

# **Transportation Demand Management (TDM) Program for The Grove at Shoal Creek**

**Prepared for:  
ARG Bull Creek LTD**

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TRF 007.001



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## 1. INTRODUCTION

The Grove at Shoal Creek is located south of West 45<sup>th</sup> Street, east of Bull Creek Road, and west of Shoal Creek in Austin, Texas (see **Figure 1**). The currently approved TIA assumes the following land uses:

- 1,135 single family and multifamily residential units
- 600 dwelling units of senior care facility
- 225,000 square feet of office space
- 143,000 square feet of retail, restaurant, and service space

A more detailed breakdown is included in Chapter 2. A site plan is shown in **Figure 2**. The City of Austin has asked the applicant to include a Transportation Demand Management (TDM) program that reduces peak-hour vehicle trips generated by the by the Project.

This comprehensive TDM program was prepared to include multimodal measures that best fit the context of the site and its users. It includes measures that are incorporated into the site's design and those that can be implemented by the property manager or by the tenants (employers). It also incorporates several existing Project features and minimum measures offered by the applicant as part of the Project.

This document summarizes trip generation for the proposed Project, the proposed TDM program, including detailed descriptions of the TDM strategies, an evaluation of the effectiveness of the TDM strategies, the party responsible for each strategy, and the trip-reduction monitoring process.



Source: Google Maps, August 2016.





## 2. PROJECT TRIP GENERATION

The purpose of the vehicular trip generation estimate is to approximate the number of new vehicle trips entering and exiting the site for various purposes (e.g., resident, employee, and visitor trips) during a selected time period. The land uses assumed in the currently approved TIA consist of up to 1,135 single family and multifamily residential units, 600 dwelling units of senior care facility, 225,000 square feet of office space, and 143,000 square feet of retail, restaurant, and service space. Land use types and quantities are subject to change with final design and implementation of the Project, though overall vehicle trip generation will be limited as shown throughout this document.

### 2.1 RAW ITE TRIP GENERATION

The Institute of Transportation Engineers (ITE) *Trip Generation* (9<sup>th</sup> Edition) is the most common industry source for developing trip generation estimates for new development. **Table 1** shows the raw trip generation, without any adjustments, taken from the approved TIA for the Project.



**TABLE 1: THE GROVE AT SHOAL CREEK RAW ITE TRIP GENERATION**

Description	Land Use	ITE Code	Units	Daily	Weekday AM Peak			Weekday PM Peak		
				Total	In	Out	Total	In	Out	Total
Residential	Single-Family Detached Housing	210	110 DU	1,146	22	65	87	72	42	114
Residential	Apartment	220	600 DU	3,760	60	238	298	226	122	348
Residential	Residential Condominium/Townhouse	230	425 DU	2,265	28	136	164	132	65	197
Residential	Congregate Care Facility	253	600 DU	1,212	21	15	36	56	46	102
Recreational	Health/Fitness Club	492	7,500 sf	247	6	5	11	15	11	26
Office	Office	710	200,000 sf	2,223	293	40	333	51	247	298
Office	Medical Office	720	25,000 sf	807	47	13	60	23	61	84
Retail	Specialty Retail Center	826	55,000 sf	2,438	67	41	108	67	86	153
Retail	Supermarket	850	35,000 sf	3,578	74	45	119	169	163	332
Retail	Pharmacy/Drugstore (no Drive-Thru)	880	8,500 sf	766	7	4	11	35	36	71
Services	Walk-in Bank	911	3,000 sf	364	-	-	-	16	20	36
Services	Drinking Place	925	8,000 sf	907	-	-	-	60	31	91
Services	Quality Restaurant	931	15,000 sf	1,349	10	2	12	75	37	112
Services	High-Turnover (Sit-Down) Restaurant	932	9,000 sf	1,144	54	43	97	54	35	89
Services	Coffee/Donut Shop (no Drive-Thru)	936	2,000 sf	1,762	111	106	217	41	41	82
<b>Total Vehicle Trips</b>				<b>23,968</b>	<b>800</b>	<b>753</b>	<b>1,553</b>	<b>1,092</b>	<b>1,043</b>	<b>2,135</b>

Source: Grove at Shoal Creek TIA, July 2016. R-K Traffic Engineering.



## 2.2 TIA TRIP GENERATION METHODOLOGY

Currently accepted methodologies, such as the rates provided by the Institute of Transportation Engineers (ITE) *Trip Generation*, are primarily based on data collected at suburban, single-use, freestanding sites. These defining characteristics limit their applicability to mixed-use or multi-use development projects, such as the Project, which, given its land use mix, design features, and setting, would include characteristics that influence travel behavior differently from typical single-use suburban developments. Thus, traditional data and methodologies would not accurately estimate the Project vehicle trip generation.

This development site provides a combination of land uses. As a result, some vehicle trips may stay internal to the site (whether by car or by some other mode). Additionally, the transportation network in this area of Austin and within the Project site provides potential for walking, bicycling, or taking transit to and from the Proposed Project.

If vehicle trip reduction in mixed-use developments such as this is understated, the result can be unwarranted impacts and excessive mitigation that can discourage development of otherwise desirable projects or transportation that is not sized to the setting of the development.

Additional trip generation studies have been completed that indicate that the trip generation could be significantly lower due to internal capture, non-auto modes, and pass-by trips.

The TIA approved by the City of Austin included reductions for internal capture, non-auto modes, pass-by trips, and trips to/from the existing TxDOT office. With these reductions included, the Project is anticipated to generate 19,442 new daily trips, 1,312 AM peak hour trips, and 1,485 PM peak hour trips.

This TDM Program has been prepared such that the development would be anticipated to generate at least 10 percent fewer trips than are shown in the previous paragraph. The targets for the TDM Program for the Project would be to generate at most 17,497 daily trips, 1,180 AM peak hour trips, and 1,336 PM peak hour trips.

### 3. EXISTING TRANSPORTATION CONTEXT

The pedestrian, bicycle, and transit facilities that support commuting to the site by modes other than the automobile are described in this section as a background for the recommended strategies in the next section.

#### 3.1 PEDESTRIAN FACILITIES

Pedestrian facilities consist of sidewalks, off-street paths, curb ramps, crosswalks, and pedestrian signals at signalized intersections. Bull Creek Road currently has sidewalks on both sides north of Jackson Avenue and on the east side (Project side) of the street south of Jackson Avenue. West 45<sup>th</sup> Street has sidewalks on the north side of the street in the area of the Project; there are no sidewalks on the south side of the street. Sidewalks are generally four to six feet wide, generally in good condition, and free from obstructions (such as telephone poles).

Most signalized intersections within one-quarter mile of the site have crosswalks and pedestrian signals on all four legs. The notable exceptions are the northbound MoPac off-ramp / Highland Terrace intersection with West 45<sup>th</sup> Street and the West 45<sup>th</sup> Street intersection with southbound MoPac on-ramp.

Land uses surrounding the site are mainly residential. Employees who live in residences near the site have the opportunity to commute by walking. Other visitors to the site, including patrons of the retail and restaurant uses who live nearby can also walk to the site using the existing pedestrian network.

#### 3.2 BICYCLE FACILITIES

Bicycle facilities comprise paths (Class I), lanes (Class II), routes (Class III), and boulevards (Class IIIA). In the immediate vicinity of the Project, these facilities include bicycle lanes on:

- Bull Creek Road between West 45<sup>th</sup> Street and Jefferson Street (though not complete)
- Shoal Creek Boulevard between West 49<sup>th</sup> Street and West 38<sup>th</sup> Street (and the Shoal Creek Trail)
- Hancock Drive between Burnet Road and Balcones Drive

Additional bicycle-friendly roads in the area include Bull Creek Road north of West 45<sup>th</sup> Street, West 40<sup>th</sup> Street east of Shoal Creek Boulevard, Jefferson Street south of Bull Creek Road, and West 34<sup>th</sup> Street between MoPac and Duval Street.

Again, the majority of land uses within a few miles of the site are residential. Employees and visitors living in these residences can travel to the site by bicycle using the bicycle network. Other major destinations that bicyclists can access from the site include the University of Texas – Austin campus (25 minutes) and Downtown Austin (30 to 35 minutes).

### 3.3 TRANSIT SERVICE

Capital Metro is the City of Austin’s regional public transportation provider. Since 1985, Capital Metro has provided service and now provides more than 32 million boardings per year. Capital Metro provides 50 local routes, ten Express and MetroRapid routes, and almost twenty shuttle routes to the University of Texas – Austin. **Table 2** contains a summary of transit routes in the area. In addition to the routes listed in Table 2, the 122 Four Points Limited and 661 FW Far West/UT routes pass nearby the site, but without a stop within one mile of the Project.

**TABLE 2: TRANSIT SERVICE SUMMARY**

Route	Nearest Stop Location	Hours of Operation		Peak Service Headways	
		Weekdays	Weekends	Weekdays	Weekends
3 Burnet / Manchaca	West 38 <sup>th</sup> St. / Medical Parkway	4:40 AM to 1:00 AM	5:45 AM to 12:40 AM	30 minutes	30 minutes
5 Woodrow / South 5 <sup>th</sup>	West 45 <sup>th</sup> St. / N. Lamar Blvd.	5:00 AM to 12:15 AM	5:15 AM to 11:50 PM	30 minutes	40 minutes
19 Bull Creek	Bull Creek Road / Jackson Ave. Bull Creek Road / West 45 <sup>th</sup> St. Bull Creek Road / Idlewild Road	5:30 AM to 11:15 PM	6:45 AM to 10:15 PM	40 minutes	45 minutes
21 Exposition	West 35 <sup>th</sup> St. / Oakmont Blvd.	5:15 AM to 11:45 PM	5:30 AM to 10:30 PM	30 minutes	45 minutes
22 Chicon	West 35 <sup>th</sup> St. / Lawton Avenue	5:25 AM to 11:00 PM	5:40 AM to 10:00 PM	30 minutes	45 minutes
338 Lamar / 45 <sup>th</sup>	West 37 <sup>th</sup> St. / North Lamar Blvd.	5:15 AM to 12:15 AM	5:15 AM to 12:15 AM	35 minutes	40 minutes
803 Burnet / S Lamar	West 38 <sup>th</sup> St. / West Avenue	5:00 AM to 12:30 AM	6:00 AM to 12:30 AM	12 minutes	20 minutes
982 Pavilion Express	West 35 <sup>th</sup> St. / Lawton Avenue	6:00 AM to 6:00 PM	No Service	10 minutes	No Service
983 N US183 Express	West 35 <sup>th</sup> St. / Lawton Avenue	4:50 AM to 12:00 PM	No Service	60 minutes	No Service
987 Leander / Lakeline Express	West 35 <sup>th</sup> St. / Lawton Avenue	5:20 AM to 7:15 PM	No Service	10 minutes	No Service

Source: Capital Metro, July 2016.

## 4. TDM MEASURES AND STRATEGIES

This section describes the proposed TDM strategies for The Grove at Shoal Creek. The site's location near the transit lines and the nearby bicycle facilities will support the use of transit and bicycle as commute modes for the residential, office, and retail employees. These are not always considered to be TDM strategies but are included in the list because they are contributing factors.

The TDM strategies are summarized in **Table 3** and are categorized as:

- Developer-provided measures
- Property management-provided measures
- Tenant-provided measures

Each strategy is described in more detail after the summary table. Measures that are included in the plan are **bolded**. The remaining measures are under consideration by the developer.

**TABLE 3: SUMMARY OF TDM STRATEGIES FOR THE GROVE AT SHOAL CREEK**

Developer-Provided Measures (Building and Site Design)		
Category	Strategy	Strategy Description
Building Design	Building Set-Backs	Building set-backs are designed close to the street.
	Pedestrian / Transit-Oriented Building Entries	Ensure pedestrian- and transit-oriented building entrances where possible.
		Pedestrian paths are provided throughout the site.
		Ensure that building access points are secure, well-lit, and covered.
	Sidewalk Amenities	Wide, shaded sidewalks with furniture are provided.
		Plant sidewalk trees and install storefront overhangs to provide shelter/shade.
Multi-Modal Street Design Elements	Enhanced Transit Stops	Bus stops with shelter & lighting are provided adjacent to the site.
		Incorporate transit stops and passenger loading zones within site (dependent on Cap Metro)
	Passenger Loading Zones	Integrate passenger loading zones near building entrances for shuttles/vanpools.
	Enhanced Pedestrian Crossings	Enhance crosswalks with high visibility paint and provide PHBs.
	Enhanced Bicycle Network	Support new bike signage, and bike lanes.
Contribute funding to fill gaps in bicycle network.		
Site Layout / Amenities	Bicycle Parking	Short- and long-term bicycle parking will be provided.
		Bicycle parking will be secure, well-lit, and sheltered.

**TABLE 3: SUMMARY OF TDM STRATEGIES FOR THE GROVE AT SHOAL CREEK**

	Bicycle Amenities	<b>Bicycle parking will be free and abundant.</b>
		Provide electric bike charging stations in close proximity to the maintenance station.
		An on-site bicycle maintenance and repair station could be provided.
		<b>Provide on-site shower and locker facilities.</b>
	Bike Share	Help fund Austin B-Cycle stations near the site.
	Pedestrian Access	<b>Ensure that internal paths prioritize pedestrian mobility between buildings.</b>
On-site Amenities	<b>Gym, dry cleaning, and banking facilities will be provided.</b>	
Property Management-Provided Measures		
Policies and Resources	Category	Strategy Description
	TDM Center	Provide a TDM information space and monitor employee commuting patterns.
	Parking Pricing Policy	<b>Unbundle the costs of leasing building space and leasing parking spaces.</b>
		Charge for parking to incentivize drivers to use alternative modes if possible.
		<b>Consider parking in context of neighborhood to ensure no off-site parking for Project uses.</b>
	Vehicle Parking Policy	<b>Ensure preferential parking spaces for carpool and vanpool.</b>
		Provide parking cash out for those that commute via transit/carpool/bicycle/walking.
	Carshare	<b>Provide carshare-only parking spaces and vehicles (8 currently proposed).</b>
		Incentivize carshare with free registration and/or free or reduced usage fees.
	Transit Enhancements	Collaborate with transit agencies to maintain / enhance service.
	Promotional Programs	Facilitate and promote Bike-to-Work Day and organize TDM activities (transportation fairs, walking groups, etc.)
		Orient new employees to commute options and TDM programs.
		Regularly market TDM programs.
Tenant-Provided Measures		
Category	Strategy	Strategy Description
Policies & Resources	Retail Customer Incentives	Provide retail customers with discounts upon proof of alternative mode usage.
		<b>Provide free bicycle parking for retail customers in visible and secure areas.</b>

Source: ARG Bull Creek LTD, July 2016.



## 4.1 DEVELOPER-PROVIDED MEASURES

### 4.1.1 BUILDING DESIGN

Building design elements aim to enhance the attractiveness of the site from the perspective of anyone entering the site from the adjacent sidewalk or bicycle network. These elements include:

- Building Set-Back
- Pedestrian / Transit-Oriented Building Entries
- Sidewalk Amenities

The buildings are located close to the street in order to enhance pedestrian and bicyclist perceptions of proximity and safety. Many building entrances are oriented toward the street for convenient access from sidewalks and transit stops. Pedestrian-only paths are provided throughout the site, and bicyclists will circulate within the site on internal roadways designed for slow speeds. All site frontages are designed with a minimum five-foot sidewalk and sidewalk furniture will be installed to enhance the street space for pedestrians and bicyclists. In areas near retail and office uses, sidewalks are designed with a minimum eight-foot width. Sidewalk trees and storefront overhangs are provided to shade and shelter the sidewalks for pedestrians.

### 4.1.2 STREET DESIGN ELEMENTS

Street design elements aim to enhance the attractiveness of the site from the perspective of pedestrians, bicyclists, bus / shuttle users, and vanpoolers / carpoolers, who are approaching the site using the adjacent roadway network. This includes:

- Enhanced transit stops
- Enhanced pedestrian crossings
- Enhanced bicycle network

#### 4.1.2.1 Enhanced Transit Stops

Bus stops with shelter and lighting could be provided at the MetroBus Local 19 stops along Bull Creek Road. The stops could be further enhanced with customized features that match the urban design of the Project site (subject to Capital Metro approval). Service could also be extended into the site, though Capital Metro has not committed to these service changes/additions. Carpoolers, vanpoolers, and shuttle riders could also benefit from passenger loading zones located near building entrances.

#### **4.1.2.2 Enhanced Pedestrian Crossings**

Crosswalks internal to the Project site have been enhanced with continental crosswalk striping and high visibility crossings, including high visibility paint, in-road pavers, and colored pavement. These will help alert drivers to the presence of a pedestrian crossing. Additionally, two pedestrian hybrid beacons will be added along Bull Creek Road and one will be added along 45<sup>th</sup> Street to increase pedestrian safety. The site is also surrounded by residential land uses. Employees and visitors who travel from nearby residences or from nearby transit routes will feel safer crossing traffic lanes with these improvements and will be encouraged to walk to the site. A pedestrian bridge across Shoal Creek is also under consideration and, if approved, would be provided by the developer.

#### **4.1.2.3 Enhanced Bicycle Network**

Bicycle lanes would be completed on Bull Creek road adjacent to the Project and on the Jackson Avenue Extension into the Project. The Project applicant has also committed to a \$100,000 contribution to the community for bicycle improvements, to be used at the discretion of the City of Austin. This contribution will be used in a matching program that will provide \$200,000 worth of improvements. The applicant will also contribute to bicycle route and wayfinding signs within the Project and in the surrounding neighborhood. These signs would help guide bicyclists between residences, transit stops, other commercial areas, and the site. These improvements would add connectivity for bicyclists throughout the neighborhood.

### **4.1.3 SITE LAYOUT & AMENITIES**

Site layout elements and amenities aim to provide the infrastructure needed to support alternative modes. These include:

- Bicycle Parking
- Bicycle Amenities
- Bike Share

#### **4.1.3.1 Bicycle Parking**

Bicycle rack parking spaces will be free for anyone to use and will be provided throughout the site in convenient locations with respect to street access and building entrances. Long-term bicycle parking spaces could also be provided via a bicycle "valet." Such a service would be free for employees and operate during extended business hours. Some bicycle parking will be provided in the multifamily and commercial buildings, which will provide parking that is secure, well-lit, and protected from the elements. A bicycle storage room inside the office buildings could be permanently maintained for use by all tenants and employees.

#### **4.1.3.2 Bicycle Amenities**

A bicycle maintenance and repair station could be provided in the tenant space dedicated to bicycle uses. Electric bike charging stations could be provided on-site near the bicycle maintenance station. On-site shower and locker facilities will be provided as part of the Project.

#### **4.1.3.3 Bike Share**

The Project applicant has had conversations with B-Cycle about expansion of the system to the site. While this area is currently outside of the system service area, the Project is adding designated concrete pads for future use when the service area expands to include the Project site.

#### **4.1.3.4 On-site Amenities**

Dry-cleaning, childcare, and banking facilities, as well as a gym, could be provided on-site; restaurant options will expand with this phase of the development.

## **4.2 PROPERTY MANAGEMENT-PROVIDED MEASURES**

### **4.2.1 TDM CENTER**

A space near the office building lobby or retail centers could be set-aside as the on-site transportation and commuter center offering one-stop shopping for transit and alternative information. This center would include public transit maps and schedules, bicycle route maps, rideshare information, and pedestrian information. Real-time transit, carshare, and bikeshare may also be displayed on a lobby screen.

Additionally, the property management could conduct an annual review of employee commuting patterns and characteristics as part of the monitoring process to ensure that the TDM program operates in the manner intended.

### **4.2.2 PARKING POLICY**

Some parking spaces will be reserved for carpools and vanpools. These spaces should be located in preferred locations such as near elevators. The Project applicant would be responsible for ensuring that these spaces are used only by carpools and vanpools, e.g., through license-plate monitoring or parking permits. Additionally, employees of the Project could receive parking cash outs for commuting via alternative modes, such as walking, bicycling, carpool, or transit. Lastly, parking pricing should be carefully considered to encourage use of alternative modes, but not to encourage neighborhood parking.

#### 4.2.3 CARSHARE

Carshare parking spaces will be provided and carshare providers will utilize the spaces to make carshare vehicles available to users. Currently, eight vehicles and spaces are planned. The Project applicant could coordinate with the provider to provide membership discounts to employees. Some examples of potential carshare providers include Zipcar and Car2go. These services typically charge users a flat membership fee plus a time- or distance-based fee; users are then required to return the vehicle to the same location where they picked it up or to a designated available drop-off location.

#### 4.2.4 TRANSIT ENHANCEMENTS

The applicant can collaborate with transit agencies to maintain / enhance transit serving the site, if possible. Improvements could potentially address frequency, capacity, and / or route issues that users have.

#### 4.2.5 PROMOTIONAL PROGRAMS

Promotional programs administered by the Project applicant could include elements such as:

- New employee orientation to alternative mode options and benefits
- Regular marketing of alternative modes through flyers, posters, emails, and newsletters
- Fun activities such as transportation fairs, transit field trips, Bike-to-Work Day, and walking groups

### 4.3 TENANT-PROVIDED MEASURES

The tenants who will occupy the office space are responsible for carrying out TDM elements which require their participation, for example, to communicate messages from TDM staff, to set protocol, and to finance subsidies. In addition, they will have the option to include measures outside of those they have committed to within their individual leases. Tenant-provided measures include:

- Program administration
- Flexible work options
- Alternative mode incentives

The lease agreements will require the tenant to carry out a minimum reasonable level of these strategies to meet their share of required employee trip reductions. As mentioned, some of the measures will not be required by the lease agreements.

#### 4.3.1 PROGRAM ADMINISTRATION

Tenants have the option to administer TDM elements that are not provided by property management, as needed.

#### 4.3.2 FLEXIBLE WORK ARRANGEMENTS

Tenants will be encouraged to provide employees with flexible work options, including:

- Telecommuting
- Compressed work weeks (more hours per day, fewer days per week)
- Staggered work hours to shift trips to off-peak hours

#### 4.3.3 ALTERNATIVE MODE INCENTIVES

Tenants will be required to provide customers with discounts upon proof of arrival to the Project site by transit, walking, or bicycling. Tenants will also be encouraged to provide employees with monetary and other incentives for using alternative modes, such as:

- Transit subsidies – provide a transit subsidy and/or transit passes to all employees (regular, part-time, and contract) who utilize public transit and desire to have a subsidy or pass for the life of the Project
- Carshare perks – tenants are encouraged to offer employees free registration costs, free hours of usage every month, and / or reduced rates for carshare services
- Bike Share perks – tenants are encouraged to offer employees free membership costs for Austin B-Cycle in order to incentivize them to use B-Cycle as part of their commute and / or for midday trips
- Walking / Biking perks – tenants are encouraged to offer to reimburse walking- and bicycling-related costs such as bike maintenance, walking shoes, etc.

These perks can all be aggregated into a company-wide employee commute rewards program.



## 5. TDM STRATEGY EVALUATION

BIG RED DOG Engineering has used a trip generation and TDM model that is grounded in objective and fact-based research to assess TDM measures for specific projects.

The trip generation model draws on a US Environmental Protection Agency (EPA)-sponsored national study of the trip generation characteristics of multi-use sites. Travel survey data was gathered from 239 mixed-use developments (MXDs) in six major metropolitan regions (including Houston, TX), and correlated with the characteristics of the sites and their surroundings. The findings indicate that the amount of external traffic generated is affected by a wide variety of factors including the mix of employment and residents, the overall size and density of the development, the internal connectivity for walking or driving among land uses, the availability of transit service, and the surrounding trip destinations within the immediate area outside the Project site. An empirically validated method of estimating vehicle trip generation at mixed-use developments was the result of the research. The model allows for predicting external vehicle trip reduction as a function of the MXD characteristics. Applying the external vehicle trip reduction percentage to “raw trips”, as predicted by ITE, produces an estimate for the number of vehicle trips traveling in or out of the site. To be clear, the basis for this model is the standard ITE trip generation rates and equations.

The MXD model has been approved for use by the EPA<sup>1</sup>. It has also been peer-reviewed in the ASCE Journal of Urban Planning and Development<sup>2</sup>, peer-reviewed in a 2012 TRB paper evaluating various smart growth trip generation methodologies<sup>3</sup>, recommended by SANDAG for use on mixed-use smart growth developments<sup>4</sup>, promoted in an American Planning Association (APA) Planning Advisory Service (PAS)<sup>5</sup> which recommended it for evaluating traffic generation of mixed-use and other forms of smart growth.

The TDM model draws on the individual effectiveness and grouped effectiveness of measures based on the literature review from the California Air Pollution Control Officers Association (CAPCOA) report titled

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<sup>1</sup> Trip Generation Tool for Mixed-Use Developments (2012). [www.epa.gov/dced/mxd\\_tripgeneration.html](http://www.epa.gov/dced/mxd_tripgeneration.html)

<sup>2</sup> “Traffic Generated by Mixed-Use Developments—Six-Region Study Using Consistent Built Environmental Measures.” Journal of Urban Planning and Development, 137(3), 248–261.

<sup>3</sup> Shafizadeh, Kevan et al. “Evaluation of the Operation and Accuracy of Available Smart Growth Trip Generation Methodologies for Use in California”. Presented at 91st Annual Meeting of the Transportation Research Board, Washington, D.C., 2012.

<sup>4</sup> SANDAG Smart Growth Trip Generation and Parking Study.  
<http://www.sandag.org/index.asp?projectid=378&fuseaction=projects.detail>

<sup>5</sup> Walters, Jerry et al. “Getting Trip Generation Right – Eliminating the Bias Against Mixed Use Development”. American Planning Association. May 2013.

*Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures.*<sup>6</sup> Specifically, the TDM measures included in the TDM model were screened on the basis of the feasibility of quantifying the emissions, the availability of robust and meaningful data upon which to base the quantification, and whether the measures (alone or in combination with other measures) would result in appreciable reductions in vehicle trips. Only the TDM measures that the Project applicant has committed to have been included in the TDM model.

With the diversity of land uses provided, the availability of alternative modes, and the proposed TDM Program, the anticipated external vehicle trip generation totals are significantly lower than those estimated from the raw ITE rates. Additional reductions for pass-by trips to the uses and trip generation by existing uses on the Project site are included separately.

***With only the TDM measures that the Project applicant has committed to***, the trip generation and TDM models anticipate that the Project would result in the following external vehicle trip generation totals (and the accompanying reduction from the raw ITE rates):

- 17,425 daily trips (27 percent reduction)
- 1,034 AM peak hour trips (33 percent reduction)
- 1,285 PM peak hour trips (40 percent reduction)

These totals represent the number of trips that would be observed at Project access driveways. These totals are lower than the vehicle trip generation goals stated in Chapter 2 (page 6).

For reference, with the TDM reductions above, ***as well as credit for trip generation by existing uses on the Project site and pass-by trips***, the following totals represent estimates for the net new external vehicle trips that would be anticipated to be generated by the Project (and the accompanying reduction from the raw ITE rates):

- 15,723 net new external daily vehicle trips (34 percent reduction)
- 919 net new external AM peak hour vehicle trips (41 percent reduction)
- 1,044 net new external PM peak hour vehicle trips (51 percent reduction)

Based on the necessary monitoring process outlined in Chapter 6, programmatic elements of the TDM program can be adjusted to ensure the Project continues to meet any vehicle trip targets.

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<sup>6</sup> This report was prepared in collaboration with the Northeast States for Coordinated Air Use Management (NESCAUM) and the National Association of Clean Air Agencies. The report provides methods for quantifying trip reductions from a specified list of mitigation measures, primarily focused on project-level mitigation.

## 6. IMPLEMENTATION & MONITORING

As mentioned, it is likely that the TDM program will need to evolve over time as tenants or travel behaviors change. Below are methods that can be used to help evaluate the effectiveness of the TDM program on an annual basis.

The property owner could develop an annual monitoring report summarizing the success of the TDM programs for employees, visitors, and residents. The report could include the following elements:

- Office Tenants
  - A description of the current TDM program elements and services offered
  - Annual employee survey that captures data on how employees access the site
- Residential Property Management
  - A description of the current TDM program elements and services offered
  - Annual residential survey, capturing the number of residents using the TDM programs

The TDM report should be informed by surveying all employees and residents and through driveway traffic counts. Driveway traffic counts could be prepared and included in the TDM report to provide additional data regarding actual vehicle trips coming to and leaving the site. Below is a summary of data collection to aid in the reporting process.

### 6.1.1 VEHICLE TRIP DATA COLLECTION

Data collection could be conducted annually to help aid the evolution of the TDM program. If data collection is conducted, the data should include the following:

1. Selecting a typical work week to conduct the vehicle counts. The week should be consistent with prior years' data collection time frame. The selection of the week should take care to avoid unusual activities (e.g., school breaks or when special events occur, which may attract an unusually high volume of traffic) or inclement weather.
2. The driveway counts will be conducted for:
  - a. Tuesday, Wednesday, and Thursday of the selected week
  - b. Morning peak period (6:30 AM to 9:30 AM), Evening peak period (4:00 PM to 7:00 PM)
  - c. For all driveways providing access to/from the site
3. Field observations will be conducted during the AM and PM peak periods for each of the data collection days to confirm that the survey reflects a typical day without special events.

The report should include a calculation of the AM and PM peak hour vehicle counts entering the specified driveways. The AM and PM peak hour vehicle counts will be an average over the three-day data collection period. If appropriate, the AM and PM peak hour vehicle counts may be adjusted based on field observations (i.e., if employees are parking on the street and thus not captured by the driveway counts).

### **6.1.2 EMPLOYEE AND RESIDENT SURVEY**

A survey of all employees and residents could be conducted and should be timed to coincide with the vehicle trip data collection effort. The results of the survey will be used to inform and adjust the peak hour trip results, if necessary.

### **6.1.3 IDENTIFY ADDITIONAL STRATEGIES**

The employee and resident surveys may also be used to provide insight into the success of various TDM program elements. It will provide guidance on how to change unpopular strategies and expand upon successful ones. It is recommended that the TDM strategies in this document be reviewed in conjunction with the annual employee survey results to identify refinements to existing strategies and new strategies to implement.

### **6.1.4 ANNUAL REPORT**

The applicant could prepare an annual TDM report to determine the overall trip reduction within the Project. Trips actually at the Project should be compared with those shown in Table 1 to determine the overall trip reduction. The report should include the following elements:

1. The TDM report shall determine the extent to which the Project has achieved reduced peak-hour vehicle trip generation from ITE average vehicle trip rates. The report shall provide an explanation of how and why the reduction has been reached and a description of additional measures that could be implemented by the property owner or tenant in order to further reduce vehicle trip generation, if necessary.
2. Status of all existing TDM program measures and strategies – including any data on participation rates.
3. Status of all recommended TDM measures from prior monitoring report (if applicable) – including any available data on participation rates.
4. Data collection methodology.
5. Documentation of traffic count results.
6. Employee survey results.