Transit Ridership & VMT Estimation Methodology

Uptown Connect is a transit center at the heart of a new mixed-use development that will be designed, constructed, and managed by ABQ RIDE's Project Development Team. Mixed-use developments are known to generate lower numbers of Vehicle Miles Traveled (VMTs). This development form is supportive of active transportation due to the close proximity of uses. There are generally more pedestrian-oriented streetscapes associated with mixed-use development that make a safer and more enjoyable walking environment. The mix of destinations that are accessible with a short travel time reduce the need for longer trips to access everyday goods and services. Uptown is one of the main employment centers in Albuquerque with over 18,000 jobs, 13,000 of which are within ½ mile of the project site. This means there is an abundance of both jobs and services within convenient walking distance of the project.

The convenient access to the Uptown Transit Center is known to be another factor in reducing VMTs. Uptown Transit Center is the terminus of the ART 766 line with service every 15 minutes. There are 20,200 jobs within a 30-minute walk and 221,000 jobs within 60 minutes of travel time walking and by traveling on bus.[1] The number of jobs accessible by walking and transit is a stand-in for the amount of goods and services that can be reached in a certain amount of time.

This paper documents ABQ RIDE's approach to estimating the reduction in VMTs that will occur as part of this project.

Key findings:

- This project will result in a likely **17 new workers who are likely to take 170 transit commuting trips per week** (Calculation 1). It will generate **227 new total** transit trips per day (Calc. 2).
- This project will result in a **42% gain in overall transit ridership originating at the Uptown Transit Center** for weekdays (Calculation 3).
- This development will generate **17.5% fewer vehicles, or 51 fewer vehicles,** than the same development in a more suburban location (Table 6).
- Of all new trips generated by this project, there will be **77 *internal* pedestrian trips – or 24% of all trips – meaning that this project will have a smaller impact on the street system** than a development that did not include mixed uses.
- Residents of the Uptown Connect development will **save $547,128 per year** in reduced vehicle ownership and operation costs (Calculation 5).
- As a result of fewer vehicles owned per household, the project will result in a **reduction of 955,188 VMTs per year** in relation to what a similar development with less frequent transit service would have generated (Table 7).
- This project will result in a reduction of **43,026 gallons of gasoline per year** needed by project residents and consequently **382 metric tons of CO2 gas per year** (Table 8).

[1] Uptown Transit Center TRAM Model and Jarrett Walker Associates analysis of 2019 transit service.

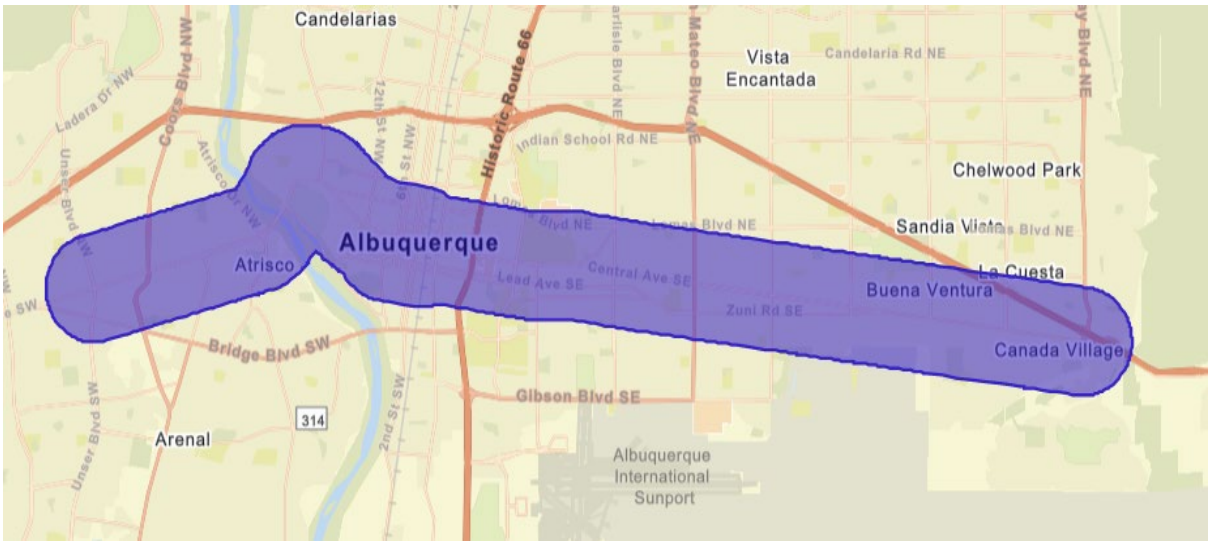
Transit Ridership & Active Transportation Mode Share

This project will add 215 new residential dwelling units. In 2020, 1.24% of workers over 16 years of age took public transportation in Albuquerque. The Mid-Region Council of Governments calculated a citywide rate of 1.12 workers per household as the Albuquerque average, based on US Census American Community Survey data. At this rate, ABQ RIDE estimates the project will generate 241 workers in the new development.

The Mid-Region Metropolitan Planning Organization calculated the mode share for commuters who live within 5/8th of a mile of the ART system, which provides service every 8 minutes. The 5/8th of a mile distance was selected as a reasonable distance that people are willing to walk to access high-capacity transit service. This distance is used because it approximates a 10-minute walk for an average resident, at 3.5 miles per hour. Because the Uptown Transit Center is the northernmost terminus of the ART Route 766, and the Urban Center shares some of the same development characteristics as Central does, this mode share is taken as the likely rate of transit ridership generated by this development.

Commuting Mode Share

For this calculation, the Mid-Region Metropolitan Planning Organization provided US Census data that has been pulled for the citywide geography. The data came from ESRI and US Census Bureau ACS 2016-2020 5-year data. This data was then geographically analyzed to determine the primary commute mode for workers who live within 5/8th of a mile from the Central Avenue corridor that is served by Albuquerque Rapid Transit (ART) service. The data was then split into addresses within the 5/8th mile distance of Central Avenue's centerline and addresses for the remainder of the City of Albuquerque outside the selected ART corridor. The "Central Ave. ART Corridor" geography is shown in the map below:



The results of this GIS calculation show that the high-frequency transit service on Central Avenue is associated with a dramatic shift in travel modes relative to the rest of the city, particularly in the categories of transit and walking.

Table 1. 2020 Workers' Commute Rates by Geography

Commute: 2020 Workers 16+	Central Ave. ART Corridor		Remainder of Albuquerque	
Drove Alone to Work	30,310	71.4%	180,692	79.8%
Carpooled	4,472	10.5%	21,048	9.3%
Took Public Transportation	1,748	4.1%	2,812	1.2%
Bicycled	937	2.2%	1,679	0.7%
Walked	1,748	4.1%	3,294	1.5%
Took Other Means of Transportation	435	1.0%	2,340	1.0%
Worked at Home	2,791	6.6%	14,654	6.5%
Commute to Work Base	42,441	100%	226,519	100%

The project site shares many of the same characteristics that impact travel choice that Central Avenue has. The general vicinity is developed with a primarily grid pattern. This increases the distance someone could be willing to walk by allowing more direct travel than street networks with more cul-de-sacs, dead ends, and winding roads. The land uses are similar to those along Central Avenue. There is a mix of commercial, restaurant, entertainment, office, and service uses. And finally, both locations are served with ART bus frequencies, with connections to other local routes. The Uptown Transit Center has slightly higher frequencies because it is the connection hub for several different routes.

Data from California published in the Public Policy Institute of California's "Making the Most of Transit: Density, Employment Growth, and Ridership around New Stations" found that "proximity to transit determines ridership—even more for workplace proximity than for residential proximity. Within one-half mile of a transit station, 6.7 percent of residents and 7.2 percent of workers commute by subway, streetcar, or railroad." Because Uptown Connect is a unique housing project and mixed-use development that is located at the terminus of Albuquerque's ART bus rapid transit route 766, these slightly higher percentages of riders are likely ratios of resident's commuting patterns. They also convey that we might expect an almost similar number of all trips for residents to shift from single-occupancy vehicles to transit. The abundance of jobs in the Uptown area, combined with high-frequency transit service, makes it likely that 7.2% of all commuting trips by people employed in Uptown could be taken via transit.

Applying the mode share rates for commuting that were calculated for the buffer area around Central Avenue to the Uptown Transit Center, this project will result in a likely 17 new transit commuters.

Calculation 1

New workers (241) x TOD Transit Commute Rate (7.2%) = 17 new Transit Commuters

At a minimum, that would result in 34 new commuting trips per day (two trips per person), or **170 new commuting trips per week**.

All Trips Taken from a TOD Development

Considering the number of all trips taken will give us the most realistic understanding of this project and its' impacts on the surrounding transportation system, the overall numbers of Vehicle Miles Traveled (VMTs), and the environmental impacts due to personal transportation.

The US DOT's Bureau of Transportation Statistics' Travel Survey also notes that only 15% of daily trips are taken for commuting.[2] To determine the ratio of all trips taken, the following calculation applies:

Calculation 2

34 Daily Commuting Trips / Total Daily Trips (15%) = 227 Total Transit Trips

To understand the magnitude of the new trips generated, we can compare the new trips generated by this project to the current transit boardings at the Uptown Transit Center.

Table 2: Uptown Transit Center Boardings for 2022

Uptown Transit Center 2022 Boardings[3]	**Weekday Trips**	**Saturday Trips**	**Sunday Trips**
Platform	333	319	184
Park and Ride lot	69	48	28
Americas Parkway northbound	44	25	17
Americas Parkway southbound	29	24	7
Indian School/Nusenda	62	41	23
Totals	**537**	**457**	**259**

Note 1: The 2022 ridership data for Uptown Boardings does not include alightings. Because commuting trips are typically round trip, this calculation counts the commute as one trip, rather than two rides.

Calculation 3

*New Transit Trips (227) / Average Weekday Boardings (537) * 100 = 42.3% Increase in Uptown Boardings*

Using the citywide commuting mode share for public transportation, this project will result in a **42% gain in ridership originating at the Uptown Transit Center** for weekdays, based on the January to March 2022 weekday boarding data (See Table 2 and Note 1).

Regarding the other travel modes, this project is likely to result in more active transportation commutes than typical citywide development does. This is demonstrated in the following table:

[2] National Household Travel Survey Daily Travel Quick Facts, May 31, 2017. Source: https://www.bts.gov/statistical-products/surveys/national-household-travel-survey-daily-travel-quick-facts

[3] JWA data is boarding only. https://webmap.jwainternal.com/ABQ/index.html

Table 3. Imputed Commute Patterns for Project Residents Comparing a TOD development to Citywide

Commute Modes: 2020 Workers 16+ Computed for 263 New Workers	Central Ave. ART Corridor		Remainder of Albuquerque		Difference
Drove Alone to Work	68.3%	165	79.8%	192	-27
Carpooled	10.5%	25	9.3%	22	3
Took Public Transportation	7.2%	17	1.2%	3	14
Bicycled	2.2%	5	0.7%	2	4
Walked	4.1%	10	1.5%	4	6
Took Other Means of Transportation	1.0%	2	1.0%	2	0
Worked at Home	6.6%	16	6.5%	16	0
Commute to Work Base	100%	241	100%	263	n/a

According to this estimation methodology, there will be a mode shift of 10% towards the active transportation modes: transit, biking, and walking. This means there will be 20 fewer workers who drive to work alone, along with higher numbers in the other transportation modes:

- 14 more workers who take public transportation
- 6 more workers who walk
- 4 more workers who bicycle

The mode shift results can also be used in determining the amount of change in terms of greenhouse gases created and the reduction in VMTs.

Note 2: Earlier in the analysis, there is discussion of the 17 new transit riders that are generated by this development. This second methodology compares the magnitude of change relative to if this development was constructed in another more suburban development area. The actual number of new transit riders that can be attributed to this project is the full 17 commuting workers out of 241 new workers over 16.

New Trips Generated by Uptown Connect

Looking at the new uses that will be added by this project, there will be a total of 318 trips generated by this project for the evening peak hour, according to the Institute of Transportation Engineer's Trip Generation Tables. Of these, there will be **77 internal pedestrian trips – or 24% of all trips – meaning that this project will have a smaller impact on the street system** than a development that did not include mixed uses. The presence of the Transit Center also increases the amount of transit trips we would expect. We do not have data on the average trip length by type, so the reduced number of trips is not added to the VMT or Greenhouse gas calculations.

Table 4. Trips Generated by the Joint Development Project

Trips Generated, PM Peak Hour	
All Person Trips	318

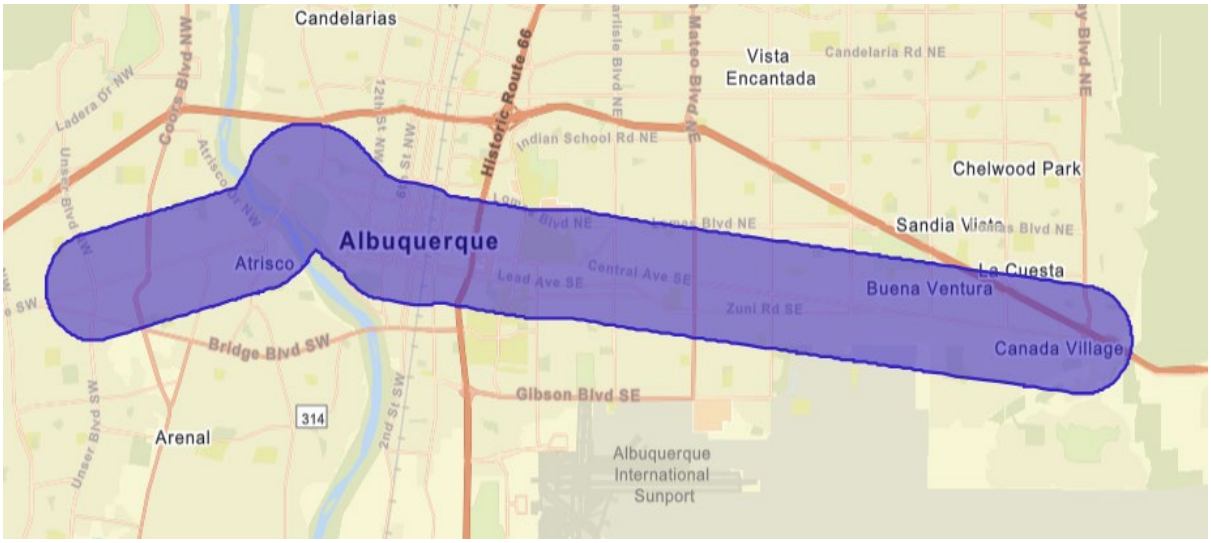
	Number	Percent
Internal Non-Motorized Trips	77	24%
External Vehicle Trips	231	73%
External Transit Trips	8	3%
External Non-Motorized Trips	2	1%

Reduced VMTs

Related to the calculations for determining the number of new transit riders and overall commuting mode shift is determining the change to Vehicle Miles Traveled (VMTs).

Vehicle Ownership

For this calculation, the Mid-Region Metropolitan Planning Organization provided US Census data that has been pulled for the citywide geography. The data came from ESRI and US Census Bureau ACS 2016-2020 5-year data. This data was then processed to determine the vehicle ownership for residences within 5/8th of a mile from the Central Avenue corridor that is served by Albuquerque Rapid Transit (ART) service. This distance is used because it approximates a 10-minute walk for an average resident, at 3.5 miles per hour. The data was then split into households within the 5/8th mile distance of Central Avenue's centerline and households for the remainder of the City of Albuquerque outside the selected ART corridor. The geography is shown in the map below:



The results of this GIS calculation show there are double the number of renter households with no vehicle. There are about an equal number of houses with 1 vehicle, and slightly fewer with 2 or more vehicles.

Table 5. 2022 Renter Households' Vehicle Ownership Rates Comparing a TOD development to Citywide

Variable: 2020 Renter Households	Central Ave. ART Corridor Households	%	Remainder of Albuquerque Households	%
Renter Households with No Vehicles	5,345	24%	8,222	12%
Renter Households with 1 Vehicle	10,519	47%	34,462	50%
Renter Households with 2 Vehicles	4,934	22%	21,049	31%
Renter Households with 3 Vehicles	1,017	5%	4,004	6%
Renter Households with 4 Vehicles	318	1%	968	1%
Renter Households with 5 or More Vehicles	32	0%	263	0%
	22,165	100%	68,968	100%

Within the Central Avenue ART Corridor, there are substantially fewer vehicles per household compared to households in the remainder of the city. As described in the section above for Mode Shift Related to Transit-Oriented Development, the Uptown Transit Center and Uptown Connect project have similar characteristics to the Central Avenue ART Corridor. Therefore, the rates of car ownership for future residents at Uptown Connect will more closely mirror the car ownership rates for locations within the Central Avenue ART Corridor.

From the rates of car ownership calculated for the City's Transit-Oriented Development areas, we can extrapolate how many households would own a vehicle in the Uptown Connect project. For the 215 new households generated by this project, results show that residents at this development in whole will own 51 fewer vehicles than would be needed in other locations citywide. This development will generate **17.5% fewer vehicles** than the same development in a more suburban location.

Calculation 4

TOD Estimated Vehicles (241) / Citywide Estimated Vehicles (292) = 82.5%
100% – 82.5% = 17.5%

Table 6. 2022 Renter Households' Vehicle Ownership Comparing a TOD development to Citywide

Variable: 2020 Renter Households	Central Ave. ART Corridor Est HH	Est vehicles	If project is anywhere else in Albuquerque Est HH	Est vehicles	Difference in # of vehicles owned Vehicles
Renter Households with No Vehicles	52	0	26	0	0
Renter Households with 1 Vehicle	102	102	107	107	-5
Renter Households with 2 Vehicles	48	96	66	131	-36
Renter Households with 3 Vehicles	10	30	12	37	-8
Renter Households with 4 Vehicles	3	12	3	12	0
Renter Households with 5 or More Vehicles	0	2	1	4	-3
Total	215	**241**	215	**292**	-51

* Assumes households in the 5+ category have 5 vehicles
* Assumes the car ownership rates at Uptown would be similar to households in the Central Ave. ART Corridor area.

Estimated Cost of Driving per Year

Taking the difference in the number of vehicles owned by residents in urban, transit-oriented developments (compared with numbers of vehicles owned elsewhere in the city), we can determine the cost savings for those households. AAA has been estimating driving costs for over 70 years, and their estimates for the national average for new car ownership in the US is $10,728 in 2022.[4] This includes ownership and operating costs including fuel, maintenance/repair/tire costs, insurance, license/registration/taxes, depreciation, and finance charges. The study assumes 15,000 miles driven annually. Using this figure, collectively, residents of the Uptown Connect development would **save $547,128 per year** in vehicle ownership and operation costs. Because transit service is free in Albuquerque, that would not be off-set by any additional cost for public transportation.

Calculation 5

51 Fewer Vehicles x $10,728 Dollars per Year = $547,128 Savings per Year

There are additional cost savings that are likely due to internal trip capture at this development, and the availability of many goods, services, and jobs within walking distance of the project site. However, ABQ RIDE has not modeled the percent of all trips that are likely to be shifted to other travel modes.

Estimated VMTs per Year

In the Highway Statistics (2000) for State and Urbanized Areas[5], the USDOT estimates for New Mexico there are 1,239,045 licensed drivers who drive an estimated 18,369 vehicle miles on average per year.

Presuming each vehicle is driven by a licensed adult, the following VMTs are calculated for TOD development areas in comparison to the remainder of the City. The following Calculation is applied to each variable in Table 7 below to determine the overall VMT reduction per year.

Calculation 6

Number of HH x 18,369 VMT per year = VMTs generated

See Table 7 for Calculations by Variable

[4] https://newsroom.aaa.com/2022/08/annual-cost-of-new-car-ownership-crosses-10k-mark/
[5] https://www.fhwa.dot.gov/ohim/onh00/onh2p11.htm

Table 7. 2022 Renter Households' Vehicle Ownership & VMT, Comparing a TOD development to Citywide

Variable: 2020 Renter Households	Central Ave. ART Corridor		If project is anywhere else in Albuquerque		Difference in # of VMTs generated
	Est HH	VMTs generated	Est HH	VMTs generated	
Renter Households with No Vehicles	52	0	26	0	0
Renter Households with 1 Vehicle	102	1,873,638	107	1,965,483	(91,845)
Renter Households with 2 Vehicles	48	1,763,424	66	2,424,708	(661,284)
Renter Households with 3 Vehicles	10	551,070	12	661,284	(110,214)
Renter Households with 4 Vehicles	3	220,428	3	220,428	0
Renter Households with 5 or More Vehicles	0	0	1	91,845	(91,845)
Total	215	**4,408,560**	215	**5,363,748**	(955,188)

As a result of the lower vehicle ownership rates for renter households in TOD areas in Albuquerque, this project will result in a **reduction of 955,188 VMTs per year** in relation to what a similar development in a more urban location would have generated. The actual VMTs generated by this would be lower because there is a higher rate of transit and walking commute modes, and the mixed-use urban form allows shorter trips, which typically result in more trips being made by active transportation modes.

Estimated Greenhouse Gas Reduction per Year

The US EPA developed a Greenhouse Gasses Equivalencies Calculator to convert different types of energy consumption into the equivalent greenhouse gas emission numbers.[6] For this project, we considered the reduction in VMTs associated with this project and calculated the miles per gallon for the average vehicle. In 2019, the weighted average combined fuel economy of cars and light trucks was 22.2 miles per gallon (FHWA 2020). This resulted in the number of gallons of gallons of gasoline that would be expected to be reduced by this project in a Transit-Oriented Development area. The number of gallons of gasoline was then converted to determine the CO2 reduction. This value assumes that all the carbon in the gasoline is converted to CO2.

Calculation 7

8,887 grams of CO2/gallon of gasoline = 8.887 × 10-3 metric tons CO2/gallon of gasoline

(VMT Reduction / Average MPG) x Grams of CO2 per gallon = CO2 Reduction (grams)

CO2 Reduction (grams) / 1,000,000 = CO2 Reduction (tons)

See Table 8 for Calculations

[6] https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references

Table 8. EPA VMT to CO2 Calculation

955,188	VMT reduction (miles)
8,887	grams of CO2 per gallon of gasoline consumed
22.2	miles per gallon for average vehicle
43,026	gallons of gasoline reduction
382,376,385	CO2 reduction (grams)
382	C02 reduction (metric tons)

This project will result in a reduction of at least **43,026 gallons of gasoline** needed by project residents and **382 metric tons of CO2 gas** generated by transportation.

The full reduction in the number of trips and their length cannot be estimated at this with known data. Therefore, as a result of convenient access to high-frequency transit and the convenience of daily items within a ½ mile walk means that there will likely be a much higher rate of active transportation and shorter trip lengths. Both the reduction in VMTs and reduction in Greenhouse gasses created could likely double to triple due to only considering commuting trips in those analyses.[7]

[7] Based on the average commuting tips being between 15% - 30% of daily trips taken. National Household Travel Survey Daily Travel Quick Facts, May 31, 2017. Source: https://www.bts.gov/statistical-products/surveys/national-household-travel-survey-daily-travel-quick-facts