DRIVE UNTIL YOU QUALIFY: EVIDENCE FROM THE TWIN CITIES URBAN AREA

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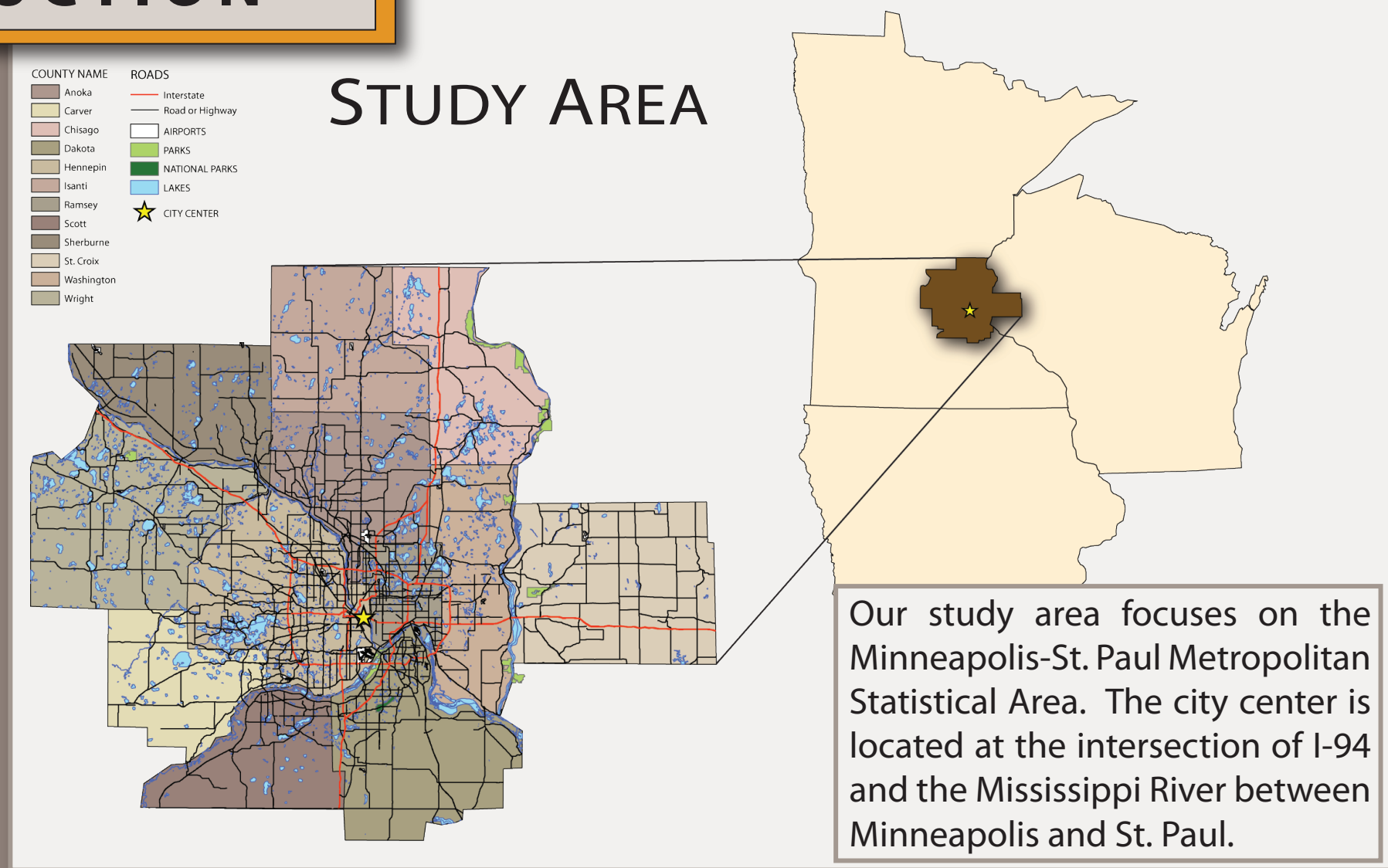
INTRODUCTION

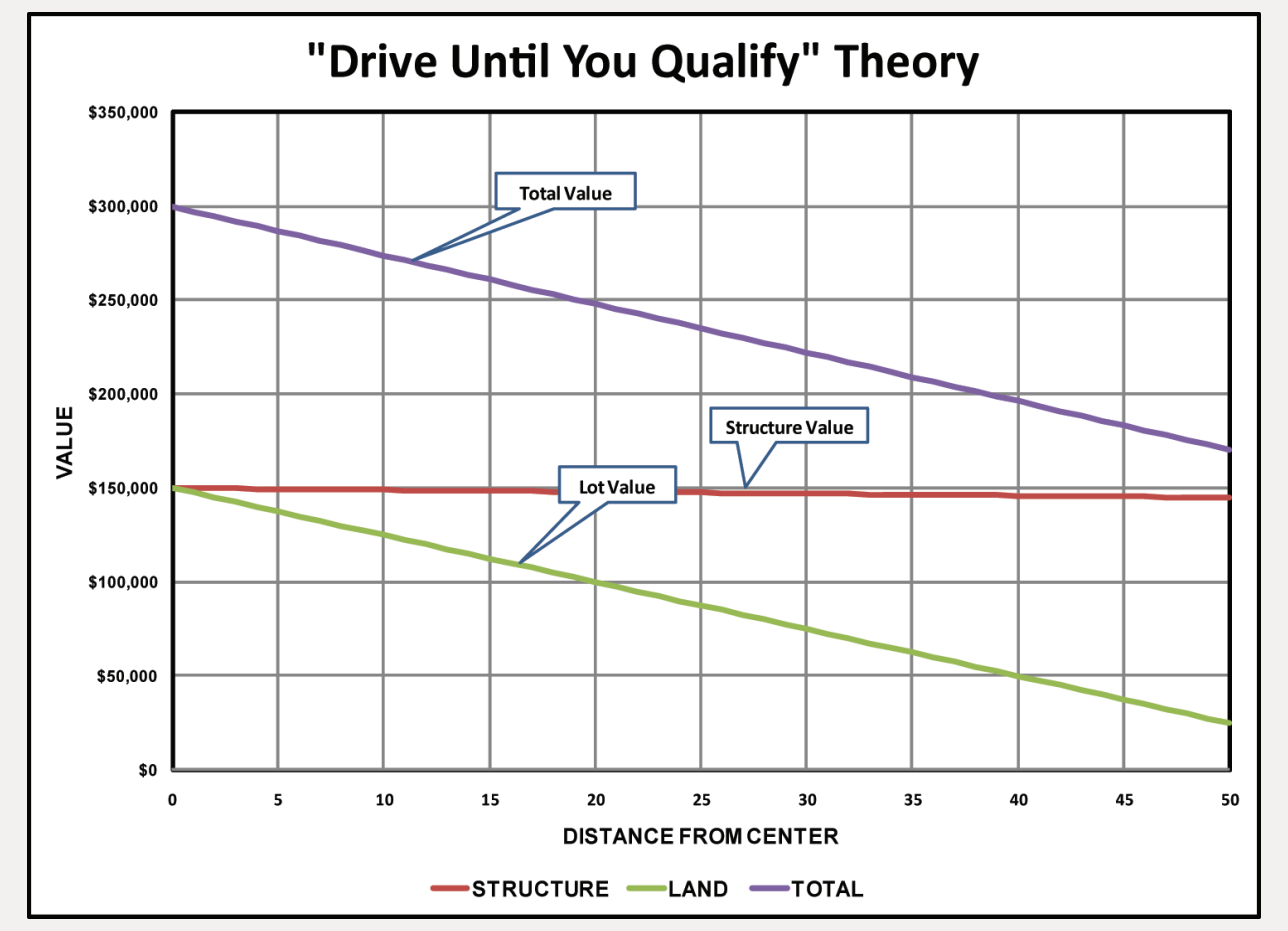
ABSTRACT

"Drive until you qualify" is a phrase often cited as a major cause of urban sprawl and increasing dependence upon foreign oil. The primary idea is that house prices decay with distance from the center of a city because of falling land prices. This study analyzes empirical data from available real estate transactions to model the price/distance dynamic in the Twin Cities metropolitan area. While generally true, the phenomenon has strong directional biases and responds well to transportation corridors and physical barriers.

STUDY AREA



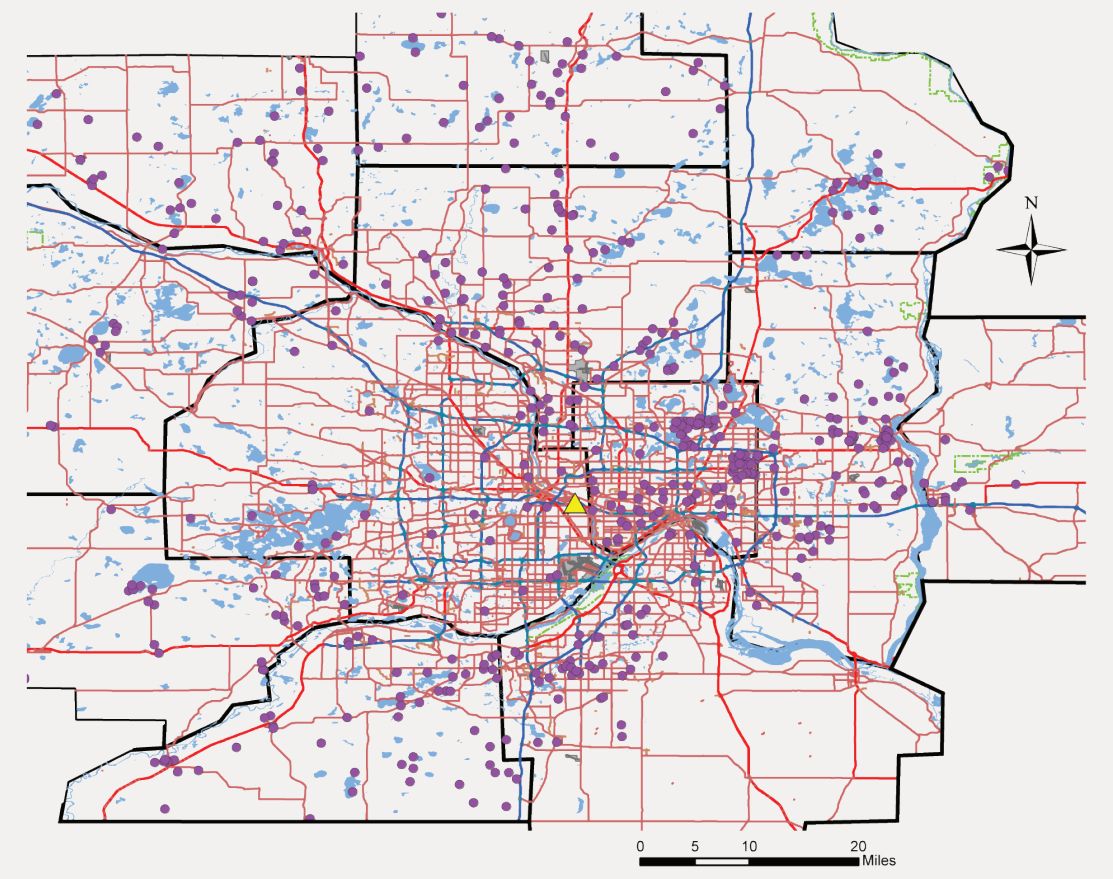
Our study area focuses on the Minneapolis-St. Paul Metropolitan Statistical Area. The city center is located at the intersection of I-94 and the Mississippi River between Minneapolis and St. Paul.



This graph illustrates our hypothesis of "drive until you qualify." As distance from city center increases, lot value decreases. Demand for land is higher closer to the city center and decreases with distance. The structure value remains relatively constant. The decline in total value correlates directly with the decrease in lot value.

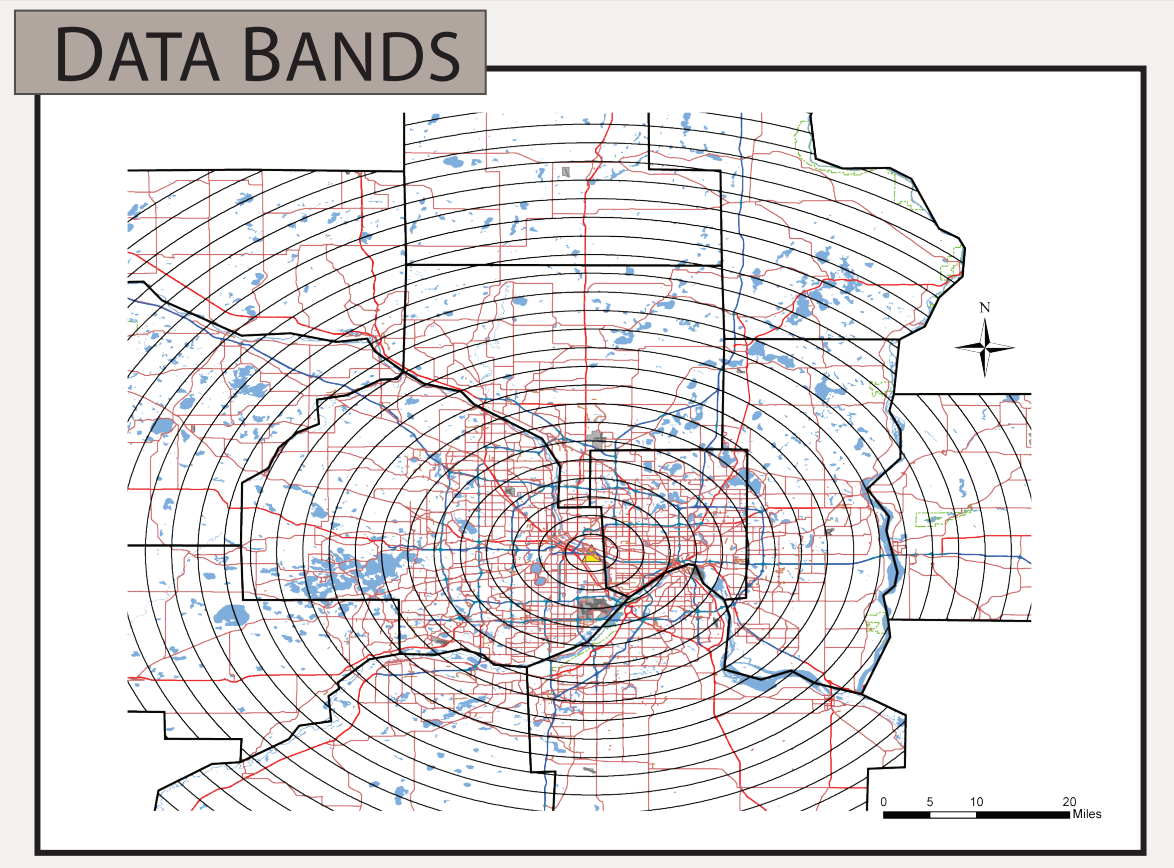
SAMPLE DATA

● Each dot in the map is a sample point representing a single-family home listed on Zillow. Specific data for each house were obtained from local assessor's offices: house area (sq. ft.), lot area (sq. ft.), assessed structure value ($), and assessed lot value ($). From this point forward, the data were analyzed and manipulated using Microsoft Excel and ArcGIS 9.3.



BAND DATA

DATA BANDS

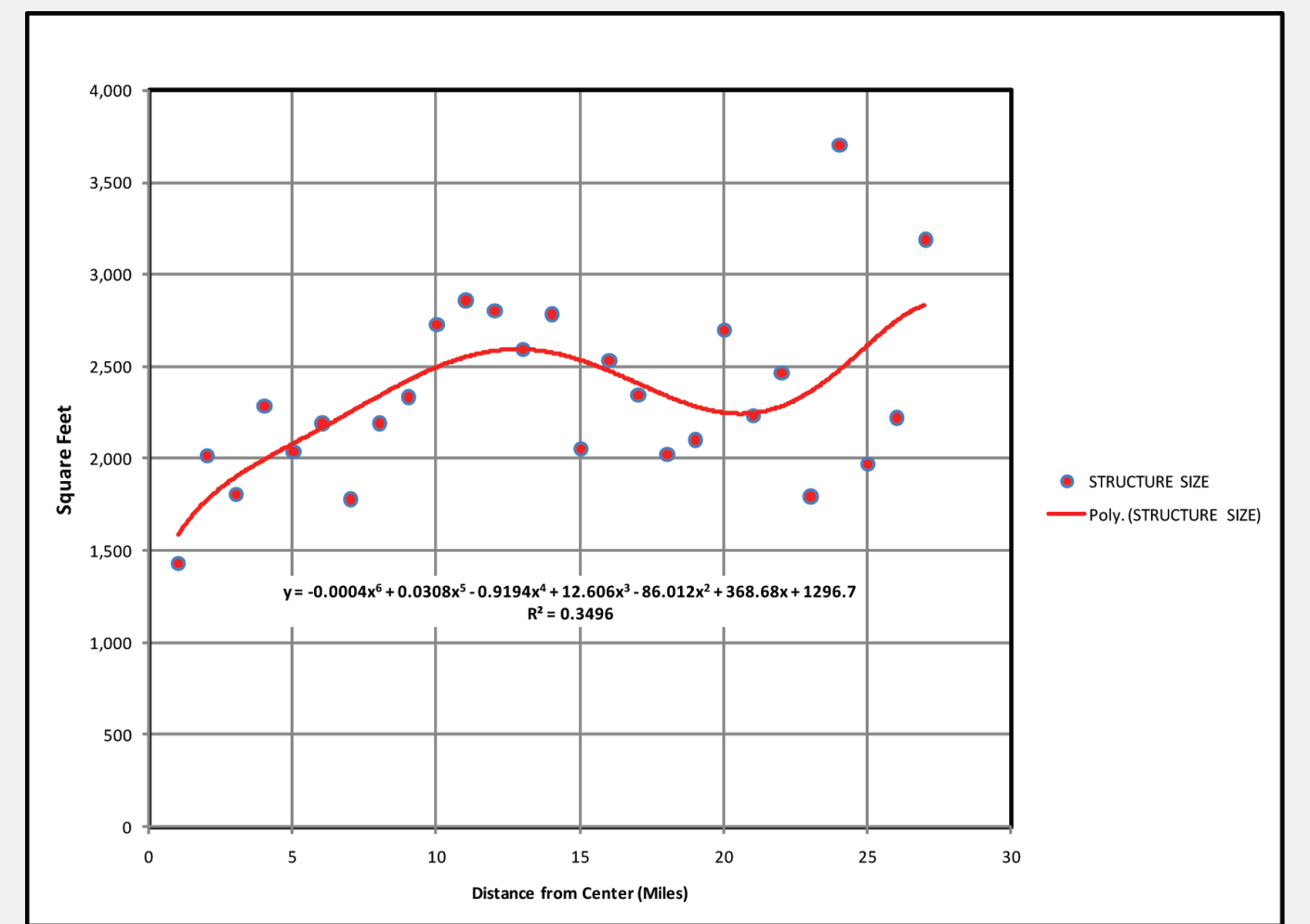


The sample data points contained a great deal of directional and other noise that was removed by averaging all data by two mile bands. The band data provides a "normalized" view of lot and structure raw and square foot values. Below is a table of variables for each two mile band. The "ideal" band, highlighted in yellow, is used to normalize home values and is examined in depth in the 'Band Data' section.

BAND	STRUCTURE (SQ FT)	STRUCTURE ($)	LOT ($)	LOT (SQ FT)	STRUCTURE (VALUE/SQ FT)	LOT (VALUE/SQ FT)	
0-2	1,429	219,100	87,233	6,063	185.5	14.5	
2-4	2,013	271,811	97,389	6,350	138.3	14.0	
4-6	1,802	258,300	78,920	5,346	146.1	14.4	
6-8	2,283	235,183	92,572	8,641	112.9	11.2	
8-10	2,036	237,171	98,459	13,863	122.6	10.0	
10-12	2,190	270,943	102,011	21,565	127.7	9.6	
12-14	1,778	240,886	100,836	14,880	154.7	11.8	
14-16	2,190	264,832	104,339	15,925	125.0	8.1	
16-18	2,334	281,777	125,279	39,013	123.2	6.6	
18-20	2,727	409,198	141,083	97,487	152.7	4.7	"IDEAL" BAND
20-22	2,859	405,748	155,409	76,767	143.7	6.7	
22-24	2,802	381,096	182,728	136,753	145.2	5.8	
24-26	2,594	382,291	161,720	152,026	164.8	7.3	
26-28	2,784	281,590	103,005	149,354	107.8	2.3	
28-30	2,051	218,748	103,476	80,283	108.4	7.2	
30-32	2,534	243,737	101,184	72,894	109.8	3.7	
32-34	2,343	211,192	84,275	124,145	92.9	3.2	
34-36	2,020	167,520	70,077	128,741	93.7	3.0	
36-38	2,101	181,278	77,339	157,833	89.3	2.4	
38-40	2,700	257,235	84,588	179,394	107.6	1.7	
40-42	2,234	182,146	93,869	344,967	85.6	3.1	
42-44	2,463	201,800	79,693	118,806	84.7	2.5	
44-46	1,791	213,886	133,529	202,665	124.9	5.7	
46-48	3,703	211,100	144,313	472,055	60.9	1.9	
48-50	1,969	160,243	53,414	68,323	82.1	4.4	
50-52	2,221	187,180	134,900	594,185	90.5	3.5	
52-54	3,191	278,550	95,200	803,682	87.2	0.8	

IDEAL HOUSE SQ FT
2,746

IDEAL LOT SQ FT
115,758

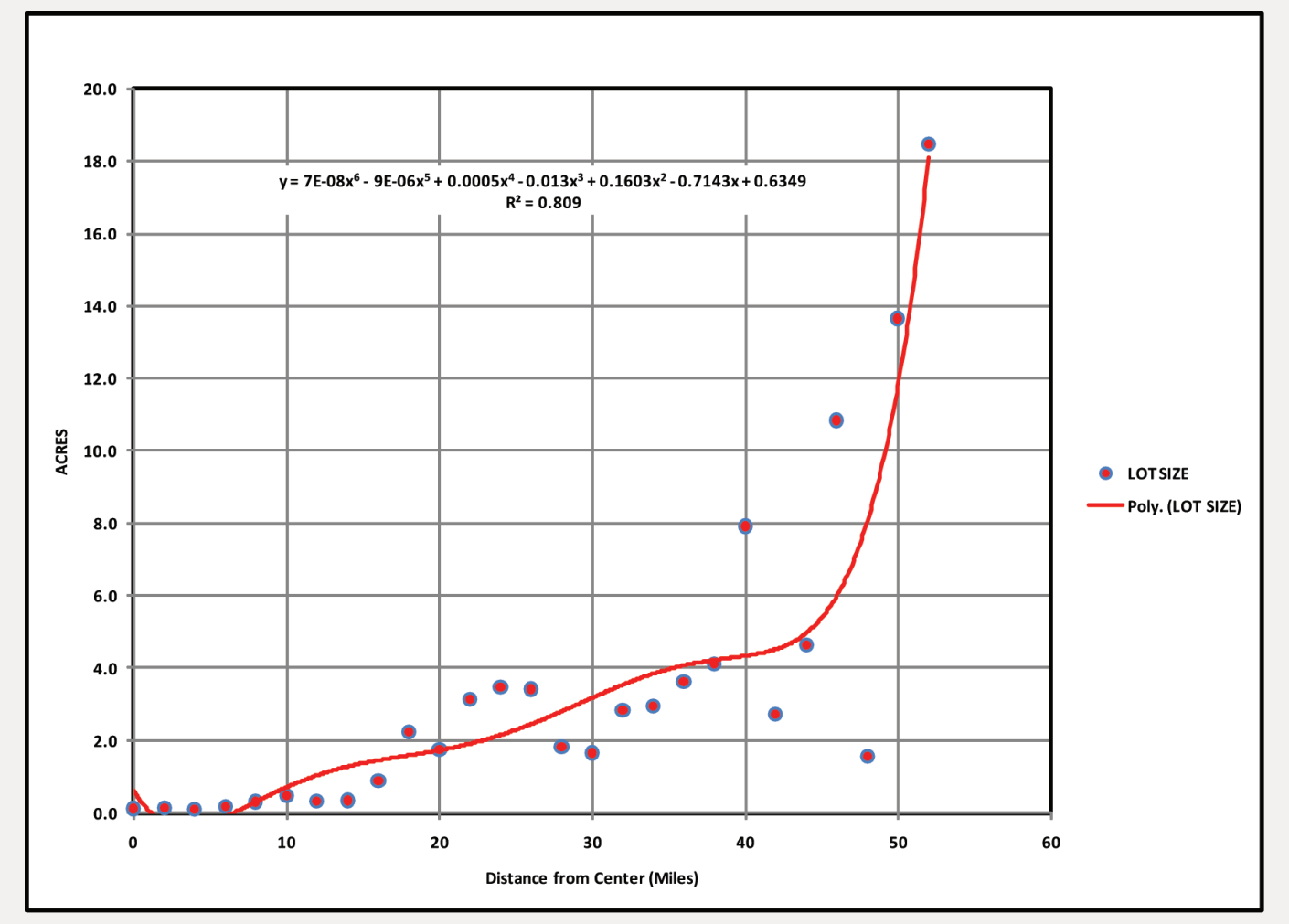


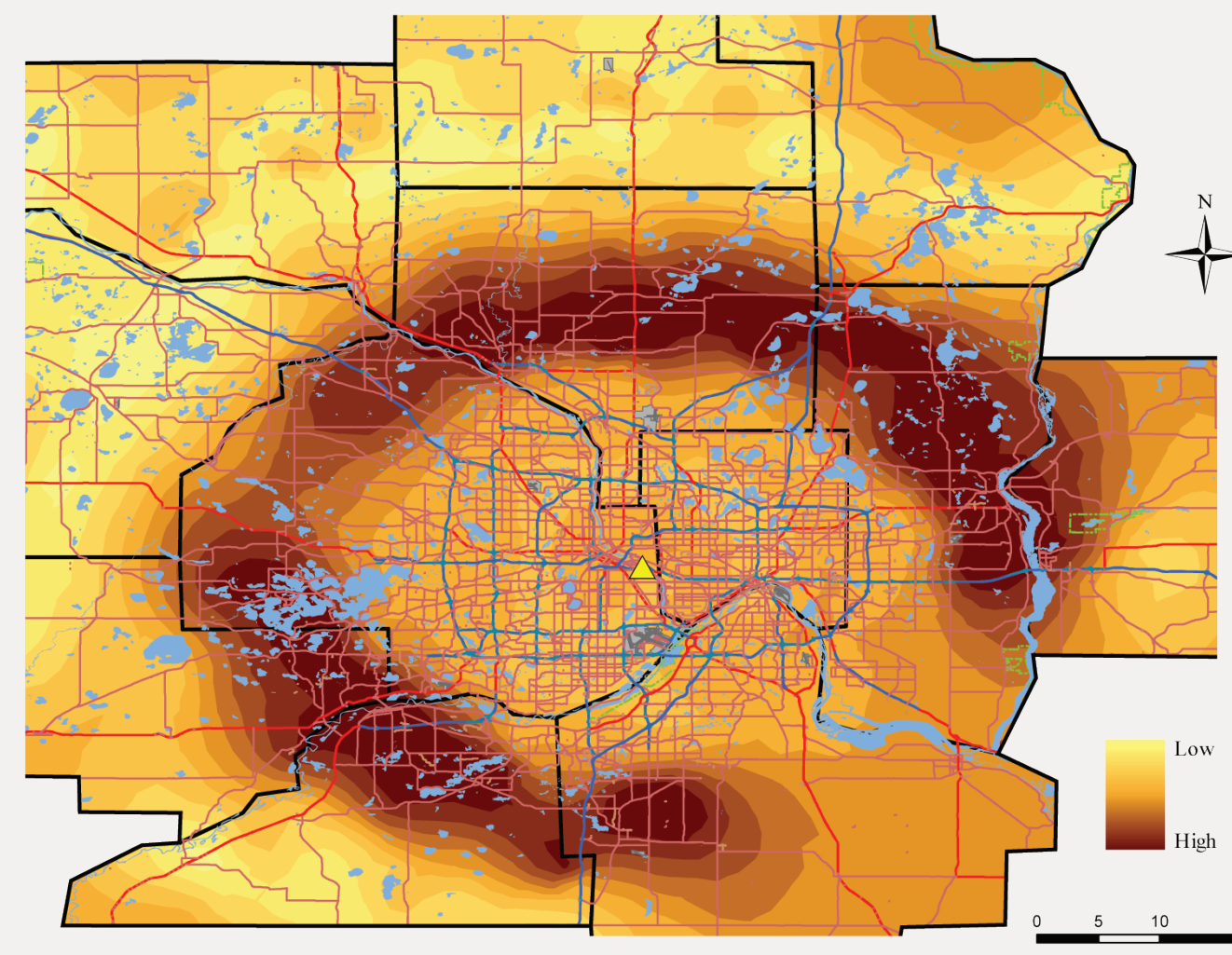
STRUCTURE SIZE

Structure size is small in the center of the city and gradually increases with distance until it reaches a peak at approximately 13 miles. The structure size takes a downward shift until it reaches a distance of 22 miles at which it begins to increase again. The sixth order polynomail equation for distance and structure value "explains" roughly 35% of the variation in structure size.

LOT SIZE

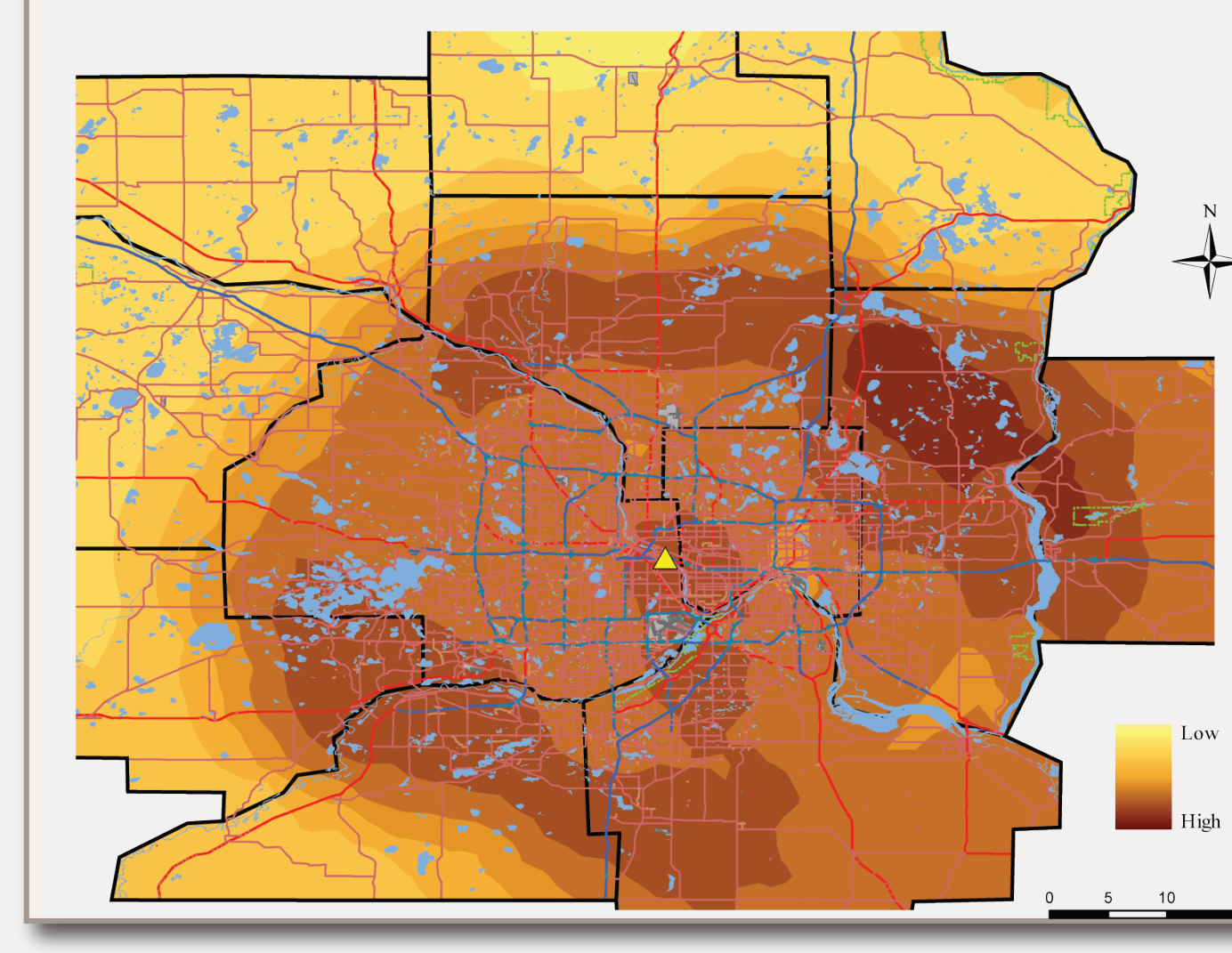
Lot size is very small in the center of the city due to high demand and high population density. It gradually increases with distance until approximately 45 miles away from the city center. At this point the lot size begins to increase dramatically. The sixth order polynomial equation for distance and lot size "explains" roughly 81% of the variation in lot size.





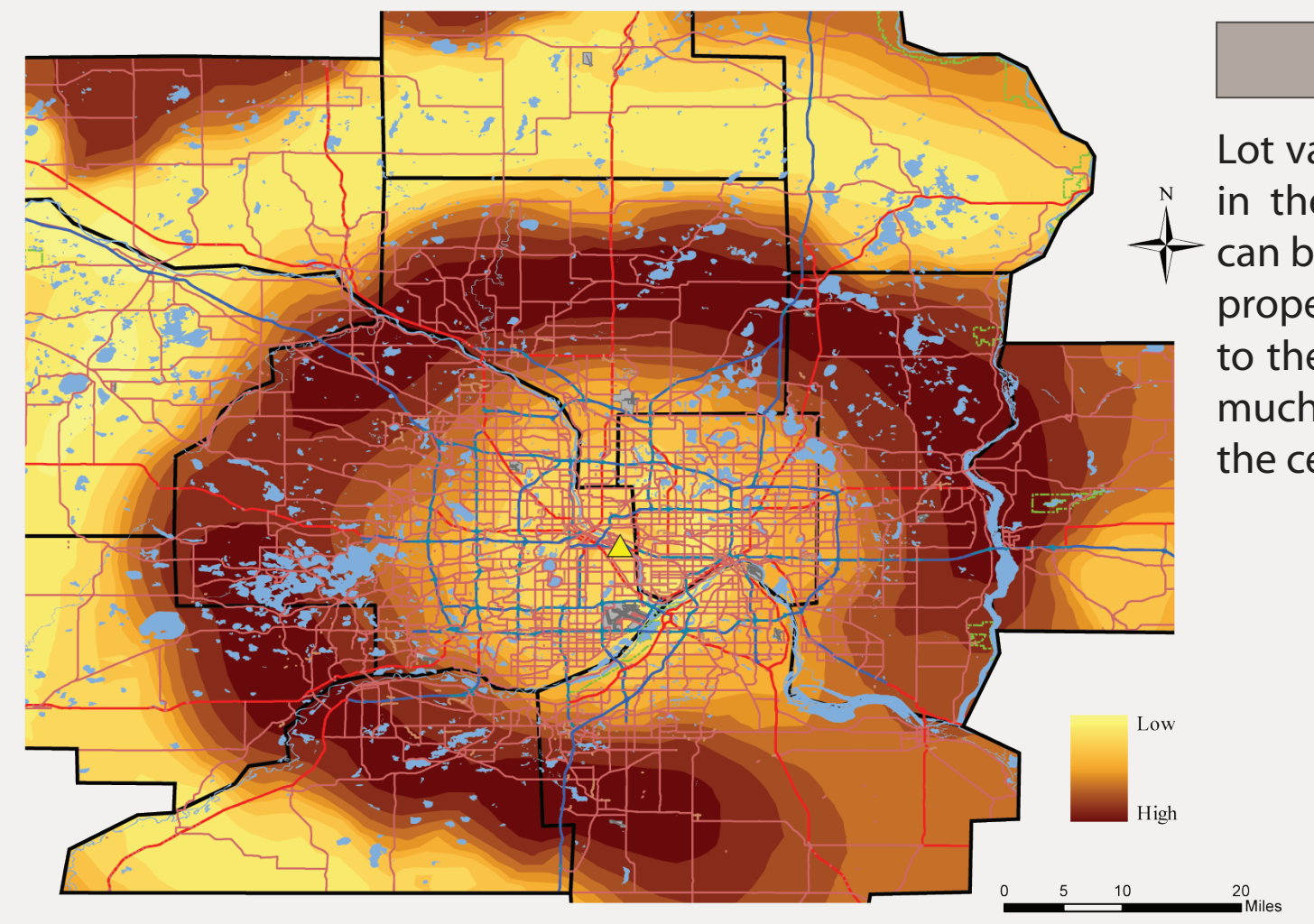
STRUCTURE VALUE

The structure value increases from the center of the city until it reaches a peak at the 18-26 mile bands. This is clearly visible on the map on the left. Note the anomalies in the NW and the SE. These anomolies are further clarified under the segment headed "Anommolies Explained".



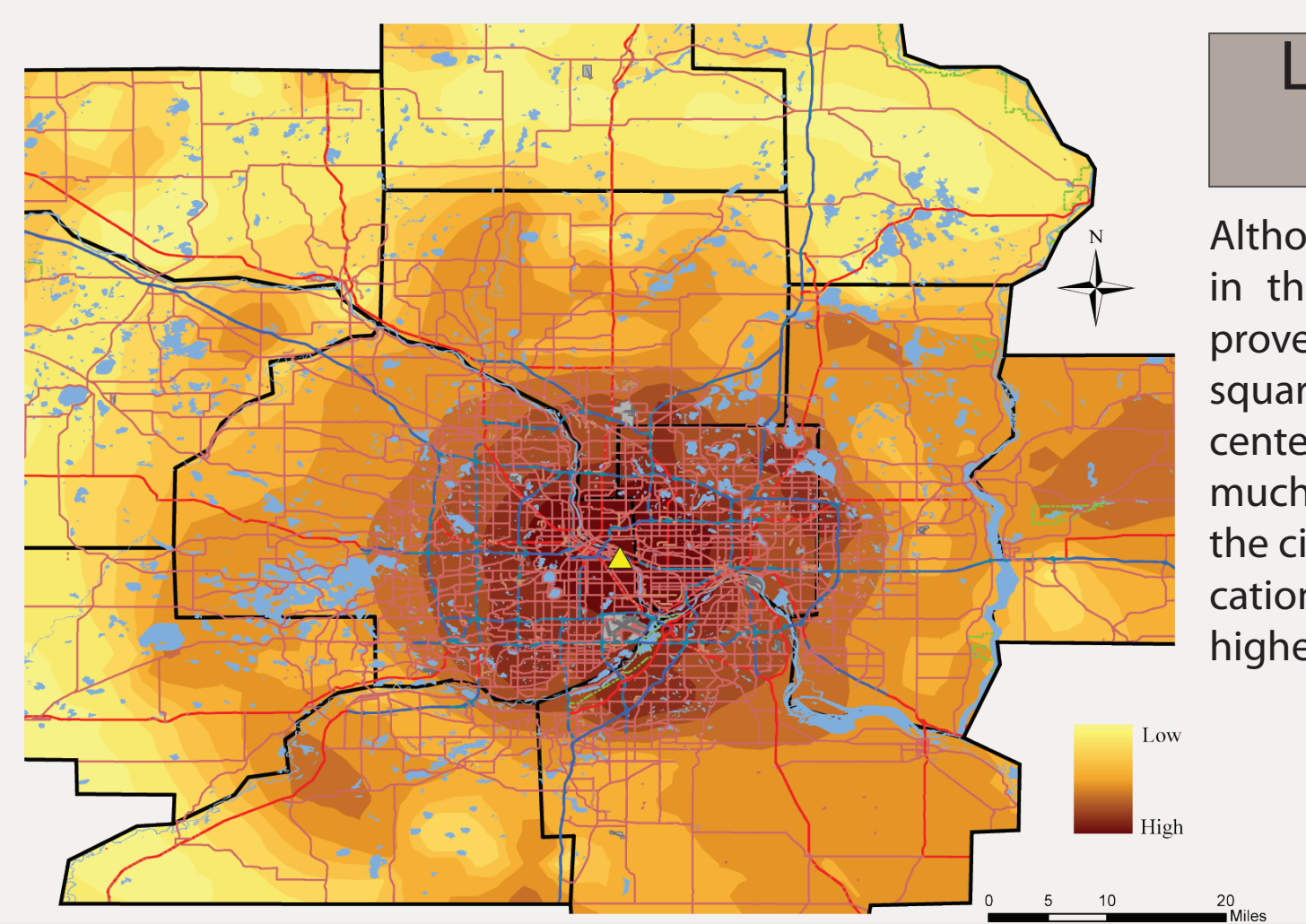
STRUCTURE VALUE PER SQ FT

Structure value per square foot decreases with distance away from the center of the city. It then begins to increase with proximity to lakes and rivers particularly in the St. Croix River Valley and other waterfront property.



LOT VALUE

Lot value is significantly higher in the 18-26 mile band. This can be explained by waterfront property which causes increase to the lot value. These lots are much larger than lots closer to the center of the city.

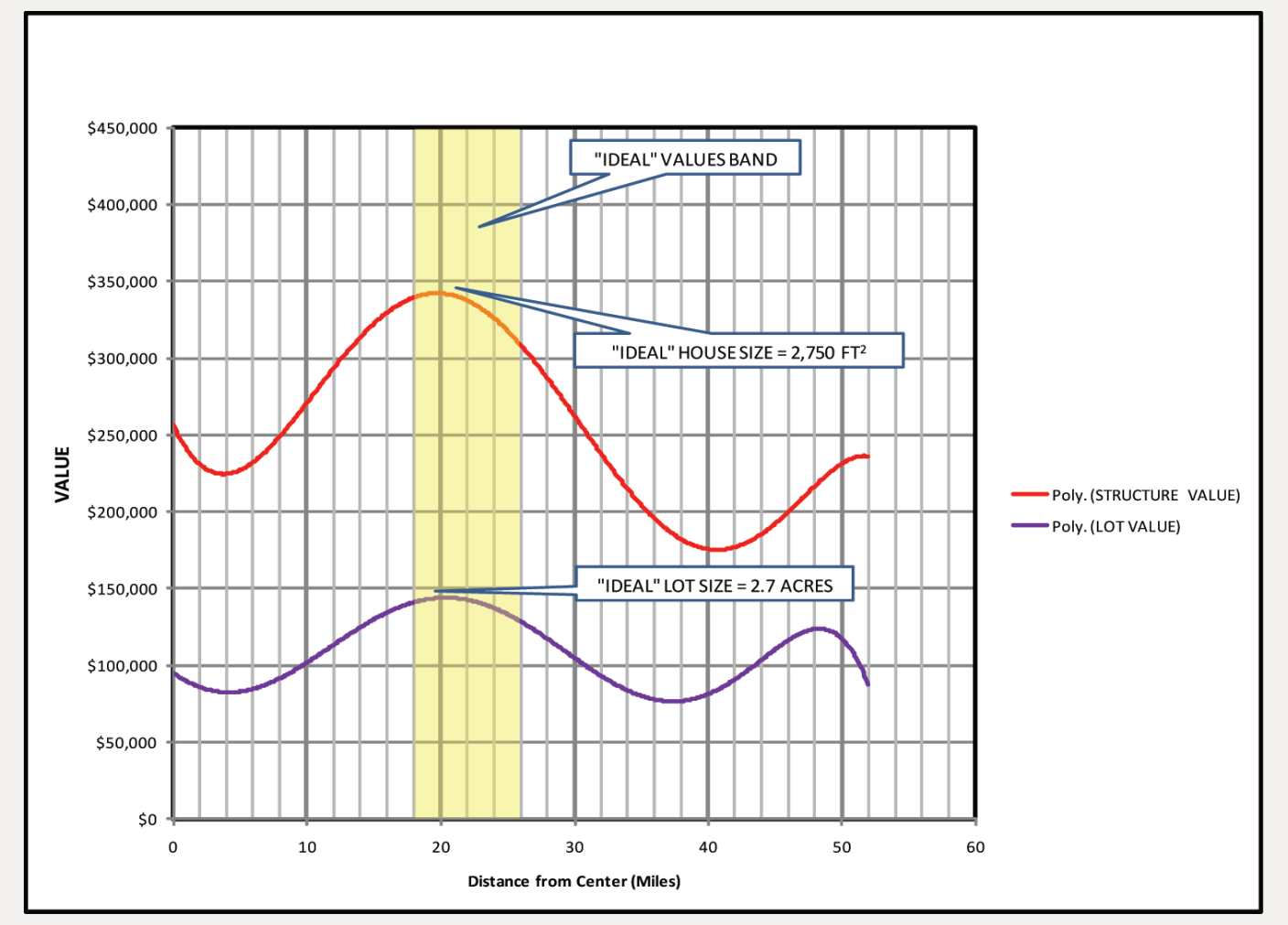


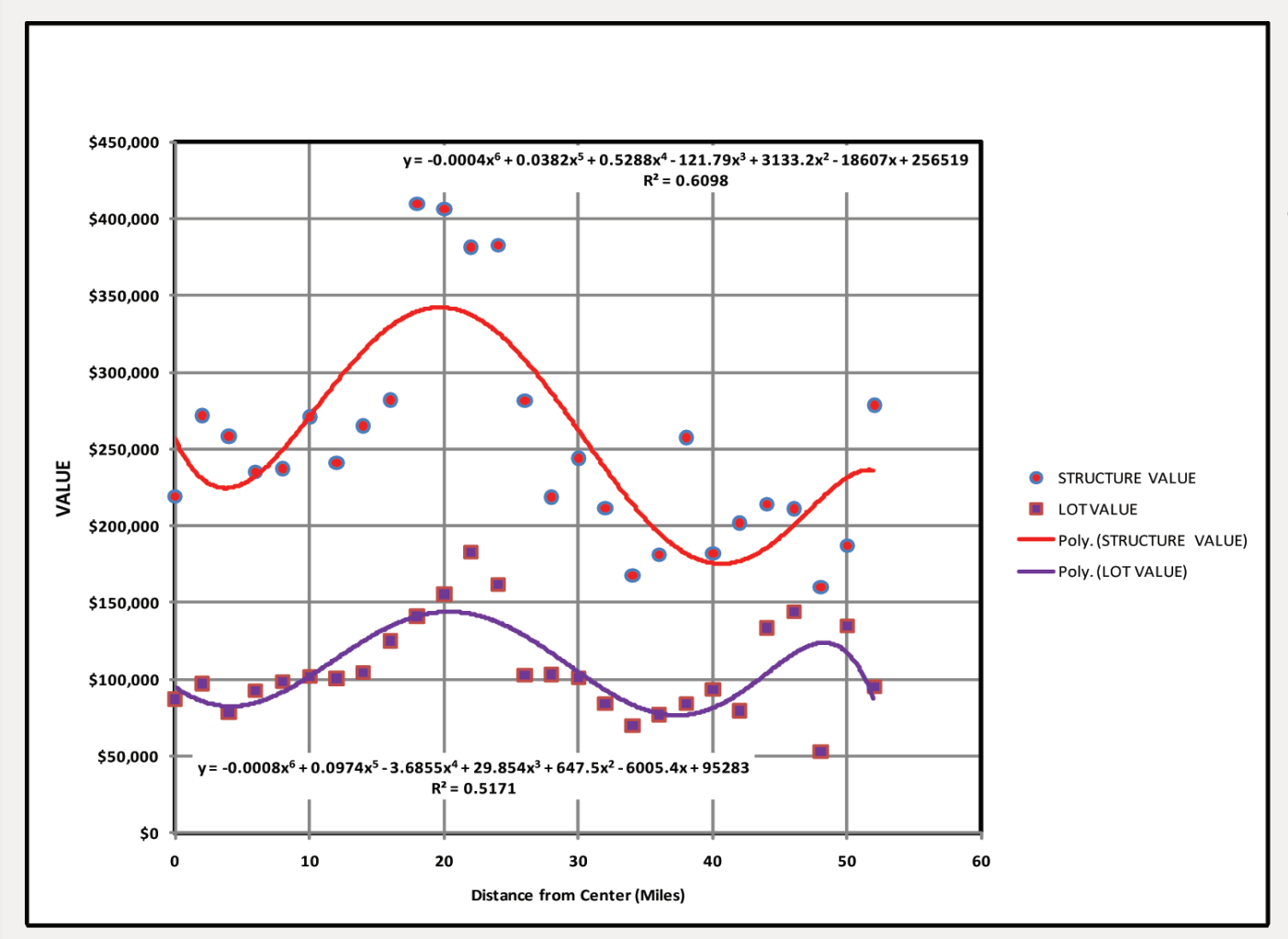
LOT VALUE PER SQ FT

Although lot value appears low in the above map, this map proves that the lot value per square foot is highest at the center of the city. Lots are much smaller in the center of the city but because of their location and demand they have a higher value per square foot.

THE IDEAL BAND

The "ideal" band (highlighted) represents the highest priced housing (structure + lot value). The averages for this band were used as the "ideal " structure and lot sizes desired by the "average" home purchaser.



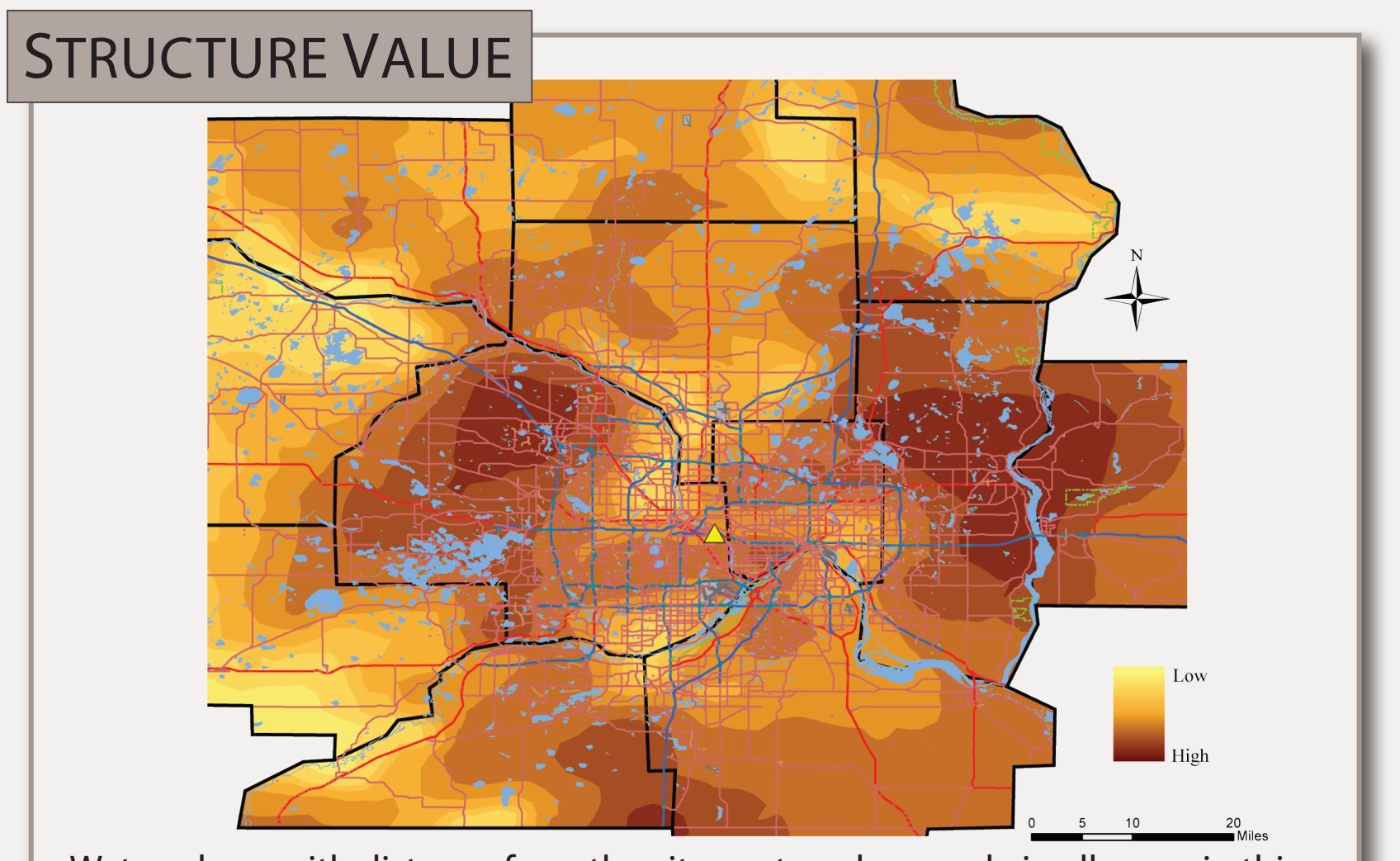


STRUCTURE & LOT VALUES

This graph shows a strong statistical correlation between distance and lot value and structure value. The sixth order polynomial equation for distance and structure value "explains" roughly 61% of variation in the data while distance explains 52% of the variation in lot value.

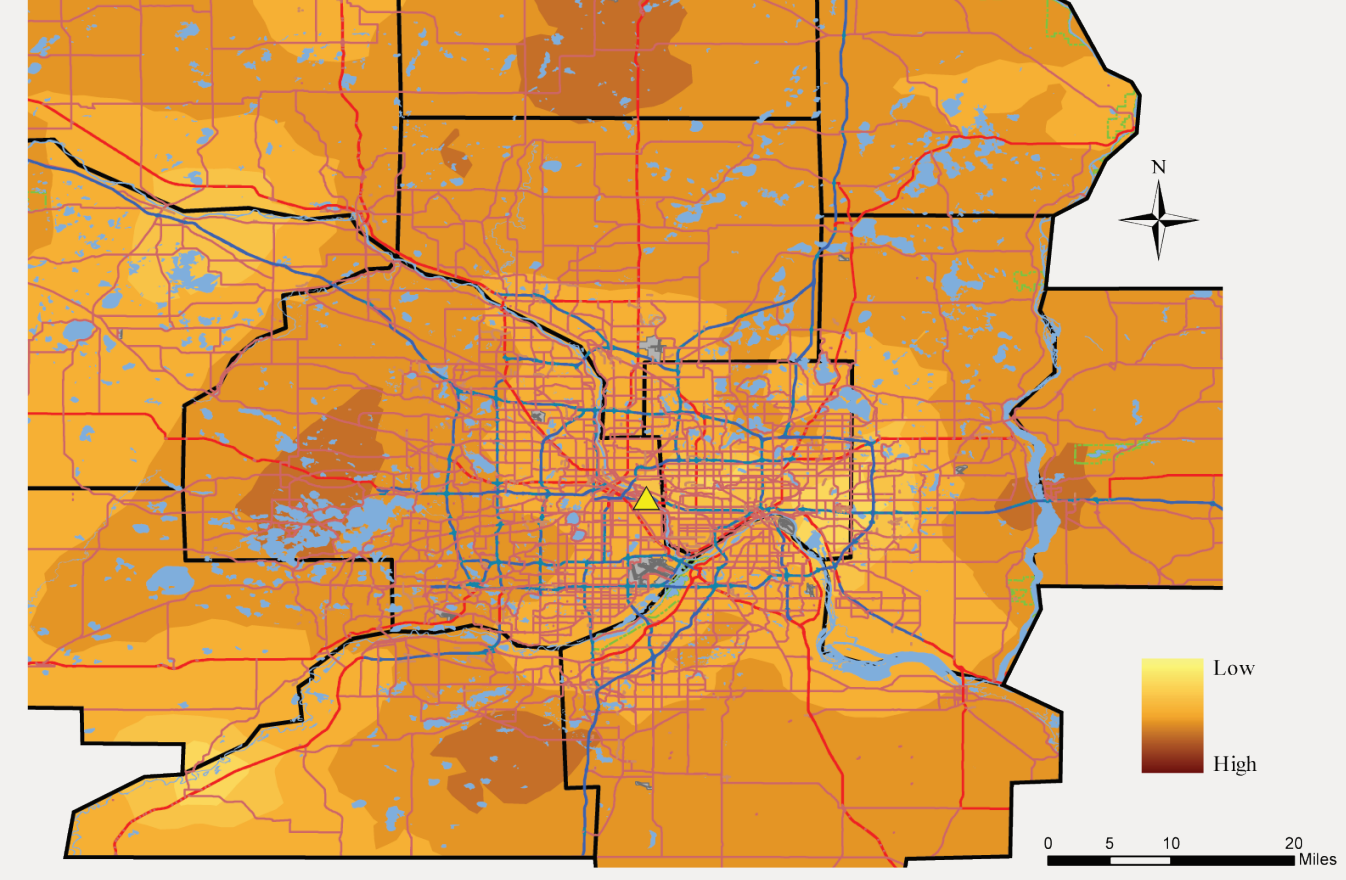
RAW DATA

STRUCTURE VALUE



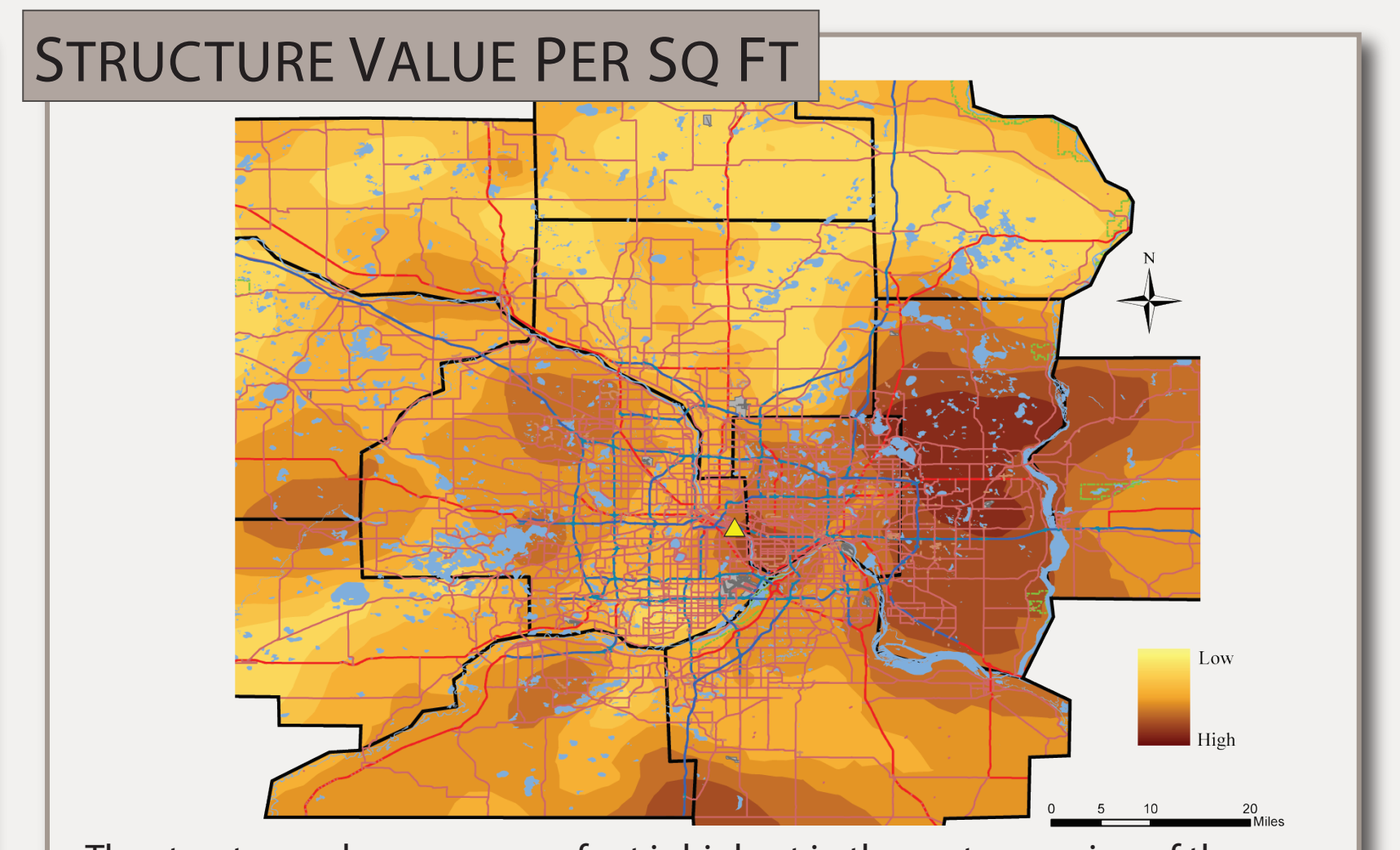
Water, along with distance from the city center, plays a role in all maps in this section.

STRUCTURE SIZE (SQ FT)



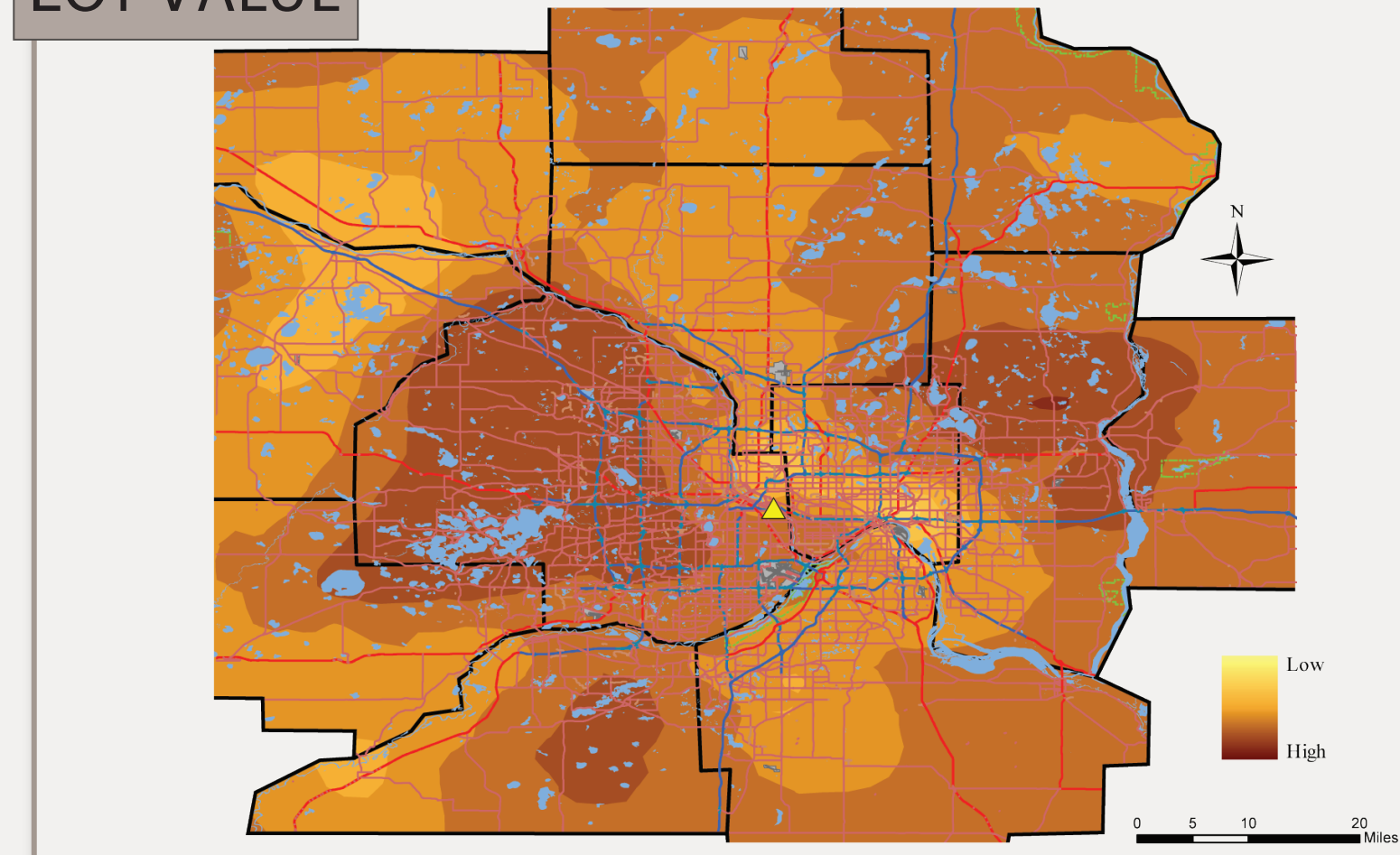
The structure size increases slightly with distance from city center

STRUCTURE VALUE PER SQ FT



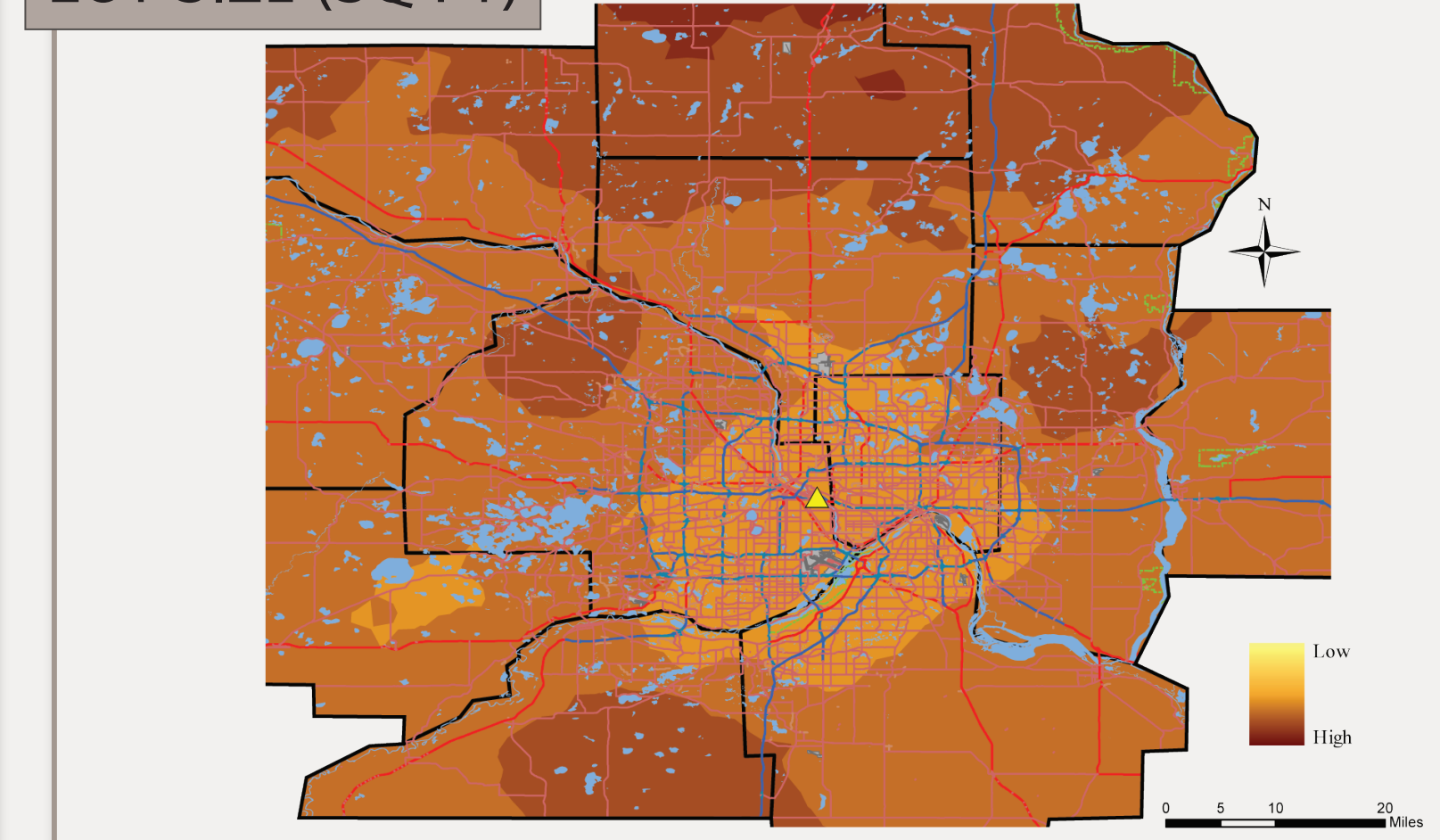
The structure value per square foot is highest in the eastern region of the study area.

LOT VALUE



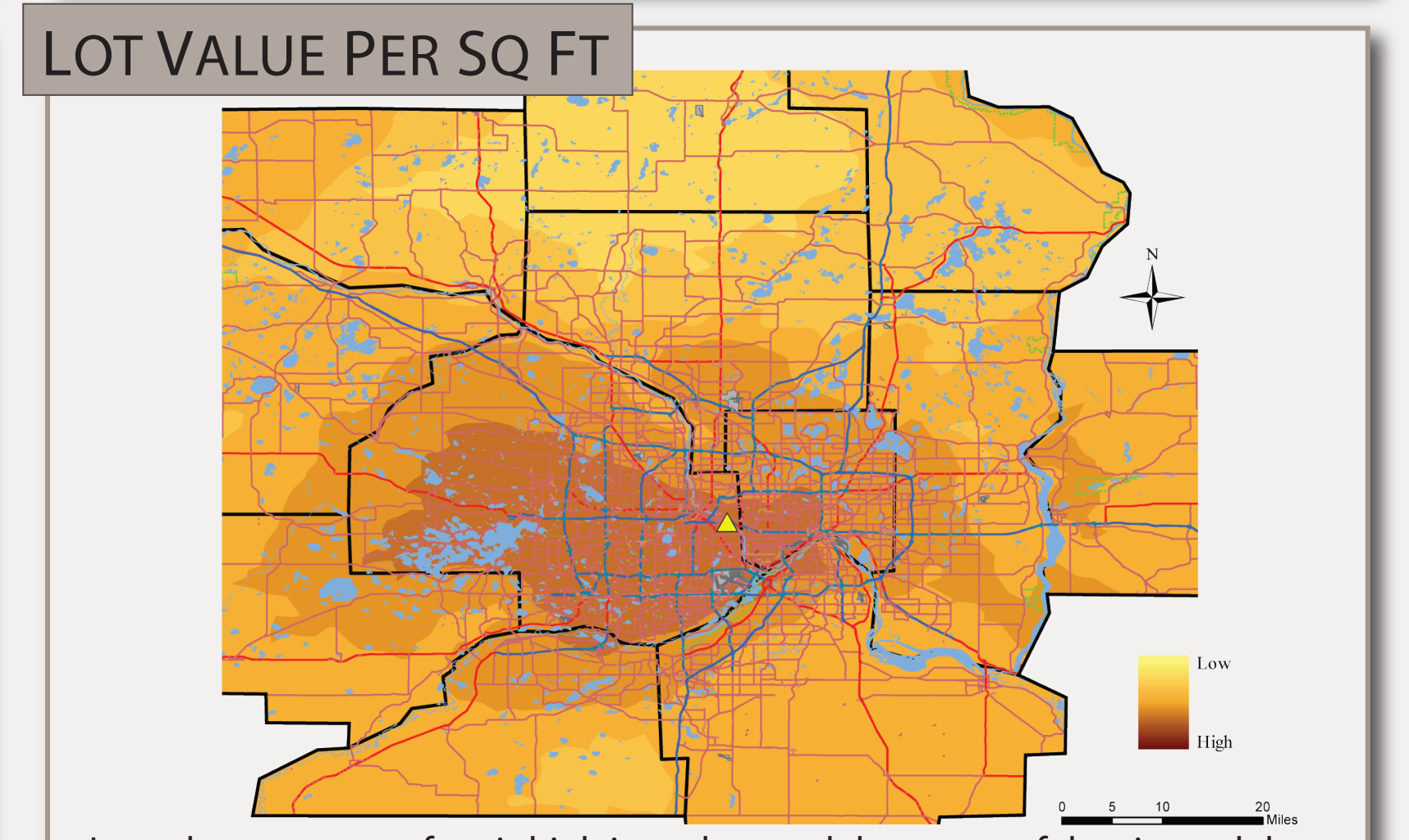
Lots are more expensive on the outskirts, especially where water is present.

LOT SIZE (SQ FT)



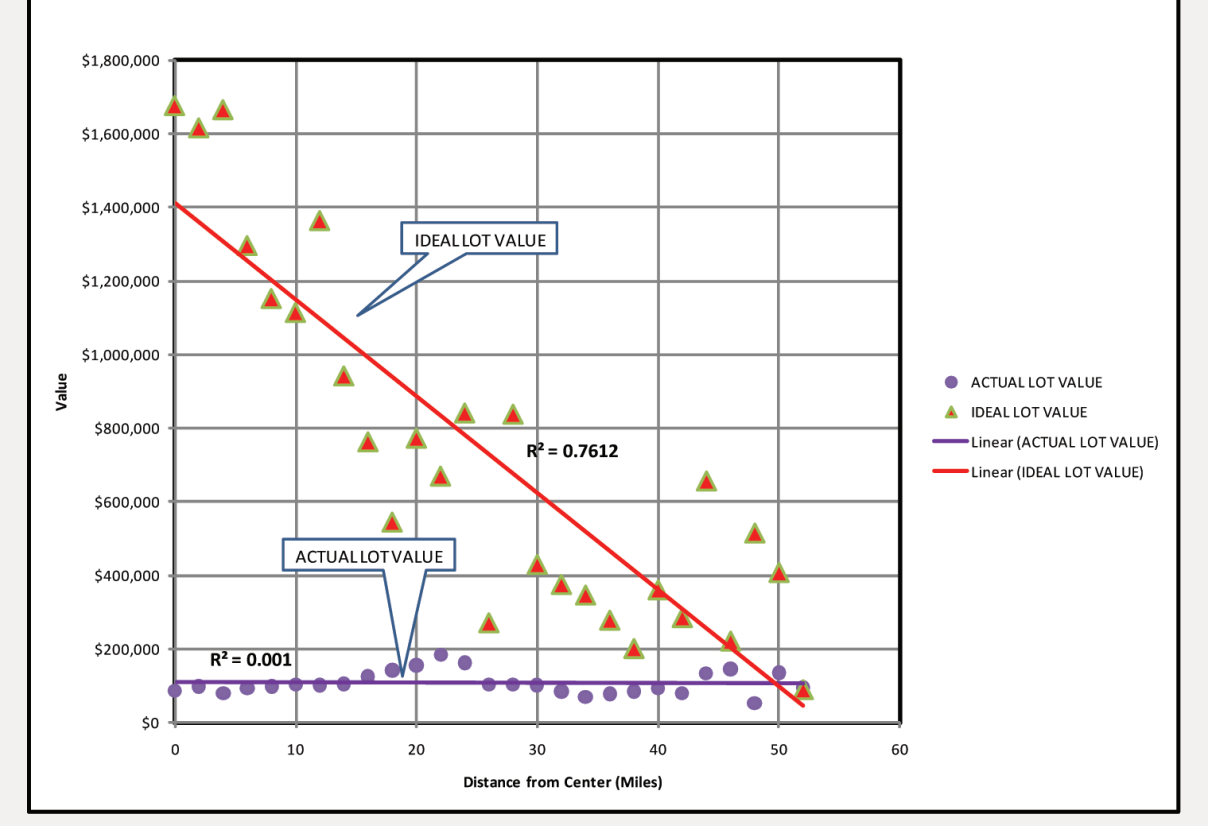
Lot sizes, like lot values, are much larger further away from the center of the city.

LOT VALUE PER SQ FT



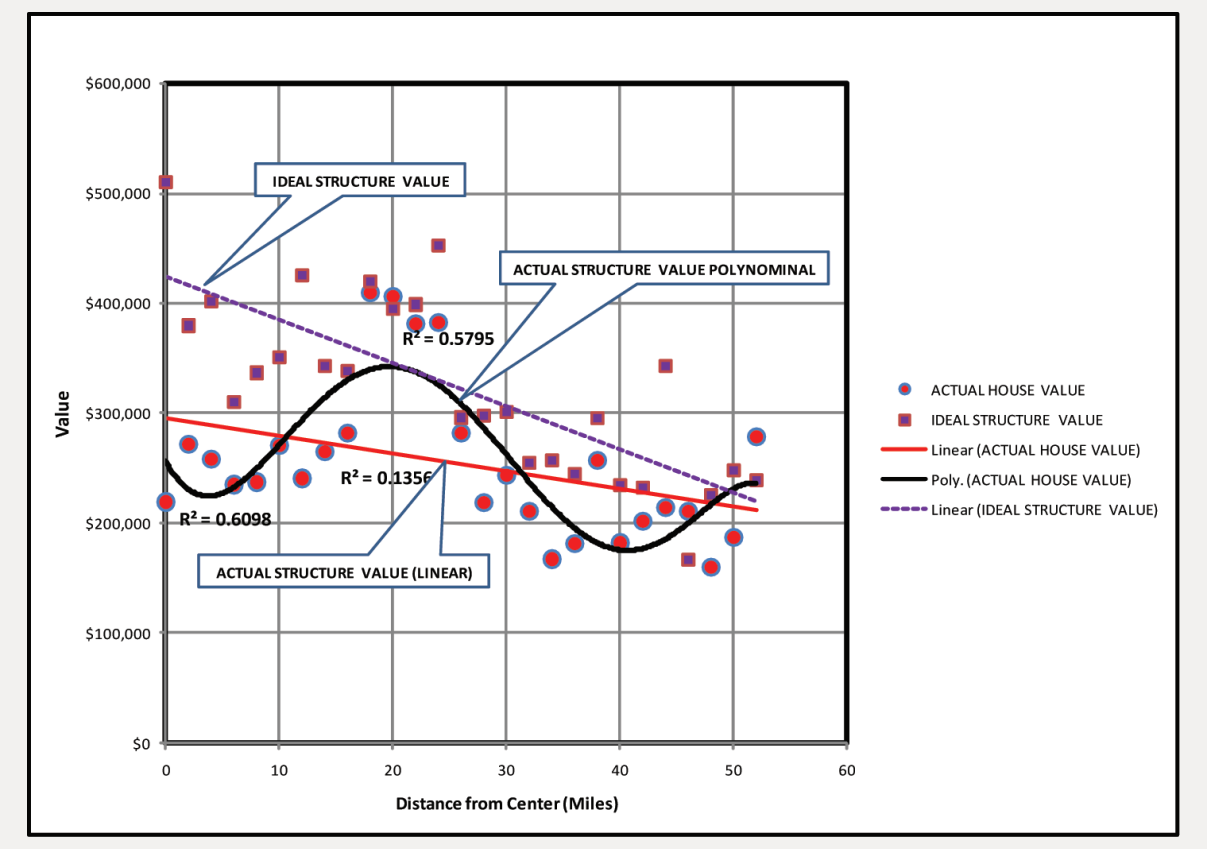
Lot value per square foot is high in and around the center of the city and decreases with distance.

IDEAL DATA



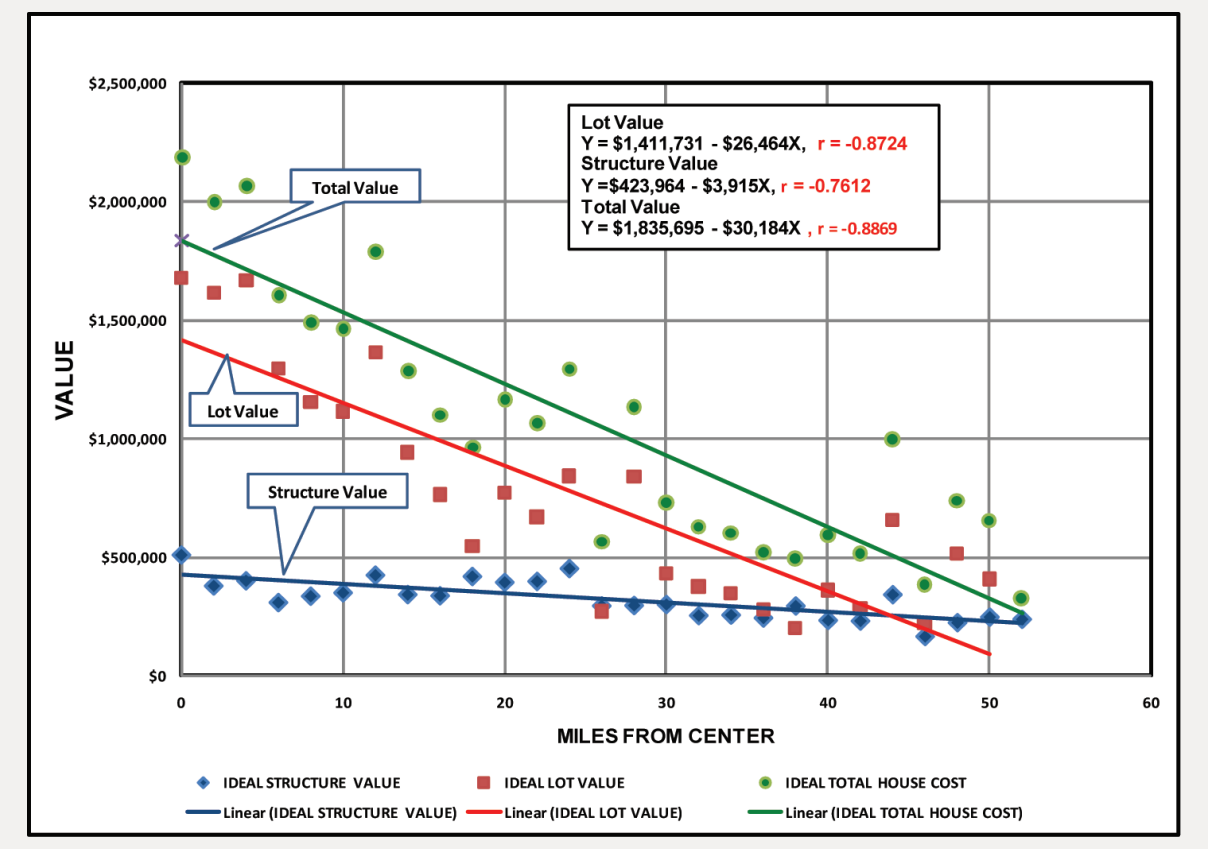
IDEAL LOT VALUE

The above graph shows the actual lot value compared to the ideal lot value. Ideal lot value is calcuated by mulitplying the price per square foot in each band by the "ideal" lot size (2.7 acres). This average lot size was applied to all data points and depicted in the map below. At zero miles from the city center, the expected lot value is over 1.4 million dollars. In reality, however, lot size in the center of the city is actually much smaller than the "ideal", resulting in a smaller actual lot value.



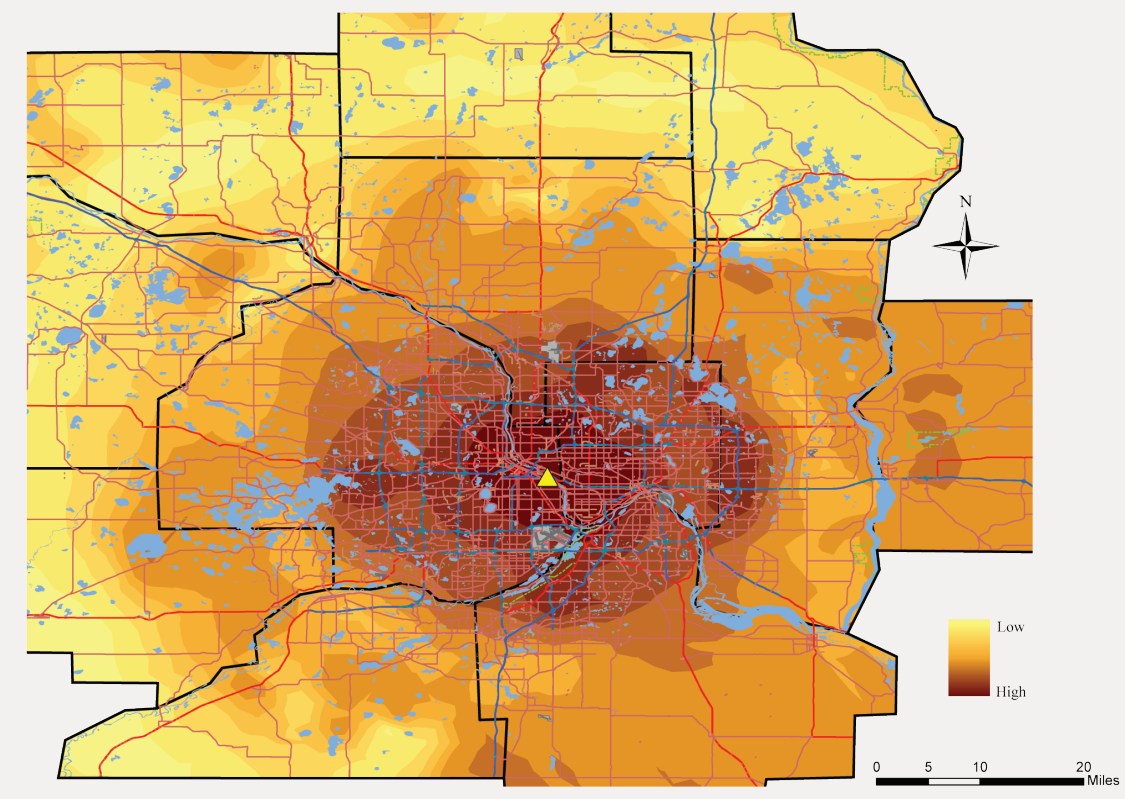
IDEAL STRUCTURE VALUE

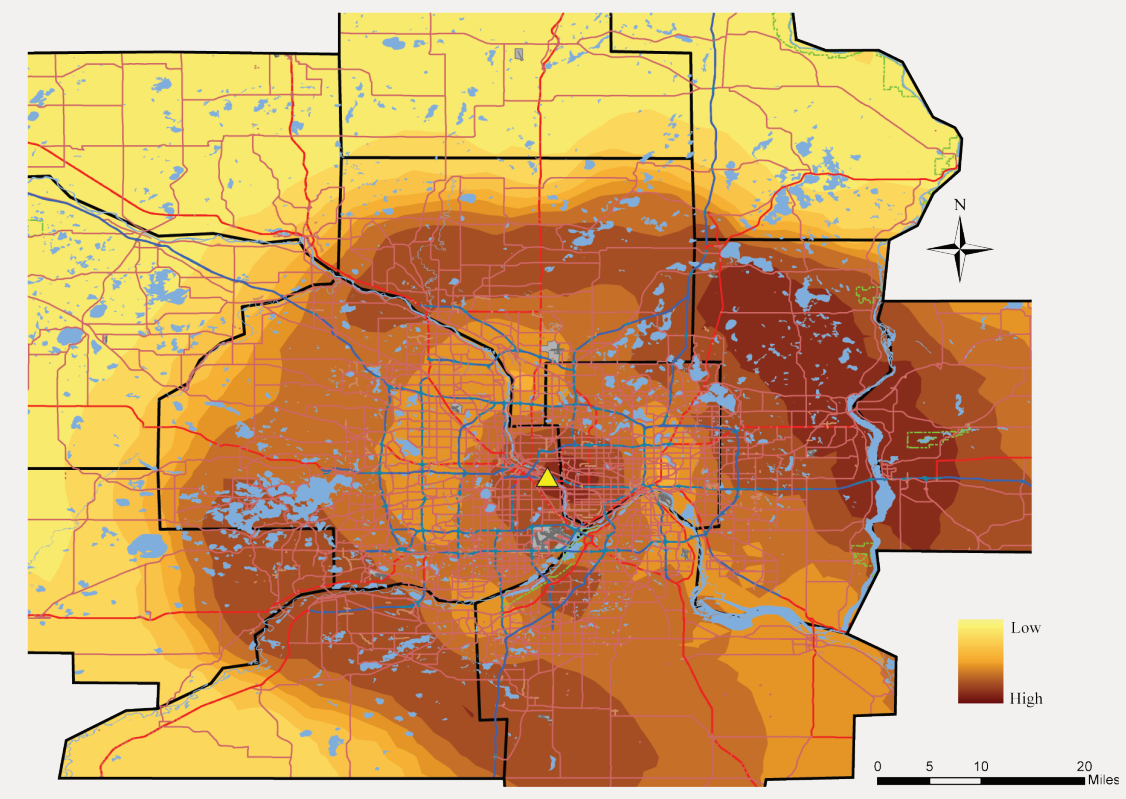
Ideal house value equals the "ideal" size (2,750 sq. ft.) by the average band price per square foot. The graph above shows the averages for each band. The map below is the result of applying this equation to each sample data point. The map shows high values in selected neighborhoods in the inner city, the importance of water, and the low value corridors to the northwest and southeast that are also apparent in the raw data.

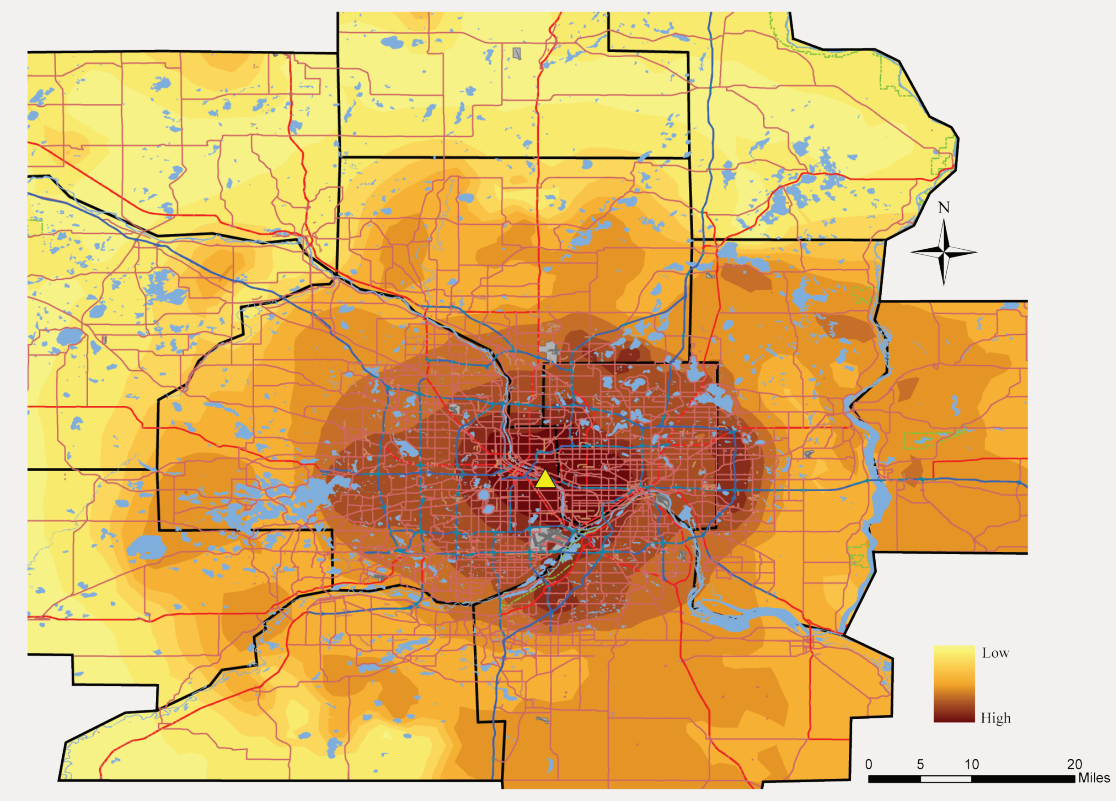


IDEAL TOTAL VALUE

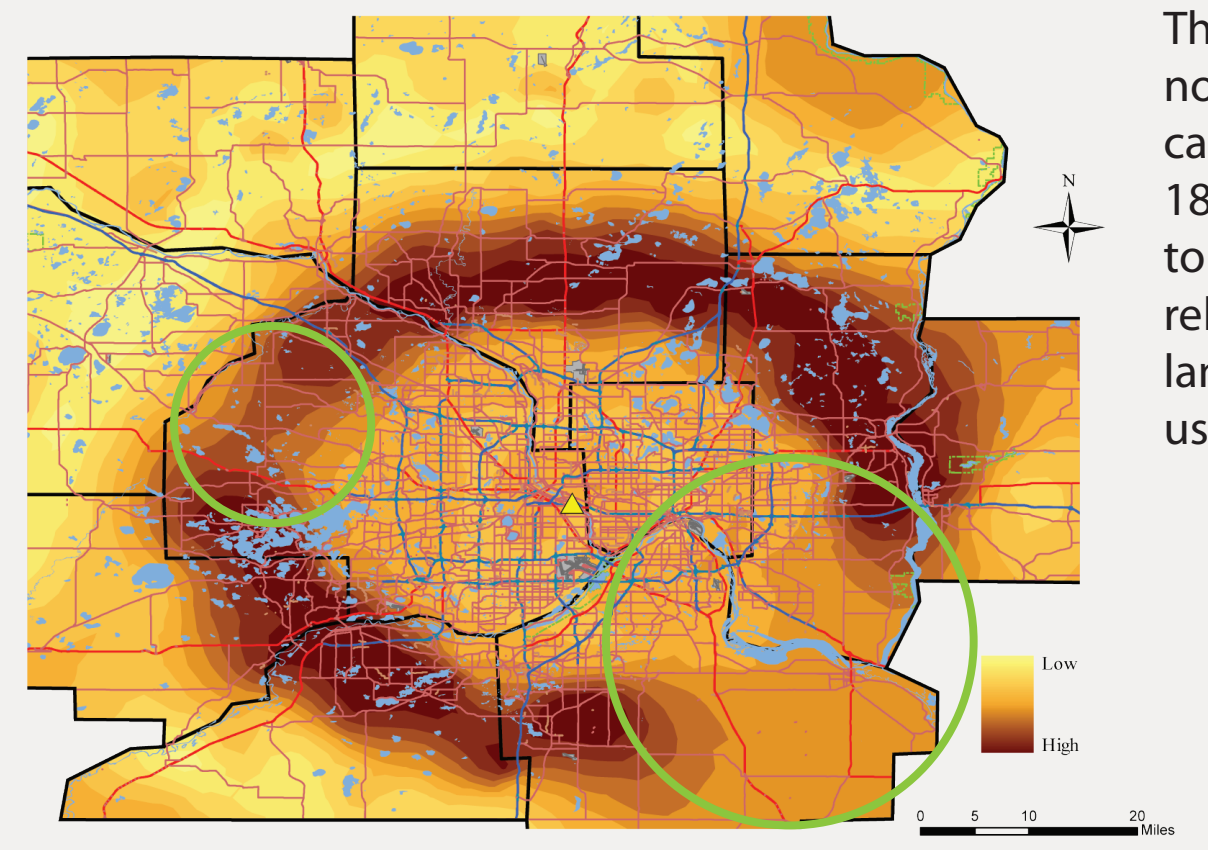
Ideal total value is a combination of the ideal lot value and ideal structure value. The above graph shows the total value curve and the lot value curve to be roughly parallel. The map of ideal total value looks strikingly similar to the ideal lot value map suggesting that the lot value plays a major role in the "drive until you quality" hypothesis.





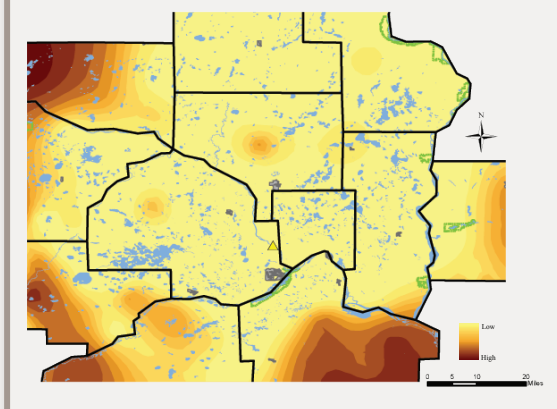


ANOMALIES EXPLANED



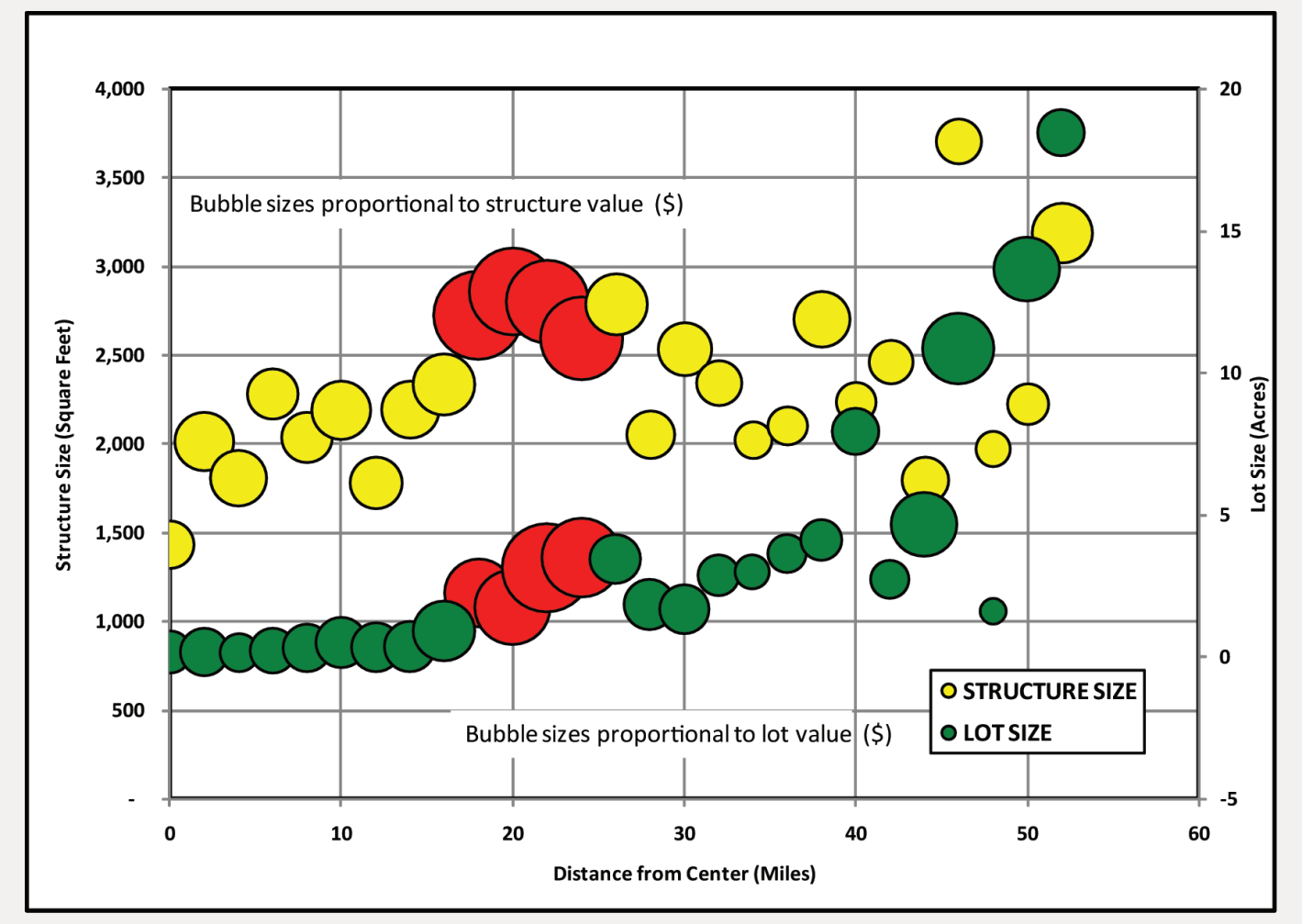
The anomoly in the northwest has no main transportation artery, causing a break in the high value 18-26 mile band. The large break to the southeast is the result of relatively high value agricultural land which outbids suburban land use.

AGRICULTURAL VALUE



PROPORTIONED STRUCTURE SIZE & LOT SIZE

This graph shows structure and lots by both size and value. The 18-26 mile band is highlighted in red. The relationships between lot size and structure size with distance are also shown.



RESULTS

Our research clearly demonstrates that the "drive until you qualify" hypothesis has strong validity for the Twin Cities Metropolitan Area. The thesis must be modified by the fact that price alone is not the primary factor. The majority of potential home buyers desire a specific size home on a specific sized lot (representing the "Leave it to Beaver" suburban ideal). This combination can be found at a middle class price mostly in the 18-26 mile band where land prices have declined enough (distance from the city) to make the ideal lot affordable.

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ACKNOWLEDGEMENTS

Special thanks goes to Dr. James B. Foust for help with this research project. We would also like to thank the University of Wisconsin-Eau Claire's Office of Research and Special Programs for proving funds for travel to Las Vegas for the presentation of our research and results.