



Traffic Impact Mitigation Analysis

Parking Study

Trip Generation Comparison

Parking Master Plan



October 3, 2019

Chris Brown  
Residential Pursuits Investments LLC  
7600 E Doubletree Ranch Rd, Suite 130  
Scottsdale, AZ 85258

Phone: (602) 478-0662



*Michelle E. Beckley*

**Subject: Traffic Impact and Mitigation Analysis Statement  
South Scottsdale Residential on Hayden Road – Scottsdale, Arizona**

Dear Mr. Brown,

Y2K Engineering, LLC. (Y2K) has been retained to prepare a traffic impact and mitigation analysis statement for the proposed South Scottsdale residential development located on Hayden Road, approximately 550 feet north of Oak Street in Scottsdale, Arizona. The proposed development will consist of approximately 27 single-family residential units spread over  $\pm$  3.89 gross acres. This development requires a Category I study, as it is anticipated to generate less than 100 vehicles trips during the peak hour. The proposed site will be built adjacent to an existing church, which is to remain. The site will be served by an existing driveway, which currently provides access to the church property. A vicinity map is shown in **Figure 1**, and the proposed site is shown in **Figure 2**.

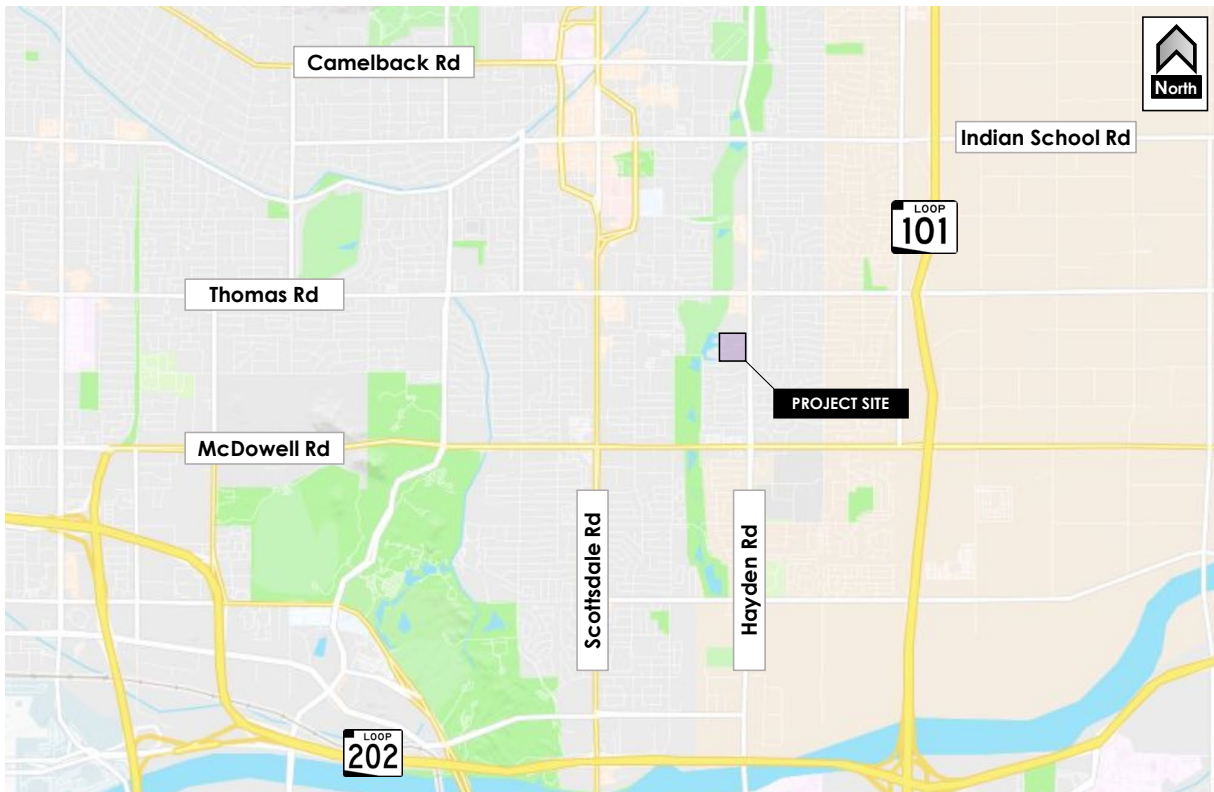


Figure 1: Project Vicinity Map

## EXISTING CONDITIONS

### SURROUNDING LAND USE

The proposed site for the single-family development exists within two parcels: 131-23-005A (an undeveloped land parcel) and 131-23-008 (an existing church property). The project site is primarily surrounded by single-family and multiple-family residential land uses, with several small office/commercial parcels on the east side of Hayden Road. The surrounding land uses are depicted in **Figure 2**.

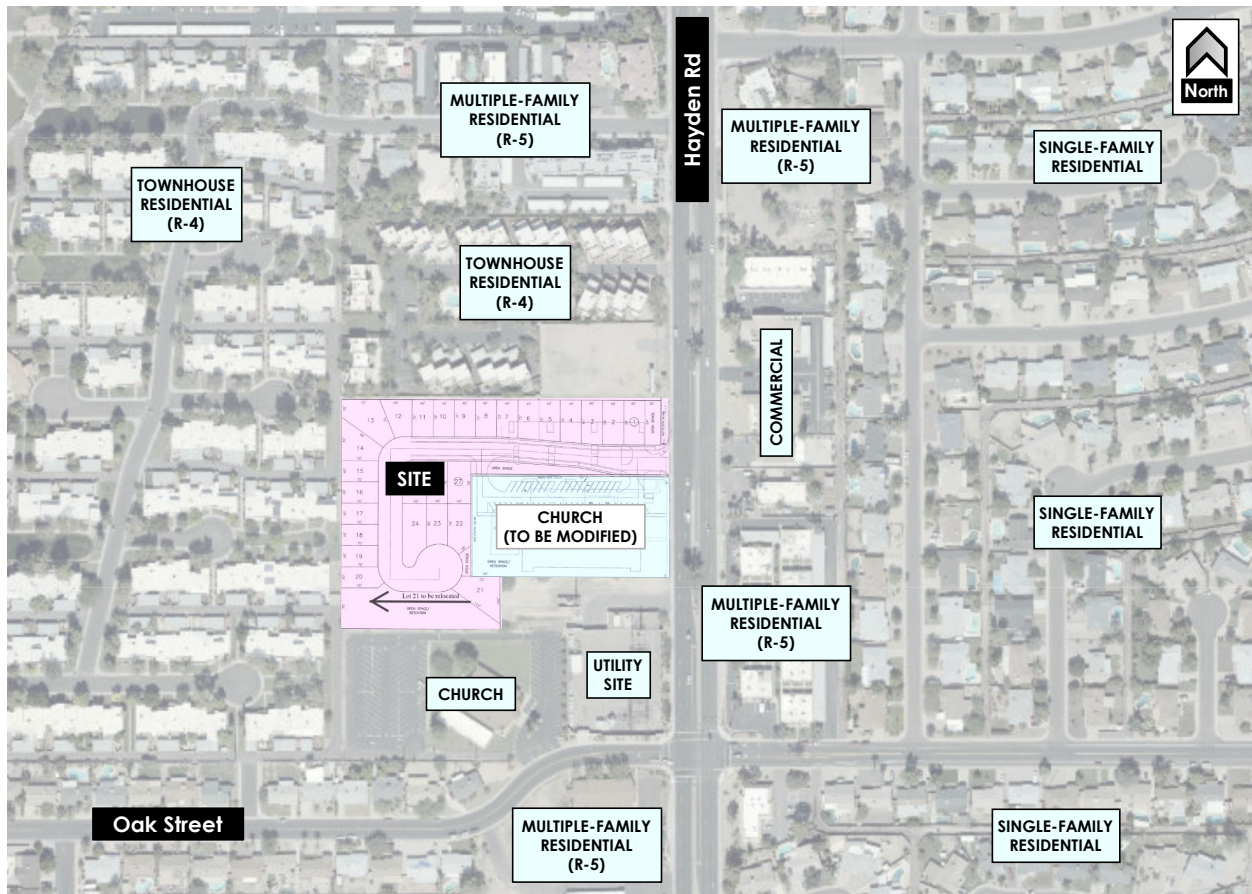


Figure 2: Proposed Site and Surrounding Area

The two parcels proposed for development, 131-23-005A and 131-23-008, are currently zoned as R-5 (multiple-family residential) and R1-7 (single-family residential), respectively. The proposed zoning for the combined site is R-4 (townhouse residential). The proposed development will provide detached, single-family homes that meet the density requirements of R-4 zoning.

### EXISTING ROADWAY NETWORK

**Hayden Road** is a north-south roadway classified as a major arterial by the Scottsdale Street Classification Map. Hayden Road provides three lanes in each direction divided by a raised median. Sidewalk, curb, gutter, and roadway lighting are provided on both sides of the street. Bike lanes are not present along the roadway. Hayden Road provides access to State Route 202, approximately 2.5 miles south of the proposed site. The

posted speed limit on Hayden Road is 45 miles per hour (mph). According to the City of Scottsdale’s website, the average daily traffic on Hayden Road is 27,600 vehicles per day (based on 2016 data).

**Oak Street** is an east-west major collector that provides access to the residential neighborhoods south and east of the proposed development site. Oak Street is an undivided, two-lane roadway. Bike lanes are present east of Hayden Road. Sidewalk, curb, and gutter are provided on both sides of the street. Roadway lighting is present along the south side of Oak Street. The posted speed limit on Oak Street is 25 mph. According to the City of Scottsdale’s website, the average daily traffic on Oak Street is 2,200 vehicles per day (based on 2016 data).

The intersection of **Hayden Road and Oak Street** is a four-legged signalized intersection, located approximately 550 feet south of the proposed site. The northbound and southbound approaches consist of one dedicated left-turn lane, two through lanes, and one through/right-turn lane. The eastbound approach consists of one dedicated left-turn lane and one through/right-turn lane. The westbound approach consists of one dedicated left-turn lane, one through lane, and one dedicated right-turn lane.

At the **site driveway**, a dedicated northbound left-turn lane is present, with a storage length of approximately 105 feet. Southbound right-turning movements into the site are from a shared right/thru lane. There is an eastbound left-turn lane and right-turn lane provided for vehicles exiting the site. An aerial of the surrounding roadway network and existing traffic control is shown in **Figure 3**.

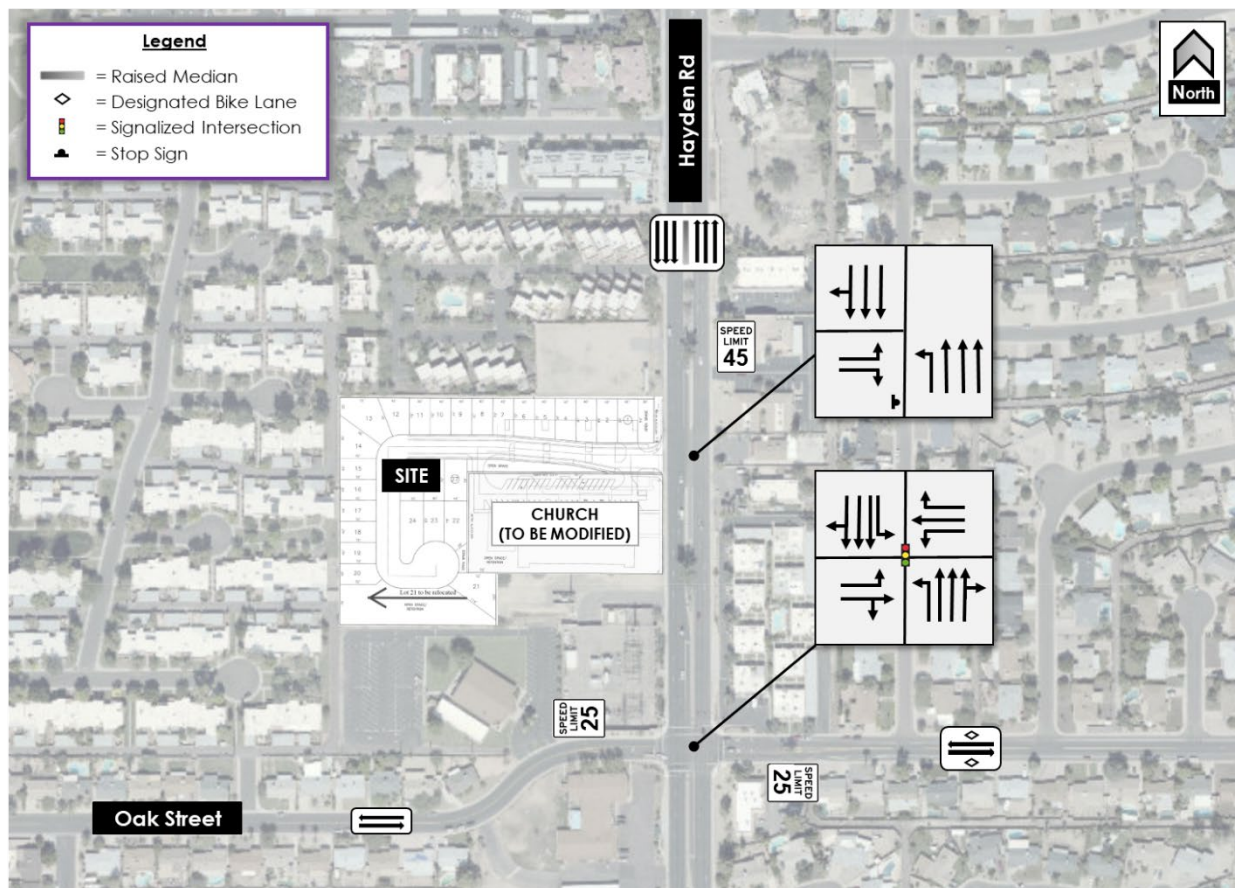


Figure 3: Existing Roadway Network

### HISTORICAL CRASH REVIEW

The three most recent years of crash data from 2016 to 2018 were reviewed in the vicinity of the proposed site. Data was collected from the ADOT Safety Data Mart and reviewed for a length of 3,000 feet on Hayden Road (1,500 feet north and south of the existing church driveway). The evaluated segment includes the signalized intersection of Hayden Road and Oak Street. Within the 3,000-foot segment, there were 37 crashes within the past three years. Fourteen of the crashes occurred at or near the intersection of Hayden Road and Oak Street. One crash occurred at the existing church driveway location, on April 6, 2017 at 5:40 p.m. This was a left-turn crash that resulted in property damage only.

One crash during the study period involved a non-motorized user; a pedestrian was involved in a crash at the intersection of Hayden Road and Oak Street on December 12, 2016 at 6:36 a.m. The pedestrian crossed Hayden Road within the crosswalk, but disregarded the traffic signal and was struck by a motorist. The pedestrian sustained serious injuries.

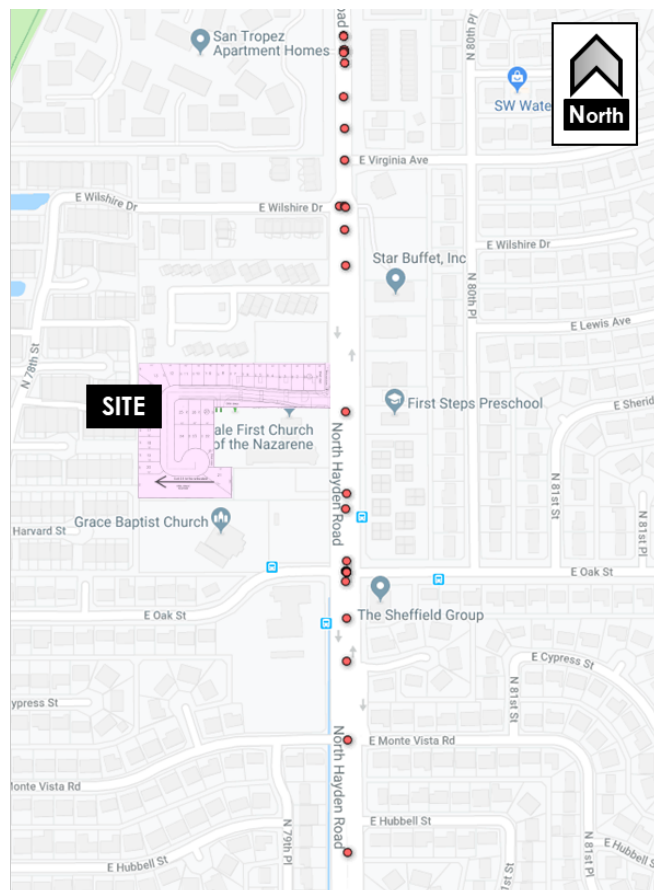
One fatal crash was reported during the study period, on April 28, 2018 at 11:57 p.m. The crash occurred on Hayden Road, approximately 950 feet south of Thomas Road (1,100 feet north of the site driveway). A northbound vehicle was speeding and crossed over the median, colliding with two southbound vehicles. The driver of the northbound vehicle sustained fatal injuries.

Based on the analysis, there is not a significant crash history near the proposed site. A summary of the Hayden Road crashes is shown in **Figure 3**.

Figure 3: Crash Review of Hayden Road within Study Area, 2016 to 2018

| Injury Severity | 2016      | 2017      | 2018      | Total     |
|-----------------|-----------|-----------|-----------|-----------|
| Fatal           | -         | -         | 1         | 1         |
| Serious Injury  | 1         | -         | -         | 1         |
| Minor Injury    | 1         | 2         | 1         | 4         |
| Possible Injury | 2         | 1         | 3         | 6         |
| No Injury       | 9         | 7         | 9         | 25        |
| <b>Total</b>    | <b>13</b> | <b>10</b> | <b>14</b> | <b>37</b> |

| Manner of Collision | Total     |
|---------------------|-----------|
| Rear-End            | 11        |
| Angle               | 8         |
| Left-Turn           | 8         |
| Sideswipe           | 5         |
| Single Vehicle      | 1         |
| Head On             | 2         |
| Other/Unknown       | 2         |
| <b>Total</b>        | <b>37</b> |





## PROPOSED DEVELOPMENT

### SITE LOCATION, LAND USE, AND ACCESS

The proposed South Scottsdale residential development will be located on two parcels; an undeveloped parcel and an existing church parcel. The proposed site is located on Hayden Road north of Oak Street in Scottsdale, Arizona. The residential development proposed consists of 27 single-family residential units. The existing church, Scottsdale First Church of the Nazarene, will remain. The existing church building will be slightly modified, but the gross floor area is anticipated to remain approximately the same as it exists currently. The church parking lot will be modified to accommodate the proposed residential development and private access roadway.

The residential development will be accessed from the existing church driveway on Hayden Road. A turn-around at the end of the private roadway will be provided for emergency vehicle access. The site plan is provided in **Attachment A**.

### TRIP GENERATION

The trip generation for the project was estimated utilizing the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 10<sup>th</sup> Edition*. ITE's *Trip Generation Manual, 10<sup>th</sup> Edition* contains data collected by various transportation professionals for a wide range of different land uses. The data summarized in the manual includes average rates and equations that have been established correlating the relationship between an independent variable that describes the development size and generated trips for each categorized land use. The manual provides information for daily and peak hour trips. This analysis evaluated three scenarios:

1. **Existing Land Use (Church)** – This scenario evaluates the trip generation characteristics for the existing  $\pm 14,000$  square-foot (SF) church. The church has a sanctuary that can accommodate 182 fixed seats.
2. **Possible Land Use Under Existing Zoning** – This scenario evaluates the greatest trip generation conditions possible under the current zoning plan. The larger parcel ( $\pm 4.7$  acres), where the church currently exists, is currently zoned as R1-7 Single-Family Residential. The smaller parcel ( $\pm 0.7$  acre) is R-5 Multi-Family Residential. Given the parcel areas and land use designations, 10 single-family homes and 10 multi-family homes are assumed. The church is assumed to remain.
3. **Proposed Land Use Under Future Zoning** – This scenario evaluates the existing  $\pm 14,000$  square-foot (SF) church and the proposed single-family development (27 units) under the proposed R-4 Townhouse Residential zoning.

The following ITE Land Use Categories (LUC) were used in the analysis of the scenarios:

- LUC 210 – Single-Family Housing
- LUC 220 – Multi-Family Housing
- LUC 560 - Church

The daily and peak hour generated trips for the three scenarios are summarized in **Table 1**. For the residential land uses, the weekday peak hour trip generation projections are based on the peak hour of the adjacent street. For the church land use, the weekend peak hour (Sunday) trip generation was based on the peak hour of the generator. ITE equations were used to calculate the trip generation based on the number of residential lots and the square footage of the church building area.



Table 1: Trip Generation

| Scenario #1: Existing Land Use                                      |                           |      |       |                         |              |           |           |              |           |           |                   |           |            |
|---|---------------------------|------|-------|-------------------------|--------------|-----------|-----------|--------------|-----------|-----------|-------------------|-----------|------------|
| DESCRIPTION OF LAND USE   |                           |      |       | VEHICLE GENERATED TRIPS |              |           |           |              |           |           |                   |           |            |
|   |                           |      |       | Daily                   | AM Peak Hour |           |           | PM Peak Hour |           |           | Weekend Peak Hour |           |            |
| ITE LUC   | Land Use                  | Size | Units | Total                   | Enter        | Exit      | Total     | Enter        | Exit      | Total     | Enter             | Exit      | Total      |
| 560   | Church                    | 14   | KSF   | 97                      | 3            | 2         | 5         | 3            | 4         | 7         | 67                | 73        | 140        |
| <b>Total</b>  |                           |      |       | <b>97</b>               | <b>3</b>     | <b>2</b>  | <b>5</b>  | <b>3</b>     | <b>4</b>  | <b>7</b>  | <b>67</b>         | <b>73</b> | <b>140</b> |
| Scenario #2: Possible Land Use Under Existing Zoning (R1-7 and R-5) |                           |      |       |                         |              |           |           |              |           |           |                   |           |            |
| DESCRIPTION OF LAND USE   |                           |      |       | VEHICLE GENERATED TRIPS |              |           |           |              |           |           |                   |           |            |
|   |                           |      |       | Daily                   | AM Peak Hour |           |           | PM Peak Hour |           |           | Weekend Peak Hour |           |            |
| ITE LUC   | Land Use                  | Size | Units | Total                   | Enter        | Exit      | Total     | Enter        | Exit      | Total     | Enter             | Exit      | Total      |
| 210   | Single-Family Residential | 10   | DU    | 125                     | 3            | 9         | 12        | 7            | 4         | 11        | 5                 | 4         | 9          |
| 220   | Multi-Family Residential  | 10   | DU    | 36                      | 1            | 4         | 5         | 5            | 3         | 8         | 4                 | 4         | 8          |
| 560   | Church                    | 14   | KSF   | 97                      | 3            | 2         | 5         | 3            | 4         | 7         | 67                | 73        | 140        |
| <b>Total</b>  |                           |      |       | <b>258</b>              | <b>7</b>     | <b>15</b> | <b>22</b> | <b>15</b>    | <b>11</b> | <b>26</b> | <b>76</b>         | <b>81</b> | <b>157</b> |
| Scenario #3: Proposed Land Use Under Future Zoning (R-4)            |                           |      |       |                         |              |           |           |              |           |           |                   |           |            |
| DESCRIPTION OF LAND USE   |                           |      |       | VEHICLE GENERATED TRIPS |              |           |           |              |           |           |                   |           |            |
|   |                           |      |       | Daily                   | AM Peak Hour |           |           | PM Peak Hour |           |           | Weekend Peak Hour |           |            |
| ITE LUC   | Land Use                  | Size | Units | Total                   | Enter        | Exit      | Total     | Enter        | Exit      | Total     | Enter             | Exit      | Total      |
| 210   | Single-Family Residential | 27   | DU    | 312                     | 6            | 18        | 24        | 18           | 11        | 29        | 14                | 12        | 25         |
| 560   | Church                    | 14   | KSF   | 97                      | 3            | 2         | 5         | 3            | 4         | 7         | 67                | 73        | 140        |
| <b>Total</b>  |                           |      |       | <b>409</b>              | <b>9</b>     | <b>20</b> | <b>29</b> | <b>21</b>    | <b>15</b> | <b>36</b> | <b>81</b>         | <b>85</b> | <b>165</b> |

Source: ITE Trip Generation Manual, 10<sup>th</sup> Edition

The existing church is estimated to generate minimal trips, with 5 trips during the weekday AM peak hour, 7 trips during the weekday PM peak hour, and 140 trips during the Sunday peak hour. If residential units are to be constructed around the church property under existing zoning (Scenario #2), the residential development would generate 17 new trips during the AM peak hour and 19 trips during the PM peak hour. The proposed residential development under the revised zoning (Scenario #3) is anticipated to generate 24 new trips during the AM peak hour and 29 peak hour trips during the PM peak hour. The updated zoning will generate slightly more trips to the site, but fewer than 100 new trips during the peak hour.

### TRIP DISTRIBUTION AND ASSIGNMENT

The trip distribution and assignment is based on surrounding traffic volumes and the proximity of known activity centers. It is assumed that 55% of site trips will be north on Hayden Road, and 45% of trips will be south on Hayden Road.

### EXISTING AND FUTURE SITE VOLUMES

The existing and future traffic volumes are estimated based on the trip generation (weekday peak hour) of the existing and proposed site.

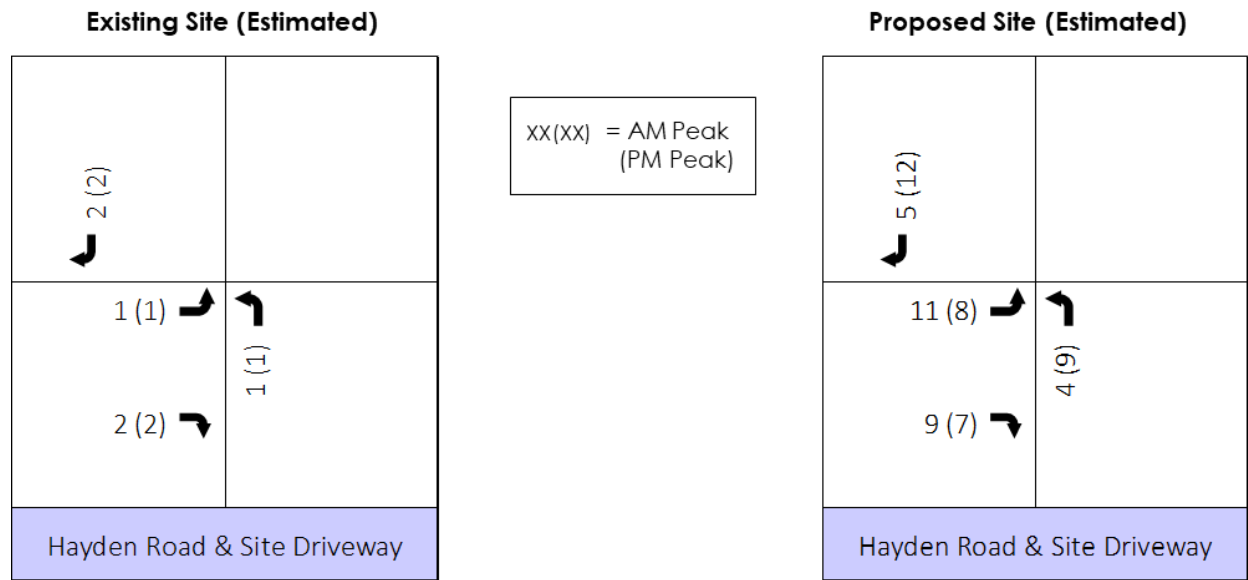


Figure 4: Existing and Future Peak Hour Traffic Volumes (Estimated)

#### DECELERATION LANE CRITERIA AT DRIVEWAYS

According to City of Scottsdale Design Standards & Policies Manual, right-turn deceleration lanes are required at all new driveways on major arterials and at new commercial/retail driveways on minor arterials. Deceleration lanes for driveways may also required on collector streets and for non-commercial/retail driveways on minor arterials. For these locations, the right-turn deceleration lane criteria is described below:

- A. At least 5,000 vpd are expected to use the street;
- B. The 85th percentile traffic speed on the street is at least 35 mph;
- C. At least 30 vehicles will make right turns into the driveway during a 1-hour period.

Hayden Road is a major arterial, but the existing site driveway is not new (constructed 40+ years ago). A northbound left-turn lane currently exists on Hayden Road for access into the site, but a southbound right-turn deceleration lane is not currently present. The existing storage length of the northbound left-turn lane (105 feet) is sufficient to accommodate the current and proposed site turning volume, based on AASHTO methodology.

For the consideration of a dedicated southbound right-turn lane, the conditions of Hayden Road satisfy the first two criteria, but the southbound right-turning volume is not anticipated to exceed 30 vehicles during per hour on a weekday. The proposed site (including church trips) is anticipated to generate 12 southbound right-turning vehicles during the weekday peak hour. The church is a greater generator on Sundays, where more than 30 southbound right-turning vehicles are possible during the peak hour.

Based on this assessment, a southbound right-turn lane is not required at the site driveway, but may be considered to accommodate existing church traffic on Sundays.





## CONCLUSIONS

- The proposed project, of which will include the South Scottsdale residential development and the existing adjacent church property, is anticipated to generate minimal trips with 25 new trips (entering and exiting) during the weekday AM peak hour and 29 trips (entering and exiting) during the weekday PM peak hour.
- The existing church property generates approximately 5 trips during the weekday AM peak hour and 7 trips during the weekday PM peak hour. On Sundays, the church generates approximately 140 trips (entering and exiting) during the peak hour.
- The past three years of crash data were reviewed on Hayden Road within the study area. One crash was reported at the site driveway. There is not a significant crash history near the proposed site.
- The existing driveway is proposed to remain for sole access to the site. The driveway will continue to serve the church property and the new residential units. The private access roadway within the site will include a turn-around for emergency vehicle access.
- A southbound right-turn lane into the site is not required based on the future weekday traffic volumes, but may be considered to accommodate church traffic during the Sunday peak hour.

We appreciate the opportunity to prepare this study. Should you have any questions, please feel free to contact me by email at [mbeckley@y2keng.com](mailto:mbeckley@y2keng.com) or by phone at (480) 696-1780.

Sincerely,

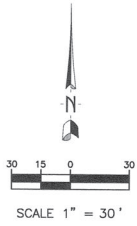
A handwritten signature in blue ink that reads 'Michelle E. Beckley'.

Michelle Beckley, PE  
Project Engineer

Attachments



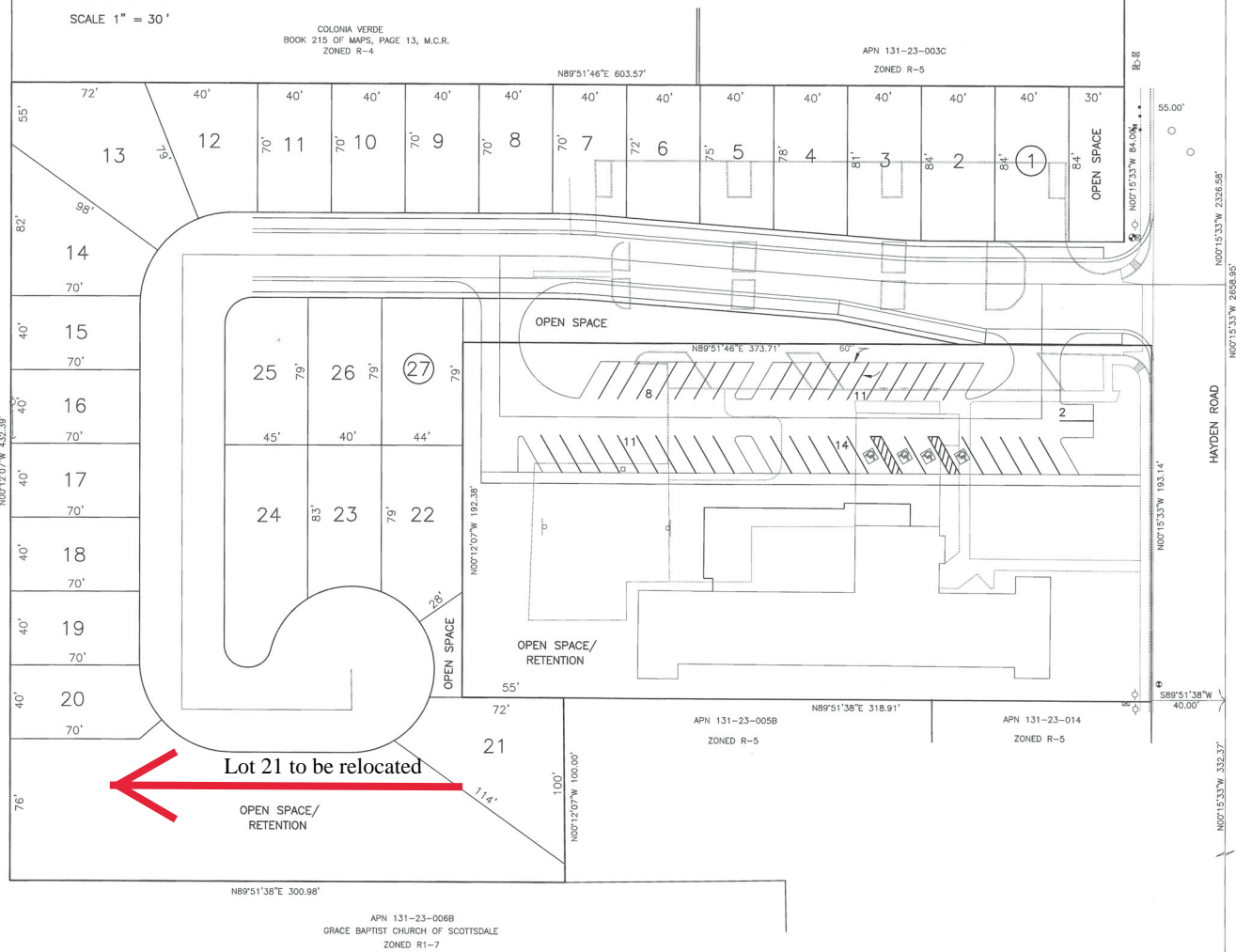
**ATTACHMENT A:**  
**SITE PLAN**



COLONIA VERDE  
BOOK 215 OF MAPS, PAGE 13, M.C.R.  
ZONED R-4

APN 131-23-003C  
ZONED R-5

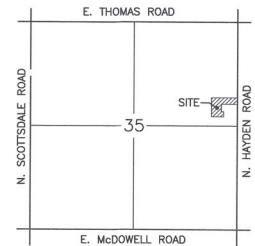
CONTINENTAL VILLAS EAST AMENDED  
BOOK 141 OF MAPS, PAGE 22, M.C.R.  
ZONED R-4



THOMAS ROAD  
NE COR  
SEC 35  
T2N R4E  
FD ALUM CAP

HAYDEN ROAD

OAK STREET



**RESIDENTIAL SITE SUMMARY**

EXISTING ZONING: R-5 & R1-7  
 PROPOSED ZONING: R-4  
 GROSS ACRES: 3.89 ACRES  
 OPEN SPACE: 0.59 ACRES (15%)  
 TOTAL NUMBER OF LOTS: 27  
 TYPICAL LOT SIZE: 40' X 70'  
 DENSITY: 6.9 LOTS/ACRE  
 ASSESSOR'S PARCEL NO: 131-23-005A & A PORTION OF 131-23-008

**ENGINEER**

CLOUSE ENGINEERING INC.  
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**DEVELOPER**

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CONTACT: CHRIS BROWN  
E-MAIL: cbrown@rcadcapitalllc.com  
PHONE: 602-478-0662

**Clouse Engineering, Inc.**  
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3010 E. Shea Blvd Suite 110 Scottsdale, AZ 85254  
Tel: 602-395-9300 Fax: 602-395-9310

**SITE PLAN**  
**SOUTH SCOTTSDALE**  
**2340 N. HAYDEN ROAD**

Revised  
5-28-19

Date  
3-12-19

As-Built

Job No.  
190303

1 OF 1