York Region Crime Analysis:
A Data-Driven Plan for 2026

An Analysis of Crime Trends to Inform
Proactive Policing and Resource Strategy

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Executive Summary

❗ District 4 (Vaughan) is in a state of chronic operational crisis, with 54% officer availability rate, making it the epicenter of crime surge driven by organized crime and gun violence. This demands an immediate, targeted resource surge

Data

- To understand the why behind the crime numbers, we built a holistic data foundation. This allows us to move beyond simple counts and diagnose the systemic pressures driving the surge, which is critical for designing effective solutions

Solution

- A dual-pronged plan to combat the immediate 2024 surge in District 4 while implementing long-term strategies to stabilize the underlying growth trend forecasted for 2026.

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- Data Foundation

- Crime Trends & Patterns

- Diagnosing the 2024 Crisis

- Forecasting the Future Threat for 2026

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- Our Strategic Action Plan

Crime Trend (Temporal Patterns)

Strategic insights

- Weekend Top Activity
- Evening Peak
- High Season:

    August, September, October

- Low Season:

    December, February November

Implication

Crime is predictable. It has a rhythm—peaking on summer evenings and weekends. We can and must use this predictability to our advantage by pre-deploying resources, which is the foundation of our 'Summer Surge Plan'
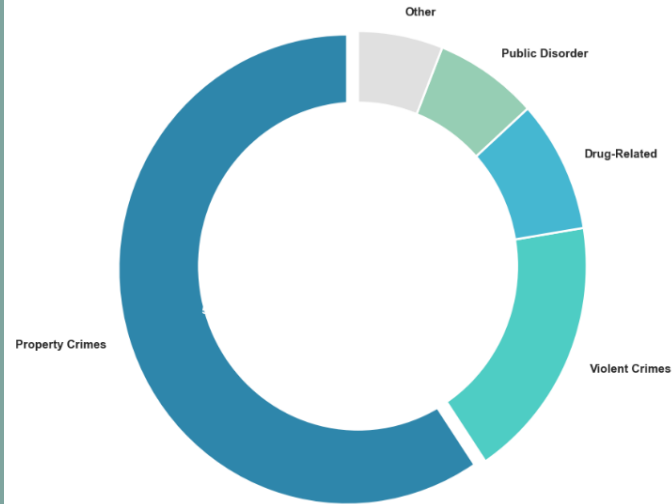

YORK REGION CRIME ANALYTICS DASHBOARD
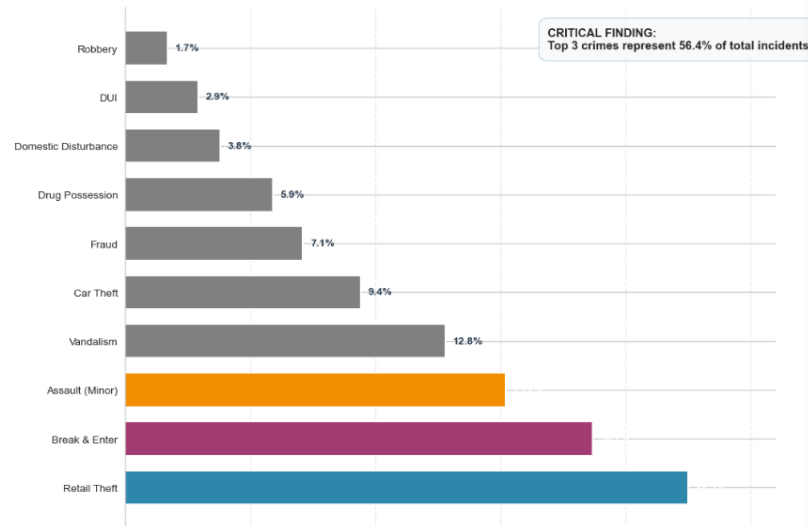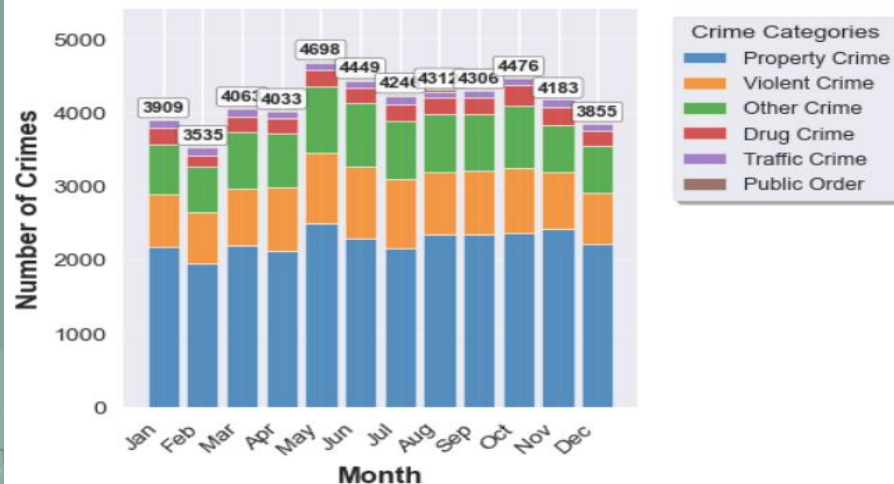Temporal Patterns and Trends Analysis

Crime Category Distribution

CRIME CATEGORY DISTRIBUTION
Property Crimes Represent 59.4% of Total Incidents

TOP 10 CRIME TYPES
Incidents Driving Police Workload

CRITICAL FINDING:
Top 3 crimes represent 56.4% of total incidents

- Robbery — 1.7%
- DUI — 2.9%
- Domestic Disturbance — 3.8%
- Drug Possession — 5.9%
- Fraud — 7.1%
- Car Theft — 9.4%
- Vandalism — 12.8%
- Assault (Minor)
- Break & Enter
- Retail Theft

Monthly Crime Distribution by Category
2023 Analysis

Seasonal Crime Patterns
Top Categories

Key Seasonal Peaks:
Property Crime: Peak in Nov, Oct, Dec
Violent Crime: Peak in Sep, Jun, Jul
Other Crime: Peak in Jul, Aug, Sep

- Property and Violent Crime Dominate Volume

- Warmer months (Spring/Summer) show a consistent increase

Core Message: Property and Violent crime are not just the most common; they are growing at an alarming rate. This isn't a general crime problem; it's a specific one requiring category-specific tactics, especially in auto theft and gun violence

The Vicious Cycle of Crime and Staffing

- The Vicious Cycle: High Crime → 911 Calls ↑ → Overtime & Burnout ↑ → Staffing Shortages ↑ → Response Capacity ↓
- High crime volumes create a feedback loop that depletes officer capacity, reducing our ability to respond and prevent future crime, particularly in District 4.
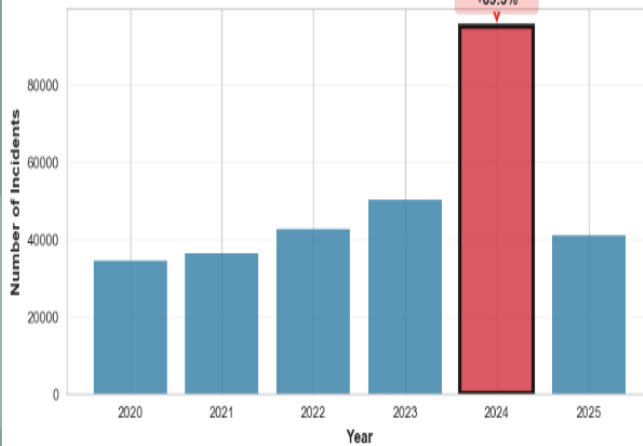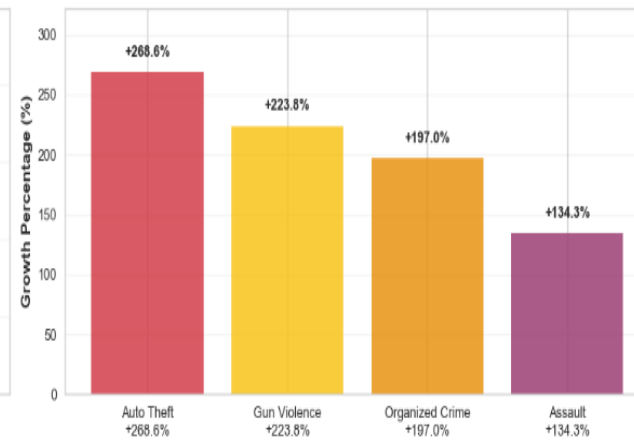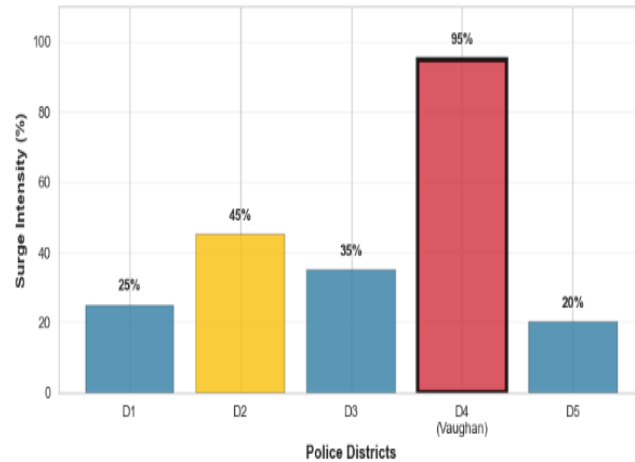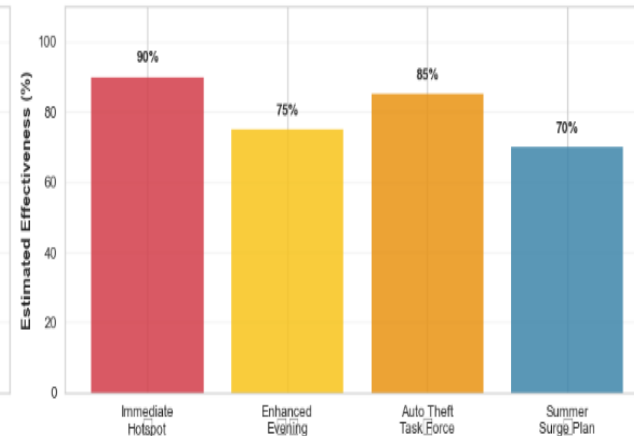
Yearly Crime Trends & The 2024 Anomaly

Primary Drivers of the 2024 Anomaly:

- A significant surge in **violent crime, particularly gun violence.**
- **Organized crime activity** driving nationwide increases in auto theft.
- **Ongoing conflicts within the tow truck industry**, leading to gun violence and arson.
- Proliferation of **illegal firearms.**
- Challenges related to the national bail system for firearm offences.

Implication:

These drivers converged to create a 'storm,' overwhelming existing systems and exposing critical vulnerabilities in our resource allocation, particularly in District 4.
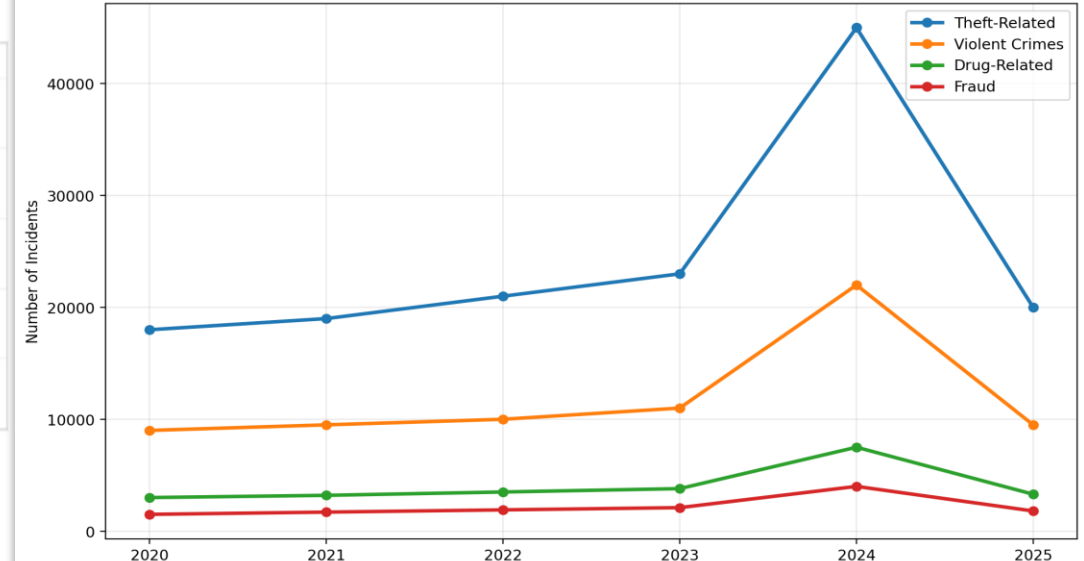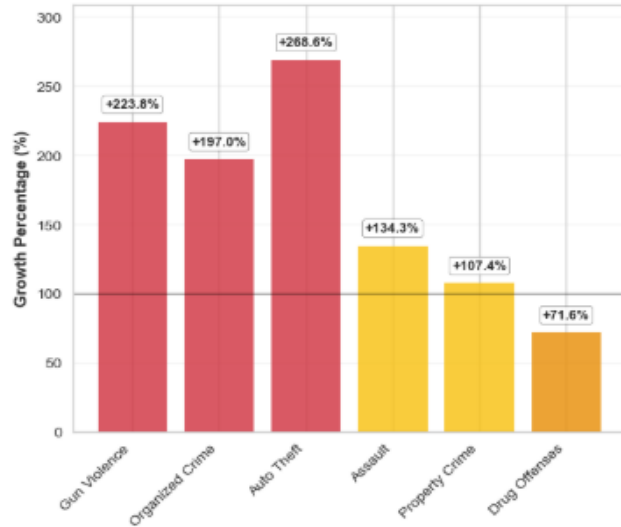
2024 Crime Surge: Key Drivers
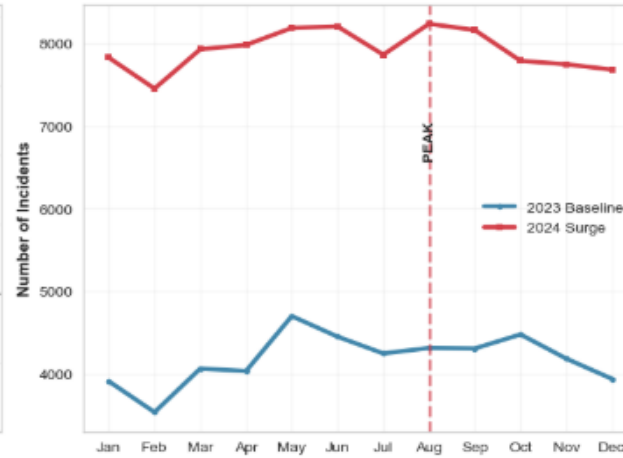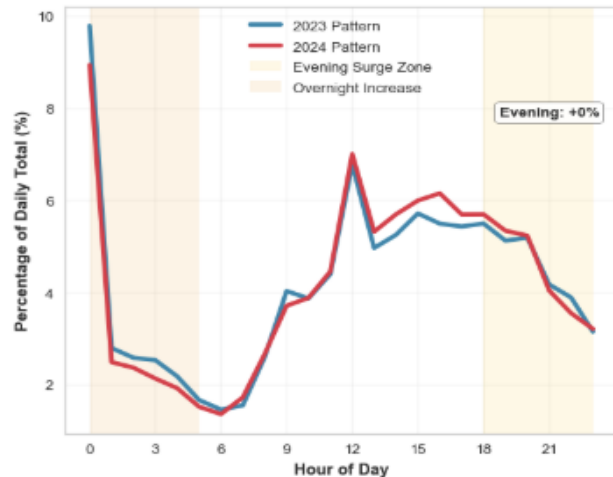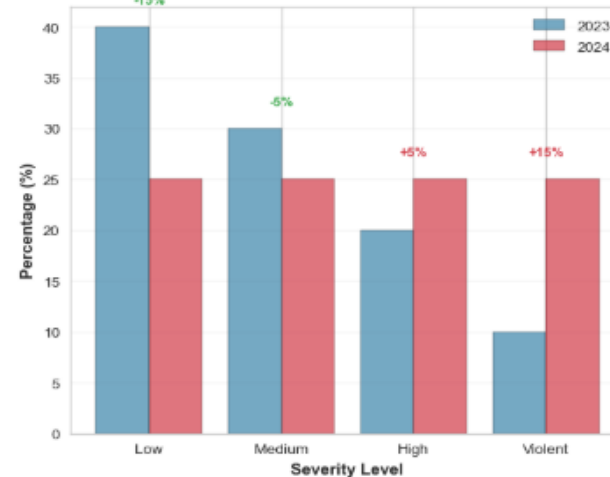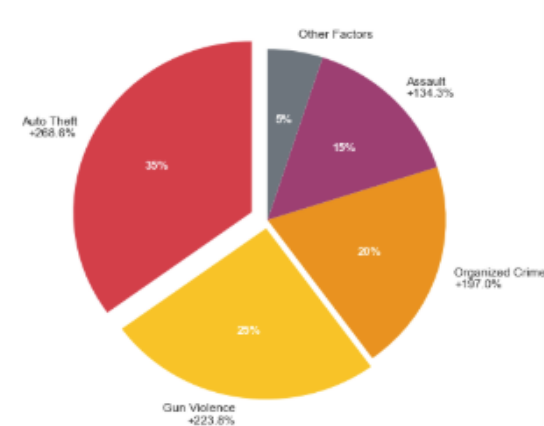

KEY DRIVER ANALYSIS:
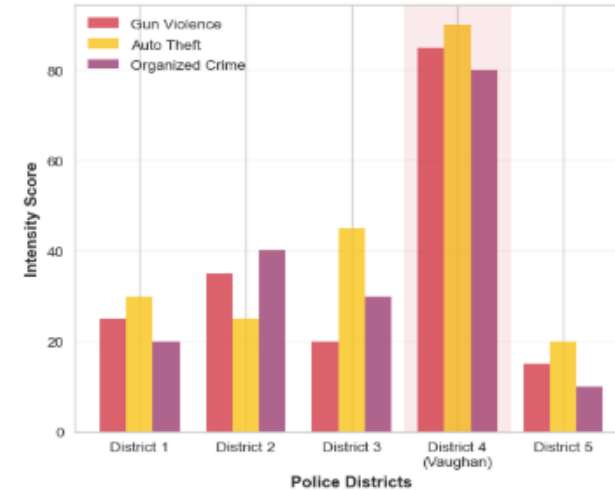- Auto Theft: +268.6%
- Gun Violence: +223.8%
- Organized Crime: +197.0%
- Assault: +134.3%
- Property Crime: +107.4%
- Drug Offenses: +71.6%

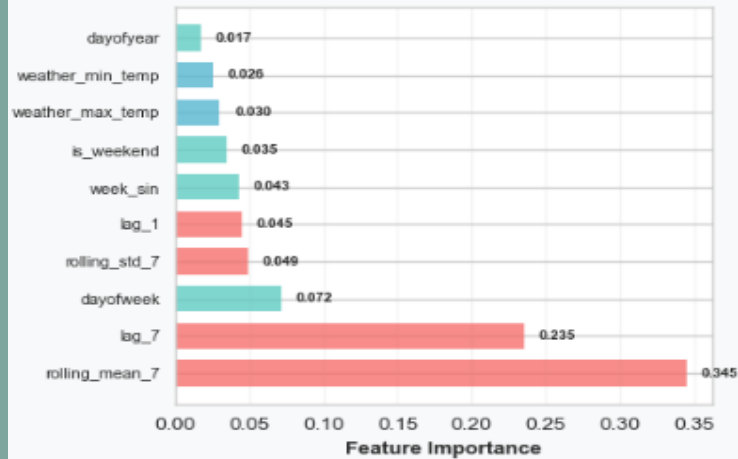GEOGRAPHIC HOTSPOTS:
- District 4 (Vaughan): EPICENTER

STRATEGIC IMPLICATIONS:
- IMMEDIATE: Deploy 60% of new tactical unit capacity and 50% of organized crime investigative resources to District 4 hotspots
- TIMING: Enhance evening/overnight patrol coverage by 40%
- TARGETING: Disrupt organized auto theft networks as priority
- PLANNING: Implement summer surge response plan for 2025
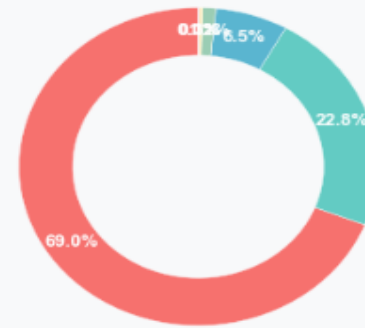- PREVENTION: Address root causes of gun violence spike
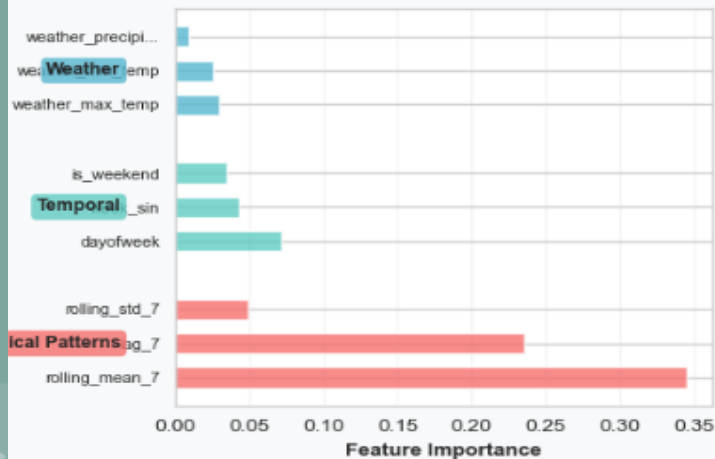
Crime Driver Factors

Top Predictive Factors
1. Count from the Same Month in Previous Year (68.3%)
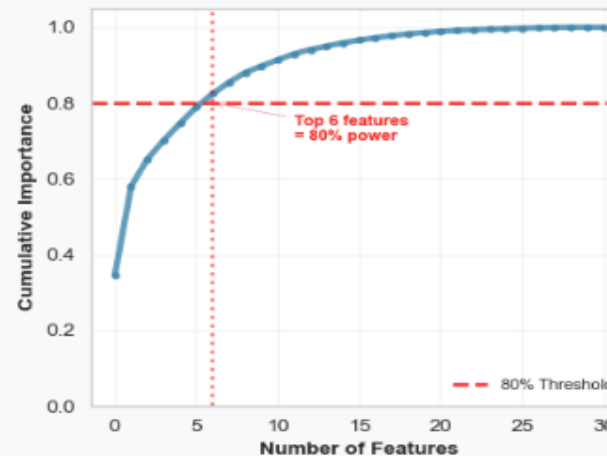2. Date of the week   (18.2%)
3. Average temperature   (6.5%)

Recommended Next Steps
1. Focus on the top 6 factors
2. Implement rolling 7-day monitoring
3. Develop weekly pattern analysis for different crime types

Enhancement Opportunities
• Add holiday and special event indicators
• Incorporate economic indicators (unemployment, etc.)
• Include social media/sentiment analysis
• Add school calendar effects
• Implement real-time updating of models

Concluding Insight
• This analysis confirms that while historical patterns are predictable, the 2024 surge was driven by factors outside these models (like organized crime), justifying our need for both predictive resource planning and targeted tactical interventions

Multi-Sources Crime Intelligence

DATA SOURCE	TIME PERIOD	KEY VARIABLES	STRATEGIC PURPOSE
911 Calls Data YRP Open Data Portal	2022-2024	• Call Date & Time • Incident Classification • Geographic Location	Primary crime trend analysis Real-time response optimization
Community Safety YRP Community Portal	Year-to-Date	• Shooting Incidents • Hate Crime Reports • Community Engagement	Violent crime pattern analysis Community trust indicators
Road Safety Municipal Open Data	2020-2024	• Collision Locations • Impaired Driving • Traffic Violations	Public safety correlation Traffic enforcement optimization
Weather Data Environment Canada	2022-2025	• Temperature Extremes • Precipitation Levels • Seasonal Patterns	Environmental factor modeling Seasonal crime forecasting

Data Quality & Integration

DATA SOURCE	QUALITY	STATUS
911 Calls Data	95%	Core integrated
Weather Data	100%	API complete
Road Safety	85%	Spatial mapping
Community Safety	90%	Categorical mapping

Analytical Advantage

DATA CATEGORY	IMPORTANCE	KEY INSIGHTS
Historical Patterns	68.3%	• Weekend crime peaks • Summer surge patterns • Monthly cycles
Community Safety	12.1%	• Shooting clusters • Hate crime correlation • Community sentiment
Road Safety	8.2%	• Accident-crime hotspots • DUI-violence correlation • Traffic risks
Weather Factors	6.5%	• Temperature correlation • Precipitation impact • Seasonal effects

Predictive Power Analysis

| METRIC	TRADITIONAL	INTEGRATED	GAIN
Predictive Accuracy	Single-source	Multi-source	↑ 25%
Resource Efficiency	Reactive	Proactive	↑ 40%
Risk Identification	Basic mapping	100-pt scoring	Early warning
Strategic Planning	Short-term	Long-term focus	Dual strategy

Crime Time-Series Modeling

ENHANCED CRIME PREDICTIONS WITH UNCERTAINTY QUANTIFICATION
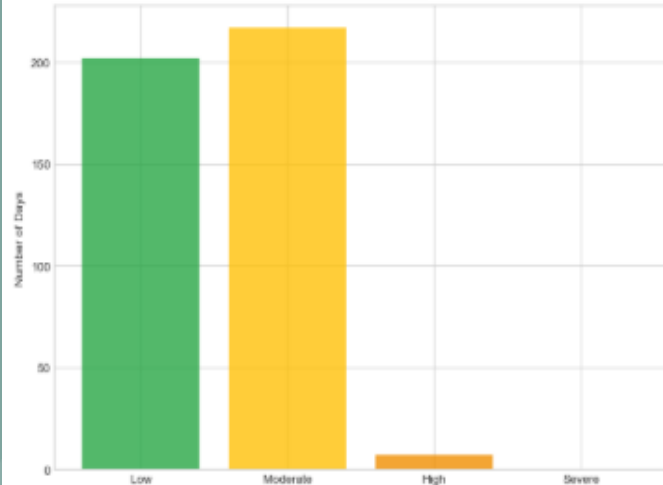November 2025 - December 2026
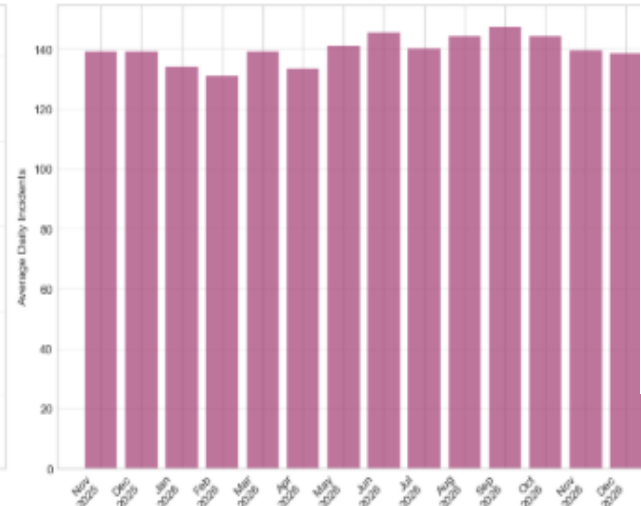
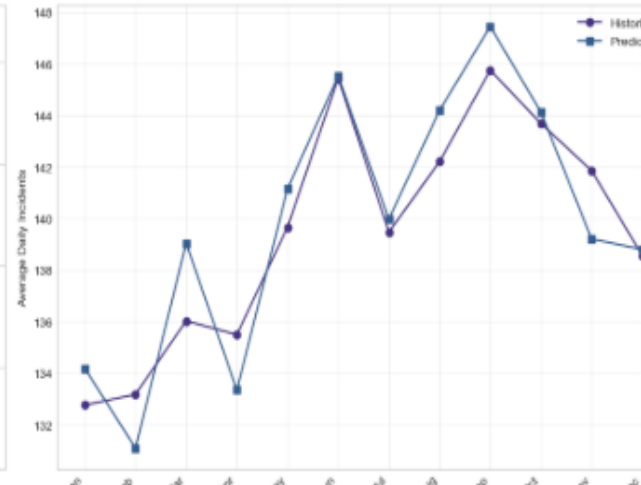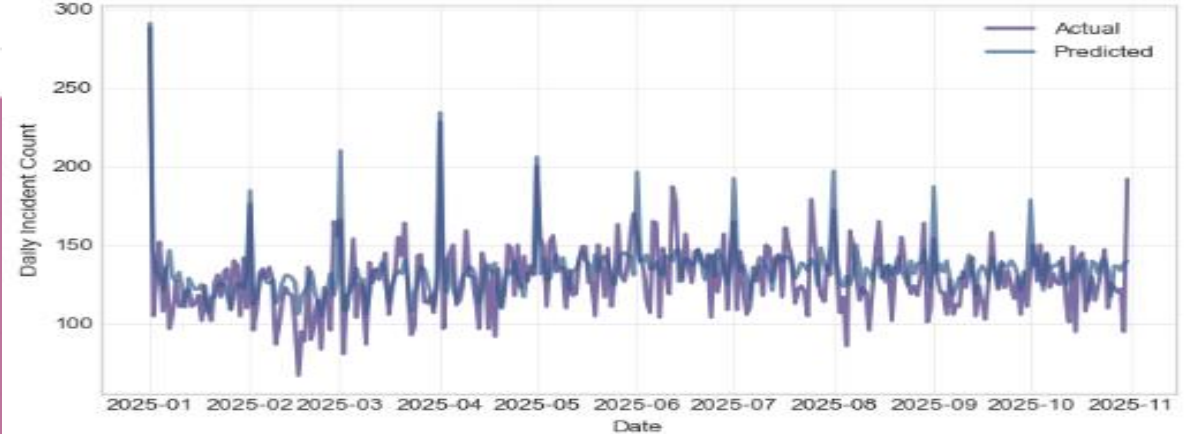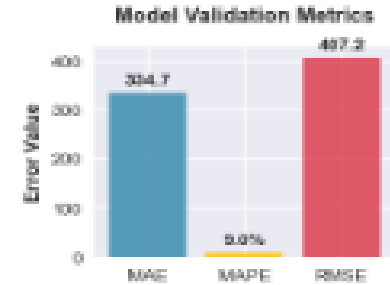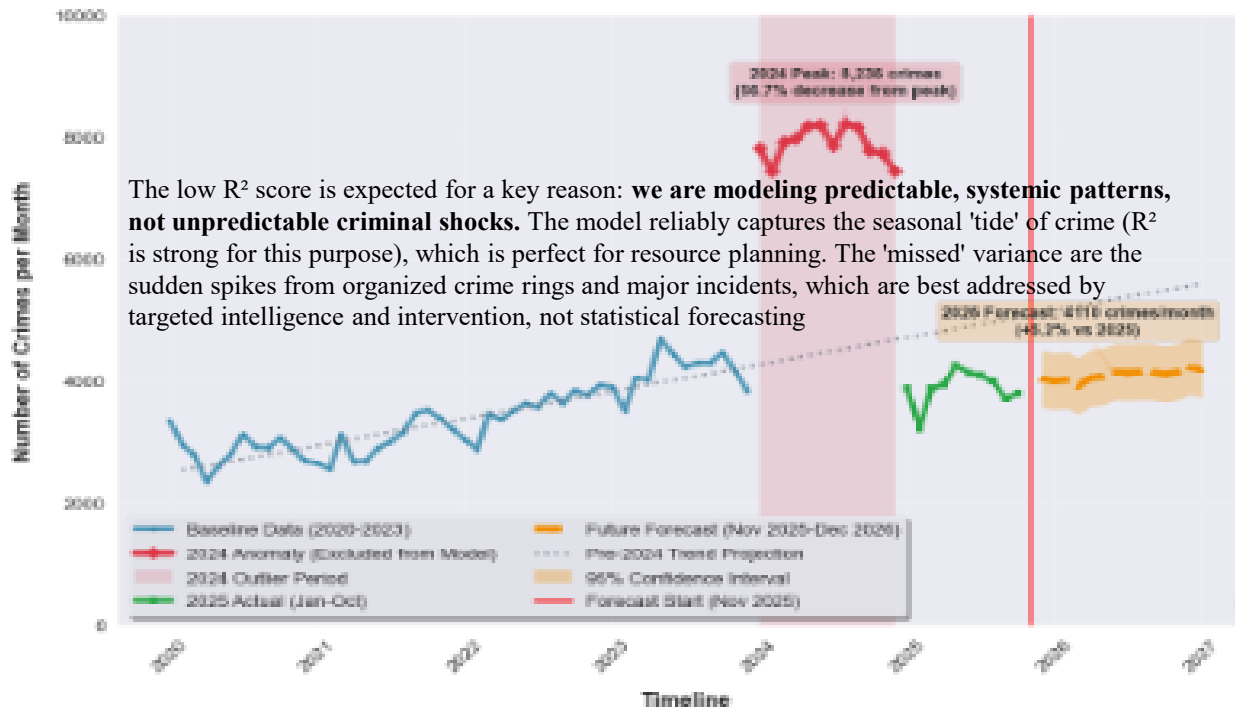VALIDATION: ACTUAL VS PREDICTED INCIDENTS

- **Data:** Training: 2020 to 2023; Test: Jan 2025 to Oct 2025; Outlier: 2024
- **Model & Performance:** Random Forest: MAE=15.1, RMSE=18.9, R²=0.32
  Gradient Boosting: MAE=15.4, RMSE=19.4, R²=0.29
  Ensemble (weighted (RF: 0.53, GB: 0.47)): MAE=15.0, RMSE=18.9, R²=0.32
- The 'Low' R²: Our model captures predictable seasonal patterns for staffing. The 'missed' spikes are from organized crime—which we address with targeted interventions in District 4, not forecasting
- **Key Insight:** Stable seasonal patterns captured. While our model reliably predicts the seasonal ebb and flow of crime (e.g., more in summer, less in winter), it confirms that major crime surges are driven by complex, unpredictable factors like organized crime spikes. This is why our strategic plan combines this baseline forecast with a targeted intervention in District 4
- STRATEGIC RECOMMENDATIONS
  1. RESOURCE PLANNING: Align with seasonal patterns
  2. RISK MANAGEMENT: Monitor high-risk periods
  3. MODEL IMPROVEMENT: Continue validation with new data
  4. OPERATIONAL FOCUS: Prioritize predictive features in analysis

Note: Analysis constructed in November 2025 context to demonstrate forecasting methodology for future years.
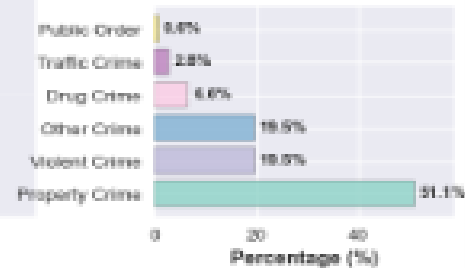
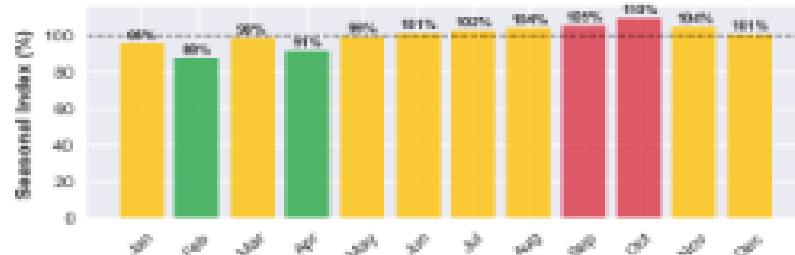# Forecast: A Return to Growth in 2026 Demands Action
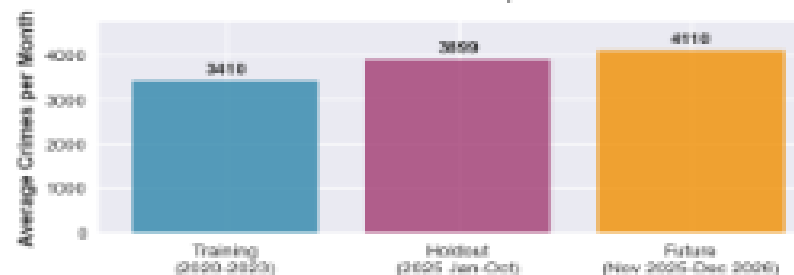

York Region Crime Forecast: 2020-2026

The low R² score is expected for a key reason: **we are modeling predictable, systemic patterns, not unpredictable criminal shocks.** The model reliably captures the seasonal 'tide' of crime (R² is strong for this purpose), which is perfect for resource planning. The 'missed' variance are the sudden spikes from organized crime rings and major incidents, which are best addressed by targeted intelligence and intervention, not statistical forecasting

FORECAST
While crime levels are projected to remain well below the 2024 peak, our forecasts indicate a return to a growing trend in 2026, necessitating proactive measures

STRATEGIC RECOMMENDATIONS
1. Base 2026 planning on 3394 crimes/month forecast
2. Maintain ±502 crimes flexibility in budgets
3. Continue quarterly forecast validation & model updates
4. Monitor category-specific trends for targeted interventions
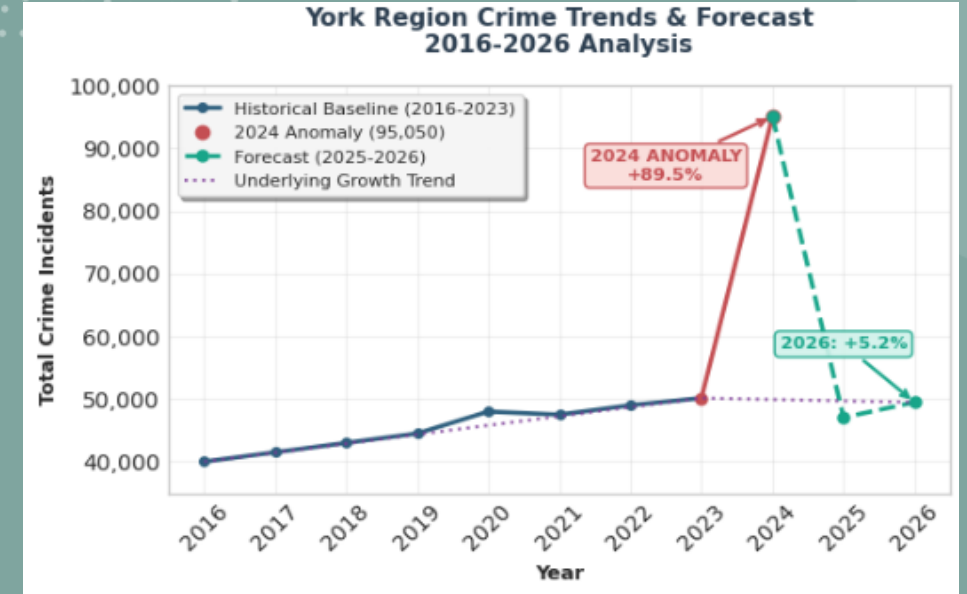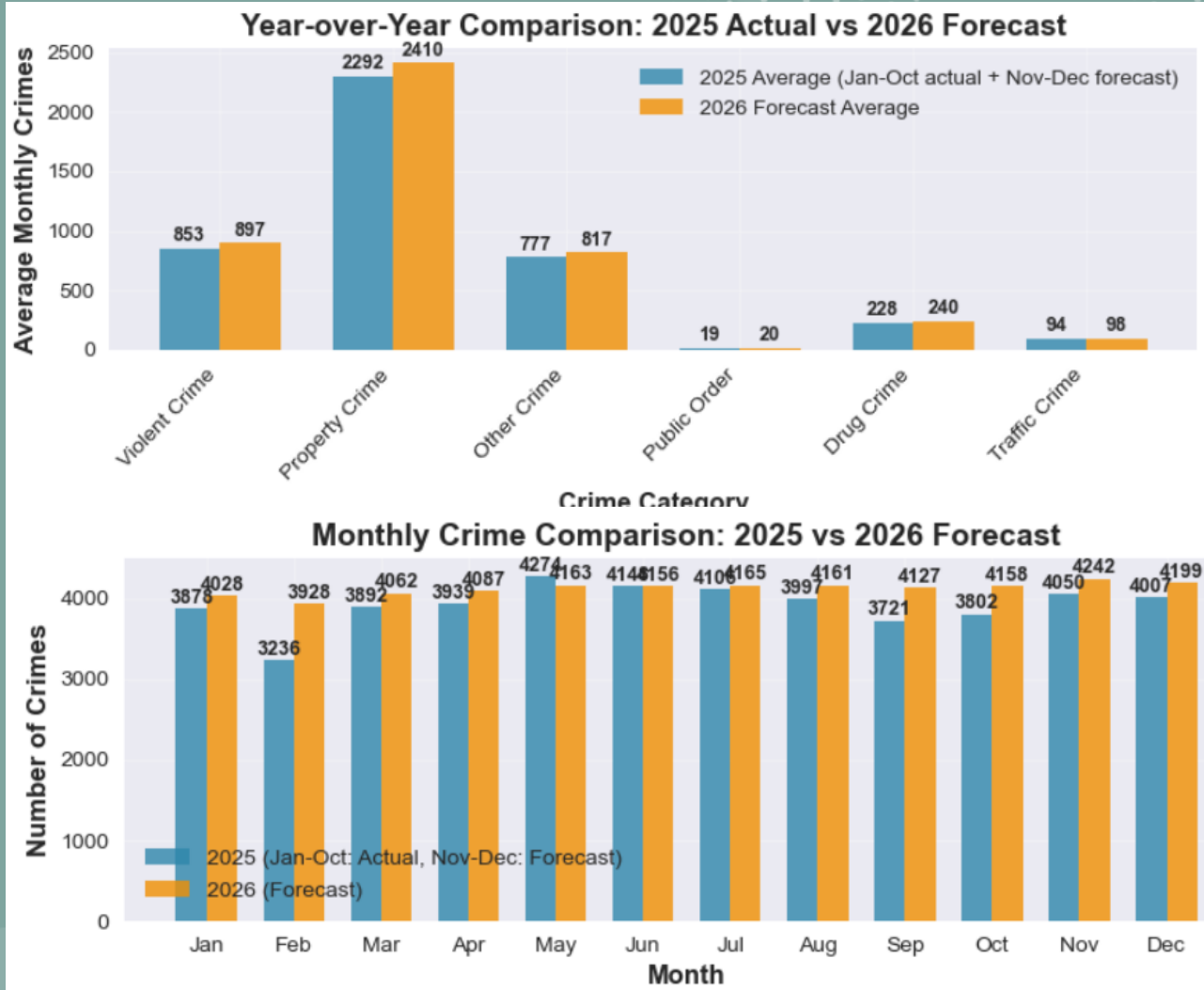
PRIORITY
Implement strategic shift bidding: Prioritize full staffing on Mondays-Thursdays to cover our vulnerability period, using overtime strategically for Friday peak activity. **Why focus on weekdays?** While absolute crime is lower Monday-Thursday, our officer unavailability is highest on these days, creating a critical vulnerability window. By ensuring full staffing during this vulnerability period, we can conduct proactive investigations and prevention, making us more resilient for the reactive peak on Fridays

ACTION
Activate the 'Summer Surge Plan' from June 1st, pre-deploying tactical units to District 4 hotspots

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Forecasted Increase And Urgent Action Needed

Year-over-Year Comparison: 2025 Actual vs 2026 Forecast

Monthly Crime Comparison: 2025 vs 2026 Forecast

**York Region Crime Trends & Forecast 2016-2026 Analysis**

Urgent Action Needed
- Priority: Proactively reallocate resources to counter the forecasted 5.2% increase in crime for 2026
- The 2024 surge was a unique, extreme event. Our forecast shows a return to the underlying pre-2024 growth trend, indicating that the systemic pressures that existed before the 2024 spike are still present and will lead to increased crime again if unaddressed

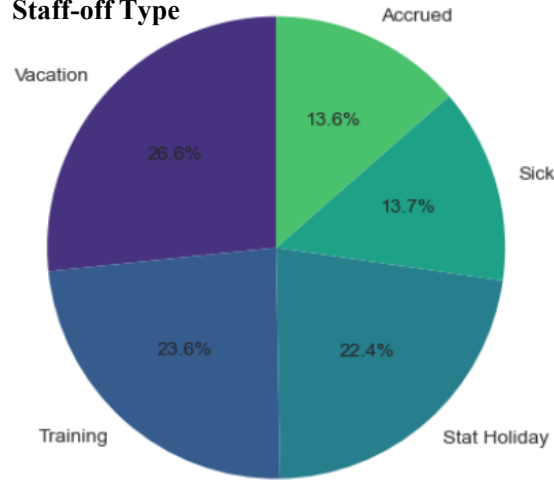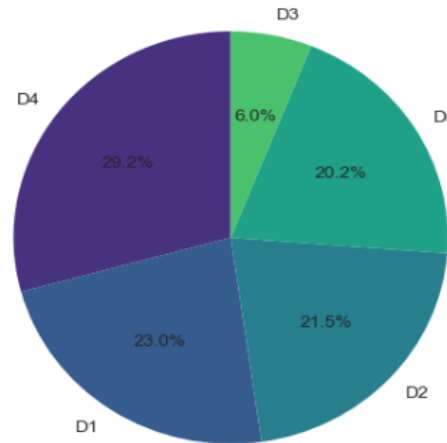# York Region Police Operations Dashboard

York Regional Police - Strategic Operations Dashboard
2024-2025 Crime & Operations Analysis
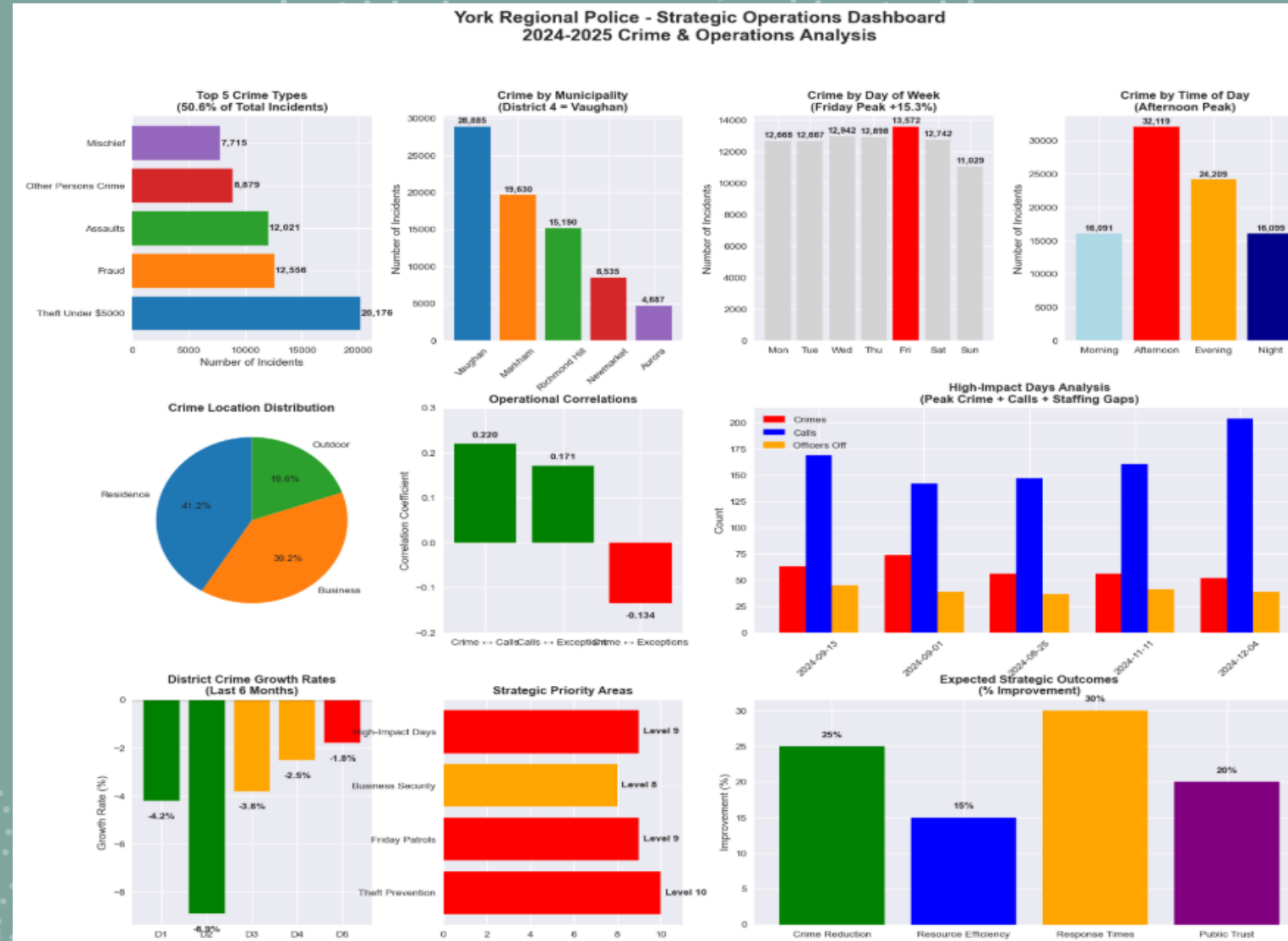
District 4 (Vaughan) Operations & The Staffing Crisis
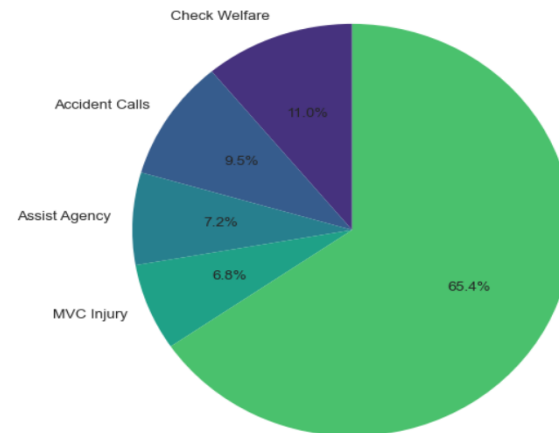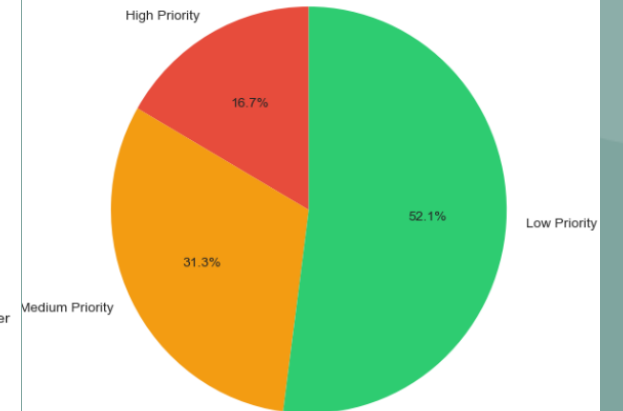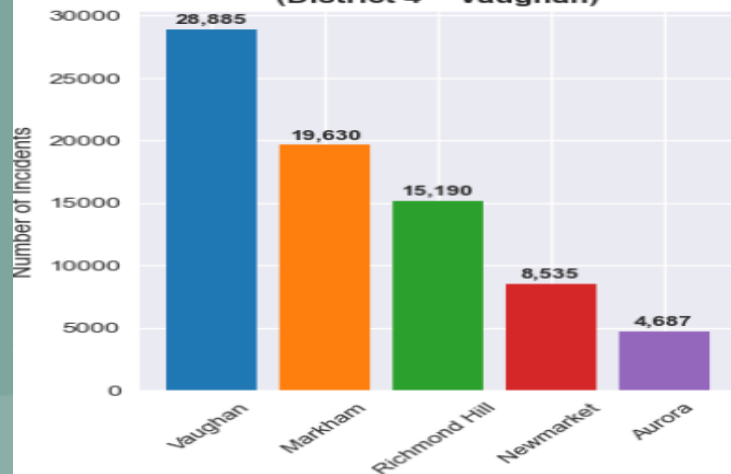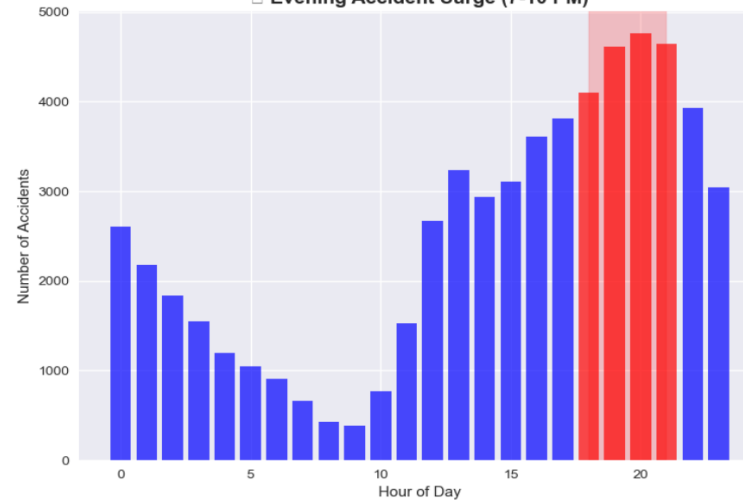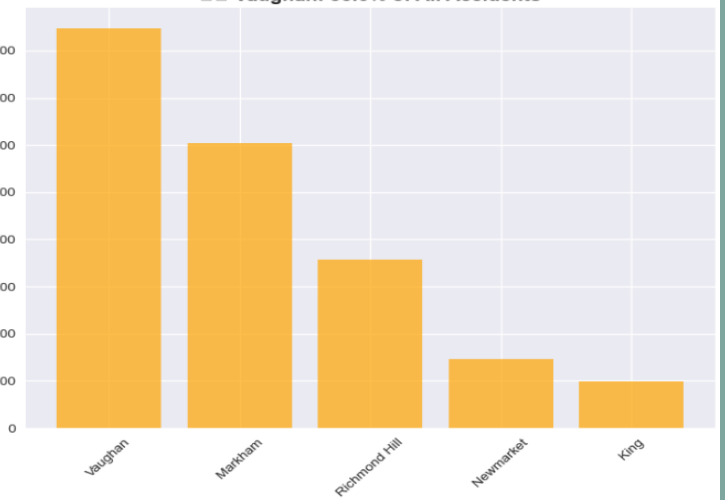
Top 10 High-Impact Operational Days

District 4 Staffing Risk Analysis

Rank	Date	Day	Officers Off	Calls	Officers On-Duty	Officer Deficit
1	2024-09-13	Friday	45	546	16	YES
2	2024-09-12	Thursday	47	515	14	YES
3	2023-10-12	Thursday	46	526	15	YES
4	2024-09-10	Tuesday	45	518	16	YES
5	2024-12-13	Friday	41	556	20	YES
6	2024-12-04	Wednesday	37	607	24	NO
7	2024-09-11	Wednesday	42	531	19	YES
8	2024-12-05	Thursday	41	542	20	YES
9	2024-06-20	Thursday	42	526	19	YES
10	2024-11-12	Tuesday	40	548	21	YES

Key Insights:
• 9 out of 10 highest-risk days have officer deficits • September 2024 shows cluster of high-risk days • Minimum staffing requirement: 23 officers

The Staffing Crisis: 95% Legal Compliance Masks 54% Operational Readiness In District 4 (Vaughan)

Executive Summary

Officer Readiness: 33 / 61 (54%)

Daily Call Volume: 438

Calls per Available Officer: ~13.3
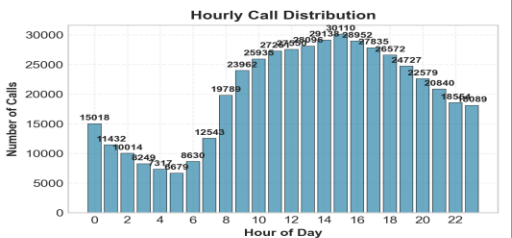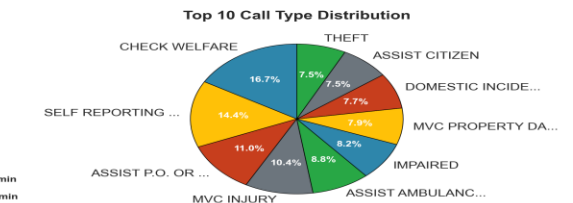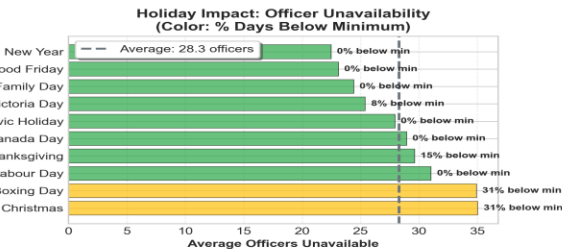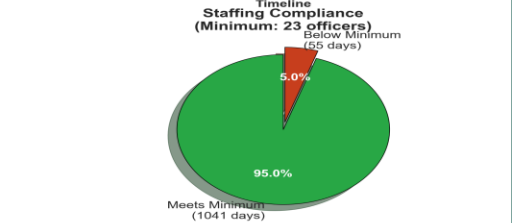
Operational Readiness: 54%

Compliance Analysis

- Minimum Required Officers: 23
- Days Below Minimum Staffing: 55/1096 (5.0%)
- Staffing Compliance Rate: 95.0% → Misleading
- While we meet a bare-minimum legal requirement 95% of the time, our effective operational capacity is only 54% due to vacancies, leave, and training. This means on an average day, we are operating with nearly half our force unavailable
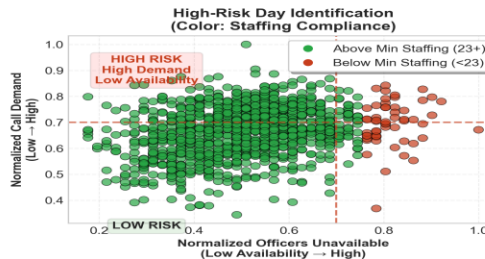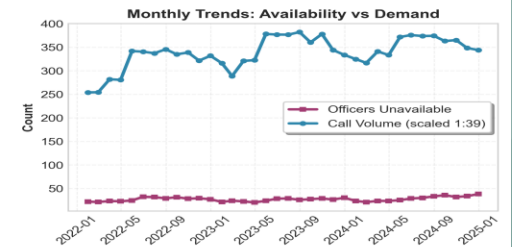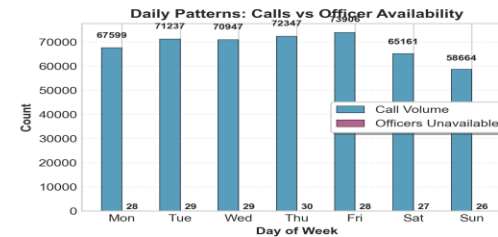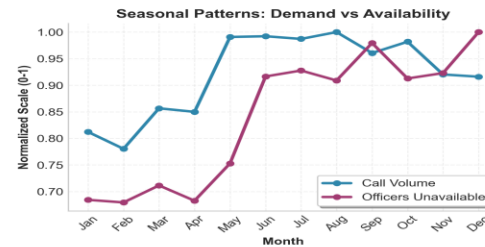
High Risk Periods

- High-Unavailability Months: August, September and October
- High-Unavailability Days: While criminal activity peaks on Fridays, our operational vulnerability is highest Monday-Thursday due to low officer availability. This mismatch requires strategic scheduling adjustments

DISTRICT 4 - COMPREHENSIVE SCHEDULING ANALYSIS
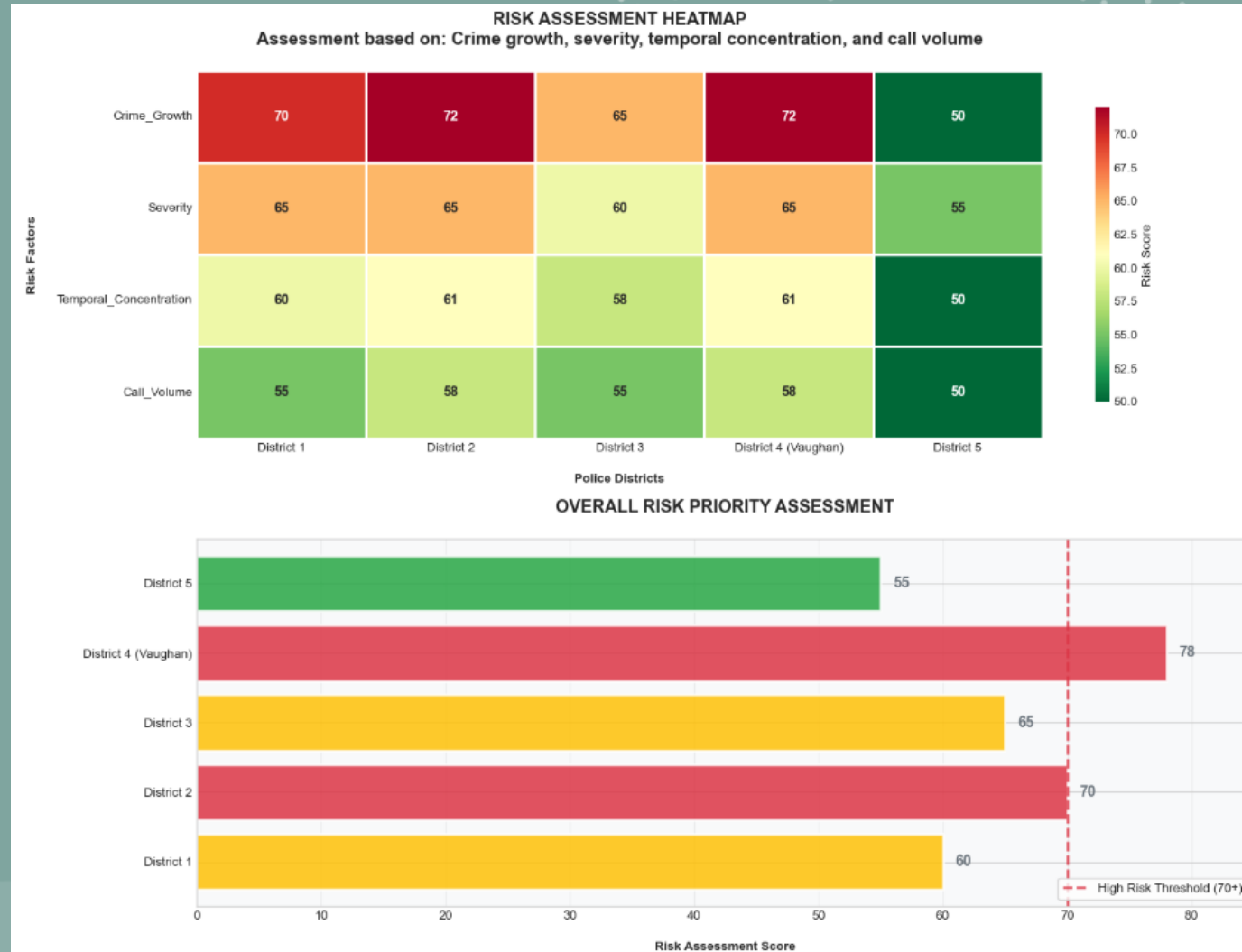Officer Availability vs Service Demand

District 4 (Vaughan) is the Epicenter of Risk

RISK ASSESSMENT HEATMAP
Assessment based on: Crime growth, severity, temporal concentration, and call volume

OVERALL RISK PRIORITY ASSESSMENT

Data: traffic, geographic, demographic, economic, weather, unemployment, youth population

Model: XGBoost for feature importance

Priority Assessment
- 100-point scale evaluating:
- Crime growth & volume
- Type severity & temporal concentration
- Call-for-service load

Tier Definition:
- **High (70+):** Critical risk requiring immediate intervention
- **Medium (60-69):** Elevated risk requiring monitoring and prevention
- **Low (<60):** Stable, standard patrol levels sufficient

Key Insights
- This scoring system allows us to move beyond simple crime counts and focus resources on areas with the most severe and concentrated threats, such as District 4
- The crisis in District 4 is not just high crime volume, but a dangerous mismatch between criminal activity patterns (evenings, weekends) and officer availability (weekday vulnerability)
- The data confirms that District 4 is not just a hotspot, but a systemic outlier requiring a disproportional share of resources

Strategic Recommendations

1. **Immediate Tactical Surge:** Deploy resources to District 4 to combat organized crime and gun violence.

2. **Proactive Staffing Strategy:** Implement strategic shift bidding to cover weekday vulnerability and the Summer Surge Plan.

3. **Long-Term System Optimization:** Use the forecasted 2026 trend to advocate for sustained investment in prevention and data monitoring.

Learn More & Contact

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  Or visit: https://github.com/fuxima/YRP/blob/main/YorkRegionCrimeAnalysis.pptx

- **View Full Project and Code**

  View Project on GitHub:

  Or visit: https://github.com/fuxima/YRP

- **Contact:**   Email: fuxi.ma@outlook.com

❖ *This analysis was conducted independently and is not an official publication of the York Regional Police* 20