Appendix F

Fiscal Metrics Summary

Fiscal Metrics Summary

INTRODUCTION

The Business 121 Corridor Study consists of a thorough examination of the existing corridor and its potential. A significant element of discussing its potential includes a scenario planning model using ESRI's ArcUrban Software. In partnership with Halff Associates and ESRI, Urbex Solutions assisted with the scenario modeling effort. Specifically, Urbex Solutions built a dataset designed to establish potential revenue metrics for various development patterns along the corridor.

This report outlines the process undertaken to create the dataset used in the model. It highlights major steps in the process and includes some details regarding some of the biggest challenges, some comparison with similar previous efforts, and some areas for improvement.

This report describes in a general way the process of cleaning each county's data, joining the tabular data with the geo shapes, standardizing the data across the four counties, appending all four standardized county datasets together, and adding the additional development features data from NCTCOG.

The City of Lewisville resides mostly in Denton County, northeast of the City of Fort Worth and southeast of the City of Denton. A small portion of the city resides in Dallas County. As a centrally located jurisdiction in the Dallas/Fort Worth Metroplex, the City has a vast range of potential development outcomes along the 121 Corridor. This location also provides a very large data sample of nearby development patterns that can provide context for modeling future development.

Data used in this exercise came primarily from the following sources:

- Denton Central Appraisal District (Denton CAD) - Geo Data (Parcels) & Tax Rolls (Tabular Data)
  https://www.dentoncad.com/data-extracts/
- Tarrant Appraisal District (Tarrant CAD) - Geo Data (Parcels) & General Tax Rolls (Tabular Data)
  https://www.tad.org/resources/data-downloads
- Tarrant County Assessor's Office (Tarrant TAO) - Detailed Tax Rolls (Tabular Data)
  https://www.tarrantcountytx.gov/en/tax/property-tax/tarrant-county-tax-roll.html
- Dallas Central Appraisal District (Dallas CAD) - Geo Data (Parcels) & General Tax Rolls (Tabular Data)
  https://www.dallascad.org/DataProducts.aspx
- Dallas County Assessor's Office (Dallas TAO) - Detailed Tax Rolls (Tabular Data)
  https://www.dallascounty.org/departments/tax/tax-roll.php
- Collin Central Appraisal District (Collin CAD) - Geo Data (Parcels) & Tax Rolls (Tabular Data)
  https://www.collincad.org/downloads
- North Central Texas Council of Governments (NCTCOG) - Additional data regarding developments
  https://data-nctcoggis.opendata.arcgis.com/
- The Texas Geographic Information Office (TxGIO) - Standardized Parcel Data
  https://data.geographic.texas.gov/

These jurisdictions and organizations have well-developed websites that provide good access to their data. Links have been included above, but should those links change an interested party should search for “public data”, “GIS Data”, “Data downloads”, or a similar search term. Reaching out to the staff would also work.

The crux of this effort comes from assigning an estimate of property tax revenue values to the parcel shapes. The parcel shape data came primarily from the TxGIO and the various CADs. The tax revenue information came from additional CAD datasets as well as some data provided by the Tarrant and Dallas TAOs. Lastly, a feature development set from the NCTCOG provided additional details about different developments, especially so for commercial, industrial, and multifamily developments.

Parcel and property tax data can vary from jurisdiction to jurisdiction, making it challenging to assemble into a cohesive dataset. Mapping every element of the property tax revenue isn’t strictly required for taxing purposes, so a significant portion of the tax revenue data may not have an immediate match with a geographic parcel shape. Once the data is gathered, the effort to clean it all up, standardize it, and map it constitutes the bulk of the work.

For this effort, our team primarily used ESRI’s ArcPro GIS software to clean and manage the geo data, and Safe Software’s FME Workbench to clean and assemble tabular data. Joining the tabular data to the geo data required some work in both. The list below describes the ArcPro geoprocessing tools and FME transformers that accomplished most of these goals.

ESRI ArcGIS Pro Tools:

- Check Geometry
- Repair Geometry
- Dissolve
- Add Spatial Join
- Calculate Field
- Calculate Geometry
- Select Layer by Location
- Select Layer by Attribute
- Buffer
- Export Features

Safe Software FME Transformers:

- Creator
- Feature Reader
- Attribute Manager
- Unique Value Logger
- Aggregator
- Geographic Area Calculator
- Tester
- Attribute Trimmer
- Statistics Calculator
- Tester Filter
- Geometry Validator
- Area on Area Overlayer
- Point on Area Overlayer
- Feature Joiner
- Duplicate Filter
- String Element Duplicate Remover
- String Length Calculator
- Feature Writer

MAJOR EFFORTS & CHALLENGES

Cleaning the Data

Large datasets often contain errors or defects that can corrupt the data and make it unusable. Additionally, the datasets in this effort needed reformatting as they came in different formats such as text files (txt, tab, pipe, csv), shapefiles, geodatabase files, ASCII files, and others. Reformatting these files to work together can create new issues, so cleaning the data needs to happen redundantly at multiple stages; first when retrieving the raw data and then again after reformatting it.

The initial cleaning effort comprised of looking for inappropriate characters in the text files and flagging any geometry issues in the geodata. Text editors provide a light and simple means of opening the various data files, handling large data files, and performing search and replace process to remove inappropriate characters. Emurasoft's EmEditor proved useful since it handles large files well, and has vertical editing capabilities, but other capable text editors exist. Both the ESRI ArcPro and FME softwares contain tools and transformers designed to flag and repair invalid geometries. This effort required both, as some geodata responded better to one or the other software tool/transformer.

Additional data cleaning efforts arose after transforming the data into a common format, and again after aggregating the tabular data together into their common geo location. The most common issue encountered while transforming the data types into a GPKG, and again while aggregating/dissolving them together as described below, consisted of string field length exceeding a maximum number of characters. Trimming the string lengths and removing duplicate values where possible solved the issue.

Property taxes often contain multiple records with unique IDs that all relate to the same geo shape (parcel) creating a many-to-one relationship between the tabular data and the geodata. This commonly occurs with commercial development and condominium development, but can occur in other ways too. A commercial development will have a unique property tax record associated with the real estate and then one or more additional unique records associated with personal business property (PBB), such as inventory or equipment associated with the business. A commercial development with multiple tenants, such as a mall or strip center, might have a record for each tenant's PBB.

Condominium developments will also have many tax records associated with the single parcel they all reside on. The aggregator transformer in FME and the dissolve tool in ArcPro both worked well to accumulate the many records into a single record to associate with the parcel. This approach worked again when the same challenges with a many-to-one relationship arose again when joining the development feature data from NCTCOG to the property tax and parcel data already assembled.

Field Name	Alias	Data Type	Description
OBJECTID	OBJECTID	Object ID	Unique ID for each shape
Shape	Shape	Geometry	Geo data for shape
Obj_ID	Obj_ID	Double	Unique ID for each record, will be gaps from dissolving/aggregating
Prop_ID	Prop_ID	Text	Property ID from the tax records, presents first value from multiple records
Geo_ID	Geo_ID	Text	Geo ID from the tax records, presents first value from multiple records
County	County	Text	Name of County
City	City	Text	Name of City
DBA	DBA	Text	Doing Business as Name if present in tax or NCTCOG data
Name	Name	Text	Name of property owner or business tenant
Entities	Entities	Text	Codes of jurisdictions collecting property taxes
Land_Area_SqFt	Land_Area_SqFt	Double	Area of shape in square feet
Land_Area_Acres	Land_Area_Acres	Double	Area of shape in acres
Imprv_Area	Imprv_Area	Double	Area of structures residing within the shape
FAR	FAR	Double	Floor Area Ratio = Imprv_Area / Land_Area_SqFt
State_Code_1	State_Code_1	Text	Alphanumeric code indicating development classification for taxing purposes
Land_Code_1	Land_Code_1	Text	Alphanumeric code indicating land classification for taxing purposes
Land_Desc_1	Land_Desc_1	Text	Description of State_Code_1 or Land_Code_1 values
Imprv_Code_1	Imprv_Code_1	Text	Alphanumeric code indicating structural classification for taxing purposes
Imprv_Desc_1	Imprv_Desc_1	Text	Description of Imprv_Code_1 values
SIC_Code	SIC_Code	Text	Standard Industrial Classification Codes
NAICS_Code	NAICS_Code	Text	North American Industry Classification System
PBB_Code	PBB_Code	Text	Personal Business Property classification codes used for property taxes
Mineral_Code	Mineral_Code	Text	Mineral Code classification codes used for property taxes
Exmp_Code	Exmp_Code	Text	Exemption Code classifications used for property taxes

Field Name	Alias	Data Type	Description
Year_Built_1	Year_Built_1	Text	Build Year value (may have multiple years for individual structures or remodels)
Year_Built_2	Year_Built_2	Text	Build Year value (may have multiple years for individual structures or remodels)
Year_Built_3	Year_Built_3	Text	Build Year value (may have multiple years for individual structures or remodels)
Stories	Stories	Text	Number of stories
Units	Units	Double	Number of residential units
Pool	Pool	Text	Pool present
DevStatus	DevStatus	Text	NCTCOG; values including: Expansion-New-Redevelopment-Renovation
DevStyle	DevStyle	Text	NCTCOG; style of development information
DevType	DevType	Text	NCTCOG; description of DevStyle including: Announced or Conceptual or Existing or Under Construction
Type	Type	Text	NCTCOG character description of development Class/SubClass
SubClass	SubClass	Text	NCTCOG development classification; more specific than Class
Activity	Activity	Text	NCTCOG - describes type of activity on site
IsMixedUse	IsMixedUse	Text	NCTCOG - indicates whether development is Mixed-Use
Land_Val	Land_Val	Double	Total Land Value of all records related to the parcel
Imprv_Val	Imprv_Val	Double	Total Structural Value of all records related to the parcel
Asd_Val	Asd_Val	Double	Total Assessed Value of all records related to the parcel
Exmp_Val	Exmp_Val	Double	Total Value of Exemptions of the Parcel, not included in all data sets
Tax_Val	Tax_Val	Double	Total Taxable Value of all records related to the parcel
Tax_Rate_Flat	Tax_Rate_Flat	Double	Uniform tax rate for study purposes (.55), has been adjusted in the excel sheet to the City of Lewisville Tax Rate
Tax_Rev_Flat	Tax_Rev_Flat	Double	Total Tax Revenue of all records related to the parcel using the flat tax rate
Tax_Rev_Acre_Flat	Tax_Rev_Acre_Flat	Double	Total Tax Revenue per acre for each parcel using the Flat Tax Rate = Tax_Rev_Flat / Land_Area_Acres

Standardizing the Data

The jurisdictions assembling the data do not all use the same attribute labels and formats. So, assembling the various datasets into a single cohesive dataset required a standardized attribute labeling and formatting structure. The standardized attribute structure used the field name and data type structure included above for this effort.

Standardizing the data occurred mostly in FME using the "AttributeManager" transformer and renaming attribute fields from various sets of data to match the standardized field names. The FME workbench files are available for reference and show the renaming process for each dataset.

Appending the Data

Once the various datasets share the same naming conventions, they need to be appended together. Without appending them, any queries developed to run against the data would need to run uniquely for each different data set. That makes gathering results much more cumbersome than it needs to be. Appending the data simply means combining them into a single dataset. ESRI's ArcPro has an "Append" tool, but for this exercise the appending occurred in FME by simply writing them to a common geopackage destination.

The same process for cleaning, standardizing, and appending the parcel data occurred with the NCTCOG development dataset. However, this effort had a unique element of taking point data and moving it into a polygon dataset, the parcels. A many-to-one relationship frequently occurred, with more than one development data point residing on a single parcel. Joining the points to the parcels proved difficult, so the effort included turning the points into small polygons using a Buffer tool and using a spatial join to create a matching parcel shape for each point. This stacked parcels where more than one point resided within the parcel boundaries. Aggregating/Dissolving the stacked parcels after the spatial join comprised the last step in creating the final dataset.

Challenges

Efforts like this present a variety of challenges. While most property tax revenue is generated from the value of land and structures, personal business property (PBB) also generates a fair amount of revenue. This can be especially true for jurisdictions with a large commercial and industrial land use base. Each business will have a tax record for personal business property, but that record may not have any clear means of connecting it to the geo-shape it resides on. Some will share some kind of discernible feature with a related record that relates directly to a geo-shape and can find the correct shape through that related record. In this exercise, any PBB that had a related record was incorporated into the overall data set. For this effort, PBB records without a relatable connection to a geo-shape were left out of the final dataset. This will affect a small portion of the commercial and industrial parcels.

The challenge with PBB extends to other facets of the raw data. Dissolving/Aggregating condominium records down to a single shape can present a challenge. Jurisdictions may differ with how they report number of stories, with some listing the overall number of structure in each record, and some just listing the number of stories for the individual unit. This can present some real challenges for an effort that requires an accurate story count. Additionally, the overall area listed in record related to the condominium common area might represent the overall structural area of all structures or just the structures shared by the condominium association.

The final challenge worth mentioning here occurs occasionally when a record is duplicated across more than one shape. This might occur when the record information is duplicated across multiple lots that legally comprise a single parcel shape. For example, a structure might be built across historic property lines before that was legally prohibited, or an invalid geometry might create a sliver or secondary shape that contains the some record information as the larger valid shape. In those cases, the sum total value of value and structural area attributes will be exponentially higher than reality.

Finding and fixing those types of areas often involves trial and error as they're difficult to anticipate but become obvious statistical outliers when mapped or aggregated into summary statistics.

Comparison to Similar Studies & Potential for Improvement

Efforts like this have become more common in city planning projects. In most cases the data is related to, mapped, and analyzed in relation to the parcels. In this effort, the primary mapped analysis will relate far more to the structures and structural values contributing to the property tax revenue. This leaves out some significant value dynamics related to development, but it also captures in greater detail one of the most important aspects of the relationship between a jurisdiction's built environment and its budget. Structural value has the greatest variety and depth of relationship with a jurisdiction's development regulations and potential cost burdens. So, while the ArcUrban model present a unique approach to the fiscal analysis, it serves well for this effort and has great potential if future efforts can incorporate the value of land and retail sales tax revenue.

Statistical Analysis

Introduction

The scenario planning and modeling for this project has come primarily from ESRI's ArcUrban modeling software. ArcUrban provides a robust suite of tools that the City can use for a variety of scenario planning exercises. The supporting data analyzed to establish structural values for the different Place Types comes from property tax parcel data. The parcel data collected for this effort offers a variety of statistical insights aside from what the ArcUrban model might produce. This report will describe some of those additional statistical insights and provide some recommendations for how the city might use this type of data.

Data analysis has become a hot topic in many professional fields, and certainly in city planning. Demographic, social, environmental, economic and fiscal data analyses have all become standard exercises for city planning efforts. Over the last few decades, data has become so ubiquitous that the challenge of finding good data has transitioned into the challenge of identifying the best data for a particular project. For this effort, we've focused on finding a robust revenue data set.

Also, a quick note on why this type of data analysis is important for cities to understand and undertake. This is not an effort to maximize return on investment (ROI) through regulation, but to provide a clear understanding of how cities make long term financial decisions through land use planning. Land use planning efforts often have many goals and objectives, and they should always include positive financial outcomes. A city should strive to provide a built environment that its citizens benefit from living in and can support financially. The relationship between a city's development policies and regulations, the existing built environment, and its budgeting practices is not a straightforward or simple relationship. However, understanding that relationship and communicating it clearly is necessary for any city to operate with prudence, temperance, and justice.

Total Property Tax Revenue Per Parcel VS Property Tax Revenue Per Acre

Figure 139 illustrates the total tax revenue value for each parcel within the City of Lewisville with the color range representing 10% equally distributed quantiles. The height of the parcels represents the overall total value and corresponds to the light to dark color transition. This data drills down past the appraised, assessed, and taxable values down to the estimated property tax revenue collected by the City of Lewisville. As such, tax exempt properties have been removed from the map and all exemptions, freezes, and ceilings have been accounted for.

Total tax revenue per lot can tell an interesting story. Through this lens, the larger parcels in southern and eastern Lewisville have the highest concentration of total value. **Figure 140** illustrates the same values through the height of the parcels, but color codes them according to the state land use codes used for property taxes. The color coding reveals that the apartment and commercial & office contain the majority of the high-value parcels in the city.

One could suggest from the maps that a city looking to maximize the revenue potential of its built environment should focus on large lot commercial, office, and apartment uses. However, this is not the only lens we could or should look through.

Fig.139: Total Property Tax Revenue Per Lot Shown In Colors Corresponding To 10% Quantiles, City Of Lewisville, TX (2024)

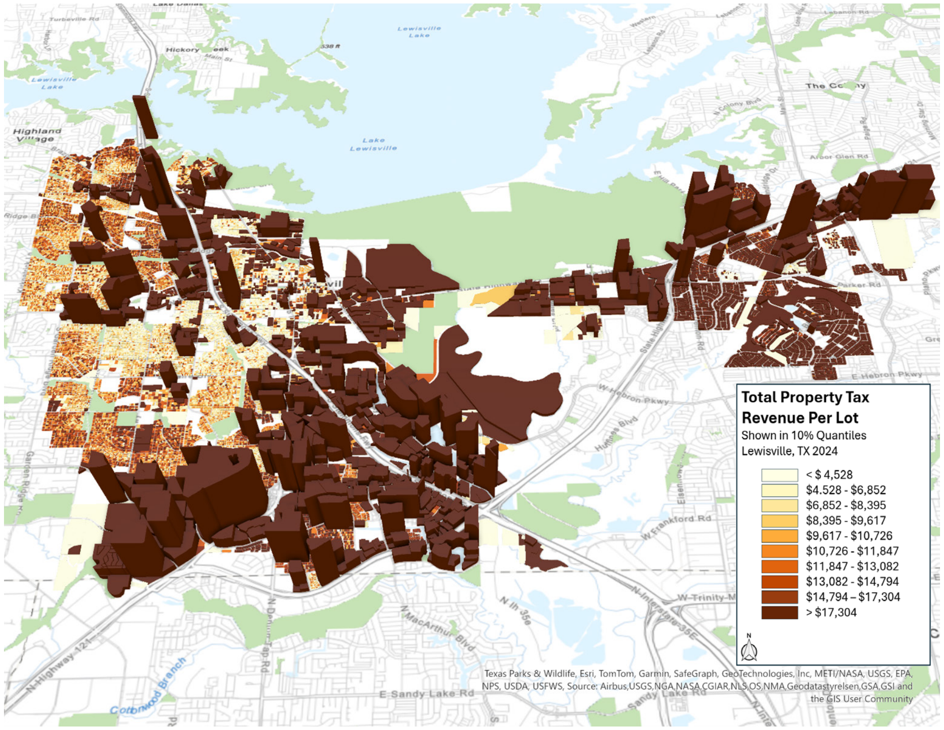
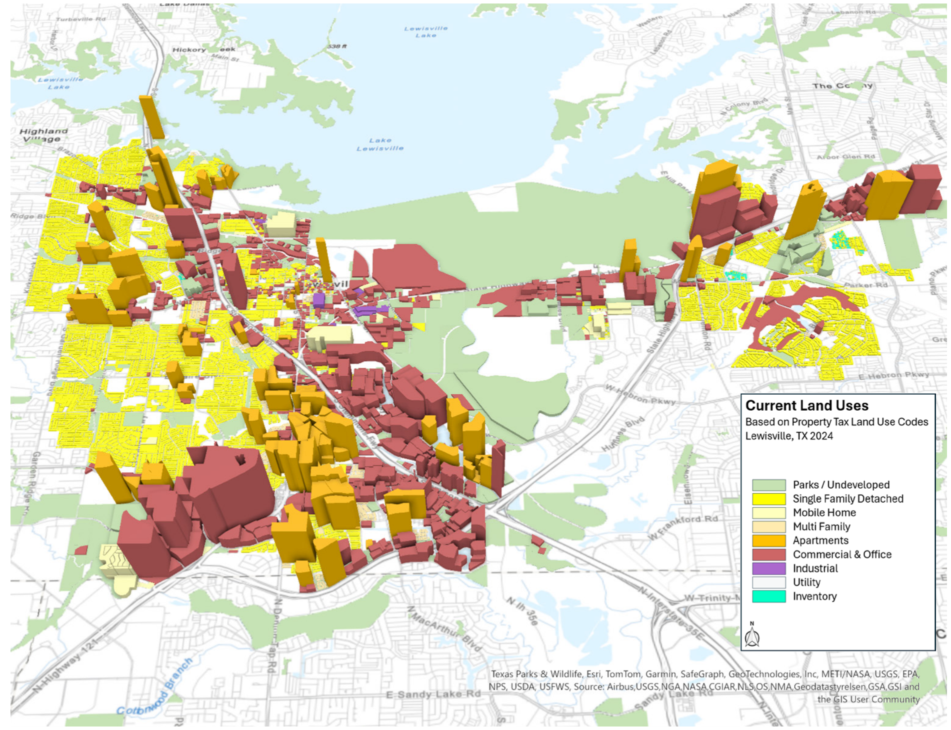


Fig.140: Total Property Tax Revenue Per Lot Shown In Colors Corresponding To State Land Use Classifications, City Of Lewisville, TX (2024)



A different lens to look through is the tax revenue per acre lens. **Figures 141 and 142** illustrate the tax revenue per acre for the City of Lewisville and mimic the color schemes of **Figures 139 and 140** respectively. However, this time the height of the parcel illustrates the tax revenue per acre, rather than the total tax revenue value.

Tax Revenue Per acre metric offers a more applicable metric for fiscally analyzing cities because it more closely corresponds to the cost burden structure cities work within when using property tax revenue funds. For instance, general fund services such as streets, police, fire, parks, and libraries carry a cost burden based on service areas rather than number of parcels served or usage events. Police and fire services often try to serve all residents in the city within a minimum emergency response time. Similarly, library and park facilities often develop around proximity and access guidelines. Citizens expect these services to remain available even when they are not needed. That is especially true for police, fire, and streets. However, citizens do not get a discount on their property taxes for using them less, and they do not pay more in their property taxes by using them more often.

These dynamics makes the cost burden far more geographic than unit or use-based. With a geographic cost burden, a geographic revenue metric makes more sense, and so this report will focus on tax revenue per acre as the key value metric for analysis.

Figures 141 and 142 tell a significantly different story than **Figures 139 and 140**. The overall pattern has more consistency, lacking the large gaps between some parcels and others seen in the total revenue per parcel maps. **Figure 141** still shows a concentration of high performance in eastern Lewisville, but western Lewisville has a much more evenly-distributed performance pattern. **Figure 142** also reveals that the land uses do not maintain as large of a delta in performance between them. Some single family uses clearly outperform some commercial, office, and apartment uses.

Figure 142 suggests that each land use might have its own range of high and low performers. Digging deeper into the land use data, the charts below compare how each land use performs relative to each other, and among different lot size categories within the same land use.

Fig.141: Property Tax Revenue Per Acre Shown In Colors Corresponding To 10% Quantiles, City Of Lewisville, TX (2024)

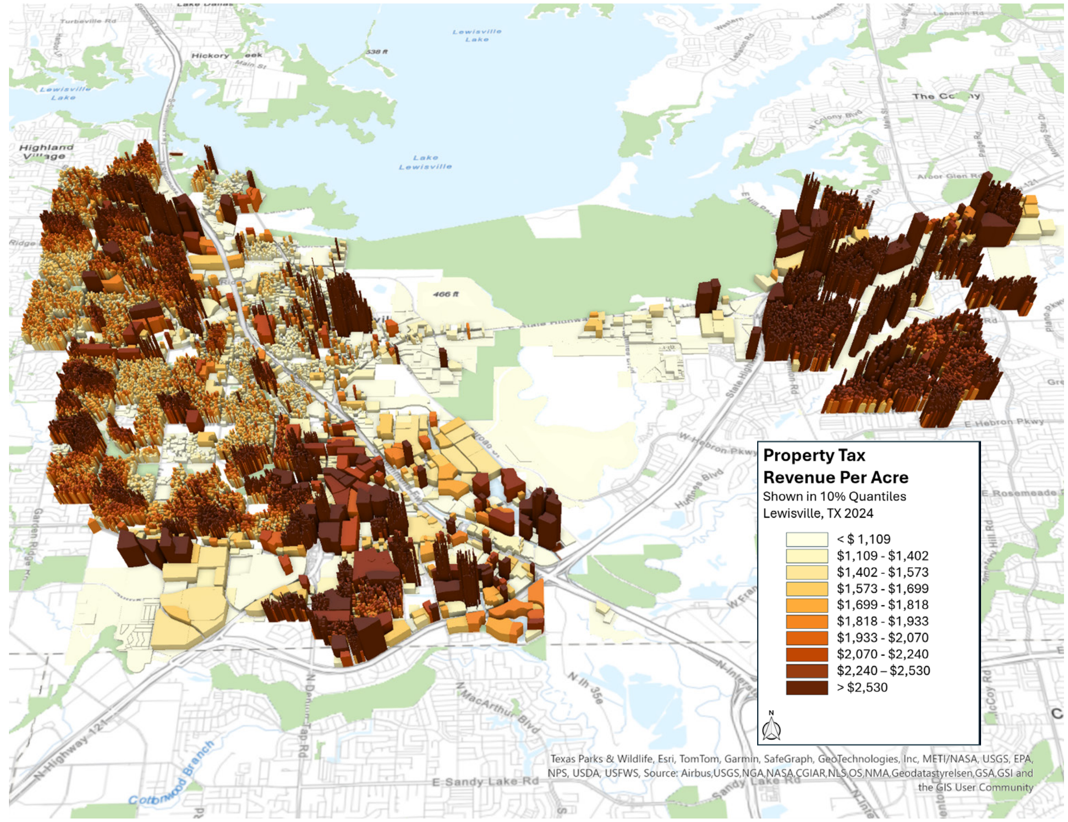
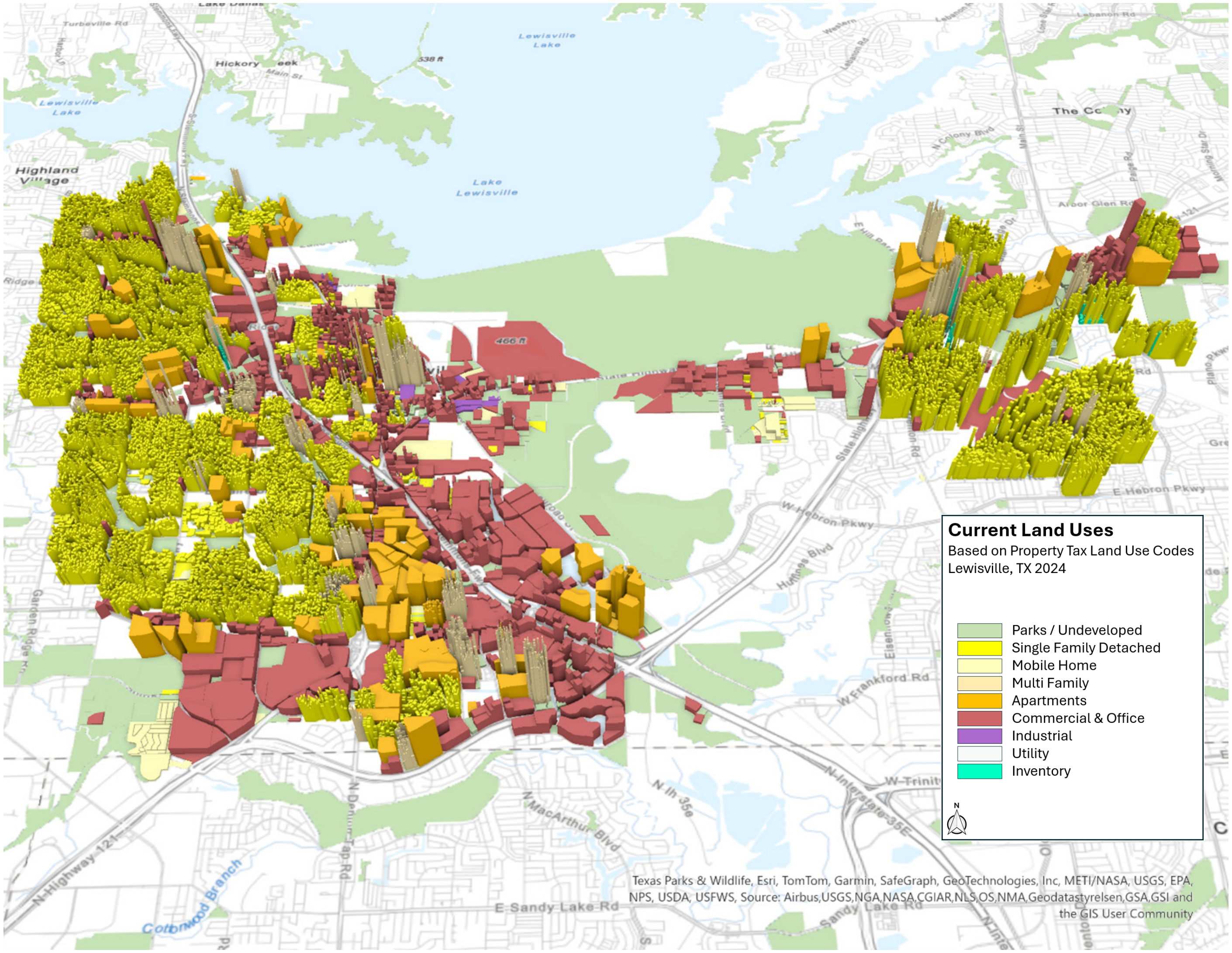


Fig.142: Total Property Tax Revenue Per Acre Shown In Colors Corresponding To State Land Use Classifications, City Of Lewisville TX (2024)

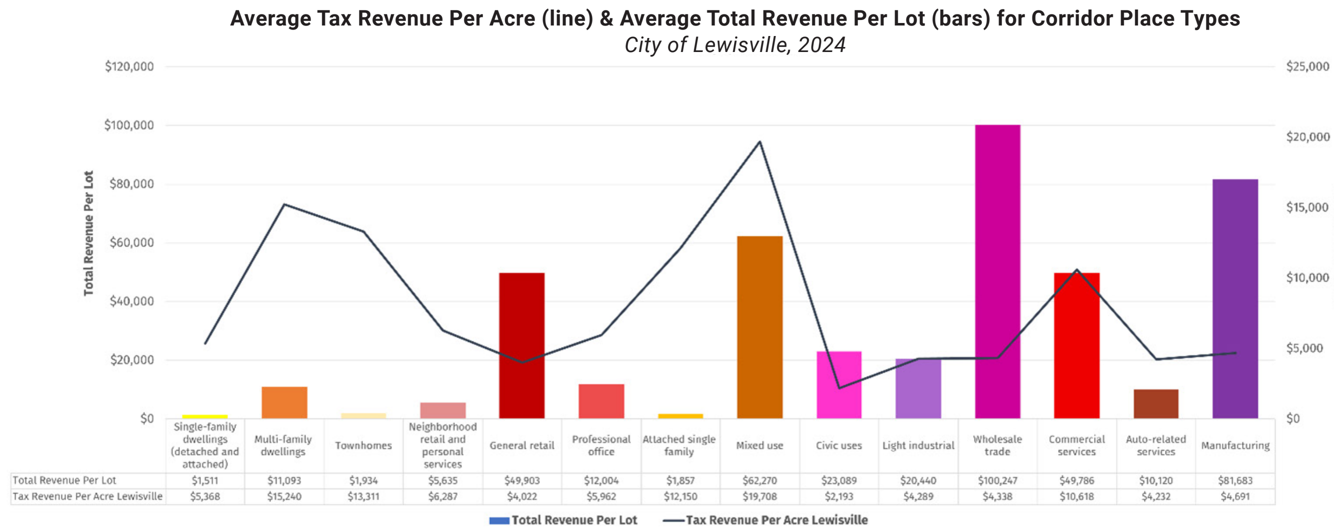


Revenue Data Results & Analysis

In any type of data analysis, it is important to pay attention to patterns and correlations. The revenue data provides an interesting suite of patterns and correlations that provide some insight into the relationship between the built environment and the City of Lewisville's fiscal health.

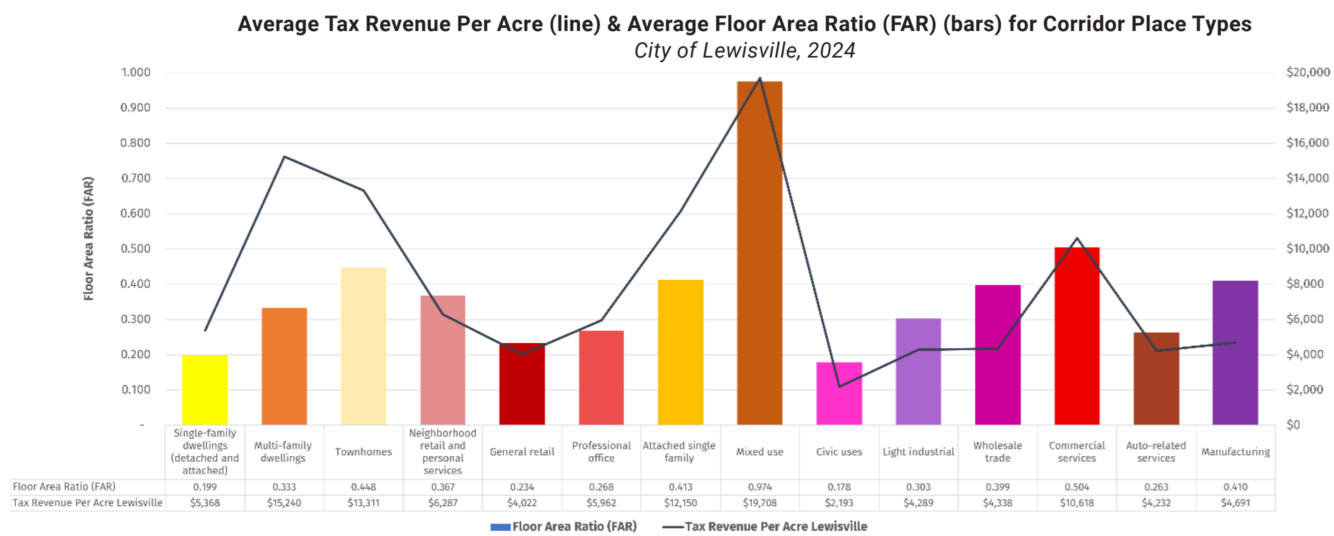
Figures 143 and 144 show the place types used in the ArcUrban Model and represents parcel and tax data across four counties in the DFW region including Denton, Tarrant, Collin, and Dallas Counties. Note that in **Figure 143** the tax revenue per acre and the total revenue per lot will sometimes have an inverse correlation, as demonstrated for general retail, wholesale trade, and manufacturing. However, the correlation in **Figure 144** between average tax revenue per acre and floor area ratio remain more consistently positive, rising and falling together across the land place types.

Fig.143: Place Types With Average Revenue Per Acre & Average Total Revenue Per Lot Across 4-County Area



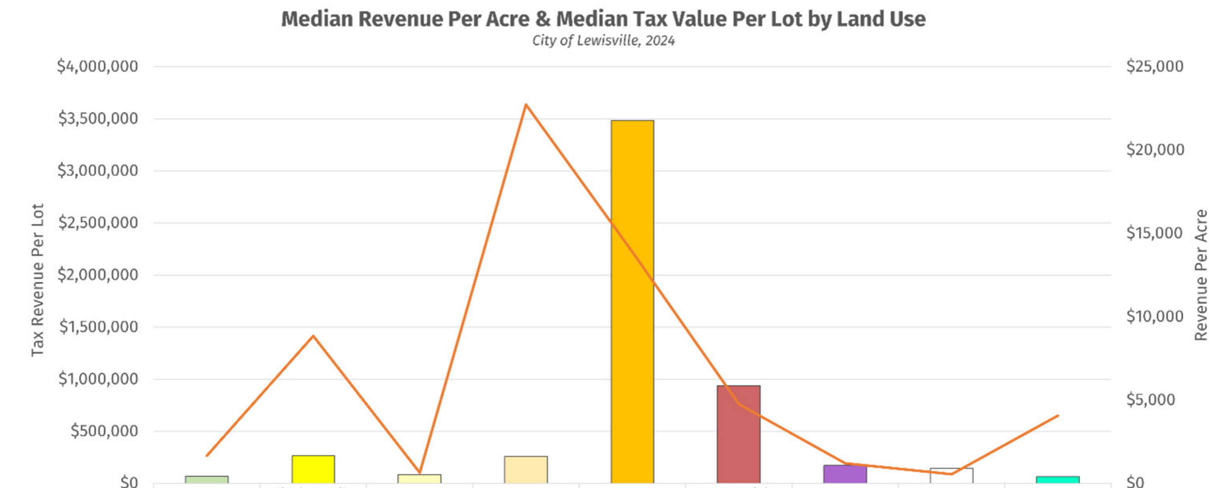
	Single-family dwellings (detached and attached)	Multi-family dwellings	Townhomes	Neighborhood retail and personal services	General retail	Professional office	Attached single family	Mixed use	Civic uses	Light industrial	Wholesale trade	Commercial services	Auto-related services	Manufacturing
Total Revenue Per Lot	$1,511	$11,093	$1,934	$5,635	$49,903	$12,004	$1,857	$62,270	$23,089	$20,440	$100,247	$49,786	$10,120	$81,683
Tax Revenue Per Acre Lewisville	$5,368	$15,240	$13,311	$6,287	$4,022	$5,962	$12,150	$19,708	$2,193	$4,289	$4,338	$10,618	$4,232	$4,691

Fig.144: Place Types With Average Revenue Per Acre & Floor Area Ratio (Far) Across 4-County Area



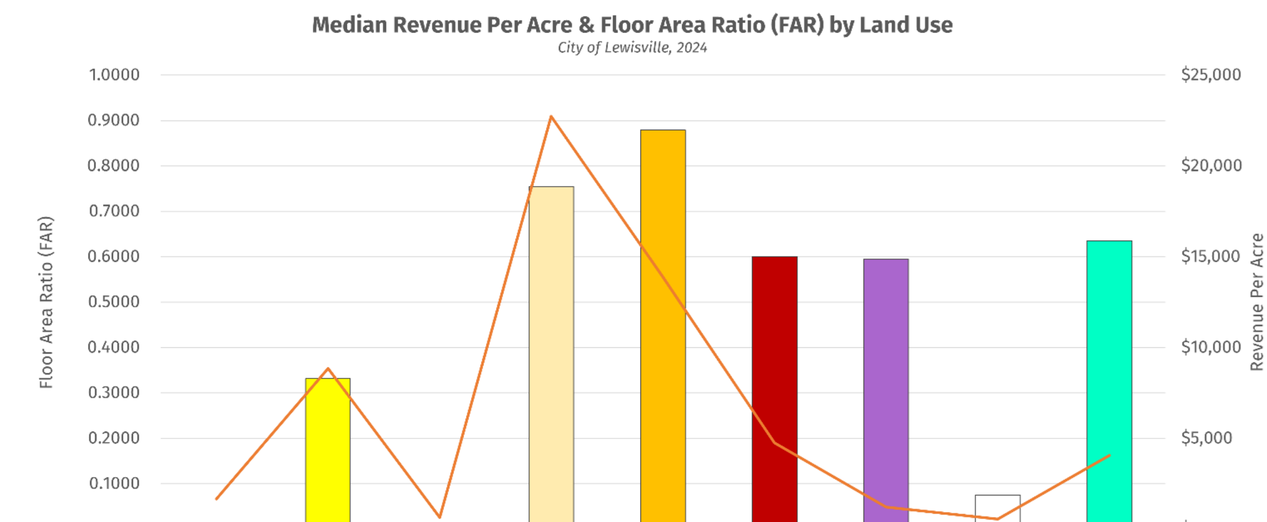
	Single-family dwellings (detached and attached)	Multi-family dwellings	Townhomes	Neighborhood retail and personal services	General retail	Professional office	Attached single family	Mixed use	Civic uses	Light industrial	Wholesale trade	Commercial services	Auto-related services	Manufacturing
Floor Area Ratio (FAR)	0.199	0.333	0.448	0.367	0.234	0.268	0.413	0.974	0.178	0.303	0.399	0.504	0.263	0.410
Tax Revenue Per Acre Lewisville	$5,368	$15,240	$13,311	$6,287	$4,022	$5,962	$12,150	$19,708	$2,193	$4,289	$4,338	$10,618	$4,232	$4,691

Fig.145: Land Uses With Median Revenue Per Acre & Average Total Revenue Per Lot In City Of Lewisville



	Undeveloped	Single Family Detached	Mobile Home	Multi Family	Apartments	Commercial & Office	Industrial	Utility	Inventory
Median Tax Value Per Lot	$71,533	$266,974	$85,484	$260,011	$3,483,432	$941,671	$173,727	$146,863	$65,345
Median Revenu Per Acre	$1,670.04	$8,852.55	$652.07	$22,729.76	$13,889.33	$4,756.96	$1,211.39	$554.36	$4,070.09

Fig.146: Land Uses With Median Revenue Per Acre & Floor Area Ratio (Far) In City Of Lewisville



	Undeveloped	Single Family Detached	Mobile Home	Multi Family	Apartments	Commercial & Office	Industrial	Utility	Inventory
Floor Area Ratio	0.0129	0.3316	0.0069	0.7548	0.8787	0.6007	0.5952	0.0755	0.6354
Median Revenu Per Acre	$1,670.04	$8,852.55	$652.07	$22,729.76	$13,889.33	$4,756.96	$1,211.39	$554.36	$4,070.09

Figures 145 and 146 show the land uses as seen in **Figures 140 and 142** with median total tax value per lot and median tax revenue per acre respectively. Note that the correlative relationship between the revenue per acre and the total revenue per lot in **Figure 145** mimics the pattern seen in **Figure 143** above from the larger data set. Likewise, the correlation between revenue per acre and FAR in **Figure 146** mimics the pattern seen in **Figure 144**.

Figures 147 through **150** show a more detailed breakdown of these same patterns within the single family detached use across the four-county study area and within the City of Lewisville. Separating out single family detached development patterns by lot size reveals similar relationships between revenue per acre, total revenue per lot, and floor are ratio as seen in **Figures 139-142**. Both the four-county data set (**Figures 143 and 144**) and the City of Lewisville data show these patterns (**Figures 145 and 146**) of the revenue per acre correlating negatively with total revenue per lot and positively with floor area ratio.

Interestingly, the revenue per acre also consistently shows a negative correlation with lot size. As the lot size gets larger the revenue per acre decreases. In fact, this pattern is observable across all but one of the land uses illustrated in these charts, both across the four-county area and within the City of Lewisville as shown in **Figures 151-162** in the supplemental figures. Apartment and multi-family uses slightly deviate from this pattern. Apartments and multi-family developments tend to peak in revenue per acre between 1 and 5 acres.

Fig.147: Single Family Detached Average Revenue Per Acre & Avg Total Revenue Per Lot Across 4-County Area

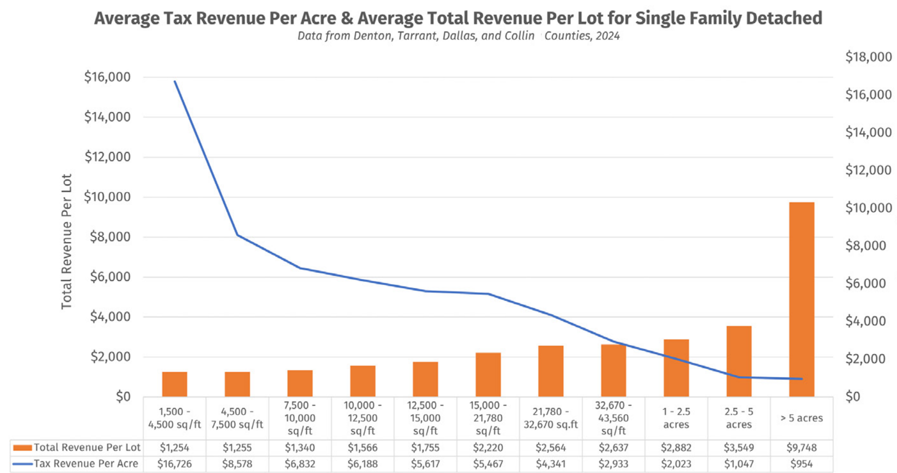


Fig.148: Single Family Detached Average Revenue Per Acre & Floor Area Ratio Across 4-County Area

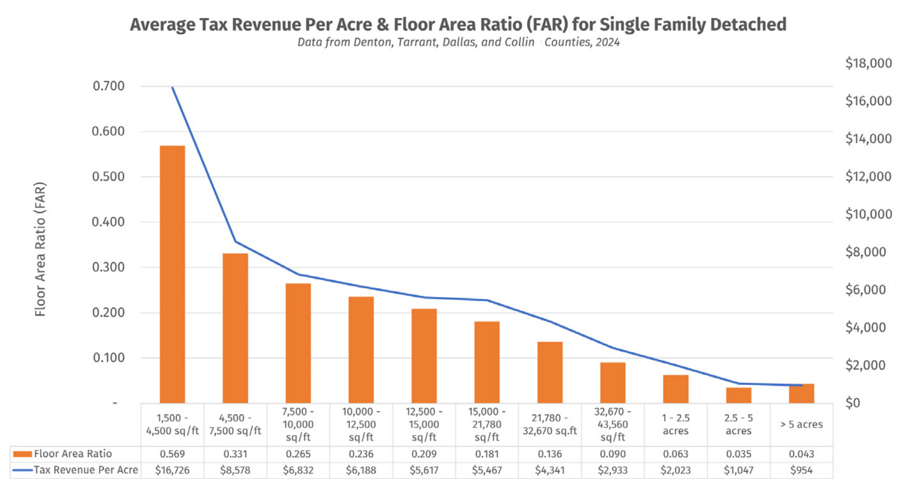
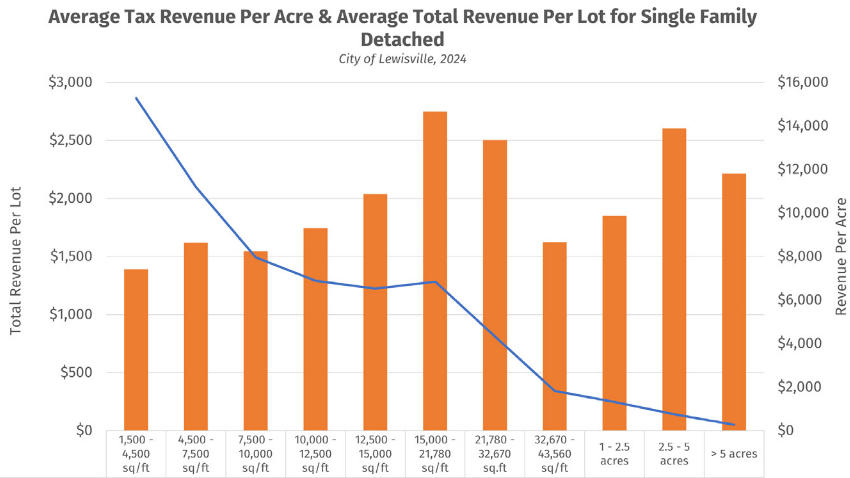
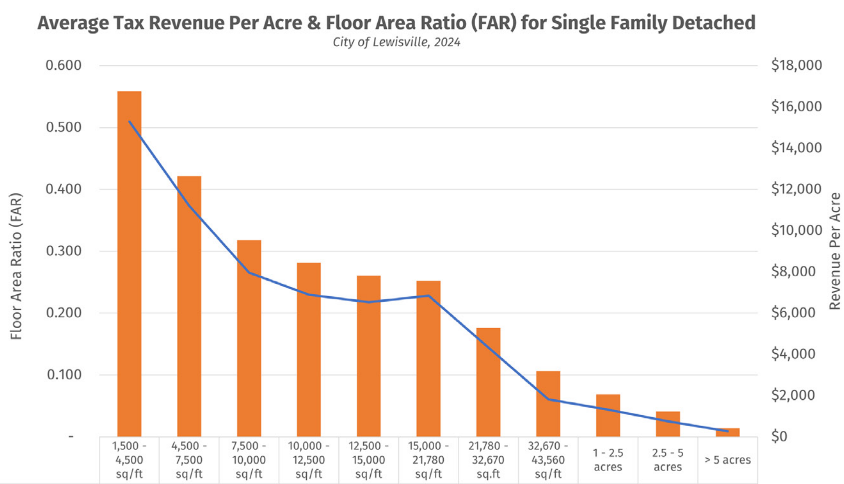


Fig.149: Single Family Detached Average Revenue Per Acre & Total Revenue Per Lot In City Of Lewisville



	1,500 - 4,500 sq/ft	4,500 - 7,500 sq/ft	7,500 - 10,000 sq/ft	10,000 - 12,500 sq/ft	12,500 - 15,000 sq/ft	15,000 - 21,780 sq/ft	21,780 - 32,670 sq.ft	32,670 - 43,560 sq/ft	1 - 2.5 acres	2.5 - 5 acres	> 5 acres
Total Revenue Per Lot	$1,392	$1,617	$1,548	$1,744	$2,040	$2,749	$2,504	$1,625	$1,850	$2,604	$2,214
Tax Revenue Per Acre	$15,285	$11,202	$7,960	$6,896	$6,529	$6,849	$4,329	$1,824	$1,321	$755	$275

Fig.150: Single Family Detached Average Revenue Per Acre & Total Revenue Per Lot In City Of Lewisville



	1,500 - 4,500 sq/ft	4,500 - 7,500 sq/ft	7,500 - 10,000 sq/ft	10,000 - 12,500 sq/ft	12,500 - 15,000 sq/ft	15,000 - 21,780 sq/ft	21,780 - 32,670 sq.ft	32,670 - 43,560 sq/ft	1 - 2.5 acres	2.5 - 5 acres	> 5 acres
Floor Area Ratio (FAR)	0.558	0.422	0.318	0.282	0.260	0.252	0.176	0.106	0.068	0.041	0.014
Tax Revenue Per Acre	$15,285	$11,202	$7,960	$6,896	$6,529	$6,849	$4,329	$1,824	$1,321	$755	$275

The data analyzed in this effort has shown some consistent patterns and correlations. Based on those observations, it is reasonable to conclude that:

1. Revenue acre is a strong metric for fiscally analyzing the relationship between the built environment and the City's fiscal health, especially concerning property tax revenues.
2. Analyzing land uses as broad categories provides limited insight and does not offer enough detail to properly inform discussions about the fiscal relationship between development patterns/regulations and a city's fiscal health. Efforts at this type of analysis should consider metrics beyond the land use such as lot size and floor area ratio.
   A. For instance, **Figures 145 and 146** show us that single-family detached land uses in Lewisville, on lots smaller than 10,000 square feet, generate higher revenue per acre than all other land uses shown in **Figures 141 and 142** except for apartments and multi-family. That means future single-family detached development can operate as a high yield development pattern if allowed to do so.
3. Revenue per acre has an inverse correlation with lot size across most land uses, therefore large minimum lot sizes and/or prohibition of small lot development can be detrimental to a city's fiscal health.
4. Revenue per acre has a positive correlation with floor area ratio (FAR); therefore, if a city desires to position its future development patterns to yield higher revenue per acre performance, then that city might revisit policies in regulations which impact FAR. Those regulations and policies would concern lot size, parking requirements, building height, density, block length, street width standards, and others.

Additional Notes

1. Fiscal analysis can tempt some to take a "maximize ROI" approach to planning efforts. Fiscal analysis efforts should always consider the social and environmental health of the city. While dense urban landscapes with tall structures can provide immense financial stability, they are not necessary, and in many places not preferred. The end game should focus on providing development opportunities that facilitate an overall net gain financially, and overall land use portfolio that covers the city's expenses. That might include some properties that cost more than they generate in revenue, which isn't bad if the rest of the portfolio can make up the difference.
2. One safe way of maximizing revenue without considering dense private development is to densify public tax-exempt development. Sprawling single-story public facilities such as city halls and schools create larger than necessary gaps in a city's revenue footprint. A three-story public facility might consume half the space as the same facility built in a single-story format. The space saved by building taller public facilities provides more space for revenue-generating development. It also decreases the amount of service area it consumes and road infrastructure it requires.
3. Retail sales tax revenue data is much more difficult to acquire and include in studies like this. This study, and others, cannot directly point to patterns and correlations within the retail sales tax data. However, anecdotally, retail sales tax revenues share the most fundamental ingredient for its generation with property tax revenues, namely people. Generally, as population densities increase so do the FARs and revenue per acre numbers for property taxes. Likewise, areas with dense populations generally have higher demands for commercial services. If a city can facilitate higher population densities and the commercial services to meet their demands, then it's fair to assume that it would enjoy higher property tax and retail sales tax revenues together.
4. A proper return on investment analysis would include cost data. While this study did not include any cost data, we can safely make a few assumptions about how it might impact ROI.
   A. A city should consider decreasing its level of required infrastructure, especially for uses with lower expected revenue per acre performance. For instance, large lot single-family detached subdivisions may not justify the expense of curb and gutter streets where bar ditch roads might serve them just as well. Similarly, a city might save itself and the development community some expense by allowing longer block lengths for vehicles while maintaining short block lengths for pedestrian and cyclists. This allows the developer and city to dilute the concentration of the higher-cost vehicular infrastructure without harming connectivity for pedestrians and cyclists.
   B. Increasing connectivity by limiting cul-de-sacs can increase the service area footprint of fire, police, libraries, parks, and other public services. That allows them to serve larger coverage areas more efficiently with linear networks.
   C. Avoid duplicating private infrastructure and services with a publicly-funded version. Residential neighborhoods or subdivisions with HOA-maintained recreational/green spaces may not benefit enough from public recreation/green spaces to justify the costs.
   D. Paying for infrastructure and services through the M&O budget is less costly than issuing debt and paying for it through the I&S budget. This requires establishing tax rates that align more with covering costs than matching or lowering the rate from previous years.
   E. Avoid new infrastructure when possible. Vacant and undeveloped properties residing in the interior of a city create a significant financial burden. Cities continue to provide the full suite of public services, but the properties themselves generate very little, if any, income to help cover the cost. Focusing on the redevelopment of property within the city that already has infrastructure and services could provide the city with increased revenues without creating new cost burdens. Redevelopment can also present good opportunities for private-public partnerships to restore or rebuild aging public infrastructure such as old roads and utilities.

Concluding Remarks

Any city that gathers public funds to provide public services should strive to do so with as much transparency and prudence as possible. It is a matter of stewarding our resources well. Moving forward, this type of analysis could expand to incorporate costs for a true return on investment study. Moreover, it could serve as a powerful analytical tool for large planning efforts such comprehensive plans and zoning code updates. Beyond long-range planning projects, fiscal stewardship needs to remain a lively discussion point in any public setting related to development or city finances.

Supplemental Figures

Fig.151: Average Tax Revenue per Acre & Average Total Revenue per Lot for Apartments and Multi-Family

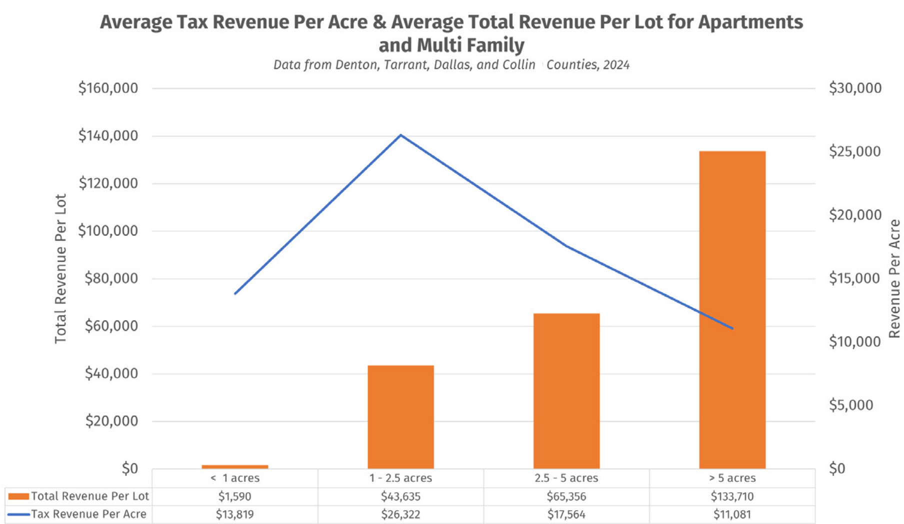


Fig.152: Average Tax Revenue per Acre & Floor Area Ratio (FAR) for Apartments and Multi-Family

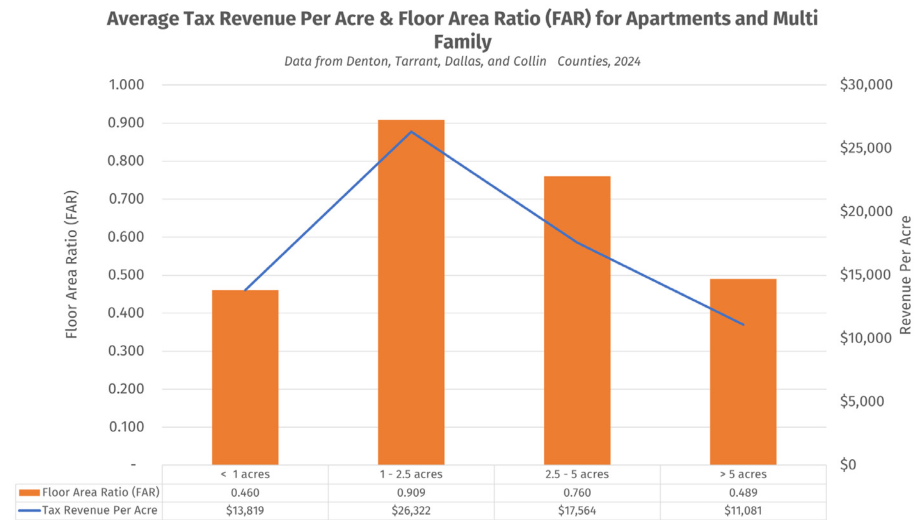


Fig.153: Average Tax Revenue per Acre & Average Total Revenue per Lot for Apartments

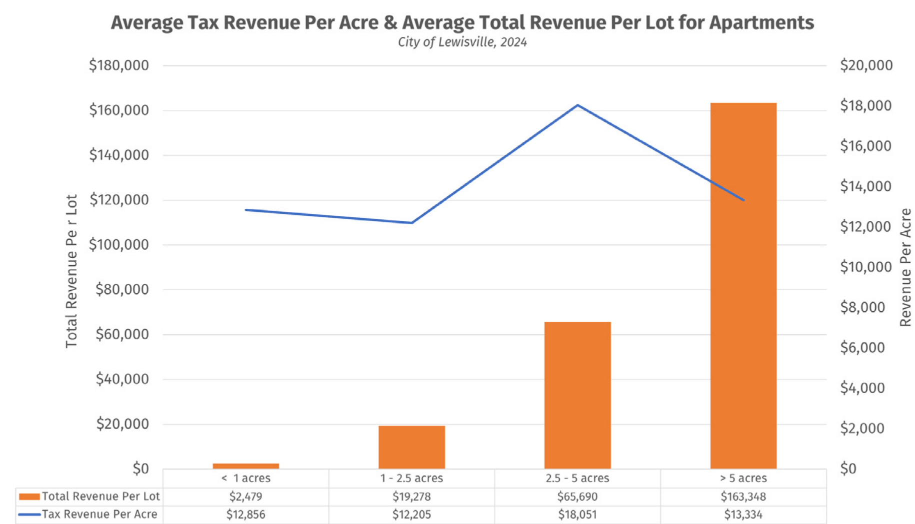
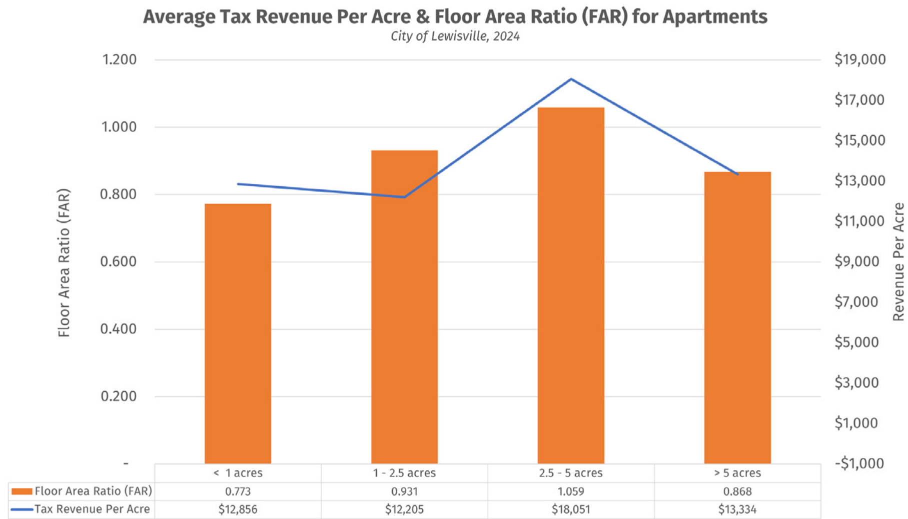
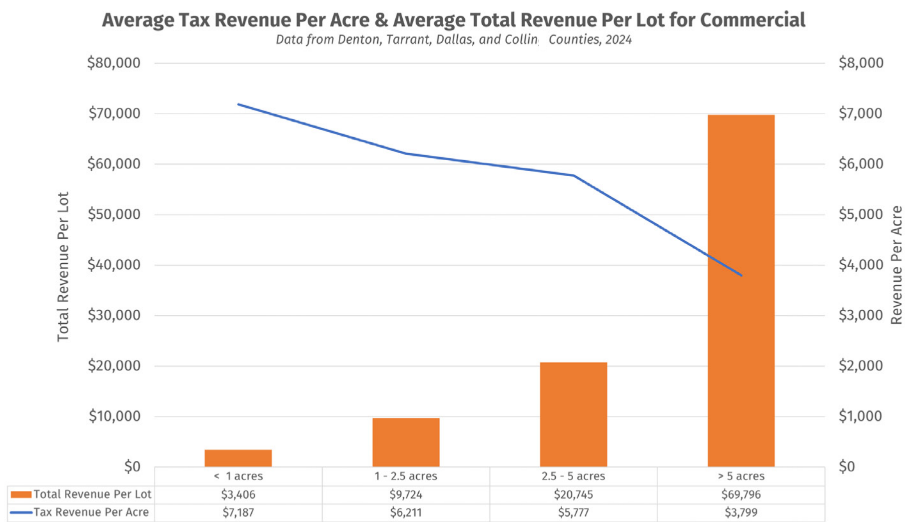


Fig.154: Average Tax Revenue per Acre & Floor Area Ratio (FAR) for Apartments



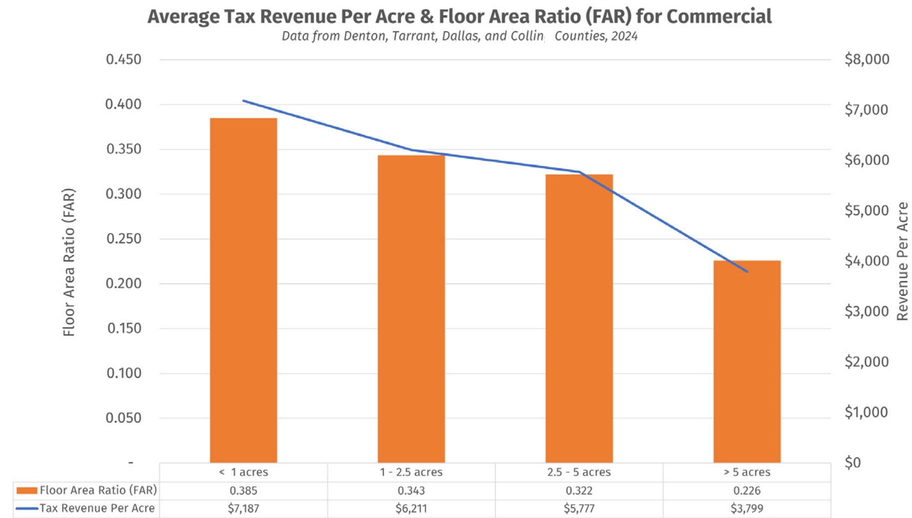
	< 1 acres	1 - 2.5 acres	2.5 - 5 acres	> 5 acres
Floor Area Ratio (FAR)	0.773	0.931	1.059	0.868
Tax Revenue Per Acre	$12,856	$12,205	$18,051	$13,334

Fig.155: Average Tax Revenue per Acre & Average Total Revenue per Lot for Commercial



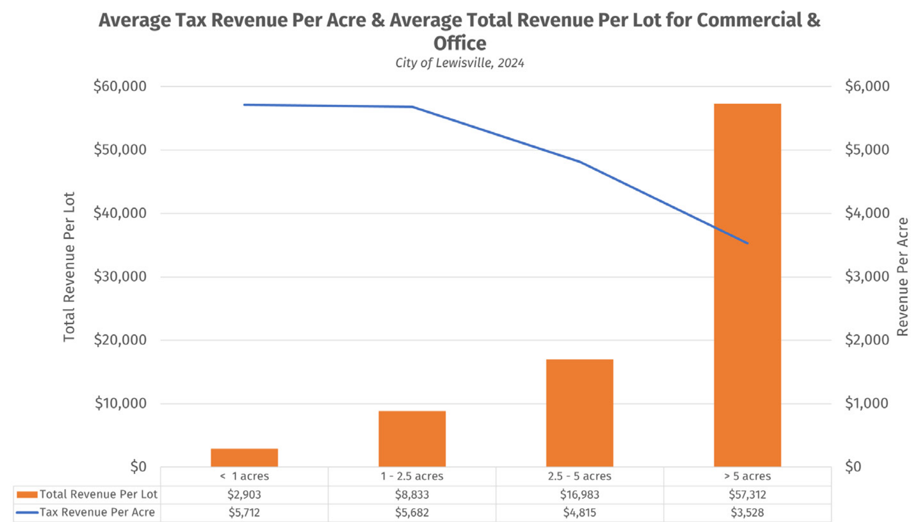
	< 1 acres	1 - 2.5 acres	2.5 - 5 acres	> 5 acres
Total Revenue Per Lot	$3,406	$9,724	$20,745	$69,796
Tax Revenue Per Acre	$7,187	$6,211	$5,777	$3,799

Fig.156: Average Tax Revenue per Acre & Floor Area Ratio (FAR) for Commercial



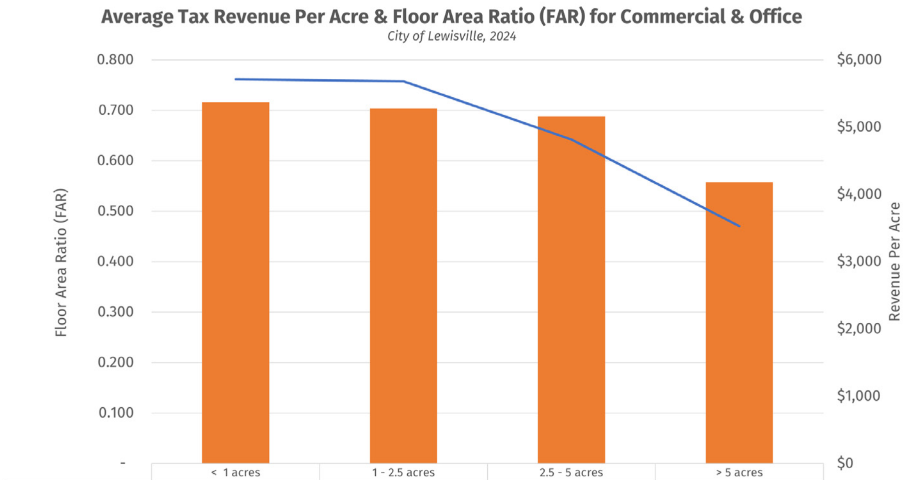
	< 1 acres	1 - 2.5 acres	2.5 - 5 acres	> 5 acres
Floor Area Ratio (FAR)	0.385	0.343	0.322	0.226
Tax Revenue Per Acre	$7,187	$6,211	$5,777	$3,799

Fig.157: Average Tax Revenue per Acre & Average Total Revenue per Lot for Commercial and Office



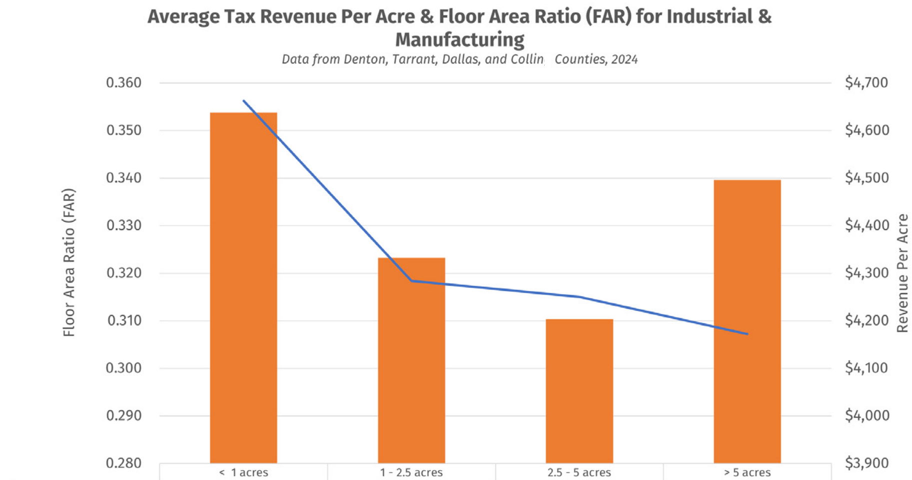
	< 1 acres	1 - 2.5 acres	2.5 - 5 acres	> 5 acres
Total Revenue Per Lot	$2,903	$8,833	$16,983	$57,312
Tax Revenue Per Acre	$5,712	$5,682	$4,815	$3,528

Fig.158: Average Tax Revenue per Acre & Floor Area Ratio (FAR) for Commercial and Office



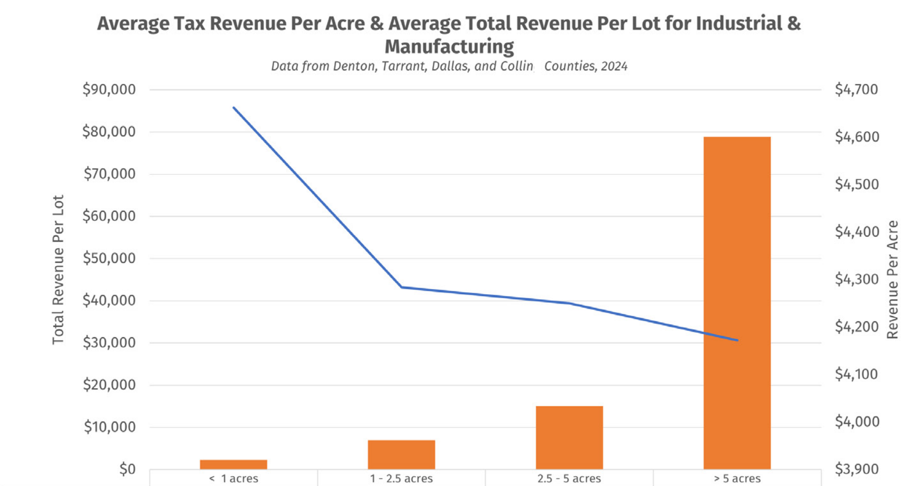
	< 1 acres	1 - 2.5 acres	2.5 - 5 acres	> 5 acres
Floor Area Ratio (FAR)	0.716	0.704	0.688	0.558
Tax Revenue Per Acre	$5,712	$5,682	$4,815	$3,528

Fig.160: Average Tax Revenue per Acre & Floor Area Ratio (FAR) for Industrial & Manufacturing



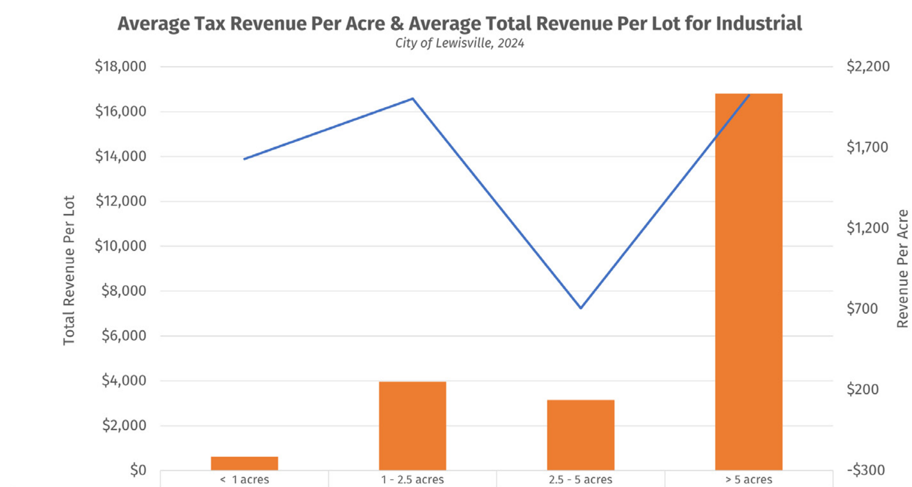
	< 1 acres	1 - 2.5 acres	2.5 - 5 acres	> 5 acres
Floor Area Ratio (FAR)	0.354	0.323	0.310	0.340
Tax Revenue Per Acre	$4,663	$4,284	$4,250	$4,172

Fig.159: Average Tax Revenue per Acre & Average Total Revenue per Lot for Industrial & Manufacturing



	< 1 acres	1 - 2.5 acres	2.5 - 5 acres	> 5 acres
Total Revenue Per Lot	$2,309	$6,993	$15,036	$78,887
Tax Revenue Per Acre	$4,663	$4,284	$4,250	$4,172

Fig.161: Average Tax Revenue per Acre & Average Total Revenue per Lot for Industrial



	< 1 acres	1 - 2.5 acres	2.5 - 5 acres	> 5 acres
Total Revenue Per Lot	$613	$3,957	$3,147	$16,814
Tax Revenue Per Acre	$1,630	$2,003	$704	$2,023

Fig.162: Average Tax Revenue per Acre & Floor Area Ratio (FAR) for Industrial

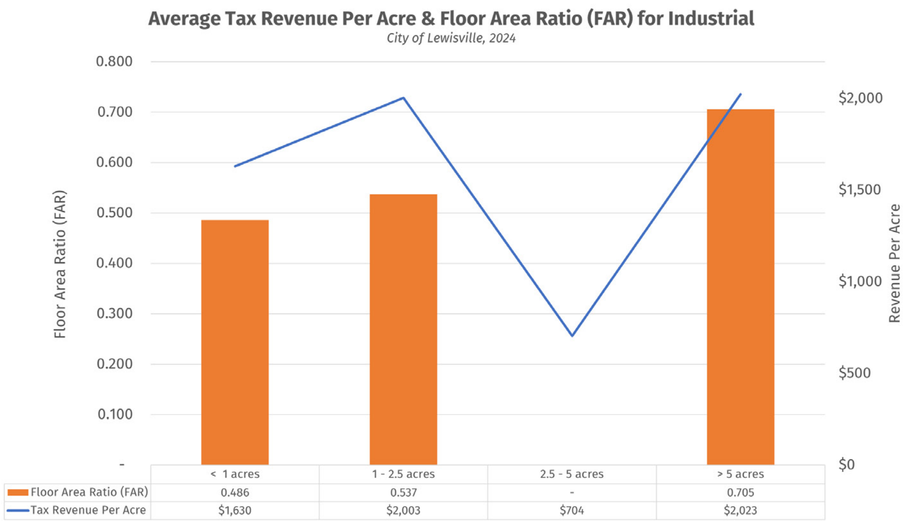


Fig.164: Average Tax Revenue per Acre & Floor Area Ratio (FAR) for Mixed-Use

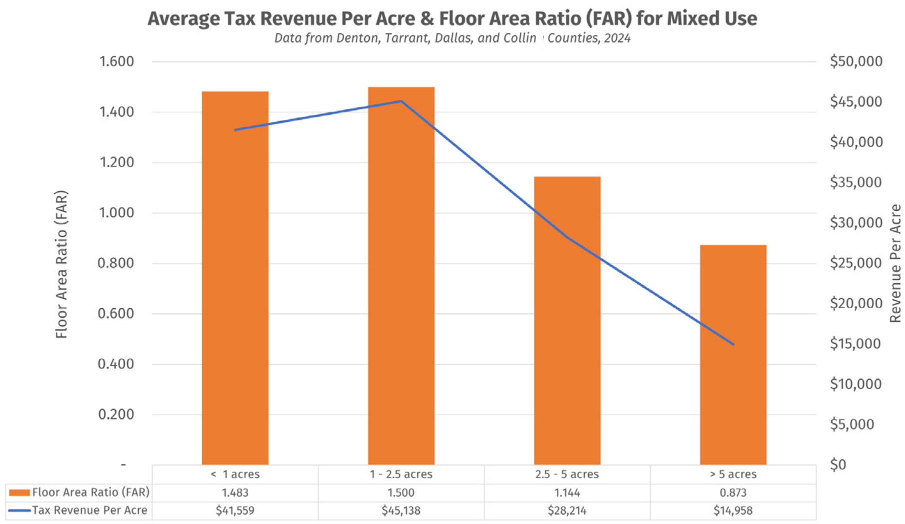
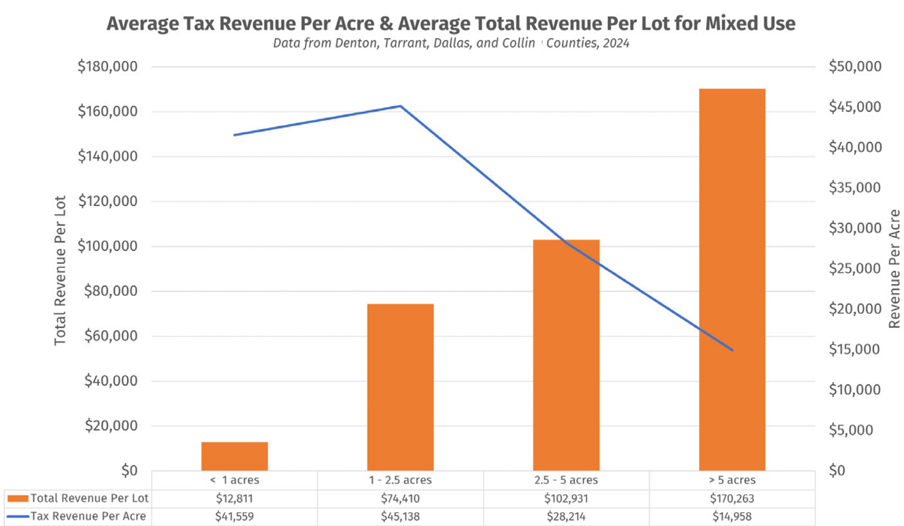


Fig.163: Average Tax Revenue per Acre & Average Total Revenue per Lot for Mixed-Use



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