The Art and Science of Transportation Research in the AI Era

PowerBI

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Learning Goals

TECHNISCHE UNIVERSITÄT DARMSTADT

Institut für Verkehrsplanung und Verkehrstechnik TU Darmstadt

#1 Understand what is an interactive dashboard

#2 Get familiar with Power BI

#3 Be able to create a simple dashboard in Power BI

Lecture Structure

#1 Interactive Dashboards

#2 PowerBI 101

Interactive Dashboards

- **Dynamic tools** that visually represent data in a user-friendly, engaging format, allowing users to explore and analyze data **interactively.**

Why use them?

- Interactive filtering or drill-down functionality, which dynamically updates all related visualizations based on your selection.

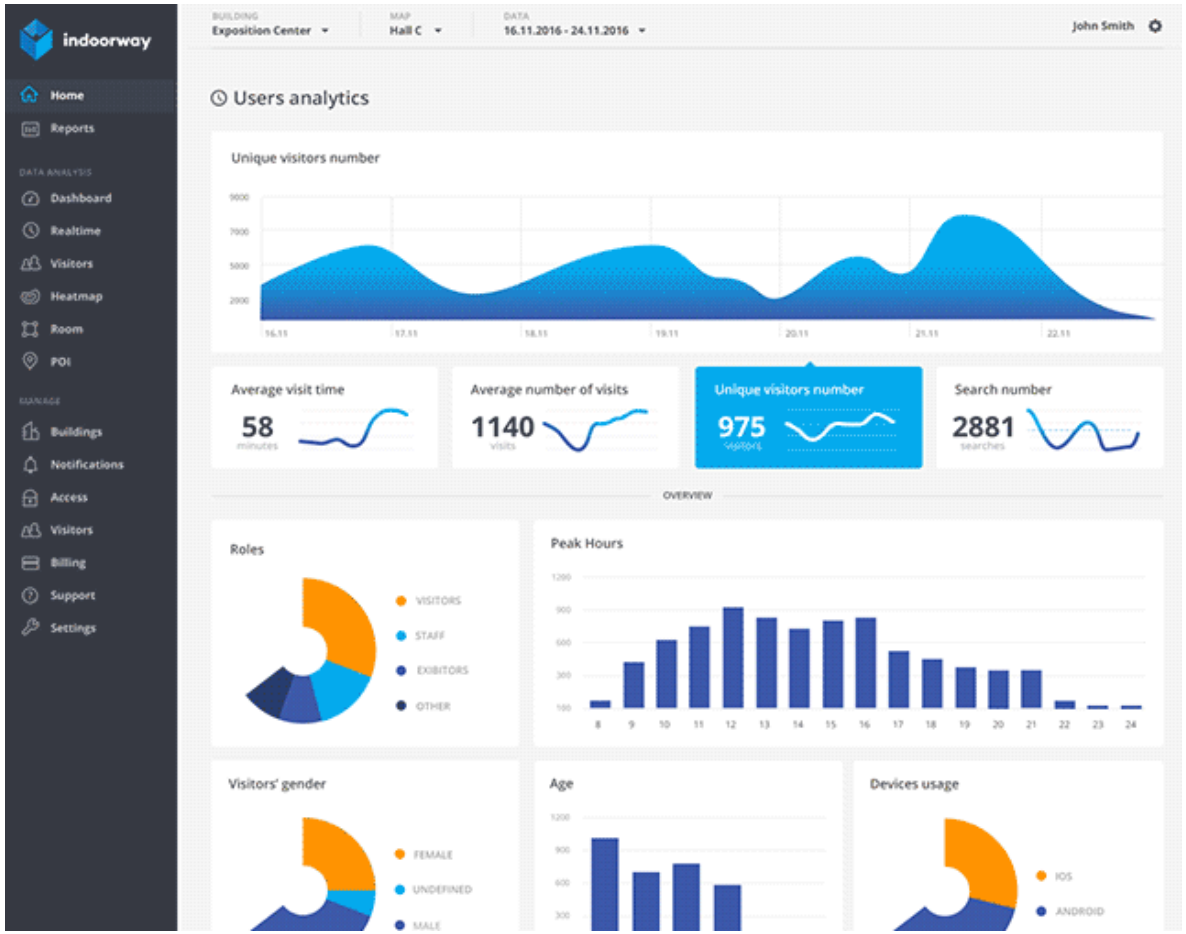
- **ETL Processes:** Extract, Transform, Load (ETL) processes clean and transform raw data into a structured format suitable for visualization.

- **Real-Time Updates:** Some dashboards support live data updates, while others use periodic refreshes.

Examples:

https://public.tableau.com/app/profile/hiba.karam/viz/CornellCarRentalAnalysis1/Dashboard

https://www.novypro.com/project/normal

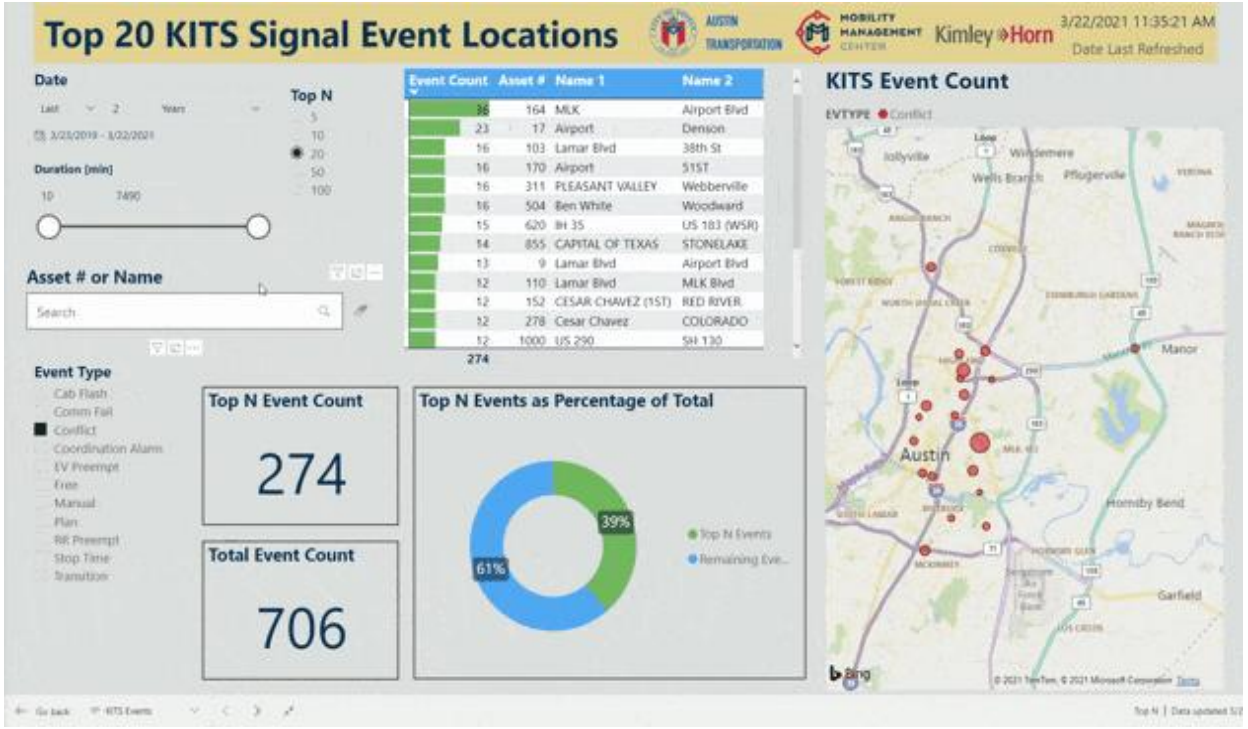


An Interactive Dashboard

Power BI

- Power BI is a **business intelligence** (BI) and **data visualization tool** developed by Microsoft that allows users to connect to various data sources, analyze data, and create interactive dashboards and reports.

- Visualize traffic volumes using line charts, heatmaps, or geographic maps.
- Monitor peak traffic hours and bottlenecks using dashboards.
- Track metrics like on-time performance, passenger counts, and route efficiency.
- Monitor warehouse-to-delivery route efficiency and identify cost-saving opportunities.
- Visualize accident hotspots on a map using geospatial data.



KITS Signal Events: A breakdown of signal events by categories (e.g., alarms, conflicts).
Traffic Engineer

Student Research

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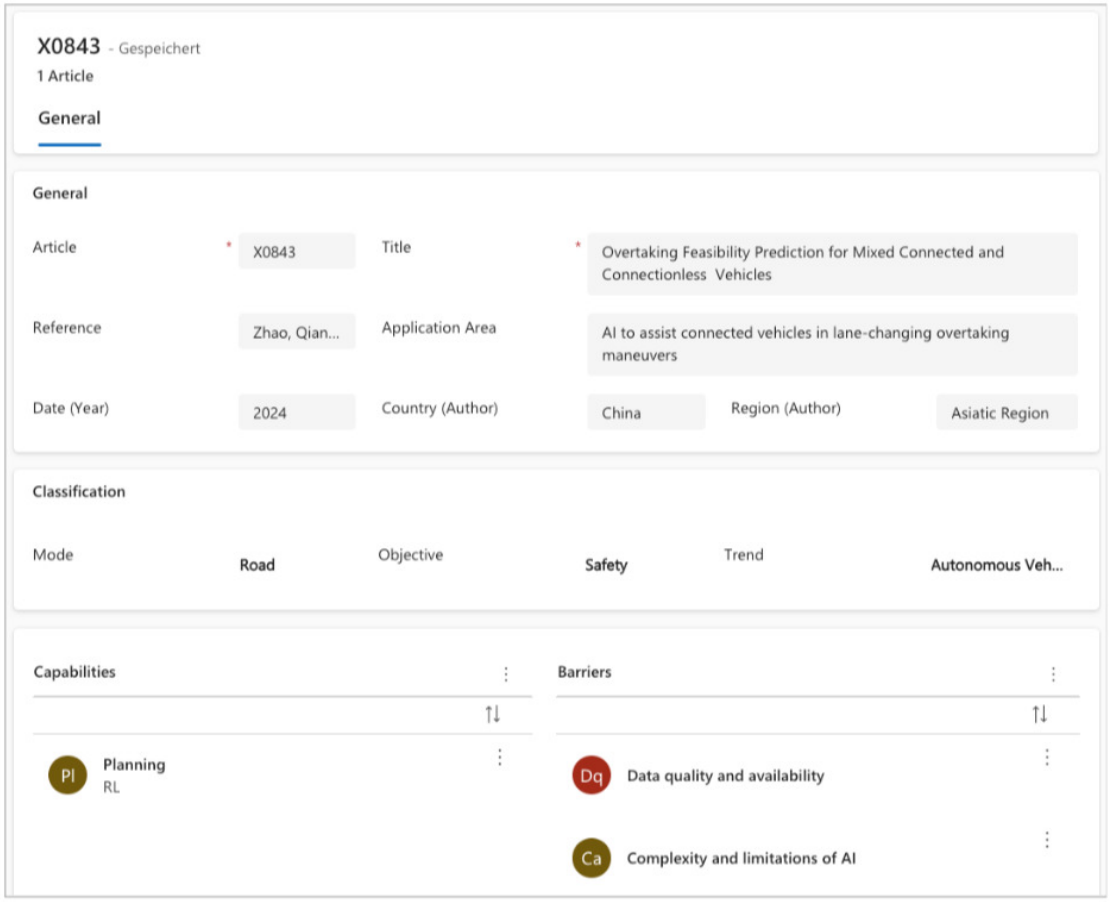
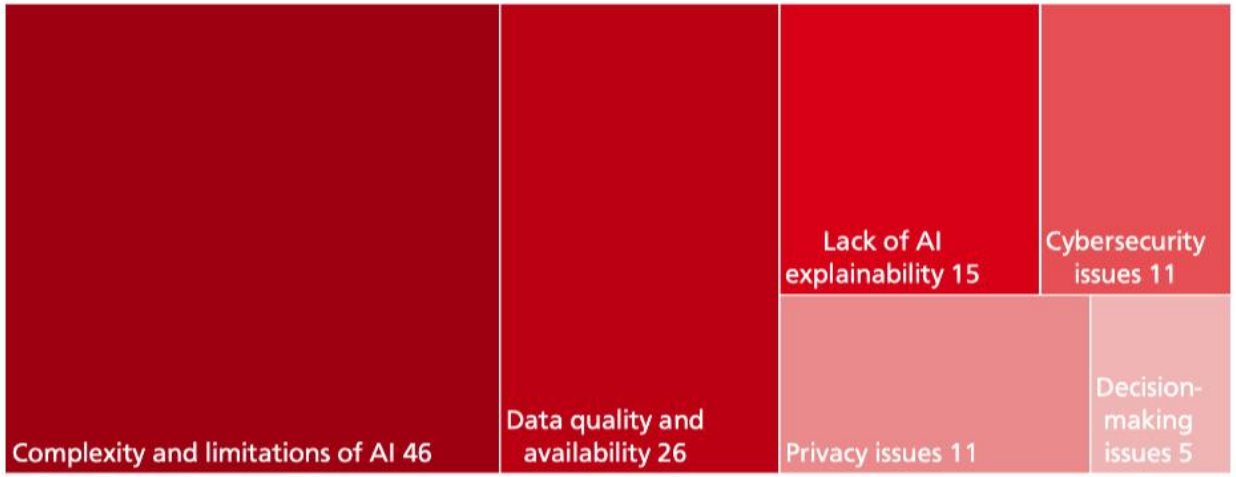


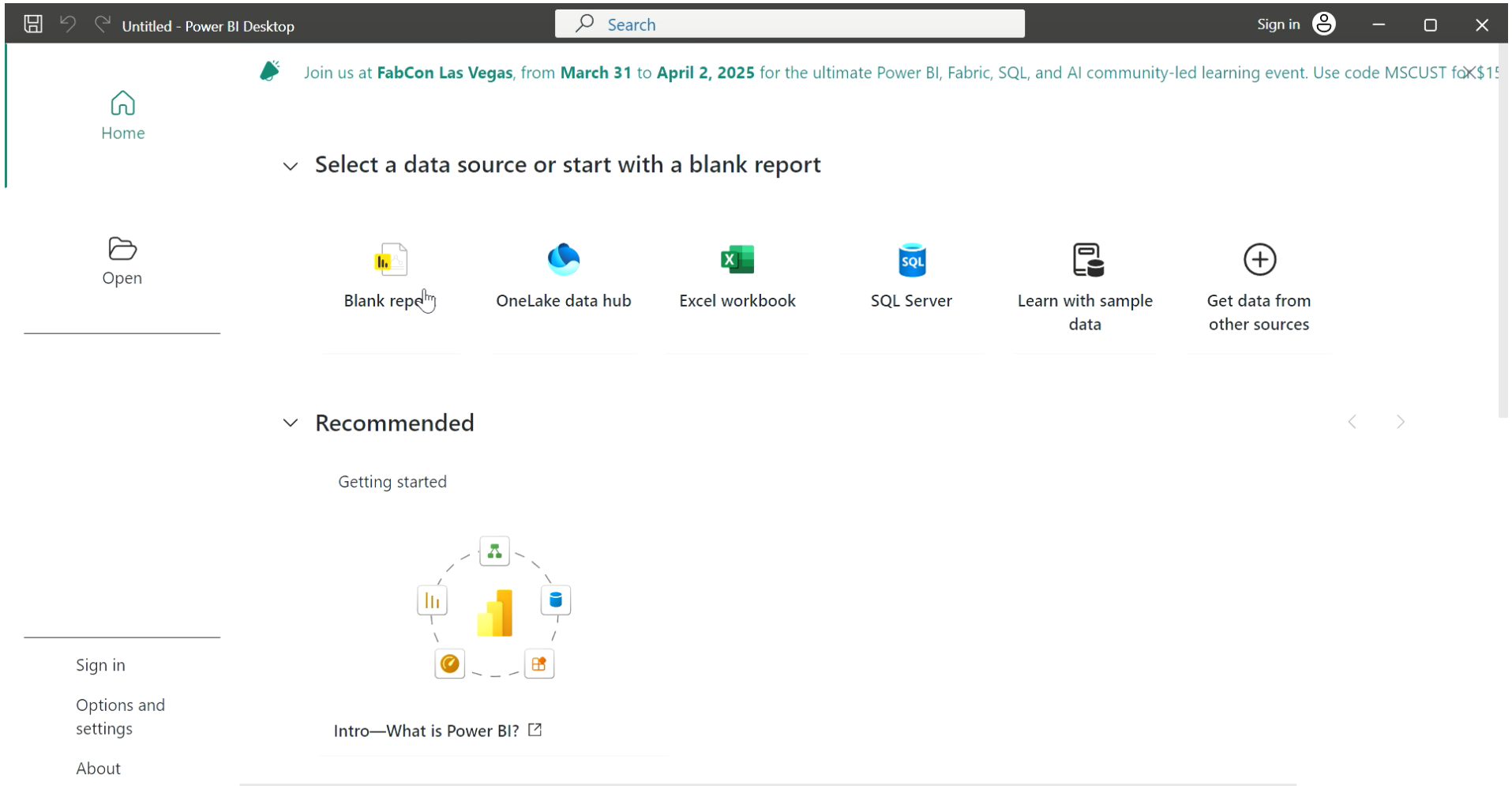
Microsoft Power Apps

Integrating Artificial Intelligence in Transportation: Challenges, and Strategic Solution



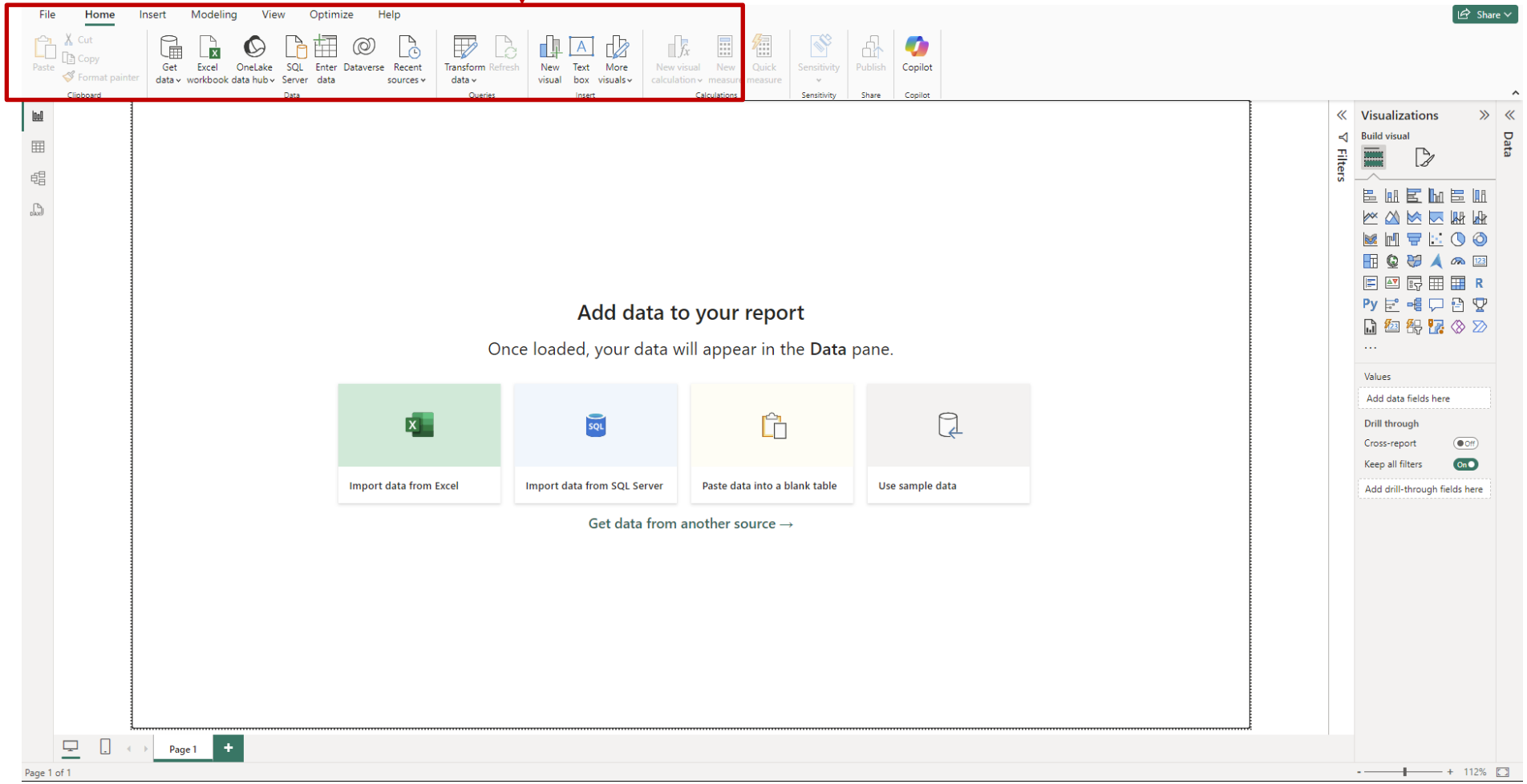
Microsoft Power BI

Loading a Dataset

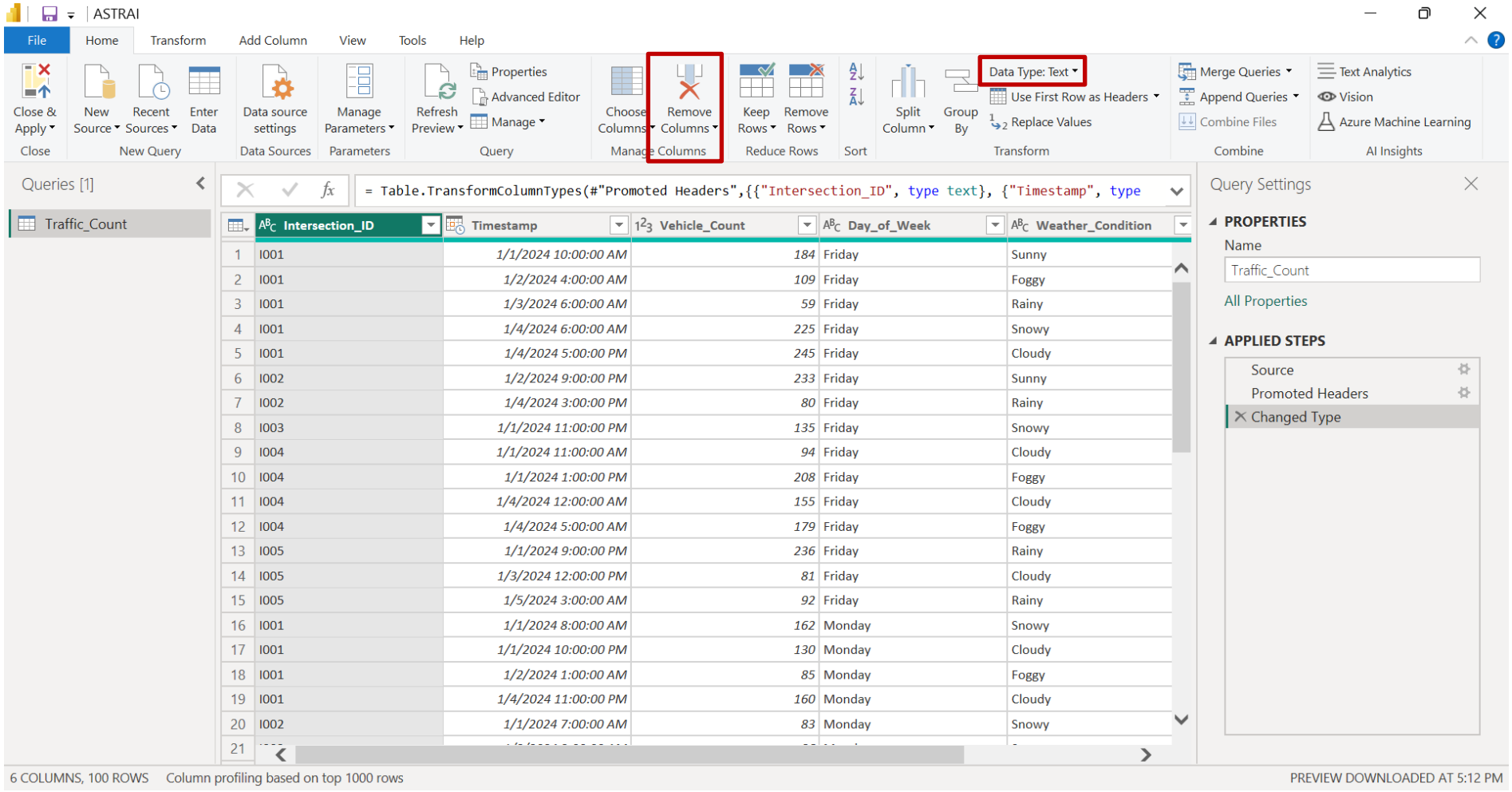


Interface

Ribbon



Interface



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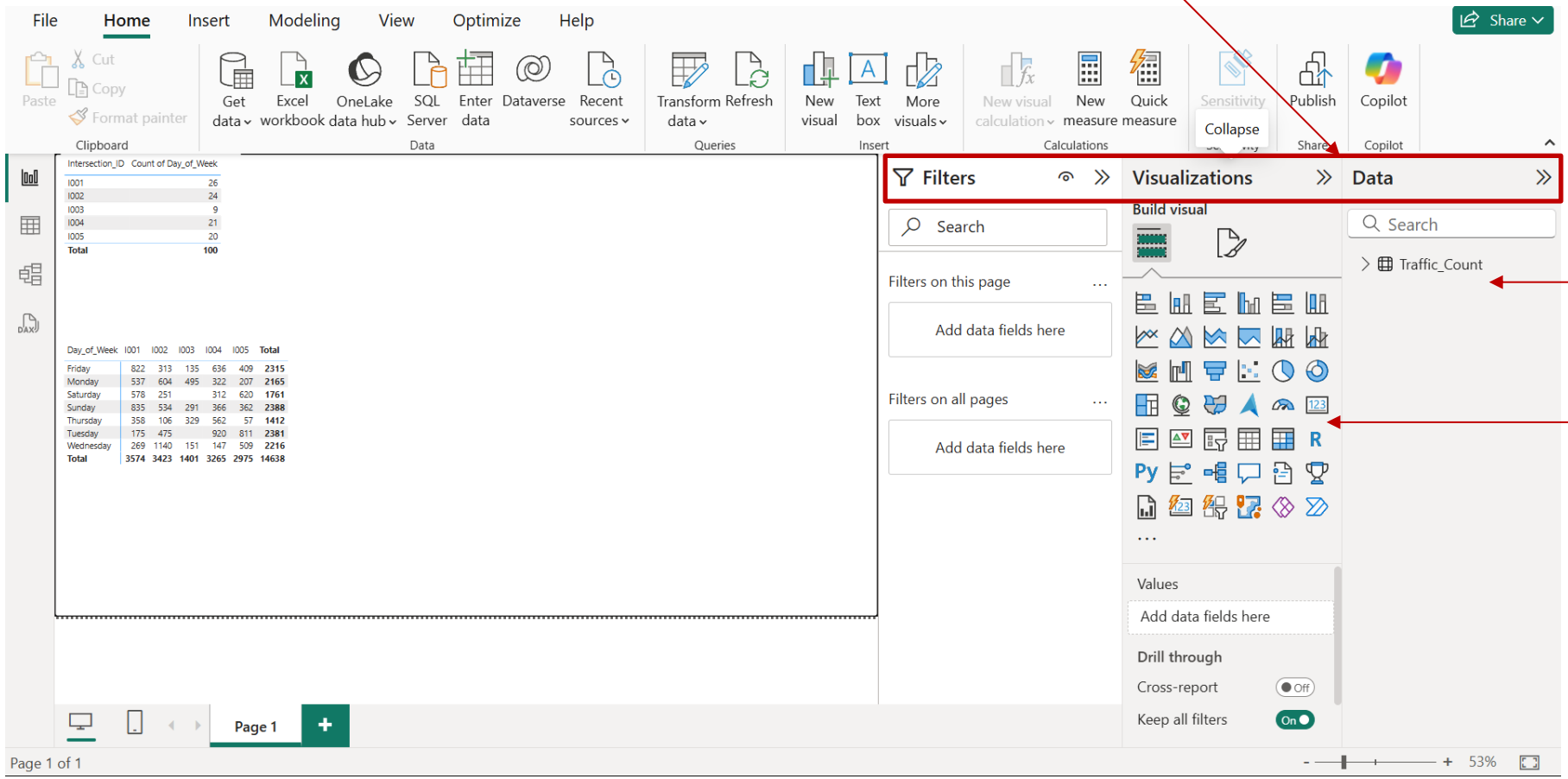
2	I001	1/2/2024 4:00:00 AM	109	Friday	Foggy
3	I001	1/3/2024 6:00:00 AM	59	Friday	Rainy
4	I001	1/4/2024 6:00:00 AM	225	Friday	Snowy
5	I001	1/4/2024 5:00:00 PM	245	Friday	Cloudy
6	I002	1/2/2024 9:00:00 PM	233	Friday	Sunny
7	I002	1/4/2024 3:00:00 PM	80	Friday	Rainy
8	I003	1/1/2024 11:00:00 PM	135	Friday	Snowy
9	I004	1/1/2024 11:00:00 AM	94	Friday	Cloudy
10	I004	1/1/2024 1:00:00 PM	208	Friday	Foggy
11	I004	1/4/2024 12:00:00 AM	155	Friday	Cloudy
12	I004	1/4/2024 5:00:00 AM	179	Friday	Foggy
13	I005	1/1/2024 9:00:00 PM	236	Friday	Rainy
14	I005	1/3/2024 12:00:00 PM	81	Friday	Cloudy
15	I005	1/5/2024 3:00:00 AM	92	Friday	Rainy
16	I001	1/1/2024 8:00:00 AM	162	Monday	Snowy
17	I001	1/1/2024 10:00:00 PM	130	Monday	Cloudy
18	I001	1/2/2024 1:00:00 AM	85	Monday	Foggy
19	I001	1/4/2024 11:00:00 PM	160	Monday	Cloudy
20	I002	1/1/2024 7:00:00 AM	83	Monday	Snowy
21					

Interface

You can expand and collapse the **Filters**, **Visualizations**, and **Data** panes by selecting the arrows at the tops of the panes. Collapsing the panes provides more space on the canvas.



Displays the fields (columns) from your dataset. You can drag and drop fields onto visualizations.

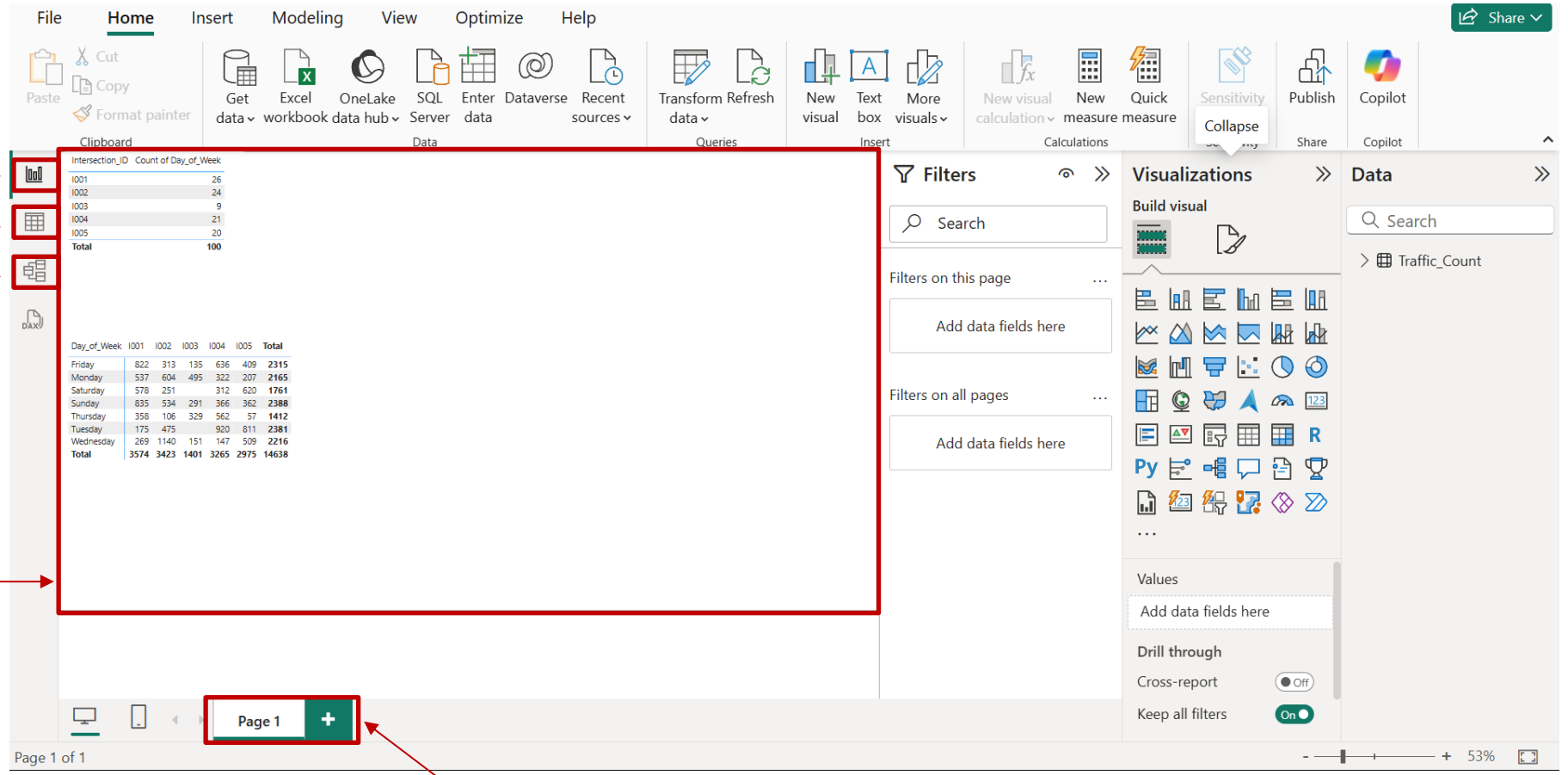
Helps you add visual to your dashboard and format it.

Interface

Report View: is the default view

Data View: shows your data

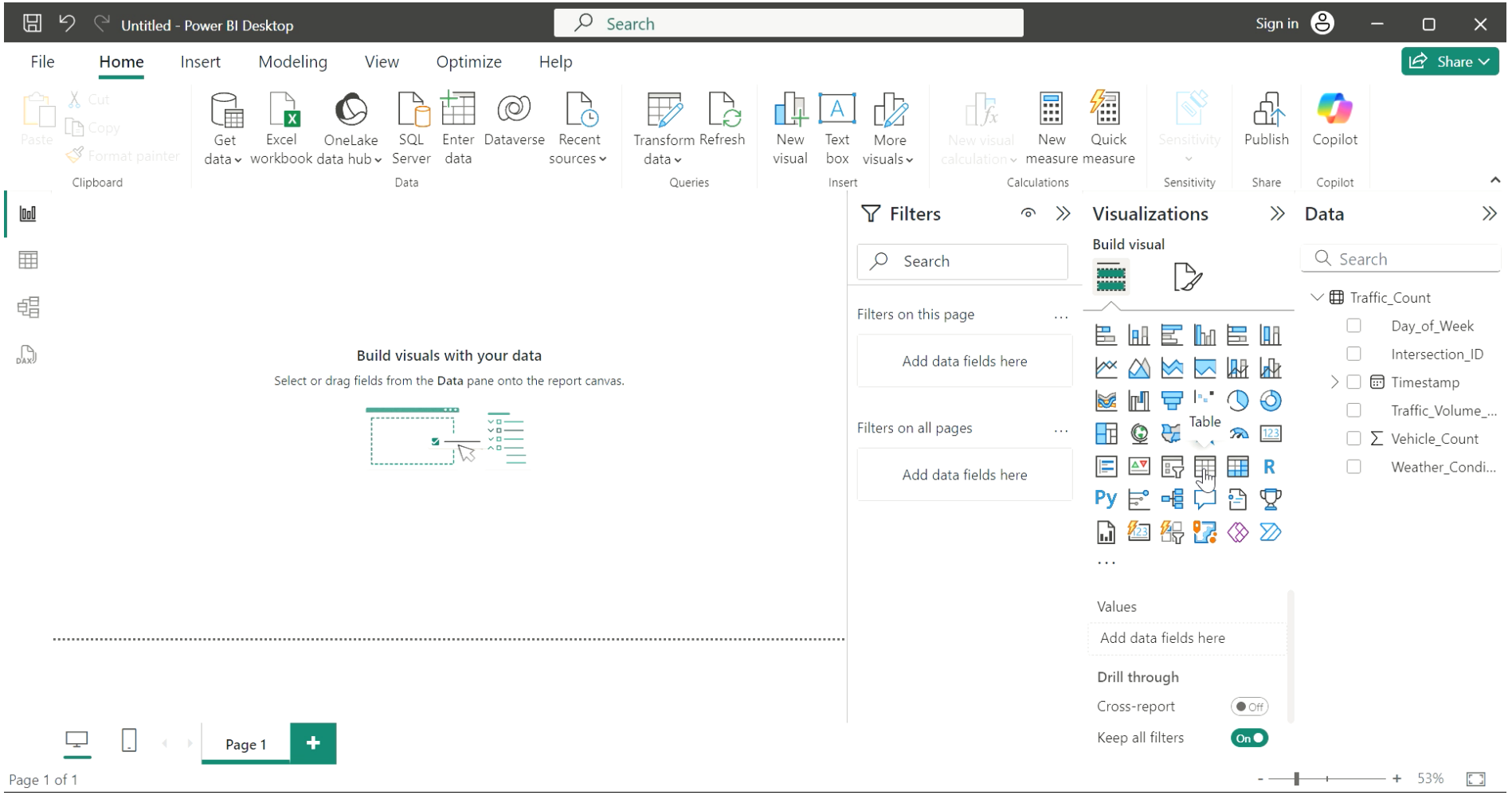
Model View: Build relationships in data



Dashboard Canvas / Workspace

The pages tab area at the bottom, which lets you select or add report pages.

Table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Build visuals with your data
Select or drag fields from the Data pane onto the report canvas.
Filters
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Filters on this page
Add data fields here
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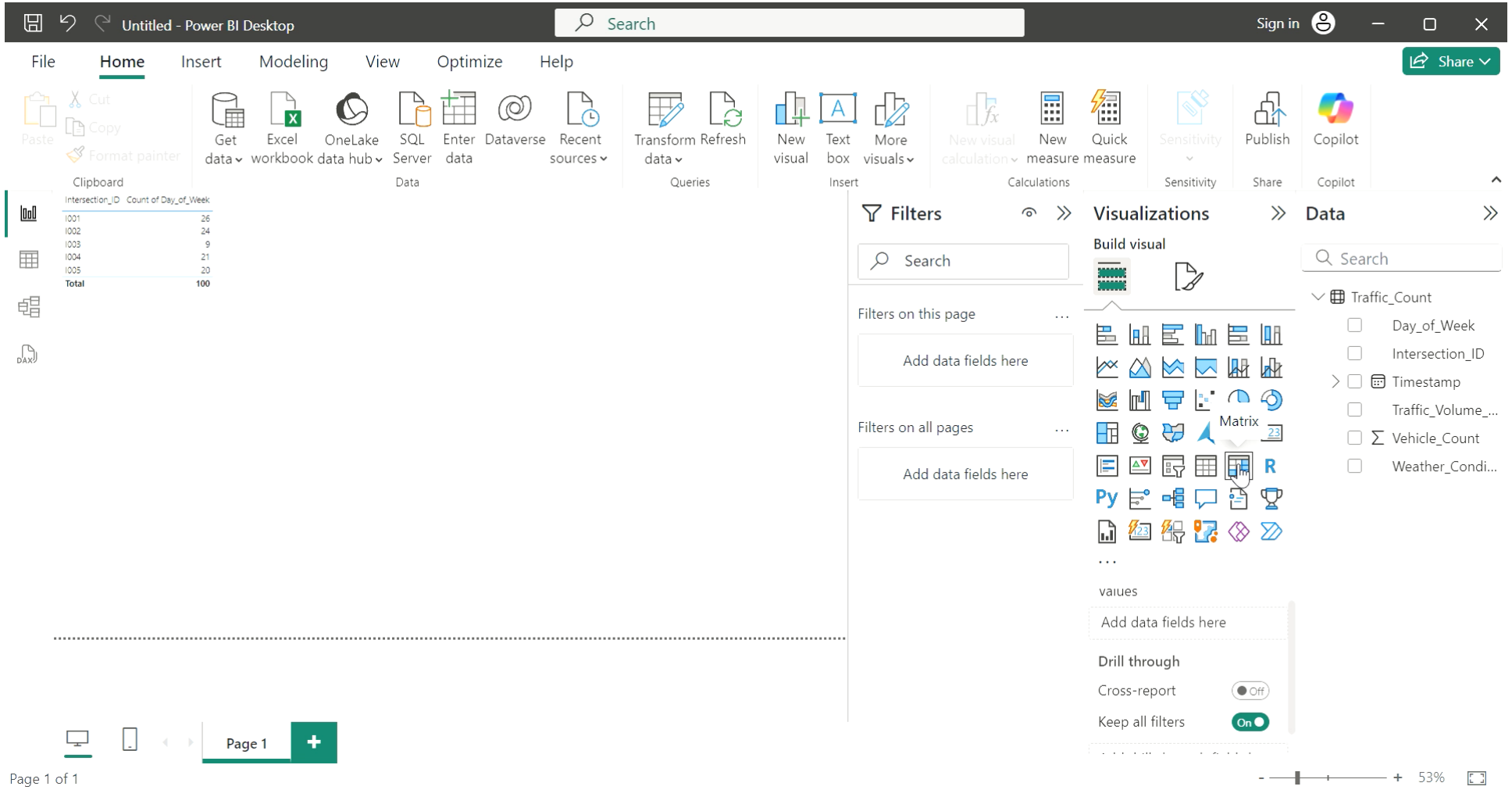
Matrix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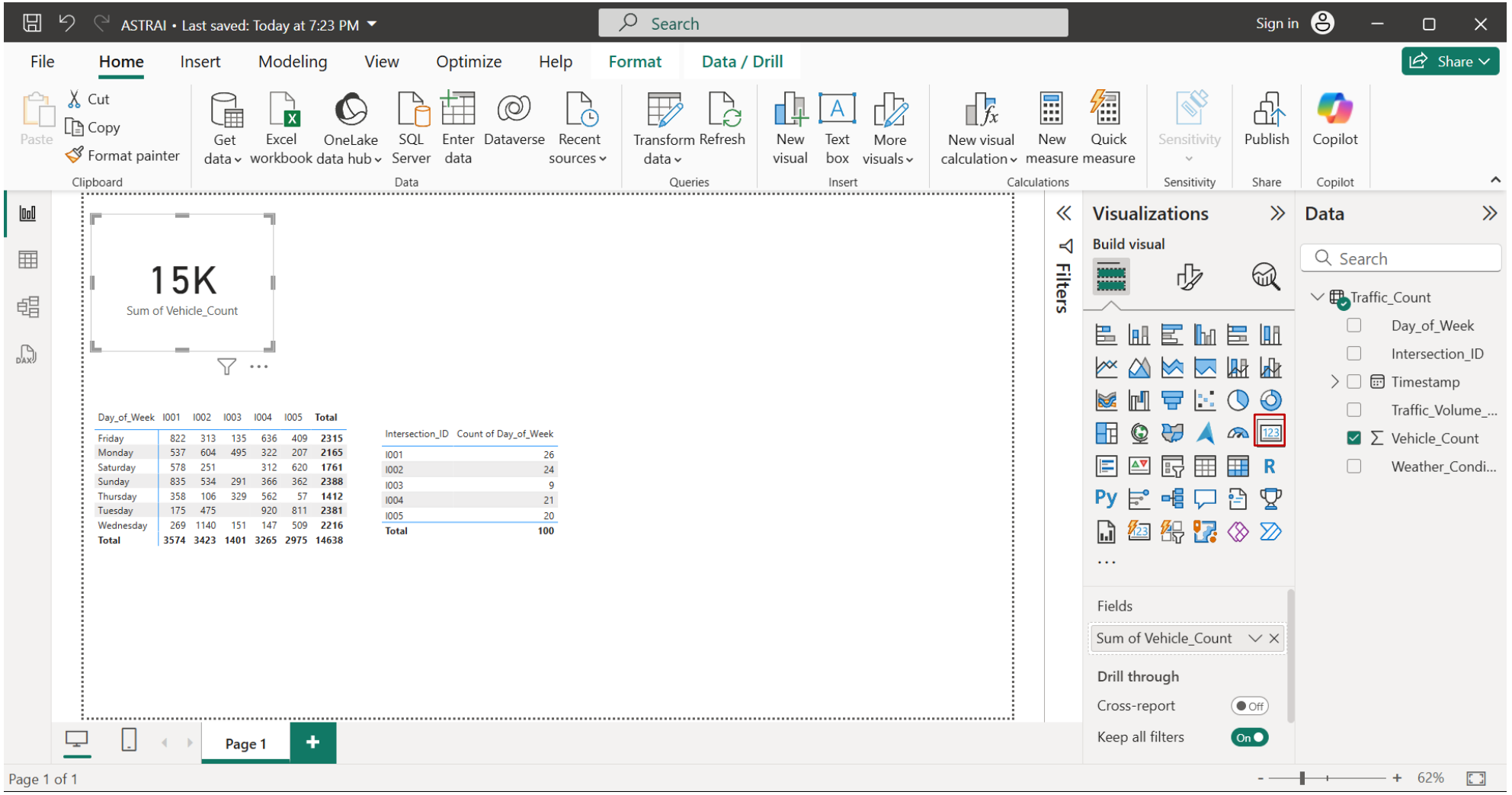
Card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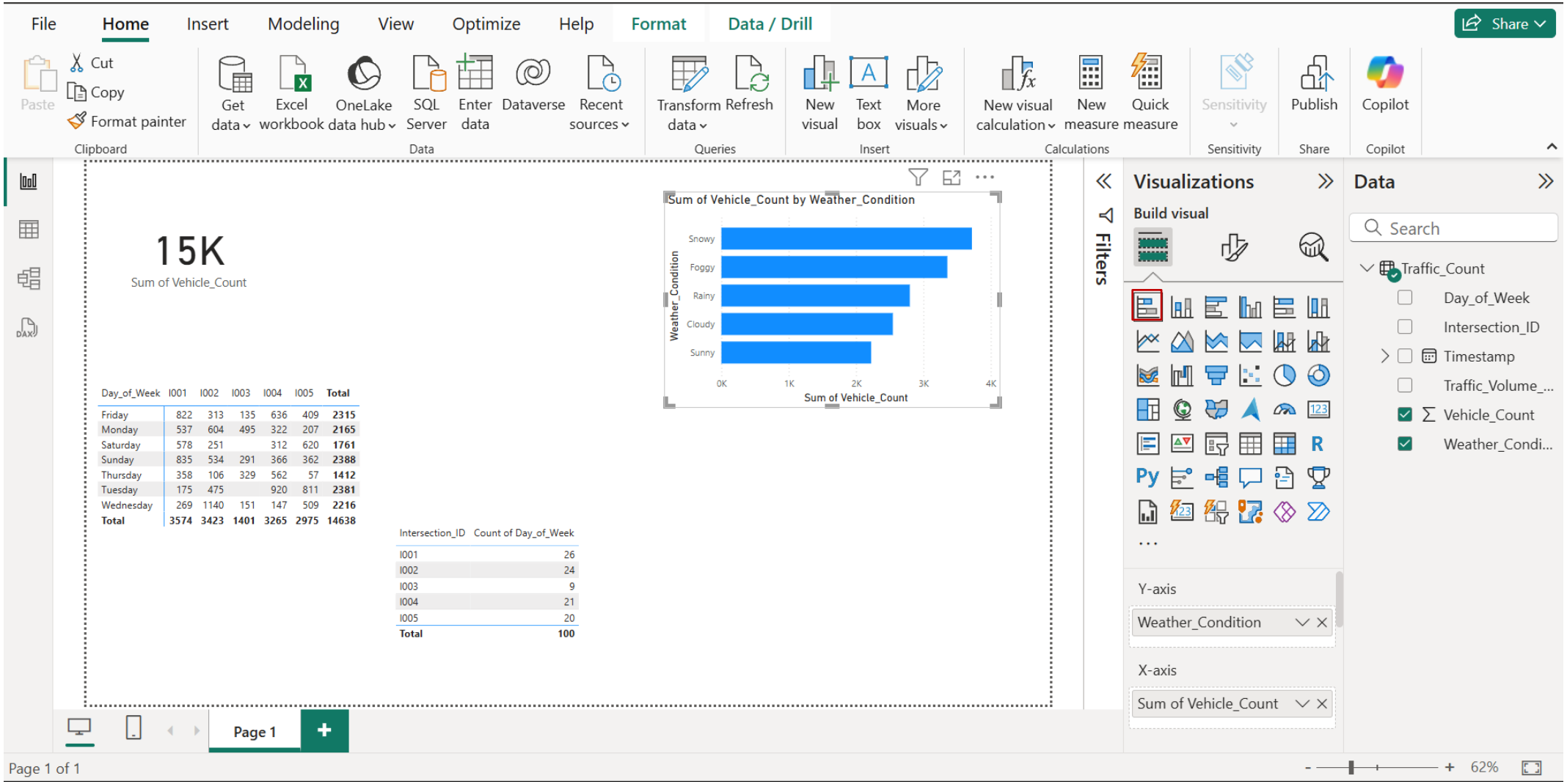
Stacked Bar Chart



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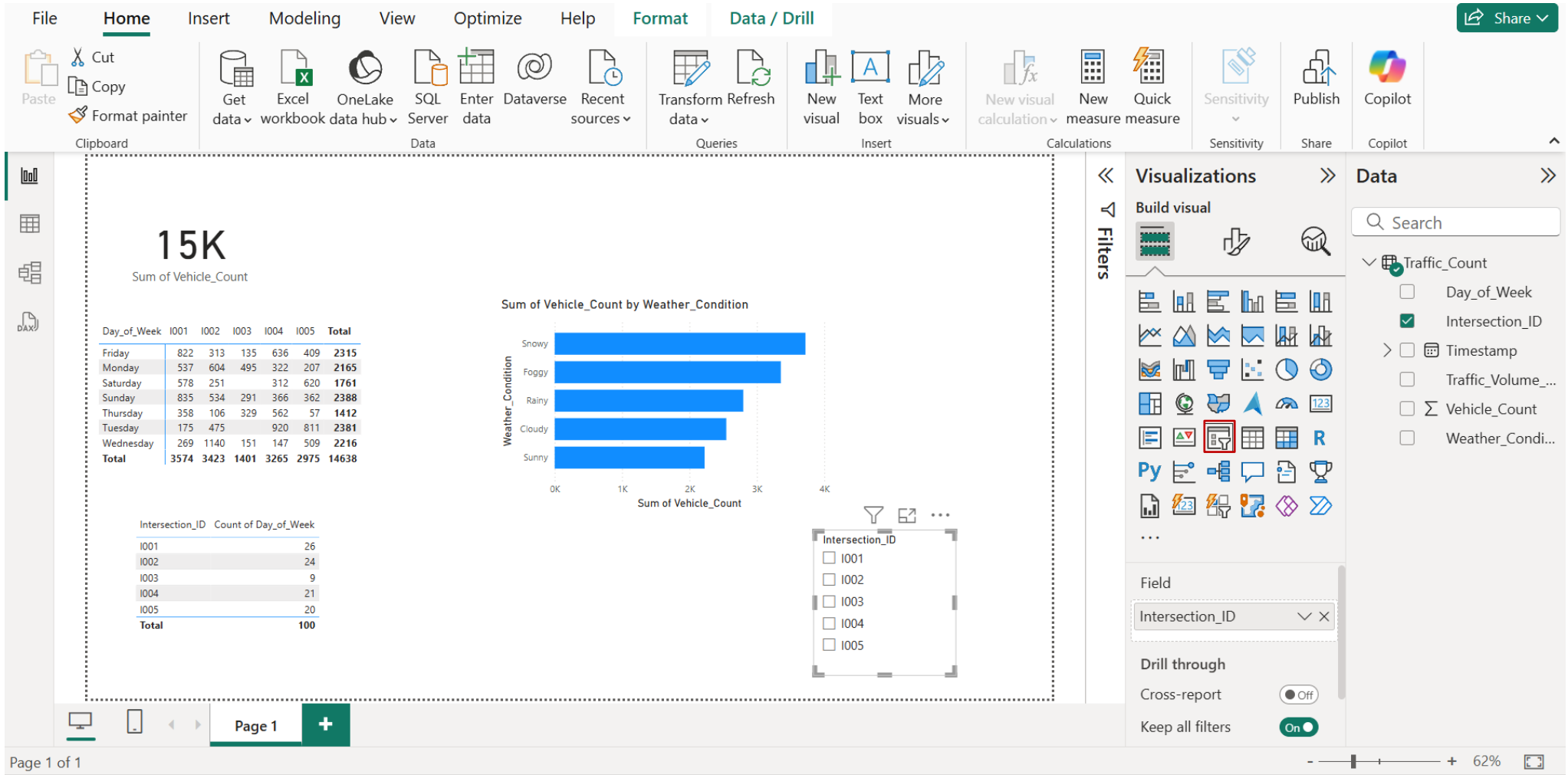
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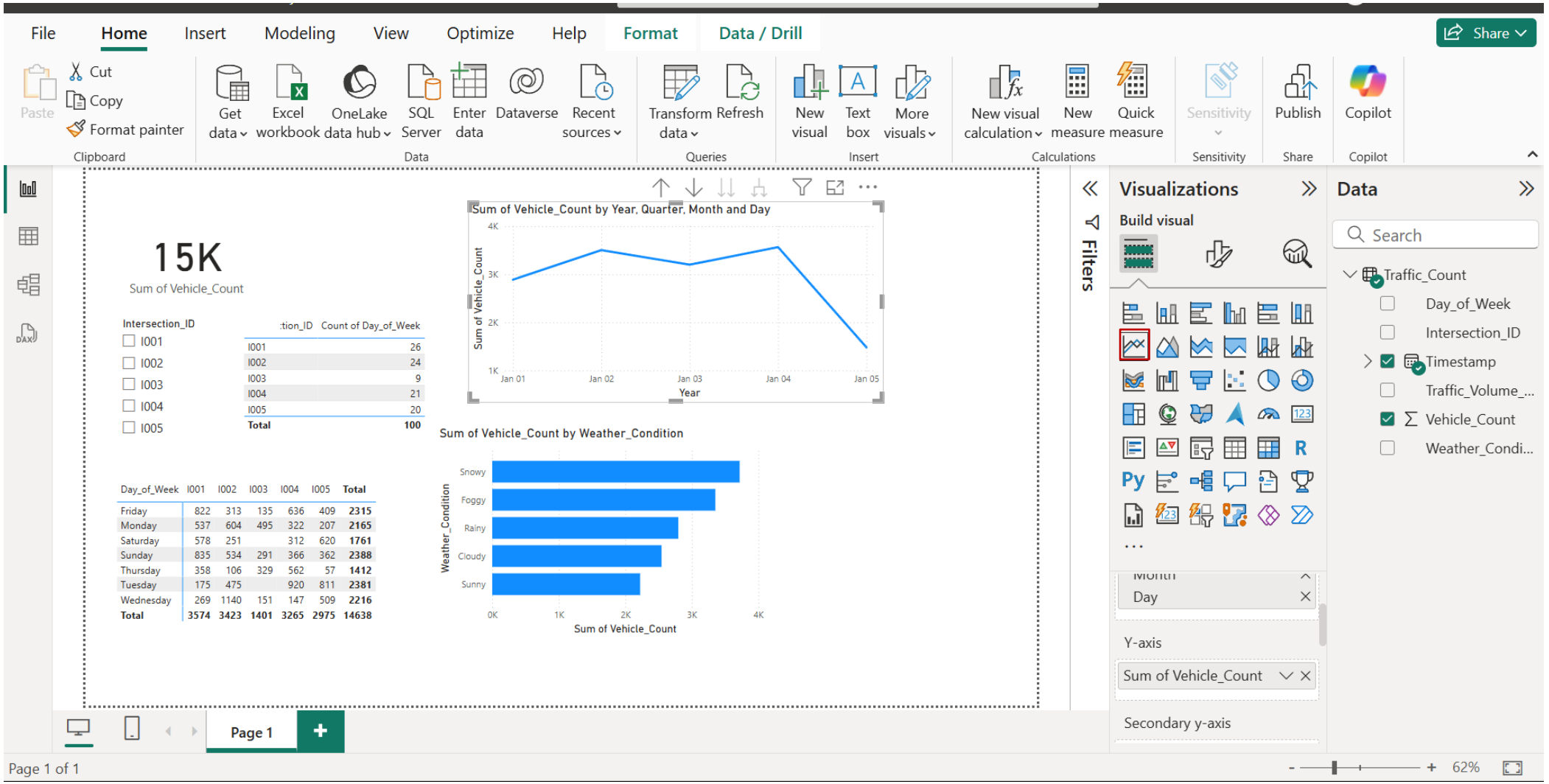
Line Chart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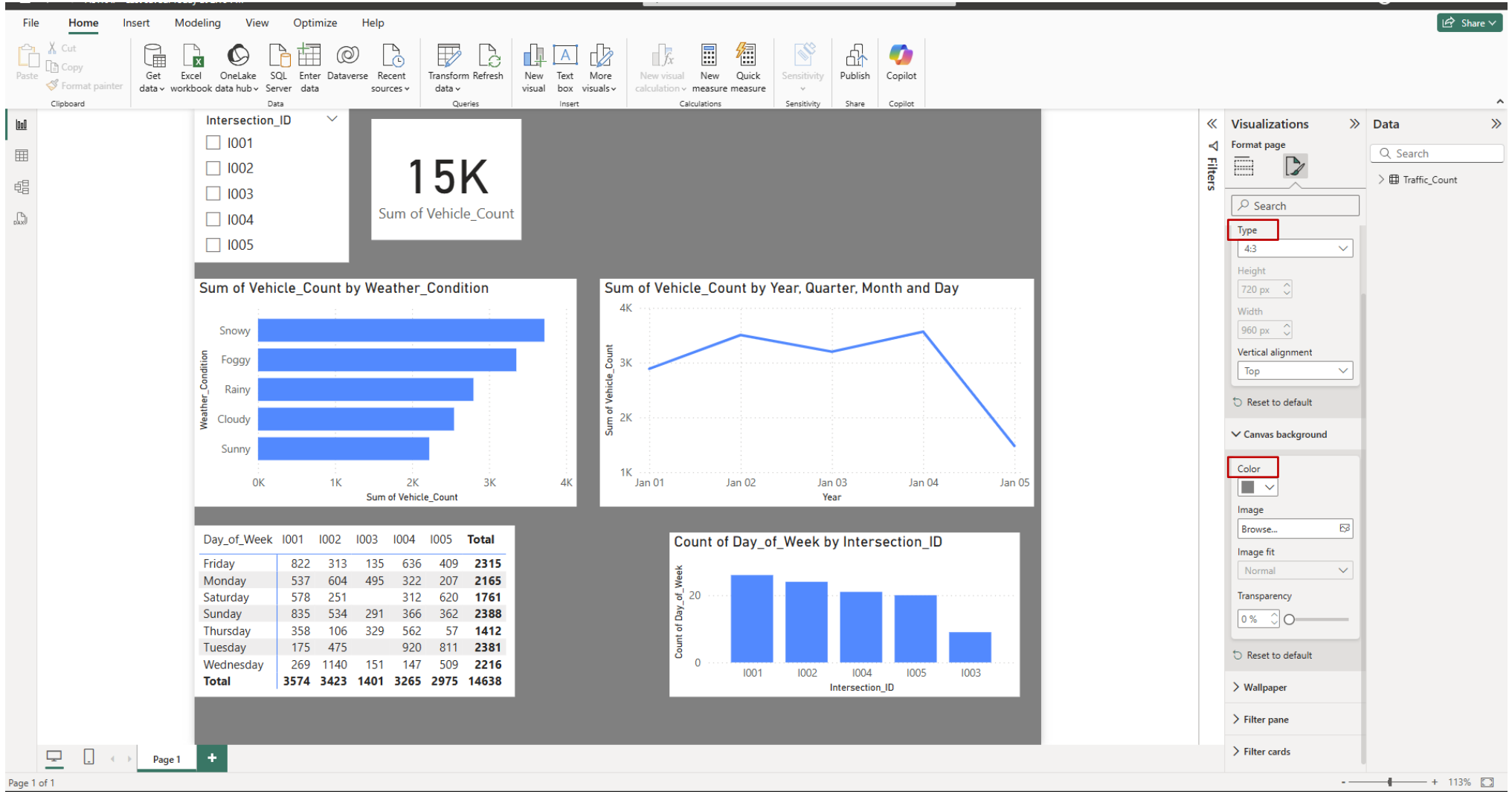
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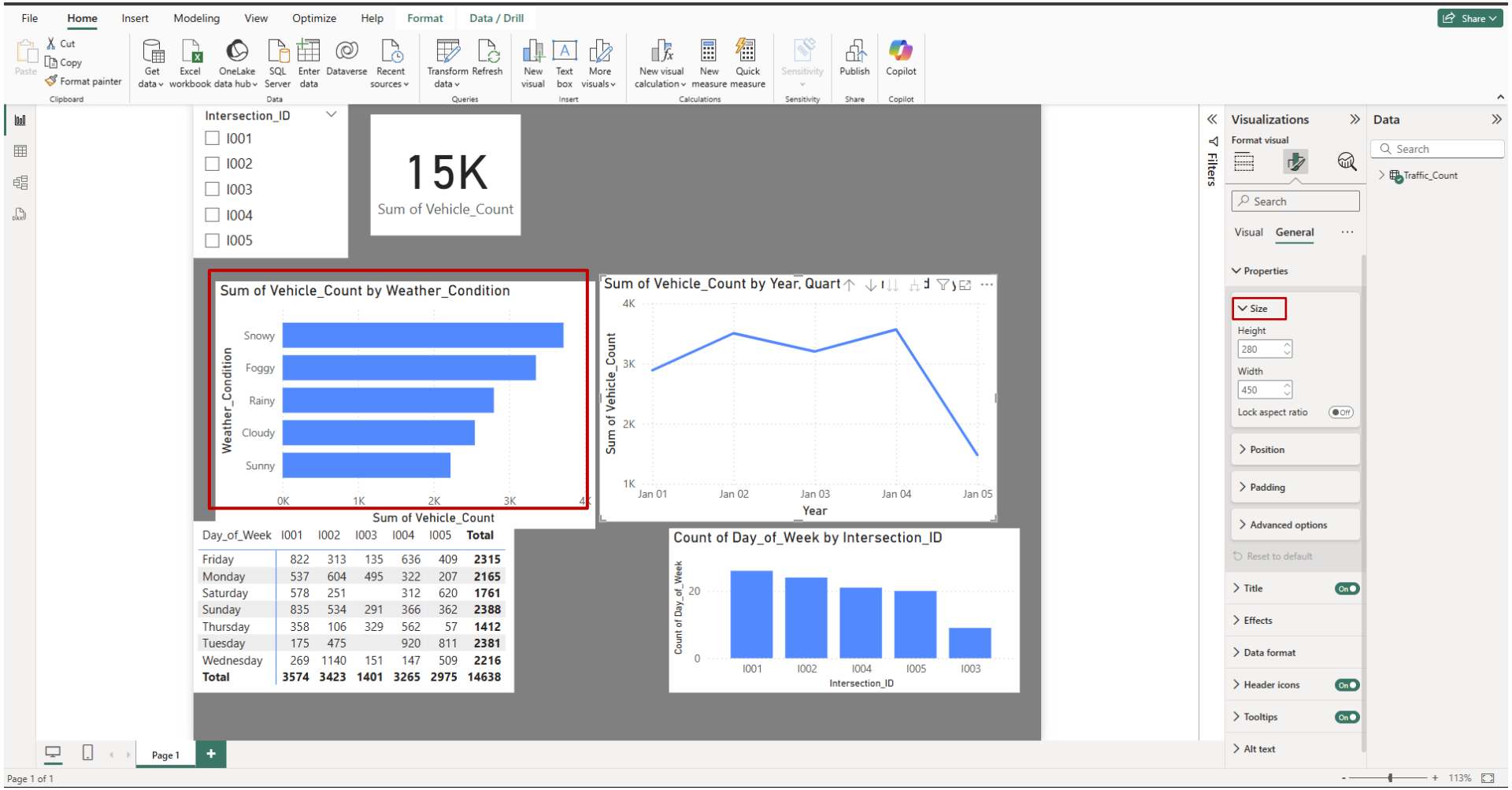
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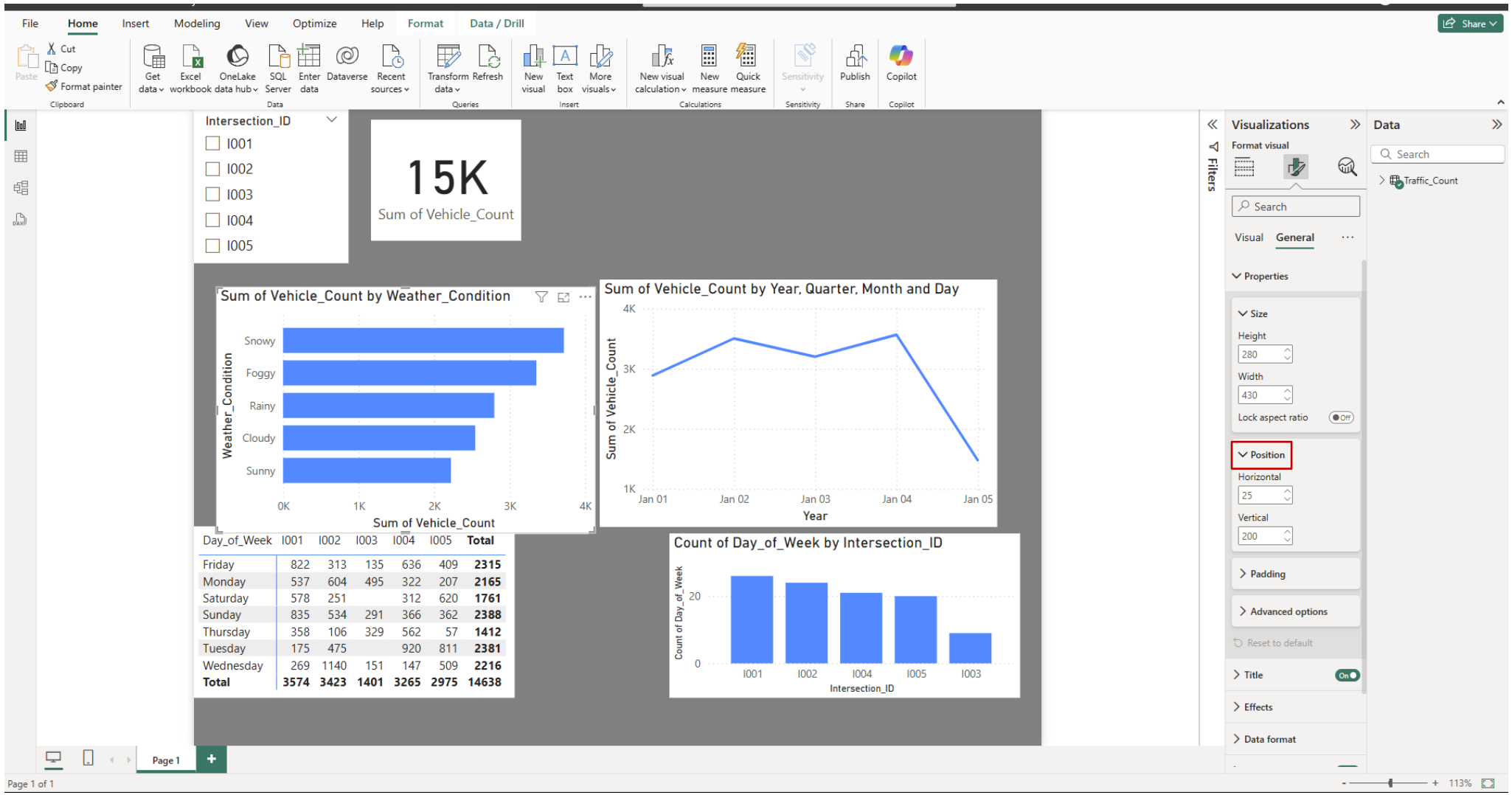
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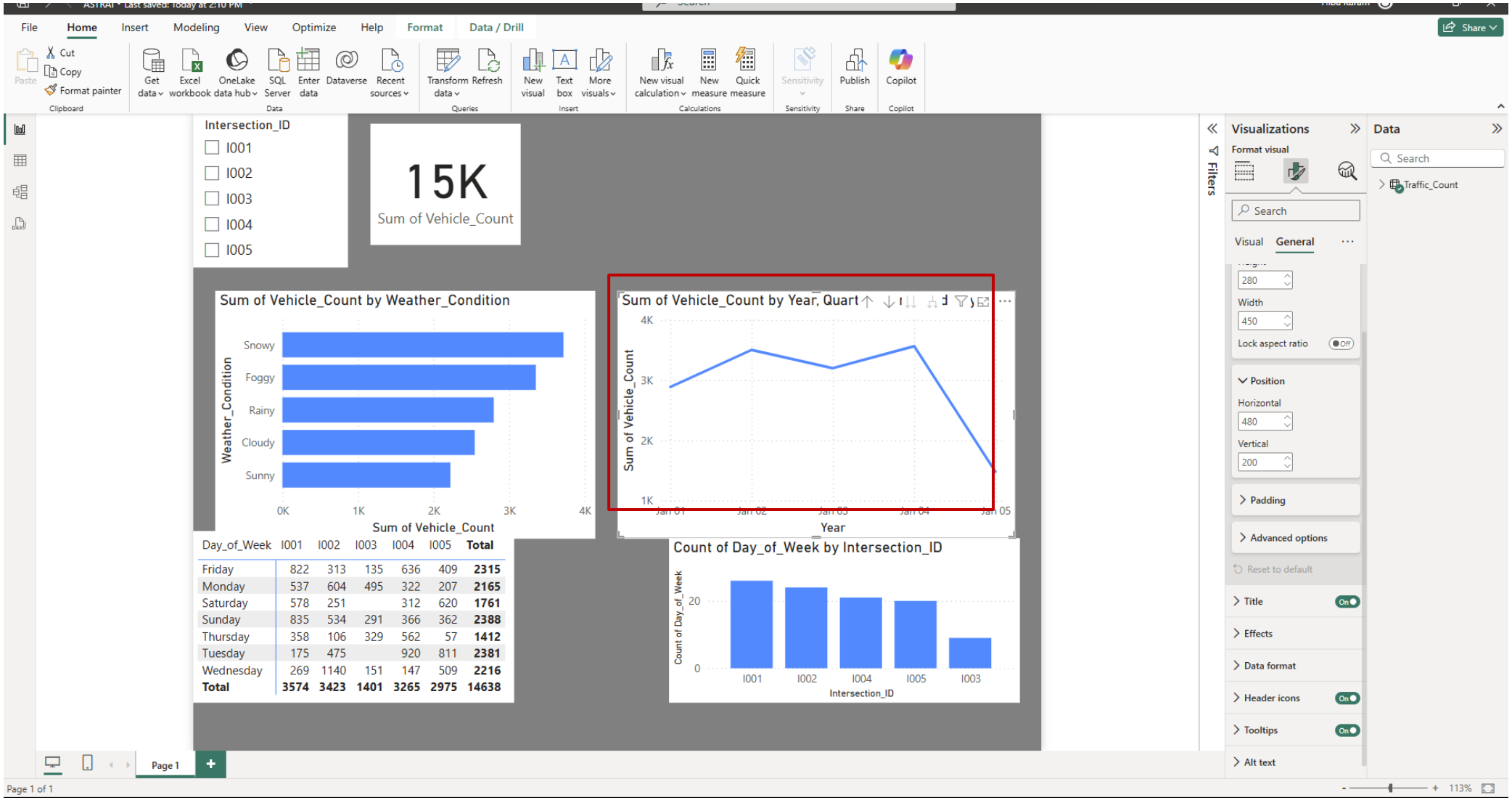
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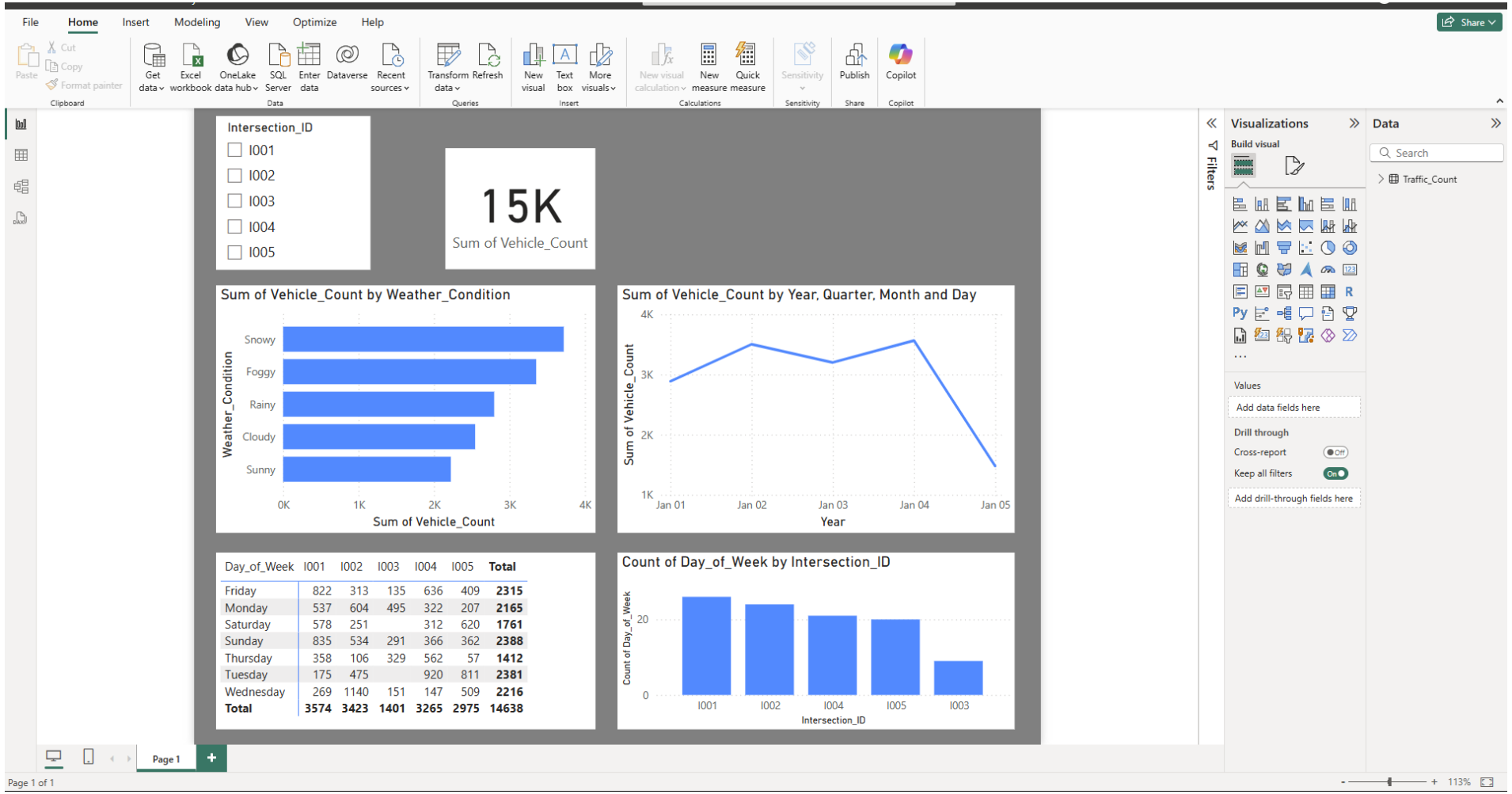
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I001
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I005
15K
Sum of Vehicle_Count
Sum of Vehicle_Count by Weather_Condition
Weather_Condition
Snowy
Foggy
Rainy
Cloudy
Sunny
0K
1K
2K
3K
4K
Sum of Vehicle_Count
Sum of Vehicle_Count by Year, Quarter, Month and Day
Sum of Vehicle_Count
Jan 01
Jan 02
Jan 03
Jan 04
Jan 05
Year
Day_of_Week I001 I002 I003 I004 I005 Total
Friday 822 313 135 636 409 2315
Monday 537 604 495 322 207 2165
Saturday 578 251 312 620 1761
Sunday 835 534 291 366 362 2388
Thursday 358 106 329 562 57 1412
Tuesday 175 475 920 811 2381
Wednesday 269 1140 151 147 509 2216
Total 3574 3423 1401 3265 2975 14638
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Add drill-through fields here
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Page 1 of 1
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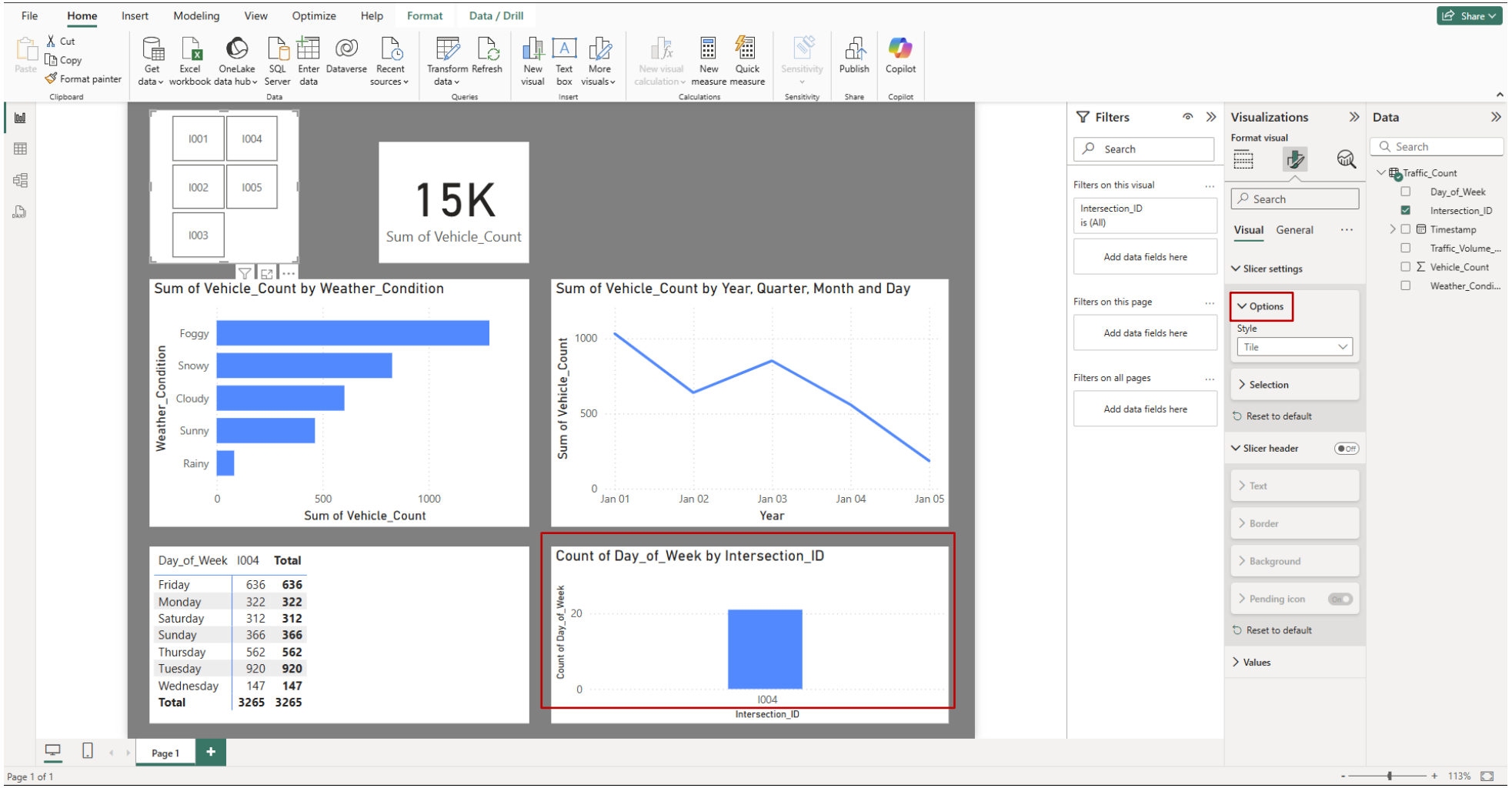
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Text box
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Monday 322 322
Saturday 312 312
Sunday 366 366
Thursday 562 562
Tuesday 920 920
Wednesday 147 147
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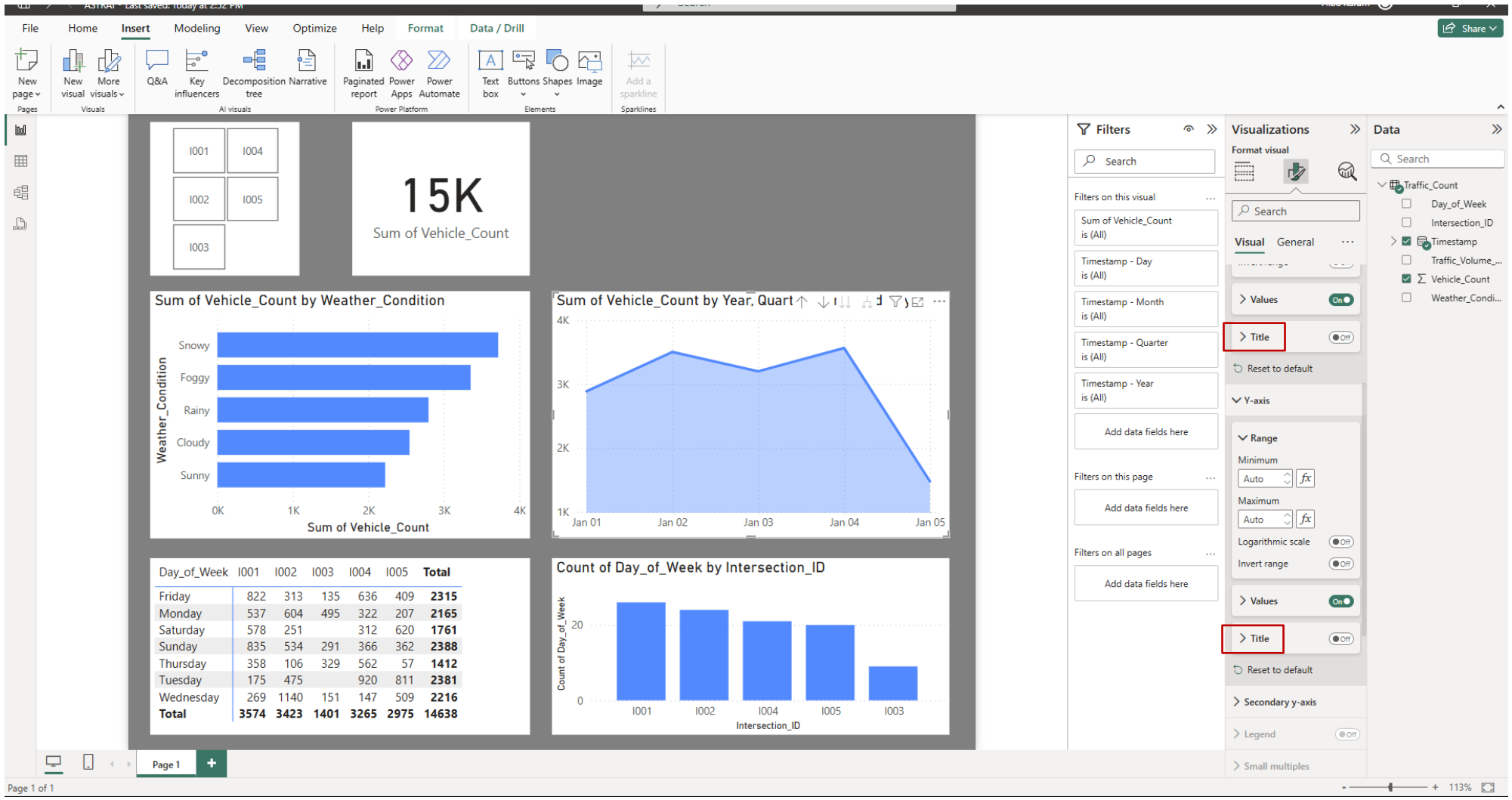
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Total 3574 3423 1401 3265 2975 14638
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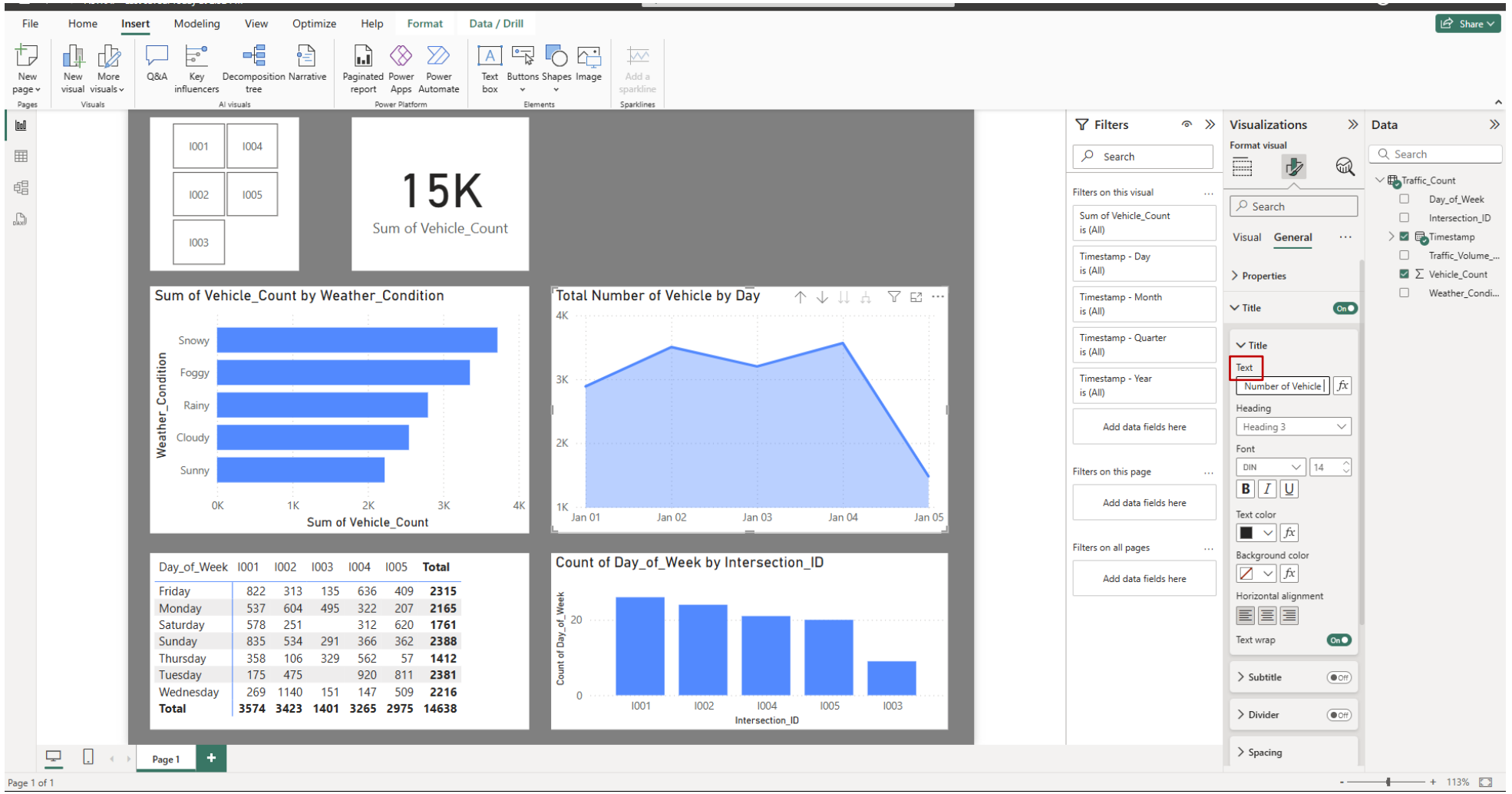
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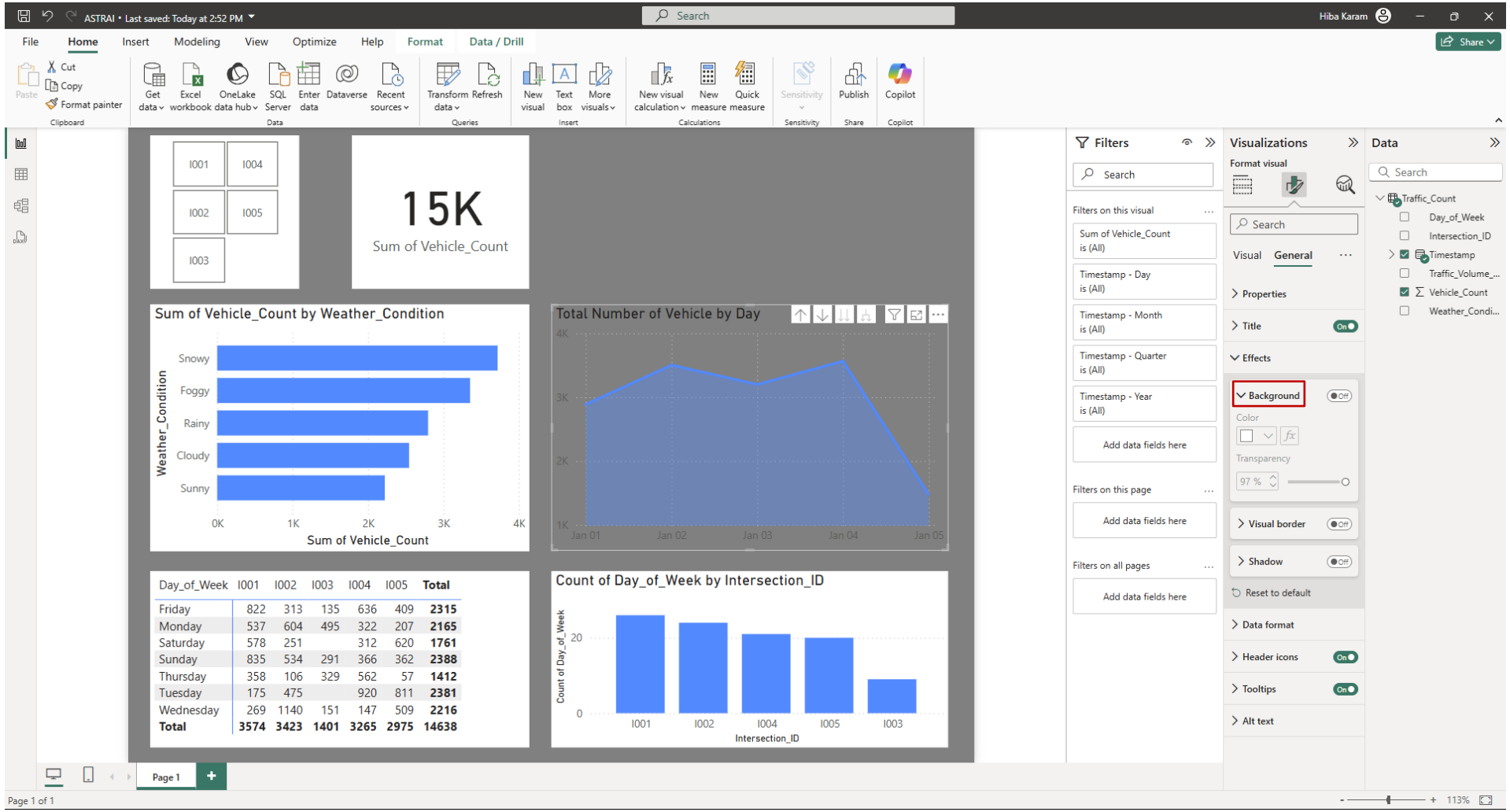
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Sum of Vehicle_Count
Sum of Vehicle_Count by Weather_Condition
Weather_Condition
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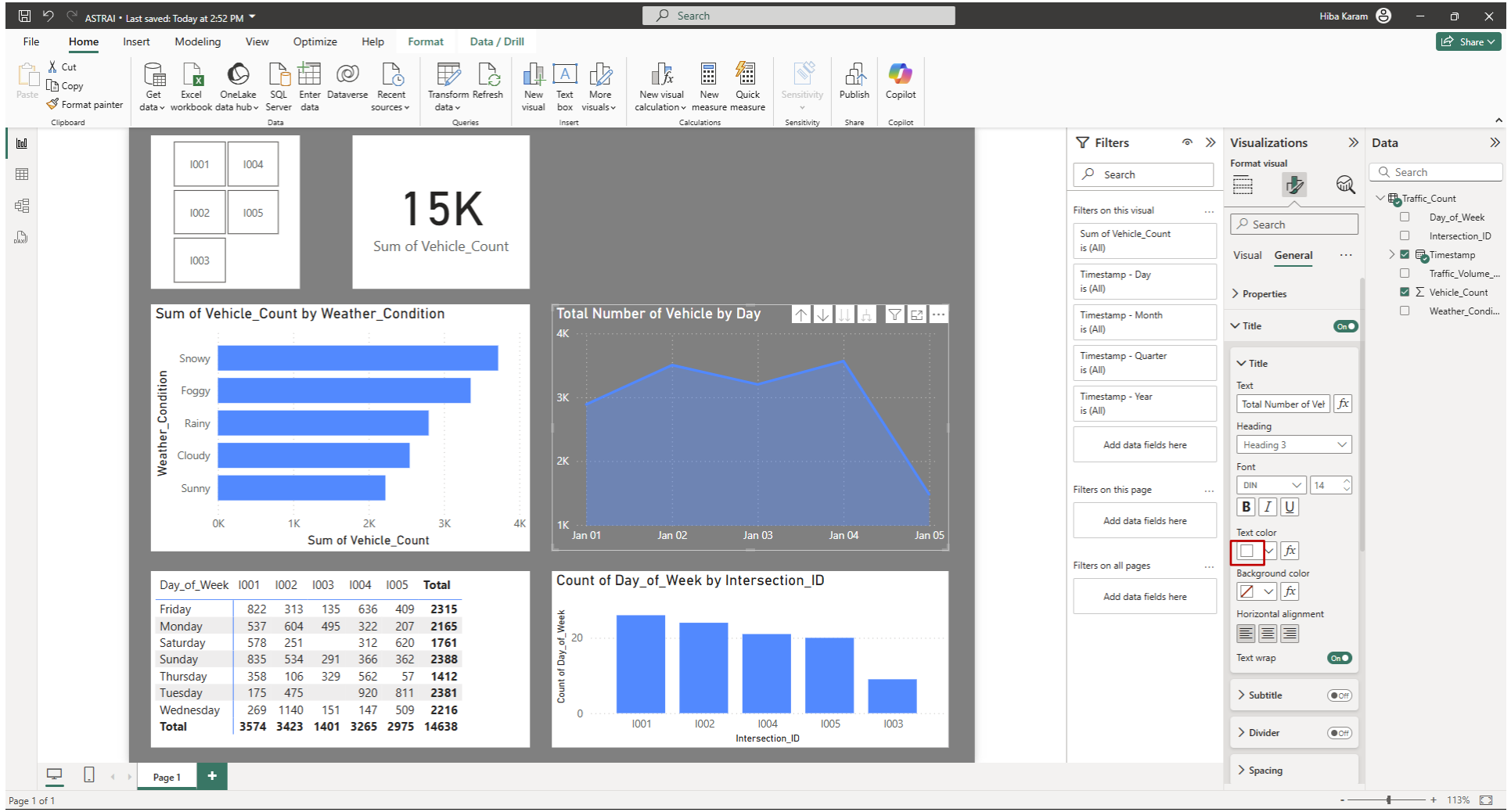
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Weather_Condition
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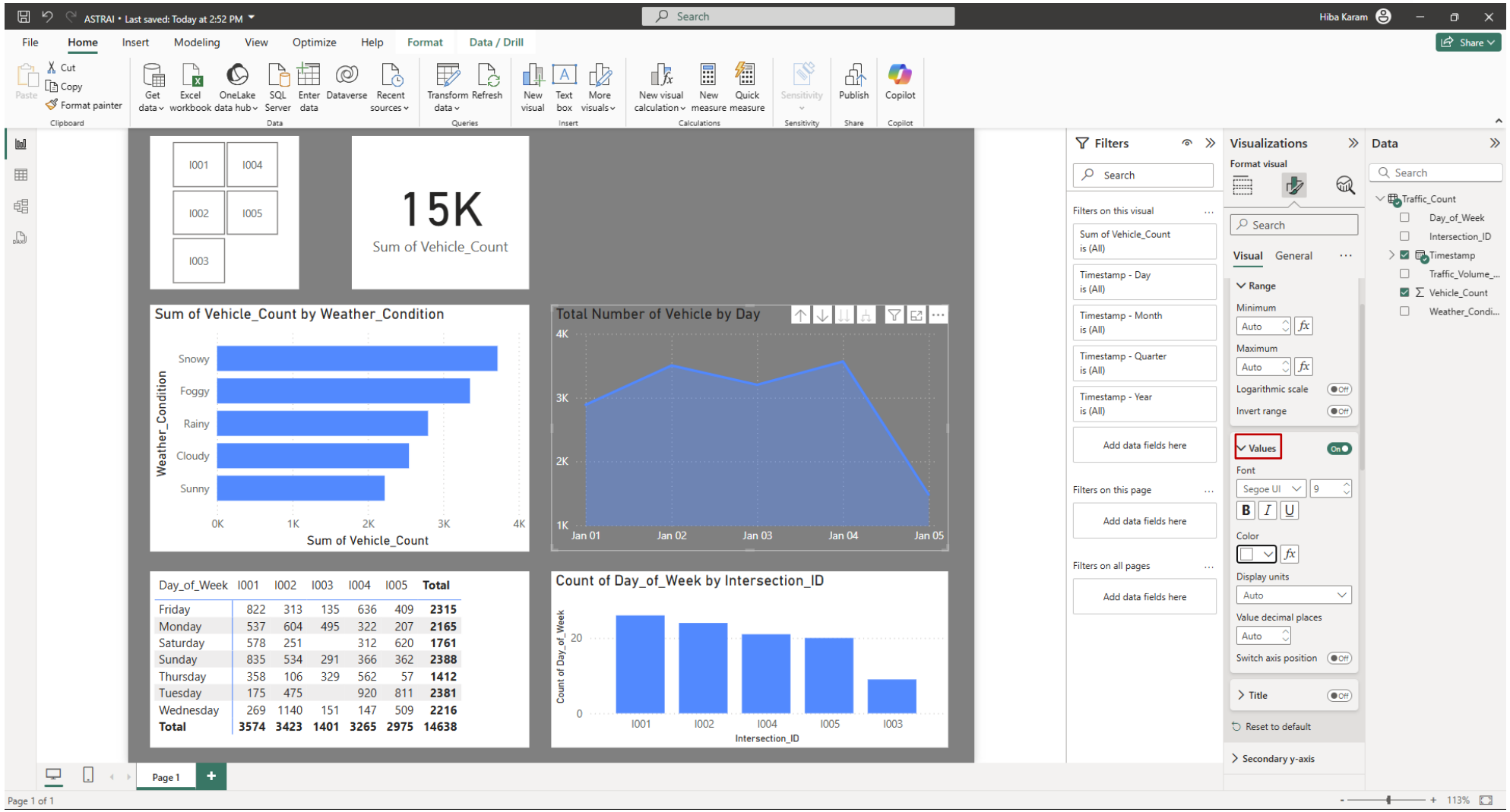
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Weather_Condition
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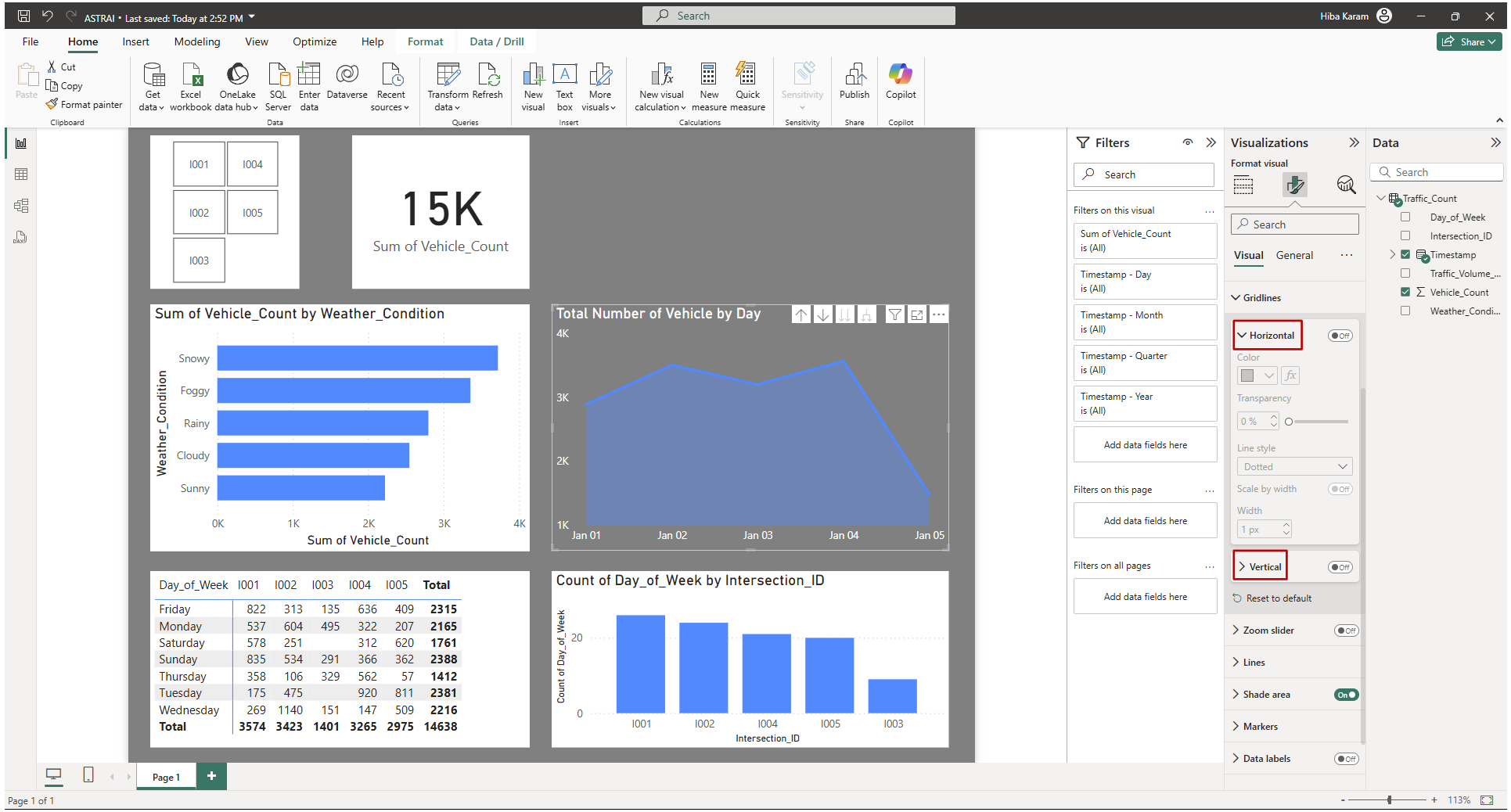
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Sum of Vehicle_Count
Sum of Vehicle_Count by Weather_Condition
Weather_Condition
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Rainy
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Day_of_Week I001 I002 I003 I004 I005 Total
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Monday 537 604 495 322 207 2165
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Total 3574 3423 1401 3265 2975 14638
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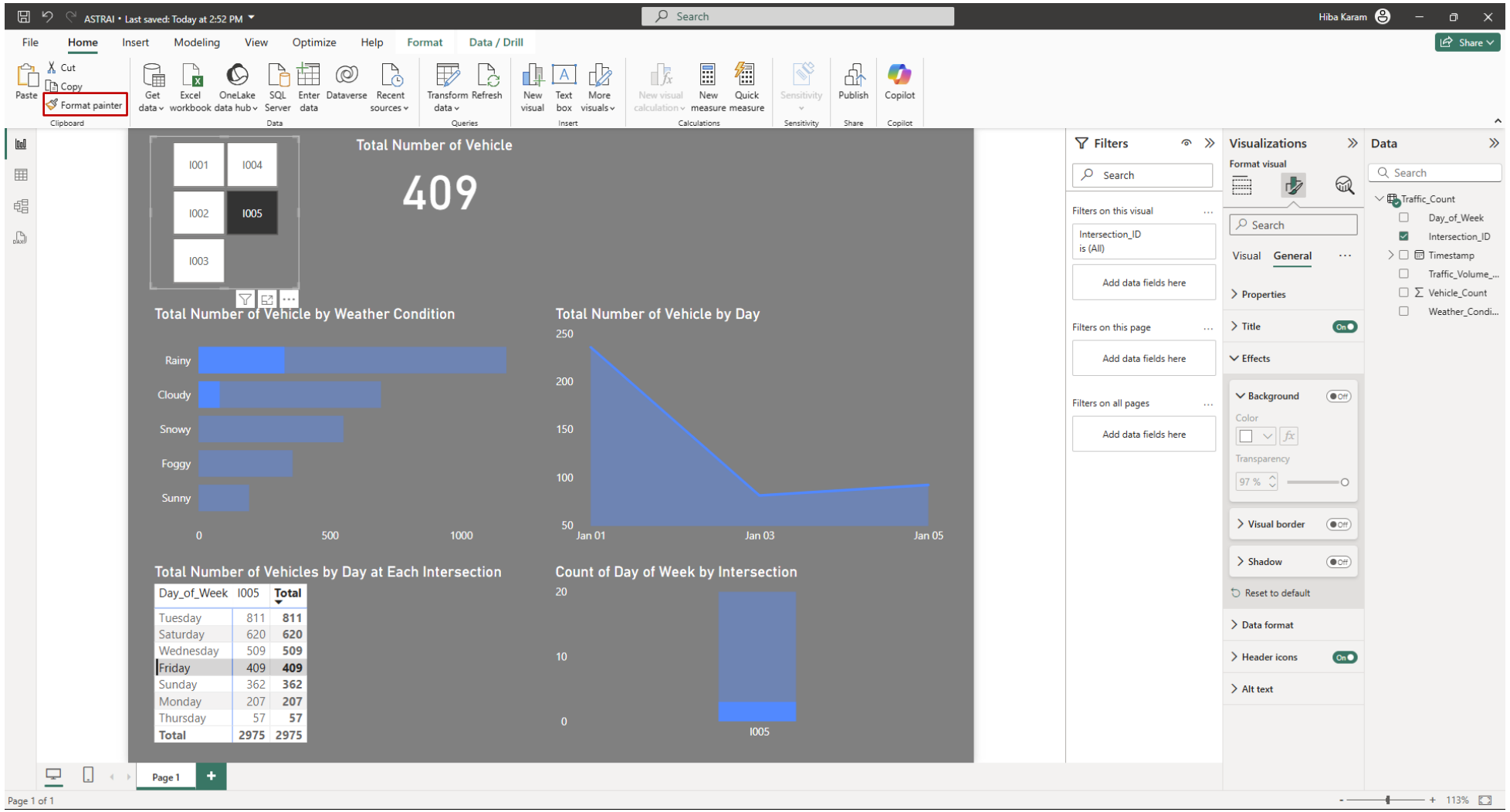
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Total Number of Vehicle by Weather Condition
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Cloudy
Snowy
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Total Number of Vehicles by Day at Each Intersection
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Tuesday 811 811
Saturday 620 620
Wednesday 509 509
Friday 409 409
Sunday 362 362
Monday 207 207
Thursday 57 57
Total 2975 2975
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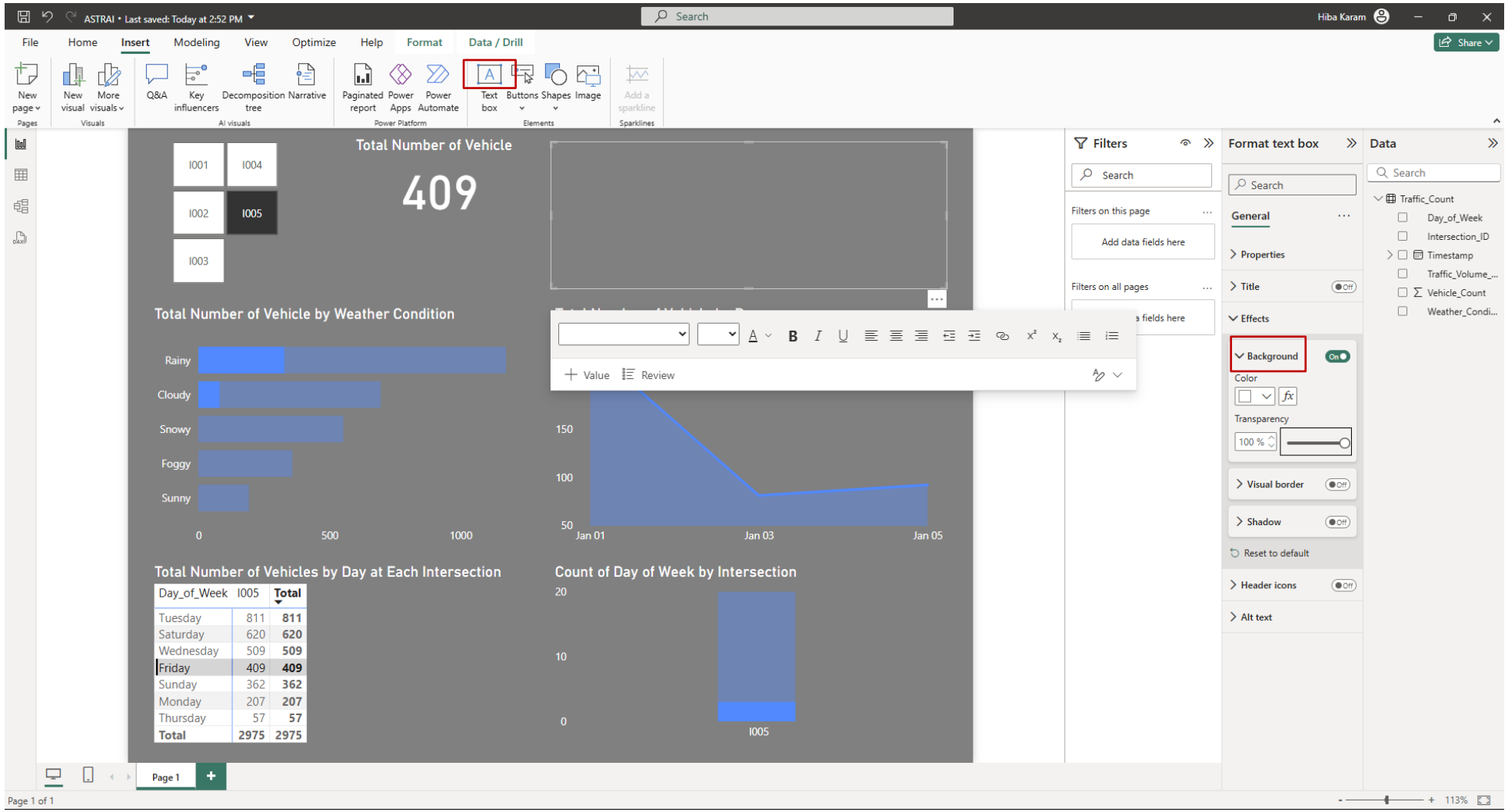
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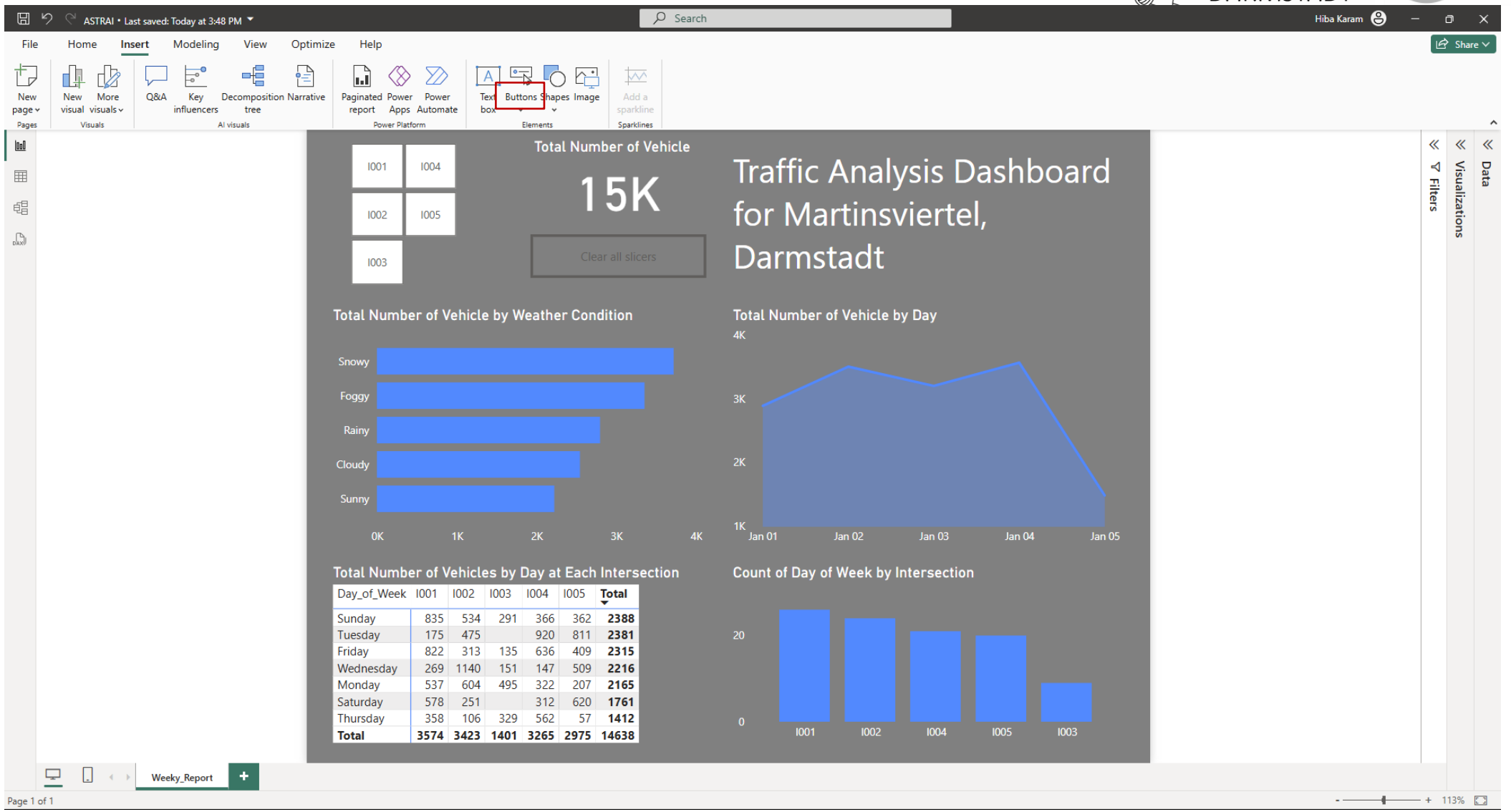

Day_of_Week	I001	I002	I003	I004	I005	Total
Sunday	835	534	291	366	362	**2388**
Tuesday	175	475		920	811	**2381**
Friday	822	313	135	636	409	**2315**
Wednesday	269	1140	151	147	509	**2216**
Monday	537	604	495	322	207	**2165**
Saturday	578	251		312	620	**1761**
Thursday	358	106	329	562	57	**1412**
Total	**3574**	**3423**	**1401**	**3265**	**2975**	**14638**


ANY
QUESTIONS