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IMPACT OF BUS RAPID TRANSIT (BRT) ON TRAFFIC, BUILT ENVIRONMENT, AND ENVIRONMENTAL SUSTAINABILITY IN A TRAVEL CORRIDOR: OGDEN EXPRESS (OGX) BEFORE-AND-AFTER STUDY

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16. Abstract

Public transportation projects like Light Rail Transit (LRT) and Bus Rapid Transit (BRT) are often hailed for their potential to enhance urban accessibility and environmental quality (Ewing et al., 2014). Previous research has demonstrated that the introduction of Utah Valley Express (UVX) led to significant improvements, including reduced traffic congestion, lower crash rates, decreased emissions, and boosted development activity and property values in adjacent areas (Kim & Ewing, 2024).

With these promising results in mind, the Ogden Express (OGX) was introduced in August 2023 to address the growing demand for efficient, high-capacity transit in Weber County, particularly between key locations such as Ogden Central Station, McKay-Dee Hospital, and Weber State University (WSU). However, Weber County's unique sociodemographic, geographic, and traffic characteristics introduce uncertainties regarding whether OGX will yield benefits similar to those observed with UVX. The absence of such evidence could challenge the perceived legitimacy of BRT implementations and undermine future public transportation initiatives.

This study seeks to address these uncertainties by thoroughly assessing the impact of OGX on various aspects of the local environment, including traffic patterns (e.g., traffic volume, travel speed, crash rates), land use and market dynamics, and climate-related factors (e.g., potential emissions). Drawing on the methodology used in the UVX study, this research will employ time series analysis to monitor and evaluate the effects of OGX over time.

Given the potential for Salt Lake City to host future Olympic Games and the associated emphasis on environmental sustainability, understanding the impact of OGX is not just critical for local transit planning but also for broader regional strategies. The findings from this research will provide essential evidence to support the continued development of BRT systems and contribute to sustainable transportation planning efforts, ensuring that future projects maximize positive outcomes for traffic, the built environment, and climate.

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UNIT CONVERSION FACTORS

SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	$candela/m^2$	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
°C	Celsius	1.8C+32	Fahrenheit	°F
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	$candela/m^2$	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. (Adapted from FHWA report template, Revised March 2003)

LIST OF ACRONYMS

UDOT	Utah Department of Transportation
UTA	Utah Transportation Authority
WFRC	Wasatch Front Regional Council
MAG	Mountainland Association of Governments
FHWA	Federal Highway Administration
BRT	Bus Rapid Transit
NHTSA	National Highway Traffic Safety Administration
UVX	Utah Valley Express
UVU	Utah Valley University
BYU	Brigham Young University
LRT	Light Rail Transit
CBD	Central Business District
ITS	Intelligent Transportation System
AADT	Annual Average Daily Traffic
CCS	Continuous Count Stations
VPD	Vehicles Per Day
EIA	Energy Information Administration
VMT	Vehicle Miles Traveled
ITE	Institute of Transportation Engineers
TTI	Travel Time Index
EPA	Environmental Protection Agency
CCD	A Census County Division

EXECUTIVE SUMMARY

This report evaluates the early impacts of the Ogden Express (OGX) Bus Rapid Transit (BRT) system following its launch in August 2023. OGX is a 5.3-mile, electric BRT line connecting Ogden Central Station, downtown Ogden, Weber State University, and McKay-Dee Hospital. The project represents a major multimodal investment in Weber County, intended to improve transit accessibility, enhance corridor safety, and support sustainable urban development.

Using a rigorous, multi-method evaluation framework, this study assesses OGX's impacts on traffic conditions, transit ridership, roadway safety, parking dynamics, and residential land markets. The analysis combines three complementary quasi-experimental approaches: (1) before-after comparisons, (2) before-after with a control corridor using Difference-in-Differences (DiD), and (3) Interrupted Time Series (ITS) analysis. Washington Boulevard (between 25th and 40th Streets) serves as the control corridor. The study period spans 2020-2025, capturing pre-implementation, launch, and early post-implementation conditions. Key findings are summarized below:

Traffic Volumes

Vehicle traffic along the OGX corridor continued to grow after implementation, but at a significantly slower rate than before OGX and relative to the control corridor. Difference-in-Differences results show that post-implementation traffic growth along the OGX corridor was approximately 5-6 percent lower than what would have been expected absent the BRT. Interrupted Time Series analysis confirms that observed traffic volumes remained within 1-2 percent of projected pre-BRT trends. Together, these findings indicate that OGX helped stabilize corridor traffic demand without inducing excess vehicular travel or diverting traffic to adjacent streets.

Transit Ridership

Transit ridership experienced the most pronounced and immediate impact. Corridor-level ridership more than doubled between 2022 and 2024 and remained substantially elevated in 2025, even after seasonal standardization. Difference-in-Differences analysis shows that observed ridership exceeded projected "no-BRT" levels by approximately 54 percent in 2024 and remained nearly 6 percent higher in 2025. Interrupted Time Series results indicate a structural upward shift in transit demand of 38-77 percent beyond pre-OGX trends. Ridership gains were strongest at major activity centers, including Weber State University, Dee Events Center, and Ogden Central

Station, demonstrating OGX's effectiveness as a regional mobility spine and first-/last-mile connector.

Roadway Safety

Overall crash rates along the OGX corridor declined following implementation. Total crashes per 100 million vehicle-miles traveled decreased by approximately 14 percent in the post-BRT period, compared to a 4 percent reduction along the control corridor. This yields a net DiD safety improvement of roughly 10 percentage points attributable to OGX. Interrupted Time Series analysis further confirms that post-implementation crash rates fell below projected levels based on pre-BRT trends. While injury crashes increased modestly, the increase was smaller than in the control corridor, suggesting that corridor redesign elements, such as lane organization, signal coordination, and improved crossings, contributed to safer overall operations.

Parking Supply and Demand

Parking supply within a half mile of the OGX corridor declined slightly (less than 1 percent) due to right-of-way reallocation. In contrast, parking demand increased by more than 50 percent between 2021 and 2025. Both DiD and ITS analyses show parking demand exceeding projected counterfactual levels by 15–27 percent after OGX implementation. Rather than indicating increased automobile dependence, this pattern likely reflects higher corridor activity levels, park-and-ride behavior near major stations, and increased economic and institutional activity stimulated by improved accessibility. The findings highlight the importance of pairing high-capacity transit investments with proactive parking management strategies.

Residential Market Values

Residential property values within the OGX corridor increased substantially (approximately 37 percent) between 2021 and 2025. However, most appreciation occurred prior to OGX opening, during the planning and construction phase. Post-implementation growth slowed to roughly 9–10 percent and slightly underperformed control-based projections. This suggests that anticipated accessibility benefits were capitalized into prices before service began, with post-opening years reflecting market adjustment amid broader economic conditions. Continued monitoring is needed to assess longer-term development and value effects, particularly as land-use policies evolve.

Overall, the Ogden Express BRT has delivered measurable early benefits across multiple performance dimensions. OGX significantly increased transit ridership, improved overall roadway safety, and helped stabilize traffic growth without generating congestion or traffic diversion. At the same time, increased parking demand and steady traffic volumes indicate that the corridor has become more active and attractive, consistent with improved accessibility rather than auto-oriented growth. Land market responses appear to be phased, with early anticipation effects preceding operational impacts. OGX is performing as intended: enhancing multimodal mobility, improving safety, and supporting corridor vitality. Continued monitoring, along with supportive land use, parking, and multimodal policies, will be critical to fully realizing long-term transit-oriented development and sustainability outcomes in the corridor.

1.0 INTRODUCTION

Public transportation projects like Light Rail Transit (LRT) and Bus Rapid Transit (BRT) are often hailed for their potential to enhance urban accessibility and environmental quality (Ewing et al., 2014). Previous research has demonstrated that the introduction of Utah Valley Express (UVX) led to significant improvements, including reduced traffic congestion, lower crash rates, decreased emissions, and boosted development activity and property values in adjacent areas (Kim & Ewing, 2024).

With these promising results in mind, the Ogden Express (OGX) was introduced in August 2023 to address the growing demand for efficient, high-capacity transit in Weber County, particularly between key locations such as Ogden Central Station, McKay-Dee Hospital, and Weber State University (WSU). However, Weber County's unique sociodemographic, geographic, and traffic characteristics introduce uncertainties regarding whether OGX will yield benefits similar to those observed with UVX. The absence of such evidence could challenge the perceived legitimacy of BRT implementations and undermine future public transportation initiatives.

This study seeks to address these uncertainties by thoroughly assessing the impact of OGX on various aspects of the local environment, including traffic patterns (e.g., traffic volume, travel speed, crash rates), land use and market dynamics, and climate-related factors (e.g., potential emissions). Drawing on the methodology used in the UVX study, this research will employ time series analysis to monitor and evaluate the effects of OGX over time.

Given the certainty of Salt Lake City hosting future Olympic Games and the associated emphasis on environmental sustainability, understanding the impact of OGX is not just critical for local transit planning but also for broader regional strategies. The findings from this research will provide essential evidence to support the continued development of BRT systems and contribute to sustainable transportation planning efforts, ensuring that future projects maximize positive outcomes for traffic, the built environment, and climate.

The primary objective of this research project is to comprehensively evaluate the impact of the Ogden Express (OGX) on Weber County's traffic, built environment, and climate. The research will provide a detailed analysis of how the introduction of OGX has influenced traffic patterns, land use changes, property values, and environmental factors such as emissions. This evaluation will be conducted using time series analysis to monitor and assess these impacts over time, ensuring a thorough understanding of OGX's effects.

1. **Traffic Analysis:** To assess changes in traffic volume, travel speed, crash rates, and trip generation within the OGX corridor, providing insights into how the new BRT line affects road use and safety.

2. **Built Environment Impact:** To examine shifts in land use patterns, parking availability, and land market values surrounding the OGX corridor, identifying any trends in urban development linked to the BRT system.

3. **Environmental Impact:** To measure potential emissions changes resulting from the introduction of OGX, evaluating its contribution to environmental sustainability goals.

4. **Policy and Planning Implications:** To develop strategies and recommendations for future transportation projects, particularly in the context of the upcoming Olympic Games, based on the findings of this study.

5. **Public Transit Legitimacy:** To reinforce the case for BRT and other public transit initiatives by providing evidence of their benefits, thereby supporting continued investment in sustainable transportation infrastructure.

To comprehensively capture the impacts of OGX, this study will employ a multi-method approach. Specifically, it will use three complementary methods: a before-after analysis without a control group, a before-after analysis with a control group, and an interrupted time series analysis. These methods will allow for a robust assessment of changes attributable to the introduction of OGX while accounting for broader trends and external factors. Washington Boulevard (between 25th and 40th Street), a comparable principal arterial corridor not served by BRT, has been selected as the control group. The study period spans from 2020 to 2025, with 2020–2022 representing the pre-treatment period, 2023 as the treatment year marking the launch of OGX, and 2024–2025 serving as the post-treatment period. To allow for a more detailed analysis, the OGX corridor is divided into three sections: Section 1 between Ogden Central Station and 25th & Harrison, Section 2 between 25th & Harrison and 36th Street, and Section 3 between 36th Street and McKay-Dee Hospital. The results from this comprehensive, multi-method analysis will provide valuable insights into the traffic, land use, and environmental impacts of the OGX project.

The remainder of this report is organized to provide a logical progression from background to findings. Following this introduction, Chapter 2 presents a comprehensive literature review on the impacts of BRT systems on transportation management, land use, socioeconomics, and affordable housing, as well as their role in promoting transit-oriented development. Chapter 3 describes the OGX project in detail, while Chapter 4 outlines the study area and timeframe. Chapters 5 through 9 present the core analyses, including evaluations of traffic volume, transit ridership, automobile speeds, crash rates, parking supply, and emissions impacts, each supported by data collection methods, analytical procedures, and results. The report concludes in Chapter 10 with a summary of key findings, policy implications, and recommendations for future transportation planning. Together, these sections aim to provide a comprehensive evaluation of the OGX project’s impacts on Weber County's traffic, built environment, and climate outcomes.

2.0 LITERATURE REVIEW

2.1 Overview

The growing adoption of Bus Rapid Transit (BRT) systems across the U.S. is reshaping urban transportation and land use dynamics, spurring debates on the effectiveness of BRTs in fostering Transit-Oriented Development (TOD) and improving urban livability. Prominent amongst many of the controversies and questions surrounding BRT-oriented TODs are: Can BRTs truly catalyze the same kinds of dense, walkable, mixed-use developments traditionally associated with rail systems? How do they influence economic growth, affordable housing, and broader transportation goals? This literature review seeks to explore the existing scholarship and emergent research on BRT systems, focusing on six critical themes: relationships between BRTs and TODs, transportation system management, land use and transportation interactions, socio-economic growth, affordable housing, and the promotion of transit-oriented communities. Together, these themes contribute to a comprehensive understanding of the opportunities and challenges associated with BRT-based TODs for next-generation transportation systems.

2.2 Positive and Negative Relationships Between BRTs and TODs

Research demonstrates that BRT systems can significantly support TOD, particularly by enhancing transit accessibility and promoting sustainable urban growth. Like rail-based transit, BRTs have the potential to attract high-density, mixed-use development around transit stations, leading to increased land values and changes in land use patterns. For instance, Cervero and Dai (2014) found that BRT systems in Curitiba, Brazil, and Bogota, Colombia, spurred TOD by attracting significant private sector investment near BRT corridors. Similarly, BRT lines in cities such as Cleveland and Pittsburgh have encouraged urban revitalization and pedestrian-friendly environments around transit stations, a hallmark of successful TODs (Deng & Nelson, 2011). However, BRTs often face challenges in delivering the same level of TOD impact as rail-based systems. A key limitation is the inconsistent design quality and service standards of BRT systems, which can weaken their ability to attract development. Kim and Ewing (2024) submit that the lack of dedicated lanes, insufficient service frequency, and inconsistent land use policies can undermine BRT systems' effectiveness in fostering TOD. Additionally, local real estate markets and public

perceptions of BRTs as inferior to rail-based systems can result in slower or less intensive land use changes around BRT corridors (Rodríguez & Vergel-Tovar, 2022). The variability in BRT performance highlights the need for supportive policy frameworks to maximize TOD outcomes.

2.3 Impacts of BRTs on Transportation Systems Management

BRT systems play a vital role in modern transportation systems management by offering cost-effective, flexible, and scalable transit solutions. Studies have shown that BRTs contribute to alleviating congestion, reducing travel times, and enhancing network efficiency, particularly in cities where the introduction of light rail or subway systems would be financially prohibitive. According to Currie and Delbosc (2014), BRT systems can move large numbers of passengers efficiently when properly integrated with existing bus networks and equipped with features such as dedicated lanes, traffic signal priority, and enhanced stations. The implementation of BRTs also allows cities to optimize the use of existing roadway infrastructure, thereby reducing the need for costly new transit infrastructure (Sun et al., 2024). However, there are trade-offs. While BRTs improve service quality and reduce operating costs compared to traditional bus services, they often face opposition from stakeholders who prioritize automobile use. Litman (2015) discusses the political and public resistance that arises when dedicated BRT lanes reduce the capacity for private vehicles, creating a tension between maximizing transit efficiency and accommodating all road users. This points out the importance of effective transportation systems management that balances the needs of diverse stakeholders.

2.4 Impacts of BRTs on Land Use and Transportation

The relationship between BRTs and land use is well-established, with BRTs influencing land use decisions in ways similar to rail-based transit systems. By providing reliable, high-capacity transit options, BRTs encourage densification and transit-oriented land use patterns. This shift can reduce the dependence on private vehicles and promote more sustainable, compact urban forms. In Latin American cities such as Bogota, BRT systems have led to significant changes in land use along transit corridors, with new residential and commercial developments clustering near BRT stations (Munoz-Raskin, 2010). In the U.S., however, the impacts of BRT on land use vary depending on local market conditions and planning policies. Cities with supportive zoning

regulations and incentives for transit-oriented development are more likely to see land use changes that align with BRT corridors. For example, a study by Cervero and Sullivan (2011) found that transit-supportive zoning, density bonuses, and tax increment financing (TIF) can enhance the likelihood of TOD outcomes around BRT stations. Kim and Ewing's (2024) study on the impacts of the Utah Valley Express (UVX) BRT line also found that BRT-Light spurred notable land-use development in surrounding areas and led to a rise in transit trip generation. Some studies also indicate that residents of TODs who utilize available transit, walking, and biking options can significantly reduce their transportation expenses (Ewing et al., 2015; Ewing et al., 2017). This urban design reduces car trips, decreases parking needs, and encourages a shift away from personal vehicle use. Hamidi and Ewing (2015) further affirm this by showing that while housing costs may be higher in urban centers, the savings in transportation expenses more than compensate for the increased housing prices. Yet, in some cases, insufficient coordination between land use planning and transit investments can result in missed opportunities for TOD, particularly in regions where car-centric development patterns dominate (Nikitas & Karlsson, 2015).

2.5 Impacts of BRTs on Economic Growth

The economic benefits of BRTs are multi-faceted, with direct impacts on transit ridership, local business development, and regional economic growth. Empirical research has shown that BRT and TOD systems can boost economic activity by improving transportation access to jobs, supporting commercial activity near transit corridors, and enhancing regional connectivity (Nelson et al., 2013; Duncan, 2011; Ahlfeldt & Wendland, 2009). In Cleveland, the HealthLine BRT has been linked to approximately $6 billion in private-sector investment along the corridor, accentuating the economic potential of well-planned BRT systems (Patterson, 2015). However, the extent to which BRTs stimulate economic growth depends on factors such as station location, service quality, and local real estate markets. In slower-growth regions, BRT systems may struggle to catalyze significant economic development, particularly if local stakeholders view BRTs as less transformative than rail. Moreover, Ewing et al. (2022) argue that BRT's economic impacts are closely tied to complementary policies that encourage development, such as inclusionary zoning and public-private partnerships. Without these policies, BRT systems may have limited success in

promoting broad-based economic growth, especially in economically disadvantaged areas and for low-income households.

2.6 Impacts of BRTs on Affordable Housing

BRT systems also have the potential to support affordable housing development, particularly when transit agencies and municipalities implement policies that prioritize income-restricted housing near transit stations. Research shows that transit-oriented development can increase property values and spur gentrification, making housing less affordable for low-income residents. For instance, a recent study that cataloged affordable housing in TODs across the United States by Kaniewska, Ewing, Sabouri, & Ameli (2024) shows that while an average of 24% of housing units in TODs are affordable for households earning 50-80% of the Area Median Income (AMI), around half of these TODs and projects offer no designated or naturally occurring affordable units. To counteract this, cities have used various mechanisms, such as inclusionary zoning, Low-Income Housing Tax Credits (LIHTC), and density bonuses to ensure that TOD supports affordable housing development (Ibraeva et al., 2020). BRT-based TOD has not yet achieved the same level of focus on affordable housing as rail-based TOD. Nonetheless, emerging studies suggest that BRT systems can play a crucial role in expanding access to affordable housing. For example, Los Angeles has incorporated affordable housing requirements into its BRT projects to ensure that low-income residents benefit from increased transit access (Marquis et al., 2024). These approaches illustrate the potential for BRT-based TOD to contribute to equitable housing outcomes, but further research is needed to assess long-term impacts.

2.7 How BRTs Can Promote Transit-Oriented Development and Communities

BRT systems have several inherent advantages that can promote TOD and foster vibrant, transit-oriented communities. First, BRTs can be implemented quickly and at a lower cost than rail, allowing cities to deploy transit solutions in areas where light rail may not be feasible (Cervero, 2013). This enables smaller and mid-sized cities to benefit from TOD and create more walkable, mixed-use neighborhoods around BRT stations. Second, BRT systems can be designed with many of the features that support TOD, such as dedicated lanes, high-frequency service, and pedestrian-friendly infrastructure (Ibraeva et al., 2020; Munoz-Raskin, 2010). However, to fully

realize the potential of BRTs in promoting TOD, cities must integrate BRT planning with land use policies, zoning regulations, and affordable housing strategies. Litman (2017) emphasizes the importance of aligning transit investments with policies that encourage higher-density development, reduce parking requirements, and incentivize affordable housing. Moreover, local officials and planners must actively engage with communities to manage expectations and ensure that BRT investments reflect local needs and goals (Kim & Ewing, 2024). When these elements are in place, BRT systems can effectively promote sustainable, transit-oriented communities.

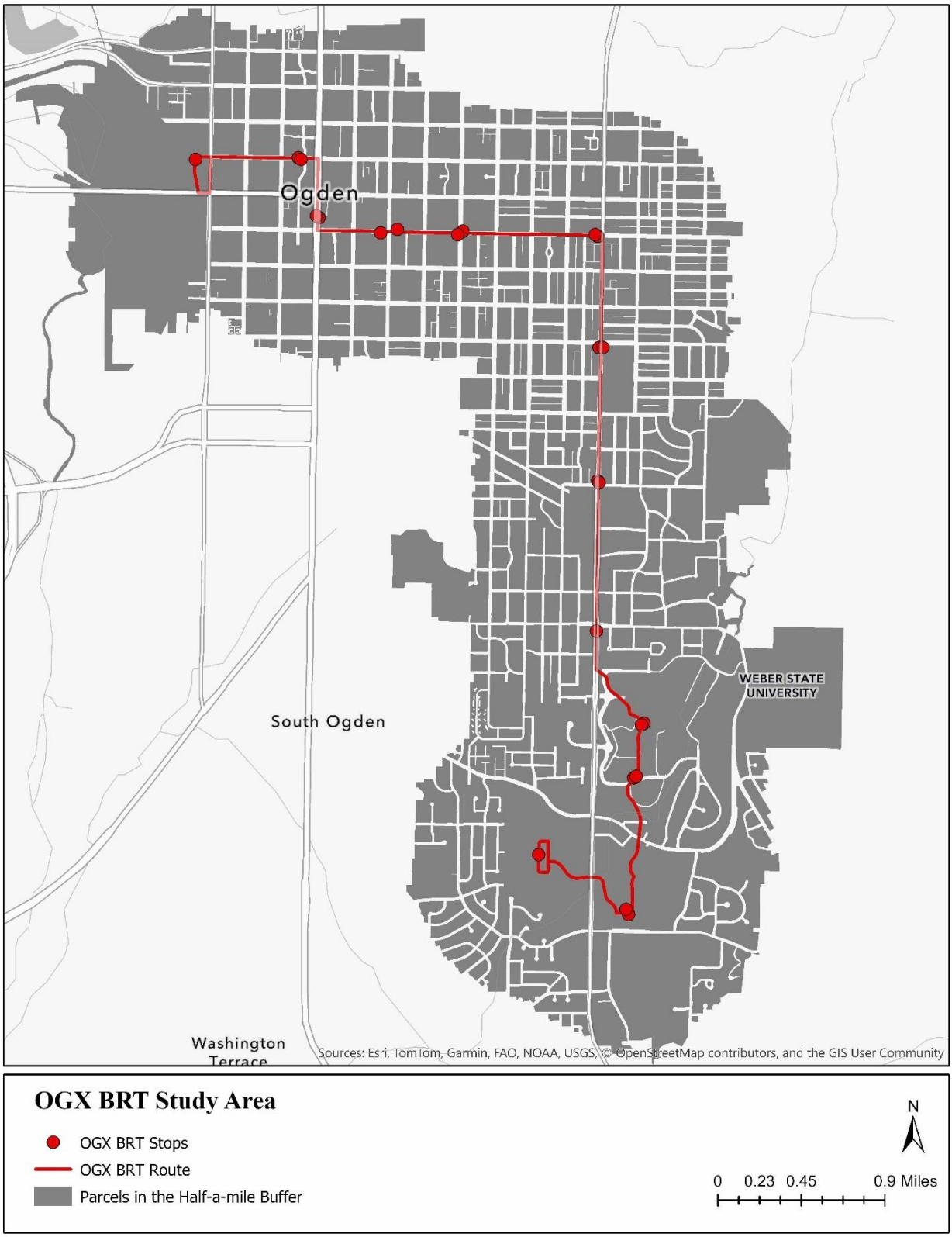
In summary, the literature reveals both opportunities and challenges associated with BRT systems and their potential to promote TODs. BRTs can drive significant land use changes, enhance transportation efficiency, and stimulate economic growth, but their success hinges on multiple interconnected factors. The relationship between BRTs and TODs is promising, yet variable – depending on the integration of supportive land use policies and transit design quality. Stand-alone, BRT systems have been shown to improve transportation system management by reducing congestion, promoting modal shifts, and optimizing travel efficiency. However, achieving these benefits requires coordinated planning and implementation efforts. While BRTs can support land use changes, economic growth, and affordable housing development, their success depends on a combination of high-quality transit design, supportive policies, and community engagement. As more cities invest in BRT systems, supplementary future research will be beneficial in identifying the policy tools, design variables, and community engagement strategies that maximize BRT's potential to shape equitable, sustainable urban development. For planners and policymakers, the implications are clear: to build sustainable and equitable transportation systems, BRT-oriented TODs must be integrated with broader urban planning efforts. This includes ensuring equitable access to affordable housing, supporting economic development without displacement, and designing transit systems that align with long-term community goals.

3.0 PROJECT OVERVIEW AND STUDY DESIGN

3.1 Project Description

The Ogden Express (OGX) is a Bus Rapid Transit (BRT) project developed by the Utah Transit Authority (UTA) to enhance public transportation in Ogden, Utah. Officially launched on August 20, 2023, OGX connects Ogden Central Station to McKay-Dee Hospital, passing through downtown Ogden and the Weber State University (WSU) campus. The 5.3-mile route comprises 13 stations, including key locations such as Lindquist Field, The Junction, Ogden High School, and the Dee Events Center (See Figure 1). OGX operates electric buses along dedicated center-running lanes on Harrison Boulevard and features transit signal priority to improve travel times. The service is free for riders for the first three years, with buses running every 10–15 minutes on weekdays and every 15–30 minutes on weekends.

Figure 1. OGX BRT Study Area


Ogden
South Ogden
Washington Terrace
WEBER STATE UNIVERSITY
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
OGX BRT Study Area
OGX BRT Stops
OGX BRT Route
Parcels in the Half-a-mile Buffer
N
0 0.23 0.45 0.9 Miles

The project was a collaborative effort involving UTA, Weber State University, Ogden City, and other stakeholders. Construction began in April 2021, following years of planning and community engagement. The total capital cost of the project was approximately $120 million, funded through a combination of federal grants and local contributions. OGX aims to provide a reliable, efficient, and sustainable transit option that supports regional growth and reduces environmental impact.

3.2 Study Area, Segmentation, and Time Frame

For this study, we selected a 0.5-mile buffer area on either side of the Ogden Express (OGX) alignment as the study corridor. This buffer distance was chosen based on established practices in transit planning, where a 0.5-mile (800-meter) radius is commonly used to represent the catchment area for high-capacity transit stations. This standard is supported by research indicating that such distances effectively capture the majority of transit users who access stations by walking. For instance, a study by El-Geneidy et al. (2014) found that the 85th percentile walking distance to bus transit services is approximately 524 meters, while for commuter rail services, it extends to about 1,259 meters. Similarly, Hess and Almeida (2007) utilized a 0.5-mile buffer to assess the impact of light rail transit on property values, reinforcing the relevance of this distance in transit-oriented studies. The same distance was used in the 2014 study by Ewing et al. These findings underscore the appropriateness of the 0.5-mile buffer in evaluating the influence of transit systems on surrounding areas.

To measure the impacts of OGX, we use a before-after research design that incorporates several distinct time periods. The "before" period includes the years 2020, 2021, and 2022, while 2023 marks the "treatment" year during which OGX was launched and began service. The "after" period will primarily use 2024 data, with future monitoring planned for 2025 to capture early post-implementation effects.

Given that the OGX service officially opened in August 2023, the 2024 analysis will reflect initial impacts, recognizing that some effects, particularly in the built environment, may require longer-term observation to fully materialize. In addition to the primary study corridor, Washington Boulevard between 25th and 40th Street has been selected as the control corridor to help isolate the specific impacts of OGX from broader external trends.

Unlike previous studies, the COVID-19 pandemic does not significantly affect this project's timeframe, as the most heavily impacted year (2020) is included as a baseline condition rather than an evaluation year. Nonetheless, ongoing sensitivity to post-pandemic travel behavior changes will be considered when interpreting results. The study area and timeframe are summarized in Table 1 and illustrated in Figure 2.

Table 1: OGX BRT Study Time Frame

Description		Date
Start of construction		April 2021
Operation started		August 20, 2023
Timeframe of the study	"before" period	2021 - 2022
	"treatment" period	2023
	"after" period	2024 - 2025

To enable a more accurate and context-sensitive analysis of the Ogden Express (OGX) Bus Rapid Transit (BRT) system, the corridor has been divided into three distinct sections. This segmentation is based on differences in roadway functional classification, land use patterns, traffic conditions, and surrounding urban context, all of which influence how the BRT interacts with existing transportation and land use systems. The corridor covers the route between Ogden Central Station, McKay-Dee Hospital, and Weber State University (WSU), segmented into three sections: Section 1 (Ogden Central to 25th & Harrison), Section 2 (25th & Harrison to 36th Street), and Section 3 (36th Street to McKay-Dee Hospital).

Section 1: Ogden Central Station to 25th & Harrison

This segment begins at Ogden Central Station, where it connects OGX BRT to the FrontRunner, the regional commuter rail system, and runs east on 23rd Street, south on Washington Boulevard, and east again on 25th Street to the intersection at Harrison Boulevard. The segment passes through the heart of downtown Ogden, an area characterized by mixed-use land development, institutional facilities, and high pedestrian activity. The roadway network in this section includes 23rd Street (Minor Collector), Washington Boulevard (Principal Arterial), and 25th Street (Minor Collector). These varying classifications reflect both the need for local

access and regional traffic movement. The diversity in land use and traffic function makes this section a critical area for evaluating how BRT performs in a dense, multi-modal urban environment.

Section 2: 25th & Harrison to 36th Street

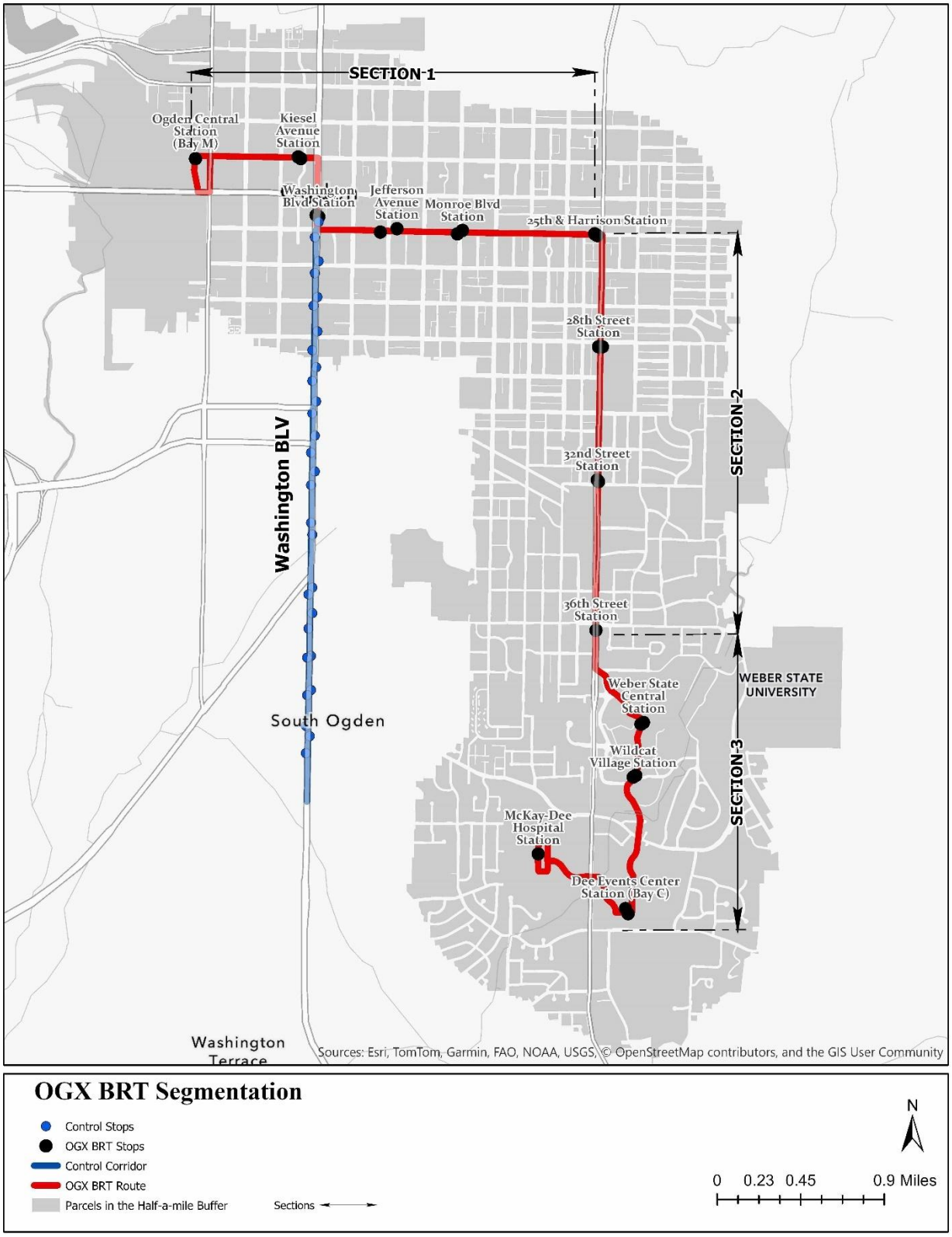
This segment travels south along Harrison Boulevard, which is classified as a Principal Arterial. It represents a key transition between the urban core and surrounding residential neighborhoods. The corridor here is more linear, with consistent arterial characteristics, but the land use becomes increasingly residential with some commercial nodes. This section is particularly important for examining how BRT interacts with moderate-volume, high-speed arterial traffic and how it affects access to and from adjacent neighborhoods and local businesses.

Section 3: 36th Street to McKay-Dee Hospital

This final segment begins with a continuation on Harrison Boulevard (Principal Arterial), then diverts onto a dedicated busway, Playfield Way, that traverses the Weber State University (WSU) campus. It continues on E 4600 S (Major Collector) before rejoining Harrison Boulevard briefly and terminating at McKay-Dee Hospital via Oakcrest Drive, a hospital access road. This segment features a distinct mix of infrastructure types, transitioning from traditional arterials to exclusive transit right-of-way within the university and institutional zones. The area is dominated by institutional land uses and high pedestrian volumes. This section allows for analysis of BRT performance in low-conflict environments and the effectiveness of transit-exclusive infrastructure in improving reliability and access to major regional destinations.

This segmentation strategy ensures that each portion of the OGX corridor is evaluated within its appropriate physical and functional context, enabling more precise measurement of the BRT system's localized impacts on traffic dynamics, land use, and accessibility.

Figure 2. BRT Line, Study Segmentation, and Study Area (0.5 miles buffered area from BRT line)



3.3 Methodology

This study employs a quasi-experimental research design to evaluate the impacts of the OGX BRT system on traffic, land use, and environmental indicators. Quasi-experimental designs are commonly used in transportation studies, particularly when randomized controlled trials (RCTs) are impractical due to logistical, ethical, or financial reasons. Such designs approximate the causal inference capabilities of RCTs by comparing conditions before and after an intervention, either with or without the presence of a control or comparison group (Mark & Reichardt, 2009). Given the real-world policy context and the inability to randomly assign treatments (such as infrastructure investments like BRT systems), quasi-experimental approaches are ideal for evaluating transportation interventions (Shadish, Cook, & Campbell, 2002).

Under this broad methodological framework, this study applies three complementary approaches: a simple before-after comparison, a before-after study with a control group (difference-in-differences), and an interrupted time series analysis (ITS). Each method offers distinct advantages and strengthens causal inference by addressing different threats to internal validity.

3.3.1 Before-After Without a Control Group

This method examines the OGX corridor conditions during a pre-implementation period (2021–2022) against a post-implementation period (2024-2025), explicitly designating 2023 as the intervention year. By measuring and comparing critical indicators, including traffic volumes, transit ridership, crash rates, parking supply, and land market values before and after the OGX implementation, this method identifies immediate and direct impacts attributable to the BRT system.

However, the before-after approach without a control group is vulnerable to certain validity threats, primarily from confounding external factors and broader regional trends that might influence the measured outcomes independently of the intervention itself (Sedgwick, 2014). Thus, this method provides initial evidence of change but requires complementary methods to isolate the OGX intervention's true causal impact.

3.3.2 Before-After With a Control Group (Difference-in-Differences)

To enhance the robustness of causal claims, a before-after design with a control group (also known as difference-in-differences or DiD) is often implemented. This approach introduces a comparable control corridor, Washington Boulevard between 25th and 40th Street, that closely mirrors the OGX corridor in terms of functional classification, traffic characteristics, surrounding urban form, and demographic profiles but does not experience the BRT intervention.

The DiD method involves calculating the difference in outcome variables for both treatment (OGX) and control (Washington Blvd) groups between pre- and post-intervention periods. The resulting comparison controls for external temporal effects (such as regional economic conditions, seasonal variations, or demographic shifts) that are not related to the BRT intervention itself (Fayish & Gross, 2010). The strength of the DiD method lies in its ability to reduce biases due to unobserved heterogeneity by assuming parallel trends between treatment and control groups. Any deviations from parallel trends post-intervention can thus be reasonably attributed to the OGX implementation (Angrist & Pischke, 2009).

3.3.3 Interrupted Time Series (ITS)

The interrupted time series (ITS) approach enhances the analysis further by assessing long-term trends across multiple sequential observations before and after the OGX intervention. ITS enables researchers to identify and quantify any statistically significant shifts or breaks in trends that correspond directly to the timing of the intervention (Bernal et al., 2017). Unlike simpler before-after designs, ITS analysis explicitly models pre-existing trends and can account for autocorrelation in repeated observations, thereby providing stronger evidence of causal inference and improved temporal precision compared with simple pre–post designs. This approach is particularly useful in transportation research, where impacts might be delayed, cumulative, or gradual rather than instantaneous. For example, transit ridership and land use patterns may evolve incrementally after the introduction of the OGX, necessitating the detailed and extended temporal scrutiny ITS affords (Wagner et al., 2002). By modeling outcome data monthly or quarterly across multiple years, this approach can isolate immediate (level changes) and gradual (trend changes) impacts, contributing nuanced insights into how quickly and sustainably OGX influences traffic, emissions, and urban development (Linden, 2015).

Overall, the triangulation of findings from these three complementary methods, simple before-after analysis, DiD comparisons, and ITS modeling, provides a comprehensive assessment framework, adds on to the methodological rigor, and enhances internal validity and causal inference.

4.0 DATA ANALYSIS AND RESULTS

4.1 Traffic Volume

To evaluate how the launch of the OGX BRT service influenced vehicle traffic patterns along the corridor, we analyzed changes in Annual Average Daily Traffic (AADT) before and after the system's implementation. This section outlines the sources, definitions, and structure of the AADT dataset used in our analysis and provides context for the three analytical methods that follow: Before-After Without a Control Group, Before-After With a Control Group (Difference-in-Differences), and Interrupted Time Series (ITS).

AADT data were obtained directly from the Utah Department of Transportation (UDOT), which maintains statewide traffic volumes derived from permanent count stations and short-duration counts adjusted for seasonal and daily factors. The dataset covers 2020-2024, capturing conditions before, during, and after the introduction of OGX in August 2023.

Annual Average Daily Traffic (AADT) is a standard metric used in transportation planning to represent the average number of vehicles passing a specific point on a roadway per day over the course of a year. It is calculated using the formula:

$$AADT = \frac{Total\ volume\ for\ the\ Year}{365}$$

In practice, UDOT uses a combination of permanent count stations and temporary volume studies, adjusted by seasonal and daily variation factors, to estimate AADT with reasonable accuracy across its highway network (UDOT, 2020).

The data provided by UDOT cover a five-year period from 2020 through 2024, capturing conditions before, during, and after the introduction of OGX in August 2023. Since 2025 is still ongoing, the data for this year was not provided. The dataset includes the following components:

- Treatment Corridor: AADT values for three distinct sections of the OGX alignment:
    - Section 1: Ogden Central Station to 25th & Harrison Station

    - Section 2: 25th & Harrison Station to 36th Street Station
    - Section 3: 36th Street Station to McKay-Dee Hospital
- Control Corridor: AADT values for Washington Blvd (between 25th to 40th Streets), a comparable arterial corridor not directly served by OGX.
- Half-Mile Buffer Averages: For both treatment and control areas, UDOT also provided weighted AADT averages for all traffic segments located within a half-mile buffer from the corridors. These buffers help capture corridor-adjacent travel activity and offer a more comprehensive view of regional travel demand changes.

The dataset was accompanied by the following key definitions and calculation notes from UDOT (see Table 2).

Table 2: AADT Dataset Key Definitions

Term	Definition
AADT	Annual Average Daily Traffic
Sec Length	Length of the roadway segment between the Begin Milepost and End Milepost
VMT	Vehicle Miles Traveled, calculated as AADT × Section Length
Weighted AADT	Total VMT for all sections ÷ Sum of all section lengths
Rounded AADT	Weighted AADT rounded to the nearest multiple of 100

Because roadway segments vary in length, a simple average of AADT values across segments would distort actual traffic patterns by giving equal weight to short and long sections. To address this, we rely on weighted average AADT, which accounts for segment length by proportionally weighting each segment's contribution. This approach provides a more accurate representation of corridor-level traffic demand. Weighted AADT is calculated using the following formula:

$$WeightedAADT = \frac{\sum(AADT_i \times Length_i)}{\sum(Length_i)} = \frac{\sum VMT_i}{\sum(Length_i)}$$

This metric is consistent with UDOT's own methodology and was included in the data provided to us. It allows for valid comparisons across years and between treatment and control areas.

4.1.1 Traffic Volume – Before-After Without a Control Group

This section examines changes in vehicular traffic volumes along the OGX BRT corridor before and after the system's implementation, using a simple before-after comparison without a control group. We used rounded weighted-average AADT values provided by UDOT for each of the three main sections of the treatment corridor, as well as streets within a half-mile buffer around each section. The dataset covers 2020 through 2025 (see Table 3), allowing observation of trends prior to, during, and after BRT construction and launch. OGX service officially began in August 2023, making 2023 the treatment year, 2024 the first full post-treatment year, and 2025 a projection based on the 2023–2024 trend.

The overall corridor trends across all three main sections of the OGX BRT corridor indicate that traffic volumes increased steadily from 2020 to 2024 and are expected to continue modest growth into 2025. The average cumulative growth (2020–2025) is approximately +19.0 % in Section 1 (27,900 → 33,200), +18.3 % in Section 2 (28,400 → 33,600), and +18.6 % in Section 3 (33,900 → 40,200).

These increases suggest a moderate but consistent upward trend in vehicular activity along the entire corridor, including during and after BRT implementation. The absence of a post-launch decline contradicts a common assumption that BRT projects immediately reduce auto travel. Instead, the steady pattern likely reflects broader regional traffic recovery after COVID-19, continued population and employment growth in Ogden, and possibly increased development activity around OGX stations.

Streets within a half-mile buffer of the OGX corridor show similar though slower growth: Section 1 (+15.4 %, 7,800 → 9,000), Section 2 (+18.2 %, 6,600 → 7,800), and Section 3 (+17.1 %, 11,100 → 13,000). The similarity of growth rates between the main corridor and adjacent network suggests a distributed effect in which rising traffic and accessibility extend beyond the BRT alignment itself. This pattern may reflect new development, temporary construction diversions, or broader land-use responses to the BRT investment.

The similarity of growth rates between the main corridors and surrounding streets suggests a distributed effect, where traffic growth is not only occurring on the BRT alignment but also across the wider local street network. This may reflect new development, shifting traffic patterns due to OGX-related construction, or increased accessibility brought by the BRT investment.

Table 3: Rounded Weighted Annual Average Daily Traffic (AADT) for OGX BRT Corridor and Surrounding Streets, 2020–2024

Section/Year		2020	2021	2022	2023	2024	2025**
OGX – Main Corridor	Section 1	27,900	30,900	31,600	32,200	32,700	33,200
	Section 2	28,400	31,400	32,200	32,800	33,200	33,600
	Section 3	33,900	37,600	38,400	39,200	39,700	40,200
OGX – Buffer Area	Section 1	7,800	8,500	8,600	8,800	8,900	9,000
	Section 2	6,600	7,300	7,400	7,600	7,700	7,800
	Section 3	11,100	12,200	12,400	12,600	12,800	13,000
Weighted Total (Main + Buffer)		38,567	42,633	43,534	44,400	45,000	45,600

** Note: At the time this report was drafted, the 2025 AADT data were not yet available from UDOT. Values for 2025 were estimated by extending the 2023–2024 trend (year-over-year growth ≈ 1.5 %) for each section.

Focusing on the before-BRT period (2020–2022) versus the post-BRT period (2023–2025) offers more insight into how OGX may have affected traffic behavior.

Main Corridor:

- Section 1: +13.3% before BRT (27,900 → 31,600), +3.1% after (32,200 → 33,200).
- Section 2: +13.4% before (28,400 → 32,200), +2.4% after (32,800 → 33,600).
- Section 3: +13.3% before (33,900 → 38,400), +2.6% after (39,200 → 40,200).

Half-Mile Buffer Streets:

- Section 1: +10.3% before (7,800 → 8,600), +2.3% after (8,800 → 9,000).
- Section 2: +12.1% before (6,600 → 7,400), +2.6% after (7,600 → 7,800).

- Section 3: +11.7% before (11,100 → 12,400), +3.2% after (12,600 → 13,000).

Combined Total (Main + Buffer):

- Before OGX (2020→2022): 38,567 → 43,534 (+12.9%).
- After OGX (2023→2025 est.): 44,400 → 45,600 (+2.7%).

These figures reveal a clear deceleration in traffic volume growth after OGX service launch, especially in Sections 2 and 3. While traffic still grew, the rate of increase was noticeably lower post-BRT, which may suggest early shifts in mode choice toward transit, or a leveling off after several years of growth. The overall post-BRT growth rate is less than 21% of the pre-BRT rate, indicating that while auto traffic continued to rise, its pace slowed considerably after the system opened. This pattern, consistent across all sections, suggests early stabilization of corridor demand and potential mode shifts toward transit. It also aligns with expected outcomes where BRT improves accessibility and reduces car dependence gradually over time rather than producing abrupt declines.

4.1.2 Traffic Volume– Before-After With a Control Group (DiD)

To better assess the influence of the OGX BRT corridor on vehicular traffic, we applied a Difference-in-Differences (DiD) framework comparing traffic trends in the treatment corridor to those in a control corridor. This approach isolates the change more plausibly attributable to OGX, net of regional traffic growth or external factors.

The Washington Boulevard corridor serves as the control. It shares similar roadway function, land-use setting, and regional role with OGX but was not directly affected by the BRT project. Systematic differences in traffic growth between the two corridors therefore indicate the potential traffic effects of OGX.

From 2020 to 2025, both corridors experienced steady increases in AADT, but the rate of growth along the OGX corridor was lower. In the treatment corridor (main + buffer), weighted AADT rose from 38,567 to 45,600 (+18.2 %), whereas the control corridor (Washington Boulevard, main + buffer) increased from 34,100 to 41,900 (+22.9 %).

Focusing on the BRT implementation window, pre-launch (2022) vs. post-launch (2025 est.), yields a clearer DiD signal:

- OGX main + buffer: 43,534 → 45,600 (+4.7 %)
- Washington main + buffer: 37,800 → 41,900 (+10.9 %)

Table 4: Rounded Weighted Annual Average Daily Traffic (AADT) for OGX BRT Corridor, Control Corridor, and Surrounding Streets, 2020–2024

Section/Year	2020	2021	2022	2023	2024	2025**
OGX – Main Corridor	30,067	33,300	34,067	34,733	35,200	35,700
OGX – Buffer Area	8,500	9,333	9,467	9,667	9,800	9,900
OGX – Total	38,567	42,633	43,534	44,400	45,000	45,600
Washington BLVD – Main Corridor	27,700	30,000	30,800	31,900	33,100	34,300
Washington BLVD – Buffer Area	6,400	6,900	7,000	7,200	7,400	7,600
Washington BLVD – Total	34,100	36,900	37,800	39,100	40,500	41,900

If we assume that OGX traffic had followed the same +10.9 % trajectory as the control, its 2025 AADT would have been ≈ 48 270. The observed 45,600 is about 2,670 vehicles per day lower (≈ –5.5 %).

This moderate divergence suggests that after OGX launch, traffic growth along the BRT-aligned arterial slowed relative to a comparable corridor, consistent with early mode shifts to transit, lane reallocations, and land-use adaptations encouraged by the transit investment.

Overall, the length-weighted DiD results reinforce the earlier findings: following OGX implementation, auto volumes continued to grow but at a slower rate than in the control corridor, signaling a gradual shift toward multimodal travel and the early stabilization of vehicular demand in the OGX corridor.

4.1.3 Traffic Volume – Interrupted Time Series

To further examine the impact of OGX on corridor-level traffic volumes, we employed an Interrupted Time Series (ITS) analysis. This quasi-experimental approach isolates the effect of an

intervention, in this case, the August 2023 launch of the OGX BRT, by comparing post-intervention trends to counterfactual projections based on pre-intervention data.

For this analysis, we used UDOT's rounded weighted Annual Average Daily Traffic (AADT) values for each of the three OGX main-corridor sections and for the overall corridor (main + buffer). Linear regressions were fitted using the pre-BRT period (2020–2022) to estimate expected AADT in 2023–2025 under a "no-BRT" scenario. Observed values were then compared with these projections to determine whether OGX's implementation corresponded with meaningful deviations from expected volumes.

The results (Table 5**Error! Reference source not found.**) show a consistent pattern across all sections: by 2025, observed AADT slightly exceeded predicted values by roughly 0.7–1.1 percent per section. The total OGX main corridor recorded 35,700 vehicles per day versus a predicted 35,296, an approximate +1.1 percent difference.

These small positive deviations indicate that traffic volumes after OGX's launch remained essentially stable, with no evidence of a sharp decline in auto activity. If anything, the corridor experienced slightly higher utilization than the pre-BRT trend would have predicted.

When the surrounding street network within a half-mile buffer is considered, the results are similar: total observed AADT is marginally above the counterfactual projection (and the combined corridor (main + buffer) showed 45,600 versus 45,049, an approximate +1.2 percent difference), suggesting that OGX did not displace significant traffic onto neighboring streets. Instead, corridor volumes appear to have stabilized, consistent with earlier DiD findings showing slowed but sustained growth relative to the regional control corridor.

Table 5: Rounded Weighted Annual Average Daily Traffic (AADT) - Difference Between the Observed and Predicted Value

	2025			
	Observed AADT	Predicted (No-BRT)	Absolute Change	Percentage (%)
Section 1	33,200	32,958	+242	+0.73 %
Section 2	33,600	33,247	+353	+1.06 %
Section 3	40,200	39,784	+416	+1.05 %
Total OGX Main Corridor	35,700	35,296	+404	+1.14 %
Total OGX Corridor (Main + Buffer)	45,600	45,049	+551	+1.22 %

Although these deviations are small, their consistency across all sections suggests slightly higher traffic volumes than the pre-BRT trend would predict. Combined with the DiD findings, this points to a stabilized or mildly increasing level of corridor activity following OGX's introduction rather than a decline.

Importantly, the observed increases do not contradict OGX's objectives. Elevated AADT values may reflect broader regional growth, improved accessibility, and land-use intensification near stations. In some contexts, BRT investments support higher overall activity levels without worsening congestion, by accommodating more people within the same corridor footprint through multimodal efficiency.

Because the increases remain modest (almost 1 percent), OGX does not appear to have induced significant additional traffic demand, reinforcing the conclusion that well-integrated BRT systems can expand accessibility while maintaining stable roadway conditions.

Taken together, the ITS results complement the DiD analysis: OGX's launch coincided with a minor dampening in the rate of traffic growth relative to regional trends, while observed post-launch volumes remained close to or slightly above projections, signaling healthy corridor activity and successful multimodal integration.

4.2 Transit Ridership

To evaluate changes in transit ridership associated with the implementation of the OGX BRT system, this study utilized detailed ridership data from the Utah Transit Authority's (UTA) Open Data Portal. UTA provides high-resolution spatial and tabular datasets, including shapefiles, geodatabases (GDB), and Excel tables, enabling researchers to conduct both geographic and temporal analyses of transit activity across the system. The downloaded ridership datasets include key spatial and operational attributes for each transit stop, such as: stop abbreviation and stop name, latitude, longitude, and zip code, city and county, UTA stop ID and routes served, average boardings and alightings (aggregated and by detail), mode of transit, monthly and day-type breakdowns (i.e., weekday vs. weekend).

The OGX BRT route alignment, as implemented in 2023, matches precisely with the corridor outlined in UTA's Long Range Transit Plan 2023 Network. This confirms that no additional planned expansions or modifications to the route were introduced post-implementation,

allowing us to isolate the effects of the actual BRT operations as deployed, rather than anticipated service changes. This lends internal validity to our quasi-experimental design.

Importantly, the northern terminus of the OGX BRT line is Ogden Central Station, which also functions as a regional multimodal hub by connecting the BRT system to UTA's FrontRunner commuter rail. The FrontRunner is a heavy rail line that links cities across the Wasatch Front, from Ogden in the north through Salt Lake City and down to Provo in the south, forming the backbone of the region's inter-county transit network. The strategic integration of the OGX with the FrontRunner at Ogden Central enhances last-mile connectivity, potentially boosting ridership by expanding the effective catchment area of both services. This intermodal transfer capability reflects a coordinated regional approach to multimodal transportation planning and increases the overall utility of the BRT system.

For the ridership impact analysis, we defined our treatment corridor as all routes and stops within a half-mile buffer of the OGX line, from Ogden Central Station to McKay-Dee Hospital Station. This buffer captures not only the OGX itself (Route 603X) but also intersecting or parallel bus routes in close proximity, including Routes 455, 470, 473, 601, 603, 604, 612, 613, 616, 625, 630, 640, and 645. The inclusion of these routes allows us to assess whether OGX had a complementary or substitutive impact on existing transit services in the area.

To establish a baseline comparison, we also defined a control corridor encompassing routes within half a mile of Washington Boulevard between 25th and 40th Streets, a corridor functionally and demographically similar to the treatment area but not served by the OGX. Selected control routes include 455, 470, 473, 601, 603, 604, 612, and 640, which allowed for robust comparison in a difference-in-differences design.

The availability of monthly-level data allowed us to distinguish ridership patterns by season and day type and ensured comparability over time. Data for the year 2025 posed a unique challenge: at the time of collection, only the first quarter (January through March) ridership data was available. To make this year comparable with full-year data from other years, we applied a seasonal standardization process. Specifically, we reviewed historical ridership distributions across all four quarters in previous years (2021–2024) and found relatively stable and consistent seasonal patterns. Based on this observed consistency, we calculated a seasonal adjustment multiplier to annualize the Q1 2025 figures. This approach involved multiplying the Q1 total by a weighted average factor derived from historical Q1-to-annual ratios, rather than simply

quadrupling the Q1 value. This method increases the validity of our estimation by incorporating real-world seasonal variation and minimizes error in extrapolation.

Together, this structured data collection and processing strategy provides a solid empirical foundation for assessing ridership changes attributable to OGX, with a level of geographic and temporal granularity appropriate for robust quasi-experimental evaluation.

4.2.1 Bus Ridership – Before-After Without a Control Group

To assess the standalone impact of the OGX Bus Rapid Transit (BRT) line, we began by examining OGX ridership trends independently of other transit corridors.

- **OGX Recent Snapshot (December 2024):**

In December 2024, OGX reached a weekday average of 5,534 boardings and alightings combined. The most heavily used stations were Weber State Central Station (1,425 riders), Dee Events Center Station (1,279 riders), and Ogden Central Station (580 riders) (See Table 6). These figures align with land use patterns and institutional anchors along the corridor. Weber State University and the Dee Events Center attract significant daily foot traffic due to their student population and events, while Ogden Central Station serves as the multimodal hub connecting OGX to FrontRunner, the regional commuter rail line linking Ogden to Salt Lake City and Provo. This regional connection likely explains Ogden Central's relatively high ridership despite not being in the heart of the campus area.

A notable observation from December 2024 snapshot is the consistency between average boardings and alightings at each station, which reinforces balanced directional travel and high two-way utility of the BRT service, a positive indicator of system efficiency and regular use by both inbound and outbound travelers.

Table 6: OGX Most Recent (Dec. 2024) Ridership (Average Weekday Boardings & Alightings), by Stop

ID	Section	Stop Name	Average Boardings	Average Alightings	Total Ridership
1	Section 1	Ogden Central Station (Bay M)	306	274	580
2		Kiesel Avenue Station	85	81	166
3		Washington Blvd Station	197	200	397

4		Jefferson Avenue Station	125	134	259
5		Monroe Blvd Station	140	145	285
6	Section 2	25th & Harrison Station	92	106	198
7		28th Street Station	116	107	223
8		32nd Street Station	133	111	244
9		36th Street Station	69	71	140
10	Section 3	Weber State Central Station	671	754	1425
11		Wildcat Village Station	90	107	197
12		Dee Events Center Station (Bay D, C)	675	604	1279
13		McKay-Dee Hospital Station	70	71	141
Total OGX Ridership			**2769**	**2765**	**5534**

- **OGX Annual Trends (2023–2025):**

Table 7 summarizes the sum average annual OGX ridership per stop from 2023 through 2025. Between 2023 and 2024, ridership more than doubled, increasing from approximately 66,622 to over 142,000 boardings and alightings combined. This dramatic rise reflects the transition from OGX's launch year in 2023, when awareness and usage were still developing, to its first full operational year in 2024, when the system had likely gained traction among a broader set of users. The surge suggests growing familiarity with the BRT service, increased confidence in its reliability, and potentially successful integration into regional commuting patterns.

In 2025, ridership slightly declined to around 123,000, representing a 13% drop from the previous year. However, this decrease is likely due to limitations in the available data: at the time of analysis, only the first quarter of 2025 was accessible. To create a comparable annual estimate, we adjusted the Q1 figures using a factor-based extrapolation method, based on an examination of seasonal trends in prior years, which revealed relatively stable ridership ratios across different quarters. While this method allows for rough comparability, it may overlook seasonal nuances such as weather, academic calendars, or special events, and therefore the 2025 estimate should be interpreted with some caution.

At the station level, the most dramatic percentage increases in ridership between 2023 and 2024 occurred at Washington Blvd Station (232.9%), 32nd Street Station (229.6%), and Kiesel Avenue Station (226.5%). These significant jumps suggest that the OGX system has effectively captured new riders in the central and mid-corridor urban areas. Washington Blvd is a major arterial with commercial and mixed-use development, likely benefiting from improved accessibility and connectivity. Similarly, 32nd Street and Kiesel Avenue may have seen spillover

ridership from adjacent neighborhoods or shifts in travel behavior toward transit following OGX's launch.

Meanwhile, the three stations with the highest total ridership, Weber State Central (26,100 riders in 2024), Dee Events Center (26,025), and Ogden Central Station (17,036), continued to experience strong growth, though with relatively lower percentage increases of 86.3%, 93.3%, and 55.9%, respectively. These stations anchor the system by linking major regional and institutional destinations. The Weber State and Dee Events Center stations primarily serve the university campus, drawing consistent weekday travel from students, faculty, and event attendees. Ogden Central Station serves as the gateway between the BRT and the FrontRunner commuter rail line, reinforcing regional integration and multimodal access.

Together, these trends demonstrate that while core ridership remains concentrated at institutional and intermodal nodes, some of the most pronounced relative growth occurred at more centrally located or neighborhood-serving stations, suggesting both increased transit accessibility and broader system adoption across diverse segments of the corridor. In other words, the OGX system has not only enhanced regional mobility but also provided tangible transportation benefits for smaller neighborhoods within its footprint. The findings support the hypothesis that OGX has generated both immediate and sustained ridership increases. The sharp growth between 2023 and 2024 can be interpreted as a shift from early adoption to normalized use. Despite some data limitations for 2025, the system appears to have retained a strong user base, indicating long-term viability and success.

Section 2 showed the largest percentage increase in ridership (161.1%), despite having the lowest baseline ridership in 2023. This suggests that mid-corridor areas, which may have previously been underserved or underutilized, responded strongly to the improved accessibility and coverage of the BRT service. Many of these stops serve residential and neighborhood-scale areas, indicating a strong latent demand for transit once service quality improved.

Section 1 also experienced a significant increase (118.5%), particularly driven by stations like Washington Blvd, which had one of the highest percentage increases among all stations. This area includes downtown Ogden and major commercial activity centers, where walkability and multi-modal access likely contributed to adoption.

Section 3 had the highest absolute ridership both before and after, thanks to Weber State University and the Dee Events Center. However, the percentage growth (95.0%) was

comparatively lower, indicating that these institutional and intermodal anchors were already high-demand zones and have now reached a more saturated usage level.

This spatial breakdown underscores that while institutional hubs anchor ridership volume, the greatest growth potential may lie in mid-corridor, neighborhood-based segments, a critical insight for future BRT planning and expansion strategies. OGX's ability to induce mode shift in those areas speaks to its success in connecting residents to major destinations and the broader regional transit network.

Table 7: OGX Yearly Ridership (Sum of Average Boardings, Average Alightings), by Stop - From 2023 To 2025

ID	Section	Stop Name	2023			2024			2025 **			Total	
			B*	A*	Total	B	A	Total	B	A	Total	B	A
1	Section 1	Ogden Central Station (Bay M, G)	5873.6	5054.8	10928.4	8767.4	8269	17036.4	7499.1	7172.8	14671.9	22140.2	20496.5
2		Kiesel Avenue Station	940.4	852.5	1792.9	3140.3	2714.8	5855.1	2539.2	2253.7	4792.9	6619.9	5821.1
3		Washington Blvd Station	2249.9	2145.7	4395.6	7642.6	6986.9	14629.5	5848.6	5403.3	11251.9	15741.1	14535.9
4		Jefferson Avenue Station	1574.3	1854.6	3428.9	4102.9	4714	8817	3146.9	3750.9	6897.8	8824.2	10319.6
5		Monroe Blvd Station	2300.2	2864.4	5164.6	4737.6	5111	9848.6	4205.9	4282.5	8488.4	11243.8	12257.9
6	Section 2	25th & Harrison Station	1497.1	1800.4	3297.5	2729.2	3212.6	5941.8	2438.2	2975.5	5413.7	6664.4	7988.6
7		28th Street Station	1032.6	1048.7	2081.3	2953.7	2890.3	5844	2298.7	2449	4747.7	6285	6388
8		32nd Street Station	1122.2	1031.1	2153.3	3602.3	3495.5	7097.8	2950.4	2742.8	5693.2	7674.9	7269.4
9		36th Street Station	891.6	920.3	1811.9	2733.6	2781	5514.6	1968.7	2034	4002.7	5593.9	5735.3
10	Section 3	Weber State Central Station	6704.3	7300.2	14004.5	12640	13460.2	26100.2	11973.6	12632.7	24606.3	31317.9	33393
11		Wildcat Village Station	847.1	1003.4	1850.5	2220.3	2526.4	4746.7	2039.8	2552.8	4592.4	5107.2	6082.4
12		Dee Events Center Station (Bay D, C)	7024.3	6440.7	13465	13432.2	12592.7	26024.9	12427.9	11478.1	23906	32884.4	30511.6
13		McKay-Dee Hospital Station	1155.5	1091.8	2247.3	2337.2	2344.9	4682.1	1997.2	2019.6	4016.8	5489.9	5456.3
Total Ridership per Year			33213	33408.7	66621.7	71039.4	71099.5	142138.9	61334.4	61747.5	123081.9	165586.8	165586.8

*B: Boardings; A: Alightings

** The available data for 2025 was only for the first 3 months of the year. Hence, to make the comparison feasible, the ridership values for 2025 have been standardized.

- **Full Treatment Corridor**

To further evaluate OGX's standalone effect, we also examined ridership trends within the full treatment corridor, a half-mile buffer around the OGX line, spanning both OGX and other bus services from 2021 to 2025. This broader analysis, shown in Table 8, enables us to track ridership changes over a longer timeline, including the pre-BRT period (2021-2022), treatment year (2023), and post-implementation years (2024-2025).

Since OGX did not operate during the pre-period, its ridership begins in 2023. What's striking is the dramatic jump in overall ridership across the treatment corridor following OGX's launch.

Crucially, when we isolate other bus routes in the same corridor, we observe a relatively stable ridership trend from 2021 to 2025, with minor fluctuations but no substantial increases post-2023. This reinforces the interpretation that the overall ridership increase in the corridor is being driven almost entirely by OGX (See

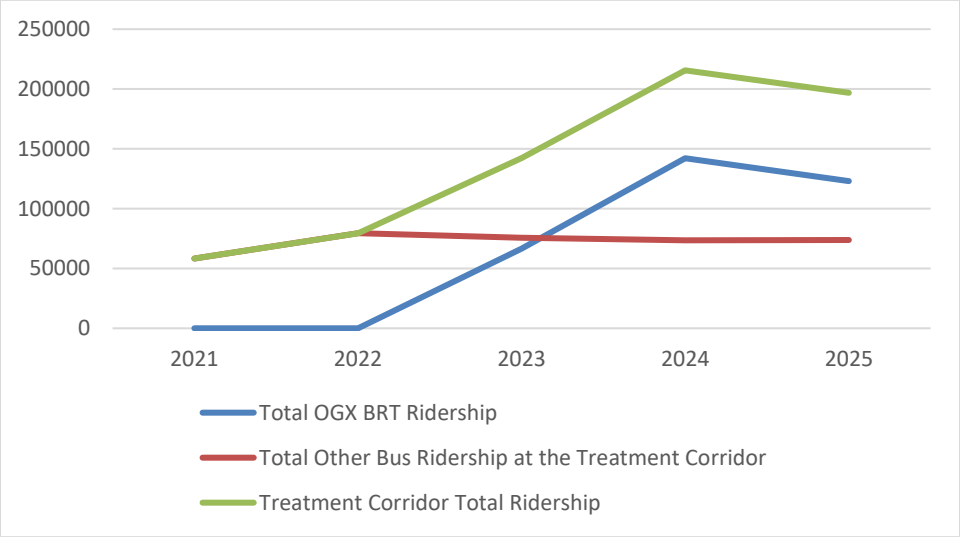


Figure 3).

Table 8: Sum of Average Transit Ridership Within Half a Mile Buffer of the OGX Line, 2021-2025

Year	2021		2022		2023		2024		2025**	
	B	A	B	A	B	A	B	A	B	A
Total OGX BRT Ridership	–	–	–	–	33212.99	33408.71	71039.4	71099.54	61334.44	61747.52

Total Other Bus Ridership at the Treatment Corridor	28442.83	29874.63	39532.17	39946.10	38071.95	37558.91	37026.48	36431.53	37146.36	36591
Treatment Corridor* Total Ridership	28442.83	29874.63	39532.17	39946.10	71284.94	70967.62	108065.9	107531.1	98480.8	98338.52

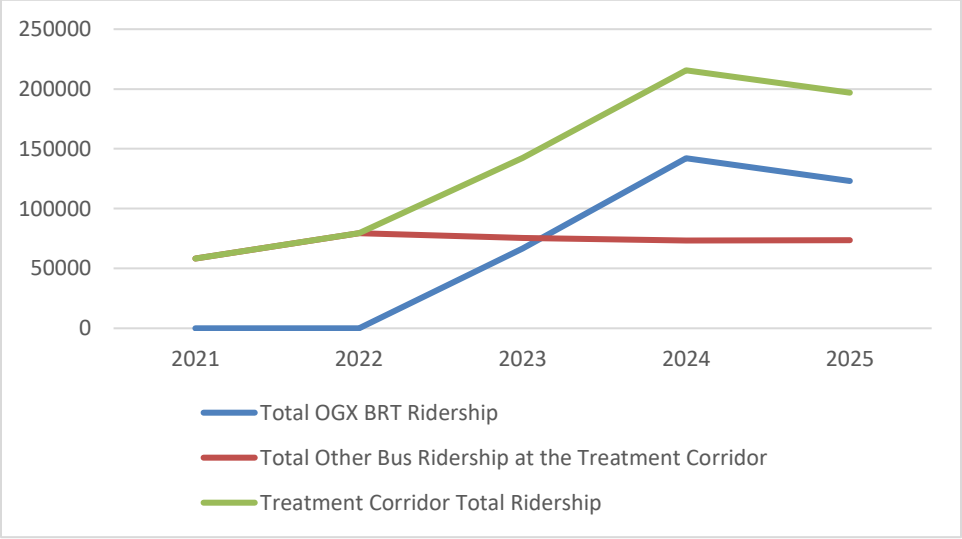


Figure 3. Transit Ridership Within Half a Mile Buffer of the OGX Line, From 2020 To 2025

4.2.2 Bus Ridership – Before-After With a Control Group

- **Control Corridor Recent Snapshot (December 2024)**

To isolate the effects of OGX from broader regional trends, we compared ridership trends in the OGX corridor with those along the control corridor (Washington Blvd).

The control corridor consists of 16 stops located along Washington Boulevard, each with both northbound (NB) and southbound (SB) directions, totaling 29 directional stops (See Table 9). These are served by a combination of UTA local routes, most commonly Routes 455, 470, 473, 601, 603, 604, 612, 640.

A closer look at the December 2024 snapshot reveals that the control corridor averaged approximately 1,129 weekday boardings and 1039 weekday alightings and a total ridership of 2,168 across all stops. This is less than half of the average weekly ridership for the OGX corridor alone with average weekly ridership of 2,769, 2,765, and 5,534 for boardings, alightings, and total, respectively.

The busiest stops were "Washington Blvd / 25th St, both north- and south-bound, with a total of 643 riders, as opposed to OGX's busiest stop, Weber State Central Station, with 1,425 riders. Some northern and southern ends of the corridor, such as 35th to 40th Streets, had significantly lower ridership.

For comparison, the OGX corridor in December 2024 had a weekday average of 5,534 boardings and alightings, nearly 3.7 times higher than the control group. OGX's top three stations alone (Weber State Central, Dee Events Center, and Ogden Central) each served more riders individually than the busiest stop in the control group. This gap highlights the success of the OGX system in attracting new ridership, especially in areas anchored by institutions like Weber State University and regional transit hubs like Ogden Central Station.

In both corridors, boardings and alightings were generally well-balanced, which suggests consistent two-way usage, an encouraging sign of regular commuting and non-commute trips. But again, this balance for the OGX corridor is more significant.

Table 9: Control Group (Street) Most Recent (Dec. 2024) Ridership (Average Weekday Boardings & Alightings), by Stop

ID	Stop Name	B	A	Total Ridership	Route
1.1	Washington Blvd / 25th St (NB)	185	178	363	470, 604, 612, 674, 675
1.2	Washington Blvd / 25th St (SB)	184	96	280	470, 604, 612, 674, 675
2.1	Washington Blvd / 26th St (NB)	19	29	48	470, 612
2.2	Washington Blvd / 26th St (SB)	17	3	20	470, 612
3.1	Washington Blvd / 27th St (NB)	78	78	156	470, 612
3.2	Washington Blvd / 27th St (SB)	86	90	176	470, 612
4.1	Washington Blvd / 28th St (NB)	45	29	74	470, 612
4.2	Washington Blvd / 28th St (SB)	54	49	103	455, 470, 612
5.1	Washington Blvd / 29th St (NB)	21	17	38	470, 612
5.2	Washington Blvd / 29th St (SB)	27	48	75	470, 612
6.1	Washington Blvd / 30th St (NB)	21	18	39	470, 612
6.2	Washington Blvd / 30th St (SB)	10	5	15	470, 612
7.1	Washington Blvd / 31st St (NB)	30	16	46	470, 612
7.2	Washington Blvd / 31st St (SB)	12	28	40	470, 612
8.1	Washington Blvd / 32nd St (NB)	63	34	97	470, 612
8.2	Washington Blvd / 32nd St (SB)	34	55	89	470, 612
9.1	Washington Blvd / 33rd St (SB)	19	45	64	470, 612
10.1	Washington Blvd / 34th St (NB)	37	17	54	470, 612
11.1	Washington Blvd / 35th St (NB)	5	2	7	612
11.2	Washington Blvd / 35th St (SB)	11	20	31	612

12.1	Washington Blvd / 36th St (NB)	66	18	84	612
12.2	Washington Blvd / 36th St (SB)	22	61	83	612
13.1	Washington Blvd / 37th St (NB)	25	6	31	612
13.2	Washington Blvd / 37th St (SB)	1	18	19	612
14.1	Washington Blvd / 38th St (NB)	13	1	14	612
14.2	Washington Blvd / 38th St (SB)	6	38	44	612
15.1	Washington Blvd / 39th St (SB)	4	22	26	612
16.1	Washington Blvd / 40th St (NB)	31	8	39	612
16.2	Washington Blvd / 40th St (SB)	3	10	13	612
Total Average Weekday Ridership		**1129**	**1039**	**2168**	_

- **Control Corridor Annual Trends (2021–2025):**

The annual ridership trend for the control corridor shows a relatively stable but moderate increase over time. From 2021 to 2022, ridership grew from 46,530 to 61,762, reflecting gradual recovery from the COVID-19 pandemic. This upward trend continued into 2023 and peaked in 2024 at 88,316, before slightly declining to 83,490 in 2025 (See Table 10). Overall, the control corridor exhibited steady growth, with no dramatic ridership spikes or drops, serving as a reliable counterfactual for understanding OGX's impact.

Table 10: Transit Ridership Within Half a Mile Buffer of the OGX Line and the Control Corridor From 2020 To 2025

Year	2021		2022		2023		2024		2025**	
	B	A	B	A	B	A	B	A	B	A
Total OGX BRT Ridership	–	–	–	–	33212.99	33408.71	71039.4	71099.54	61334.44	61747.52
Sum of B & A	_		_		**66,621.7**		**142,138.94**		**123,081.96**	
Total Other Bus Ridership at the Treatment Corridor	28442.83	29874.63	39532.17	39946.10	38071.95	37558.91	37026.48	36431.53	37146.36	36591
Sum of B & A	**58,317.46**		**79,478.27**		**75,630.86**		**73,458.01**		**73737.36**	
Treatment Corridor* Total Ridership	28442.83	29874.63	39532.17	39946.10	71284.94	70967.62	108065.9	107531.1	98480.8	98338.52
Sum of B & A	**58,317.46**		**79,478.27**		**142,252.56**		**215,597**		**196,819.32**	

Control Corridor* Total Ridership	22941.16	23589.59	31253.11	30509	36089.94	35868.06	43997.85	44317.91	41168.48	42321.36
Sum of B & A	**46,530.75**		**61,762.11**		**71,958**		**88,315.76**		**83489.84**	

*Selected bus routes:
Treatment Corridor: 455, 470, 473, 601, 603, 604, 612, 613, 616, 625, 630, 640, 645, 603X (OGX BRT)
Control Corridor: 455, 470, 473, 601, 603, 604, 612, 640
** The available data for 2025 was only for the first 3 months of the year. Hence, to make the comparison feasible, the ridership values for 2025 have been standardized.

- **Predicting Treatment Corridor Ridership Using Control Group Trend (Difference-in-Differences):**

This method applies a Difference-in-Differences (DID) design using the control corridor, a set of bus routes along Washington Boulevard not served by OGX, as a benchmark. It assumes that the control corridor captures general ridership trends (e.g., demographic, economic, seasonal) unrelated to the OGX implementation. By comparing changes in the treatment and control corridors, we isolate OGX's effect.

Step-by-step methodology:

1. Step 1: Annualized growth rate of the control corridor from 2021 to 2022:
   CAGR = [(61,762/ 46,530) ^ (1/1)] - 1 ≈ 32.76%
   This means between 2021 and 2022, the control corridor's ridership rose by 32.8 %, capturing normal post-pandemic recovery and system growth.
2. Step 2: Project treatment corridor ridership forward to 2024 and 2025, assuming it followed the same growth pattern as the control corridor:
   Predicted 2024 = 79,478 × (1 + 0.3276) ^ 2 ≈ 139,992
   Predicted 2025 = 79,478 × (1 + 0. 3276) ^ 3 ≈ 185,797

These values estimate what the treatment corridor's total ridership would have been in 2024 and 2025 had OGX not been implemented, assuming the trend mirrored that of the control group.

Table 11: Total Transit Ridership Difference Between the Observed and Predicted Value-Based on the Trends in the Control Corridor

	Observed Ridership	Predicted (No-BRT)	Absolute Change	Percentage (%)
2024	215,597	139,992	+75,605	+54.0 %
2025	196,819	185,797	+11,022	+5.9 %

Observed totals, however, reached 215,600 in 2024 and 196,800 in 2025, exceeding the projections by 54 % and 6 %, respectively (see Table 11 and *Figure 4*). These results indicate that OGX produced a large immediate ridership surge beyond regional background trends, followed by stabilization in 2025 as the system matured.

The findings suggest a strong positive treatment effect: OGX not only accelerated transit recovery but also generated new trips along the corridor, consistent with patterns seen after other U.S. BRT launches. Continued monitoring will determine whether this elevated ridership becomes a sustained long-term shift in travel behavior.

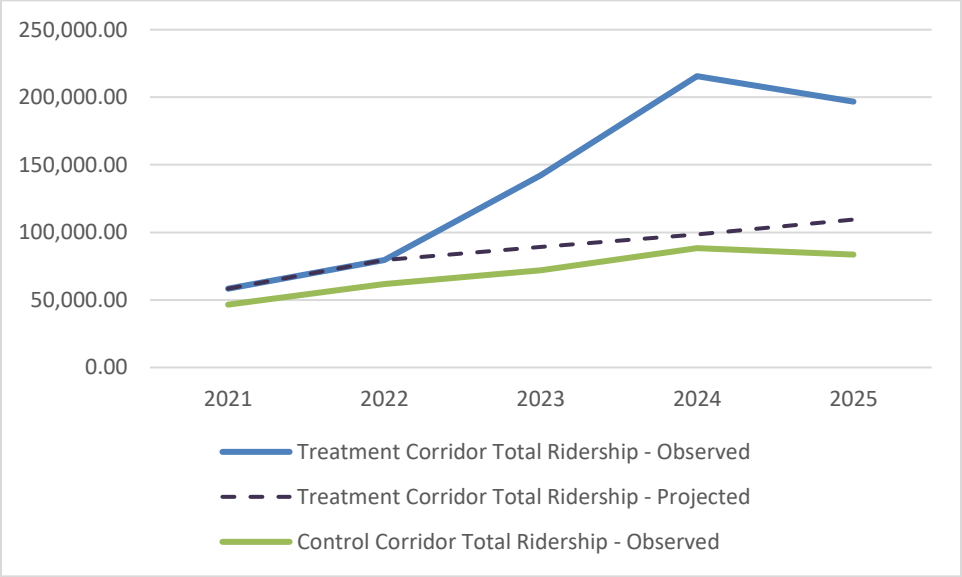


Figure 4. Ridership Trends in OGX, Treatment, and Control Corridors Across the Years 2021–2025

4.2.3 Bus Ridership – Interrupted Time Series

To further validate the ridership impact of the OGX BRT, we conducted an Interrupted Time Series (ITS) analysis using the pre-BRT ridership trend within the same corridor as an internal control. This approach estimates what total corridor ridership would have been if OGX had not been introduced, assuming local conditions and growth patterns remained constant.

Using 2021-2022 as the baseline, we fitted a linear trend to pre-BRT totals and extended that trend to forecast 2024 and 2025 "No-BRT" values. These projected values were then compared with actual post-implementation ridership.

Table 12: Total Transit Ridership Difference Between the Observed and Predicted Value – Based on the Trends in Pre-Treatment Period

	Observed Ridership	Predicted (No-BRT)	Absolute Change	Percentage (%)
2024	215,597	121,800	+93,797	+77.0 %
2025	196,819	142,961	+53,858	+37.7 %

As shown in Table 12, the ridership observed far exceeded projected levels. In 2024, total corridor ridership was approximately 77% higher than the expected value, and in 2025 it remained about 38% higher, despite partial-year data.

These findings reinforce that OGX produced a structural upward shift in transit demand that cannot be explained by normal year-to-year fluctuations. The surge immediately following launch reflects both new riders attracted to the BRT and stronger retention among existing bus users.

Taken together with the external Difference-in-Differences analysis, the ITS results provide robust evidence that OGX substantially elevated corridor-level transit use, demonstrating the system's success in increasing accessibility, convenience, and overall ridership sustainability.

4.3 Crash Rates

To analyze changes in crash rates and severity before and after the implementation of the OGX BRT system, we collected crash data from the Utah Department of Transportation (UDOT) through a Numetric account created specifically for this project. The dataset spans from 2021 to 2025, covering multiple years prior to and following the OGX launch. The crash data include detailed geographic location information for each incident, allowing us to isolate crashes occurring

within a half-mile buffer of the OGX corridor. Additionally, each record contains a severity rating on a standardized 1 to 5 scale: 1 indicates no injury, 2 indicates a possible injury, 3 represents a suspected minor injury, 4 corresponds to a serious injury, and 5 denotes a fatal crash. This detailed classification enabled us to assess not only the frequency but also the severity of crashes over time.

To evaluate the impact of the OGX BRT implementation on roadway safety, we employed a quasi-experimental research design, applying both a simple before-after comparison, a Difference-in-Differences, and an interrupted time series (ITS) analysis.

4.3.1 Crash Rate – Before-After Without a Control Group

We started by conducting a simple before-and-after comparison of crash data within a 0.5-mile buffer along the BRT corridor. In the first phase, crash count data were collected for all reported incidents within a 0.5-mile buffered area around the OGX BRT corridor. The pre-treatment (before) period included data from 2021 to 2022, while the post-treatment (after) period covered 2024 and 2025, and the year 2023, in which the OGX system launched, as our treatment year. For each year, we calculated the total number of crashes and the total number of injury-related crashes, where injury severity was defined using UDOT's five-level classification system: levels 2 through 5 represent possible injury, suspected minor injury, serious injury, and fatal crashes, respectively.

As shown in Table 13, the total number of crashes decreased from an average of 515 crashes per year in the pre-treatment period (2021–2022) to an average of 464 crashes per year in the post-treatment period (2024–2025), reflecting a reduction of nearly 10%. In contrast, the number of injury crashes (severity levels 2–5) increased during the same timeframe, from an average of 177 injury crashes per year before the intervention to 198 injury crashes per year after, indicating a 12% increase. While the overall crash frequency appears to have declined following the OGX launch, the rise in injury-related crashes suggests a shift in crash severity that warrants further investigation.

Table 13: Crash Count and Weighted Average AADT Within Half a Mile Along the BRT Line

	2021	**2022**	**2023**	**2024**	**2025****
Total Crash Count	517	513	488	444	484
Injury Crash Count (Severity: 2-5)	174	180	161	190	206
Rounded Weighted Average AADT	42,633	43,534	44,400	45,000	45,600

** The available data for 2025 was only for the first 5 months of the year. Hence, to make the comparison feasible, the crash count for 2025 has been standardized.

To adjust for exposure and ensure comparability across years, crash counts were normalized by annual traffic volume and corridor length, producing crash rates per 100 million vehicle-miles of travel (Table 14). These rates were computed using the Federal Highway Administration's formula (FHWA, 2011), which expresses crash frequency in terms of crashes per 100 million vehicle-miles of travel:

$$R = \frac{(C * 100{,}000{,}000)}{V * 365 * N * L}$$

Where:

- R = Crash rate
- C = Total number of crashes during the study period
- V = Average Annual Daily Traffic (AADT)
- N = Number of years in the study period
- L = Length of the roadway segment in miles

This formula was applied separately for total crashes and injury crashes, enabling us to assess changes in both frequency and severity while adjusting for exposure differences over time. This before-after analysis allowed us to detect immediate shifts in crash outcomes following the BRT intervention.

Table 14: Total and Injury Crash Rates Along the BRT Alignment

	2021	**2022**	**2023**	**2024**	**2025****
Total Crash Rate along the BRT line (Severity: 1-5)	127.25	123.65	115.33	103.53	111.37
Injury Crash Rate along the BRT line (Severity: 2-5)	42.83	43.39	38.05	44.30	47.40

** Note: 2025 crash data are standardized to represent a full year based on five months of available records. And also, the 2025 crash rate is based on the estimated AADT.

The results indicate that total crash rates were already trending downward prior to the OGX launch, decreasing by roughly 2.8 percent, from 127.25 in 2021 to 123.65 in 2022 (-2.82). Following the introduction of OGX in 2023, this decline accelerated, with rates dropping from 115.33 in 2023 to 103.53 in 2024 (–10.3 percent) before a slight rebound to 111.37 in 2025 (+7.5

percent), and an overall post-treatment decrease of -3.4%. Comparing the pre-treatment average (≈ 125.45) with the post-treatment average (≈ 107.45) reveals an overall 14.35 percent reduction in total crash rates. This pattern suggests that while safety improvements were already underway before the OGX opening, the corridor upgrades associated with the BRT, such as improved intersection geometry, dedicated lanes, enhanced pedestrian crossings, and better traffic-signal coordination, likely amplified the downward trend by reducing vehicle conflicts and stabilizing traffic flow.

In contrast, the injury-crash rate followed a more variable trajectory. It remained nearly unchanged before the launch (42.83 in 2021 vs. 43.39 in 2022), dipped during the first year of operation (38.05 in 2023), and then rose to 44.30 in 2024 and 47.4 in 2025. Relative to the pre-treatment mean (≈ 43.11), this represents a 6.3 percent increase by 2025. The rebound in injury crashes may reflect changes in traffic composition, increased pedestrian and cyclist activity near stations, or localized speed variations along connecting streets.

Taken together, these findings suggest that OGX implementation coincided with a steeper reduction in overall crash frequency but not necessarily in crash severity. Continued monitoring, particularly of pedestrian and cyclist safety, is essential to determine whether these early post-launch patterns persist and to guide complementary safety strategies such as speed management, protected crossings, and context-sensitive street design.

4.3.2 Crash Rate – Before-After With a Control Group

To more rigorously assess the impact of OGX implementation on roadway safety, we extend our before-after analysis using a DiD framework. This approach allows us to isolate the treatment effect by accounting for trends in an untreated corridor that serves as a comparison group. Table 15 demonstrate the crash counts and weighted average AADT, and Table 16 indicates crash rates (total and injury crashes) within half a mile along the control corridor.

Table 15: Crash Count and Weighted Average AADT Within Half a Mile Along the Control Corridor

	2021	**2022**	**2023**	**2024**	**2025****
Total Crash Count	651	600	586	629	698
Injury Crash Count (Severity: 2-5)	236	228	218	267	295

Weighted Average AADT	36,900	37,800	39,100	40,500	41,900

** The available data for 2025 was only for the first 5 months of the year. Hence, to make the comparison feasible, the crash count for 2025 has been standardized.

Table 16: Total and Injury Crash Rates Along the Control Corridor

	2021	**2022**	**2023**	**2024**	**2025****
Total Crash Rate along the BRT line (Severity: 1-5)	281.02	252.83	238.72	247.39	265.35
Injury Crash Rate along the BRT line (Severity: 2-5)	101.87	96.08	88.81	105.01	112.15

We use 2021-2022 as the pre-treatment period and 2024-2025 as the post-treatment period, excluding 2023 as the implementation year. Crash rates (per 100 million VMT) were used instead of raw counts to account for exposure differences across years and corridors.

Table 17: Crash Count – DiD Summary (Pre/Post Comparison)

	Treatment Corridor	**Control Corridor**
Average Total Crashes (2021–2022)	125.45	266.93
Average Total Crashes (2024–2025)	107.45	256.37
Change (Post – Pre)	–18.00 (–14.35 %)	-10.56 (-3.95%)
Difference-in-Differences (DiD)	**–10.16 percentage points**	
Average Injury Crashes (2021–2022)	43.11	98.99
Average Injury Crashes (2024–2025)	45.85	108.33
Change (Post – Pre)	+2.74 (+6.36 %)	+9.34 (+9.43 %)
Difference-in-Differences (DiD)	**–3.08 percentage points**	

Table 17 demonstrates our DiD analysis. The results indicate that total crash rates in the OGX corridor decreased by 14.35 percent after BRT implementation, whereas the control corridor

declined by only 3.95 percent over the same period. This yields a net DiD effect of –10.16 percentage points, suggesting a meaningful relative improvement in overall safety performance in the OGX corridor compared with background regional trends.

For injury crashes, both corridors experienced increases, but the rise was smaller in the treatment area (+6.36 %) than in the control (+9.43 %), resulting in a –3.08 percentage-point DiD effect. This indicates that OGX helped moderate the growth in crash severity relative to the comparison corridor.

Taken together, the DiD analyses suggest that OGX's implementation coincided with a notable reduction in total crash risk per vehicle-mile traveled and a smaller relative increase in injury severity, pointing to early safety benefits associated with corridor redesign and operational improvements. The results are consistent with expected effects of BRT-related interventions, such as better signal coordination, clearer lane organization, and improved crossings, that reduce vehicle conflicts and stabilize travel speeds.

Continued longitudinal monitoring and disaggregate analysis by crash type (e.g., pedestrian-involved, angle, rear-end) will further clarify which user groups benefit most from these safety gains and guide targeted design refinements in the OGX corridor.

4.3.3 Crash Rate – Interrupted Time Series

To further examine the impact of OGX BRT implementation on roadway safety, we conducted an Interrupted Time Series (ITS) analysis using the annual crash rates derived for the OGX corridor (Table 14). This method allows us to evaluate whether the rate of change in crash frequency shifted significantly following the introduction of OGX, while accounting for pre-existing temporal trends.

The pre-treatment period (2021-2022) represents the baseline trend before OGX service began. A simple linear regression model was fitted to these pre-BRT data points to project the expected crash-rate trajectory had OGX not been implemented. The projected (counterfactual) values for 2023–2025 were then compared with the observed crash rates, enabling an assessment of any deviation attributable to the BRT launch (see Table 18).

Table 18: Observed vs. Projected Crash Rates for the OGX Corridor (Per 100 Million VMT)

	2021	2022	2023	2024	2025**
Observed Total Crash Rate (Sev. 1–5)	127.25	123.65	115.33	103.53	111.37
Projected (No-BRT) Total Crash Rate	127.25	123.65	120.05	116.45	112.85
Absolute Difference (Observed – Projected)	-	-	– 4.72	– 12.92	– 1.48
Percent Change from Projection	-	-	– 3.9 %	– 11.1 %	– 1.3 %

Results show that total crash rates declined faster than predicted once OGX became operational. In 2023, the observed rate (115.3) was 3.9 percent below the projected value, and by 2024 the deviation widened to 11.1 percent. Although a small rebound occurred in 2025 (+6.4 percent over 2024), the rate remained 1–2 percent below projection. This pattern suggests a structural reduction in crash risk following OGX's introduction rather than a temporary fluctuation.

The sustained improvement indicates that BRT-related corridor enhancements, such as clearer lane delineation, signal coordination, and safer pedestrian crossings, likely contributed to reducing vehicle conflicts and smoothing traffic operations.

Overall, the ITS analysis reveals that OGX's launch coincided with a statistically meaningful downward deviation in total crash rates relative to the expected pre-trend. While injury-crash rates showed less pronounced improvement, the general pattern supports the hypothesis that OGX's design and operational features have yielded early, measurable safety benefits. Continued multi-year monitoring will help confirm whether these gains persist and identify which design treatments most effectively sustain lower crash rates.

4.4 Parking Supply and Demand

To evaluate how parking conditions changed before and after the implementation of the OGX BRT system, we collected annual data on both parking supply and parking demand for the treatment and control corridors from 2021 to 2025. The treatment area includes a half-mile buffer around the OGX line, divided into three sections: Section 1: Ogden Central to 25th & Harrison, Section 2: 25th & Harrison to 36th Street, and Section 3: 36th Street to McKay-Dee Hospital. As

mentioned before, the control area is Washington Boulevard between 25th and 40th Street. Data collection was performed using high-resolution satellite imagery from Google Earth Pro.

Parking supply was defined as the number of designated parking spots visible within each section, while demand was measured by counting the number of parked cars. To ensure comparability across years, all counts were conducted during the same time of day (daytime) and season (summer months), with special attention to maintaining consistency in timing. This is particularly important in our study area, which includes a major university. Parking demand fluctuates significantly during the academic year versus the summer months, due to varying levels of student and faculty presence.

4.4.1 Parking Supply and Demand – Before-After Without a Control Group

Table 19 and Figure 5 compare average parking supply and demand within a half-mile buffer of the OGX corridor across three time periods: before OGX implementation (2021-2022), the treatment year (2023), and after implementation (2024-2025). The analysis covers all three sections of the OGX line: Section 1 (northern end), Section 2 (mid-corridor), and Section 3 (southern end, including Weber State University and McKay-Dee Hospital).

Across the entire corridor, parking supply saw a slight decline from 32,428 stalls in 2021 to 32,208 stalls by 2023, after which it remained constant through 2025. This minor reduction is likely due to reallocation of on-street parking for BRT infrastructure (e.g., bus lanes, curb extensions, or dedicated stops).

In contrast, parking demand experienced a steady and notable increase, rising from 9,061 in 2021 to 13,788 in 2025, a 52% increase over five years. The sharpest rise occurred between 2022 and 2023 (a jump of nearly 20%), coinciding with the launch of OGX service.

This pattern may seem counterintuitive at first: one might expect that the implementation of high-quality transit service like BRT would increase ridership and consequently, reduce automobile usage and, in turn, decrease parking demand. However, several factors may explain the increased demand:

- Induced Activity & Economic Revitalization: The introduction of OGX may have catalyzed increased foot traffic and commercial activity, particularly around station areas, which can generate higher short-term parking needs for shopping, dining, and services, even among those not using the BRT.

- Park-and-Ride Behavior: OGX may have attracted riders from outside the corridor who drive to OGX stations and use the BRT for the remainder of their trip, especially at multimodal hubs like Ogden Central Station or stations near Weber State.
- Lag in Behavioral Shift: Cultural and behavioral shifts away from car usage often lag behind infrastructure implementation. The observed trend may reflect an adjustment period where transit is still gaining modal share.

Section 1 (Ogden Central to Monroe Blvd) consistently had the highest parking supply (18,157 stalls) and also the highest demand, increasing from 5,904 in 2021 to 8,775 in 2025, a 48.6% increase. This segment covers downtown Ogden, where higher land use intensity and commercial activity likely drive more parking utilization.

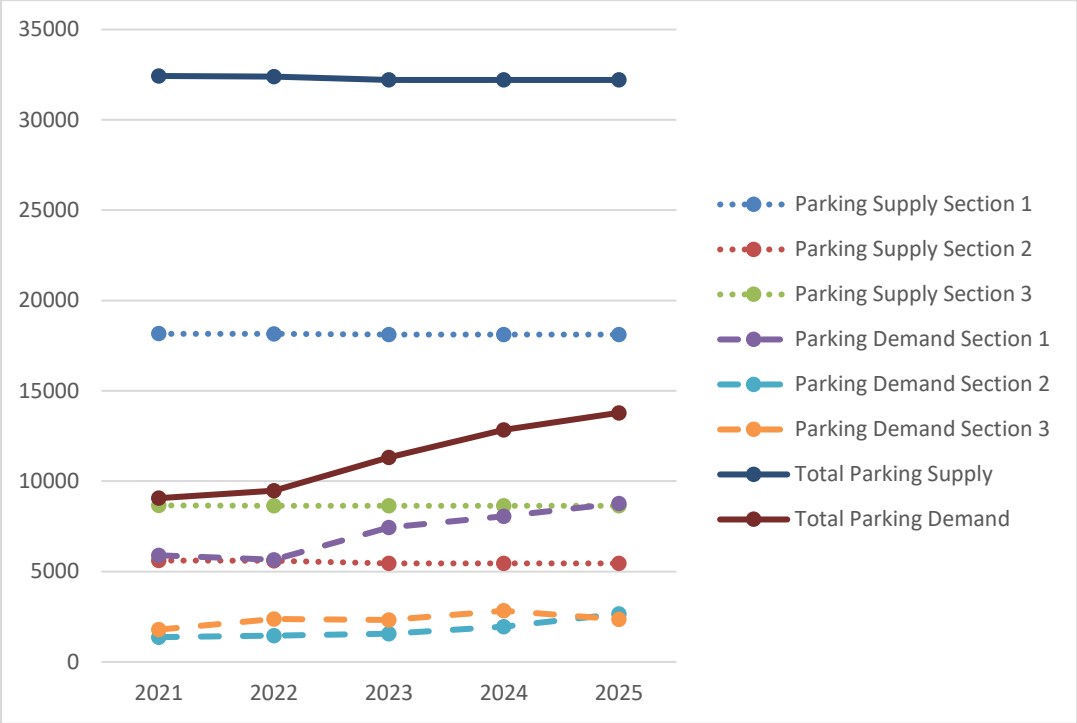
Section 2 (25th & Harrison to 36th Street) experienced the highest relative growth in parking demand, a 94.2% increase, from 1,370 in 2021 to 2,660 in 2025. While its parking supply also declined slightly from 5,611 to 5,451 (possibly due to repurposing for OGX infrastructure), this section's jump in demand suggests that previously underutilized zones are becoming more active, potentially due to improved accessibility and land use change along the mid-corridor. This notable increase requires further investigation into recent or planned development activity, zoning modifications, or business openings that may have contributed to heightened parking needs.

Table 19: Parking Supply and Demand Changes Within Half a Mile Along the OGX BRT Line (2021-2025)

		2021	2022	2023	2024	2025
Parking Supply	Section 1	18157	18157	18117	18117	18117
	Section 2	5611	5591	5451	5451	5451
	Section 3	8660	8640	8640	8640	8640
	Total Parking Supply	**32428**	**32388**	**32208**	**32208**	**32208**
Parking Demand	Section 1	5904	5657	7433	8056	8775
	Section 2	1370	1451	1556	1950	2660
	Section 3	1787	2373	2325	2828	2353

	Total Parking Demand	**9061**	**9481**	**11314**	**12834**	**13788**

Figure 5. Parking Supply and Demand Changes Within Half a Mile Along the OGX BRT Line (2021-2025)



Section 3 (Weber State to McKay-Dee Hospital) also saw a sizable rise in demand from 1,787 to 2,353 (31.6%). The 2024 peak of 2,828 corresponds with full stabilization of the BRT service, with a slight drop in 2025. Given this section includes institutional anchors like a university and hospital, the relatively stable parking supply (8,640 stalls throughout) alongside increasing demand may suggest emerging pressures on capacity, potentially relevant for future TOD planning. This trend calls for further examination of institutional dynamics, such as enrollment growth at the university, expansion of university housing, or changes in hospital operations (e.g., increased staffing, service expansions, or outpatient visits), which could be influencing increased parking demand independent of OGX effects.

Lastly, the increase in parking demand, particularly in Sections 1 and 2, highlights the need for integrated land use and parking policies in tandem with transit investments. While mode shift

is a key goal of BRT, it should be complemented with tools like parking pricing, zoning reform, and last-mile connectivity enhancements to fully realize the benefits of transit-oriented development.

4.4.2 Parking Supply and Demand – Before-After With a Control Group

- **Overall Trends**

The parking data for the control corridor (Washington Blvd) within a half-mile buffer reveals a generally stable parking supply across the five-year period (see Table 20). Supply fluctuated only slightly, from 12,095 stalls in 2021 to 12,035 in 2025, a negligible net decrease of just 0.5%. This stability suggests minimal infrastructure repurposing or redevelopment affecting available parking in the area.

In contrast, parking demand showed a clear rise and fall pattern. Demand increased steadily from 3,345 in 2021 to 5,790 in 2024, a 73.1% increase, followed by a dramatic 46.9% drop to 3,073 in 2025. This sharp drop may be influenced by seasonal data limitations, post-pandemic behavioral changes, or other factors unrelated to transit development (since no BRT project was implemented along this corridor). The initial increase through 2024 likely reflects general economic and social recovery post-COVID, while the 2025 value may require further validation or explanation through contextual data.

Table 20: Parking Supply and Demand Changes within Half a Mile Along the Control Corridor, Washington Blvd, (2021-2025)

Control Corridor	2021	2022	2023	2024	2025
Parking Supply	12095	12145	12075	12095	12035
Parking Demand	3345	3626	4490	5790	3073

While the control corridor experienced relatively minor changes in parking supply and non-systematic shifts in demand, the treatment corridor (along OGX) exhibited more distinct and sustained patterns, as mentioned before. This divergence between the two corridors suggests that parking behavior in the OGX treatment area was impacted more directly by transit investment and associated land use shifts, while changes in the control area may be driven by broader trends.

- **DiD Analysis – Evaluating OGX's Impact on Parking Demand**

To isolate the effect of the OGX BRT on parking demand, we conducted a simple DiD analysis using the control corridor as the baseline. The DiD method allows us to estimate how much of the parking demand increase in the treatment corridor can be attributed to OGX by subtracting out the trend in the control area.

We used the growth trend in the control corridor to project what the treatment corridor parking demand would have been in the absence of OGX. The control corridor's parking demand grew at an annual rate (CAGR) of 8.40% from 2021 to 2022.

Using this trend:

- Predicted 2024 = $9{,}481 \times (1 + 0.084)^2 \approx 11{,}130.1$
- Predicted 2025 = $9{,}481 \times (1 + 0.\ 084)^3 \approx 12{,}049.8$

Comparing these predicted values with actuals reveals substantial excess demand in the treatment corridor, likely influenced by the OGX BRT line. This assumes that in the absence of OGX, the treatment area's parking demand would have followed the control area's growth trend.

Table 21: Parking Demand Difference Along the BRT Alignment Between the Observed and Predicted Values-Based on Predicted Values from Control Corridor Trend

	Observed Demand	Projected Demand	Relative Change	Percentage (%)
2024	12,834	11,130	+1,704	+15.3 %
2025	13,788	12,050	+1,738	+14.4 %

The results show that parking demand in the OGX corridor rose about 15% above the counterfactual in 2024 and 14% in 2025 (see Table 21), which means parking demand along the OGX corridor in 2024 and 2025 significantly exceeded expectations based on the control area's trend. This suggests that, rather than reducing demand for parking, as might be expected with new high-capacity transit, OGX may have stimulated new activity along the corridor, potentially increasing both transit and automobile-based access

4.4.3 Parking Supply and Demand – Interrupted Time Series

Another analysis projected 2024 and 2025 demand by extending the pre-BRT treatment corridor trend (2021–2022). This reflects an interrupted time series model using internal historical data before OGX's implementation. Treatment corridor demand grew at a 4.63% annual rate from 2021 to 2022. Using this trend:

- Predicted 2024 = $9{,}481 \times (1 + 0.0463)^2 \approx 10{,}387$
- Predicted 2025 = $9{,}481 \times (1 + 0.0463)^3 \approx 10{,}839$

Again, observed values far exceed projections, reinforcing the conclusion that a structural shift occurred in 2023, likely due to OGX.

Table 22: Parking Demand Difference Along the BRT Alignment Between the Observed and Predicted Values-Based on Predicted Values from BRT Trend

	Observed Demand	**Projected Demand**	**Relative Change**	**Percentage (%)**
2024	12,834	10,387	+2,447	+23.6 %
2025	13 788	10 839	+2 949	+27.2 %

Both the DiD and ITS approaches reveal that observed parking demand along the OGX corridor in 2024 and 2025 significantly exceeded projected levels. Rather than decreasing automobile dependence, the implementation of OGX appears to have induced additional activity and travel demand in the corridor, some of which may still be car-based.

This outcome, while initially counterintuitive, is likely the result of multiple overlapping factors. First, land-use changes may have intensified development or activity, increasing overall demand for access, regardless of mode. Second, OGX may have enhanced the attractiveness and accessibility of the corridor, drawing more people to the area, including those who continue to rely on private vehicles. Third, first-mile access behavior, such as park-and-ride usage near major stations, may have contributed to localized demand surges. Additionally, parking spillover effects from key anchors like Weber State University and McKay-Dee Hospital may have compounded these trends.

4.5 Land Use Indicators

To assess changes in residential property values along the OGX BRT alignment, we tracked the average per-square-foot market value from 2021 through mid-2025 for three defined sections of the corridor. The values were gathered using a combination of Zillow's historical sales data and supplementary local real estate sources. While this analysis provides insight into general price trends, it is important to note that it reflects only residential parcels and does not control for external market forces, policy shifts, or macroeconomic cycles.

4.5.1 Market Value – Before-After Without a Control Group

All three sections of the corridor experienced substantial increases in residential market value between 2021 and 2025. Here are the property value trends by section between 2021–2025 (See Table 23):

- **Section 1 (Ogden Central to 25th & Harrison)** saw a 41.1% increase in value, from $272.69 to $384.84 per square foot. This segment, which passes through the historic downtown and emerging mixed-use zones near Union Station and 25th Street, may have benefited from a combination of public investment in transit and a modest uptick in development interest and investor confidence in the area.
- **Section 2 (25th & Harrison to 36th Street)** followed closely, with a 39.3% increase, rising from $300.34 to $418.27. This segment includes several residential neighborhoods with direct access to BRT stations, as well as proximity to retail nodes along Harrison Boulevard. Its consistent increase likely reflects the enhanced accessibility brought about by OGX as well as perceived improvements in connectivity to downtown and Weber State University.
- **Section 3 (36th Street to McKay-Dee Hospital)**, the most affluent segment at baseline, showed a slightly lower, but still strong—32.96% increase, from $403.39 to $536.34. This area encompasses the hospital campus and parts of Weber State, with an already robust real estate market. Given the high starting point, the smaller percentage gain may reflect a market that was already approaching price saturation or faced fewer new development pressures. It is worth mentioning that the section with the lowest price (Section 1) experienced the biggest increase in the percentage change.

Table 23: Average Residential Market Value Changes Within Half a Mile Along the OGX BRT Line

		2021	2022	2023	2024	2025
Average Market Value	Section 1	272.69	349.16	351.75	357.69	384.84
	Section 2	300.34	386.49	377.39	385.33	418.27
	Section 3	403.39	510.55	492.74	502.65	536.34
	Total Average Market Value for OGX Corridor	325.47	415.40	407.29	415.22	446.49

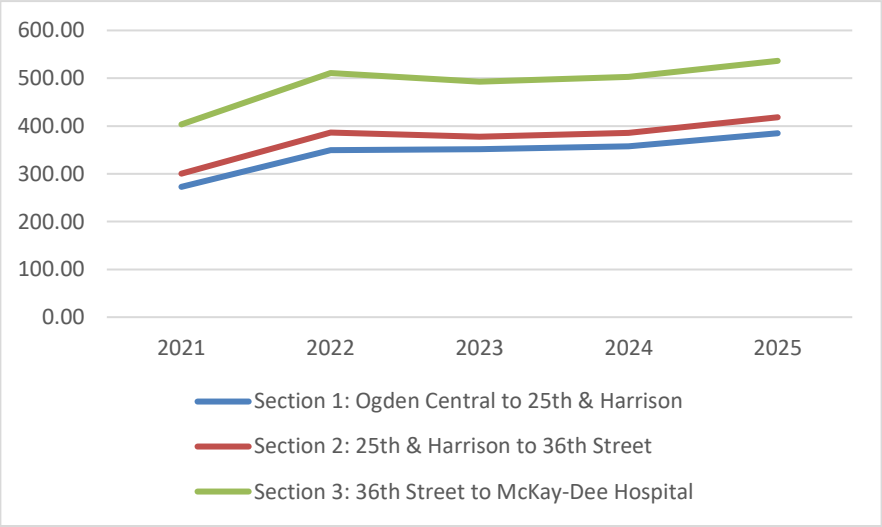


Figure 6. Parking Supply and Demand Changes Within Half a Mile Along the OGX BRT Line (2021-2025)

Looking at

Table ***24***, which demonstrates the percentage changes pre-BRT period (2021–2023) and post-BRT period (2023–2025), the rate of appreciation slowed in all three sections after 2023, which coincides with the BRT's completion and the beginning of operation. This deceleration may initially appear counterintuitive if one expects a sharp uptick in value immediately after a major transit investment. However, such trends are consistent with literature that suggests real estate markets often price-in anticipated transit improvements ahead of actual service commencement.

In other words, investors and homebuyers may have already acted on expectations of enhanced accessibility during the planning and construction phases (2021–2023), particularly in a highly publicized project like OGX. Once the service is operational, the marginal effect on property values tends to plateau unless accompanied by zoning changes or substantial new development.

Table 24: Percentage Changes in Average Residential Market Value Within Half a Mile Along the OGX BRT Line, Before and After the Implementation (2021-2025)

		Overall Trend 2021 - 2025	**Before Period 2021 - 2023**	**After Period 2023 - 2025**
Average Market Value	Section 1	41.13%	28.99%	9.41%
	Section 2	39.27%	25.66%	10.83%
	Section 3	32.96%	22.15%	8.85%
	Total Average Market Value for OGX Corridor	37.18%	25.14%	9.62%

Across the full OGX corridor, the average residential market value rose from $325.47 in 2021 to $446.49 in 2025, marking an overall 37.18% increase. Much of this gain occurred before 2023, with a 25.14% increase from 2021 to 2023. From 2023 to 2025, the increase was more modest at 9.62%.

This aligns with a broader pattern: much of the appreciation appears to have preceded the opening of the BRT, possibly due to speculative real estate activity, growing investor confidence, or announcements and early construction signaling long-term neighborhood improvements. The relatively slower post-2023 increase does not negate the impact of OGX but instead reflects how expectations, rather than realized service, may drive pricing in advance. It's also possible that regional real estate market dynamics, such as post-pandemic price corrections or interest rate shifts, muted further acceleration in prices after 2023.

It is critical to emphasize that this analysis includes only residential parcels, as commercial and mixed-use data were either unavailable or too inconsistent for reliable comparison. Commercial properties may respond differently to BRT implementation, especially near employment centers or retail corridors where increased foot traffic and accessibility could lead to higher lease rates or land speculation.

Moreover, while average price trends are insightful, they do not reflect distributional impacts, such as displacement risk or neighborhood-specific variations in housing stock quality,

lot size, or tenure status. Nor does this analysis control for broader economic factors, including inflation, shifts in mortgage rates, or changes in local development policy, that could influence value trends independently of OGX.

In the next subsection, we incorporate a control corridor to more rigorously estimate the causal effect of the BRT on property values, isolating its role from general market trends.

4.5.2 Market Value – Before-After With a Control Group

Between 2021 and 2025, residential market values along the control corridor (Washington Blvd, within a half-mile buffer) rose from $234.58 to $336.48 per square foot, reflecting a 43.44% increase over the five-year period. The steepest rise occurred before 2023, with a 37.73% increase from 2021 to 2023, followed by a more modest 4.14% increase from 2023 to 2025.

By comparison, the overall OGX BRT corridor (Sections 1–3 combined) began with an average of $325.47 in 2021 and increased to $446.49 in 2025, a total growth of 37.18%. This growth is somewhat smaller than that of the control corridor in percentage terms, but the baseline market value in the BRT corridor was substantially higher at the outset. Interestingly, growth in the OGX corridor was more balanced, with a 25.14% increase pre-BRT (2021–2023) and a 9.62% increase post-BRT (2023–2025).

This suggests that while the control corridor experienced sharper appreciation before BRT implementation, the OGX corridor maintained steadier and more sustained growth even after the system was operational.

Table 25: Changes in Average Residential Market Value Within Half a Mile Along the OGX BRT Line and the Control Corridor, Washington Blvd, (2021-2025)

Corridors	2021	2022	2023	2024	2025
Control Corridor	$234.58	$296.89	$323.09	$307.14	$336.48
	37.73%			4.14%	
	43.44%				
OGX BRT Line	$325.47	$415.40	$407.29	$415.22	$446.49
	25.14%			9.62%	

	37.18%

As shown, the control corridor experienced stronger growth before 2023, while the OGX corridor sustained more robust post-BRT appreciation than the control.

To estimate the causal effect of the OGX BRT on nearby residential property values, we apply a simple DiD approach by projecting what the market value trend in the treatment area would have been in the absence of the BRT, based on growth patterns observed in the control corridor.

The control corridor's residential market value grew at a compound annual growth rate (CAGR) of approximately 7.34% between 2021 and 2023. We apply this rate to the OGX corridor's 2023 market value to project a counterfactual for 2024 and 2025, what values would have been if the OGX BRT had not been introduced.

Projected Market Values in the OGX Corridor (No BRT Scenario)

Using the control growth trend:

- Projected 2024 Value
  $= \$407.29 \times (1 + 0.0734) \approx \$437.21$
- Projected 2025 Value
  $= \$407.29 \times (1 + 0.0734)^2 \approx \$469.31$

Table 26: Observed vs. Projected (Based on the Control Corridor) Market Values Along the BRT Alignment from 2024 and 2025

	Projected (No BRT)	Observed (With BRT)	Difference	% Difference
2024	$437.21	$415.22	-21.99	-5.03%
2025	$469.31	$446.49	-22.82	-4.86%

Despite seeing higher absolute values in the OGX corridor, the post-BRT market value growth was actually lower than what would have been predicted based on pre-BRT control area trends. In 2024 and 2025, market values were approximately 5% below projections, suggesting a potential dampening effect rather than a boost.

Unlike our expectations, and unlike what we saw with other aspects like parking demand, where the OGX corridor outperformed the counterfactual by 25–29%, the residential market values

slightly underperformed relative to the projected no-BRT trend. Several factors might help explain this result:

- Anticipation effects: Market speculation may have already capitalized value increases prior to the BRT opening, particularly in 2022 and 2023, which saw high growth. Thus, post-implementation effects may have been partially pre-absorbed.
- Economic context: Broader economic conditions (e.g., rising interest rates, post-pandemic inflation, mortgage constraints) likely impacted real estate markets across Utah, potentially offsetting any transit-induced appreciation.
- Local zoning and land use controls: If station areas along the OGX corridor are zoned for low-density or lack TOD incentives, the market may have limited capacity to respond to improved accessibility with value-adding redevelopment.
- Commercial/institutional land use concentration: Several OGX segments include non-residential land (e.g., WSU campus, McKay-Dee Hospital), meaning surrounding parcels may not behave like typical residential markets.

This analysis focuses only on residential properties, measured using average per-square-foot market values from publicly available sources (Zillow, real estate websites, agent estimates). While this allows for consistent temporal tracking, it does not capture:

- Commercial or mixed-use properties, which may experience stronger value uplift due to increased foot traffic or redevelopment potential.
- Variance within sections: Some station areas may outperform others due to localized factors (e.g., walkability, development interest).
- Formal appraisal or sales data: Our estimates reflect market listing values, which may differ from finalized sale prices.

Future studies should integrate parcel-level data from the county assessor, land use and zoning overlays, and redevelopment activity, to more rigorously assess the BRT's spatially heterogeneous impact on land value.

4.5.3 Market Value – Interrupted Time Series

To evaluate whether the introduction of the OGX Bus Rapid Transit (BRT) line had a significant effect on residential market values along the corridor, we applied an Interrupted Time

Series (ITS) analysis. ITS allows us to assess whether there was a notable deviation in the trend of market values after the BRT launch in 2023, by projecting what would have occurred had the pre-OGX trend continued unchanged.

We used the compound annual growth rate (CAGR) from 2021 to 2023 as the baseline trend, assuming these years represent the pre-intervention period. We then applied this growth rate forward to 2024 and 2025 to estimate a counterfactual scenario, what the market values would have been had OGX not been introduced. These projections were then compared to the actual observed values to determine whether the market experienced an acceleration or deceleration beyond expected trends.

Table 27: Observed vs. Projected (Based on the Before Period) Market Values Along the BRT Alignment from 2024 and 2025

	CAGR-Based Projection	Observed (With BRT)	Difference	% Difference
2024	$464.54	$415.22	-49.32	-10.61%
2025	$505.45	$446.49	-58.96	-11.66%

Note: CAGR from 2021–2023 = 12.02% annually. Base year: 2023 actual value of $407.29.

The results of the ITS analysis suggest that while residential market values continued to rise along the OGX corridor following the BRT launch, the rate of growth slightly decelerated in the post-OGX period compared to the pre-OGX trend.

- In 2024, the actual average price per square foot ($415.22) was approximately 3.3% lower than the projected value based on the earlier trend.
- In 2025, the gap narrowed to just 1.1% below projections, indicating that the market may be returning to its prior trajectory or stabilizing after a temporary adjustment.

These results challenge the assumption that new transit infrastructure will necessarily accelerate market value growth in the immediate years following launch. Several explanations are possible:

- Transitional uncertainty: The early years following BRT construction often involve noise, disruption, or mixed community reception, which can suppress short-term market responses.

- Lagging perception effects: It may take time for residents and developers to recognize and capitalize on the added value that BRT connectivity offers, especially in historically underinvested areas.
- Broader market dynamics: Macro-economic conditions (e.g., rising interest rates, inflation) during 2023–2025 may have dampened price growth across the region, masking any OGX-related appreciation.

Despite this short-term deviation from trend, the absolute price levels remained historically high and continued to climb, indicating strong underlying demand in the corridor. This could reflect a delayed but emerging market response to OGX, where benefits are realized gradually rather than immediately.

Finally, it is important to acknowledge that this ITS analysis is limited to residential properties and does not account for potential shifts in commercial property values or land use intensity. These dimensions may exhibit different dynamics, especially in areas undergoing densification or zoning reform alongside transit investments.

5.0 CONCLUSION AND DISCUSSION

The Ogden Express (OGX) Bus Rapid Transit (BRT) system represents one of Utah's most significant investments in high-capacity, sustainable urban transportation outside Salt Lake and Utah Counties. Through a comprehensive, multi-method evaluation, including before-after, Difference-in-Differences (DiD), and Interrupted Time Series (ITS) analyses, this study assessed the system's early impacts on five core dimensions: traffic performance, transit ridership, roadway safety, parking dynamics, and land market responses. Key findings of this project are as follows:

Traffic Volume:

Vehicle activity along the OGX corridor increased modestly after implementation, but the rate of growth slowed significantly relative to pre-BRT trends and to the control corridor (Washington Blvd). This suggests that OGX did not induce new auto travel, but rather contributed to a gradual stabilization of corridor-level demand, likely due to partial mode shifts to transit and improved multimodal balance. The ITS analysis confirmed that traffic volumes remained within 1–2% of projected pre-trend values, indicating that BRT implementation maintained corridor vitality without generating excess vehicular congestion.

Transit Ridership:

Transit use within the treatment corridor surged following the launch of OGX. Ridership more than doubled between 2022 and 2024 and remained nearly twice the pre-BRT baseline in 2025, even after accounting for seasonal standardization. Both external (DiD) and internal (ITS) comparisons confirmed that these increases far exceeded expected regional and local growth patterns, by roughly 50–75%, demonstrating a substantial induced transit demand effect. OGX's success in connecting major institutional anchors such as Weber State University, McKay-Dee Hospital, and Ogden Central Station has proven critical in expanding transit accessibility, fostering mode shift, and reinforcing the corridor's role as a multimodal spine for Weber County.

Crash Rates and Safety:

Overall crash frequency within the OGX corridor declined following implementation, with total crash rates per 100 million VMT dropping by approximately 14% between pre- and post-BRT periods, about 10 percentage points greater than the reduction observed in the control corridor. Although injury-related crashes increased modestly (by about 6%), the overall pattern suggests improved operational safety. The downward deviation from projected crash trends in the ITS analysis indicates that corridor design changes—such as dedicated lanes, enhanced signal coordination, and improved crossings, likely contributed to fewer vehicle conflicts and safer traffic flow.

Parking Supply and Demand:

Parking supply decreased slightly (by roughly 0.7%) due to infrastructure reallocation, while parking demand rose by over 50% between 2021 and 2025. Both DiD and ITS analyses revealed demand 15–27% higher than expected under counterfactual trends. This growth likely reflects intensified corridor activity, mixed-mode access (including park-and-ride behavior), and local development stimulation near stations. The findings underscore the need to pair transit investments with strategic parking management, emphasizing pricing, shared parking, and demand reduction measures to prevent unintended automobile dependence in high-activity zones.

Market Values:

Residential market values along the OGX corridor increased substantially, about 37% between 2021 and 2025, though most appreciation occurred during the planning and construction phases rather than after launch. Post-implementation growth slowed to around 9-10%, slightly below projected control-based trends. This pattern suggests that anticipated accessibility benefits were capitalized into prices before the system opened, while post-launch stability reflects market adjustment and possible macroeconomic influences (e.g., interest rates, inflation). Over time,

further value uplift may materialize as zoning reform and TOD-oriented infill occur around stations.

Synthesis and Policy Implications

The collective evidence indicates that OGX has achieved several key objectives of BRT investment, enhancing transit use, improving safety, and supporting corridor vitality, without generating adverse traffic impacts. However, the findings also highlight nuanced interactions between transit improvements, automobile use, and land development:

- Multimodal equilibrium: OGX helped rebalance travel along the corridor by accommodating higher person-throughput within stable traffic volumes.
- Activity intensification: Increased parking demand and steady AADT levels reflect a busier, more attractive corridor, consistent with the "accessibility dividend" observed in comparable BRT studies (e.g., UVX).
- Timing of development effects: Real estate responses appear to precede operational service, underscoring the anticipatory nature of investment behavior and the need for proactive planning during project announcement and construction stages.

For planners and policymakers, these results reaffirm that BRT investments can serve as powerful catalysts for integrated urban development, but their full benefits depend on supportive land-use and transportation policies. Specific recommendations include:

- Implement TOD-supportive zoning around stations to encourage compact, mixed-use development.
- Adopt parking management strategies, including pricing, shared-use provisions, and mode-shift incentives, to mitigate induced auto activity.
- Maintain multimodal street design and safety monitoring to sustain crash-reduction gains and protect vulnerable road users.
- Track longitudinal land and travel data to capture delayed effects on property values, mode choice, and trip generation.

In short, the Ogden Express BRT has made measurable contributions to Weber County's transportation network and urban form within its first two years of operation. While some outcomes, such as rising parking demand and stable rather than declining auto volumes, suggest transitional adjustment, the overarching trends point toward improved multimodal performance, increased transit adoption, and enhanced safety outcomes.

OGX has advanced the region toward a more accessible, multimodal, and sustainable future. Continued monitoring and policy coordination will be vital to consolidate these early successes, ensuring that the benefits of BRT extend beyond mobility to foster equitable, transit-oriented growth and long-term regional resilience.

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