



## Stacking Criteria and Analysis

### Guiding Principles:

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1. The stacking areas shall have direct access to the service window, station, or pick-up/drop-off location.

**The proposed use is a quick service oil change facility. The use does not have a traditional service window. The cars enter the bays from west to east. Once the customer approaches the entry to the bay, employees guide the vehicle into the bay with hand signals. Once in the bay the customer remains in the car and the services are purchased from a pay station inside the bay. The employee finalizes the purchase and then performs a 10-minute oil change. Once completed the customer is then guided out of the east side of the bay.**

2. The stacking area shall not include space for any other circulation driveway, parking space, or maneuvering area.

**Please see the site plan for clear delineation of maximum expected stacked vehicles as indicated in the analysis below. Stacked vehicles are not expected to block drive aisles, parking spaces or maneuvering areas. The building has been set offset to the two-way drive aisle to support stacking and prevent interference with the drive aisle.**

3. The stacking area shall be located and of sufficient length so that it will not block traffic circulation within the development during peak queuing periods.

**The facility will house three automotive bays, with space for an additional car to be parked at the entrance of the bay for stacking, this allows for 6 cars to stack any given hour, 3 actively being serviced and 3 pending service.**

4. Adequate stacking storage to accommodate normal peak queues shall be provided on-site and shall not overflow onto adjacent streets.

**The analysis below looks at each car being serviced in each bay. The analysis examines the time it takes to service a car and adds time to the service to allow for transaction. The analysis illustrates the site will have adequate stacking available for the use and not cause overflow into the street/public right of way.**



## Stacking Analysis:

The following calculations are based on the total generated trips in PM hour acquired from the ITE Trip Generation Manual (11<sup>th</sup> Edition). Based on ITE code 941- Quick Lubrication Vehicle Shops, the highest trips occur in the P.M. hours with 15 trips at peak times, as depicted in Table 1 below. The following study examines the service of the vehicles as stacking position just like a standard drive through facility where the service window space is calculated for stacking.

As seen in Table 2 of the next page, the business model provides that oil change service is completed in 10 minutes. Normally the 10-minutes includes the time it takes for ordering and finalizing transaction, which is approximately 4 minutes or less. For purposes of this study the ordering and finalizing of the transaction is separated out of the 10-minute service time. Based on a time of 14 minutes on average to service a single vehicle, one bay can service 4.35 cars an hour. Multiply 4.35 by 3 bays which equals 13.05 cars serviced an hour. Based on 15 trips (which is the total studied trips for all AM hours) divide 13.05 cars an hour which equals 1.15 per bay per 14 minutes. Based on the calculations at any given time. The conditional use site plan depicts one car in the service bay and one car waiting.

**Table 1**

Description/ ITE Code		ITE Vehicle Trip Generation Rates								
		(peak hours are for peak hour of adjacent street traffic unless highlighted)								
		Weekday	AM	PM	Pass-By	AM In	AM Out	PM In	PM Out	
Quick Lubrication Vehicle Shop - 941		69.57	5.80	8.70	0%	75%	25%	42%	58%	
Units	Expected Units	Total Generated Trips			Total Distribution of Generated Trips					
		Daily	AM Hour	PM Hour	AM In	AM Out	Pass-By	PM In	PM Out	Pass-By
Independent Variable										
KSF <sup>2</sup>	1.671	116	10	15	7	2	0	6	8	0



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Table 2

Number of vehicles waiting in line		
Arrival Rate:	15	customers/hour
Average Service Time:	0.23	hours/customer
Methodology:	$1.0 \text{ (hr.)} / 0.23 = 4.35 \text{ cars per bay, per hour}$ $4.35 \text{ cars} \times 3 \text{ bays} = 13.05 \text{ cars an hour}$ $15 \text{ peak hour trips} / 13.05 \text{ Cars an hour} = 1.15$	
Average Customers in Line Per Bay:	1.15	customers
Average Customer Wait:	14	minutes

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