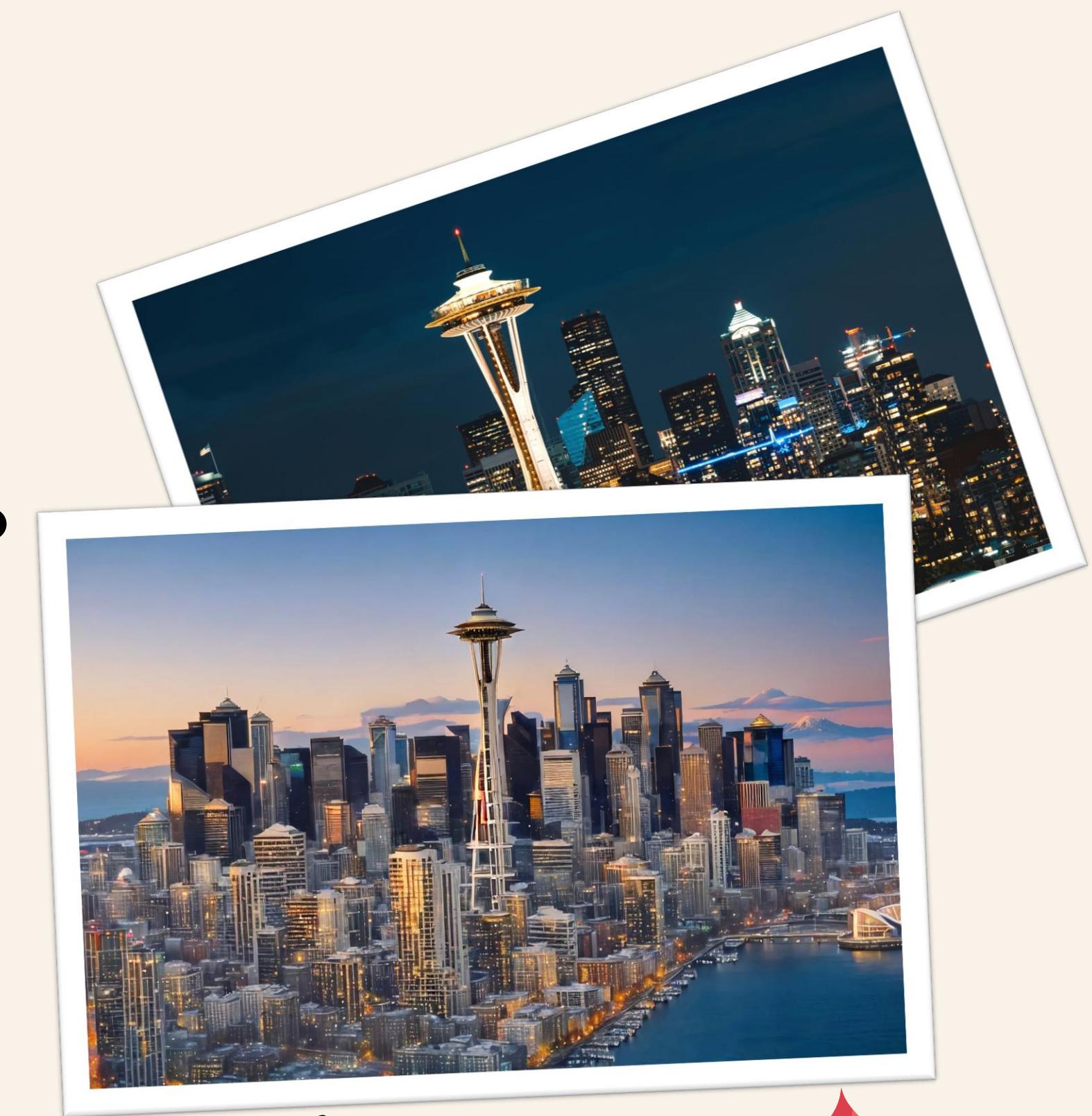


SHAPING THE  
SKYLINE

# SEATTLE COMMERCIAL & RESIDENTIAL DEVELOPMENT

Arpanjot Kaur





# PROJECT SCOPE

This project examines Seattle's residential development through building permit data to assess how major housing investments are transforming the city.

By analyzing trends in new construction, demolitions, and net housing changes across neighborhoods, zoning types, and dwelling categories, the analysis highlights where growth is concentrated and how residential patterns are shifting.



# DATA SOURCES

1

SOURCE: Seattle Open Data Portal

CONTENT: Building Permit records used to analyze commercial and residential development

COLUMNS: 61

ROWS: 45215

LINK: <https://data-seattlecitygis.opendata.arcgis.com/datasets/b15bb712fa0a4f4c9862a78e6d7da513/explore?location=47.459114%2C-124.187613%2C8.58>

2

SOURCE: Redfin Data Center

CONTENT: Housing Prices and Sales Trends

COLUMNS: 1

ROWS: 168

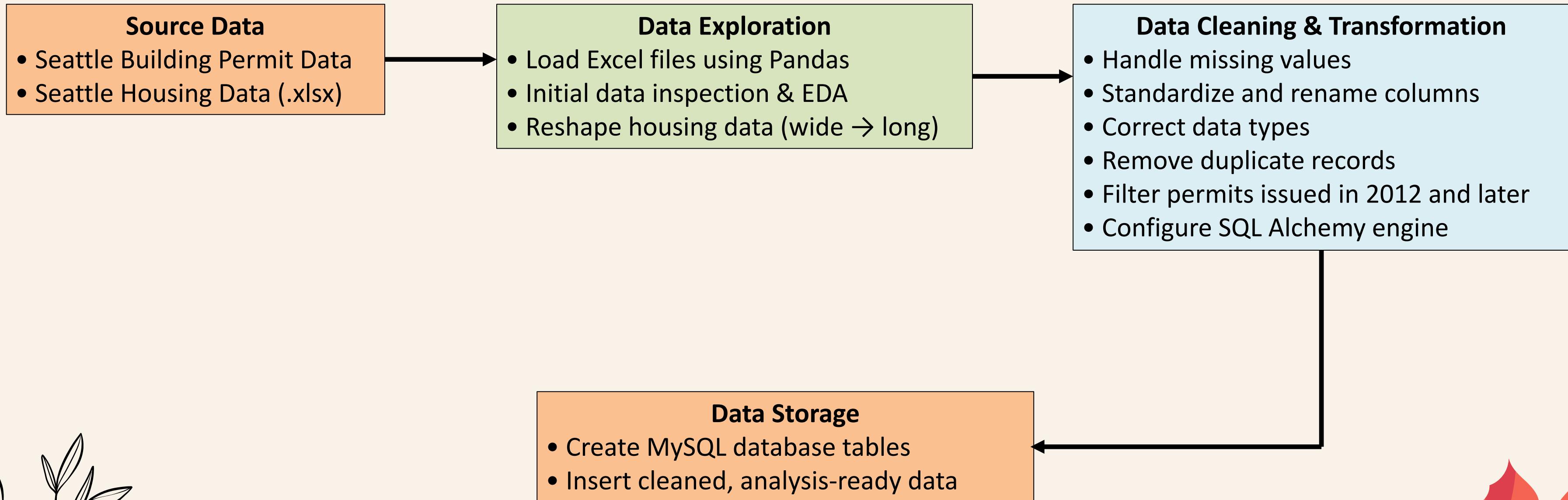
LINK: <https://www.redfin.com/news/data-center/>

# ZONING CODES USED IN ANALYSIS

Code	Meaning	Usage
NR	Neighborhood Residential	Houses, ADUs
L	Low Rise	Townhouses, small apartments
MR	Midrise	Apartments
NC	Neighborhood Commercial	Mixed-use
SF	Single-Family (legacy)	Detached houses
C	Commercial	Offices, retail
I	Industrial	Warehouses
UNK	Unknown	N/A

Code	Meaning
ADU	Accessory Dwelling Unit attached to a house (inside or over garage)
DADU	Detached Accessory Dwelling Unit (a small backyard cottage)
MF	Multifamily unit (townhouse, rowhouse, apartment)
SF	Single-family detached house

# DATA FLOW DIAGRAM



# ETL LOAD - PYTHON

```
from urllib.parse import quote_plus
password = quote_plus("mysql04$")

# Create SQLAlchemy engine for database interaction
engine = create_engine(
    f"mysql+pymysql://root:{password}@localhost:3306/seattle_analytics",
    pool_pre_ping=True,
    future=True
)

# Read the cleaned Excel file into a Pandas DataFrame
df = pd.read_excel(
    "Cleaned_Residential_Building_Permits.xlsx",
    parse_dates=[
        "application_date",
        "permit_issued_date",
        "permit_final_date"
    ]
)

# Load the DataFrame into a staging table in MySQL
df.to_sql(
    "permit_staging",
    engine,
    if_exists="replace",
    index=False,
    method="multi",
    chunksize=5000
)
```

# TABLE SCHEMA - MYSQL

permit\_staging table holds cleaned data loaded from pandas.

	TABLE_CATALOG	TABLE_SCHEMA	TABLE_NAME	TABLE_TYPE
►	def	seattle_analytics	dwellingunitdim	BASE TABLE
	def	seattle_analytics	factpermits	BASE TABLE
	def	seattle_analytics	locationdim	BASE TABLE
	def	seattle_analytics	permit_staging	BASE TABLE
	def	seattle_analytics	permitdates	BASE TABLE
	def	seattle_analytics	permittypedim	BASE TABLE
	def	seattle_analytics	zoningdim	BASE TABLE

# dwellingunitdim

Reference table that defines and categorizes all possible types of dwelling units.

	DwellingUnitID	DwellingUnitType	DwellingUnitTypeCode	CondoParcelOrPlat
►	1	ADU	Accessory Dwelling, Attached	Y
	2	DADU	Accessory Dwelling, Detached	Y
	3	MF	Townhouse	N
	4	DADU	Accessory Dwelling, Detached	N
	5	SF	Detached Single-Family	N
	6	MF	Rowhouse	N
	7	SF	Detached Single-Family	Y
	8	MF	Apartment	N
	9	ADU	Accessory Dwelling, Attached	N
	10	MIXED	Townhouse	N
	11	NONE	No Dwelling Units	N
	12	MF	Small Efficiency Dwelling	N

# factpermits

The table stores measurable events (number of permits issued) and links to all dimension tables via foreign keys (LocationID, ZoningID, etc.).

PermitNumber	LocationID	ZoningID	DwellingUnitID	PermitTypeID	NewUnitsPermitted	DemolishedUnitsPermitted	NetUnitsPermitted
6064856	17729	132	3	7	2	0	2
6073452	13292	132	6	7	2	0	2
6074870	15593	133	25	7	50	0	50
6089142	13996	375	32	7	1	0	1
6096965	11344	175	53	7	42	0	42
6098287	17938	138	5	7	1	0	1
6100770	4373	130	5	7	1	0	1
6118619	5277	130	1	7	1	0	1

# locationdim

The columns represent a standard geographic hierarchy:  
(Address → Neighborhood → Community/ReportingArea → CouncilDistrict), enabling analysis at different geographic levels.

LocationID	ProjectAddress	Neighborhood	CommunityReportingArea	CommunityReportingAreaNumber	CouncilDistrict	UrbanVillageName	UrbanVillageType	Longitude	Latitude
1	13505 MERIDIAN AVE N	Northwest	Haller Lake	9.50	5	Outside Villages	Outside Villages	-122.3347731	47.7271426
2	13542 A 39TH AVE NE	North	Cedar Park/Meadowbrook	8.30	5	Outside Villages	Outside Villages	-122.2862971	47.7275681
3	13542 C 39TH AVE NE	North	Cedar Park/Meadowbrook	8.30	5	Outside Villages	Outside Villages	-122.2865142	47.7275963
4	13544 39TH AVE NE	North	Cedar Park/Meadowbrook	8.30	5	Outside Villages	Outside Villages	-122.2866402	47.7277320
5	13713 35TH AVE NE	North	Cedar Park/Meadowbrook	8.30	5	Outside Villages	Outside Villages	-122.2913875	47.7287794

# permittypedim

The table defines the two key attributes of a permit: its current stage (Permit Issued vs. Permit Finaled) and its purpose (Construction, Demolition, Phased Project).

PermitTypeID	PermitStage	TypeOfPermit	Source
1	Permit Finaled	Construction Permit	ACC
2	Permit Finaled	Demolition Permit	AOC
3	Permit Finaled	Phased Project Permit	AOC
4	Permit Issued	Phased Project Permit	AOC
5	Permit Issued	Demolition Permit	ACC
6	Permit Issued	Construction Permit	AOC
7	Permit Finaled	Construction Permit	HAN
8	Permit Finaled	Demolition Permit	HAN
9	Permit Issued	Construction Permit	HAN

# zoningdim

The table standardizes and categorizes all land use zoning codes (e.g., SF 5000, LR3, MR-85) that govern what can be built at a location, a critical factor for housing development analysis.

ZoningID	ZoningPrimaryZone	ZoningCategory	ZoningClassification	ZoningAllZones	ZoningReportedZone
127	NR3	NR3	NR	NR3	NR3
128	NR2	NR2	NR	NR2	NR2
129	LR1 (M)	LR1	L	LR1 (M)	LR1 (M)
130	SF 5000	SF 5000	SF	SF 5000	SF 5000
131	UNKNOWN	UNKNOWN	UNK	NONE	UNKNOWN
132	LR2	LR2	L	LR2	LR2
133	LR3	LR3	L	LR3	LR3
134	LR1 (M)	LR1	L	LR1 (M), SF 5000	MULTIPLE ZONE
135	MR-85	MR	MR	MR-85	MR-85
136	SF 7200	SF 7200	SF	SF 7200	SF 7200
137	LR3 (M1)	LR3	L	LR3 (M1)	LR3 (M1)

# QUERIES - QUESTION 1

1. Which neighborhoods are adding the most housing units within each zoning type?

```
SELECT *
FROM (
  SELECT
    l.Neighborhood,
    d.DwellingUnitType,
    SUM(f.NewUnitsPermitted) AS TotalNewUnits,
    RANK() OVER (PARTITION BY d.DwellingUnitType ORDER BY SUM(f.NewUnitsPermitted) DESC) AS RankByType
  FROM FactPermits f
  JOIN DwellingUnitDim d ON f.DwellingUnitID = d.DwellingUnitID
  JOIN LocationDim l ON f.LocationID = l.LocationID
  GROUP BY l.Neighborhood, d.DwellingUnitType
) AS ranked
WHERE RankByType <= 3
ORDER BY DwellingUnitType, RankByType;
```

# OUTPUT - QUESTION 1

1. Which neighborhoods are adding the most new housing units within each zoning type?

Neighborhood	DwellingUnitType	TotalNewUnits	RankByType
Northwest	ADU	408	1
Northeast	ADU	327	2
Southwest	ADU	230	3
Northwest	DADU	570	1
Ballard	DADU	351	2
North	DADU	331	3
Greater Duwamish	IND	0	1
Delridge Neighborhoods	IND	0	1
Northeast	INST	0	1
Lake Union	MF	2601	1
Ballard	MF	2413	2
East	MF	2113	3
Lake Union	MIXED	19047	1
East	MIXED	12735	2
Downtown	MIXED	7554	3
Northwest	NONE	2	1
Northeast	NONE	1	2
Delridge Neighborhoods	NONE	1	2
Ballard	SF	921	1
Northwest	SF	754	2
Northeast	SF	733	3

## QUERIES - QUESTION 2

2. Which neighborhoods in Seattle saw the most commercial development between 2023 and 2025, based on new commercial units permitted?
- 

```
SELECT
    l.Neighborhood,
    SUM(f.NewUnitsPermitted) AS TotalUnits,
    COUNT(f.PermitNumber) AS TotalPermits
FROM FactPermits f
JOIN LocationDim l ON f.LocationID = l.LocationID
JOIN ZoningDim z ON f.ZoningID = z.ZoningID
JOIN PermitDates pd ON f.PermitNumber = pd.PermitNumber
WHERE z.ZoningClassification LIKE "c" -- "c" for commercial zoning
    AND YEAR(pd.IssuedDate) BETWEEN 2023 AND 2025
GROUP BY l.Neighborhood
ORDER BY TotalUnits DESC, TotalPermits DESC;
```

## OUTPUT - QUESTION 2

2. Which neighborhoods in Seattle saw the most commercial development between 2023 and 2025, based on new commercial units permitted?

---

Neighborhood	TotalUnits	TotalPermits
Northwest	227	7
Greater Duwamish	149	6
Lake Union	90	3
Delridge Neighborhoods	4	2
Magnolia/Queen Anne	2	2
Northeast	1	1

## QUERIES - QUESTION 3

3. What is the distribution of new housing units by dwelling type (e.g., SF, MF, ADU) across different zoning classifications (e.g., NR1, LR1, MR-85)?
- 

```
SELECT
    z.ZoningClassification,
    d.DwellingUnitType,
    SUM(f.NewUnitsPermitted) AS TotalNewUnits
FROM FactPermits f
JOIN ZoningDim z ON f.ZoningID = z.ZoningID
JOIN DwellingUnitDim d ON f.DwellingUnitID = d.DwellingUnitID
GROUP BY z.ZoningClassification, d.DwellingUnitType
ORDER BY z.ZoningClassification, TotalNewUnits DESC;
```

## OUTPUT - QUESTION 3

3. What is the distribution of new housing units by dwelling type (e.g., SF, MF, ADU) across different zoning classifications (e.g., NR1, LR1, MR-85)?

ZoningClassification	DwellingUnitType	TotalNewUnits
MR	MF	1474
MR	ADU	1
MR	NONE	0
MR	SF	0
NC	MIXED	27441
NC	MF	1156
NC	SF	49
NC	DADU	6
NC	ADU	5
NC	NONE	0
NR	DADU	1377
NR	ADU	986
NR	SF	550
NR	MIXED	99
NR	MF	6
SF	SF	3785
SF	DADU	1602
SF	ADU	1406
SF	MF	253
SF	MIXED	37

## QUERIES - QUESTION 4

4. Which zoning classifications have the highest number of demolitions, and how does this correlate with new units permitted in the same areas?

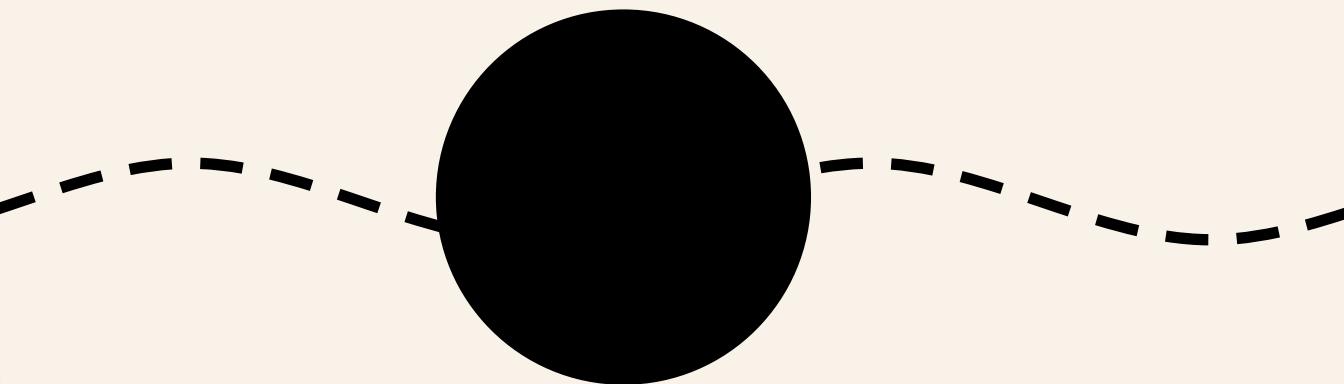
```
SELECT
    z.ZoningClassification,
    SUM(f.DemolishedUnitsPermitted) AS TotalDemolitions,
    SUM(f.NewUnitsPermitted) AS TotalNewUnits
FROM FactPermits f
JOIN ZoningDim z ON f.ZoningID = z.ZoningID
GROUP BY z.ZoningClassification
HAVING TotalDemolitions > 0
ORDER BY TotalDemolitions DESC, TotalNewUnits DESC;
```

## OUTPUT - QUESTION 4

4. Which zoning classifications have the highest number of demolitions, and how does this correlate with new units permitted in the same areas?

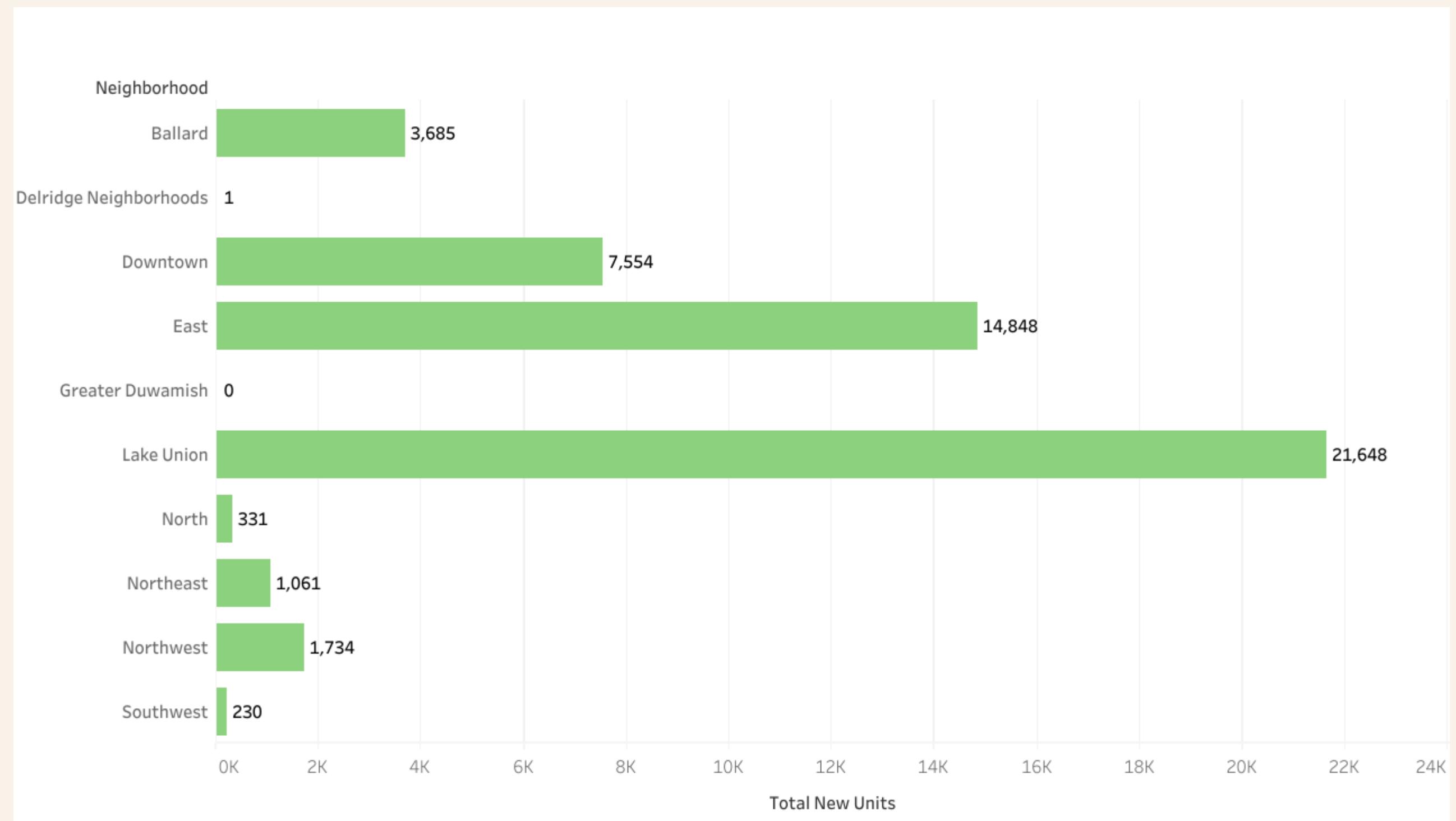
ZoningClassification	TotalDemolitions	TotalNewUnits
L	2388	21294
SF	1799	7085
UNK	814	1471
NR	487	3018
NC	477	28657
D	229	16074
MR	200	4856
HR	134	3375
C	108	6584
MIO	96	1859
MPC	59	2501
I	47	511
SM	19	12705

# VISUALIZATIONS



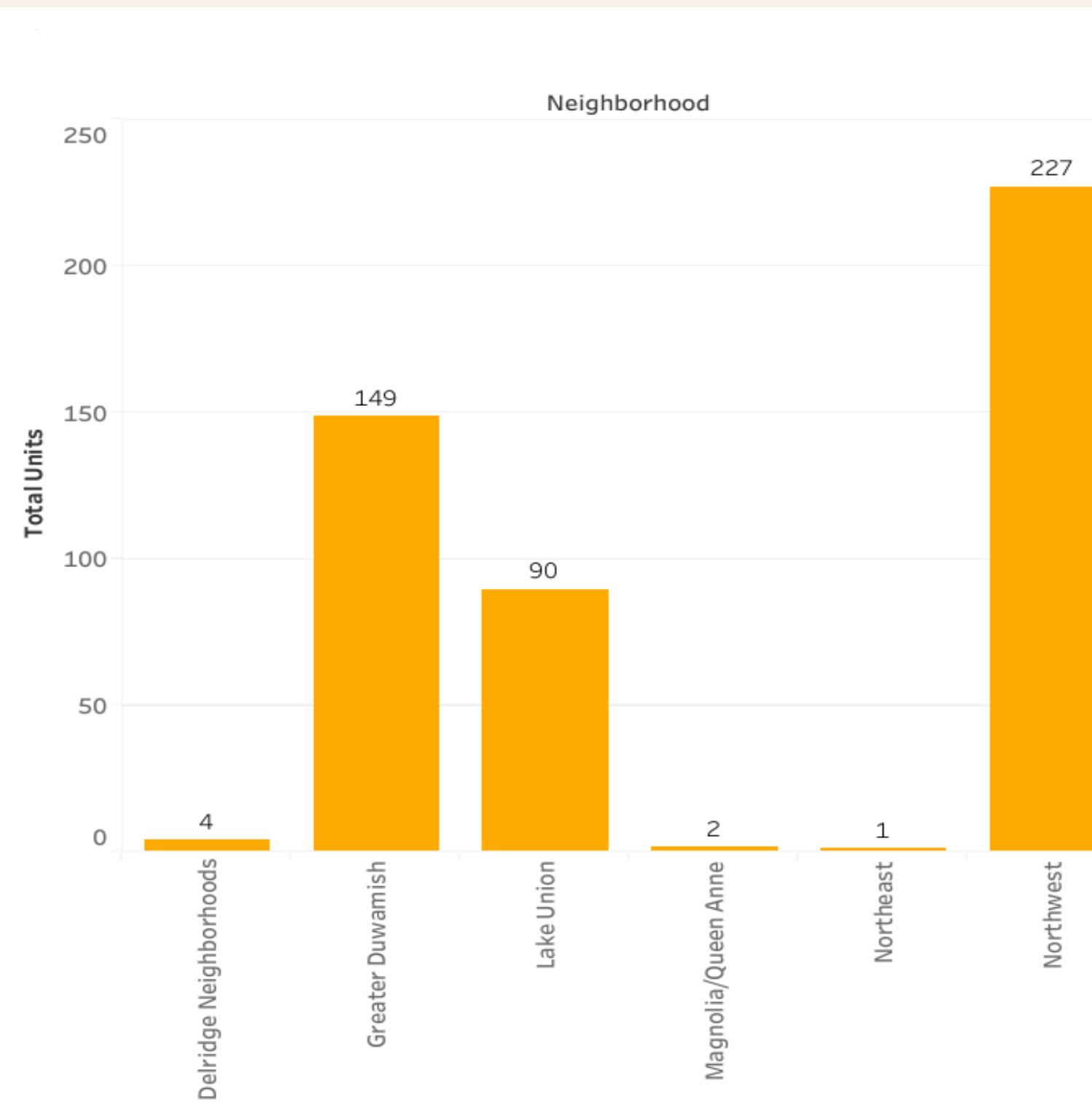
# VISUALIZATION - QUESTION 1

1. Which neighborhoods are adding the most housing units?



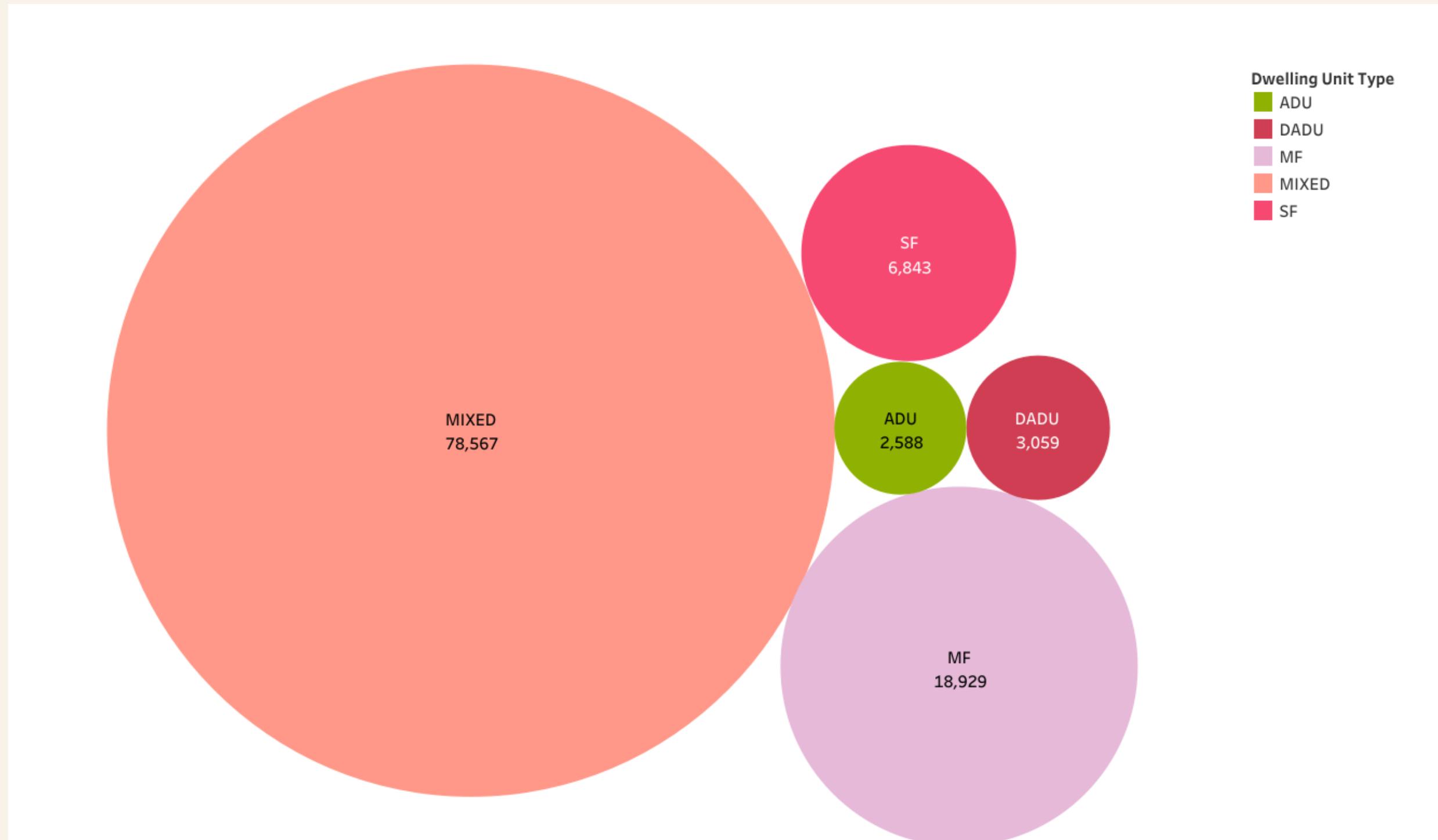
## VISUALIZATION - QUESTION 2

2. Which neighborhoods in Seattle saw the most commercial development between 2023 and 2025, based on new commercial units permitted?



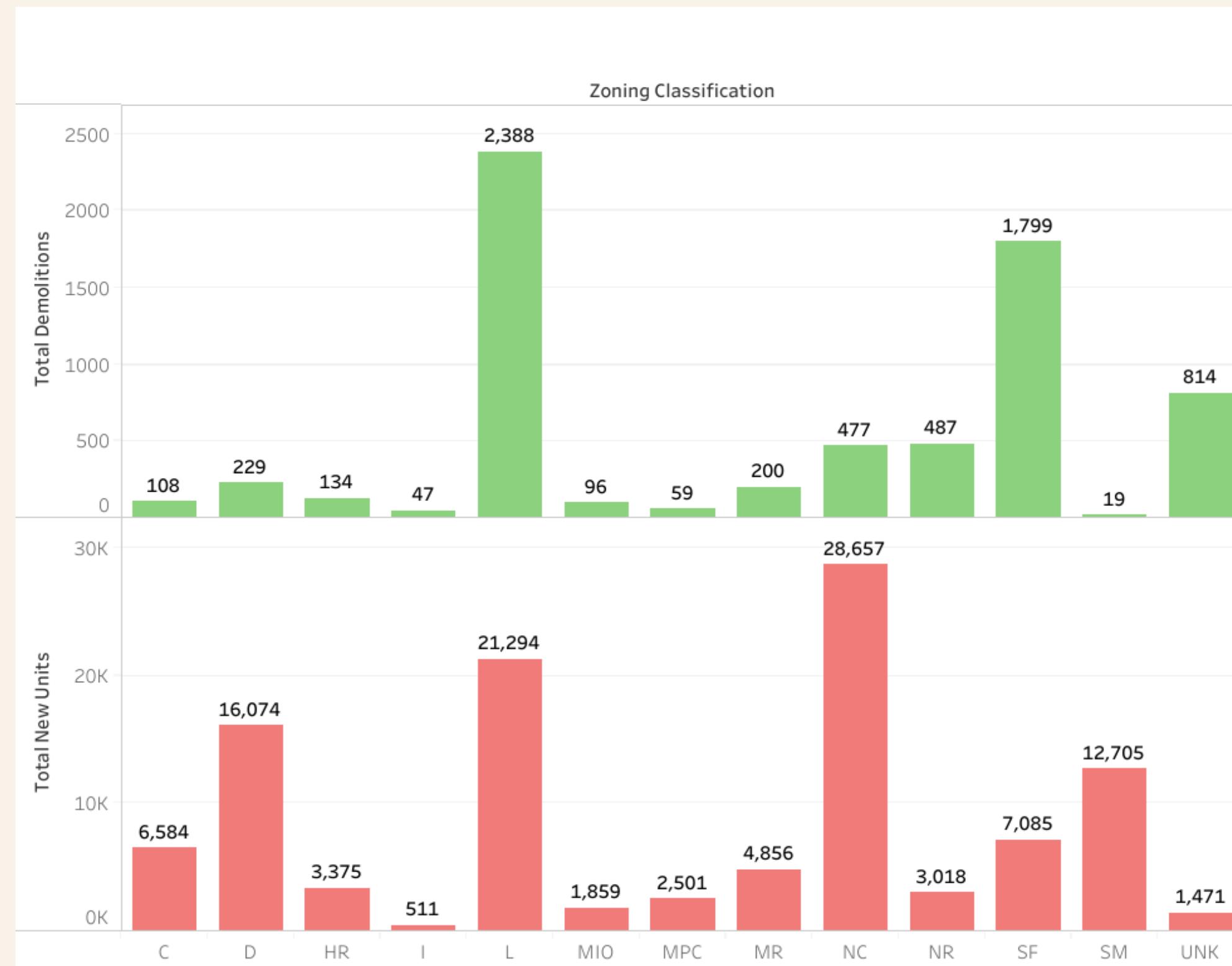
## VISUALIZATION - QUESTION 3

3. What is the distribution of new housing units by dwelling type (e.g., SF, MF, ADU)?



# VISUALIZATION - QUESTION 4

4. Which zoning classifications have the highest number of demolitions, and how does this correlate with new units permitted in the same areas?

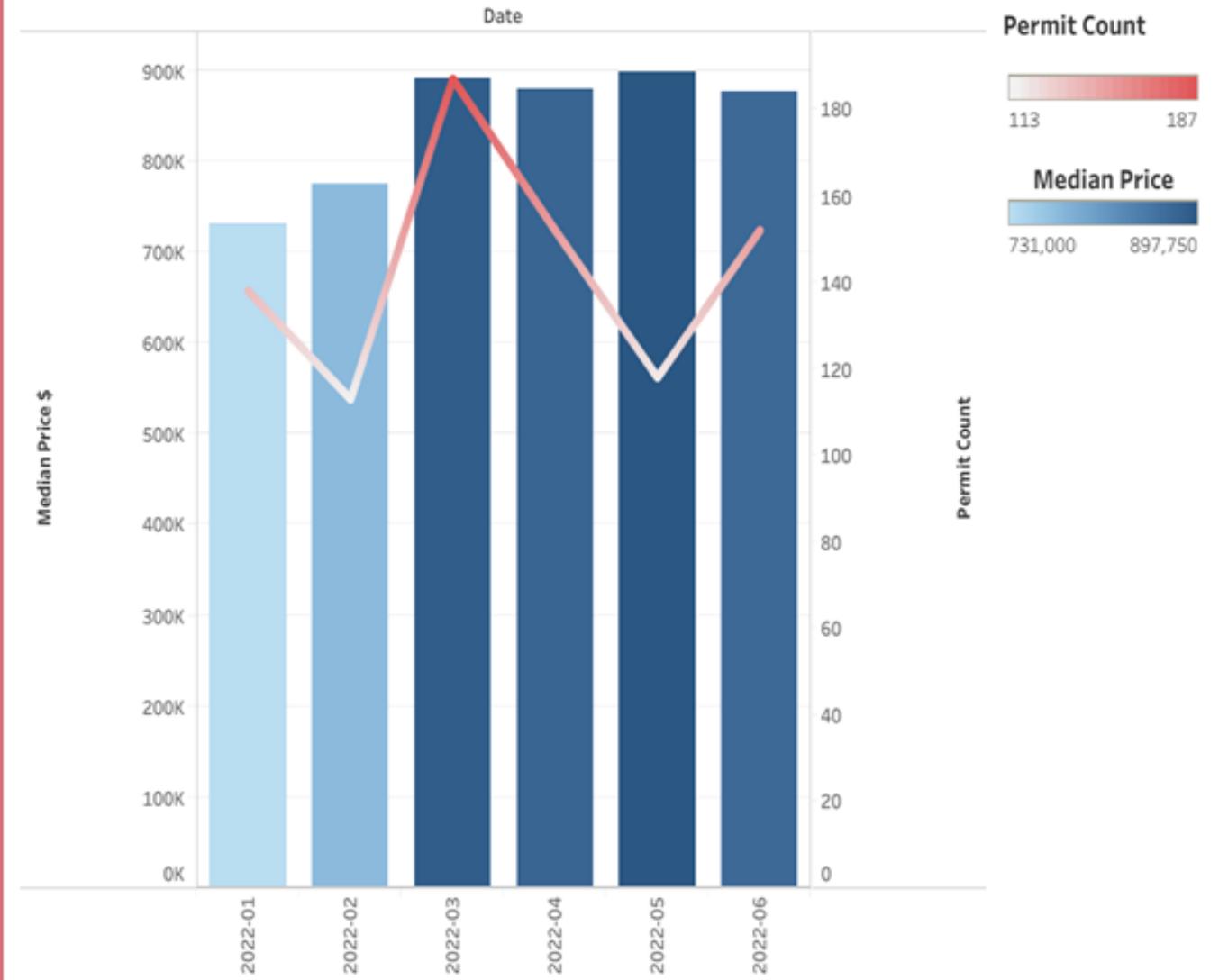


# VISUALIZATION - MARKET DYNAMICS

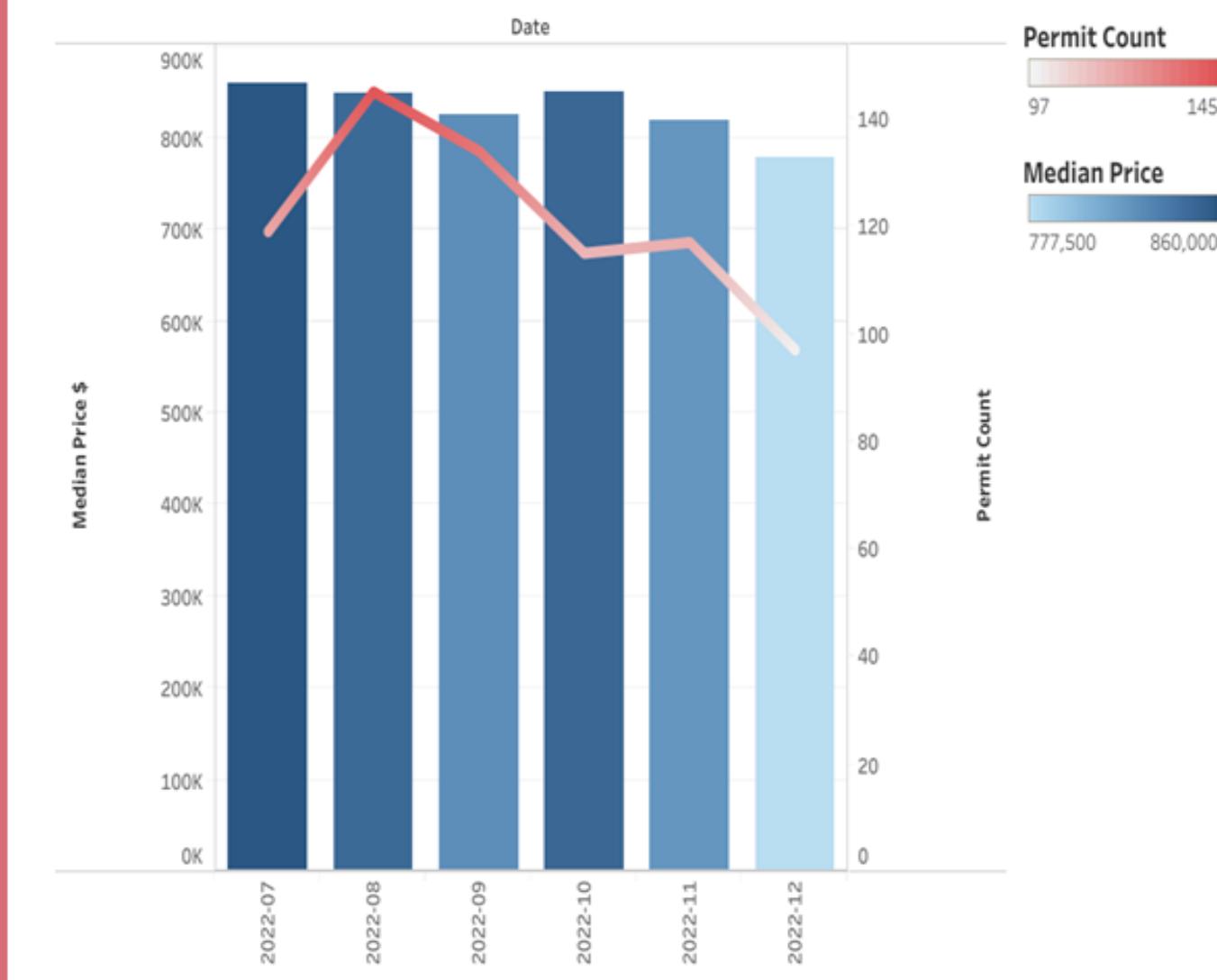
## 4. How do Seattle's residential and commercial developments shape the housing market?

### How Seattle's Residential and Commercial Development Shapes the Housing Market?

Seattle Housing Trends: Median Prices/  
Permit Counts



Seattle Housing Trends: Median Prices/  
Permit Counts





# Thank You!

