods; receive feedback

Suitability Assessment

Assess opportunities and conflicts on the **streetscape**

Develop strategies for "cooling" corridors

Propose implementation projects; receive feedback

Continuous learning and iteration to guide spatial analysis with community perspectives

Phoenix's road network in one-mile segments
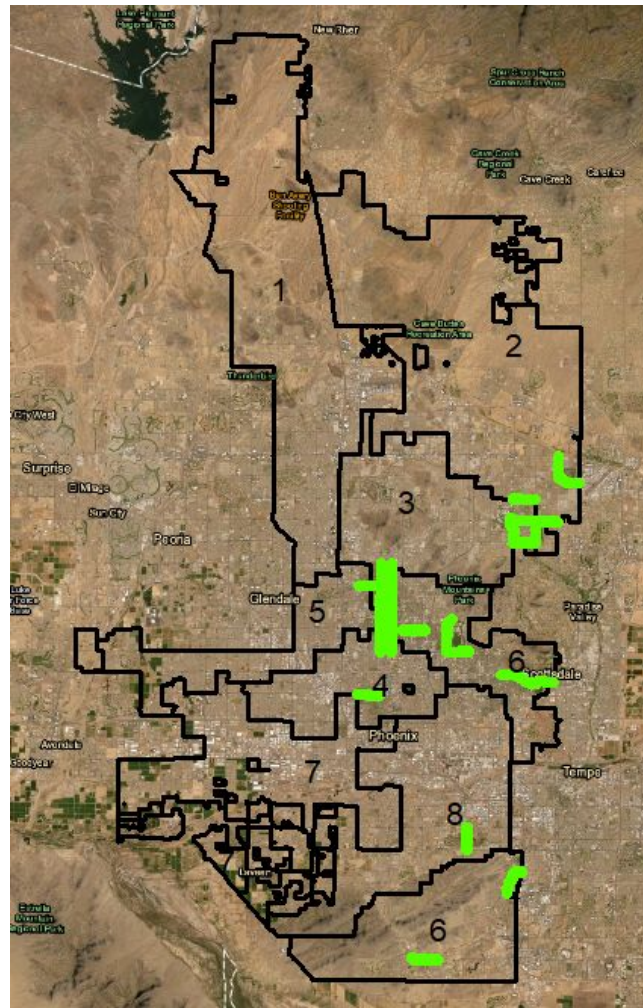
Rank segments based on the combination of

1. Low average land surface temperature in the immediate proximity of the road

2. Low sky view factor on the road

Cool Corridor Identification

"Top 25"

Cool Corridor Candidate: Central (Glendale-Bethany Home)

7307 N Central Ave
Phoenix, Arizona

Street View

1. Does this example match the current concept of a cool corridor (cool + shade for pedestrians)? Why or why not?
2. Looking at this example, how do we need to update the concept for a cool corridor?

Cool Corridor Candidate: 56th Street (Shea-Cactus)

1. Does this example match the current concept of a cool corridor (cool + shade for pedestrians)? Why or why not?
2. Looking at this example, how do we need to update the concept for a cool corridor?

Cool Corridor Candidate: 32nd Street (Broadway-Southern)

1. Does this example match the current concept of a cool corridor (cool + shade for pedestrians)? Why or why not?
2. Looking at this example, how do we need to update the concept for a cool corridor?

Cool Corridor Candidate: 7th Ave (Northern-Glendale)

1. Does this example match the current concept of a cool corridor (cool + shade for pedestrians)? Why or why not?
2. Looking at this example, how do we need to update the concept for a cool corridor?

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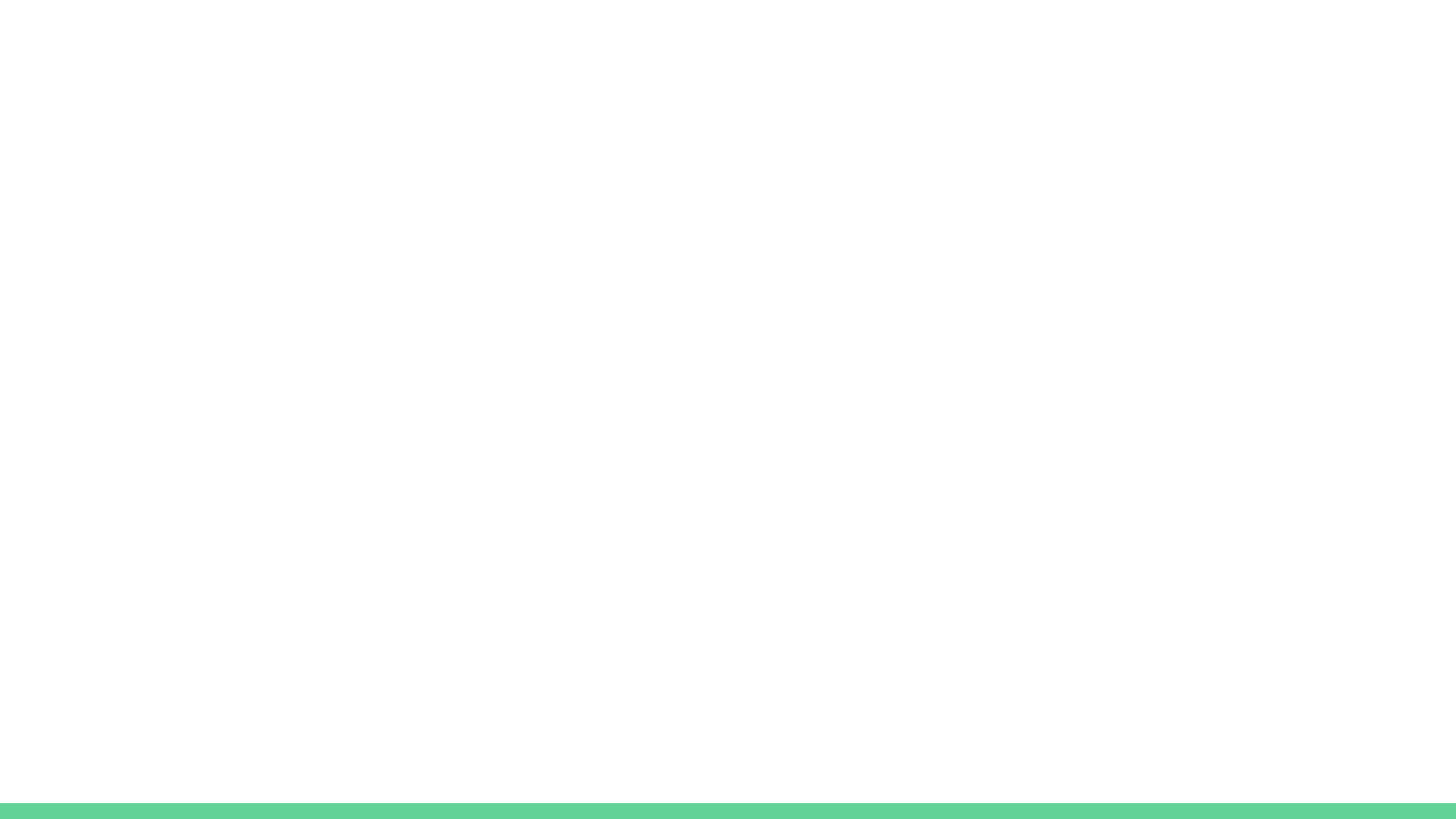
Cool Corridor Prioritization

Neighborhood Vulnerability

Each corridor is assigned the Heat Vulnerability Index score of its surrounding census tracts based on the most recent 5-year American Community Survey (following Wright et al., UREx, etc.)

Transit Dependency

Each corridor is assigned the % of housing units with no car available of its surrounding census tracts based on the most recent 5-year American Community Survey

Pedestrian Use

Each corridor is assigned the total number of walking trips that intersect the corridor in ASU/MAG simulation data

Shade Coverage & Temperature

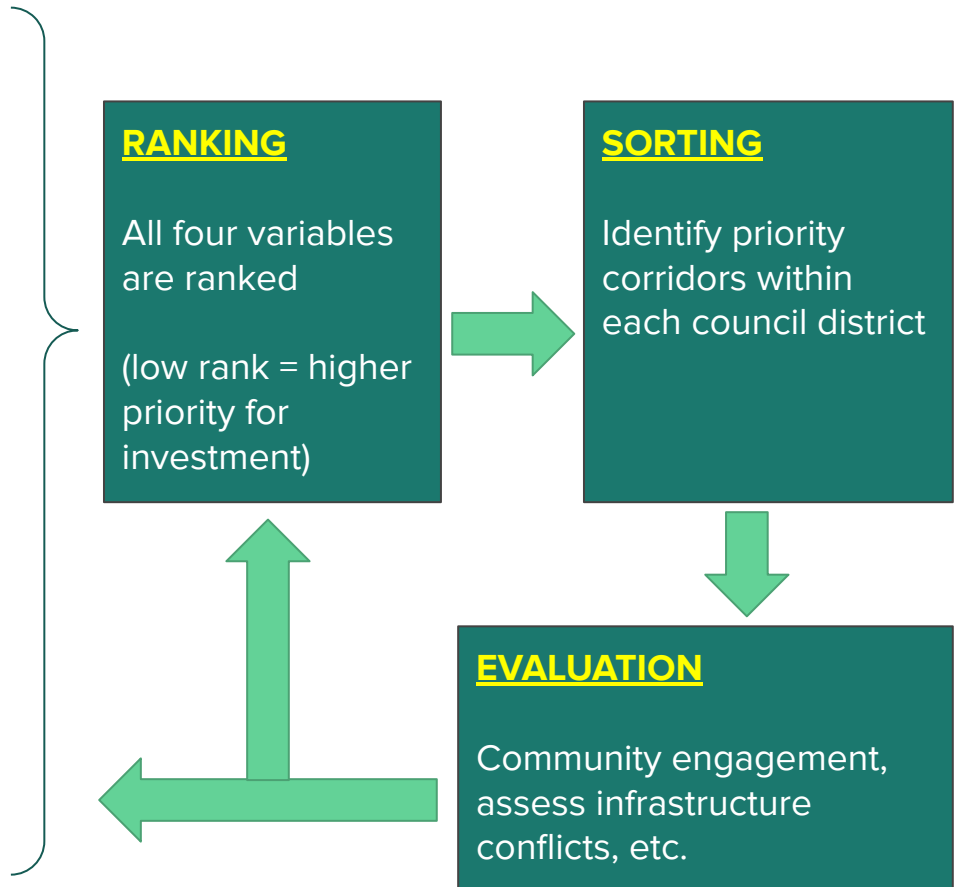Each corridor is assigned % shade coverage and land surface temperature based on ASU data

RANKING

All four variables are ranked

(low rank = higher priority for investment)

SORTING

Identify priority corridors within each council district

EVALUATION

Community engagement, assess infrastructure conflicts, etc.

Sample of Heat Vulnerability data

- Corridor highlighted in blue
- Vulnerability score in yellow would be used for ranking exercise
- Vulnerability classification in green (irrelevant)

- **How to assign one score for this road segment?**
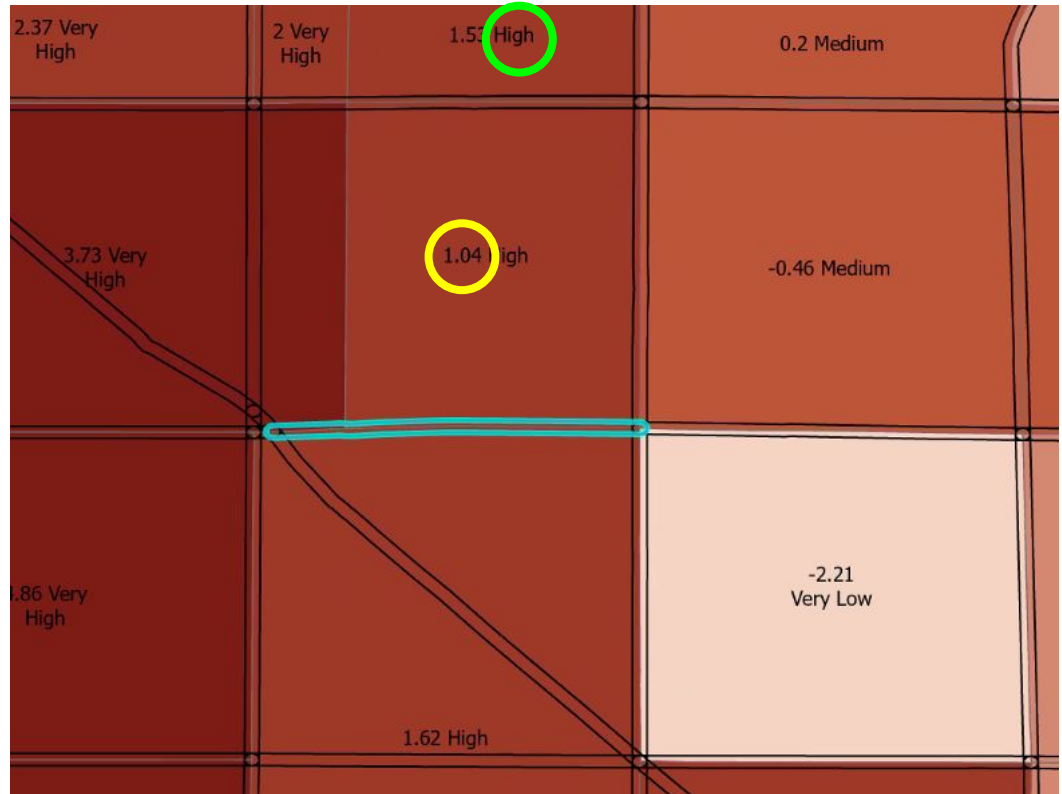
Heat Vulnerability Index

- Census + assessor + satellite data

- Rooted in hazards of place academic literature - Susan Cutter and others, 1990s

- Adaptation of all-hazards approach specifically for heat - Colleen Reid and others, 2009

- Maricopa County version correlated with heat deaths - Sharon Harlan and others, 2013

- Phoenix-specific versions produced by ASU 2015-present

HVI
0   25   50   75   100
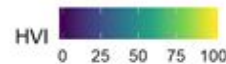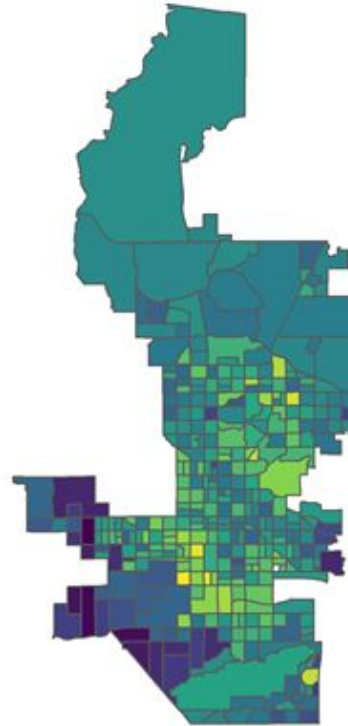
HVI variables
Poverty
Education
Ethnic minority
Latino immigrants
Senior citizens
Living alone
No air conditioning
Greenness (NDVI)

PARCEL AVERAGE STATISTICS ON FOLLOWING SLIDES

Note: these do NOT reflect total land area/proportions

	PROPTYPE	lst_mean	tree_mean	grass_mean	building_mean	asphalt_mean	soilconcrete_mean
4	RESIDENTIAL	127.4841	0.12544523	0.06104407	0.386293830	0.008311179	0.4078199
3	COMMERCIAL	130.3230	0.11082292	0.04030894	0.212508597	0.217414897	0.4035136
2	VACANT	130.6685	0.03890360	0.03253204	0.017380927	0.029171426	0.7139714
1	AG	115.5383	0.01508245	0.01368068	0.007813566	0.005099446	0.2522723
5	NA	NaN	NaN	NaN	NaN	NaN	NaN

GenPUCDesc	lst_mean	tree_mean	grass_mean
RESIDENTIAL REC CENTERS	125.6055	0.242307388	0.0805458552
GOLF COURSES	118.9154	0.185183728	0.3695983617
LIMITED USE	128.0360	0.180924254	0.0586128534
CONVERTED USE PROPERTY	128.3906	0.156116049	0.0839198315
RESORTS	120.7316	0.144869128	0.0246973010
WATER UTILITY OPERATING PROPERTY	130.4433	0.144623019	0.0009099699
SINGLE FAMILY RESIDENTIAL SITE OF 5 ACRES OR LESS	127.6222	0.133294471	0.0757840020
CARE FACILITIES	128.1792	0.123745243	0.0525812843
PARTIALLY COMPLETE STRUCTURES	129.4926	0.119372066	0.0536072473
HOTELS	129.6631	0.119012247	0.0249590907

GenPUCDesc	lst_mean	tree_mean	grass_mean
VEHICLE SALES_LEASING_STORAGE_PARTS	135.9564	0.021223015	0.0049229485
SPECIAL DISTRICTS - EXEMPT TAXING JURISDICTIONS	129.9444	0.021296371	0.0125016115
INDUSTRIAL PROPERTIES	135.8559	0.025579892	0.0083940600
MUNICIPAL UTILITIES	135.0382	0.029859954	0.0047089087
SERVICE STATIONS_AUTO TRUCK STOPS_REPAIR	135.0954	0.032439288	0.0047024064
INDUSTRIAL WAREHOUSES	136.3117	0.034552670	0.0096639099
CONVENIENCE_RETAIL STRIP_SUPERMARKETS	134.5872	0.034894172	0.0059501819
CROP TREES AND TREE FARMS	118.6190	0.036470769	0.1016329046
PARKING FACILITIES	134.0163	0.036583508	0.0090876686
TELECOMMUNICATIONS OR WASTE WATER PROPERTY	134.3717	0.041166483	0.0214239883
THEATERS AND AMUSEMENT FACILITIES	133.5747	0.047070736	0.0063857451
MISCELLANEOUS COMMERCIAL	134.1163	0.048964366	0.0173490454
VACANT LAND	131.1109	0.049060843	0.0401630741

DISTRICT	lst_mean	tree_mean	grass_mean	building_mean	asphalt_mean
7	129.2294	0.07865944	0.03942898	0.3142807	0.05025545
8	129.9814	0.08985270	0.04732670	0.2897765	0.05805792
5	129.0076	0.09867475	0.06784715	0.3795276	0.02600232
4	128.8974	0.11772872	0.08825101	0.3633483	0.05793633
1	129.5073	0.12836407	0.04487291	0.3618214	0.01843348
3	127.0883	0.13305069	0.05822967	0.3827862	0.02730178
2	126.5015	0.13365908	0.03092837	0.3631424	0.01575508
6	124.9730	0.16121061	0.08729925	0.4137741	0.02610463
NA	122.2471	0.18066975	0.10079269	0.1237128	0.02146382

VILLAGE	lst_mean	tree_mean	grass_mean	building_mean	asphalt_mean
Rio Vista	127.7524	0.02662631	0.000000000	0.00360506	0.03324413
Central City	132.9988	0.06586822	0.035114063	0.27452208	0.17703470
Estrella	128.6349	0.07706667	0.040407440	0.28457245	0.04575895
Maryvale	130.3498	0.08223393	0.051705372	0.35902732	0.02965764
Laveen	128.7078	0.08634833	0.036685962	0.27420904	0.01415084
South Mountain	129.4380	0.08901796	0.049386720	0.29275483	0.03839289
North Mountain	128.1737	0.12016172	0.063762765	0.38968314	0.02776785
North Gateway	127.3378	0.12045213	0.002989966	0.36652475	0.01390871
Desert View	125.4327	0.12707884	0.003636552	0.33445441	0.01732343
Alhambra	126.8908	0.13202058	0.106799215	0.39540230	0.04152592
Deer Valley	129.2475	0.13291363	0.036307913	0.36304850	0.02014392
Ahwatukee Foothills	127.4737	0.13495498	0.047907564	0.39585087	0.01572159
Paradise Valley	126.5913	0.14006912	0.053710419	0.37019100	0.01815781
Encanto	127.2878	0.14709159	0.100643207	0.34791822	0.06879598
Camelback East	124.2886	0.17047313	0.110287333	0.42493091	0.03958054
NA	121.4959	0.19377365	0.096282679	0.13541130	0.02319330