MTA Ridership & Recovery Analysis Dashboard - Documentation

Date: November 21, 2025

Tools: Power BI, SQL

1. Executive Summary

This Power BI dashboard provides a comprehensive analysis of the Metropolitan Transportation Authority (MTA) ridership data. It tracks daily ridership figures across various transit systems (Subway, Bus, LIRR, Metro-North, Bridges & Tunnels, etc.), monitors the recovery progress post-pandemic compared to pre-pandemic levels, and identifies seasonal and temporal trends.

Key Objectives:

- Monitor total ridership volume trends from 2020 to present.
- Analyze recovery percentages relative to pre-pandemic equivalents.
- Compare performance across different transit agencies.
- Identify seasonal, monthly, and day-of-week ridership patterns.

2. Dashboard Structure & Navigation

The report is divided into five distinct analytical pages, each focusing on a specific dimension of the data:

1. **MTA Daily Ridership (Home/Overview):** High-level KPIs and system comparisons.
2. **Pandemic Analysis:** Deep dive into recovery rates and pre-vs-post pandemic performance.
3. **Time Series Analysis:** Seasonal trends, monthly averages, and YOY growth.
4. **Correlation Analysis:** Relationships between different transit modes.
5. **Ridership Trends:** detailed volume analysis over time.

3. Page-by-Page Breakdown

3.1. Page 1: MTA Daily Ridership (Overview)

Purpose: To provide a snapshot of the current state of the transit network.

Visuals:

- **Most Utilized Transit System (Donut Chart):** Breaks down the market share of ridership.
  - *Insight:* Subways are the dominant mode of transport (~54%), followed by Buses (~21%).
- **Highest Returning % by Transit System (Bar Chart):** Ranks agencies by their recovery performance or absolute return volume.

    - *Insight:* Bridges and Tunnels and Access-A-Ride show the strongest recovery/usage relative to other sectors.
- **Overall Recovery % Over Time (Area Chart):** A trend line showing the aggregate system recovery percentage.
    - *Insight:* Recovery has steadily increased from ~34% in 2020 to ~81% in 2024.
- **Slicers:** Month Name, Day Name, Year (allows filtering the entire page).

3.2. Page 2: Pandemic Analysis

Purpose: To specifically track how close current ridership is to pre-pandemic (2019) levels.

Visuals:

- **Recovery Percentages Over Years (Line Chart):** Detailed timeline of recovery.
    - *Insight:* Shows the initial crash in 2020 (dropping to ~17%) and the gradual climb to ~86% by late 2024.
- **Overall Recovery Trends & Seasonality (Clustered Column Chart):** Compares recovery metrics across different years side-by-side to highlight seasonal dips or spikes.
- **Subways vs. Buses: Recovery Trend Comparison (Line Chart):** A direct comparison of the two largest systems.
    - *Insight:* While both are recovering, they track closely, with Buses occasionally showing higher resilience during specific periods.
- **Current Recovery Status by Agency (Bar Chart):** Horizontal bars showing the exact recovery percentage for each agency.
    - *Insight:* Bridges & Tunnels have exceeded 93%+ recovery, significantly outperforming mass transit options like Subways (~70-80%).

3.3. Page 3: Time Series Analysis

Purpose: To uncover cyclical patterns and temporal behaviors in ridership.

Visuals:

- **Average Monthly Ridership Overview (Bar Chart):** Shows which months have the highest average volume.
    - *Insight:* October and September are peak ridership months; February is typically the lowest.
- **Seasonal Distribution of Total Ridership (Donut Chart):** Aggregates data by season.
    - *Insight:* Fall (27.29%) is the busiest season, followed closely by Spring and Summer.
- **Ridership Patterns by Day of Week (Bar Chart):** Splits volume between Weekday vs. Weekend.
    - *Insight:* Mid-week (Wednesday/Thursday) sees the highest traffic (approx. 1.3B), while Sundays are the lowest (728M).
- **Year-over-Year Ridership Trend and Growth Rate (Combo Chart):** plots total ridership (line) against YOY growth (bars/markers).

    - *Insight:* 2021 saw massive growth (1.00 or 100%) as the city reopened, stabilizing to more modest growth (0.09) in 2023.

3.4. Page 4: Correlation Analysis

Purpose: To identify relationships and operational connections between different transit modes.

Visuals:

- **Subway vs. Bus Ridership Trends (Clustered Column):** Direct volume comparison year-over-year.
- **LIRR vs. Metro-North Correlation (Clustered Column):** Compares the monthly volume of the two commuter rail systems.
    - *Insight:* There is a strong positive correlation; when LIRR usage rises, Metro-North usage typically rises as well, indicating shared commuter behaviors.
- **Monthly Subway Ridership Trends vs. Pre-Pandemic Recovery (Combo Chart):** Overlays volume against the recovery rate %.
- **Total Access-A-Ride Trips by Year (Bar Chart):** Tracks the specific growth of the paratransit service, reaching 9.3M trips in 2023/2024.

3.5. Page 5: Ridership Trends (Detail)

Purpose: A granular view of total volume metrics.

Visuals:

- **Ridership Trends Over Time (Area Chart):** Large-scale view of total volume growth from 758M (2020) to over 1.7B (2024).
- **Top Days by Total Ridership (Bar Chart):** Ranks specific days of the week by cumulative volume over the dataset's history.
    - *Observation:* Consistent with the Time Series page, Wednesdays are the absolute peak for the system.

4. Data Dictionary (Inferred)

Field Name	Description	Data Type
Date	The date of the ridership record.	Date
Agency	The transit system (Subway, Bus, LIRR, etc.).	Text
Total Estimated Ridership	The count of riders for that day.	Whole Number
% of Comparable Pre-Pandemic Day	Comparison metric (Current Ridership / 2019 Ridership).	Percentage
Day Name	Monday, Tuesday, etc.	Text
Month Name	January, February, etc.	Text
Season	derived column (Winter, Spring, Summer, Fall).	Text

5. Technical Implementation Details

- **Data Source:** Public MTA Ridership Data (CSV/API).
- **Transformations (Power Query):**
  - Date dimension table created for time intelligence functions (Season, Day of Week).
  - Unpivoting of wide-format data if source provided separate columns for agencies.
  - Calculation of "Recovery %" if not provided natively.
- **Theme:** The report uses a custom theme with a soft beige background (#F5E6D3 approx) and strong organizational colors (Burnt Orange for primary metrics, Brown for secondary).

6. User Guide

1. **Filtering:** Use the slicer panels on the right side of the "MTA Daily Ridership" and "Ridership Trends" pages to filter by specific **Years** or **Seasons**.
2. **Cross-Highlighting:** Clicking on a specific bar (e.g., "Subway" in the Overview) will filter all other charts on that page to show data *only* for Subways.
3. **Tooltips:** Hover over any data point on the line charts to see the exact rider count and date.