

# Bowman

## Memorandum

**To:** Mr. Thomas Pannell, P.E.

**CC:**

**From:** Carlos G. Garcia, P.E.

**Date:** 4/20/2021

**Re:** 9804 S. Yosemite Street SSCW – Trip Generation Comparison and Stacking Analysis

---



As requested, Bowman Consulting Group (BCG) has conducted a trip generation comparison and stacking analysis for the proposed Super Star Car Wash (SSCW) development located at 9804 S. Yosemite Street in Lone Tree, Colorado.

The purpose of this memorandum is to compare the projected trip generation for the proposed SSCW against the existing land use. Additionally, this memorandum summarizes the results of the stacking/storage analysis evaluation for the on-site operations of the proposed car wash.

The goal of this analysis is to determine if the proposed development is in conformance with the previous land use, and if the projected traffic impact of the proposed development can be accommodated within the surrounding roadway network.

The scope of this memorandum was coordinated with the Lone Tree City Engineer, Mr. Jacob James, P.E. on April 16, 2021. This coordination is contained in **Attachment A**.

### **Background Information**

The proposed site is located within the Heritage Hills Shopping Center at the northeast corner of S. Yosemite Street and Lincoln Avenue in Lone Tree, CO. Currently, the existing land use of the site is a 3,550 S.F. KFC Restaurant with drive-thru. The proposed SSCW development is expected to replace this existing KFC Restaurant and is expected to consist of a 3,870 SF Automated Car Wash. The site location is depicted in **Figure 1**.



## Proposed Development Trip Generation Comparison

As previously stated, the proposed SSCW development is expected to consist of a 3,870 SF Automated Car Wash, replacing the existing 3,550 SF KFC Restaurant with drive-thru. The Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10<sup>th</sup> Edition* was used to determine the number of trips generated by both the proposed and existing land uses. **Table 1** summarizes the projected trip generation for the existing and proposed land uses.

**Table 1. Trip Generation Comparison**

Trip Generation				PM Peak Hour <sup>(1)</sup>			Saturday Peak Hour <sup>(1)</sup>		
Development	Land Use	Size	Units	Total Trips			Total Trips		
				In	Out	Total	In	Out	Total
Existing KFC Restaurant <sup>(2)</sup>	934	3,550	Square Feet	60	56	116	99	96	195
Automated Car Wash <sup>(3)</sup>	948	3,870	Square Feet	27	28	55	59	59	118
<b>Trip Difference</b>				<b>-33</b>	<b>-28</b>	<b>-61</b>	<b>-40</b>	<b>-37</b>	<b>-77</b>

(1) No morning peak hour or average daily trip generation information included in the 10th Edition of the ITE Trip Generation Manual.

(2) Trip generation estimated based on measured area from aerial imagery

(3) Based on the Institute of Transportation Engineers Trip Generation Manual - 10th Edition.

As shown in **Table 1**, the proposed development is projected to generate 55 trips during the weekday evening peak hour (27 in and 28 out) and 118 trips during the Saturday peak hour (29 in and 59 out). Additionally, the proposed development is expected to generate 61 fewer trips the weekday evening peak hour and 77 fewer trips during the Saturday peak hour compared to the existing KFC Restaurant with drive-thru.

## Stacking Analysis

A stacking/storage analysis was performed for the proposed SSCW development in order to evaluate the on-site operations of the proposed car wash. The stacking analysis was based on the information contained in the Institute of Transportation Engineers (ITE) *Transportation and Land Development (2<sup>nd</sup> Edition)* by Vergil G. Stover and Frank J. Koepke. The relevant excerpts from this document are contained in **Attachment C** to this memorandum.

As previously mentioned, the proposed SSCW is expected to generate a maximum of 118 trips (59 in and 59 out) during the Saturday peak hour.

Per coordination with the Applicant, it is Bowman's understanding that a typical Super Star Car Wash can process 75 vehicles per hour. The Applicant also shared with Bowman that, in a typical day, a Super Star Car Wash facility will process 400 total vehicles.

Similar car wash facilities can typically process 60 to 70 vehicles per hour, so in order to perform a conservative analysis, it was assumed that the proposed car wash will process 60 vehicles per hour during the Saturday peak hour.

- Peak Hour Drive-Thru Entering Volume = 59 trips
- $59 \text{ trips/hour} * 1 \text{ hour}/60 \text{ min} = 0.98 \text{ vehicles per minute}$
- $0.98 \text{ vehicles per minute} * 5 \text{ minute service time} = 4.9 \text{ vehicles stacked}$
- $4.9 \text{ vehicles} * 25 \text{ feet/vehicle} = 123 \text{ ft maximum queue}$

As shown in in the attached conceptual plan (**Attachment A**), the proposed site is designed to accommodate a queue storage in excess of 123 feet, allowing for 25 vehicles (620 feet) in the drive-thru stacking lanes. Based on this analysis, it is expected that the projected maximum queue will not spill back onto the internal roadways of the Heritage Hills Shopping Center.

Furthermore, the stacking area for the proposed car wash is physically separated from the rest of the site – ensuring that no internal site traffic conflicts are expected to occur as a result of the vehicular stacking.

## **Conclusions**

The proposed SSCW development is proposed to replace an existing 3,550 SF KFC Restaurant with drive-thru in the Heritage Hills Shopping Center.

The results of the trip generation comparison indicate that the proposed development is expected to generate fewer weekday evening and Saturday peak hour trips than the existing KFC Restaurant. The proposed SSCW is expected to generate 61 fewer trips during the evening peak hour and 71 fewer trips during the Saturday peak hour.

Therefore, the proposed SSCW is in conformance with the current land use of the existing site within the Heritage Hills Shopping Center. Furthermore, the proposed SSCW is not anticipated to have a detrimental impact on the surrounding roadway area, as it reduces the assumed traffic impact of the existing land use.

Additionally, the proposed SSCW is designed to provide adequate queue/stacking storage to ensure that the car wash operations are not expected to spill back beyond the footprint of the proposed site.