Correspondence Between Staff and Applicant

Approval Letter

Planning and Development Services Division

7447 East Indian School Road
Scottsdale, Arizona 85251

9/23/2019

Michael Leary
10278 E Hillery Dr
Scottsdale, AZ 85255

RE: Determination of a Planning Commission hearing

Dear Mr. Leary:

Your Development Application 19-ZN-2013#2, Core Center, is scheduled on the 10/16/2019 Planning Commission hearing agenda.

You may be required to make a presentation to the Planning Commission. If you choose to present your application to the Planning Commission utilizing a Power Point presentation, please submit the electronic file to your project coordinator by 1:00 p.m. on Monday 10/14/2019. Please limit your presentation to a maximum of 10 minutes.

A subsequent letter with your site post requirements will be sent shortly after the required text has been verified. Typically, this is approximately twenty-one (21) days before a hearing date.

The Planning and Development Services Division has had this application in review for 58 Staff Review Days.

Thank you,

Brad Carr, AICP
Principal Planner

C: Case File

CivTech

August 5, 2019

Brad Carr, AICP
Principal Planner
City of Scottsdale
3939 N. Drinkwater Blvd.
Scottsdale, AZ 85251

RE: 19-ZN-2013 #2 - Core Center
1st Review Comment Responses – Traffic Study Specific

Dear Mr. Carr:

CivTech has prepared this letter on behalf of Impact Church as both a cover letter to the hereto attached, *Core Center Trip Generation and Level of Service Analysis – 2nd Submittal* and to provide written responses to "1st Review" comments specific to the *Core Center Trip Generation and Level of Service Analysis, June 2019,* the "traffic study" component of the above-referenced rezoning application. Two sets of 1st review comments specific to the traffic study have been received from the City of Scottsdale (COS) to date. COS Comment No.'s 21 through 25 of your (1st Review) letter to Michael P. Leary, dated July 12, 2019 and five unnumbered comments CivTech received directly from COS Traffic Engineer Doug Ostler via e-mail, on July 29, 2019. Presented below are first the City's July 12th comments and then the July 29th comments, each comment followed by our written response. A full copy of each set of 1st review comments as they were received by CivTech has also been attached for reference.

JULY 12, 2019 TRAFFIC STUDY-SPECIFIC REVIEW COMMENTS & RESPONSES

COS Comment No. 21: Transportation staff is not fully supportive of the installation of a traffic signal at 84th Street/Hayden Road due to signal spacing. The proposed change from a church to offices and restaurants result in ~ 4x the daily and AM peak hour trips generated and ~10X the PM peak hour trips generated. This has profound impacts on traffic, particularly at the 84th Street/Hayden Road intersection. Signalization was not intended/planned for this location. DSPM 5-3.123 G3 indicates that "At Minor Arterial/Minor Arterial (or smaller designated streets) intersections the designer should evaluate using a roundabout as an alternative to a traffic signal for all new or significantly rebuilt intersections." The TIMA appears to include no indication that a roundabout option was evaluated. Please address these issues with the next submittal. (DSPM, Sec. 5-3.123)

CivTech Response:

The first submittal version of the traffic study was prepared in accordance with a scope established through discussion with City of Scottsdale Traffic Engineering staff in advance of

initiating the analysis. Presenting a weekday daily and peak hour trip generation comparison and intersection level of service analysis was part of the agreed upon scope as was identifying roadway capacity and/or traffic control mitigation warranted by the proposed development. Both were provided with the initial submittal. The initial submittal did not however, recognize the opportunity or challenges with converting the intersection of 84th Street and Hayden Road to a roundabout as an alternative to signalizing the intersection in its current conventional configuration. That option has since been considered fairly extensively, the results of which are summarized below.

*We have evaluated the appropriateness of a roundabout from an operational perspective using the roundabout warranting benchmarks specified in Section 5-3.124 of the City's Design Standards and Policies Manual (DSPM) which reads, "**Roundabouts are most appropriate…***

1. ***at locations with high turning movements,***

   Assuming the traffic count data we were required to collect for this analysis was representative of typical weekday conditions prior to the occupancy of the northwest corner property (4.0-acre +/- APN 215-48-065F) by CARMAX, turning movement volume accounted for approximately 15% of total daily volume entering this intersection. With the addition of CARMAX traffic (estimated to add another 310 turning movements per day, with 24 being made during the am peak hour and 27 during the pm peak hour), we expect this percentage to increase to 16%. Once CORE CENTER traffic and another year of background traffic growth is taken into account, the turning movement percentage is likely to increase to approximately 26%. This begs the question, "What does the City consider "high" in this context?" While 26% is certainly significant and would suggest that further consideration of roundabout appropriateness is warranted, it bears recognizing that 26% is nowhere near the 38-40% turning movement-to-total volume percentage that characterizes the Hayden/Northsight roundabout, a quarter-mile to the northeast.

2. ***where intersecting street traffic volume on the major street is less than ten times the volume on the minor street,***

   Assuming again, that the traffic count data we collected for this analysis is representative of typical weekday conditions prior to the occupancy of the northwest corner property by CARMAX, the number of vehicles entering the 84th Street and Hayden Road intersection from a major street (Hayden Road) approach is about 13 times that of vehicles entering from either of the two minor street approaches, well outside the range the City considers indicative on its own, of an intersection for which conversion to a roundabout should be considered further. However, with the addition of CORE CENTER traffic to the intersection, we expect the major-to-minor multiplier will drop to about 8%, within the City's indicated range of appropriateness for a roundabout.

3. ***and where safety is a primary concern."***

Roundabouts are frequently recognized for their safety benefits particularly in the context of reducing the potential for head-on, right angle, and/or left turn collisions. Review of crash data provided by the City of Scottsdale indicates a total of nine (9) reported traffic accidents have occurred in the immediate vicinity of the 84th Street and Hayden Road intersection over the three-year period ending December 31, 2018, none of which resulted in a fatality or serious injury. Of the nine, one (1) was interpreted as a rear-end crash; three (3) were interpreted as side swipe crashes, two (2) were interpreted as left turn/angle accidents involving a northeast-bound driver attempting to turn left/north onto 84th Street being hit by an oncoming through vehicle traveling in the southwest-bound direction, two (2) were interpreted as right angle crashes involving a northbound driver exiting the CORE SCOTTSDALE development attempting to turn left or right onto Hayden Road and getting hit by a driver traveling northeast or southwest on Hayden Road; and one was interpreted as involving two vehicles traveling in the same direction but this was the extent to which the cause or effect could be determined.

Based on the accident history just described, several of the accidents may have been avoided if the intersection were configured as a roundabout but those same accidents might have been avoided if there were a traffic signal in place to periodically grant right of way to turning traffic as well. This accident history on its own is not significant enough to characterize the intersection as unsafe and in need of alternate traffic control purely for safety reasons.

The above-described application of the City's roundabout warranting guidelines yielded results that suggest that the appropriateness of a roundabout in lieu of a traffic signal or any other traffic control alternative cannot be fully determined without more input from the various stakeholders in the outcome of this decision and without consideration of more than just operational factors. For this reason, and at the request of the applicant, we have also prepared a couple of preliminary geometric design concept exhibits which illustrate some of the physical impacts the conversion of this intersection to a roundabout would likely have. The exhibits are included with responses to first review comments, in Appendix A. Both exhibits describe a two-lane by one-lane roundabout similar in configuration to that which exists at Hayden Road and Northsight Boulevard. Both concepts avoid the need for right of way from the north/non-CORE CENTER side of the intersection. The primary difference between the two concepts is that the concept presented in Exhibit A1 has a 169-foot inscribed circle diameter (ICD), identical to that of the Hayden/Northsight Roundabout and the concept presented in Exhibit A2 has a 150-foot diameter ICD. The larger ICD concept allows the circulating path radius (R2) to remain within the City's' specified 15-20 mph design speed range but positioned to avoid any need for north side right of way, would cut fairly deep into the CORE CENTER site and likely cause need for significant adjustments to vertical elements of the site plan, including the building

proposed for location on the southeast quadrant of this intersection. The smaller ICD concept reduces the extent to which the intersection would need to be pushed south (and off of its current alignment) yet allows 22 mph travel along the R2 segment of the fastest path through the roundabout, higher than the City's standards support but still well within the range supported by nationally recognized (NCHRP Report 672) standards.

As to the comment regarding concern over the (quarter-mile) spacing that would result from installing a signal at 84th Street and Hayden Road, based on the understanding that the City is planning to convert the Hayden/Raintree intersection to a roundabout in the not too distant future, there will be an approximately one-mile stretch of Hayden Road with continuous flow endpoint intersections and either one or two signalized intersections in between. It seems therefore that the significance of the quarter-mile spacing of this signal from the 83rd Place and Hayden Road signal should not be as significant as it would be along a longer stretch of arterial with regularly spaced signals.

COS Comment No. 22: Please revise the traffic study to add a queue analysis for site driveways due to the substantial increase in projected trip generation as well as queue analysis for the intersection of 84th street and Hayden Road due to the proposed control change.

CivTech Response:

A queue analysis has been added to the Traffic Impact and Improvement Analysis section of the traffic study.

COS Comment No. 23: Please revise the traffic study to provide project site & total ADT on major street(s) within the study area. (DSPM, Sec. 5-1.701)

CivTech Response:

Site and Total ADT's for those segments of 84th Street and Hayden Road where traffic count date was collected for this analysis have been added to applicable traffic volume figures in the 2nd submittal version of the traffic study. As discussed with City traffic engineering staff on 8/1/2019, current ADT information about other roadway segments further away from the Project site is not available and therefore has not been added to the report.

COS Comment No. 24: Page 31, 1st bullet (84th Street & Hayden Road), 3rd sentence - the site plan depicts a redesign of the existing site driveway. The developer is responsible for correct alignment of their proposed new driveway to prevent negative offset of left turning vehicles. Should the intersection be signalized, the developer will be responsible for improvements associated with the traffic signal, including and not limited to providing a left turn lane on all approaches. Please revise the project plans to address this comment. (Zoning Ordinance, Sec. 1.204.)

CivTech Response:

The project plans have been revised to show curb line geometry and lane striping for the 84th Street driveway to achieve lane alignment north-south across Hayden Road. Two exhibits included with these review comment responses, Exhibit D1 and Exhibit D2, provide a little more detail of what was recommended for that area of the driveway near Hayden Road. Recognizing the site plan is still somewhat conceptual, a detailed assessment of internal circulation has not been performed as part this analysis.

COS Comment No. 25: Please revise the traffic study to add a queue analysis for site driveways due to the substantial increase in projected trip generation as well as queue analysis for the intersection of 84th street and Hayden Road due to the proposed control change

CivTech Response:

A queue analysis has been added to the Traffic Impact and Improvement Analysis section of the traffic study.

JULY 29, 2019 TRAFFIC STUDY-SPECIFIC REVIEW COMMENTS & RESPONSES

July 29th COS General Comment: In addition to the comments already provided, please address the following items related to evaluation of appropriate traffic control at the 84th Street and Hayden Road intersection:

CivTech Response:

All of the requested items have been addressed as requested.

July 29th COS Specific Comment No. 1: Please use the 24-hour counts that were collected at the 84th Street and Hayden Road intersection for evaluating the signal warrants in existing conditions.

CivTech Response:

The 24-hour counts collected for this analysis were used for the traffic signal warrant analysis. If detailed documentation beyond that which is provided in the Appendix of the traffic study is desired, it can be provided upon request.

July 29th COS Specific Comment No. 2: A reduction for right turning traffic is expected to be applied to the minor street approach volumes (see MUTCD Section 4C.01 Paragraph 8).

CivTech Response:

Reductions were taken for a portion of the right turn traffic on the minor street approaches. This reduction varied by approach.

July 29th COS Specific Comment No. 3: Staff recommends consideration of restricting left turns out of the driveway as an alternative to signalization, even if signal warrants are met (see MUTCD Section 4B.04 Paragraph 2J). This restriction would be for the driveway by means of a pork-chop median or channelization, etc.; 84th Street would remain full access. Note: this does not retract comment 21 in the comment letter. You may state the circumstances and/or reference discussion(s) indicating compliance with DSPM 5-30123 G3.

CivTech Response: *The turn restriction alternative has been considered, discussion of which appears below and in the Traffic Impact and Improvement Analysis section of the 2nd Submittal version of the traffic study.*

The turn restriction alternative would effectively reassign the task of accommodating CORE SCOTTSDALE and CORE CENTER traffic wanting to head southwest on Hayden Road upon exiting the site, to another intersection. In other words, this option which involves construction of a raised channelizing island in the CORE SCOTTSDALE/CORE CENTER driveway such that the only allowable exit movement from the CORE SCOTTSDALE/CORE CENTER development becomes a right turn onto northeast-bound Hayden Road towards Frank Lloyd Wright Boulevard. Exiting CORE SCOTTSDALE/CORE CENTER traffic wanting to head southwest on Hayden Road would therefore first have to make a right turn onto northeast-bound Hayden Road, and then find an alternate route back to southwest-bound Hayden Road. It is anticipated most of the exiting traffic in this situation would attempt a northeast-to-southwest-bound U-turn at the next closest median break to the northeast (adjacent to the Burger King/Home Depot and Go AZ Motorcycles dealership driveways). Due to the limited curb to curb clearance on the southbound side of the Hayden Road median, U-turns cannot be made without either jumping curb on the opposite side of Hayden Road (evidence of which can be see all along this segment) or, traveling to the middle of the median break and using some of the intersecting driveway pavement. Attached Exhibit E1 illustrates path of a passenger vehicle executing the right turn followed by U-turn movement.

July 29th COS Specific Comment No. 4: Correct reference to Sarival Avenue (instead of Hayden Road) on page 17 of the study.

CivTech Response: *The requested correction has been made.*

July 29th COS Specific Comment No. 5: Using the 24-hour counts that were collected at the 84th Street and Hayden Road intersection, state the 24-hour volume on Hayden Road in existing conditions as well as the projected ADT added by the site.

CivTech Response:

The requested ADT information has been added to the applicable traffic study figures.

We appreciate the City's consideration of these comments. Please call me if you have any questions about this statement and/or if we can be of further assistance.

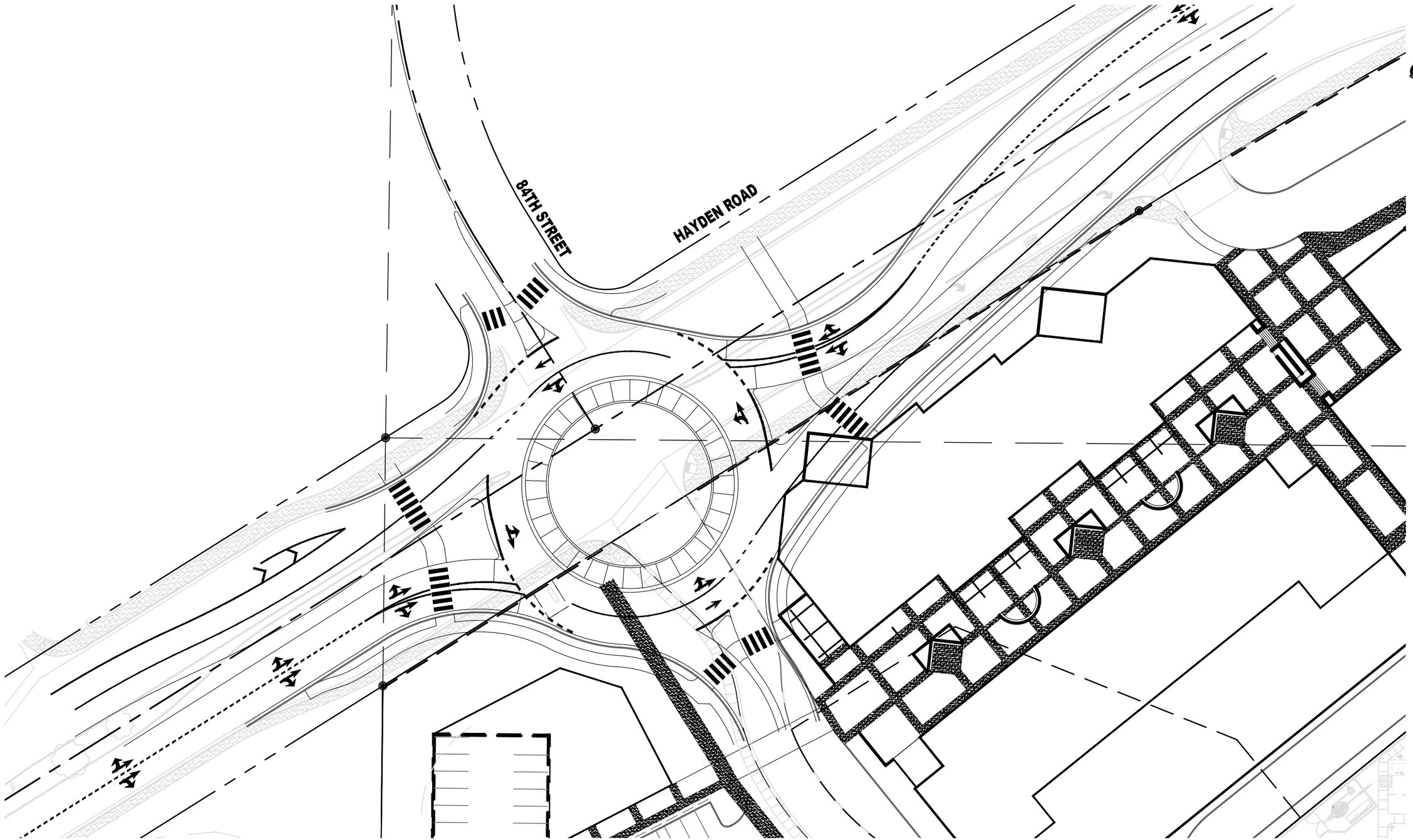
Sincerely,

CivTech Inc.

Tove C. White, P.E., PTOE
Project Manager/ Senior Traffic Engineer

Attachments:

EXHIBIT A1: CORE CENTER ROUNDABOUT DESIGN CONCEPT (169' ICD)
EXHIBIT A2: CORE CENTER ROUNDABOUT DESIGN CONCEPT (150' ICD)
EXHIBIT D1: 84TH STREET LANE ALIGNMENT ACROSS HAYDEN ROAD, SHEET 1 OF 2
EXHIBIT D2: 84TH STREET LANE ALIGNMENT ACROSS HAYDEN ROAD, SHEET 1 OF 2
EXHIBIT E1: EXITING RIGHT TURN FOLLOWED BY DOWNSTREAM U-TURN
Copy of 1st Review Comments letter, dated 7/12/2019
Copy of 1st Review Comments follow-up e-mail message, dated 7/29/2019
Core Center Trip Generation and Level of Service Analysis – 2nd Submittal, August 2019



SCALE: 1”=50’

0’ 25’ 50’ 100’

CivTech Inc.
10605 N. Hayden Rd.
Suite 140
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480.659.4250 p
480.659.0566 f
info@civtech.com

JOB NO.	19-0000
1ST SUBMITTAL:	-
2ND SUBMITTAL:	-
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CORE CENTER

ROUNDABOUT CONCEPT (169’ ICD)

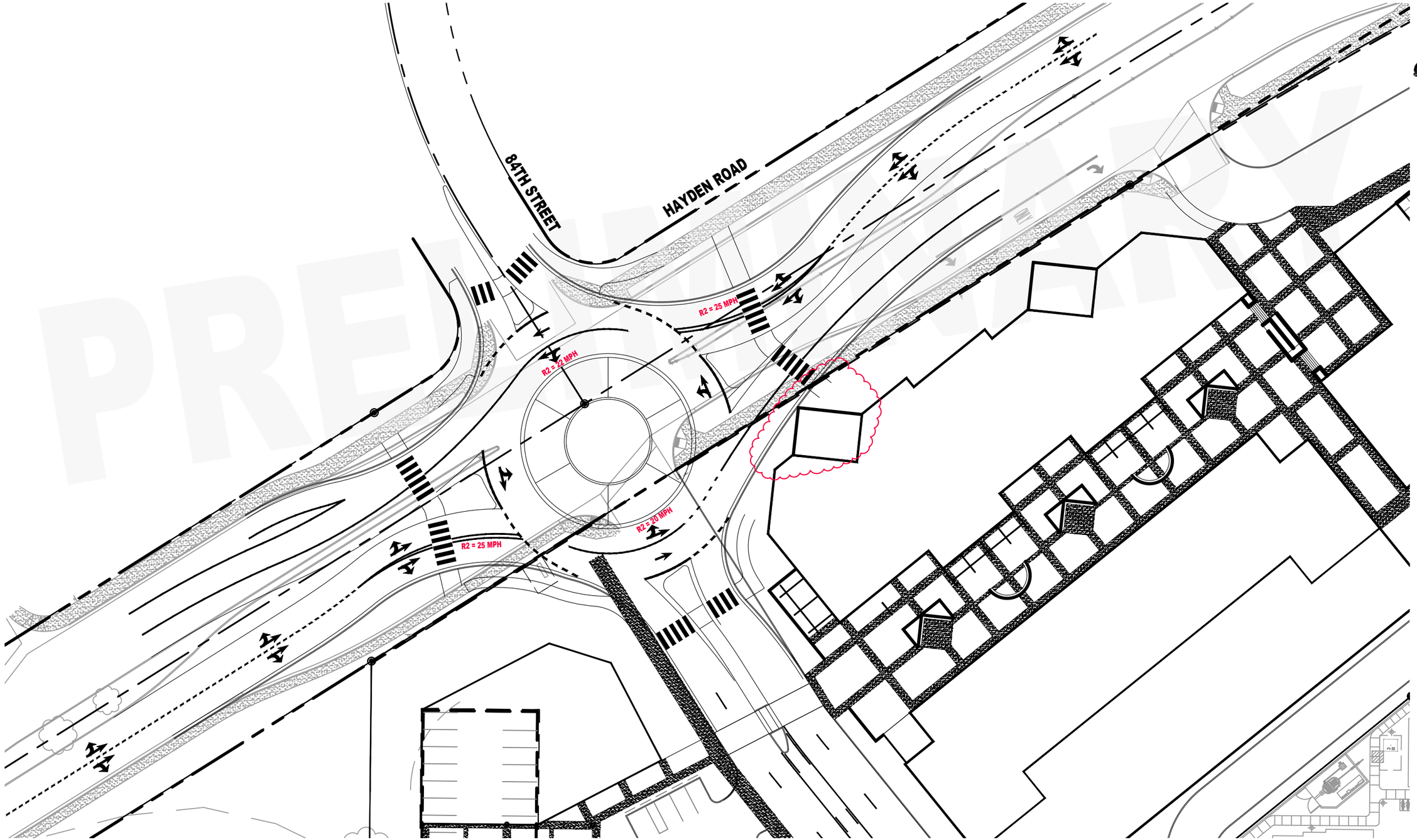
PRELIMINARY

REVIEW

NOT FOR CONSTRUCTION OR RECORDING

EXHIBIT A1

19-ZN-2013#2
8/8/2019



SCALE: 1”=50’

0’ 25’ 50’ 100’

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JOB NO:	19-0000
1ST SUBMITTAL:	-
2ND SUBMITTAL:	-
SCALE:	1”=50’
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CORE CENTER

ROUNDABOUT CONCEPT (150’ ICD)

PRELIMINARY

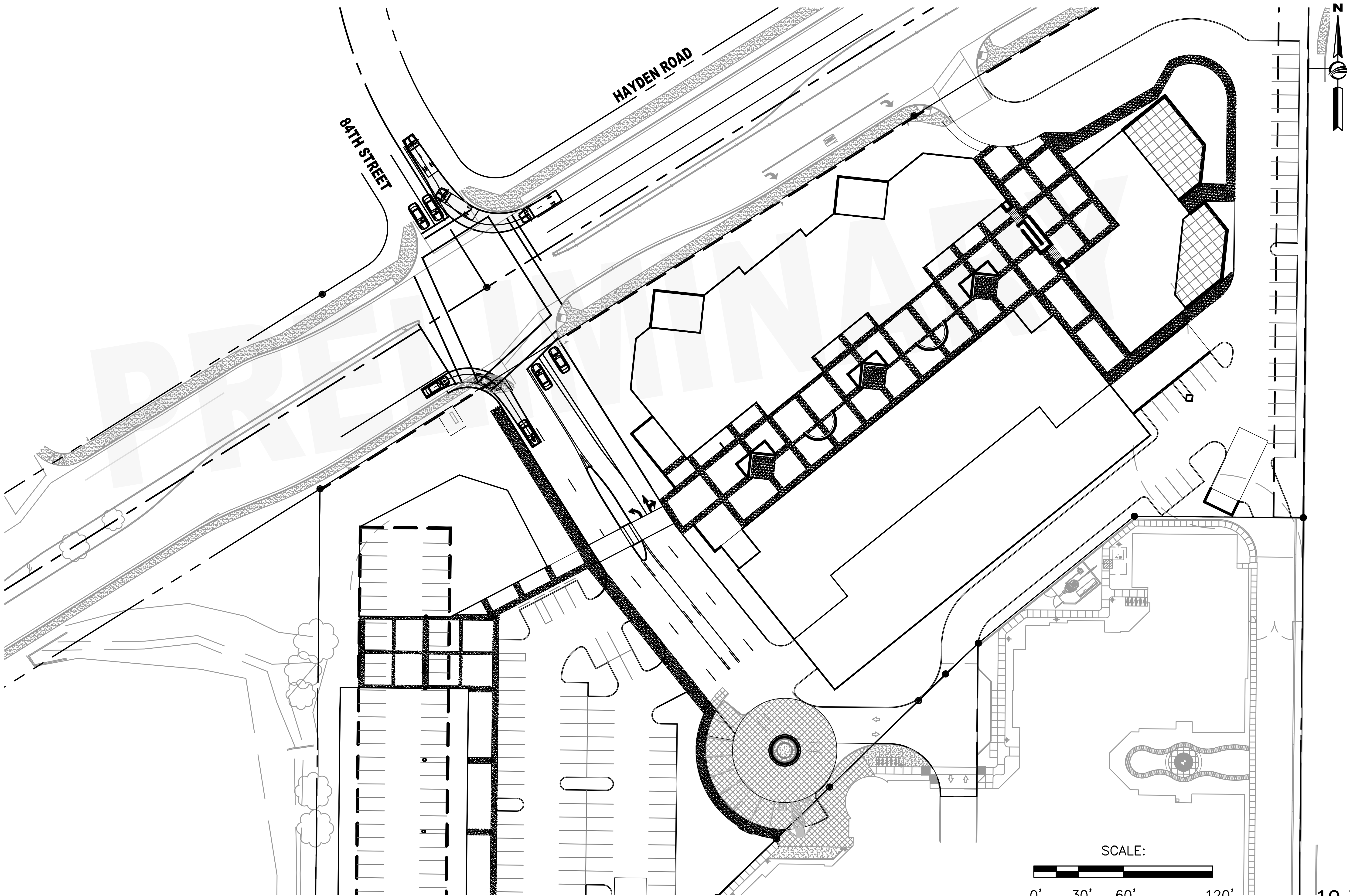
REVIEW

NOT FOR CONSTRUCTION OR RECORDING

EXHIBIT A2

19-ZN-2013#2

8/8/2019



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CHECKED:	T. WHITE

CORE CENTER

84TH STREET LANE ALIGNMENT ACROSS HAYDEN ROAD, SHEET 1 OF 2

PRELIMINARY
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

EXHIBIT D1

19-ZN-2013#2
8/8/2019

Jul 31, 2019 – 1:06pm
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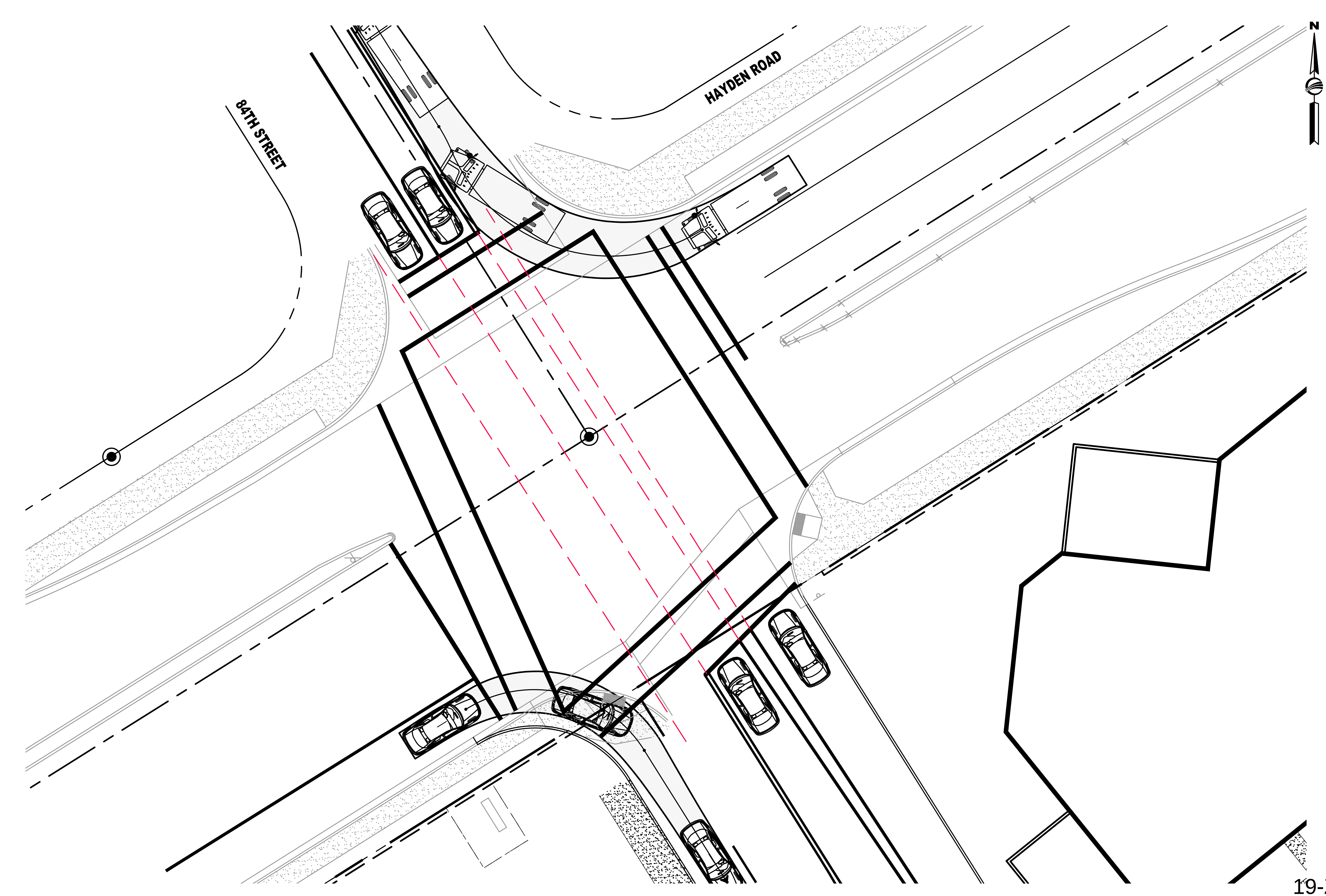

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JOB NO:	19-0000
1ST SUBMITTAL:	-
2ND SUBMITTAL:	-
SCALE:	1"=20'
DESIGN:	G. WHITE
DRAWN:	G. WHITE
CHECKED:	T. WHITE

CORE CENTER

84TH STREET LANE ALIGNMENT ACROSS HAYDEN ROAD, SHEET 2 OF 2

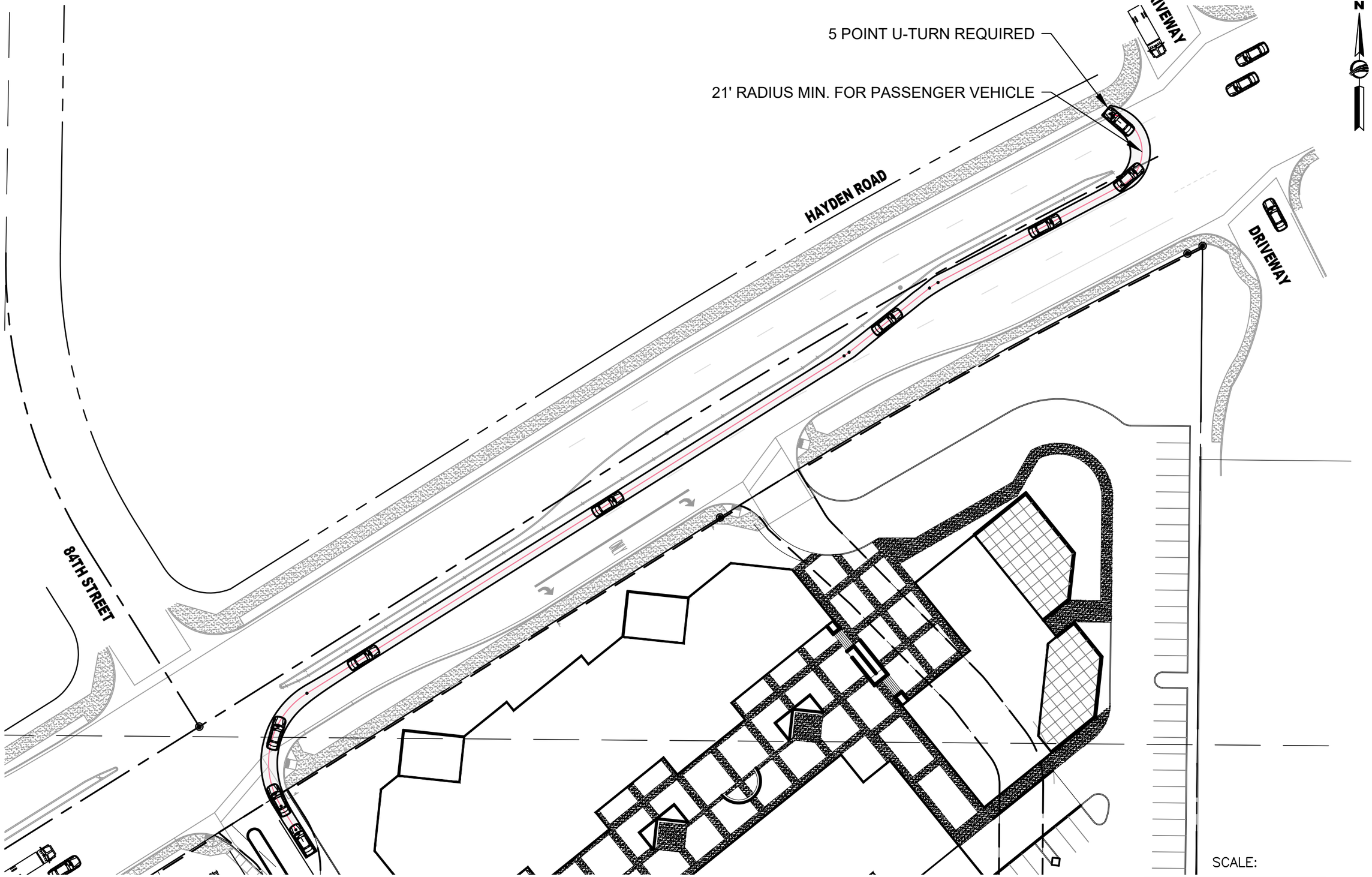
PRELIMINARY

REVIEW

NOT FOR CONSTRUCTION OR RECORDING

EXHIBIT D2

19-ZN-2013#2
8/8/2019



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JOB NO:	19-0000
1ST SUBMITTAL:	-
2ND SUBMITTAL:	-
SCALE:	1"=50'
DESIGN:	G. WHITE
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CHECKED:	T. WHITE

CORE CENTER

EXITING RIGHT TURN FOLLOWED BY DOWNSTREAM U-TURN

PRELIMINARY

REVIEW

NOT FOR CONSTRUCTION OR RECORDING

EXHIBIT E1

CITY OF SCOTTSDALE

7/12/2019

Michael P. Leary, LTD
10278 E Hillery Dr
Scottsdale, AZ 85255

RE: 19-ZN-2013#2
Core Center
H4145 (Key Code)

Dear Mr. Leary:

The Planning & Development Services Division has completed the review of the above referenced development application submitted on 6/5/2019. The following **1st Review Comments** represent the review performed by our team, and is intended to provide you with guidance for compliance with city codes, policies, and guidelines related to this application.

Zoning Ordinance and Scottsdale Revise Code Significant Issues

The following code and ordinance related issues have been identified in the first review of this application, and shall be addressed in the resubmittal of the revised application material. Addressing these items is critical to scheduling the application for public hearing, and may affect the City Staff's recommendation. Please address the following:

Zoning:

1. Please revise the Project Narrative to include a discussion of the use of the PCP district bonus provisions. Discussion should include the proposed bonus to be requested, the justification for the proposed bonus, calculations for the estimated value of the bonus, as well as a plan for community benefit related to the estimated value of the bonus. (Zoning Ordinance, Sec. 5.4008. and 7.1200.)
2. Please revise the project plans to demonstrate compliance with the setback and stepback requirements of the PCP zoning district. The setback requirement is a minimum of 25 feet from the curb line along N. Hayden Road. The stepback requirements starts at the minimum setback line. (Zoning Ordinance, Sec. 5.4007.D. & 5.4007.E.)
3. Please revise the project plans to include the calculations for floor area ratio (FAR) in compliance with the Zoning Ordinance, Sec. 5.4007.A.
4. The site and Core Apartments as part of case 19-ZN-2013 appears to not have complied with stipulation 7 "PEDESTRIAN CONNECTIONS. The site shall provide a minimum of three (3) pedestrian connections to existing properties surrounding the site. A minimum of one (1) connection having a minimum with of six (6) feet shall be provided to each of the west, south and east sides of the site. Pedestrian connections shall be reviewed and approved by

city transportation staff." Please revise the project plans to identify compliance with these requirements.

5. Please submit a revised copy of the Citizen Review Report summary to include details of the most recent public outreach efforts, including any additional public comments that may have been received. (Zoning Ordinance, Sec. 1.305.C.2.b.)

6. Please provide conceptual elevations in conformance with the district requirements with the next submittal. (Zoning Ordinance, Sec. 1.303.)

<u>2001 General Plan & Greater Airpark Character Area Plan (GAPCAP) Analysis:</u>

7. The first submittal narrative/ development master plan- a document that is intended to provide overall coordination of urban design character, buffering to adjacent uses, transportation systems, and infrastructure necessary for the proposed development – includes unnecessary/oppositional statements that are not material in any manner to the application request; please see applicant responses to General Plan Growth Area Element Goal #2, Bullet #1, and Community Mobility Element Goal #5, Bullet#3 regarding light-rail transit and equestrians. Please revise the Project Narrative to include only necessary statements are in direction relation to the proposed development be included in the development master plan upon resubmittal.

   To this end, please ensure that responses that are completed with “refer to prior responses” (found throughout the document) indicate by numerical identification, and page number, reference to the response the applicant is directing the reader to. Additionally, please remove responses that indicate “not applicable”.

8. The General Plan Character and Design Element (Goal 4, bullets 10, 14, and 15) encourage “streetscapes for major roadways that promote the city’s visual quality and character; and blend into the character of the surrounding area. The Greater Airpark Character Area Plan Character and Design Element (Goal CD2, Policy CD 2.1.6, CD 2.2, and CD2.7), and Economic Vitality Element (Goal 5, bullet 6) promotes vibrant Signature Corridors in the Greater Airpark to provide a distinct identify and design theme in the area. Although the first submittal discusses Hayden Road being designated as a Signature Corridor, there appears to be no indication as to what that means as a result of this development proposal – details of such are expected of a formal Development Plan. Please note Hayden Road at the subject site’s frontage is a designated Signature Corridor and Buffered Roadway – an area in which 50’ foot minimum setback, measured from back of curb line, is expected to be maintained as per CD2.7 of the GACAP.

   Please respond both graphically and narratively as to how the proposed development will provide this dimension and enhance the Streetscape in response to the cited considerations. Please consider additions of areas of pedestrian lighting, public art, bus shelters, and other public amenities to enhance the pedestrian environment and streetscape.

9. Please respond to Goal 10, along with any applicable bullets, of the of the General Plan Preservation and Environmental Planning Element, and Goal EP5 of the Greater Airpark Character Area Plan addressing how the proposed development may, if at all, utilize green building alternatives that support sustainable desert living.

   a. Please note, Scottsdale is progressively attempting to install in capital projects, and request from private development applications, Low Impact Development (LID) and Green Infrastructure (GI) as a method of stormwater control, water harvesting, and

cleansing for the first flush requirements of the City's Floodplain Ordnance. Accordingly, please consider utilization of this resource. More information on this initiative can be found at:

https://sustainability.asu.edu/sustainable-cities/resources/lid-handbook/

10. As a respond to Goal 1 of the Community Involvement Element, with a resubmittal, please provide an updated Citizen Involvement Report that describes the key issues that have been identified through the public involvement process.

Fire:

11. Please revise the project plans to demonstrate hydrant spacing, existing and proposed (Fire Ord. 4283, 507.5.1.2)

12. Please revise the project plans to demonstrate the location of Fire Department Connection(s). (Fire Or. 4283, 912)

Drainage:

13. Please submit a copy of the revised Drainage Report with the remainder of the resubmittal material identified in Attachment A. Please see comments within the red-lined 1st submittal of the Drainage Report and Preliminary G&D and address accordingly.

Water and Wastewater:

14. Please submit a revised Water and Wastewater Design Report with the remainder of the resubmittal material identified in Attachment A. Please see comments within the red-lined 1st submittal of the Report. The Preliminary Basis of Design Report must be accepted by the Water Resources Department prior to scheduling of first hearing of project.

15. Please submit flow monitoring results of northern 8-inch sewer in Hayden Road with next submittal.

Airport:

16. The subject site is within Airport noise compatibility study AC-2 area. Please note that a signed Avigation Easement along with the required legal descriptions and graphic, and a copy of the Noise Disclosure statement will be required with the final plans submittal.

Engineering:

17. All waste shall be placed in suitable containers to facilitate waste removal in a sanitary condition. Please revise the project plans accordingly. (SRC, Sec. 24-13)

18. Off-site transportation, stormwater and water resources improvements along property frontages to existing supporting infrastructure, with associated dedications, is required. Please update the project plans accordingly. (SRC, Sec. 48-7, 47-10 & 49-219)

Significant Policy Related Issues

The following policy related issues have been identified in the first review of this application. While these issues may not be critical to scheduling the application for public hearing, they may affect the City Staff's recommendation pertaining to the application and should be addressed with the resubmittal of the revised application material. Please address the following:

Transportation:

19. The entry drive should be redesigned to be in conformance with COS Standard Detail #2257, CH-2. The proposed raised median creates offset lanes alignments with the existing driveway to the northwest. An entry drive of 48 feet of pavement width transitioning to 55 feet is unnecessary. Please revise the project plans accordingly. (DSPM, Sec. 5-3.200 & 5-3.205)

20. The north end of the site is designed poorly. The driveway leading from Hayden Road directs vehicles into the pedestrian courtyard. The short turning radius on the site drive leading to this driveway will create issues with vehicle queuing and blocking inbound traffic. Please revise the project plans to correct these issues. (Zoning Ordinance, Sec. 1.204.)

Traffic Study:

21. Transportation staff is not fully supportive of the installation of a traffic signal at 84th Street/Hayden Road due to signal spacing. The proposed change from a church to offices and restaurants result in ~ 4x the daily and AM peak hour trips generated and ~10X the PM peak hour trips generated. This has profound impacts on traffic, particularly at the 84th Street/Hayden Road intersection. Signalization was not intended/planned for this location. DSPM 5-3.123 G3 indicates that "At Minor Arterial/Minor Arterial (or smaller designated streets) intersections the designer should evaluate using a roundabout as an alternative to a traffic signal for all new or significantly rebuilt intersections." The TIMA appears to include no indication that a roundabout option was evaluated. Please address these issues with the next submittal. (DSPM, Sec. 5-3.123)

22. Please revise the traffic study to add a queue analysis for site driveways due to the substantial increase in projected trip generation as well as queue analysis for the intersection of 84th Street and Hayden Road due to the proposed control change (signalization). (Zoning Ordinance, Sec. 1.303.)

23. Please revise the traffic study to provide project site & total ADT on major street(s) within the study area. (DSPM, Sec. 5-1.701)

24. Page 31, 1st bullet (84th Street & Hayden Road), 3rd sentence - the site plan depicts a redesign of the existing site driveway. The developer is responsible for correct alignment of their proposed new driveway to prevent negative offset of left turning vehicles. Should the intersection be signalized, the developer will be responsible for improvements associated with the traffic signal, including and not limited to providing a left turn lane on all approaches. Please revise the project plans to address this comment. (Zoning Ordinance, Sec. 1.204.)

Engineering:

25. Please review the Context Aerial with corrections provided by Engineering for existing easement conflicts that will need to be modified or released prior to permit issuance, including:
    a. Any GLO easements in conflict with proposed development and not required by city LAIPS or TMP will need to be abandoned by property owner prior to any permit issuance. Specifically for this project, the supplied ALTA survey identified GLOs per the following recording information: docket 1443 page 63 and docket 3025 page 473. Please call out required abandonments on site plan. (DSPM, Sec. 1-2.400)

b. Water lines located outside of a public right-of-way or street tract must be placed in a minimum 20’ wide easement:

   i. Horizontally, a minimum of 6’ is required between the water line and the edge of easement.

   ii. The easement will be free of obstructions, shall not be in a fenced area, and shall be accessible always to city service equipment such as trucks and backhoes.

   iii. Easements outside of paved areas shall have a 10’ wide hardened patch with a cross-slope not greater than 10% and a longitudinal slope not greater than 20%. Hardened paths shall consist of native soil compacted to 95% to a depth of 1’.

   iv. Revegetation within the easement shall consist of low growing shrubs. Update site plan accordingly.

c. Existing cross access and emergency services access easement through project parcel to abutting parcel in conflict with proposed development will need to be relocated to provide cross access to southern and eastern abutting parcels. Please update the project plans accordingly. (DSPM, Sec. 5-3.201)

26. Please revise the project plans to comply with the following location and design requirements for non-residential, mixed-use, and multi-family residential refuse and recycling enclosures. Please locate and position the enclosure(s): (DSPM, Sec. 2-1.309)

    a. A minimum of one (1) enclosure shall be provided for every 20,000 square feet of office/retail space.

    b. So that the approach pad for the enclosure(s) is located that the refuse truck route to and from the public street has a minimum unobstructed vertical clearance of 13 feet 6 inches (14 feet is recommended), and unobstructed minimum vertical clearance above the approach pad and refuse enclosure of 25 feet. (The vertical clearances are subject to modification based on enclosure container size, location, and positioning as determined by the Sanitation Director, or designee.);

    c. In a location that is easily accessible for collection, and does not require the refuse truck to “backtrack”;

    d. A maximum 100 feet distance from building service exit to refuse enclosure;

    e. So that collection vehicles do not back up more than 35 feet;

    f. So that the path of travel for the refuse truck accommodates a minimum vehicle turning radius of 45 feet, and a minimum length of 40 feet;

    g. So that the approach pad is level, with a maximum of 2 percent slope;

    h. So that the enclosure(s) are not placed between the on-site buildings and adjacent lower density residential unless there is no reasonable alternative. In these situations, orient the enclosure(s) towards the interior of the property;

    i. So that the enclosure(s) are not placed next to drainage ways or basins, unless there is no reasonable alternative;

    j. So that the enclosure(s) are not placed between the street and the front of the building, unless there is no reasonable alternative; and

k. So that the enclosure(s) are not placed at the end of a dead-end parking aisle.

27. Compactors may be used as an alternative to refuse or recycling containers. To determine adequacy and site location of compactors, if proposed, please provide the following on a refuse plan:

    a. Compactor type,

    b. Compactor capacity – state on site plan compactor capacity conversion equating to the city's required 1 enclosure for every 20,000 square feet with no recycling,

    c. Compactor location, addressing the following:

        i. Place the refuse compactor container and approach pad so that the refuse truck route to and from the public street has a minimum unobstructed vertical clearance of thirteen (13) feet six (6) inches (fourteen (14) feet is recommended), and unobstructed minimum vertical clearance above the concrete approach slab and refuse compactor container storage area concrete slab of twenty-five (25) feet,
        ii. Place the refuse compactor container in a location that does not require the bin to be maneuvered or relocated from the bin's storage location to be loaded on to the refuse truck,
        iii. Provide a refuse compactor container approach area that has a minimum width of fourteen (14) feet and length of sixty (60) feet in front of the container, and
        iv. Demonstrate path of travel for refuse truck accommodates a minimum vehicle turning radius of 45', and vehicle length of 40'.

28. Although not a requirement, recycling is an amenity found to be desired by Scottsdale residents. Please note if recycling containers will be provided for the development project.

29. Please revise the project plans with a 6' width accessible pedestrian route from the main entry of the development to each Hayden. (DSPM, Sec. 2-1.310)

30. Please revise the project plans to provide an eight (8) foot wide minimum, curb-separated sidewalk along the project boundary. (DSPM, Sec. 5-3.102 and 5-3.110)

Technical Corrections

The following technical ordinance or policy related corrections have been identified in the first review of the project. While these items are not as critical to scheduling the case for public hearing, they will likely affect a decision on the final plans submittal (construction and improvement documents) and should be addressed as soon as possible. Correcting these items before the hearing may also help clarify questions regarding these plans. Please address the following:

Site:

31. Please revise the project plans to identify pedestrian connections to the surrounding commercial businesses. (Zoning Ordinance, Sec. 1.303.)

Transportation:

32. Please revise the project plans to identify what measures will be provided to ensure a safe pedestrian crossing of the main entry drive. (Zoning Ordinance, Sec. 1.303.)

33. The proposed entry drive is showing a raised median. Please note that this will require the reconstruction of the existing curb returns on Hayden Road. Please revise the project plans to identify this. (Zoning Ordinance, Sec. 1.204.)

Traffic Study:

34. Potential errors were noticed in the study which may not necessarily affect the final recommendations of the study nor necessitate a revised study. Please verify the following items prior to a future resubmittal:
    a. Page 7, 3rd paragraph (Hayden Road), 1st Sentence - Hayden Road is a minor arterial within the vicinity of the site, not a major arterial.
    b. Page 7, 4th paragraph (83rd Place), 2nd & 3rd sentences - these two sentences likely belong in the next paragraph (83rd Way/Costco Driveway) Please verify.
    c. Page 7, 5th paragraph (83rd Way/Costco Driveway), 2nd & 3rd sentences - these two sentences likely belong in the prior paragraph (83rd Place). Please verify.
    d. Page 8, 4th paragraph (Costco/Hayden), last sentence - missing "lane" after "deceleration".
    e. Page 13-14, 83rd Place & Hayden Road, last sentence - intersection is operating acceptably per DSPM 5-1.801 B.1, please verify recommendation to monitor the intersection.
    f. Page 14, 2nd full paragraph (84th Street & Hayden Road), 2nd sentence. See DSPM 5-1.801 B for correct threshold requirements (Generally LOS D or better overall, individual/approach should be LOS D or better, must be LOS E or better). This comment may be applicable to other locations that are not marked. Please revise the Traffic Study and project plans to address this.

Other:

35. Please revise the Zoning Boundary Exhibit to include half of the right-of-way for N. Hayden Road as it fronts the site. All zoning boundaries include adjacent right-of-way. (Zoning Ordinance, Sec. 1.303.)

Please resubmit the revised application requirements and additional/supplemental information identified in Attachment A, Resubmittal Checklist, and a written summary response addressing the comments/corrections identified above as soon as possible for further review. The City will then review the revisions to determine if the application is to be scheduled for a hearing date, or if additional modifications, corrections, or additional/supplemental information is necessary.

PLEASE CALL 480-312-7767 TO SCHEDULE A RESUBMITTAL MEETING WITH ME PRIOR TO YOUR PLANNED RESUBMITTAL DATE. DO NOT DROP OFF ANY RESUBMITTAL MATERIAL WITHOUT A SCHEDULED MEETING. THIS WILL HELP MAKE SURE I'M AVAILABLE TO REVIEW YOUR RESUBMITTAL AND PREVENT ANY UNNECESSARY DELAYS. RESUBMITTAL MATERIAL THAT IS DROPPED OFF MAY NOT BE ACCEPTED AND RETURNED TO THE APPLICANT.

The Planning & Development Services Division has had this application in review for 28 Staff Review Days since the application was determined to have the minimal information to be reviewed.

These **1st Review Comments** are valid for a period of 180 days from the date on this letter. The Zoning Administrator may consider an application withdrawn if a revised submittal has not been received within 180 days of the date of this letter (Section 1.305. of the Zoning Ordinance).

If you have any questions, or need further assistance please contact me at 480-312-7713 or at bcarr@ScottsdaleAZ.gov.

Sincerely,

Brad Carr, AICP
Principal Planner

ATTACHMENT A
Resubmittal Checklist

Case Number: **19-ZN-2013#2**

Please provide the following documents, in the quantities indicated, with the resubmittal (all plans larger than 8 ½ x11 shall be folded):

Digital submittals shall include one copy of each item identified below.

☒ One copy: COVER LETTER – Respond to all the issues identified in the first review comment letter.
☒ One copy: Revised Narrative for Project
☒ One copy: Revised Traffic Impact Mitigation Analysis (TIMA)

☒ Context Aerial with the proposed Site Plan superimposed

Color 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Site Plan:

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Open Space Plan:

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Elevations:

Color 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"
B/W 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Elevation Worksheet(s):

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Perspectives:

Color 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Color Site Plan:

Color 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Landscape Plan:

B/W 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Site Cross Sections:

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Preliminary Grading & Drainage Plan:

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Pedestrian & Vehicular Circulation Plan

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Dimensioned Zoning Boundary Exhibit

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Slope Analysis (superimposed on a topography map)

☒ Development Plan Booklets
The Development Plan booklets shall be clipped together separately, and not be bounded.

Color _____ 11" x 17" 1 8 ½" x 11"

- 8 ½" x 11" – 3 color copy on archival (acid free paper) (To be submitted after the Planning Commission hearing.)

Technical Reports: Please include one (1) digital copy of each report

☒ 1 copy of Revised Drainage Report
☒ 1 copy of Revised Water and Wastewater Design Report

Resubmit the revised Drainage Report and Water and Wastewater Design Report to your Project Coordinator.

Tove White

From: Ostler, Douglas <DOstler@Scottsdaleaz.gov>
Sent: Monday, July 29, 2019 11:58 AM
To: Tove White
Cc: Kercher, Phillip; Guntupalli, Kiran; Carr, Brad
Subject: Core Center Traffic Study Comments, 19-ZN-2013 #2

Tove,
Transportation staff had additional discussions and review of the proposed CORE Center project and associated TIMA. In addition to the comments already provided, please address the following items related to evaluation of appropriate traffic control at the 84th Street and Hayden Road intersection:

- Please use the 24-hour counts that were collected at the 84th Street and Hayden Road intersection for evaluating the signal warrants in existing conditions.
- A reduction for right turning traffic is expected to be applied to the minor street approach volumes (see MUTCD Section 4C.01 Paragraph 8).
- Staff recommends consideration of restricting left turns out of the driveway as an alternative to signalization, even if signal warrants are met (see MUTCD Section 4B.04 Paragraph 2J). This restriction would be for the driveway by means of a pork-chop median or channelization, etc.; 84th Street would remain full access.
    - Note: this does not retract comment 21 in the comment letter. You may state the circumstances and/or reference discussion(s) indicating compliance with DSPM 5-30123 G3.
- Correct reference to Sarival Avenue (instead of Hayden Road) on page 17 of the study.
- Using the 24-hour counts that were collected at the 84th Street and Hayden Road intersection, state the 24-hour volume on Hayden Road in existing conditions as well as the projected ADT added by the site.

Thanks!

Doug Ostler -- Traffic Engineer
Office: 480-312-7250
Direct: 480-312-7724
CITY OF SCOTTSDALE

CORE CENTER

Trip Generation Comparison and Analysis
2nd Submittal

15301 North Hayden Road
Scottsdale, Arizona

August 2019
Project No. 19-0480

Prepared For:
Impact Church
9943 E. Bell Road Scottsdale, Arizona 85260

For Submittal to:
The City of Scottsdale

Prepared By:

CivTech

10605 North Hayden Road Suite 140
Scottsdale, Arizona 85260
480-659-4250

19-ZN-2013#2
8/8/2019

CORE CENTER
TRIP GENERATION AND LEVEL OF SERVICE ANALYSIS
2ND SUBMITTAL

15301 North Hayden Road
Scottsdale, Arizona

Prepared for:
Impact Church
9943 E Bell Road
Scottsdale, AZ 85260

For Submittal to:

City of Scottsdale

Prepared By:

CivTech Inc.

10605 North Hayden Road
Suite 140
Scottsdale, Arizona 85260
Office: (480) 659-4250
Fax: (480) 659-0566

August 2019

CivTech Project No. 19-0480

19-ZN-2013#2
8/8/2019

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EXECUTIVE SUMMARY

CORE CENTER is an approximately 194,000-square foot mixed-use (restaurant/retail/office) development project proposed for a 6.62-acre parcel located along the southeast side of Hayden Road, between 83rd Way and Northsight Boulevard in Scottsdale Arizona, property previously proposed in conjunction with plans for the now developed (multi-family residential) parcel to the south, as the relocation site for Impact Church. The previously proposed ("Hayden One") development plan proposing church and multi-family residential uses was approved by the City in 2014.

Two existing driveways will provide access to CORE CENTER; a full movement driveway located directly across from 84th Street and a right in/right out only driveway located approximately 350 feet east of 84th Street. The 84th Street driveway currently serves as the only point of access for the adjacent multi-family development; ultimately CORE CENTER and the multi-family developments will share both driveways.

Since a full Traffic Impact and Mitigation Analysis (TIMA) of developing the project site and adjacent multi-family parcel in accordance with the Hayden One development plan has already been performed by CivTech and approved by the City (as part of the above-referenced 2014 approval), the City has not asked that a full TIMA be performed for the CORE CENTER development proposal. Instead the City has indicated a less comprehensive analysis document (report) will satisfy the TIMA requirements for this project. Specifically, the City has asked that the analysis include a trip generation comparison between the Hayden One and CORE CENTER development plans, and that it address anticipated impacts of the CORE CENTER project on capacity and level of service (LOS) at each of the two proposed site access points and at the nearby roundabout intersection of Hayden Road and Northsight Boulevard. Consistent with the Hayden One TIMA, this report addresses the traffic impacts of the proposed development on weekday traffic conditions, exclusively.

The following conclusions have been documented in this report:

GENERAL

- The previously proposed Impact Church component of the Hayden One development had the potential to generate approximately 738 external trips over the course of a typical weekday, with 46 of those trips occurring during the AM peak hour (29 in/17 out) and 45 occurring during the PM peak hour (22 in/23 out).

- The currently proposed CORE CENTER mixed-use development has the potential to generate up to 4,406 external trips over the course of a typical weekday, with 183 of those trips occurring during the AM peak hour (150 in/33 out) and 426 occurring during the PM peak hour (199 in/227 out).

- The CORE CENTER plan has the potential to generate 3,668 more external trips daily, 137 more external trips during the AM peak hour (150 more inbound/16 more outbound) and 381 more external trips during the PM peak hour (177 more inbound/ 204 more outbound). Accommodating the additional weekday traffic that a mixed-use development of the intensity proposed with the CORE CENTER plan will require an alternate form of traffic control at the

intersection of 84th Street than the tw0-way stop sign control that exists today. Potentially viable alternatives considered in the course of completing this analysis and related communication with City staff included implementing turn restrictions (i.e. eliminating the existing opportunity to turn left out of the site onto southwest-bound Hayden Road), converting the intersection to a roundabout, and installing a traffic signal.

- The turn restriction alternative would effectively reassign the task of accommodating CORE SCOTTSDALE and CORE CENTER traffic wanting to head southwest on Hayden Road upon exiting the site, to another intersection. In other words, this option which involves construction of a raised channelizing island in the CORE SCOTTSDALE/CORE CENTER driveway such that the only allowable exit movement from the CORE SCOTTSDALE/CORE CENTER development becomes a right turn onto northeast-bound Hayden Road towards Frank Lloyd Wright Boulevard. Exiting CORE SCOTTSDALE/CORE CENTER traffic wanting to head southwest on Hayden Road would therefore first have to make a right turn onto northeast-bound Hayden Road, and then find an alternate route back to southwest-bound Hayden Road. It is anticipated most of the exiting traffic in this situation would attempt to make a northeast-to-southwest-bound U-turn at the next closest median break to the northeast (adjacent to the Burger King/ Home Depot and Go AZ Motorcycles dealership driveways). Due to the limited curb to curb clearance on the southbound side of the Hayden Road median, U-turns cannot be made without either jumping curb on the opposite side of Hayden Road (evidence of which can be see all along this segment) or, traveling to the middle of the median break and using some of the intersecting driveway pavement. An exhibit illustrating the right turn followed by U-turn path of a passenger vehicle is provided with the 1st Review Comment Responses in **Appendix A**.

- From an operational standpoint, a roundabout is not out of the question dismissible based solely on the roundabout appropriateness benchmarks outlined in the City's Design Standards and Policies Manual (DSPM). Accordingly, a couple of geometric design concepts for converting this intersection to a roundabout have been prepared for consideration by the City and the CORE CENTER developer from a broader context. Further discussion of this alternative can be found in the *Traffic Impact and Improvements Analysis* section of this report, and exhibits illustrating each of the two roundabout design concepts prepared for the City's and applicant's consideration are provided with the 1st Review Comment Responses in **Appendix A**.

- Signalization is the most viable alternative of those considered.
  - Traffic volumes at this intersection already satisfy peak-hour warrant threshold volumes 3-4 hours a day, four-hour warrant threshold volumes 3-7 hours a day, and 8-hour warrant threshold volumes 3-8 hours a day depending in each case on whether the southbound approach is considered "one lane" as it is functioning today or, two lane, as it could be restriped to effect and depending further on how much right turn volume is deducted from the total minor approach volume before the threshold volume comparison is made.

- With the addition of CARMAX traffic to the southbound approach (traffic that did not exist when the traffic count data was collective for this analysis, but has since taken over the 4-acre previously vacant site on the northwest corner of the intersection) and the CORE CENTER traffic to the northbound approach, we fully anticipate peak hour and four hour warrants being fully satisfied, even with a significant percentage of right turn volume discounting. We further anticipate that eight-hour warrant threshold volumes will be satisfied at least four hours a day and as many as eight hours a day by the time CORE CENTER is fully built out and leased.

- Based on intersection capacity and LOS analysis performed using the City's signal phasing and timing, it is reasonable to expect the City will continue to give priority to through traffic on Hayden Road over turning movement traffic on intersecting side street and driveway approaches and that, as such, signalizing this intersection is not going to eliminate long delays for traffic wanting to turn left onto Hayden Road from 84th Street during peak hours; it should however, facilitate significantly shorter average delays to side street traffic than would leaving the existing stop sign control in place.

- Based on the understanding that the City is planning to convert the Hayden/Raintree intersection to a roundabout in the not too distant future, there will be an approximately one-mile stretch of Hayden Road with continuous flow endpoint intersections and either one or two signalized intersections in between. It seems therefore that the significance of the quarter-mile spacing of this signal from the 83rd Place and Hayden Road signal may not be as significant as it would be along a longer stretch of arterial with regularly spaced signals.

EXISTING CONDITIONS

- All intersections considered in this analysis currently operate with an overall level of service LOS D or better during both peak hours. The following intersections have one or more approaches operating with levels of service LOS E or LOS F.

    - The southbound left turn at the signalized intersection of **83rd Place and Hayden Road** operates at LOS E during the AM peak hour and LOS D/E during the PM peak hour. This is due primarily to a combination of a long cycle length (120 seconds), lack of a protected left turn phase for this movement (although there is one for the northbound left turn movement), and the traffic signals along Hayden Road appropriately favoring through traffic on Hayden Road over minor street approach traffic. Based on generally accepted left turn phase warranting criteria, (related to the product of left turn volumes on the subject approach and conflicting volumes on the opposite approach) a separate left turn phase is not yet warranted. CORE CENTER is not expected to add any volume to the southbound approach to this intersection. Being as the City has already recognized the need for and added separate left turn phasing for the northbound approach that when and if the City determines the

southbound approach needs protected left turn phasing as well, the City will make the change.

- The southbound movements at the unsignalized intersection of 84th Street and Hayden Road operate at LOS F during the PM peak hour. This is partly due to the centerline only striping on the north leg/southbound approach, even though 84th Street is wide enough to provide two southbound lanes while leaving a single, relatively wide northbound lane for traffic turning north onto 84th Street from Hayden Road, much of which is single unit truck traffic. It is therefore recommended that the southbound approach be restriped to designate an exclusive southbound left turn lane and a shared southbound through/right turn lane. Being as southbound through traffic is almost non-existent during most hours of the day, the shared lane will function like a right turn only lane which could at least reduce delays experienced by southbound right turn traffic.

- It will take more than restriping to cause more than a marginal improvement in level of service for southbound 84th Street traffic wanting to turn left onto Hayden Road. The larger cause of delay for traffic making these movements is the infrequency of adequate gaps in Hayden Road traffic during the PM peak hour due to the continuous westbound traffic flow effect of Hayden/Northsight roundabout. Signalizing the intersection is one option; however not the recommended option for the existing condition as, while under the current lane configuration on the southbound approach, existing volumes satisfy as many as three volume-based traffic signal warrants, they would satisfy fewer warrants under the recommended two-lane approach described above. Therefore, **restriping the southbound approach is the only recommended mitigation for existing traffic conditions at this intersection.**

- At the signalized intersection of Hayden Road and Frank Lloyd Wright Boulevard, eastbound left turns, northbound left turns and southbound left turns movements all operate in the LOS E range during one or both peak hours. This is to be expected at a large, very busy intersection that is located within 700 feet of a very busy traffic interchange. Recognizing that the City can monitor and adjust the allocation of green time at this intersection remotely and in near real time as needed to maximize its efficiency, and that analysis results do not indicate that traffic at this intersection is queuing back to the point that it is interfering with traffic operations at other intersections, no further mitigation is recommended.

OPENING YEAR CONDITIONS

- The proposed development is expected to have very little impact on capacity, level of service or delay at any study area intersection except for the intersection of 84th Street and Hayden Road.

- The southbound left turn at the signalized intersection of 83rd Place and Hayden Road will continue to operate at LOS E during the AM peak hour and LOS D/E during the PM peak hour until and unless signal timing is adjusted and/or a protected phase for southbound left turn

movements is added to the signal operation; however there is no indication either of these measures will become warranted in the context of the City's overall objectives for this intersection by the addition of CORE CENTER traffic to the area.

- The southbound movements at the unsignalized intersection of **84th Street and Hayden Road** will continue to operate at LOS E or LOS F during the PM peak hour without an alternate form of traffic control to the existing stop sign control on northbound and southbound approaches. A comprehensive assessment of four intersection traffic control alternatives – (1) retaining the two-way stop control, (2) adding turn restrictions to eliminate outbound left turn movements at the CORE SCOTTSDALE/CORE CENTER driveway, (3) converting the intersection to a roundabout and (4) signalizing the intersection, indicate that **signalization is most appropriate alternative for the post-development condition.** Regardless of which of these alternatives is ultimately pursued, restriping of both northbound and southbound approaches to the intersection will be needed. In the course of working with the applicant's civil engineer and site architect, curb line and striping geometry has been developed that will facilitate though and left turn lane alignment across 84th Street under either a full movement, two-way stop sign controlled (not recommended) or, signal controlled scenario. The recommended geometry is reflected on the current site plan.

- The proposed widening of the 84th Street aligning CORE SCOTTSDALE/CORE CENTER driveway will cut into the existing right turn deceleration lane on the eastbound approach to this driveway such that the resultant striped portion of the turn lane will be approximately 84 feet, less than the City's standard turn lane length minimum of 100 feet. However, the approach taper portion of the existing turn lane is approximately 120 feet long, 30 feet longer than the City's standard 90 foot-long taper for a 40-50 mph posted speed condition per City of Scottsdale (COS) Standard Detail 2225, and the existing turn lane adjacent to the turn lane stipe is approximately 12 feet wide (a foot wider than the City's 11 foot-wide standard. This being the case, the length of that portion of the turn lane that will remain after the widening of the CORE SCOTTSDALE/CORE CENTER driveway that is at least 11 feet wide, clear of the adjacent through lane will be well over 100 feet long, meaning that no extension of the turn lane will be necessary to comply with the critical elements of the City's turn lane standards.

- The northwest-bound (Northsight Boulevard) approach of the roundabout at Northsight Boulevard and Hayden Road is expected to operate at LOS E during the PM peak hour in the opening year with the Project. with a volume to capacity ratio (V/C) of 0.89 for the northbound left turn movement. This intersection operates efficiently during most hours of the day and the surrounding area is largely built out so no mitigation is recommended for the opening year condition.

INTRODUCTION

CORE CENTER is an approximately 194,000-square foot mixed-use (restaurant/retail/office) development project proposed for a 6.62-acre parcel located along the southeast side of Hayden Road, between 83rd Way and Northsight Boulevard in Scottsdale Arizona. A vicinity map identifying the site from both a regional and local (roadway network) context is provided in **Figure 1.** The subject property, originally developed as an auto dealership (which has since been razed) was more recently proposed in conjunction with plans for the now developed (multi-family residential) parcel to the south, as the relocation site for Impact Church. The previously proposed ("Hayden One") development plan was approved by the City in 2014.

Two existing driveways will provide access to CORE CENTER; a full movement driveway located directly across from 84th Street and a right in/right out only driveway located approximately 350 feet east of 84th Street. The 84th Street driveway currently serves as the only point of access for the adjacent multi-family development; ultimately CORE CENTER and the multi-family developments will share both driveways.

STUDY REQUIREMENTS

Since a full Traffic Impact and Mitigation Analysis (TIMA) of developing the project site and adjacent multi-family parcel in accordance with the Hayden One development plan has already been performed by CivTech and approved by the City (as part of the above-referenced 2014 approval), the City has not asked that a full TIMA be performed for the CORE CENTER development proposal. Instead the City has indicated a less comprehensive analysis document (report) will satisfy the TIMA requirements for this project. Specifically, the City has asked that the analysis include a trip generation comparison between the Hayden One and CORE CENTER development plans, and that it address anticipated impacts of the CORE CENTER project on capacity and level of service (LOS) at each of the two proposed site access points and at the nearby roundabout intersection of Hayden Road and Northsight Boulevard. Consistent with the Hayden One TIMA, this report addresses the traffic impacts of the proposed development on weekday traffic conditions.

The specific objectives of the study are:

- To quantify the trip generation potential of the CORE CENTER project and compare that potential to what the Project site would have generated if developed to serve as the relocated site of Impact Church as previously proposed.
- To determine whether the existing street system and traffic controls within the study area are adequate to accommodate existing peak hour traffic demands and if and significant deficiencies are identified, to recommend potentially viable mitigation measures.
- To determine whether the existing street system and traffic controls within the study area are adequate to accommodate the increase in traffic that will be caused by the CORE CENTER development.
- and if and significant deficiencies are identified, to recommend potentially viable mitigation measures.

STUDY AREA

The study area generally extends along Hayden Road, from 83rd Place to the southwest to Frank Lloyd Wright Boulevard to the northeast. The following specific intersections along Hayden Road have been analyzed for this report:

- 83rd Place & Hayden Road
- 83rd Way/Costco Driveway & Hayden Road
- 84th Street & Hayden Road
- Project Site Northeast Access & Hayden Road
- Burger King Driveway & Hayden Road
- Northsight Boulevard & Hayden Road
- Hayden Road & Frank Lloyd Wright Boulevard

HORIZON YEAR

The horizon year considered in this analysis is the anticipated opening year of the project, 2020. For the purposes of this analysis, it was assumed that full buildout and occupancy of the CORE CENTER project could be reached in the opening year.

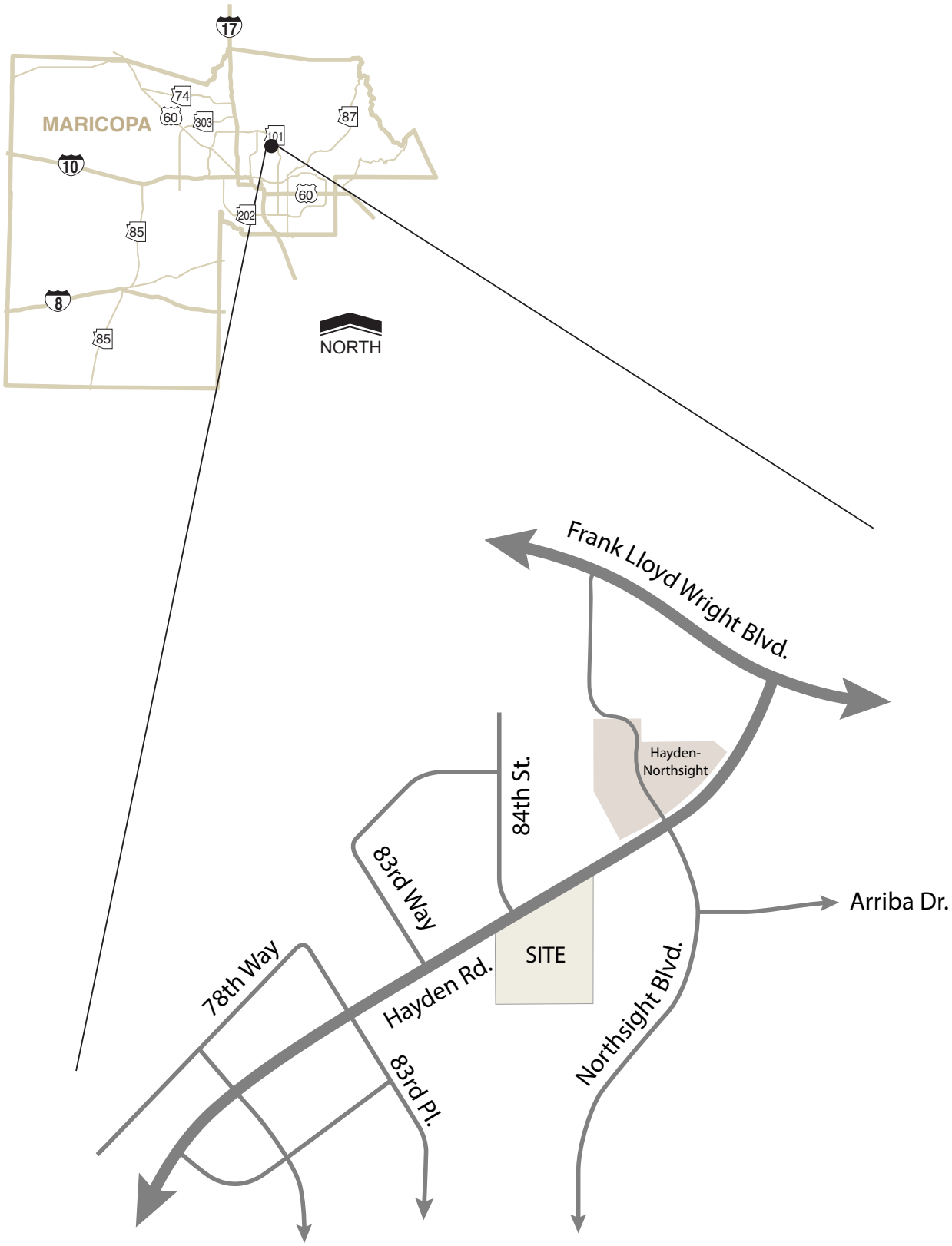


Figure 1: Vicinity Map

EXISTING CONDITIONS

LAND USE

The Project site is currently vacant of any vertical development. The off-site portions of both proposed site access drives have already been constructed. The on-site portion of the main access drive is largely complete all the way south to the adjacent multi-family parcel and currently serves as the only access for that (CORE SCOTTSDALE apartments) development. In addition to the apartments which were recently developed on the property to the south, land use in the immediately surrounding area includes a Home Depot store and a Burger King restaurant directly to the east, a Costco store directly to the west, and a U-Haul Center and other auto related uses along 84th Street across Hayden Road to the north. The Scottsdale Municipal Airport is located approximately 0.3 miles northwest of the site. The Loop 101/Frank Lloyd Wright traffic interchange is located approximately 0.6 mile (travel distance) to the northeast

EXISTING ROADWAY NETWORK

The existing roadway network within the study area includes Hayden Road, 83rd Place, 83rd Way, 84th Street, Northsight Boulevard and Frank Lloyd Wright Boulevard.

Hayden Road is a minor arterial street that runs generally north-south except in the vicinity of the Scottsdale airport (and the Project site) where it takes on an airport runway paralleling southwest-northeast alignment. Within the City of Scottsdale, Hayden Road is continuous from McKellips Road (on its true/80th Street alignment) to the south side of Frank Lloyd Wright Boulevard, on approximately the 87th Street alignment. Hayden Road picks up again on its true alignment on the north side of Frank Lloyd Wright Boulevard at the Greenway-Hayden Loop/Frank Lloyd Wright intersection and continues north continuously to just past Pinnacle Peak Road. Through the Scottsdale Airpark area, Hayden Road provides two vehicle lanes in each direction separated by a raised center median and sidewalk varying in width from six to eight feet along both sides. There are no bike lanes along this segment. The posted speed limit on Hayden Road within the vicinity of the site is 45 miles per hour (mph) and the current average daily traffic (ADT) volume in the immediate vicinity of 84th Street is approximately 18,900 vehicles per day.

83rd Way/Costco Driveway is a generally north-south local roadway within the vicinity of the site. Northwest of Hayden Road, there is one lane in each direction of travel, southeast of Hayden Road is a right-in/right-out driveway to Costco. 83rd Way begins northeast of Hayden Road at the intersection of 84th Street and continues southwest until transitioning to southeast and terminating at the intersection with Hayden Road. The posted speed limit is 25 mph. Current ADT count data for 83rd Way was not available at the time of this analysis.

83rd Place is a northwest-southeast local roadway within the vicinity of the site. Northwest of Hayden Road, there is one lane in each direction of travel, southeast of Hayden Road there is one lane in each direction of travel separated by a two-way-left-turn lane (TWLTL). 83rd Place begins northwest of Hayden Road and continues southeast until terminating just south of Raintree Drive. There is no posted speed limit on 83rd Place. Current ADT count data for 83rd Place was not available at the time of this analysis.

84th Street is a north-south local roadway within the vicinity of the site. There is one lane in each direction of travel. 84th Street begins at the existing apartment complex, located on the parcel of land bordering the proposed site to the south, and continues north for approximately 0.33 miles before terminating at a cul-de-sac just north of 83rd Way. There is no posted speed limit on 84th Street. Prior to the occupancy of the property on the northwest corner of the intersection of 84th Street and Hayden Road by CARMAX, 84th Street was carrying about 1700 vehicles per day. It is anticipated that with the move in of CARMAX, the ADT will rise to about 2,000 vehicles per day.

Northsight Boulevard is a generally north-south roadway classified as a major collector by the City of Scottsdale. North of Hayden Road, there is one lane in each direction of travel separated by a raised median in some locations and a painted median/two-way left turn lane in others. This segment of road provides a bypass for vehicles wanting to head west on Frank Lloyd Wright Boulevard while avoiding the congestion of the intersection of Hayden Road and Frank Lloyd Wright Boulevard. South of Hayden Road, there are two lanes and a bike lane in each direction of travel separated by a raised median. Northsight Boulevard begins at the intersection with Frank Lloyd Wright Boulevard and continues south until transitioning into Thunderbird Road, an east-west minor arterial roadway. The posted speed limit is 40 mph. Current ADT count data for this segment of Northsight Boulevard was not available at the time of this analysis.

Frank Lloyd Wright Boulevard is a generally east-west roadway classified as a major arterial by the City of Scottsdale. There are three lanes in each direction of travel separated by a raised median. Within the City of Scottsdale, Frank Lloyd Wright Boulevard begins at the intersection with Scottsdale Road and continues east until transitioning into 114th Street just north of Shea Boulevard. The posted speed limit is 45 mph. Current ADT count data for this segment of Frank Lloyd Wright Boulevard was not available at the time of this analysis.

EXISTING INTERSECTION CONFIGURATIONS

The intersection of **83rd Place and Hayden Road** is a four-legged signalized intersection with permissive-protected phasing on the northbound approach and permissive phasing on the southbound, eastbound and westbound approaches. Hayden Road is considered the east/west road at this intersection for the purposes of this analysis. The northbound approach consists of a dedicated left turn lane, one through lane and a dedicated right turn lane. The eastbound and westbound approaches each consist of a dedicated left turn lane, one through lane and a shared through/right turn lane. The southbound approach consists of a dedicated left turn lane and a shared through/right turn lane. There are pedestrian crosswalks across all legs of the intersection.

The intersection of **Costco Driveway and Hayden Road** is a four-legged unsignalized intersection with stop sign controls on the northbound and southbound approaches; Hayden Road is considered the east/west road for the purposes of this analysis. The northbound approach consists of a dedicated right turn lane and a sign stating that left turns (onto westbound Hayden Road) are prohibited. Exiting Costco traffic has the option of exiting/turning right onto northbound 83rd Place and turning left with the help of a protected left turn phase at the signalized intersection of 83rd Place and Hayden Road. The westbound approach consists of a dedicated left turn lane, one through lane and one shared through/right turn lane. The southbound approach consists of one shared left

turn/through/right turn lane. The eastbound approach consists of one dedicated left turn lane, two through lanes and a dedicated right turn deceleration lane.

The intersection of **84th Street and Hayden Road** is a four-legged unsignalized intersection with stop sign controls on the northbound and southbound approaches; Hayden Road is considered the east/west road for the purposes of this analysis. The northbound approach consists of a dedicated left turn lane and a shared through/right turn lane. The westbound approach consists of a dedicated left turn lane, one through lane and one shared through/right turn lane. The southbound approach consists of a wide shared left turn/through/right turn lane. The eastbound approach consists of a dedicated left turn lane, two through lanes and a dedicated right turn deceleration lane.

The intersection of **Northeast Access and Hayden Road** is a three-legged unsignalized intersection with a stop sign control on the northbound approach; Hayden Road is considered the east/west road. The northbound approach consists of a dedicated right turn lane. The westbound approach consists of two through lanes. The eastbound approach consists of two through lanes and a dedicated right turn deceleration lane.

The intersection of **Burger King Driveway and Hayden Road** is a four-legged unsignalized intersection with stop sign controls on the northbound and southbound approaches; Hayden Road is considered the east/west road for the purposes of this analysis. The northbound and southbound approaches each consist of one shared left turn/through/right turn lane. The eastbound and westbound approaches each consist of a dedicated left turn lane, two through lanes and a dedicated right turn lane.

The intersection of **Northsight Boulevard and Hayden Road** is a four-legged yield-controlled roundabout; Hayden Road is the east/west road. The northbound approach consists of a shared left turn/through lane and a dedicated right turn lane. The eastbound and westbound approaches each consist of a shared left turn/through lane and a shared through/right turn lane. The southbound approach consists of one shared left turn/through/right turn lane. There are two-stage (and in the case of the south leg, three-stage) pedestrian crosswalks across all legs of the intersection.

The intersection of **Hayden Road and Frank Lloyd Wright Boulevard** is a four-legged signalized intersection with protected left turns on the eastbound and westbound approaches and split phasing on the northbound and southbound approaches; Hayden Road is the north/south road. The northbound approach consists of one dedicated left turn lane, one shared left turn/through lane and one dedicated right turn lane. The westbound approach consists of dual left turn lanes, three through lanes and a dedicated right turn lane. The southbound approach consists of a dedicated left turn lane and a shared through/right turn lane. The eastbound approach consists of a dedicated left turn lane, three through lanes and a dedicated right turn lane. There are pedestrian crosswalks across all legs of the intersection.

The existing intersection lane configurations and traffic controls are illustrated in **Figure 2**.

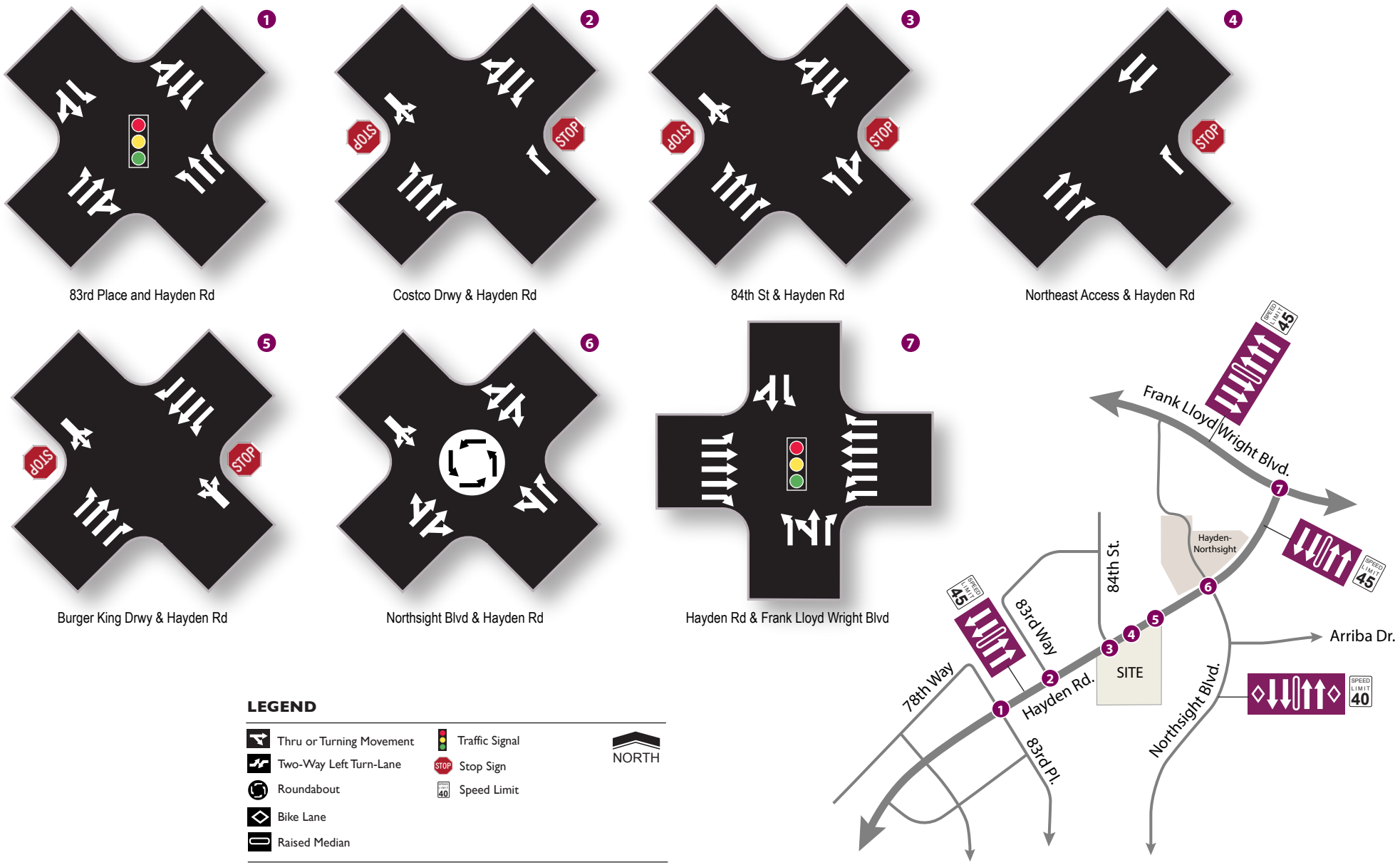
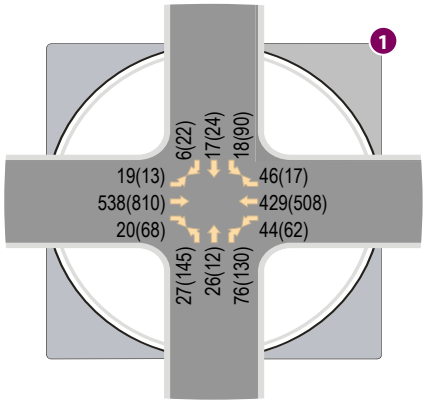


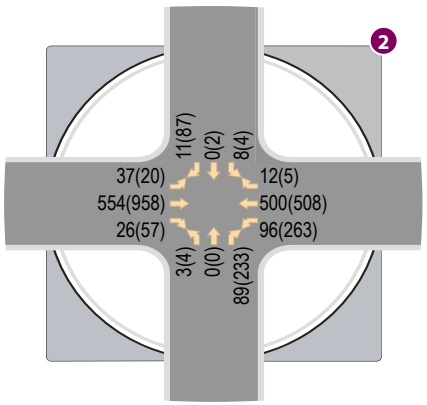
Figure 2: Existing Lane Configurations and Traffic Controls

EXISTING TRAFFIC VOLUMES

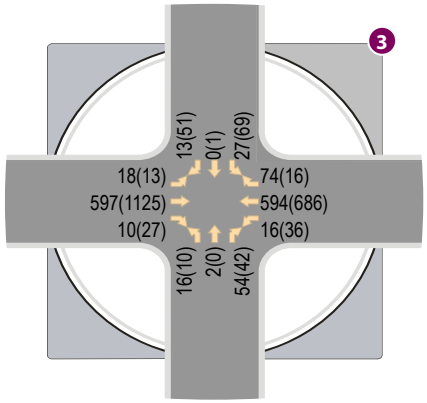
CivTech engaged Field Data Services of Arizona, Inc. to record peak hour traffic volumes at each of the study intersections and 24-hour approach volumes at the intersection of 84th Street and Hayden Road. Peak hour volume turning movement counts were recorded from 7:00-9:00 AM and 4:00-6:00 PM on Tuesday, April 2, 2019. The approach counts were recorded on Thursday, April 25, 2019. The existing total daily two-way traffic volume on Hayden Road at 84th Street is approximately 18,700 vehicles per day, generally consistent with what the City recorded in 2016, per the City's periodically published segment traffic count map. The existing two-way traffic count on 84th Street north of Hayden Road is approximately 1,750 vehicles per day and the existing two-way traffic volume on the south leg of the 84th Street and Hayden Road accessing the CORE SCOTTSDALE apartment complex is approximately 1,300 vehicles per day. Existing peak hour traffic volumes are presented in **Figure 3** for the weekday AM and PM peak hours. Raw traffic count data sheets for both the peak hour and 24-hour counts are included in **Appendix B**.



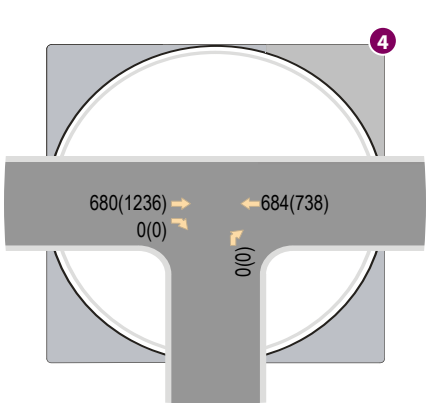
83rd Place and Hayden Rd



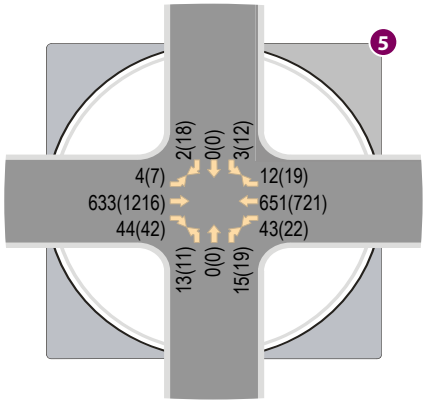
Costco Drwy & Hayden Rd



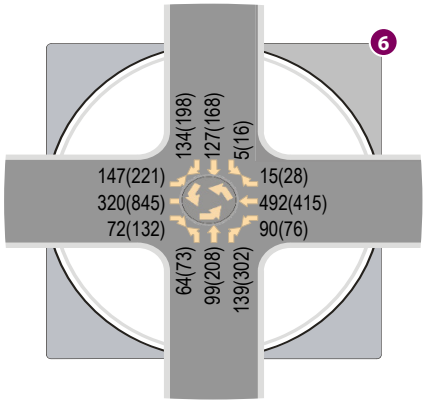
84th St & Hayden Rd



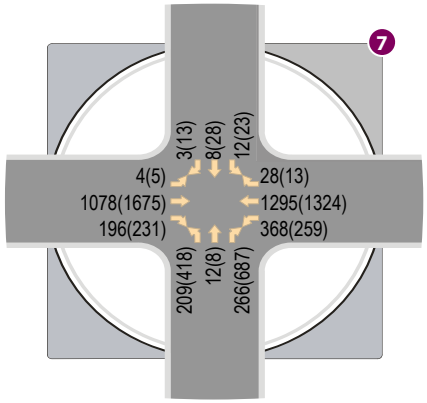
Northeast Access & Hayden Rd



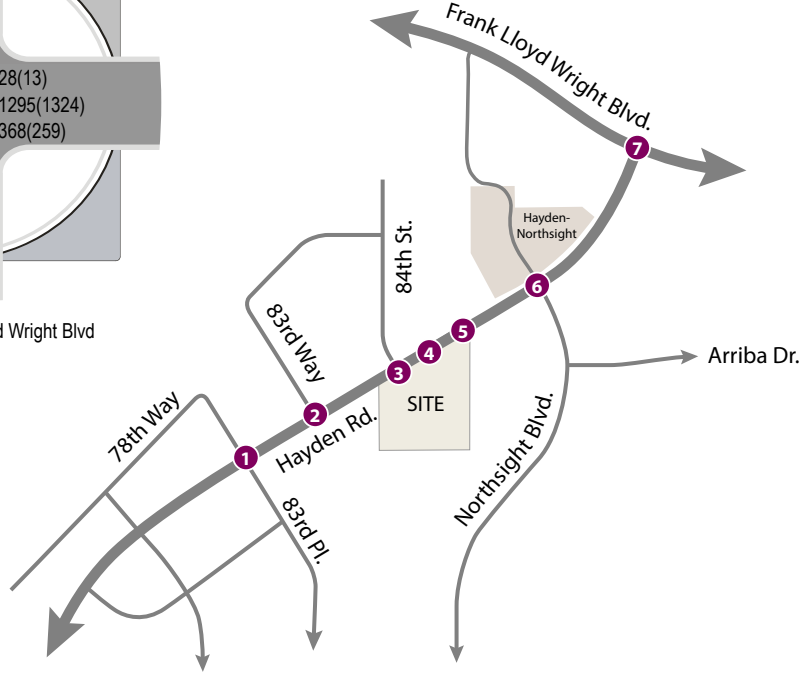
Burger King Drwy & Hayden Rd



Northsight Blvd & Hayden Rd



Hayden Rd & Frank Lloyd Wright Blvd



LEGEND

NORTH

XX(XX) - AM(PM) Peak Hour Traffic Volumes

Figure 3: Existing Traffic Volumes

EXISTING LEVEL OF SERVICE ANALYSIS

Peak hour level of service analysis has been performed for the study intersections based on existing intersection lane configuration and using existing traffic volumes. All intersections have been analyzed using the methodologies presented in the *Highway Capacity Manual (HCM), Special Report 209,* and Updated 2016 and using Synchro software, version 10.0 under the HCM 6th edition methodology.

The concept of level of service (LOS) uses qualitative measures that characterize operational conditions within the traffic stream. The individual levels of service are described by factors that include speed, travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations A through F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions. Levels of service for intersections are defined in terms of delay ranges. **Table 1** lists the level of service criteria for signalized and unsignalized intersections, respectively.

Table 1 – Level of Service Criteria for Controlled Intersections

Level-of-Service	Unsignalized Control Delay (sec/veh)	Signalized Control Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80 (or v/c > 1)	> 50 (or v/c > 1)

Source: Exhibits 19-8, 20-2, 21-8, and 22-8, Highway Capacity Manual 2017

Synchro 10.0 software calculates the LOS per HCM 2016 methodology. The 2016 HCM documents the signalized LOS calculation methodology which takes into account lane geometry, traffic volumes and cycle length/phasing to compute LOS. Synchro analysis worksheets report individual movement delay/LOS and overall delay/LOS for signalized intersections; unsignalized intersection worksheets report the worst-case delay/LOS and the average overall intersection delay. Signal timing for the two existing signalized intersections were obtained from the City of Scottsdale. Results of the existing level of service analyses are shown in **Table 2** for both AM and PM peak hours. The existing signal timing sheets and the existing conditions analysis worksheets have been included in **Appendix C**.

Table 2 – Existing Peak Hour Levels of Service (LOS)

ID	Intersection	Intersection Control	Approach/ Movement	Existing LOS AM (PM)	Mitigated LOS AM (PM)
1	83rd Place & Hayden Road	Signal	NB SB EB WB	D (D) E (D) A (A) A (A)	[Not Mitigated]
			Overall	**A (B)**	
2	Costco Driveway & Hayden Road	2-way stop (NB/SB)	NB Right SB Shared EB Left WB Left	B (C) C (A) A (A) A (C)	[Not Mitigated]
3	84th Street & Hayden Road	2-way stop (NB/SB)	NB Left NB Thru/Right SB Shared SB Left SB Thru/Right EB Left WB Left	C (E) B (C) C (F) - (-) - (-) A (A) A (B)	C (E) B (C) - (-) C (F) B (B) A (A) A (B)
4	Northeast Access & Hayden Road	1-way stop (NB)	NB Right	- (-)	[Not Mitigated]
5	Burger King Driveway & Hayden Road	2-way stop (NB/SB)	NB Shared SB Shared EB Left WB Left	B (D) C (C) A (A) A (B)	[Not Mitigated]
6	Northsight Boulevard & Hayden Road	Roundabout	NB SB EB WB	A (C) B (B) A (B) A (A)	[Not Mitigated]
			Overall	**A (B)**	
7	Hayden Road & Frank Lloyd Wright Boulevard	Signal	NB SB EB WB	D (D) E (E) E (D) C (C)	[Not Mitigated]
			Overall	**D (D)**	

The results of the existing conditions analysis summarized in **Table 2** indicates that all intersections operate with an overall level of service LOS D or better. The following intersections have one or more approaches operating with levels of service LOS E or LOS F.

- The southbound left turn at the signalized intersection of **83rd Place and Hayden Road** operates at LOS E during the AM peak hour and LOS D/E during the PM peak hour. This is due primarily to a combination of a long cycle length (120 seconds), lack of a protected left turn phase for this movement (although there is one for the northbound left turn movement), and the traffic signals along Hayden Road appropriately favoring through traffic on Hayden Road over minor street approach traffic. Based on generally accepted left turn phase warranting criteria, (related to the product of left turn volumes on the subject approach and

conflicting volumes on the opposite approach) a separate left turn phase is not yet warranted. CORE CENTER is not expected to add any volume to the southbound approach to this intersection. Being as the City has already recognized the need for and added separate left turn phasing for the northbound approach that when and if the City determines the southbound approach needs protected left turn phasing as well, the City will make the change.

- The southbound movements at the unsignalized intersection of 84th Street and Hayden Road operate at LOS F during the PM peak hour. This is partly due to the centerline only striping on the north leg/southbound approach, even though 84th Street is wide enough to provide two southbound lanes while leaving a single, relatively wide northbound lane for traffic turning north onto 84th Street from Hayden Road, much of which is single unit truck traffic. It is therefore recommended that the southbound approach be restriped to designate an exclusive southbound left turn lane and a shared southbound through/right turn lane. Being as southbound through traffic is almost non-existent during most hours of the day, the shared lane will function like a right turn only lane which could at least reduce delays experienced by southbound right turn traffic.

- It will take more than restriping to cause more than a marginal improvement in level of service for southbound 84th Street traffic wanting to turn left onto Hayden Road. The larger cause of delay for traffic making these movements is the infrequency of adequate gaps in Hayden Road traffic during the PM peak hour due to the continuous westbound traffic flow effect of Hayden/Northsight roundabout. Signalizing the intersection is one option; however not the recommended option for the existing condition as, while under the current lane configuration on the southbound approach, existing volumes satisfy as many as three volume-based traffic signal warrants, they would satisfy fewer warrants under the recommended two-lane approach described above. Therefore, restriping the southbound approach is the only recommended mitigation for existing traffic conditions at this intersection.

- At the signalized intersection of Hayden Road and Frank Lloyd Wright Boulevard, eastbound left turns, northbound left turns and southbound left turns movements all operate in the LOS E range during one or both peak hours. This is to be expected at a large, very busy intersection that is located within 700 feet of a very busy traffic interchange. Recognizing that the City can monitor and adjust the allocation of green time at this intersection remotely and in near real time as needed to maximize its efficiency, and that analysis results do not indicate that traffic at this intersection is queuing back to the point that it is interfering with traffic operations at other intersections, no further mitigation is recommended.

TRAFFIC SIGNAL WARRANT ANALYSIS

A traffic signal warrant analysis was performed for the intersection of **84th Street and Hayden Road**. The analysis has considered existing conditions as determined though collection of hourly traffic count data on each of the four approaches to his intersection April 2019 (raw data for which is included in **Appendix B**), and future conditions, with and without the proposed development using projected traffic volumes indicated in Figure 7 and Figure 8, with some additional consideration being given to the impact that the occupancy by CARMAX of the four-acre parcel on the northwest corner of the intersection will have on southbound approach traffic volumes. The traffic signal warrant

analysis was performed in accordance with standard traffic signal warranting criteria found in the *Manual on Uniform Traffic Control Devices, 2009 Edition* (MUTCD). The MUTCD describes eight conditions under which a traffic signal might be warranted, designated Warrants 1 through 8, and indicates that, "The investigation of the need for a traffic control signal shall include an analysis of the applicable factors contained in the [eight] traffic signal warrants and other factors related to existing operation and safety at the study location" while cautioning that, "The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal."

The MUTCD suggests that traffic control signals should not be installed unless one or more of the signal warrants are met. However, the satisfaction of a warrant or warrants is not in itself justification for a signal. Every situation is unique and warrant guidelines must be supplemented by the effects of specific site conditions and the application of good engineering judgment. Installation of a traffic signal should improve the overall safety and/or operation of an intersection and should be considered only when deemed necessary by careful traffic analysis and after less restrictive solutions have been attempted. It was this criterion to which the anticipated approach traffic volumes at the one (1) study intersection were compared to determine whether or not a traffic signal is currently warranted.

Warrant 1: Eight-Hour Vehicular Volume

The Eight-Hour Vehicular Volume Warrant is intended for locations where either of the following two conditions, or a combination of both, exist for each of any 8 hours of an average day and is, thus, the principal reason to consider the installation of a traffic signal: a large volume of intersecting traffic or traffic volumes so heavy on the major street that entering vehicles suffer extensive delay or conflict.

Condition A: Minimum Vehicular Volume

Condition A, the Minimum Vehicular Volume, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal. The need for a traffic control signal shall be considered if the vehicles per hour given in both of the 100 percent columns of Condition A in **Table 4C-1** of the MUTCD (reproduced below) occur on the major-street and the higher-volume minor-street approaches, respectively, to the intersection for each of any 8 hours of an average day.

Condition B: Interruption of Continuous Traffic

Condition B, the Interruption of Continuous Traffic, is intended for application at locations where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street. The need for a traffic control signal shall be considered if the vehicles per hour given in both of the 100 percent columns of Condition B in **Table 4C-1** of the MUTCD occur on the major-street and the higher-volume minor-street approaches, respectively, to the intersection for each of any 8 hours of an average day.

Combination of Conditions: A and B

The combination of Conditions A and B is intended for application at locations where Condition A is not satisfied and Condition B is not satisfied and should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the

traffic problems. The need for a traffic control signal shall be considered if the vehicles per hour given in both of the 80 percent columns of Conditions A and Condition B in **Table 4C-1** of the MUTCD occur on the major-street and the higher-volume minor-street approaches, respectively, to the intersection for each of any 8 hours of an average day.

Table 4C-1. Warrant 1: Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1.....	1.....	500	400	350	280	150	120	105	84
2 or more...	1.....	600	480	420	336	150	120	105	84
2 or more...	2 or more ...	600	480	420	336	200	160	140	112
1.....	2 or more ...	500	400	350	280	200	160	140	112
Condition B— Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1.....	1.....	750	600	525	420	75	60	53	42
2 or more...	1.....	900	720	630	504	75	60	53	42
2 or more...	2 or more ...	900	720	630	504	100	80	70	56
1.....	2 or more ...	750	600	525	420	100	80	70	56

[a] *Basic minimum hourly volume.*

[b] *Used for combination of Conditions A and B after adequate trial of other remedial measures.*

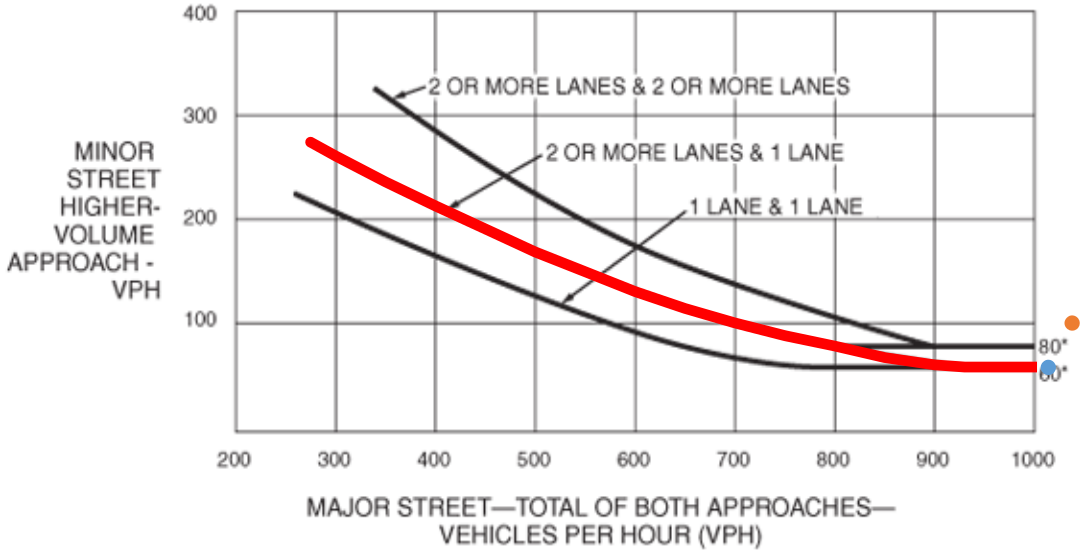
[c] *May be used when the major-street speed exceeds 70 km/h or exceeds 40 mph or in an isolated community with a population of less than 10,000.*

[d] *May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major- street speed exceeds 70 km/h or exceeds 40 mph or in an isolated community with a population of less than 10,000.*

Warrant 2: Four-Hour Vehicular Volume

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. The need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-2 (this and all other referenced figures are attached) for the existing combination of approach lanes.

Since the posted speed limit on Hayden Road exceeds 40 mph, Figure 4C-2 was used.

Warrant 3: Peak-Hour Vehicular Volume

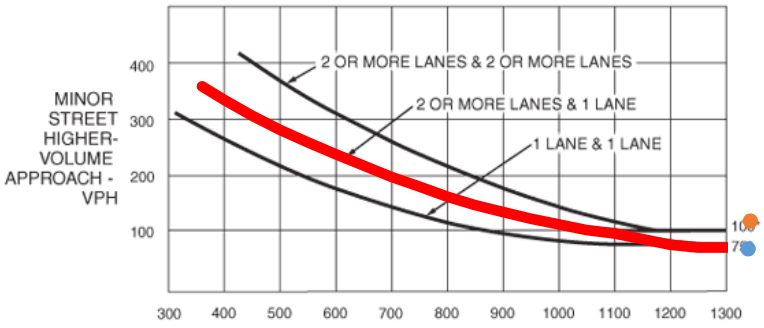
The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street. It shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:

A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:
   1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach; and
   2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; and
   3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 or 4C-4 for the existing combination of approach lanes.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

If the posted speed limit on the major street exceeds 40 mph, Figure 4C-4 may be used in place of Figure 4C-3 to satisfy the criteria in the second category of the Standard. Since the posted speed limit on Hayden Road is 45 mph, Figure 4C-4 was used for this analysis.

Signal warrant analyses results for the intersection of 84th Street and Hayden Road indicate that under the current shared single lane configuration on the southbound approach, existing volumes satisfy as many as three volume-based traffic signal warrants, depending on how much of the right turn traffic volume is reduced before the threshold volume comparisons are made, and that under a two-lane southbound approach the peak hour volume warrant is met even if a significant percentage of right turn traffic is deducted before the threshold volume comparison is made. Worksheets used for the signal warrant analysis are included in **Appendix D**.

PROPOSED DEVELOPMENT

LAND USE & LOCATION

CORE CENTER is a 194,000-square foot mixed-use (restaurant/retail/office) development project proposed for a 6.62-acre parcel located along the southeast side of Hayden Road, between 83rd Way and Northsight Boulevard in Scottsdale Arizona. The subject property, originally developed as an auto dealership (which has since been razed) was more recently proposed in conjunction with plans for the now developed (multi-family residential) parcel to the south, as the relocation site for Impact Church. The previously proposed ("Hayden One") development plan was approved by the City in 2014.

SITE ACCESS

Two existing driveways will provide access to CORE CENTER; a full movement driveway located directly across from 84th Street and a right in/right out only driveway located approximately 350 feet east of 84th Street. The 84th Street driveway currently serves as the only point of access for the adjacent multi-family development; ultimately CORE CENTER and the multi-family developments will share both driveways. A current site plane, updated since the first submittal of this report to recognize the need for alignment of lanes across Hayden Road at 84th Street and to improve internal circulation along the internal access drive leading to the more northeasterly (right in/right out only) driveway is presented in **Figure 4.**

Figure 4: Site Plan and Access

TRIP GENERATION COMPARISON

The City has asked that a weekday daily and peak hour trip generation comparison be made between old (Hayden One) and new (CORE CENTER) development plans. Since the adjacent multi-family development is effectively a component of both old and new development plans, and because its actual trip generation potential is accounted for in the existing traffic conditions analysis, this comparison focuses on the differences between the previously proposed church and the currently proposed office/retail/restaurant mix, exclusively. The Hayden One TIMA assumed that the subject 6.62 acres would be developed to create an 81,000 square foot church. The current, CORE CENTER development plan proposes a mix of commercial uses, comprised of approximately 124,000 SF of general office space, 35,000 SF of retail space and 35,000 SF of quality restaurant space.

The trip generation potential of the CORE CENTER project was estimated for this analysis utilizing the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10th Edition* and *Trip Generation Handbook, 3rd Edition*. The ITE *Trip Generation Manual* contains data collected by various transportation professionals for a wide range of different land uses. The data are summarized in the ITE Trip Generation Manual and average rates and equations have been established that correlate the relationship between an independent variable that describes the development size and generated trips for each recognized land use. The Manual provides information for estimating daily and peak hour trips. The Trip Generation Handbook provides guidance in accounting for pass-by trips; internally captured trips which are trips that begin and end on-site due to the captive market effect of complimentary land uses within a single development; and trips made using alternate modes of transportation. The trip generation potential of the Impact Church as it was presented in the Hayden One TIMA was estimated using earlier editions of these publications but for the purpose of this analysis which is to compare what is now proposed to what was previously approved, the estimates presented in the approved Hayden One TIMA will be used. **Table 3** compares the weekday daily and peak hour trip generation potentials of previously approved land use to those of the currently proposed land use. Detailed trip generation calculations are provided in **Appendix E**.

Table 3 – Weekday Trip Generation Comparison

Land Use	ITE Code	Size		Trips Generated						
				Daily	AM Peak Hour			PM Peak Hour		
		Quantity	Units	Total	In	Out	Total	In	Out	Total
Previously Approved (Hayden One) Development Plan										
Church	560	81,000	SF	738	29	17	46	22	23	45
Total External Vehicle Trips				**738**	**29**	**17**	**46**	**22**	**23**	**45**
Currently Proposed (CORE CENTER) Development Plan										
General Office	710	124,000	SF	1,308	123	20	143	22	118	140
Shopping Center	820	35,000	SF	1,322	20	13	33	64	69	133
Quality Restaurant	931	35,000	SF	2,934	22	4	26	183	90	273
Total Trips				5,564	165	37	202	269	277	546
Internal Capture Reduction				*(936)*	*(8)*	*(3)*	*(11)*	*(59)*	*(39)*	*(98)*
Alternate Mode Reduction				*(222)*	*(7)*	*(1)*	*(8)*	*(11)*	*(11)*	*(22)*
Total External Vehicle Trips				**4,406**	**150**	**33**	**183**	**199**	**227**	**426**
Trip Generation Increase /(Reduction)				***+3,668***	***+150***	***+16***	***+137***	***+177***	***+204***	***+381***

As summarized in **Table 3**, the previously proposed Impact Church component of the Hayden One development had the potential to generate approximately 738 external trips over the course of a typical weekday, with 46 of those trips occurring during the AM peak hour (29 in/17 out) and 45 occurring during the PM peak hour (22 in/23 out). The currently proposed CORE CENTER mixed-use development has the potential to generate up to 4,406 external trips over the course of a typical weekday, with 183 of those trips occurring during the AM peak hour (150 in/33 out) and 426 occurring during the PM peak hour (199 in/227 out). The CORE CENTER plan has the potential to generate 3,668 more external trips daily, 137 more external trips during the AM peak hour (150 more inbound/16 more outbound) and 381 more external trips during the PM peak hour (177 more inbound/ 204 more outbound).

SITE TRIP DISTRIBUTION AND ASSIGNMENT

A single trip distribution pattern was assumed for the proposed development. It is expected that the proposed development will generate trips based on future population. A small percentage of the trips were assumed to be going to/coming from the existing apartment complex just south of the proposed CORE CENTER mixed-use development. The resulting trip distribution percentages for the study area are shown in **Table 4**.

Table 4 – Site Trip Distribution

Direction (To/From)	Percentage
West on Frank Lloyd Wright Boulevard (west of Northsight Boulevard)	20%
East on Frank Lloyd Wright Boulevard (east of Hayden Road)	35%
South on Northsight Boulevard (south of Hayden Road)	15%
South on 84th Street (south of Hayden Road)	2%
West on Hayden Road (west of 83rd Place)	18%
South on 83rd Place (south of Hayden Road)	10%
Total	**100%**

Figure 5 illustrates the trip distribution percentages noted in **Table 4** on the roadway network within the study area. The percentages presented in **Figure 5** were applied to the site trips generated to determine the AM and PM peak hour site traffic at the intersections within the study area. **Figure 6** presents the resulting site generated traffic for the proposed development.

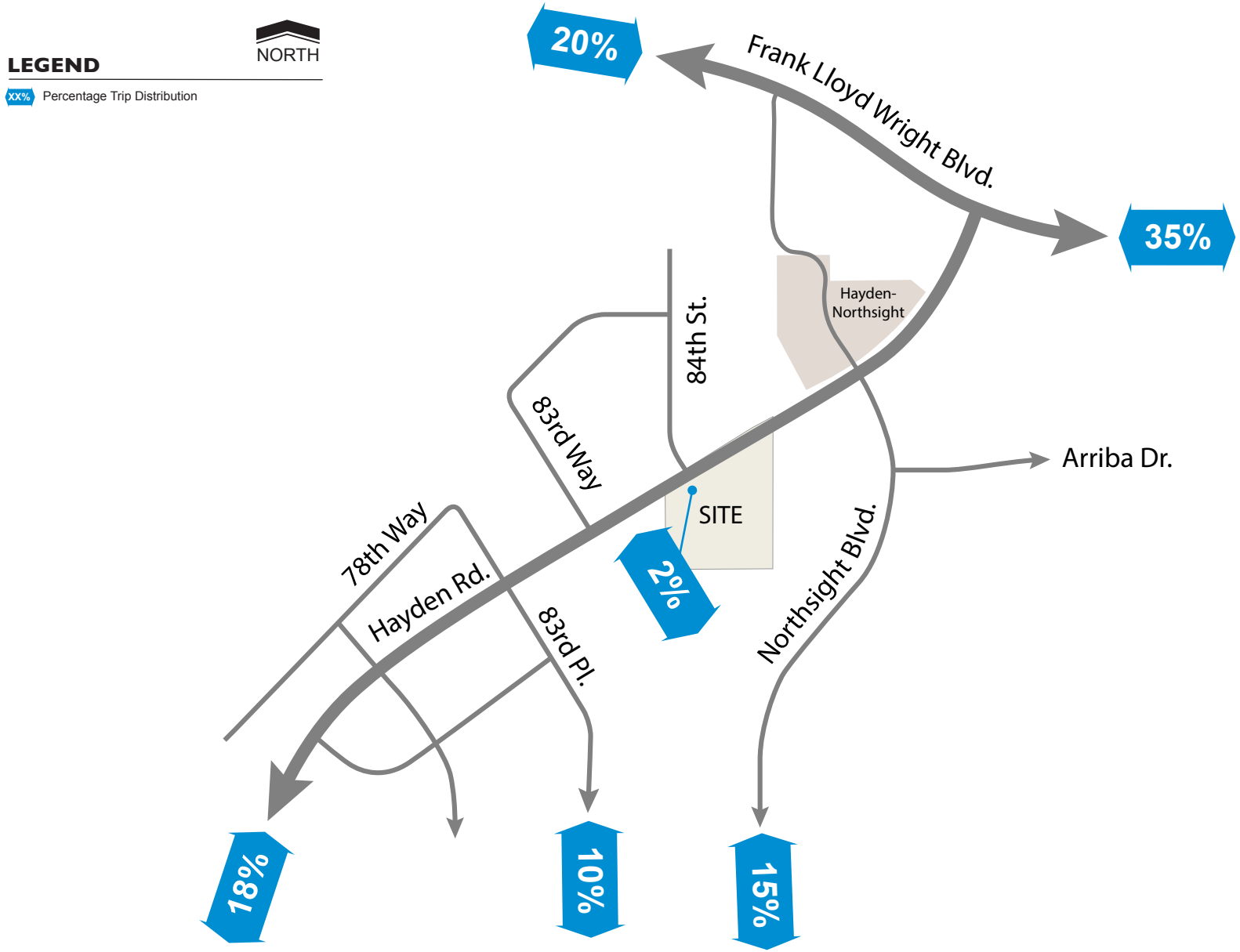
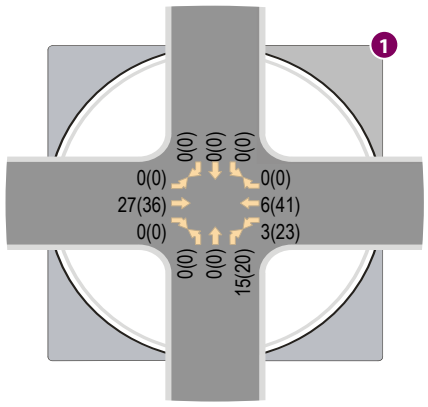
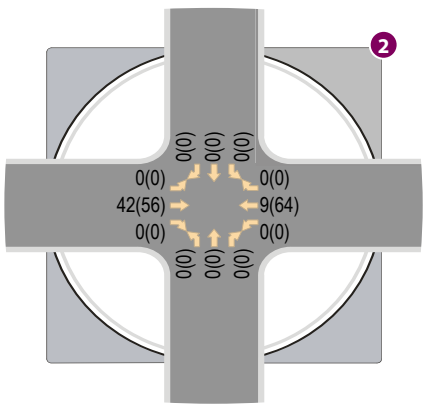


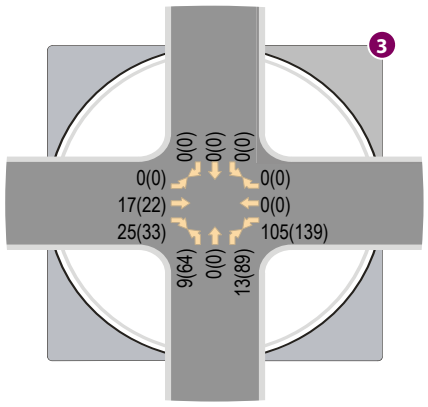
Figure 5: Trip Distribution



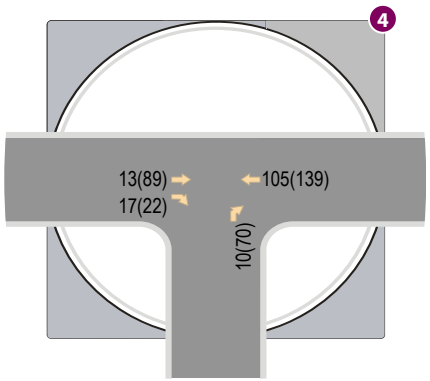
83rd Place and Hayden Rd



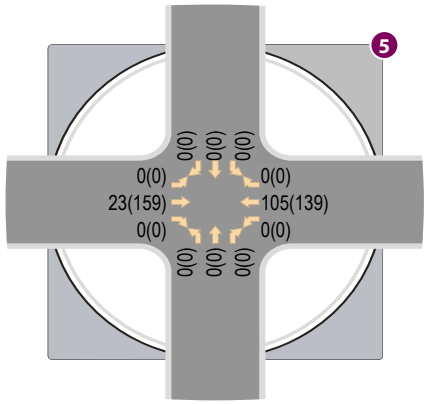
Costco Drwy & Hayden Rd



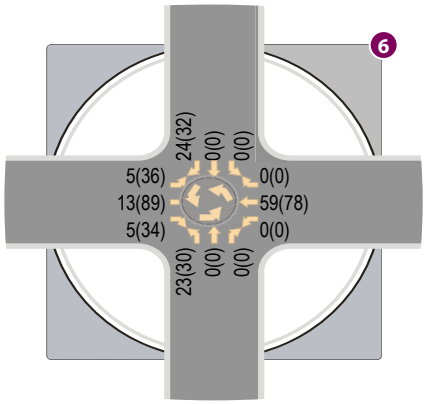
84th St & Hayden Rd



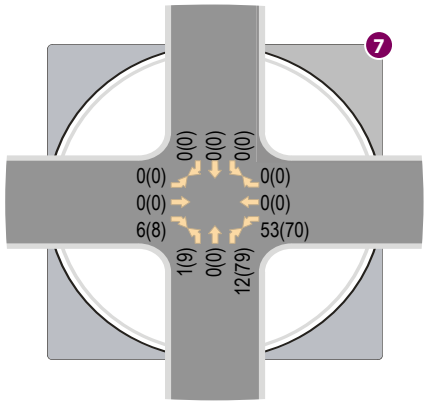
Northeast Access & Hayden Rd



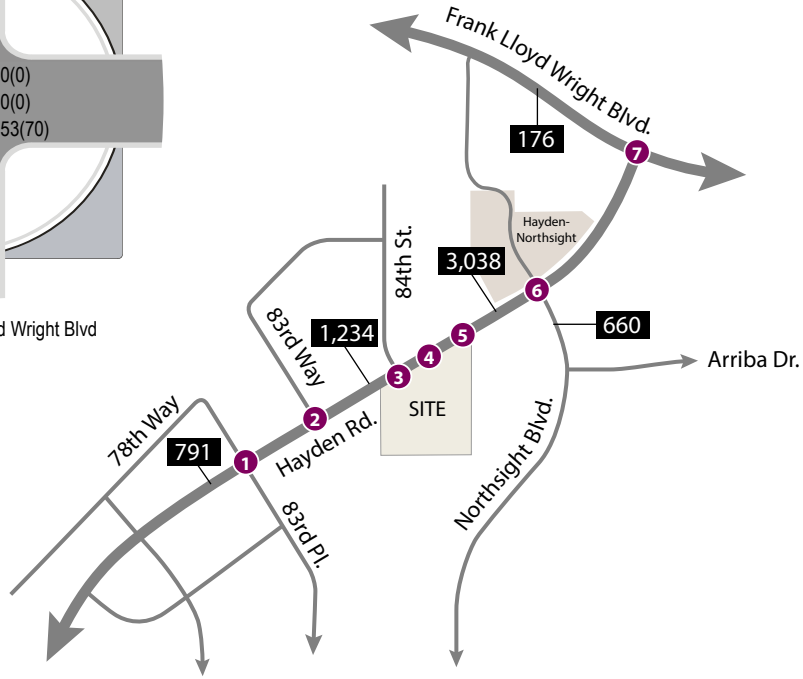
Burger King Drwy & Hayden Rd



Northsight Blvd & Hayden Rd



Hayden Rd & Frank Lloyd Wright Blvd



LEGEND

NORTH

XX(XX) - AM(PM) Peak Hour Traffic Volumes

660 Average Daily Traffic Volumes

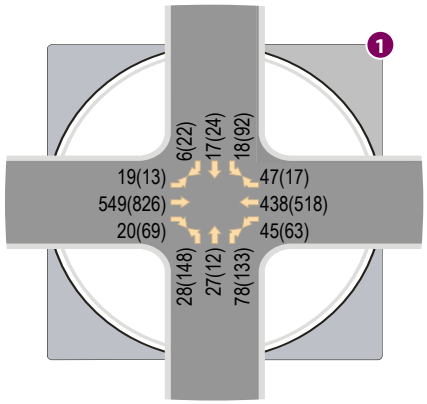
Figure 6: Site Generated Traffic Volumes

FUTURE BACKGROUND TRAFFIC

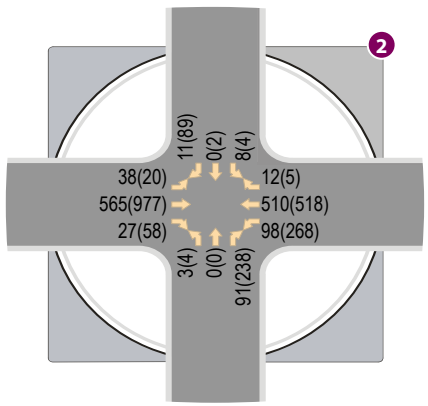
In order to estimate background traffic volumes, a growth rate was needed to estimate growth in ambient traffic, or traffic in the surrounding area not including new trips estimated to be generated by the site. A growth rate of 2% per year was found on Northsight Boulevard southeast of 87th Street. A 2% per year growth rate translates to a 1.02 growth factor for the opening year 2020. Along with growing the existing traffic counts, some of the existing northbound right turns at the 84th Street access point were re-routed to use the northeast right in/right out driveway since it can be reasonably assumed that some of the trips from the apartment will utilize this driveway to travel northeast on Hayden Road. Calculated background traffic volumes are presented in **Figure 7** and background traffic calculations are included in **Appendix F**.

TOTAL TRAFFIC

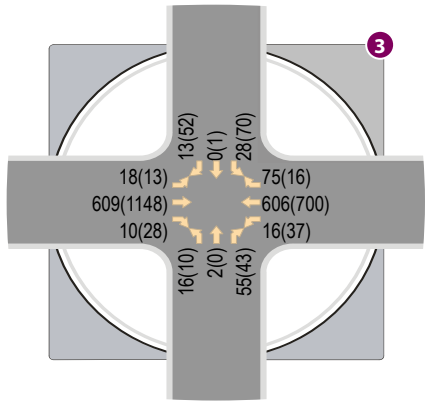
Total traffic was determined by adding the site generated traffic to the projected background traffic. Total peak hour traffic volumes for the opening year of 2020 are shown in **Figure 8**.



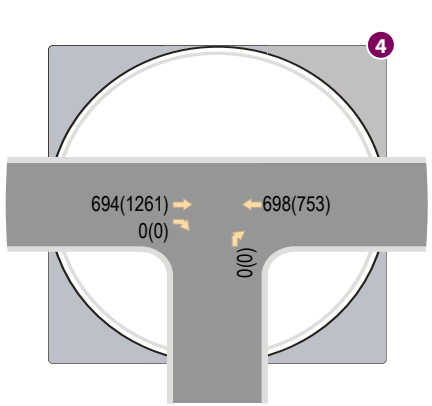
83rd Place and Hayden Rd



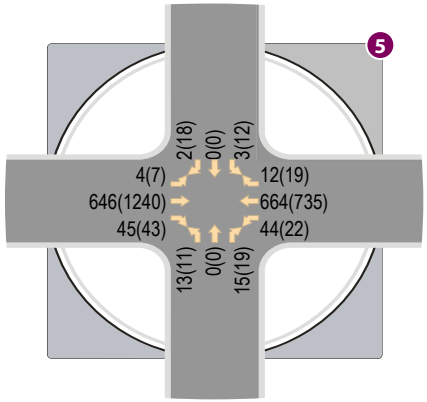
Costco Drwy & Hayden Rd



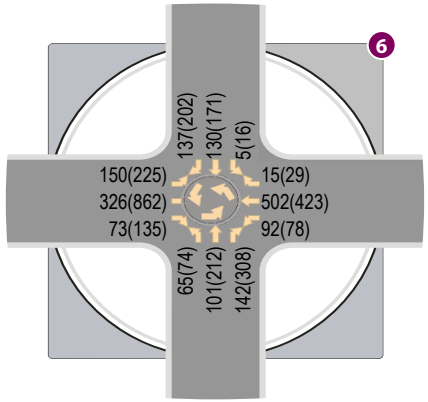
84th St & Hayden Rd



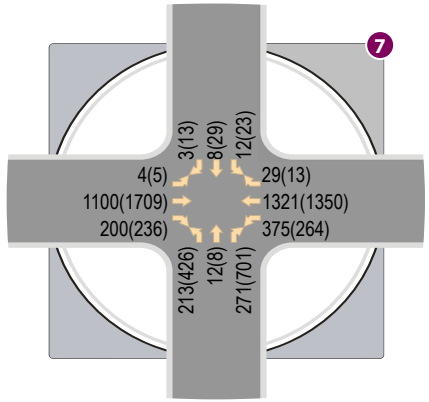
Northeast Access & Hayden Rd



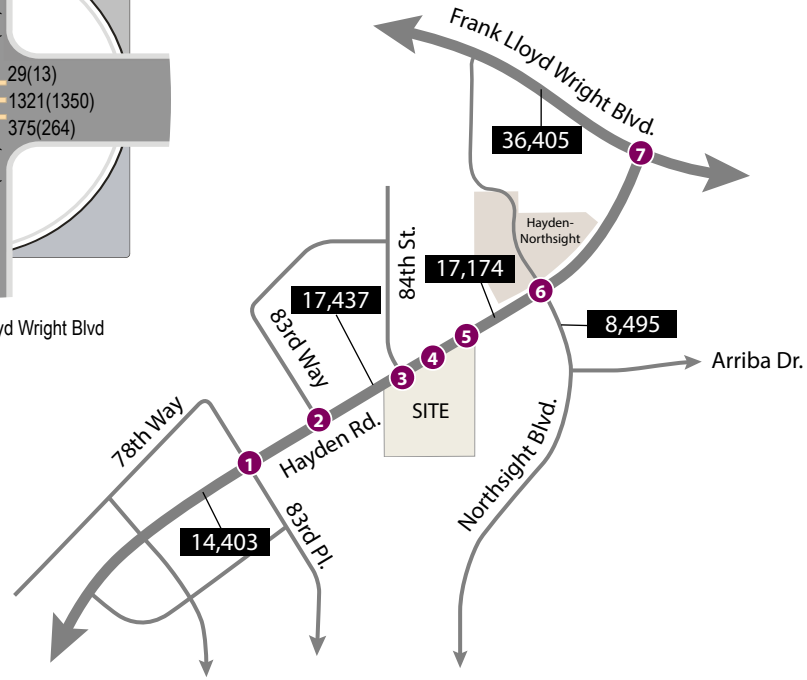
Burger King Drwy & Hayden Rd



Northsight Blvd & Hayden Rd



Hayden Rd & Frank Lloyd Wright Blvd



LEGEND

NORTH

XX(XX) - AM(PM) Peak Hour Traffic Volumes

660 Average Daily Traffic Volumes

Figure 7: 2020 Background Traffic Volumes

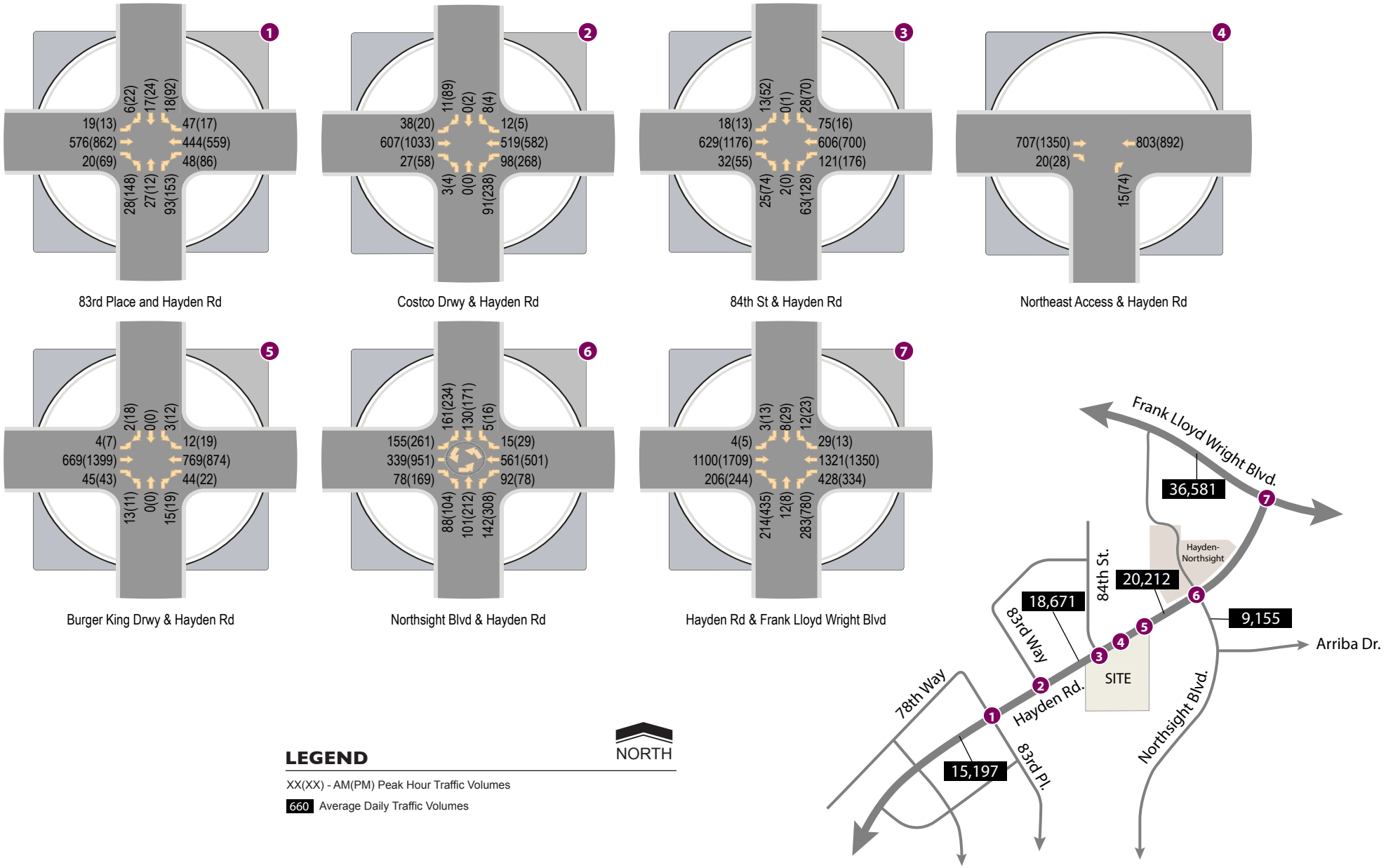


Figure 8: 2020 Total Traffic Volumes

TRAFFIC IMPACT AND IMPROVEMENT ANALYSIS

Upon initial determination that existing traffic volumes at the 84th Street and Hayden Road intersection satisfy multiple traffic signal warrants and not anticipating that either the applicant or the City of Scottsdale would consider a roundabout to be a suitable alternative to traffic signal control at this intersection given that roundabouts are not generally considered appropriate for intersections where major street traffic flow is heavily favored over minor approach level of service, the traffic impact analysis upon which conclusions and recommendations represented in the first submittal version of this report was performed assumed stop sign control and traffic signal control were the only options the City would consider for this intersection. The City has since requested a more comprehensive understanding as to the appropriateness of a roundabout at this intersection as well as to the appropriateness of restricting certain turning movements to avoid the need for any other changes to the existing traffic control. Such analysis has now been performed and based on the results of the additional analysis traffic signal control continues to be the recommended form of traffic control for this intersection. Discussion of stop sign control without restricting turning movements, traffic signal control, roundabout control, and stop sign control with restricted turning movements are each addressed in this section of the report.

Results of intersection capacity analysis for this intersection and all other study intersections under both the minor approach stop sign controlled 84th Street and Hayden Road intersection scenario that exists today and the traffic signal controlled 84th Street and Hayden Road intersection scenario recommended for the post CORE CENTER development condition are summarized in **Table 5** and **Table 6**. Detailed worksheets documenting the 2020 opening year level of service analysis can be found in **Appendix G.**

Table 5 - 2020 Peak Hour LOS – Unmitigated 84th St & Hayden Rd Alternative

ID	Intersection	Traffic Control	Approach/ Movement	2020 Without CORE CENTER LOS AM (PM)	2020 With CORE CENTER LOS AM (PM)
1	83rd Place & Hayden Road	Signal	NB SB EB WB	D (D) E (D) A (A) A (A)	D (D) E (D) A (A) A (B)
			Overall	**B (B)**	**B (B)**
2	Costco Driveway & Hayden Road	2-Way Stop (NB/SB)	NB Right Turn SB Left/Thru/Right EB Left Turn WB Left Turn	B (C) C (A) A (A) A (C)	B (C) C (A) A (A) A (C)
3	84th Street & Hayden Road	2-Way Stop (NB/SB)	NB Left Turn NB Thru/Right SB Left/Thru/Right EB Left Turn WB Left Turn	C (E) B (C) C (F) A (A) A (B)	C (F) B (D) D (F) A (A) A (C)
4	Northeast Access & Hayden Road	1-way stop (NB)	NB Right Turn	A (A)	B (C)
5	Burger King/Home Depot Driveway & Hayden Road	2-Way Stop (NB/SB)	NB Left/Thru/Right SB Left/Thru/Right EB Left Turn WB Left Turn	C (D) C (C) A (A) A (B)	C (D) D (C) A (A) A (B)
6	Northsight Boulevard & Hayden Road	Roundabout	NB SB EB WB	A (D) B (B) A (B) A (A)	A (E) B (C) A (B) A (B)
			Overall	**A (B)**	**A (C)**
7	Hayden Road & Frank Lloyd Wright Boulevard	Signal	NB SB EB WB	D (E) E (E) E (D) C (C)	D (E) E (E) E (D) C (C)
			Overall	**D (D)**	**D (D)**

The results of the Synchro analysis summarized in **Table 5** indicate that all intersections within the study area are expected to operate with overall acceptable levels of service LOS D or better in the opening year. The following intersection are expected to have one or more approaches operating at LOS E.

- The southbound left turn at the signalized intersection of **83rd Place and Hayden Road** will continue to operate at LOS E during the AM peak hour and LOS D/E during the PM peak hour

until and unless signal timing is adjusted and/or a protected phase for southbound left turn movements is added to the signal operation; however there is no indication either of these measures will become warranted in the context of the City's overall objectives for this intersection by the addition of CORE CENTER traffic to the area.

- The southbound movements at the unsignalized intersection of **84th Street and Hayden Road** will continue to operate at LOS E or LOS F during the PM peak hour without an alternate form of traffic control to the existing stop sign control on northbound and southbound approaches. **A comprehensive assessment of four intersection traffic control alternatives – (1) retaining the two-way stop control, (2) adding turn restrictions to eliminate outbound left turn movements at the CORE SCOTTSDALE/CORE CENTER driveway, (3) converting the intersection to a roundabout and (4) signalizing the intersection, indicate that signalization is most likely to multiple alternative evaluation indicate that signalizing the intersection will be both warranted in, and the most appropriate alternative for the post-development condition.** Regardless of which of these alternatives is ultimately pursued, restriping of both northbound and southbound approaches to the intersection will be needed. In the course of working with the applicant's civil engineer and site architect, curb line and striping geometry has been developed that will facilitate though and left turn lane alignment across 84th Street under either a full movement, two-way stop sign controlled (not recommended) or, signal controlled scenario. The recommended geometry is reflected on the current site plan.

- The northbound approach of the roundabout at **Northsight Boulevard and Hayden Road** is expected to operate at LOS E during the PM peak hour in the opening year with the Project. with a volume to capacity ratio (V/C) of 0.89 for the northbound left turn movement. This intersection operates efficiently during most hours of the day and the surrounding area is largely built out so no mitigation is recommended for the opening year condition.

Table 6 indicates how the recommended mitigation measures are anticipated to affect traffic conditions at the intersection of 84th Street and Hayden Road.

Table 6 – 2020 Peak Hour Level of Service – Unmitigated vs. Mitigated

ID	Intersection	Traffic Control	Approach/ Movement	2020 Unmitigated LOS AM (PM)	2020 Mitigated LOS AM (PM)
3	84th Street & Hayden Road	2-way stop (NB/SB)	NB Left Turn	C (F/455.8)	- (-)
			NB Thru/Right	B (D)	- (-)
			SB Left/Thu/Right	D (F/*)	- (-)
			EB Left Turn	A (A)	- (-)
			WB Left Turn	A (C)	- (-)
		Signal	NB Left Turn	- (-)	E/55.6 (E/58.1)
			NB Thru/Right	- (-)	E/56.5 (E/63.7)
			SB Left Turn	- (-)	E/58.2 (E/75.2)
			SB Thru/Right	- (-)	E/53.7 (D)
			EB Left Turn	- (-)	A (B)
			EB Through	- (-)	A (C)
			EB Right Turn	- (-)	A (A)
			WB Left Turn	- (-)	A (B)
			WB Thru/Right	- (-)	A (A)
			Overall	**- (-)**	**A (B)**

The values in **Table 6** following the LOS E and LOS F indicators are the average delays, in seconds per vehicle, that would be experienced by drivers waiting to make the indicated movement through/across the intersection during the indicated time period. These values have been provided to emphasize the need for an alternate form of traffic control at this intersection to accommodate the proposed development. Average delay values for all movements during each peak hour under both mitigated (signal control) and unmitigated (stop sign control) conditions are provided in **Appendix G**. Proposed lane configurations and traffic controls are illustrated in **Figure 9**.

QUEUE LENGTH ANALYSIS

Adequate storage for the queuing of vehicles waiting to turn at an intersection or driveway should be provided as necessary to avoid spillback of turning adjacent through traffic lanes and/or upstream driveways or intersections. The only existing or proposed intersections where CORE CENTER traffic is expected to increase turning movement volumes significantly are the existing intersection of 84th Street and Hayden Road and the existing but not yet used intersection of the CORE CENTER northeast driveway and Hayden Road. A queuing analysis of opening year conditions to generate recommendations for minimum queue storage lengths for the various turning traffic lanes at these intersections. Turn lane storage recommendations were reached based on a combination of long-recognized but frequently overly conservation in the case of signalized intersections methodology documented in *A Policy on Geometric Design of Highways and Streets* (the AASHTO "Green Book"), as further described below and the results of the Synchro software assisted intersection level of service analysis which predicts and reports 50th-percentile queue storage lengths and 95th-percentile queue storage lengths that are considerate of the specific manner in which traffic signal phasing and

timing being employed along the study segment are impacting the production and frequency of suitable gaps for tuning movements to be made.

The AASHTO method for unsignalized intersections yields the queue length required to hold the average number of turning vehicles expected to arrive during a two-minute period of the higher turning movement peak hour.

Storage Length (unsignalized intersection) = [(veh/hr)/(30 periods/hr)] x 25 feet

The AASHTO method for signalized intersections used for this analysis yields the queue length that would be required to hold 1.5 time the average number of vehicles expected to arrive during a single signal cycle of the higher turning movement volume peak hour.

Storage Length (signalized intersection) = [1.5 x (veh/hr)/(cycles/hr)] x 25 feet

The projected 2020 total traffic volumes indicated in **Figure 8** were utilized for the queue storage calculations. Resultant turn lane storage provisions and recommendations are presented in **Table 7.**

Table 7 – Site Access Turn Lane Queue Storage Requirements

Intersection	Assumed Traffic Control	Turning Movement	Queue Storage Length, in Feet			
			Currently Provided (1)	AASHTO Calculated	HCM Calculated(2)	Recommended
84th Street Driveway & Hayden Road	Signal	NB Left Turn	45 ft	175 ft	80 ft	175 ft
		SB Left Turn	-	100 ft	115 ft	150 ft
		EB Left Turn	135 ft	25 ft	25 ft	135 ft
		WB Left Turn	140 ft	225 ft	80 ft	140 ft
		EB Right Turn	100 ft	75 ft	25 ft	100 ft
Northeast Driveway & Hayden Road	1-way stop (NB)	EB Right Turn	130 ft	25 ft	25 ft	130 ft

(1) Measured from stop bar off 2019 aerial photos

(2) HCM 95th percentile queue as reported in Synchro analysis reports in vehicles/lane, multiplied by 25 feet per vehicle.

As summarized in **Table 7**, additional turn lane storage should be provided on the northbound, westbound and southbound approaches to the 84th Street and Hayden Road intersection to accommodate projected traffic volumes under a signalized intersection scenario. The additional left turn storage on the northbound (CORE CENTER) approach needed to comply with the **Table 7** recommendations will be provided with the Project according to the current conceptual site plan shown in Figure 4. The recommended southbound left turn storage length appears to be achievable by restriping 84th Street north of Hayden Road to a full three lane configuration for the first 150 feet north of Hayden Road (two southbound lanes – a left turn lane and a shared through/right turn lane and on northbound lane) and then transitioning back to a two lane configuration such that on street parking can continue to be permitted further to the north. A similar striping approach has been implemented along the paralleling segment of 83rd Place in order to provide designated southbound left turn storage at the 83rd Place/Hayden Road intersection.

As to consideration of a roundabout, we have evaluated the appropriateness of a roundabout from an operational perspective using the roundabout warranting benchmarks specified in Section 5-3.124 of the City's Design Standards and Policies Manual (DSPM) which reads, **"Roundabouts are most appropriate…**

1. **at locations with high turning movements,**

   Assuming the traffic count data we were required to collect for this analysis was representative of typical weekday conditions prior to the occupancy of the northwest corner property (4.0-acre +/- APN 215-48-065F) by CARMAX, turning movement volume accounted for approximately 15% of total daily volume entering this intersection. With the addition of CARMAX traffic (estimated to add another 310 turning movements per day, with 24 being made during the am peak hour and 27 during the pm peak hour), we expect this percentage to increase to 16%. Once CORE CENTER traffic and another year of background traffic growth is taken into account, the turning movement percentage is likely to increase to approximately 26%. While 26% is certainly significant and would suggest that further consideration of roundabout appropriateness is warranted, it bears recognizing that 26% is nowhere near the 38-40% turning movement-to-total volume percentage that characterizes the Hayden/Northsight roundabout, a quarter-mile to the northeast.

2. **where intersecting street traffic volume on the major street is less than ten times the volume on the minor street,**

   Assuming that the traffic count data we collected for this analysis is representative of typical weekday conditions prior to the occupancy of the northwest corner property by CARMAX, the number of vehicles entering the 84th Street and Hayden Road intersection from a major street (Hayden Road) approach is about 13 times that of vehicles entering from either of the two minor street approaches, well outside the range the City considers indicative on its own, of an intersection for which conversion to a roundabout should be considered further. However, with the addition of CORE CENTER traffic to the intersection, we expect the major-to-minor multiplier will drop to about 8%, within the City's indicated range of appropriateness for a roundabout.

3. **and where safety is a primary concern."**

   Roundabouts are frequently recognized for their safety benefits particularly in the context of reducing the potential for head-on, right angle, and/or left turn collisions. Review of crash data provided by the City of Scottsdale indicates a total of nine (9) reported traffic accidents have occurred in the immediate vicinity of the 84th Street and Hayden Road intersection over the three-year period ending December 31, 2018, none of which resulted in a fatality or serious injury. Of the nine, one (1) was interpreted as a rear-end crash; three (3) were interpreted as side swipe crashes, two (2) were interpreted as left turn/angle accidents involving a northeast-bound driver attempting to turn left/north onto 84th Street being hit by an oncoming through vehicle traveling in the southwest-bound direction, two (2) were interpreted as right angle crashes involving a northbound driver exiting the CORE SCOTTSDALE development attempting to turn left or right onto Hayden Road and getting hit by a driver traveling

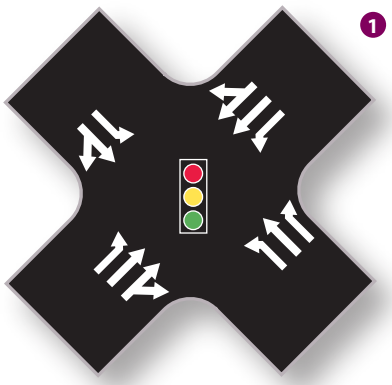
northeast or southwest on Hayden Road; and one was interpreted as involving two vehicles traveling in the same direction but this was the extent to which the cause or effect could be determined.

Based on the accident history just described, several of the accidents may have been avoided if the intersection were configured as a roundabout but those same accidents might have been avoided if there were a traffic signal in place to periodically grant right of way to turning traffic. This accident history on it' own is not significant enough to characterize the intersection as unsafe and in need of alternate traffic control purely for safety reasons.

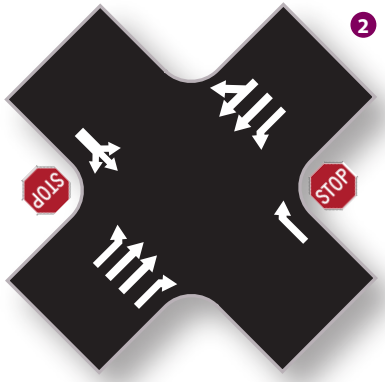
The above-described application of the City's roundabout warranting guidelines yielded results that suggest that the appropriateness of a roundabout in lieu of a traffic signal or any other traffic control alternative cannot be fully determined without more input from the various stakeholders in the outcome of this decision and without consideration of more than just operational factors. For this reason, and at the request of the applicant, we have also prepared a couple of preliminary geometric design concept exhibits which illustrate some of the physical impacts the conversion of this intersection to a roundabout would likely have. The exhibits are included with responses to first review comments, in **Appendix A**. Both exhibits describe a two-lane by one-lane roundabout similar in configuration to that which exists at Hayden Road and Northsight Boulevard. Both concepts avoid the need for right of way from the north/non-CORE CENTER side of the intersection. The primary difference between the two concepts is that the concept presented in **Exhibit A1** has a 169-foot inscribed circle diameter (ICD), identical to that of the Hayden/Northsight Roundabout and the concept presented in **Exhibit A2** has a 150-foot diameter ICD. The larger ICD concept allows the circulating path radius (R2) to remain within the City's' specified 15-20 mph design speed range but positioned to avoid any need for north side right of way, would cut fairly deep into the CORE CENTER site and likely cause need for significant adjustments to vertical elements of the site plan, including the building proposed for location on the southeast quadrant of this intersection. The smaller ICD concept reduces the extent to which the intersection would need to be pushed south (and off of its current alignment) yet allows 22 mph travel along the R2 segment of the fastest path through the roundabout, higher than the City's standards support but still well within the range supported by nationally recognized (NCHRP Report 672 standards).

The City has also asked that this analysis consider a turn restriction alternative. The turn restriction alternative would effectively reassign the task of accommodating CORE SCOTTSDALE and CORE CENTER traffic wanting to head southwest on Hayden Road upon exiting the site, to another intersection. In other words, this option which involves construction of a raised channelizing island in the CORE SCOTTSDALE/CORE CENTER driveway such that the only allowable exit movement from the CORE SCOTTSDALE/CORE CENTER development becomes a right turn onto northeast-bound Hayden Road towards Frank Lloyd Wright Boulevard. Exiting CORE SCOTTSDALE/CORE CENTER traffic wanting to head southwest on Hayden Road would therefore first have to make a right turn onto northeast-bound Hayden Road, and then find an alternate route back to southwest-bound Hayden Road. It is anticipated most of the exiting traffic in this situation would attempt a northeast-to-southwest-bound U-turn at the next closest median break to the northeast (adjacent to the Burger King/Home Depot and Go AZ Motorcycles dealership driveways). Due to the limited curb to curb clearance on the southbound side of the Hayden Road median, U-turns cannot be made without

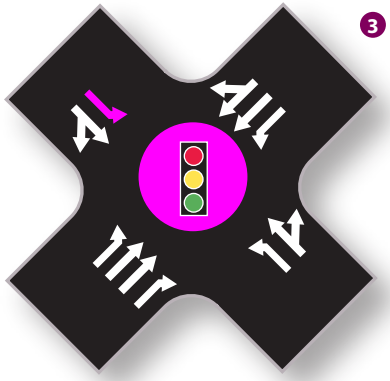
either jumping curb on the opposite side of Hayden Road (evidence of which can be see all along this segment) or, traveling to the middle of the median break and using some of the intersecting driveway pavement. An exhibit illustrating the right turn followed by U-turn path of a passenger vehicle, labeled **Exhibit E1** is included with 1st Review Comment Responses in **Appendix A**.



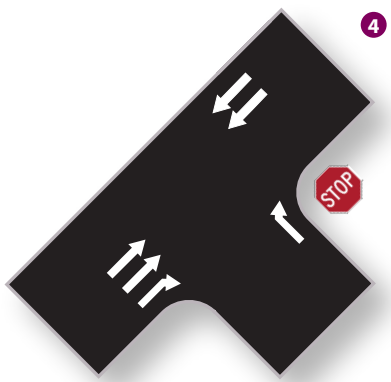
83rd Place and Hayden Rd



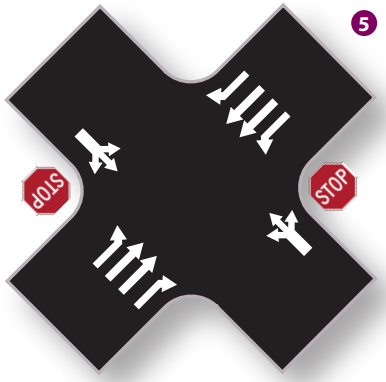
Costco Drwy & Hayden Rd



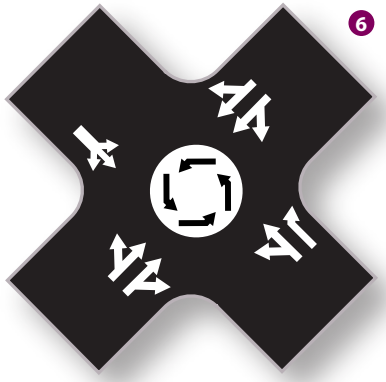
84th St & Hayden Rd



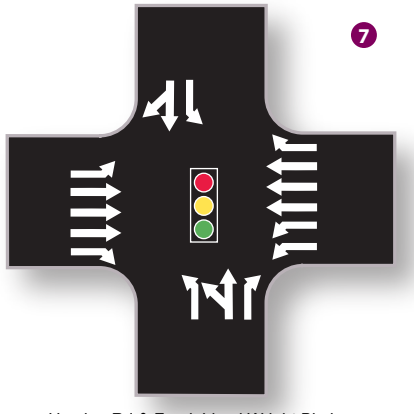
Northeast Access & Hayden Rd



Burger King Drwy & Hayden Rd

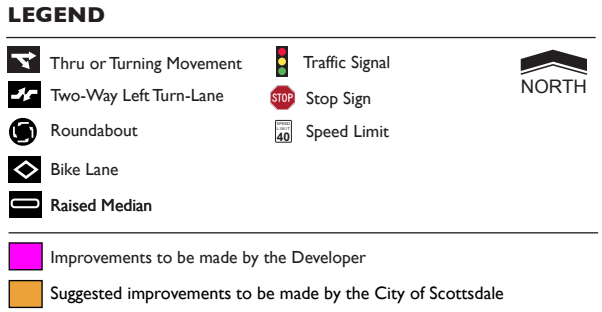


Northsight Blvd & Hayden Rd



Hayden Rd & Frank Lloyd Wright Blvd

suggested improvements to be made by the City of Scottsdale



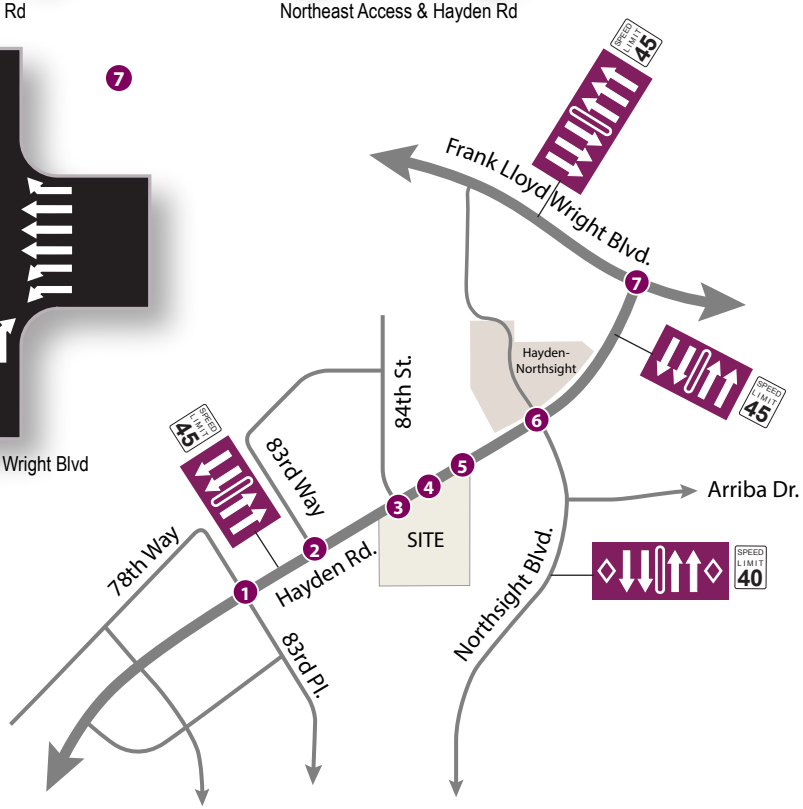


Figure 9: Proposed Lane Configurations and Traffic Controls

CONCLUSIONS

The following conclusions have been documented in this report:

GENERAL

- The previously proposed Impact Church component of the Hayden One development had the potential to generate approximately 738 external trips over the course of a typical weekday, with 46 of those trips occurring during the AM peak hour (29 in/17 out) and 45 occurring during the PM peak hour (22 in/23 out).

- The currently proposed CORE CENTER mixed-use development has the potential to generate up to 4,406 external trips over the course of a typical weekday, with 183 of those trips occurring during the AM peak hour (150 in/33 out) and 426 occurring during the PM peak hour (199 in/227 out).

- The CORE CENTER plan has the potential to generate 3,668 more external trips daily, 137 more external trips during the AM peak hour (150 more inbound/16 more outbound) and 381 more external trips during the PM peak hour (177 more inbound/ 204 more outbound). Accommodating the additional weekday traffic that a mixed-use development of the intensity proposed with the CORE CENTER plan will require an alternate form of traffic control at the intersection of 84th Street than the tw0-way stop sign control that exists today. Potentially viable alternatives considered in the course of completing this analysis and related communication with City staff included implementing turn restrictions (i.e. eliminating the existing opportunity to turn left out of the site onto southwest-bound Hayden Road), converting the intersection to a roundabout, and installing a traffic signal.

    - The turn restriction alternative would effectively reassign the task of accommodating CORE SCOTTSDALE and CORE CENTER traffic wanting to head southwest on Hayden Road upon exiting the site, to another intersection. In other words, this option which involves construction of a raised channelizing island in the CORE SCOTTSDALE/CORE CENTER driveway such that the only allowable exit movement from the CORE SCOTTSDALE/CORE CENTER development becomes a right turn onto northeast-bound Hayden Road towards Frank Lloyd Wright Boulevard. Exiting CORE SCOTTSDALE/CORE CENTER traffic wanting to head southwest on Hayden Road would therefore first have to make a right turn onto northeast-bound Hayden Road, and then find an alternate route back to southwest-bound Hayden Road. It is anticipated most of the exiting traffic in this situation would attempt to make a northeast-to-southwest-bound U-turn at the next closest median break to the northeast (adjacent to the Burger King/ Home Depot and Go AZ Motorcycles dealership driveways). Due to the limited curb to curb clearance on the southbound side of the Hayden Road median, U-turns cannot be made without either jumping curb on the opposite side of Hayden Road (evidence of which can be see all along this segment) or, traveling to the middle of the median break and using some of the intersecting driveway pavement. An exhibit illustrating the right turn followed by U-turn path of a passenger vehicle is provided with the 1st Review Comment Responses in **Appendix A**.

- From an operational standpoint, a roundabout is not out of the question dismissible based solely on the roundabout appropriateness benchmarks outlined in the City's Design Standards and Policies Manual (DSPM). Accordingly, a couple of geometric design concepts for converting this intersection to a roundabout have been prepared for consideration by the City and the CORE CENTER developer from a broader context. Further discussion of this alternative can be found in the *Traffic Impact and Improvements Analysis* section of this report, and exhibits illustrating each of the two roundabout design concepts prepared for the City's and applicant's consideration are provided with the 1st Review Comment Responses in **Appendix A**.

- Signalization is the most viable alternative of those considered.
  - Traffic volumes at this intersection already satisfy peak-hour warrant threshold volumes 3-4 hours a day, four-hour warrant threshold volumes 3-7 hours a day, and 8-hour warrant threshold volumes 3-8 hours a day depending in each case on whether the southbound approach is considered "one lane" as it is functioning today or, two lane, as it could be restriped to effect and depending further on how much right turn volume is deducted from the total minor approach volume before the threshold volume comparison is made.

  - With the addition of CARMAX traffic to the southbound approach (traffic that did not exist when the traffic count data was collective for this analysis, but has since taken over the 4-acre previously vacant site on the northwest corner of the intersection) and the CORE CENTER traffic to the northbound approach, we fully anticipate peak hour and four hour warrants being fully satisfied, even with a significant percentage of right turn volume discounting. We further anticipate that eight-hour warrant threshold volumes will be satisfied at least four hours a day and as many as eight hours a day by the time CORE CENTER is fully built out and leased.

  - Based on intersection capacity and LOS analysis performed using the City's signal phasing and timing, it is reasonable to expect the City will continue to give priority to through traffic on Hayden Road over turning movement traffic on intersecting side street and driveway approaches and that, as such, signalizing this intersection is not going to eliminate long delays for traffic wanting to turn left onto Hayden Road from 84th Street during peak hours; it should however, facilitate significantly shorter average delays to side street traffic than would leaving the existing stop sign control in place.

  - Based on the understanding that the City is planning to convert the Hayden/Raintree intersection to a roundabout in the not too distant future, there will be an approximately one-mile stretch of Hayden Road with continuous flow endpoint intersections and either one or two signalized intersections in between. It seems therefore that the significance of the quarter-mile spacing of this signal from the 83rd Place and Hayden Road signal

may not be as significant as it would be along a longer stretch of arterial with regularly spaced signals.

EXISTING CONDITIONS

- All intersections considered in this analysis currently operate with an overall level of service LOS D or better during both peak hours. The following intersections have one or more approaches operating with levels of service LOS E or LOS F.

    - The southbound left turn at the signalized intersection of **83rd Place and Hayden Road** operates at LOS E during the AM peak hour and LOS D/E during the PM peak hour. This is due primarily to a combination of a long cycle length (120 seconds), lack of a protected left turn phase for this movement (although there is one for the northbound left turn movement), and the traffic signals along Hayden Road appropriately favoring through traffic on Hayden Road over minor street approach traffic. Based on generally accepted left turn phase warranting criteria, (related to the product of left turn volumes on the subject approach and conflicting volumes on the opposite approach) a separate left turn phase is not yet warranted. CORE CENTER is not expected to add any volume to the southbound approach to this intersection. Being as the City has already recognized the need for and added separate left turn phasing for the northbound approach that when and if the City determines the southbound approach needs protected left turn phasing as well, the City will make the change.

    - The southbound movements at the unsignalized intersection of 84th Street and Hayden Road operate at LOS F during the PM peak hour. This is partly due to the centerline only striping on the north leg/southbound approach, even though 84th Street is wide enough to provide two southbound lanes while leaving a single, relatively wide northbound lane for traffic turning north onto 84th Street from Hayden Road, much of which is single unit truck traffic. It is therefore recommended that the southbound approach be restriped to designate an exclusive southbound left turn lane and a shared southbound through/right turn lane. Being as southbound through traffic is almost non-existent during most hours of the day, the shared lane will function like a right turn only lane which could at least reduce delays experienced by southbound right turn traffic.

    - It will take more than restriping to cause more than a marginal improvement in level of service for southbound 84th Street traffic wanting to turn left onto Hayden Road. The larger cause of delay for traffic making these movements is the infrequency of adequate gaps in Hayden Road traffic during the PM peak hour due to the continuous westbound traffic flow effect of Hayden/Northsight roundabout. Signalizing the intersection is one option; however not the recommended option for the existing condition as, while under the current lane configuration on the southbound approach, existing volumes satisfy as many as three volume-based traffic signal warrants, they would satisfy fewer warrants under the recommended two-lane approach described

above. Therefore, **restriping the southbound approach is the only recommended mitigation for existing traffic conditions at this intersection.**

- At the signalized intersection of Hayden Road and Frank Lloyd Wright Boulevard, eastbound left turns, northbound left turns and southbound left turns movements all operate in the LOS E range during one or both peak hours. This is to be expected at a large, very busy intersection that is located within 700 feet of a very busy traffic interchange. Recognizing that the City can monitor and adjust the allocation of green time at this intersection remotely and in near real time as needed to maximize its efficiency, and that analysis results do not indicate that traffic at this intersection is queuing back to the point that it is interfering with traffic operations at other intersections, no further mitigation is recommended.

OPENING YEAR CONDITIONS

- The proposed development is expected to have very little impact on capacity, level of service or delay at any study area intersection except for the intersection of 84th Street and Hayden Road.

- The southbound left turn at the signalized intersection of 83rd Place and Hayden Road will continue to operate at LOS E during the AM peak hour and LOS D/E during the PM peak hour until and unless signal timing is adjusted and/or a protected phase for southbound left turn movements is added to the signal operation; however there is no indication either of these measures will become warranted in the context of the City's overall objectives for this intersection by the addition of CORE CENTER traffic to the area.

- The southbound movements at the unsignalized intersection of **84th Street and Hayden Road** will continue to operate at LOS E or LOS F during the PM peak hour without an alternate form of traffic control to the existing stop sign control on northbound and southbound approaches. A comprehensive assessment of four intersection traffic control alternatives – (1) retaining the two-way stop control, (2) adding turn restrictions to eliminate outbound left turn movements at the CORE SCOTTSDALE/CORE CENTER driveway, (3) converting the intersection to a roundabout and (4) signalizing the intersection, indicate that **signalization is most appropriate alternative for the post-development condition.** Regardless of which of these alternatives is ultimately pursued, restriping of both northbound and southbound approaches to the intersection will be needed. In the course of working with the applicant's civil engineer and site architect, curb line and striping geometry has been developed that will facilitate though and left turn lane alignment across 84th Street under either a full movement, two-way stop sign controlled (not recommended) or, signal controlled scenario. The recommended geometry is reflected on the current site plan.

- The proposed widening of the 84th Street aligning CORE SCOTTSDALE/CORE CENTER driveway will cut into the existing right turn deceleration lane on the eastbound approach to this driveway such that the resultant striped portion of the turn lane will be approximately 84 feet, less than the City's standard turn lane length minimum of 100 feet. However, the approach taper portion of the existing turn lane is approximately 120 feet long, 30 feet longer

than the City's standard 90 foot-long taper for a 40-50 mph posted speed condition per City of Scottsdale (COS) Standard Detail 2225, and the existing turn lane adjacent to the turn lane stipe is approximately 12 feet wide (a foot wider than the City's 11 foot-wide standard. This being the case, the length of that portion of the turn lane that will remain after the widening of the CORE SCOTTSDALE/CORE CENTER driveway that is at least 11 feet wide, clear of the adjacent through lane will be well over 100 feet long, meaning that no extension of the turn lane will be necessary to comply with the critical elements of the City's turn lane standards.

- The northwest-bound (Northsight Boulevard) approach of the roundabout at Northsight Boulevard and Hayden Road is expected to operate at LOS E during the PM peak hour in the opening year with the Project. with a volume to capacity ratio (V/C) of 0.89 for the northbound left turn movement. This intersection operates efficiently during most hours of the day and the surrounding area is largely built out so no mitigation is recommended for the opening year condition.

LIST OF REFERENCES

Highway Capacity Manual. Transportation Research Board, Washington, D.C., 2000.

Manual on Uniform Traffic Control Devices. U.S. Department of Transportation, Federal Highways Administration, Washington, D.C., 2009.

Trip Generation Manual, 10th Edition, Institute of Transportation Engineers, Washington, D.C., 2016.

Trip Generation Handbook, 3rd Edition, Institute of Transportation Engineers, Washington, D.C., 2014.

Design Standards & Policies Manual, Geometrics, City of Scottsdale, Arizona, 2018.

TECHNICAL APPENDICES

APPENDIX A: **1ST REVIEW COMMENTS AND RESPONSES**

APPENDIX B: **EXISTING TRAFFIC COUNTS**

APPENDIX C: **EXISTING PEAK HOUR ANALYSIS AND SIGNAL TIMING**

APPENDIX D: **SIGNAL WARRANT ANALYSIS**

APPENDIX E: **TRIP GENERATION**

APPENDIX F: **BACKGROUND TRAFFIC CALCULATIONS**

APPENDIX G: **2020 PEAK HOUR ANALYSIS**

APPENDIX A

1st REVIEW COMMENTS AND RESPONSES

CivTech

August 5, 2019

Brad Carr, AICP
Principal Planner
City of Scottsdale
3939 N. Drinkwater Blvd.
Scottsdale, AZ 85251

RE: 19-ZN-2013 #2 - Core Center
1st Review Comment Responses – Traffic Study Specific

Dear Mr. Carr:

CivTech has prepared this letter on behalf of Impact Church as both a cover letter to the hereto attached, *Core Center Trip Generation and Level of Service Analysis – 2nd Submittal* and to provide written responses to "1st Review" comments specific to the *Core Center Trip Generation and Level of Service Analysis, June 2019,* the "traffic study" component of the above-referenced rezoning application. Two sets of 1st review comments specific to the traffic study have been received from the City of Scottsdale (COS) to date. COS Comment No.'s 21 through 25 of your (1st Review) letter to Michael P. Leary, dated July 12, 2019 and five unnumbered comments CivTech received directly from COS Traffic Engineer Doug Ostler via e-mail, on July 29, 2019. Presented below are first the City's July 12th comments and then the July 29th comments, each comment followed by our written response. A full copy of each set of 1st review comments as they were received by CivTech has also been attached for reference.

JULY 12, 2019 TRAFFIC STUDY-SPECIFIC REVIEW COMMENTS & RESPONSES

COS Comment No. 21: Transportation staff is not fully supportive of the installation of a traffic signal at 84th Street/Hayden Road due to signal spacing. The proposed change from a church to offices and restaurants result in ~ 4x the daily and AM peak hour trips generated and ~10X the PM peak hour trips generated. This has profound impacts on traffic, particularly at the 84th Street/Hayden Road intersection. Signalization was not intended/planned for this location. DSPM 5-3.123 G3 indicates that "At Minor Arterial/Minor Arterial (or smaller designated streets) intersections the designer should evaluate using a roundabout as an alternative to a traffic signal for all new or significantly rebuilt intersections." The TIMA appears to include no indication that a roundabout option was evaluated. Please address these issues with the next submittal. (DSPM, Sec. 5-3.123)

CivTech Response:

The first submittal version of the traffic study was prepared in accordance with a scope established through discussion with City of Scottsdale Traffic Engineering staff in advance of

initiating the analysis. Presenting a weekday daily and peak hour trip generation comparison and intersection level of service analysis was part of the agreed upon scope as was identifying roadway capacity and/or traffic control mitigation warranted by the proposed development. Both were provided with the initial submittal. The initial submittal did not however, recognize the opportunity or challenges with converting the intersection of 84th Street and Hayden Road to a roundabout as an alternative to signalizing the intersection in its current conventional configuration. That option has since been considered fairly extensively, the results of which are summarized below.

*We have evaluated the appropriateness of a roundabout from an operational perspective using the roundabout warranting benchmarks specified in Section 5-3.124 of the City's Design Standards and Policies Manual (DSPM) which reads, "**Roundabouts are most appropriate…***

1. ***at locations with high turning movements,***

   Assuming the traffic count data we were required to collect for this analysis was representative of typical weekday conditions prior to the occupancy of the northwest corner property (4.0-acre +/- APN 215-48-065F) by CARMAX, turning movement volume accounted for approximately 15% of total daily volume entering this intersection. With the addition of CARMAX traffic (estimated to add another 310 turning movements per day, with 24 being made during the am peak hour and 27 during the pm peak hour), we expect this percentage to increase to 16%. Once CORE CENTER traffic and another year of background traffic growth is taken into account, the turning movement percentage is likely to increase to approximately 26%. This begs the question, "What does the City consider "high" in this context?" While 26% is certainly significant and would suggest that further consideration of roundabout appropriateness is warranted, it bears recognizing that 26% is nowhere near the 38-40% turning movement-to-total volume percentage that characterizes the Hayden/Northsight roundabout, a quarter-mile to the northeast.

2. ***where intersecting street traffic volume on the major street is less than ten times the volume on the minor street,***

   Assuming again, that the traffic count data we collected for this analysis is representative of typical weekday conditions prior to the occupancy of the northwest corner property by CARMAX, the number of vehicles entering the 84th Street and Hayden Road intersection from a major street (Hayden Road) approach is about 13 times that of vehicles entering from either of the two minor street approaches, well outside the range the City considers indicative on its own, of an intersection for which conversion to a roundabout should be considered further. However, with the addition of CORE CENTER traffic to the intersection, we expect the major-to-minor multiplier will drop to about 8%, within the City's indicated range of appropriateness for a roundabout.

3. ***and where safety is a primary concern."***

Roundabouts are frequently recognized for their safety benefits particularly in the context of reducing the potential for head-on, right angle, and/or left turn collisions. Review of crash data provided by the City of Scottsdale indicates a total of nine (9) reported traffic accidents have occurred in the immediate vicinity of the 84th Street and Hayden Road intersection over the three-year period ending December 31, 2018, none of which resulted in a fatality or serious injury. Of the nine, one (1) was interpreted as a rear-end crash; three (3) were interpreted as side swipe crashes, two (2) were interpreted as left turn/angle accidents involving a northeast-bound driver attempting to turn left/north onto 84th Street being hit by an oncoming through vehicle traveling in the southwest-bound direction, two (2) were interpreted as right angle crashes involving a northbound driver exiting the CORE SCOTTSDALE development attempting to turn left or right onto Hayden Road and getting hit by a driver traveling northeast or southwest on Hayden Road; and one was interpreted as involving two vehicles traveling in the same direction but this was the extent to which the cause or effect could be determined.

Based on the accident history just described, several of the accidents may have been avoided if the intersection were configured as a roundabout but those same accidents might have been avoided if there were a traffic signal in place to periodically grant right of way to turning traffic as well. This accident history on its own is not significant enough to characterize the intersection as unsafe and in need of alternate traffic control purely for safety reasons.

The above-described application of the City's roundabout warranting guidelines yielded results that suggest that the appropriateness of a roundabout in lieu of a traffic signal or any other traffic control alternative cannot be fully determined without more input from the various stakeholders in the outcome of this decision and without consideration of more than just operational factors. For this reason, and at the request of the applicant, we have also prepared a couple of preliminary geometric design concept exhibits which illustrate some of the physical impacts the conversion of this intersection to a roundabout would likely have. The exhibits are included with responses to first review comments, in Appendix A. Both exhibits describe a two-lane by one-lane roundabout similar in configuration to that which exists at Hayden Road and Northsight Boulevard. Both concepts avoid the need for right of way from the north/non-CORE CENTER side of the intersection. The primary difference between the two concepts is that the concept presented in Exhibit A1 has a 169-foot inscribed circle diameter (ICD), identical to that of the Hayden/Northsight Roundabout and the concept presented in Exhibit A2 has a 150-foot diameter ICD. The larger ICD concept allows the circulating path radius (R2) to remain within the City's' specified 15-20 mph design speed range but positioned to avoid any need for north side right of way, would cut fairly deep into the CORE CENTER site and likely cause need for significant adjustments to vertical elements of the site plan, including the building

proposed for location on the southeast quadrant of this intersection. The smaller ICD concept reduces the extent to which the intersection would need to be pushed south (and off of its current alignment) yet allows 22 mph travel along the R2 segment of the fastest path through the roundabout, higher than the City's standards support but still well within the range supported by nationally recognized (NCHRP Report 672) standards.

As to the comment regarding concern over the (quarter-mile) spacing that would result from installing a signal at 84th Street and Hayden Road, based on the understanding that the City is planning to convert the Hayden/Raintree intersection to a roundabout in the not too distant future, there will be an approximately one-mile stretch of Hayden Road with continuous flow endpoint intersections and either one or two signalized intersections in between. It seems therefore that the significance of the quarter-mile spacing of this signal from the 83rd Place and Hayden Road signal should not be as significant as it would be along a longer stretch of arterial with regularly spaced signals.

COS Comment No. 22: Please revise the traffic study to add a queue analysis for site driveways due to the substantial increase in projected trip generation as well as queue analysis for the intersection of 84th street and Hayden Road due to the proposed control change.

CivTech Response:

A queue analysis has been added to the Traffic Impact and Improvement Analysis section of the traffic study.

COS Comment No. 23: Please revise the traffic study to provide project site & total ADT on major street(s) within the study area. (DSPM, Sec. 5-1.701)

CivTech Response:

Site and Total ADT's for those segments of 84th Street and Hayden Road where traffic count date was collected for this analysis have been added to applicable traffic volume figures in the 2nd submittal version of the traffic study. As discussed with City traffic engineering staff on 8/1/2019, current ADT information about other roadway segments further away from the Project site is not available and therefore has not been added to the report.

COS Comment No. 24: Page 31, 1st bullet (84th Street & Hayden Road), 3rd sentence - the site plan depicts a redesign of the existing site driveway. The developer is responsible for correct alignment of their proposed new driveway to prevent negative offset of left turning vehicles. Should the intersection be signalized, the developer will be responsible for improvements associated with the traffic signal, including and not limited to providing a left turn lane on all approaches. Please revise the project plans to address this comment. (Zoning Ordinance, Sec. 1.204.)

CivTech Response:

The project plans have been revised to show curb line geometry and lane striping for the 84th Street driveway to achieve lane alignment north-south across Hayden Road. Two exhibits included with these review comment responses, Exhibit D1 and Exhibit D2, provide a little more detail of what was recommended for that area of the driveway near Hayden Road. Recognizing the site plan is still somewhat conceptual, a detailed assessment of internal circulation has not been performed as part this analysis.

COS Comment No. 25: Please revise the traffic study to add a queue analysis for site driveways due to the substantial increase in projected trip generation as well as queue analysis for the intersection of 84th street and Hayden Road due to the proposed control change

CivTech Response:

A queue analysis has been added to the Traffic Impact and Improvement Analysis section of the traffic study.

JULY 29, 2019 TRAFFIC STUDY-SPECIFIC REVIEW COMMENTS & RESPONSES

July 29th COS General Comment: In addition to the comments already provided, please address the following items related to evaluation of appropriate traffic control at the 84th Street and Hayden Road intersection:

CivTech Response:

All of the requested items have been addressed as requested.

July 29th COS Specific Comment No. 1: Please use the 24-hour counts that were collected at the 84th Street and Hayden Road intersection for evaluating the signal warrants in existing conditions.

CivTech Response:

The 24-hour counts collected for this analysis were used for the traffic signal warrant analysis. If detailed documentation beyond that which is provided in the Appendix of the traffic study is desired, it can be provided upon request.

July 29th COS Specific Comment No. 2: A reduction for right turning traffic is expected to be applied to the minor street approach volumes (see MUTCD Section 4C.01 Paragraph 8).

CivTech Response:

Reductions were taken for a portion of the right turn traffic on the minor street approaches. This reduction varied by approach.

July 29th COS Specific Comment No. 3: Staff recommends consideration of restricting left turns out of the driveway as an alternative to signalization, even if signal warrants are met (see MUTCD Section 4B.04 Paragraph 2J). This restriction would be for the driveway by means of a pork-chop median or channelization, etc.; 84th Street would remain full access. Note: this does not retract comment 21 in the comment letter. You may state the circumstances and/or reference discussion(s) indicating compliance with DSPM 5-30123 G3.

CivTech Response: *The turn restriction alternative has been considered, discussion of which appears below and in the Traffic Impact and Improvement Analysis section of the 2nd Submittal version of the traffic study.*

The turn restriction alternative would effectively reassign the task of accommodating CORE SCOTTSDALE and CORE CENTER traffic wanting to head southwest on Hayden Road upon exiting the site, to another intersection. In other words, this option which involves construction of a raised channelizing island in the CORE SCOTTSDALE/CORE CENTER driveway such that the only allowable exit movement from the CORE SCOTTSDALE/CORE CENTER development becomes a right turn onto northeast-bound Hayden Road towards Frank Lloyd Wright Boulevard. Exiting CORE SCOTTSDALE/CORE CENTER traffic wanting to head southwest on Hayden Road would therefore first have to make a right turn onto northeast-bound Hayden Road, and then find an alternate route back to southwest-bound Hayden Road. It is anticipated most of the exiting traffic in this situation would attempt a northeast-to-southwest-bound U-turn at the next closest median break to the northeast (adjacent to the Burger King/Home Depot and Go AZ Motorcycles dealership driveways). Due to the limited curb to curb clearance on the southbound side of the Hayden Road median, U-turns cannot be made without either jumping curb on the opposite side of Hayden Road (evidence of which can be see all along this segment) or, traveling to the middle of the median break and using some of the intersecting driveway pavement. Attached Exhibit E1 illustrates path of a passenger vehicle executing the right turn followed by U-turn movement.

July 29th COS Specific Comment No. 4: Correct reference to Sarival Avenue (instead of Hayden Road) on page 17 of the study.

CivTech Response: *The requested correction has been made.*

July 29th COS Specific Comment No. 5: Using the 24-hour counts that were collected at the 84th Street and Hayden Road intersection, state the 24-hour volume on Hayden Road in existing conditions as well as the projected ADT added by the site.

CivTech Response:

The requested ADT information has been added to the applicable traffic study figures.

We appreciate the City's consideration of these comments. Please call me if you have any questions about this statement and/or if we can be of further assistance.

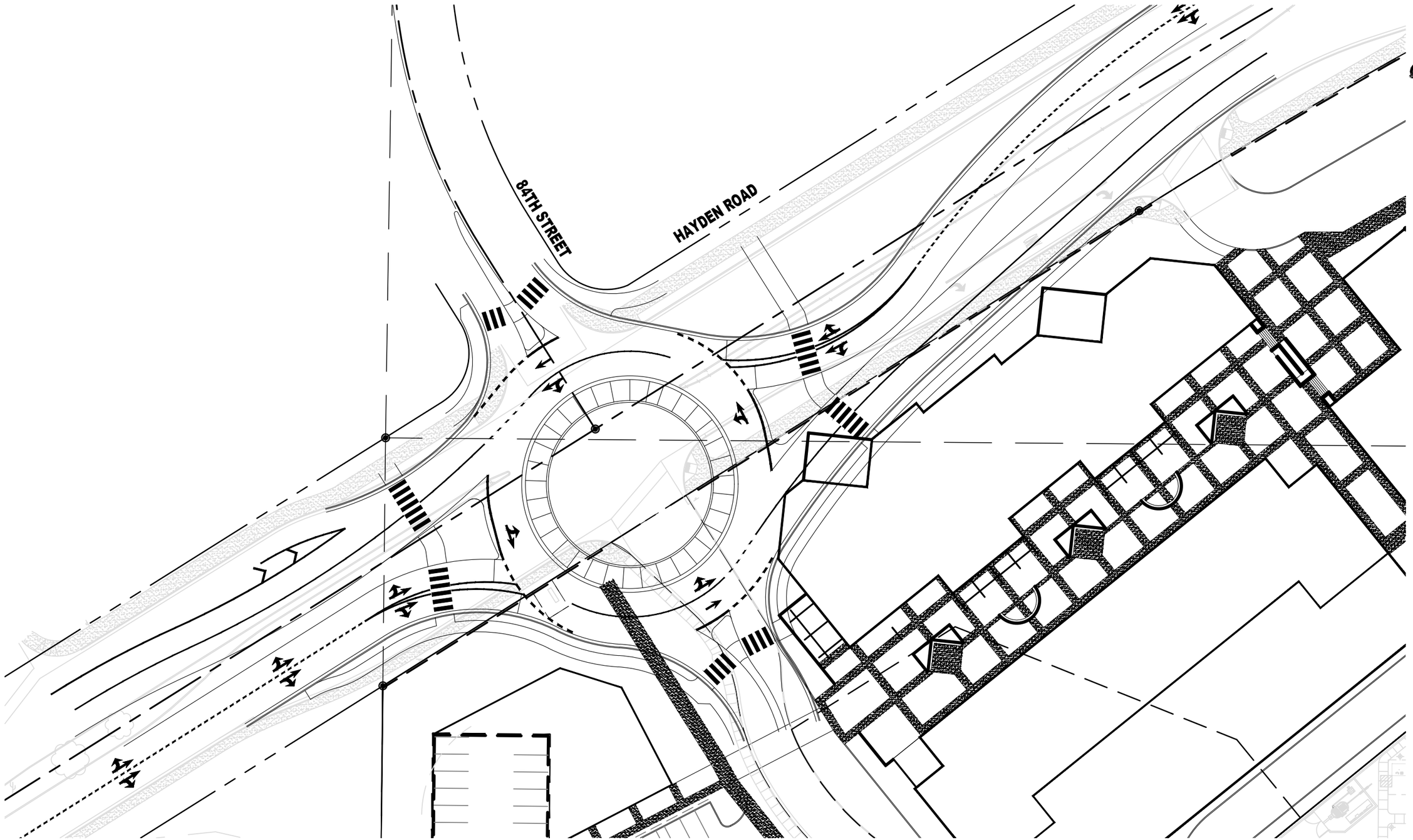
Sincerely,

CivTech Inc.

Tove C. White, P.E., PTOE
Project Manager/ Senior Traffic Engineer

Attachments:

EXHIBIT A1: CORE CENTER ROUNDABOUT DESIGN CONCEPT (169' ICD)
EXHIBIT A2: CORE CENTER ROUNDABOUT DESIGN CONCEPT (150' ICD)
EXHIBIT D1: 84TH STREET LANE ALIGNMENT ACROSS HAYDEN ROAD, SHEET 1 OF 2
EXHIBIT D2: 84TH STREET LANE ALIGNMENT ACROSS HAYDEN ROAD, SHEET 1 OF 2
EXHIBIT E1: EXITING RIGHT TURN FOLLOWED BY DOWNSTREAM U-TURN
Copy of 1st Review Comments letter, dated 7/12/2019
Copy of 1st Review Comments follow-up e-mail message, dated 7/29/2019



SCALE: 1”=50’

0’ 25’ 50’ 100’

CivTech Inc.
10605 N. Hayden Rd.
Suite 140
Scottsdale, AZ 85260
480.659.4250 p
480.659.0566 f
info@civtech.com

JOB NO.	19-0000
1ST SUBMITTAL:	-
2ND SUBMITTAL:	-
SCALE:	1”=50’
DESIGN:	G. WHITE
DRAWN:	G. WHITE
CHECKED:	T. WHITE

CORE CENTER

ROUNDABOUT CONCEPT (169’ ICD)

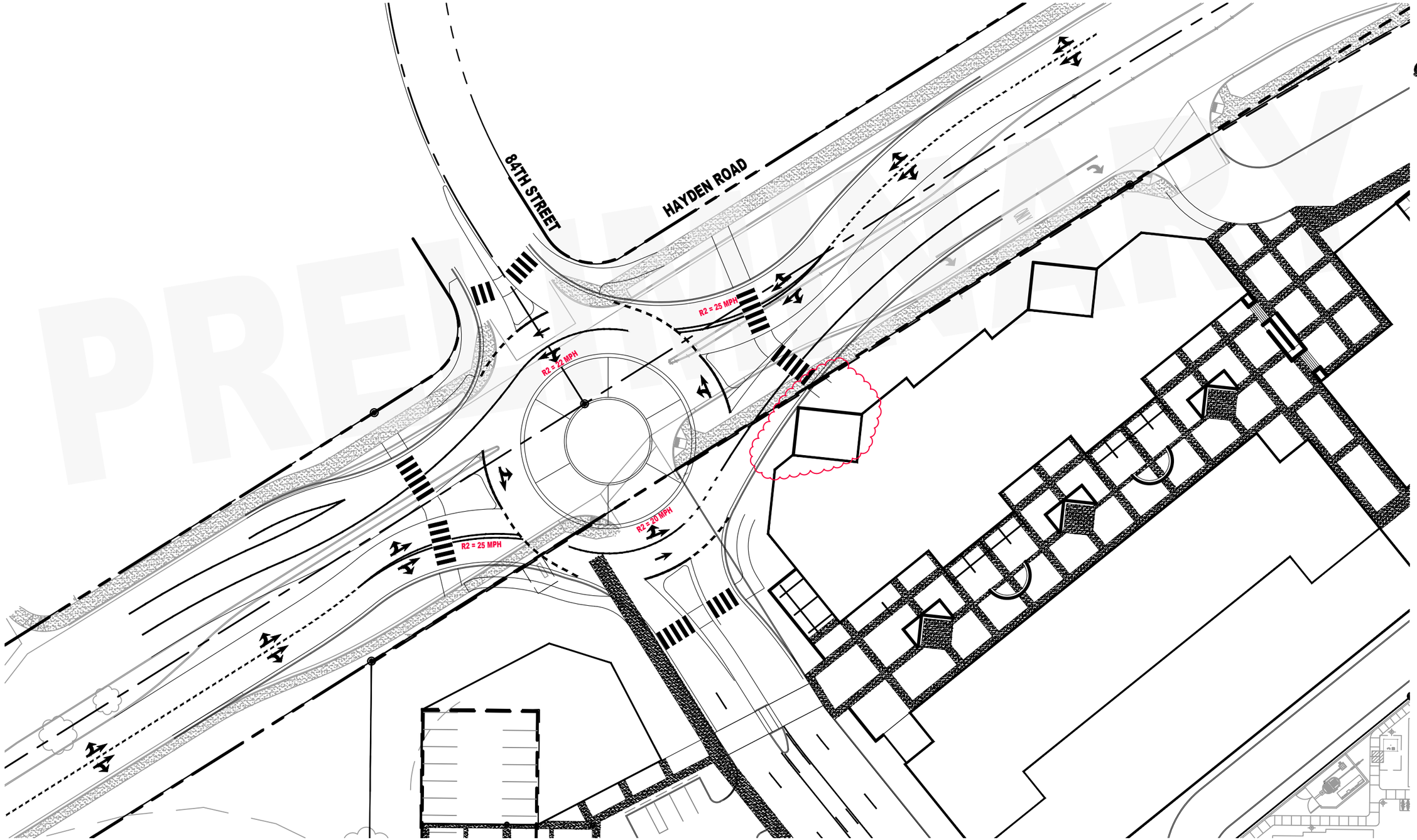
PRELIMINARY

REVIEW

NOT FOR CONSTRUCTION OR RECORDING

EXHIBIT A1

19-ZN-2013#2
8/8/2019



SCALE: 1”=50’

0’ 25’ 50’ 100’

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10605 N. Hayden Rd. Suite 140 Scottsdale, AZ 85260
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JOB NO:	19-0000
1ST SUBMITTAL:	-
2ND SUBMITTAL:	-
SCALE:	1”=50’
DESIGN:	G. WHITE
DRAWN:	G. WHITE
CHECKED:	T. WHITE

CORE CENTER

ROUNDABOUT CONCEPT (150’ ICD)

PRELIMINARY

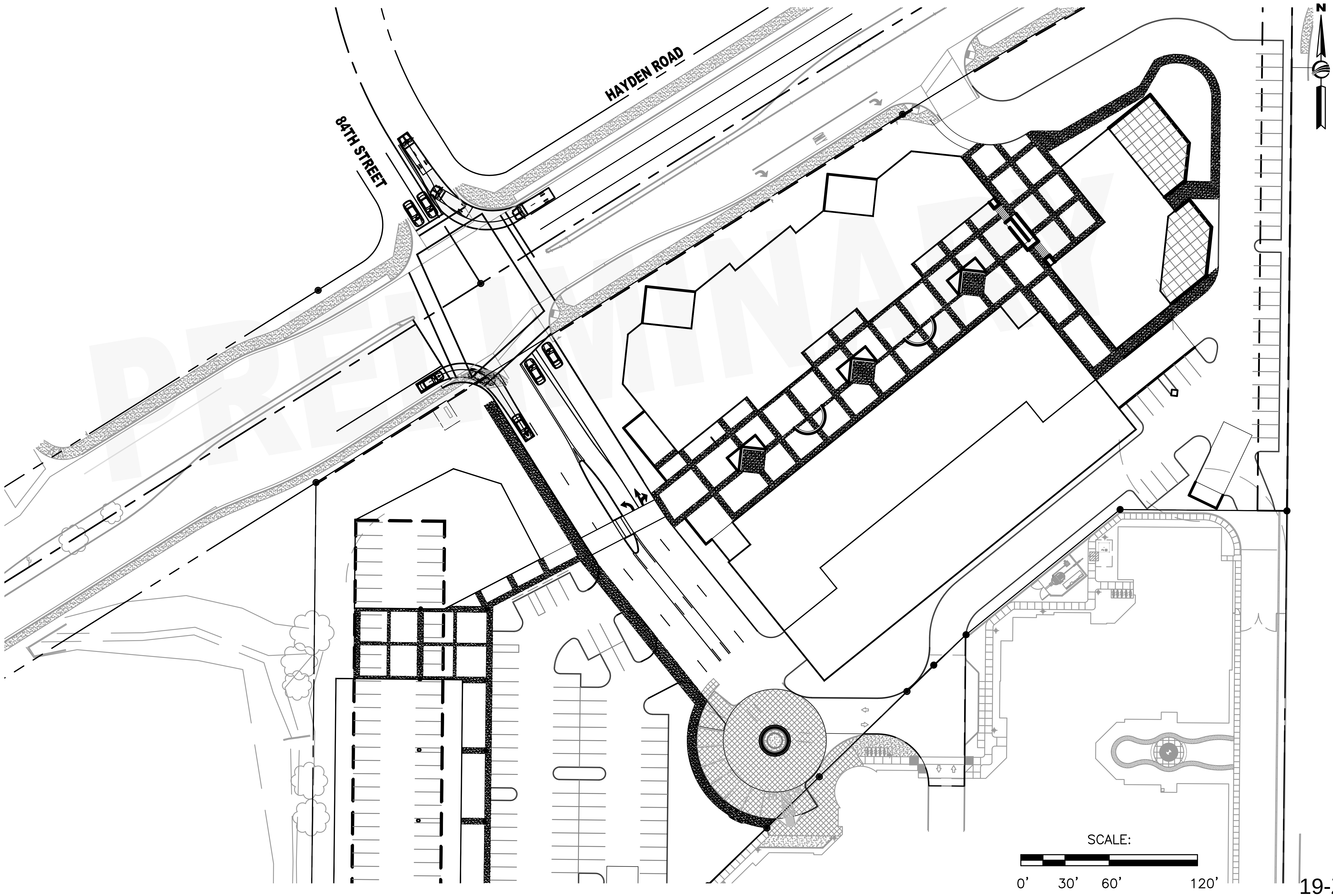
REVIEW

NOT FOR CONSTRUCTION OR RECORDING

EXHIBIT A2

19-ZN-2013#2

8/8/2019



CivTech Inc.
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480.659.0566 f
info@civtech.com

JOB NO:	19-0000
1ST SUBMITTAL:	-
2ND SUBMITTAL:	-
SCALE:	1"=60'
DESIGN:	G. WHITE
DRAWN:	G. WHITE
CHECKED:	T. WHITE

CORE CENTER

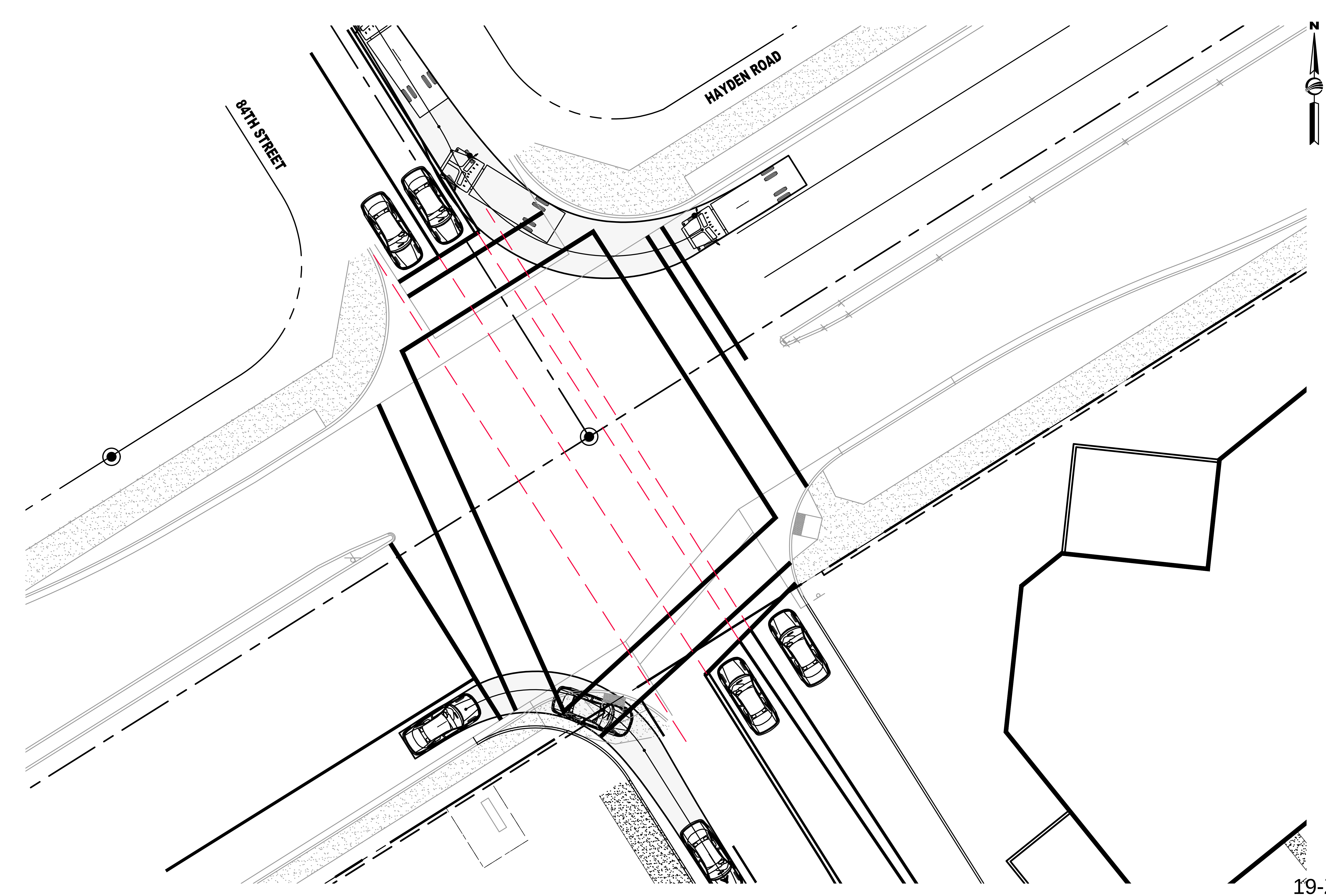
84TH STREET LANE ALIGNMENT ACROSS HAYDEN ROAD, SHEET 1 OF 2

PRELIMINARY
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

EXHIBIT D1

19-ZN-2013#2
8/8/2019

C:_PROJECTS\219003031 – CivTech–19xxx Core Center\2019–07–26 Driveway\2019–0730D.dwg
georg
Jul 31, 2019 – 1:07pm



CivTech Inc.

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Suite 140
Scottsdale, AZ 85260
480.659.4250 p
480.659.0566 f
info@civtech.com

JOB NO:	19-0000
1ST SUBMITTAL:	-
2ND SUBMITTAL:	-
SCALE:	1"=20'
DESIGN:	G. WHITE
DRAWN:	G. WHITE
CHECKED:	T. WHITE

CORE CENTER

84TH STREET LANE ALIGNMENT ACROSS HAYDEN ROAD, SHEET 2 OF 2

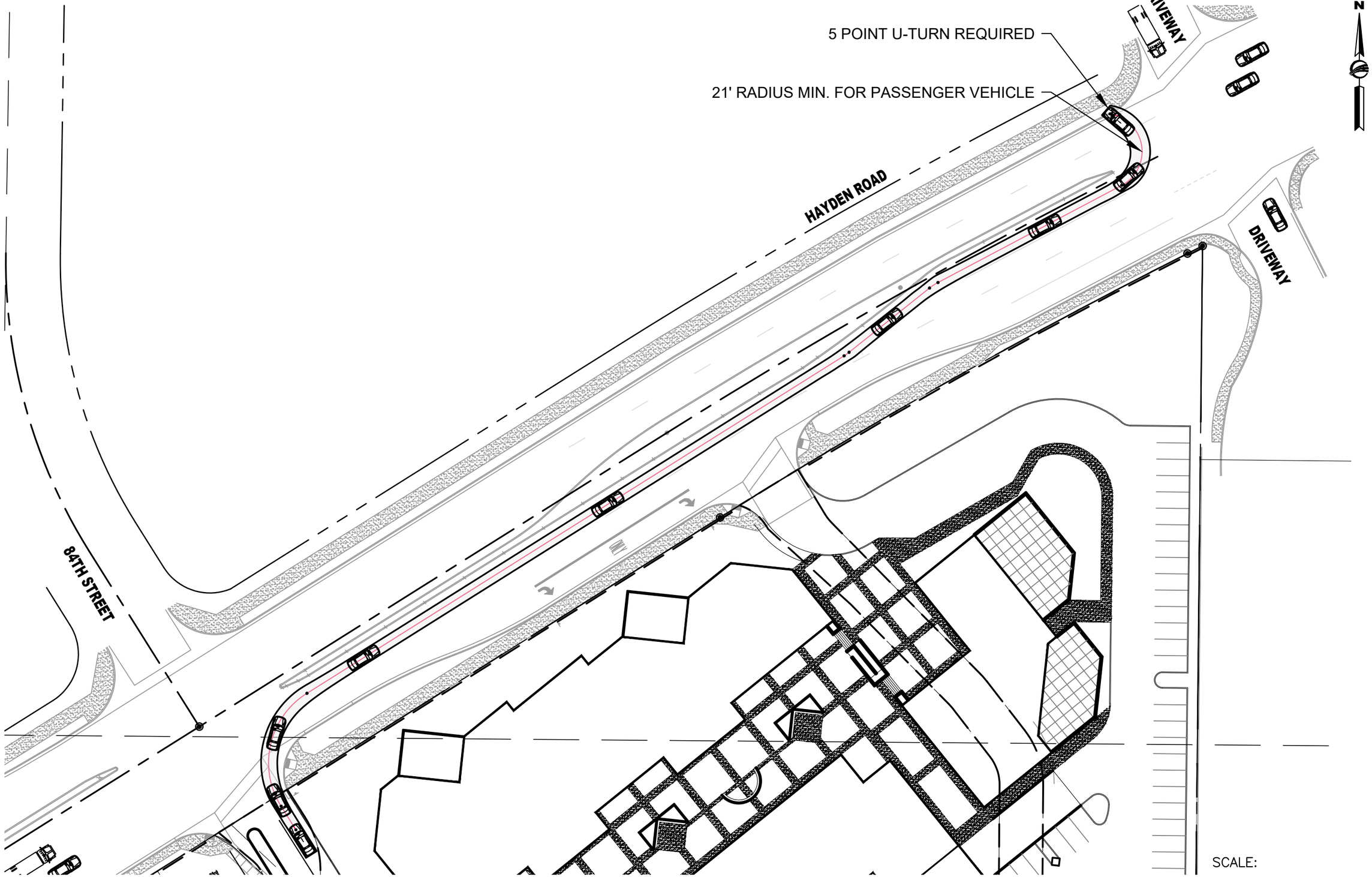
PRELIMINARY

REVIEW

NOT FOR CONSTRUCTION OR RECORDING

EXHIBIT D2

19-ZN-2013#2
8/8/2019



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Scottsdale, AZ 85260
480.659.4250 p
480.659.0566 f
info@civtech.com

JOB NO:	19-0000
1ST SUBMITTAL:	-
2ND SUBMITTAL:	-
SCALE:	1"=50'
DESIGN:	G. WHITE
DRAWN:	G. WHITE
CHECKED:	T. WHITE

CORE CENTER

EXITING RIGHT TURN FOLLOWED BY DOWNSTREAM U-TURN

PRELIMINARY

REVIEW

NOT FOR CONSTRUCTION OR RECORDING

EXHIBIT E1

CITY OF SCOTTSDALE

7/12/2019

Michael P. Leary, LTD
10278 E Hillery Dr
Scottsdale, AZ 85255

RE: 19-ZN-2013#2
Core Center
H4145 (Key Code)

Dear Mr. Leary:

The Planning & Development Services Division has completed the review of the above referenced development application submitted on 6/5/2019. The following **1st Review Comments** represent the review performed by our team, and is intended to provide you with guidance for compliance with city codes, policies, and guidelines related to this application.

Zoning Ordinance and Scottsdale Revise Code Significant Issues

The following code and ordinance related issues have been identified in the first review of this application, and shall be addressed in the resubmittal of the revised application material. Addressing these items is critical to scheduling the application for public hearing, and may affect the City Staff's recommendation. Please address the following:

Zoning:

1. Please revise the Project Narrative to include a discussion of the use of the PCP district bonus provisions. Discussion should include the proposed bonus to be requested, the justification for the proposed bonus, calculations for the estimated value of the bonus, as well as a plan for community benefit related to the estimated value of the bonus. (Zoning Ordinance, Sec. 5.4008. and 7.1200.)
2. Please revise the project plans to demonstrate compliance with the setback and stepback requirements of the PCP zoning district. The setback requirement is a minimum of 25 feet from the curb line along N. Hayden Road. The stepback requirements starts at the minimum setback line. (Zoning Ordinance, Sec. 5.4007.D. & 5.4007.E.)
3. Please revise the project plans to include the calculations for floor area ratio (FAR) in compliance with the Zoning Ordinance, Sec. 5.4007.A.
4. The site and Core Apartments as part of case 19-ZN-2013 appears to not have complied with stipulation 7 "PEDESTRIAN CONNECTIONS. The site shall provide a minimum of three (3) pedestrian connections to existing properties surrounding the site. A minimum of one (1) connection having a minimum with of six (6) feet shall be provided to each of the west, south and east sides of the site. Pedestrian connections shall be reviewed and approved by

city transportation staff." Please revise the project plans to identify compliance with these requirements.

5. Please submit a revised copy of the Citizen Review Report summary to include details of the most recent public outreach efforts, including any additional public comments that may have been received. (Zoning Ordinance, Sec. 1.305.C.2.b.)

6. Please provide conceptual elevations in conformance with the district requirements with the next submittal. (Zoning Ordinance, Sec. 1.303.)

<u>2001 General Plan & Greater Airpark Character Area Plan (GAPCAP) Analysis:</u>

7. The first submittal narrative/ development master plan- a document that is intended to provide overall coordination of urban design character, buffering to adjacent uses, transportation systems, and infrastructure necessary for the proposed development – includes unnecessary/oppositional statements that are not material in any manner to the application request; please see applicant responses to General Plan Growth Area Element Goal #2, Bullet #1, and Community Mobility Element Goal #5, Bullet#3 regarding light-rail transit and equestrians. Please revise the Project Narrative to include only necessary statements are in direction relation to the proposed development be included in the development master plan upon resubmittal.

   To this end, please ensure that responses that are completed with “refer to prior responses” (found throughout the document) indicate by numerical identification, and page number, reference to the response the applicant is directing the reader to. Additionally, please remove responses that indicate “not applicable”.

8. The General Plan Character and Design Element (Goal 4, bullets 10, 14, and 15) encourage “streetscapes for major roadways that promote the city’s visual quality and character; and blend into the character of the surrounding area. The Greater Airpark Character Area Plan Character and Design Element (Goal CD2, Policy CD 2.1.6, CD 2.2, and CD2.7), and Economic Vitality Element (Goal 5, bullet 6) promotes vibrant Signature Corridors in the Greater Airpark to provide a distinct identify and design theme in the area. Although the first submittal discusses Hayden Road being designated as a Signature Corridor, there appears to be no indication as to what that means as a result of this development proposal – details of such are expected of a formal Development Plan. Please note Hayden Road at the subject site’s frontage is a designated Signature Corridor and Buffered Roadway – an area in which 50’ foot minimum setback, measured from back of curb line, is expected to be maintained as per CD2.7 of the GACAP.

   Please respond both graphically and narratively as to how the proposed development will provide this dimension and enhance the Streetscape in response to the cited considerations. Please consider additions of areas of pedestrian lighting, public art, bus shelters, and other public amenities to enhance the pedestrian environment and streetscape.

9. Please respond to Goal 10, along with any applicable bullets, of the of the General Plan Preservation and Environmental Planning Element, and Goal EP5 of the Greater Airpark Character Area Plan addressing how the proposed development may, if at all, utilize green building alternatives that support sustainable desert living.

   a. Please note, Scottsdale is progressively attempting to install in capital projects, and request from private development applications, Low Impact Development (LID) and Green Infrastructure (GI) as a method of stormwater control, water harvesting, and

cleansing for the first flush requirements of the City's Floodplain Ordnance. Accordingly, please consider utilization of this resource. More information on this initiative can be found at:

https://sustainability.asu.edu/sustainable-cities/resources/lid-handbook/

10. As a respond to Goal 1 of the Community Involvement Element, with a resubmittal, please provide an updated Citizen Involvement Report that describes the key issues that have been identified through the public involvement process.

Fire:

11. Please revise the project plans to demonstrate hydrant spacing, existing and proposed (Fire Ord. 4283, 507.5.1.2)

12. Please revise the project plans to demonstrate the location of Fire Department Connection(s). (Fire Or. 4283, 912)

Drainage:

13. Please submit a copy of the revised Drainage Report with the remainder of the resubmittal material identified in Attachment A. Please see comments within the red-lined 1st submittal of the Drainage Report and Preliminary G&D and address accordingly.

Water and Wastewater:

14. Please submit a revised Water and Wastewater Design Report with the remainder of the resubmittal material identified in Attachment A. Please see comments within the red-lined 1st submittal of the Report. The Preliminary Basis of Design Report must be accepted by the Water Resources Department prior to scheduling of first hearing of project.

15. Please submit flow monitoring results of northern 8-inch sewer in Hayden Road with next submittal.

Airport:

16. The subject site is within Airport noise compatibility study AC-2 area. Please note that a signed Avigation Easement along with the required legal descriptions and graphic, and a copy of the Noise Disclosure statement will be required with the final plans submittal.

Engineering:

17. All waste shall be placed in suitable containers to facilitate waste removal in a sanitary condition. Please revise the project plans accordingly. (SRC, Sec. 24-13)

18. Off-site transportation, stormwater and water resources improvements along property frontages to existing supporting infrastructure, with associated dedications, is required. Please update the project plans accordingly. (SRC, Sec. 48-7, 47-10 & 49-219)

Significant Policy Related Issues

The following policy related issues have been identified in the first review of this application. While these issues may not be critical to scheduling the application for public hearing, they may affect the City Staff's recommendation pertaining to the application and should be addressed with the resubmittal of the revised application material. Please address the following:

Transportation:

19. The entry drive should be redesigned to be in conformance with COS Standard Detail #2257, CH-2. The proposed raised median creates offset lanes alignments with the existing driveway to the northwest. An entry drive of 48 feet of pavement width transitioning to 55 feet is unnecessary. Please revise the project plans accordingly. (DSPM, Sec. 5-3.200 & 5-3.205)

20. The north end of the site is designed poorly. The driveway leading from Hayden Road directs vehicles into the pedestrian courtyard. The short turning radius on the site drive leading to this driveway will create issues with vehicle queuing and blocking inbound traffic. Please revise the project plans to correct these issues. (Zoning Ordinance, Sec. 1.204.)

Traffic Study:

21. Transportation staff is not fully supportive of the installation of a traffic signal at 84th Street/Hayden Road due to signal spacing. The proposed change from a church to offices and restaurants result in ~ 4x the daily and AM peak hour trips generated and ~10X the PM peak hour trips generated. This has profound impacts on traffic, particularly at the 84th Street/Hayden Road intersection. Signalization was not intended/planned for this location. DSPM 5-3.123 G3 indicates that "At Minor Arterial/Minor Arterial (or smaller designated streets) intersections the designer should evaluate using a roundabout as an alternative to a traffic signal for all new or significantly rebuilt intersections." The TIMA appears to include no indication that a roundabout option was evaluated. Please address these issues with the next submittal. (DSPM, Sec. 5-3.123)

22. Please revise the traffic study to add a queue analysis for site driveways due to the substantial increase in projected trip generation as well as queue analysis for the intersection of 84th Street and Hayden Road due to the proposed control change (signalization). (Zoning Ordinance, Sec. 1.303.)

23. Please revise the traffic study to provide project site & total ADT on major street(s) within the study area. (DSPM, Sec. 5-1.701)

24. Page 31, 1st bullet (84th Street & Hayden Road), 3rd sentence - the site plan depicts a redesign of the existing site driveway. The developer is responsible for correct alignment of their proposed new driveway to prevent negative offset of left turning vehicles. Should the intersection be signalized, the developer will be responsible for improvements associated with the traffic signal, including and not limited to providing a left turn lane on all approaches. Please revise the project plans to address this comment. (Zoning Ordinance, Sec. 1.204.)

Engineering:

25. Please review the Context Aerial with corrections provided by Engineering for existing easement conflicts that will need to be modified or released prior to permit issuance, including:
    a. Any GLO easements in conflict with proposed development and not required by city LAIPS or TMP will need to be abandoned by property owner prior to any permit issuance. Specifically for this project, the supplied ALTA survey identified GLOs per the following recording information: docket 1443 page 63 and docket 3025 page 473. Please call out required abandonments on site plan. (DSPM, Sec. 1-2.400)

b. Water lines located outside of a public right-of-way or street tract must be placed in a minimum 20’ wide easement:

   i. Horizontally, a minimum of 6’ is required between the water line and the edge of easement.

   ii. The easement will be free of obstructions, shall not be in a fenced area, and shall be accessible always to city service equipment such as trucks and backhoes.

   iii. Easements outside of paved areas shall have a 10’ wide hardened patch with a cross-slope not greater than 10% and a longitudinal slope not greater than 20%. Hardened paths shall consist of native soil compacted to 95% to a depth of 1’.

   iv. Revegetation within the easement shall consist of low growing shrubs. Update site plan accordingly.

c. Existing cross access and emergency services access easement through project parcel to abutting parcel in conflict with proposed development will need to be relocated to provide cross access to southern and eastern abutting parcels. Please update the project plans accordingly. (DSPM, Sec. 5-3.201)

26. Please revise the project plans to comply with the following location and design requirements for non-residential, mixed-use, and multi-family residential refuse and recycling enclosures. Please locate and position the enclosure(s): (DSPM, Sec. 2-1.309)

    a. A minimum of one (1) enclosure shall be provided for every 20,000 square feet of office/retail space.

    b. So that the approach pad for the enclosure(s) is located that the refuse truck route to and from the public street has a minimum unobstructed vertical clearance of 13 feet 6 inches (14 feet is recommended), and unobstructed minimum vertical clearance above the approach pad and refuse enclosure of 25 feet. (The vertical clearances are subject to modification based on enclosure container size, location, and positioning as determined by the Sanitation Director, or designee.);

    c. In a location that is easily accessible for collection, and does not require the refuse truck to “backtrack”;

    d. A maximum 100 feet distance from building service exit to refuse enclosure;

    e. So that collection vehicles do not back up more than 35 feet;

    f. So that the path of travel for the refuse truck accommodates a minimum vehicle turning radius of 45 feet, and a minimum length of 40 feet;

    g. So that the approach pad is level, with a maximum of 2 percent slope;

    h. So that the enclosure(s) are not placed between the on-site buildings and adjacent lower density residential unless there is no reasonable alternative. In these situations, orient the enclosure(s) towards the interior of the property;

    i. So that the enclosure(s) are not placed next to drainage ways or basins, unless there is no reasonable alternative;

    j. So that the enclosure(s) are not placed between the street and the front of the building, unless there is no reasonable alternative; and

k. So that the enclosure(s) are not placed at the end of a dead-end parking aisle.

27. Compactors may be used as an alternative to refuse or recycling containers. To determine adequacy and site location of compactors, if proposed, please provide the following on a refuse plan:

    a. Compactor type,

    b. Compactor capacity – state on site plan compactor capacity conversion equating to the city's required 1 enclosure for every 20,000 square feet with no recycling,

    c. Compactor location, addressing the following:

        i. Place the refuse compactor container and approach pad so that the refuse truck route to and from the public street has a minimum unobstructed vertical clearance of thirteen (13) feet six (6) inches (fourteen (14) feet is recommended), and unobstructed minimum vertical clearance above the concrete approach slab and refuse compactor container storage area concrete slab of twenty-five (25) feet,
        ii. Place the refuse compactor container in a location that does not require the bin to be maneuvered or relocated from the bin's storage location to be loaded on to the refuse truck,
        iii. Provide a refuse compactor container approach area that has a minimum width of fourteen (14) feet and length of sixty (60) feet in front of the container, and
        iv. Demonstrate path of travel for refuse truck accommodates a minimum vehicle turning radius of 45', and vehicle length of 40'.

28. Although not a requirement, recycling is an amenity found to be desired by Scottsdale residents. Please note if recycling containers will be provided for the development project.

29. Please revise the project plans with a 6' width accessible pedestrian route from the main entry of the development to each Hayden. (DSPM, Sec. 2-1.310)

30. Please revise the project plans to provide an eight (8) foot wide minimum, curb-separated sidewalk along the project boundary. (DSPM, Sec. 5-3.102 and 5-3.110)

Technical Corrections

The following technical ordinance or policy related corrections have been identified in the first review of the project. While these items are not as critical to scheduling the case for public hearing, they will likely affect a decision on the final plans submittal (construction and improvement documents) and should be addressed as soon as possible. Correcting these items before the hearing may also help clarify questions regarding these plans. Please address the following:

Site:

31. Please revise the project plans to identify pedestrian connections to the surrounding commercial businesses. (Zoning Ordinance, Sec. 1.303.)

Transportation:

32. Please revise the project plans to identify what measures will be provided to ensure a safe pedestrian crossing of the main entry drive. (Zoning Ordinance, Sec. 1.303.)

33. The proposed entry drive is showing a raised median. Please note that this will require the reconstruction of the existing curb returns on Hayden Road. Please revise the project plans to identify this. (Zoning Ordinance, Sec. 1.204.)

Traffic Study:

34. Potential errors were noticed in the study which may not necessarily affect the final recommendations of the study nor necessitate a revised study. Please verify the following items prior to a future resubmittal:
    a. Page 7, 3rd paragraph (Hayden Road), 1st Sentence - Hayden Road is a minor arterial within the vicinity of the site, not a major arterial.
    b. Page 7, 4th paragraph (83rd Place), 2nd & 3rd sentences - these two sentences likely belong in the next paragraph (83rd Way/Costco Driveway) Please verify.
    c. Page 7, 5th paragraph (83rd Way/Costco Driveway), 2nd & 3rd sentences - these two sentences likely belong in the prior paragraph (83rd Place). Please verify.
    d. Page 8, 4th paragraph (Costco/Hayden), last sentence - missing "lane" after "deceleration".
    e. Page 13-14, 83rd Place & Hayden Road, last sentence - intersection is operating acceptably per DSPM 5-1.801 B.1, please verify recommendation to monitor the intersection.
    f. Page 14, 2nd full paragraph (84th Street & Hayden Road), 2nd sentence. See DSPM 5-1.801 B for correct threshold requirements (Generally LOS D or better overall, individual/approach should be LOS D or better, must be LOS E or better). This comment may be applicable to other locations that are not marked. Please revise the Traffic Study and project plans to address this.

Other:

35. Please revise the Zoning Boundary Exhibit to include half of the right-of-way for N. Hayden Road as it fronts the site. All zoning boundaries include adjacent right-of-way. (Zoning Ordinance, Sec. 1.303.)

Please resubmit the revised application requirements and additional/supplemental information identified in Attachment A, Resubmittal Checklist, and a written summary response addressing the comments/corrections identified above as soon as possible for further review. The City will then review the revisions to determine if the application is to be scheduled for a hearing date, or if additional modifications, corrections, or additional/supplemental information is necessary.

PLEASE CALL 480-312-7767 TO SCHEDULE A RESUBMITTAL MEETING WITH ME PRIOR TO YOUR PLANNED RESUBMITTAL DATE. DO NOT DROP OFF ANY RESUBMITTAL MATERIAL WITHOUT A SCHEDULED MEETING. THIS WILL HELP MAKE SURE I'M AVAILABLE TO REVIEW YOUR RESUBMITTAL AND PREVENT ANY UNNECESSARY DELAYS. RESUBMITTAL MATERIAL THAT IS DROPPED OFF MAY NOT BE ACCEPTED AND RETURNED TO THE APPLICANT.

The Planning & Development Services Division has had this application in review for 28 Staff Review Days since the application was determined to have the minimal information to be reviewed.

These **1st Review Comments** are valid for a period of 180 days from the date on this letter. The Zoning Administrator may consider an application withdrawn if a revised submittal has not been received within 180 days of the date of this letter (Section 1.305. of the Zoning Ordinance).

If you have any questions, or need further assistance please contact me at 480-312-7713 or at bcarr@ScottsdaleAZ.gov.

Sincerely,

Brad Carr, AICP
Principal Planner

ATTACHMENT A
Resubmittal Checklist

Case Number: **19-ZN-2013#2**

Please provide the following documents, in the quantities indicated, with the resubmittal (all plans larger than 8 ½ x11 shall be folded):

Digital submittals shall include one copy of each item identified below.

☒ One copy: COVER LETTER – Respond to all the issues identified in the first review comment letter.
☒ One copy: Revised Narrative for Project
☒ One copy: Revised Traffic Impact Mitigation Analysis (TIMA)

☒ Context Aerial with the proposed Site Plan superimposed

Color 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Site Plan:

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Open Space Plan:

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Elevations:

Color 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"
B/W 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Elevation Worksheet(s):

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Perspectives:

Color 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Color Site Plan:

Color 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Landscape Plan:

B/W 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Site Cross Sections:

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Preliminary Grading & Drainage Plan:

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Pedestrian & Vehicular Circulation Plan

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Dimensioned Zoning Boundary Exhibit

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Slope Analysis (superimposed on a topography map)

☒ Development Plan Booklets
The Development Plan booklets shall be clipped together separately, and not be bounded.

Color _____ 11" x 17" 1 8 ½" x 11"

- 8 ½" x 11" – 3 color copy on archival (acid free paper) (To be submitted after the Planning Commission hearing.)

Technical Reports: Please include one (1) digital copy of each report

☒ 1 copy of Revised Drainage Report
☒ 1 copy of Revised Water and Wastewater Design Report

Resubmit the revised Drainage Report and Water and Wastewater Design Report to your Project Coordinator.

Tove White

From: Ostler, Douglas <DOstler@Scottsdaleaz.gov>
Sent: Monday, July 29, 2019 11:58 AM
To: Tove White
Cc: Kercher, Phillip; Guntupalli, Kiran; Carr, Brad
Subject: Core Center Traffic Study Comments, 19-ZN-2013 #2

Tove,
Transportation staff had additional discussions and review of the proposed CORE Center project and associated TIMA. In addition to the comments already provided, please address the following items related to evaluation of appropriate traffic control at the 84th Street and Hayden Road intersection:

- Please use the 24-hour counts that were collected at the 84th Street and Hayden Road intersection for evaluating the signal warrants in existing conditions.
- A reduction for right turning traffic is expected to be applied to the minor street approach volumes (see MUTCD Section 4C.01 Paragraph 8).
- Staff recommends consideration of restricting left turns out of the driveway as an alternative to signalization, even if signal warrants are met (see MUTCD Section 4B.04 Paragraph 2J). This restriction would be for the driveway by means of a pork-chop median or channelization, etc.; 84th Street would remain full access.
    - Note: this does not retract comment 21 in the comment letter. You may state the circumstances and/or reference discussion(s) indicating compliance with DSPM 5-30123 G3.
- Correct reference to Sarival Avenue (instead of Hayden Road) on page 17 of the study.
- Using the 24-hour counts that were collected at the 84th Street and Hayden Road intersection, state the 24-hour volume on Hayden Road in existing conditions as well as the projected ADT added by the site.

Thanks!

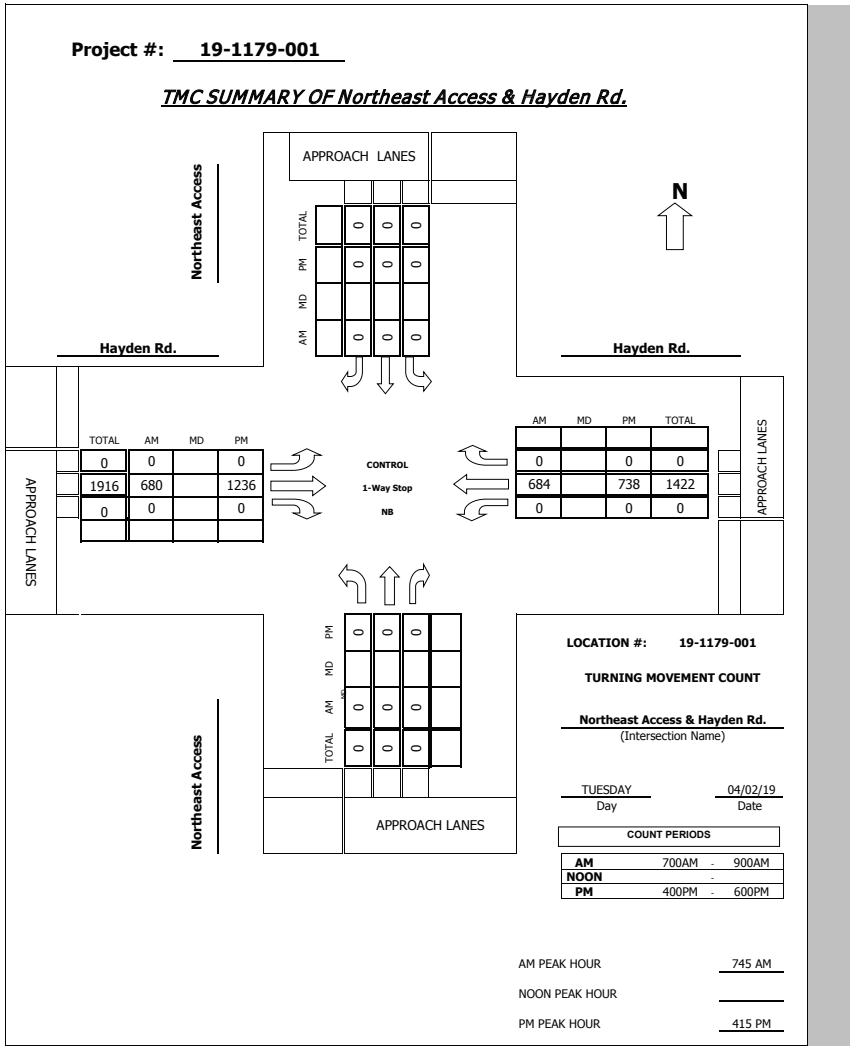
Doug Ostler -- Traffic Engineer
Office: 480-312-7250
Direct: 480-312-7724
CITY OF SCOTTSDALE

APPENDIX B

EXISTING TRAFFIC COUNTS

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: Northeast Access DATE: 04/02/19 LOCATION: Scottsdale

E-W STREET: Hayden Rd. DAY: TUESDAY PROJECT# 19-1179-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 0	NT 0	NR 1	SL 0	ST 0	SR 0	EL 0	ET 2	ER 0	WL 0	WT 2	WR 0	TOTAL
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	0	0	0	0	0	0	100	0	0	105	0	205
7:15 AM	0	0	0	0	0	0	0	115	0	0	144	0	259
7:30 AM	0	0	0	0	0	0	0	128	0	0	167	0	295
7:45 AM	0	0	0	0	0	0	0	165	0	0	168	0	333
8:00 AM	0	0	0	0	0	0	0	167	0	0	166	0	333
8:15 AM	0	0	0	0	0	0	0	164	0	0	167	0	331
8:30 AM	0	0	0	0	0	0	0	184	0	0	183	0	367
8:45 AM	0	0	0	0	0	0	0	172	0	0	149	0	321
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	0	0	0	0	0	0	1195	0	0	1249	0	2444
Approach %	####	####	####	####	####	####	0.00	100.00	0.00	0.00	100.00	0.00	
App/Depart	0	/	0	0	/	0	1195	/	1195	1249	/	1249	

AM Peak Hr Begins at: 745 AM

PEAK													
Volumes	0	0	0	0	0	0	0	680	0	0	684	0	1364
Approach %	####	####	####	####	####	####	0.00	100.00	0.00	0.00	100.00	0.00	

PEAK HR. FACTOR:	0.000	0.000	0.924	0.934	0.929

CONTROL: 1-Way Stop (NB)
COMMENT 1:
GPS: 33.626110, -111.898293

19-ZN-2013#2
8/8/2019

Intersection Turning Movement

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: Northeast Access 0
E-W STREET: Hayden Rd.
DATE: 04/02/19
DAY: TUESDAY
LOCATION: Scottsdale
PROJECT#: 19-1179-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	1	0	0	0	0	2	0	0	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	0	0	0	0	0	0	0	290	0	0	174	0	464
4:15 PM	0	0	0	0	0	0	0	303	0	0	193	0	496
4:30 PM	0	0	0	0	0	0	0	296	0	0	199	0	495
4:45 PM	0	0	0	0	0	0	0	335	0	0	163	0	498
5:00 PM	0	0	0	0	0	0	0	302	0	0	183	0	485
5:15 PM	0	0	0	0	0	0	0	273	0	0	178	0	451
5:30 PM	0	0	0	0	0	0	0	232	0	0	141	0	373
5:45 PM	0	0	0	0	0	0	0	204	0	0	121	0	325
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	0	0	0	0	0	0	2235	0	0	1352	0	3587
Approach %	####	####	####	####	####	####	0.00	100.00	0.00	0.00	100.00	0.00	
App/Depart	0	/	0	0	/	0	2235	/	2235	1352	/	1352	

PM Peak Hr Begins at: 415 PM

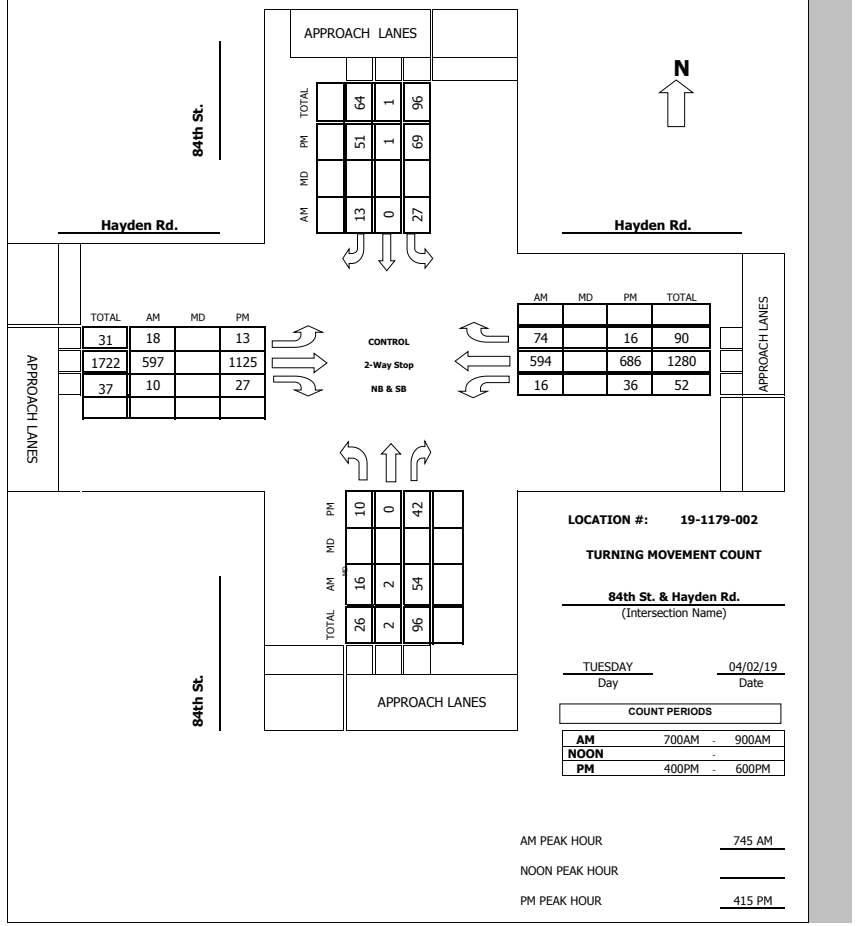
PEAK													
Volumes	0	0	0	0	0	0	0	1236	0	0	738	0	1974
Approach %	####	####	####	####	####	####	0.00	100.00	0.00	0.00	100.00	0.00	
PEAK HR. FACTOR:		0.000			0.000			0.922			0.927		0.991

CONTROL: 1-Way Stop (NB)
COMMENT 1: 0
GPS: 33.626110, -111.898293

Intersection Turning Movement
Prepared by:
FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

Project #: 19-1179-002

TMC SUMMARY OF 84th St. & Hayden Rd.



19-ZN-2013#2
8/8/2019

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: 84th St. | DATE: 04/02/19 | LOCATION: Scottsdale
E-W STREET: Hayden Rd. | DAY: TUESDAY | PROJECT#: 19-1179-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 0	NT 1	NR 0	SL 0	ST 1	SR 0	EL 1	ET 2	ER 1	WL 1	WT 2	WR 0	TOTAL
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	4	1	11	1	0	3	7	88	1	1	90	14	221
7:15 AM	5	0	9	5	0	2	6	100	0	0	128	16	271
7:30 AM	6	0	13	8	0	1	11	107	1	2	143	22	314
7:45 AM	2	1	16	5	0	2	5	142	1	1	147	20	342
8:00 AM	6	0	8	8	0	2	2	151	6	4	144	18	349
8:15 AM	3	1	16	3	0	2	6	145	2	5	141	21	345
8:30 AM	5	0	14	11	0	7	5	159	1	6	162	15	385
8:45 AM	0	0	10	11	0	5	5	151	1	9	130	10	332
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	31	3	97	52	0	24	47	1043	13	28	1085	136	2559
Approach %	23.66	2.29	74.05	68.42	0.00	31.58	4.26	94.56	1.18	2.24	86.87	10.89	
App/Depart	131	/	186	76	/	41	1103	/	1192	1249	/	1140	

AM Peak Hr Begins at: 745 AM

PEAK													
Volumes	16	2	54	27	0	13	18	597	10	16	594	74	1421
Approach %	22.22	2.78	75.00	67.50	0.00	32.50	2.88	95.52	1.60	2.34	86.84	10.82	
PEAK HR. FACTOR:	0.900			0.556			0.947			0.934			0.923

CONTROL: 2-Way Stop (NB & SB)
COMMENT 1:
GPS: 33.625626, -111.899215

Intersection Turning Movement

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: 84th St. 0 | DATE: 04/02/19 | LOCATION: Scottsdale
E-W STREET: Hayden Rd. | DAY: TUESDAY | PROJECT#: 19-1179-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 0	NT 1	NR 0	SL 0	ST 1	SR 0	EL 1	ET 2	ER 1	WL 1	WT 2	WR 0	TOTAL
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	3	0	3	15	0	15	6	272	2	10	162	3	491
4:15 PM	1	0	4	22	0	16	3	276	5	10	176	7	520
4:30 PM	5	0	23	8	0	8	5	265	3	3	193	3	516
4:45 PM	1	0	7	29	1	18	0	300	6	10	150	3	525
5:00 PM	3	0	8	10	0	9	5	284	13	13	167	3	515
5:15 PM	3	0	12	14	1	7	3	247	10	7	163	8	475
5:30 PM	2	0	6	9	0	8	2	217	7	11	128	2	392
5:45 PM	1	1	13	4	0	1	2	187	4	11	108	2	334
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	19	1	76	111	2	82	26	2048	50	75	1247	31	3768
Approach %	19.79	1.04	79.17	56.92	1.03	42.05	1.22	96.42	2.35	5.54	92.17	2.29	
App/Depart	96	/	58	195	/	127	2124	/	2235	1353	/	1348	

PM Peak Hr Begins at: 415 PM

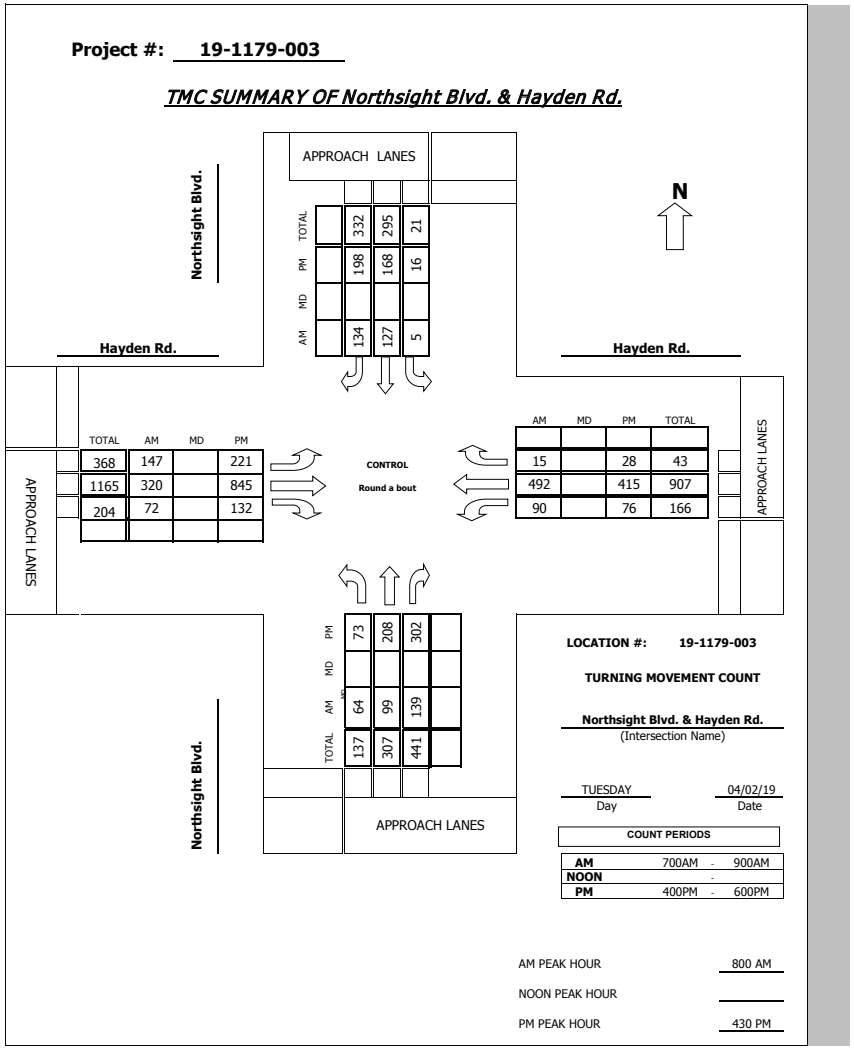
PEAK													
Volumes	10	0	42	69	1	51	13	1125	27	36	686	16	2076
Approach %	19.23	0.00	80.77	57.02	0.83	42.15	1.12	96.57	2.32	4.88	92.95	2.17	
PEAK HR. FACTOR:	0.464			0.630			0.952			0.927			0.989

CONTROL: 2-Way Stop (NB & SB)
COMMENT 1: 0
GPS: 33.625626, -111.899215

19-ZN-2013#2
8/8/2019

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: Northsight Blvd. DATE: 04/02/19 LOCATION: Scottsdale

E-W STREET: Hayden Rd. DAY: TUESDAY PROJECT# 19-1179-003

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 0.5	NT 0.5	NR 1	SL 0	ST 0	SR 1	EL 0.5	ET 1	ER 0.5	WL 0.5	WT 1	WR 0.5	TOTAL
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	11	24	29	1	17	21	19	55	14	16	78	2	287
7:15 AM	10	25	20	1	18	28	22	69	19	14	80	5	311
7:30 AM	14	32	24	2	16	24	20	87	22	17	111	2	371
7:45 AM	15	30	41	3	22	28	28	89	20	17	125	3	421
8:00 AM	13	33	42	1	20	32	24	88	21	21	122	6	423
8:15 AM	19	24	29	1	24	30	41	80	17	28	131	2	426
8:30 AM	17	20	33	2	41	33	43	74	18	21	125	5	432
8:45 AM	15	22	35	1	42	39	39	78	16	20	114	2	423
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	114	210	253	12	200	235	236	620	147	154	886	27	3094
Approach %	19.76	36.40	43.85	2.68	44.74	52.57	23.53	61.81	14.66	14.43	83.04	2.53	
App/Depart	577	/	473	447	/	501	1003	/	885	1067	/	1235	

AM Peak Hr Begins at: 800 AM

PEAK													
Volumes	64	99	139	5	127	134	147	320	72	90	492	15	1704
Approach %	21.19	32.78	46.03	1.88	47.74	50.38	27.27	59.37	13.36	15.08	82.41	2.51	
PEAK HR. FACTOR:		0.858			0.811			0.976			0.927		0.986

CONTROL: Round a bout
COMMENT 1:
GPS: 33.627311, -111.895689

19-ZN-2013#2
8/8/2019

Intersection Turning Movement

FIELD DATA SERVICES OF ARIZONA, INC. 520.316.6745 veracitytrafficgroup

N-S STREET: Northsight Blvd. 0 DATE: 04/02/19 LOCATION: Scottsdale

E-W STREET: Hayden Rd. DAY: TUESDAY PROJECT# 19-1179-003

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0.5	0.5	1	0	0	1	0.5	1	0.5	0.5	1	0.5	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	17	54	41	7	28	77	41	221	28	25	87	6	632
4:15 PM	16	60	74	5	24	50	45	205	24	21	111	3	638
4:30 PM	13	59	75	5	41	45	50	241	29	20	104	6	688
4:45 PM	18	54	59	2	42	41	54	205	30	16	122	9	652
5:00 PM	22	50	88	3	45	54	63	211	32	19	104	5	696
5:15 PM	20	45	80	6	40	58	54	188	41	21	85	8	646
5:30 PM	24	43	87	9	42	54	41	185	42	20	74	2	623
5:45 PM	25	41	74	6	39	50	28	163	28	22	50	8	534
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	155	406	578	43	301	429	376	1619	254	164	737	47	5109
Approach %	13.61	35.65	50.75	5.56	38.94	55.50	16.72	71.99	11.29	17.30	77.74	4.96	
App/Depart	1139	/	829	773	/	719	2249	/	2240	948	/	1321	

PM Peak Hr Begins at: 430 PM

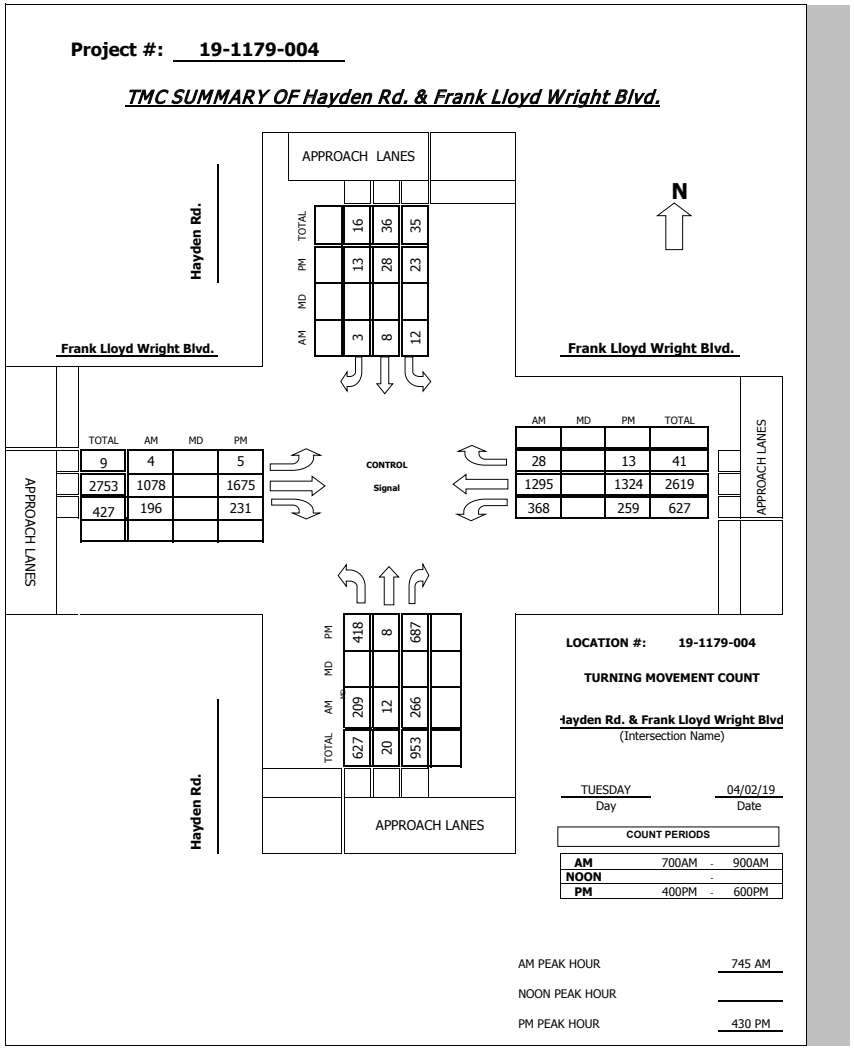
PEAK													
Volumes	73	208	302	16	168	198	221	845	132	76	415	28	2682
Approach %	12.52	35.68	51.80	4.19	43.98	51.83	18.45	70.53	11.02	14.64	79.96	5.39	
PEAK HR. FACTOR:		0.911			0.918			0.936			0.883		0.963

CONTROL: Round a bout
COMMENT 1: 0
GPS: 33.627311, -111.895689

Intersection Turning Movement
Prepared by:
FIELD DATA SERVICES OF ARIZONA, INC. 520.316.6745

Project #: 19-1179-004

TMC SUMMARY OF Hayden Rd. & Frank Lloyd Wright Blvd.



19-ZN-2013#2
8/8/2019

Intersection Turning Movement

Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: Hayden Rd. DATE: 04/02/19 LOCATION: Scottsdale

E-W STREET: Frank Lloyd Wright Blvd. DAY: TUESDAY PROJECT# 19-1179-004

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1.5	NT 0.5	NR 1	SL 1	ST 1	SR 0	EL 1	ET 3	ER 1	WL 2	WT 3	WR 1	TOTAL
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	29	2	74	3	1	1	1	214	28	69	258	6	686
7:15 AM	33	2	75	2	0	1	2	252	24	78	285	9	763
7:30 AM	30	5	50	5	1	0	1	305	41	80	286	9	813
7:45 AM	54	1	74	1	2	1	1	333	42	89	333	6	937
8:00 AM	41	4	76	4	1	0	0	236	29	111	352	9	863
8:15 AM	45	2	66	2	4	1	1	263	60	88	325	5	862
8:30 AM	69	5	50	5	1	1	2	246	65	80	285	8	817
8:45 AM	60	2	49	2	3	2	1	228	54	82	279	2	764
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	361	23	514	24	13	7	9	2077	343	677	2403	54	6505
Approach %	40.20	2.56	57.24	54.55	29.55	15.91	0.37	85.51	14.12	21.60	76.68	1.72	
App/Depart	898	/	86	44	/	1033	2429	/	2615	3134	/	2771	

AM Peak Hr Begins at: 745 AM

PEAK													
Volumes	209	12	266	12	8	3	4	1078	196	368	1295	28	3479
Approach %	42.92	2.46	54.62	52.17	34.78	13.04	0.31	84.35	15.34	21.76	76.58	1.66	
PEAK HR. FACTOR:	0.944			0.821			0.850			0.896			0.928

CONTROL: Signal
COMMENT 1:
GPS: 33.630184, -111.893175

Intersection Turning Movement

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: Hayden Rd. DATE: 04/02/19 LOCATION: Scottsdale

0

E-W STREET: Frank Lloyd Wright Blvd. DAY: TUESDAY PROJECT# 19-1179-004

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1.5	NT 0.5	NR 1	SL 1	ST 1	SR 0	EL 1	ET 3	ER 1	WL 2	WT 3	WR 1	TOTAL
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	136	3	133	5	7	2	1	325	54	69	258	8	1001
4:15 PM	122	2	154	2	4	5	2	310	41	80	296	5	1023
4:30 PM	121	1	174	3	8	2	1	501	45	74	333	2	1265
4:45 PM	104	4	158	6	5	3	1	411	58	78	322	3	1153
5:00 PM	108	1	181	9	9	6	2	422	54	66	341	6	1205
5:15 PM	85	2	174	5	6	2	1	341	74	41	328	2	1061
5:30 PM	106	5	169	8	3	5	1	333	75	32	285	5	1027
5:45 PM	103	2	131	5	2	1	0	285	50	22	276	2	879
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	885	20	1274	43	44	26	9	2928	451	462	2439	33	8614
Approach %	40.61	0.92	58.47	38.05	38.94	23.01	0.27	86.42	13.31	15.75	83.13	1.12	
App/Depart	2179	/	62	113	/	957	3388	/	4245	2934	/	3350	

PM Peak Hr Begins at: 430 PM

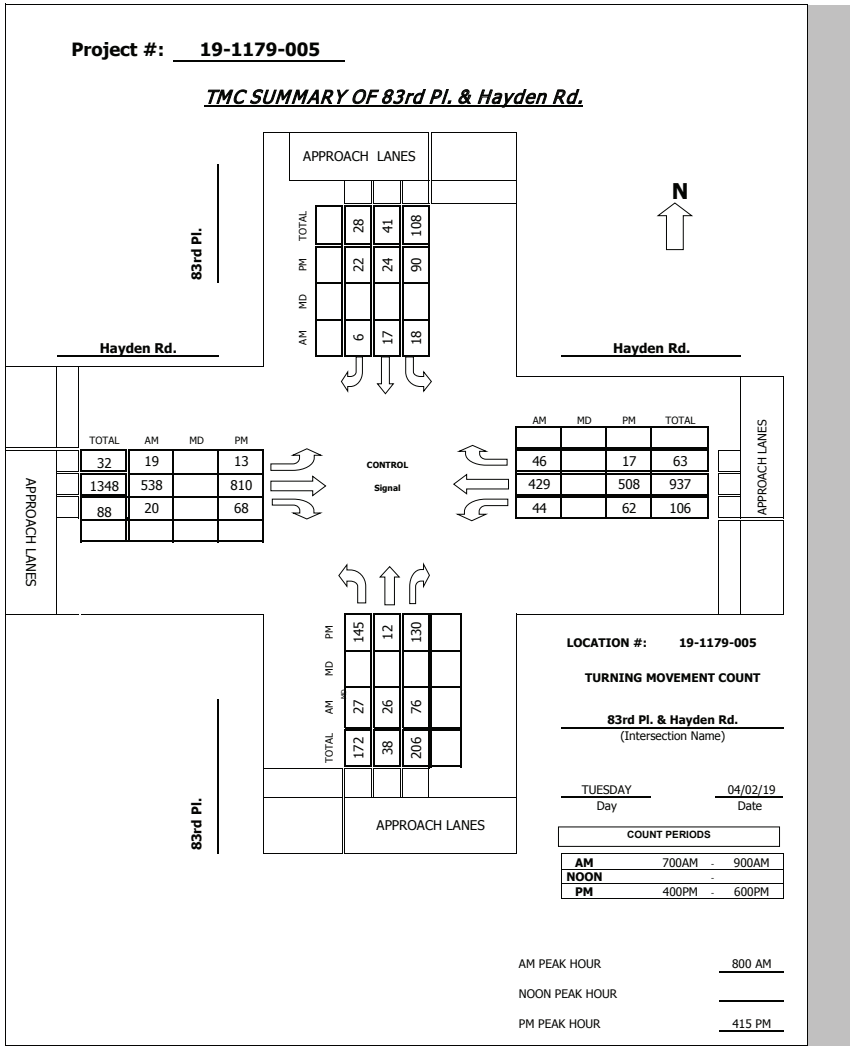
PEAK													
Volumes	418	8	687	23	28	13	5	1675	231	259	1324	13	4684
Approach %	37.56	0.72	61.73	35.94	43.75	20.31	0.26	87.65	12.09	16.23	82.96	0.81	
PEAK HR. FACTOR:	0.940			0.667			0.873			0.966			0.926

CONTROL: Signal
COMMENT 1: 0
GPS: 33.630184, -111.893175

19-ZN-2013#2
8/8/2019

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745
veracitytrafficgroup

N-S STREET: 83rd Pl. DATE: 04/02/19 LOCATION: Scottsdale
E-W STREET: Hayden Rd. DAY: TUESDAY PROJECT# 19-1179-005

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 1	NR 1	SL 1	ST 1	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	TOTAL
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	5	6	11	3	1	1	2	85	4	9	61	5	193
7:15 AM	7	6	8	4	1	1	6	83	8	14	79	6	223
7:30 AM	8	4	7	7	0	2	5	110	4	5	99	13	264
7:45 AM	7	4	16	2	1	0	1	123	4	8	101	11	278
8:00 AM	17	6	11	6	2	0	6	137	5	15	80	18	303
8:15 AM	2	4	17	3	3	0	3	119	2	15	111	7	286
8:30 AM	2	7	21	7	8	1	5	133	4	4	112	12	316
8:45 AM	6	9	27	2	4	5	5	149	9	10	126	9	361
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	54	46	118	34	20	10	33	939	40	80	769	81	2224
Approach %	24.77	21.10	54.13	53.13	31.25	15.63	3.26	92.79	3.95	8.60	82.69	8.71	
App/Depart	218	/	160	64	/	140	1012	/	1091	930	/	833	

AM Peak Hr Begins at: 800 AM

PEAK													
Volumes	27	26	76	18	17	6	19	538	20	44	429	46	1266
Approach %	20.93	20.16	58.91	43.90	41.46	14.63	3.29	93.24	3.47	8.48	82.66	8.86	

PEAK HR. FACTOR:	0.768	0.641	0.885	0.895	0.877

CONTROL: Signal
COMMENT 1:
GPS: 33.623695, -111.902930

19-ZN-2013#2
8/8/2019

Intersection Turning Movement

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: 83rd Pl.
0
E-W STREET: Hayden Rd.

DATE: 04/02/19
DAY: TUESDAY

LOCATION: Scottsdale
PROJECT# 19-1179-005

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	0	1	2	0	1	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	31	3	32	19	5	4	2	209	16	20	124	8	473
4:15 PM	35	2	26	19	6	4	2	229	15	17	136	2	493
4:30 PM	31	2	33	20	9	6	3	162	20	14	117	11	428
4:45 PM	45	5	43	25	4	9	7	197	23	17	121	3	499
5:00 PM	34	3	28	26	5	3	1	222	10	14	134	1	481
5:15 PM	47	5	42	16	7	5	3	185	17	13	125	7	472
5:30 PM	26	1	35	15	6	4	2	166	17	12	109	10	403
5:45 PM	44	3	28	9	3	1	0	137	11	12	78	1	327
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	293	24	267	149	45	36	20	1507	129	119	944	43	3576
Approach %	50.17	4.11	45.72	64.78	19.57	15.65	1.21	91.00	7.79	10.76	85.35	3.89	
App/Depart	584	/	87	230	/	293	1656	/	1923	1106	/	1273	

PM Peak Hr Begins at: 415 PM

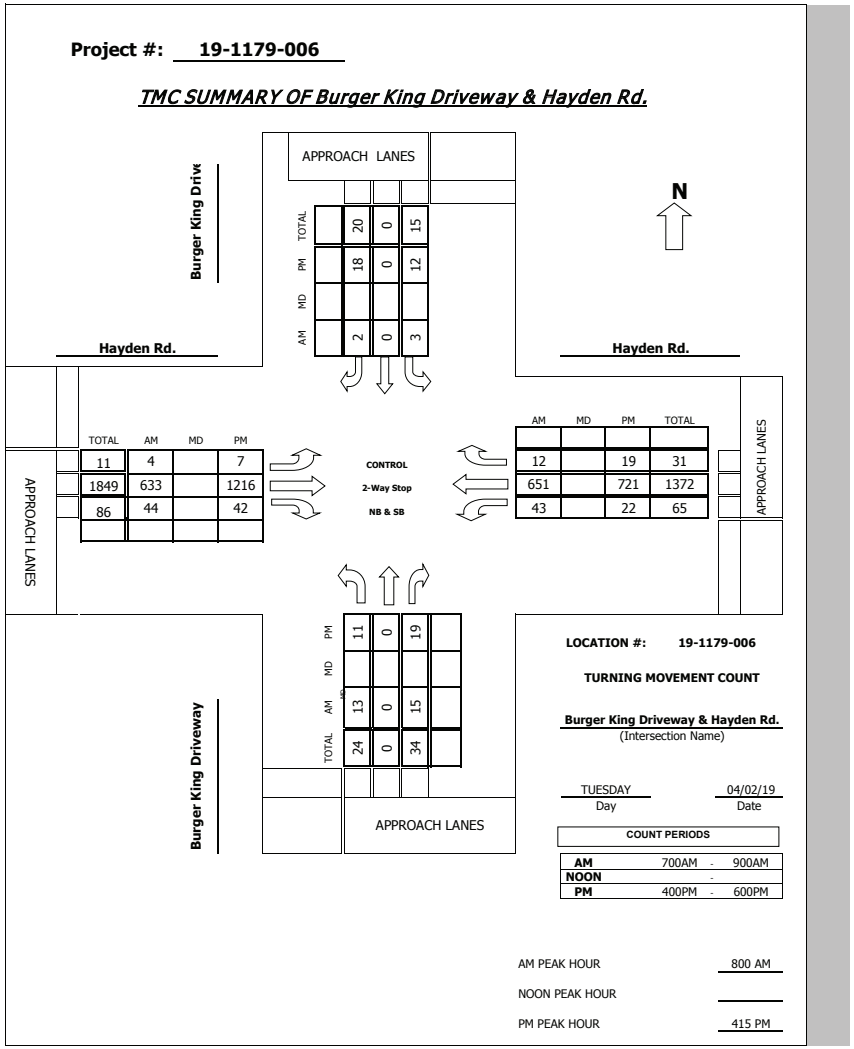
PEAK													
Volumes	145	12	130	90	24	22	13	810	68	62	508	17	1901
Approach %	50.52	4.18	45.30	66.18	17.65	16.18	1.46	90.91	7.63	10.56	86.54	2.90	
PEAK HR. FACTOR:		0.772			0.895			0.905			0.947		0.952

CONTROL: Signal
COMMENT 1: 0
GPS: 33.623695, -111.902930

Intersection Turning Movement
Prepared by:
FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

Project #: 19-1179-006

TMC SUMMARY OF Burger King Driveway & Hayden Rd.



19-ZN-2013#2
8/8/2019

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745
veracitytrafficgroup

N-S STREET: Burger King Driveway | DATE: 04/02/19 | LOCATION: Scottsdale
E-W STREET: Hayden Rd. | DAY: TUESDAY | PROJECT# 19-1179-006

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 0	NT 1	NR 0	SL 0	ST 1	SR 0	EL 1	ET 2	ER 1	WL 1	WT 2	WR 1	TOTAL
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	2	0	4	0	0	0	2	80	6	10	100	0	204
7:15 AM	5	0	7	0	0	0	0	79	15	14	114	1	235
7:30 AM	10	0	2	0	0	0	0	119	5	9	154	2	301
7:45 AM	7	0	8	0	0	0	1	144	4	16	156	1	337
8:00 AM	1	0	4	0	0	1	3	144	12	7	170	4	346
8:15 AM	4	0	4	2	0	0	0	154	12	11	157	2	346
8:30 AM	4	0	2	0	0	1	0	174	9	10	158	4	362
8:45 AM	4	0	5	1	0	0	1	161	11	15	166	2	366
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	37	0	36	3	0	2	7	1055	74	92	1175	16	2497
Approach %	50.68	0.00	49.32	60.00	0.00	40.00	0.62	92.87	6.51	7.17	91.58	1.25	
App/Depart	73	/	23	5	/	166	1136	/	1094	1283	/	1214	

AM Peak Hr Begins at: 800 AM

PEAK													
Volumes	13	0	15	3	0	2	4	633	44	43	651	12	1420
Approach %	46.43	0.00	53.57	60.00	0.00	40.00	0.59	92.95	6.46	6.09	92.21	1.70	
PEAK HR. FACTOR:	0.778			0.625			0.930			0.964			0.970

CONTROL: 2-Way Stop (NB & SB)
COMMENT 1:
GPS: 33.626551, -111.897377

Intersection Turning Movement

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745
veracitytrafficgroup

N-S STREET: Burger King Driveway 0 | DATE: 04/02/19 | LOCATION: Scottsdale
E-W STREET: Hayden Rd. | DAY: TUESDAY | PROJECT# 19-1179-006

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 0	NT 1	NR 0	SL 0	ST 1	SR 0	EL 1	ET 2	ER 1	WL 1	WT 2	WR 1	TOTAL
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	2	0	2	2	0	4	0	295	8	4	182	1	500
4:15 PM	2	0	8	2	0	3	3	294	13	5	186	1	517
4:30 PM	4	0	3	6	0	2	2	301	15	6	185	8	532
4:45 PM	3	0	4	1	0	9	1	280	3	8	176	5	490
5:00 PM	2	0	4	3	0	4	1	341	11	3	174	5	548
5:15 PM	1	0	6	1	0	4	4	265	7	4	168	2	462
5:30 PM	0	1	1	0	0	4	2	269	4	2	172	0	455
5:45 PM	1	0	2	1	0	2	1	215	4	2	121	0	349
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	15	1	30	16	0	32	14	2260	65	34	1364	22	3853
Approach %	32.61	2.17	65.22	33.33	0.00	66.67	0.60	96.62	2.78	2.39	96.06	1.55	
App/Depart	46	/	37	48	/	99	2339	/	2306	1420	/	1411	

PM Peak Hr Begins at: 415 PM

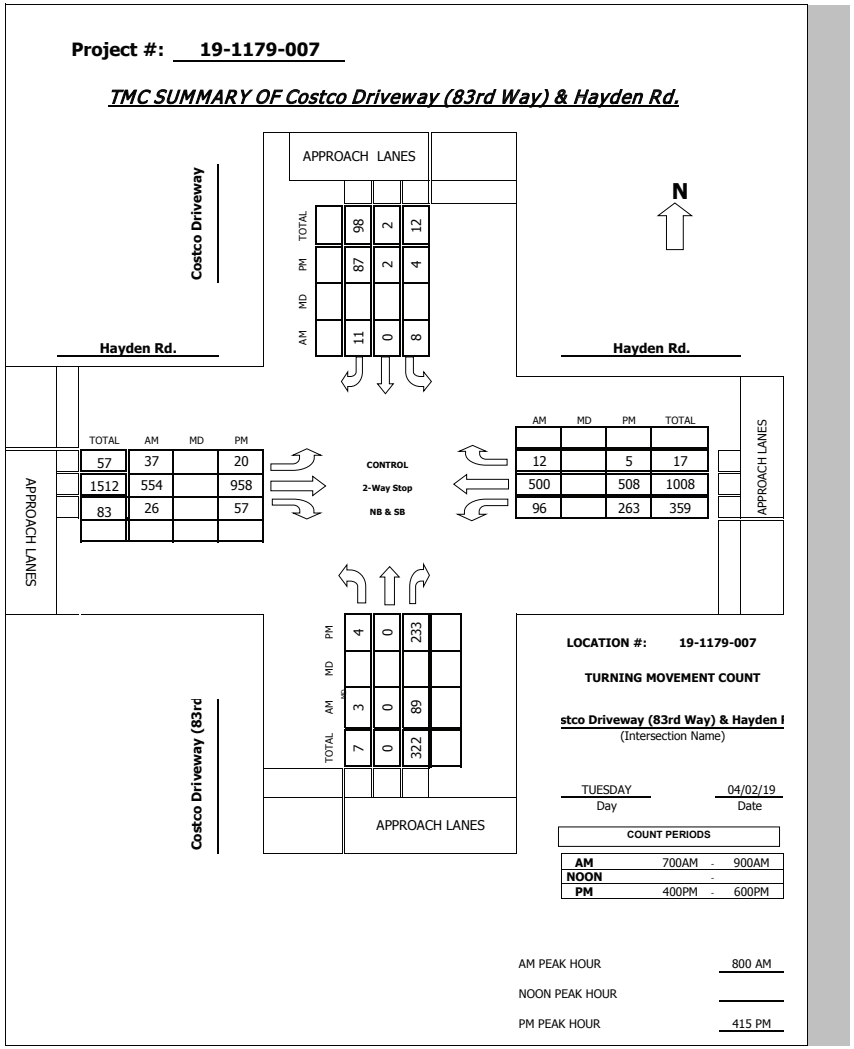
PEAK													
Volumes	11	0	19	12	0	18	7	1216	42	22	721	19	2087
Approach %	36.67	0.00	63.33	40.00	0.00	60.00	0.55	96.13	3.32	2.89	94.62	2.49	
PEAK HR. FACTOR:	0.750			0.750			0.896			0.957			0.952

CONTROL: 2-Way Stop (NB & SB)
COMMENT 1: 0
GPS: 33.626551, -111.897377

19-ZN-2013#2
8/8/2019

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: Costco Driveway (83rd Way) DATE: 04/02/19 LOCATION: Scottsdale

E-W STREET: Hayden Rd. DAY: TUESDAY PROJECT# 19-1179-007

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 0	NT 1	NR 0	SL 0	ST 1	SR 0	EL 1	ET 2	ER 1	WL 1	WT 2	WR 0	TOTAL
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	1	0	4	1	0	0	10	84	2	9	69	2	182
7:15 AM	0	0	11	0	0	0	6	87	2	12	101	4	223
7:30 AM	0	2	13	0	0	3	7	106	3	24	115	7	280
7:45 AM	0	0	12	0	0	1	20	125	9	30	112	7	316
8:00 AM	1	0	21	1	0	0	7	134	8	32	112	5	321
8:15 AM	1	0	31	2	0	1	6	131	7	21	134	3	337
8:30 AM	0	0	16	2	0	2	10	140	4	20	121	2	317
8:45 AM	1	0	21	3	0	8	14	149	7	23	133	2	361
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	4	2	129	9	0	15	80	956	42	171	897	32	2337
Approach %	2.96	1.48	95.56	37.50	0.00	62.50	7.42	88.68	3.90	15.55	81.55	2.91	
App/Depart	135	/	114	24	/	213	1078	/	1094	1100	/	916	

AM Peak Hr Begins at: 800 AM

PEAK													
Volumes	3	0	89	8	0	11	37	554	26	96	500	12	1336
Approach %	3.26	0.00	96.74	42.11	0.00	57.89	6.00	89.79	4.21	15.79	82.24	1.97	
PEAK HR. FACTOR:	0.719			0.432			0.907			0.962			0.925

CONTROL: 2-Way Stop (NB & SB)
COMMENT 1:
GPS: 33.624602, -111.901153

19-ZN-2013#2
8/8/2019

Intersection Turning Movement

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: Costco Driveway (83rd Way)
0
E-W STREET: Hayden Rd.

DATE: 04/02/19
DAY: TUESDAY

LOCATION: Scottsdale
PROJECT# 19-1179-007

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	1	2	1	1	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	0	0	47	1	0	14	4	229	22	63	126	2	508
4:15 PM	1	0	58	1	0	20	6	253	15	64	134	2	554
4:30 PM	1	0	65	2	1	23	4	209	7	70	124	0	506
4:45 PM	1	0	54	1	0	10	7	237	16	62	138	2	528
5:00 PM	1	0	56	0	1	34	3	259	19	67	112	1	553
5:15 PM	1	0	51	2	0	18	3	229	13	50	127	0	494
5:30 PM	0	0	49	2	0	20	0	208	7	64	110	1	461
5:45 PM	2	0	50	2	0	10	1	167	8	55	72	1	368
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	7	0	430	11	2	149	28	1791	107	495	943	9	3972
Approach %	1.60	0.00	98.40	6.79	1.23	91.98	1.45	92.99	5.56	34.21	65.17	0.62	
App/Depart	437	/	37	162	/	604	1926	/	2232	1447	/	1099	

PM Peak Hr Begins at: 415 PM

PEAK													
Volumes	4	0	233	4	2	87	20	958	57	263	508	5	2141
Approach %	1.69	0.00	98.31	4.30	2.15	93.55	1.93	92.56	5.51	33.89	65.46	0.64	
PEAK HR. FACTOR:		0.898			0.664			0.921			0.960		0.966

CONTROL: 2-Way Stop (NB & SB)
COMMENT 1: 0
GPS: 33.624602, -111.901153

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, April 25, 2019 City: Scottsdale Project #: 19-1226-001

Location: 84th St. & Hayden Rd.

AM Period	NB		SB		EB		WB			PM Period	NB		SB		EB		WB		
00:00	0		1		9		9			12:00	10		9		128		134		
00:15	0		0		6		19			12:15	7		11		133		141		
00:30	3		0		9		13			12:30	5		10		139		158		
00:45	1	4	0	1	8	32	9	50	87	12:45	8	30	14	44	145	545	163	596	1215
01:00	2		3		4		7			13:00	13		16		141		166		
01:15	1		1		7		7			13:15	16		13		147		161		
01:30	0		0		10		6			13:30	13		20		154		154		
01:45	2	5	1	5	11	32	9	29	71	13:45	13	55	21	70	161	603	147	628	1356
02:00	1		2		7		5			14:00	11		28		166		141		
02:15	0		1		5		8			14:15	7		24		196		145		
02:30	0		0		8		4			14:30	5		26		179		158		
02:45	1	2	1	4	4	24	7	24	54	14:45	8	31	33	111	185	726	154	598	1466
03:00	0		0		7		10			15:00	14		30		201		185		
03:15	0		0		5		11			15:15	10		32		222		196		
03:30	0		0		8		13			15:30	11		28		243		199		
03:45	2	2	0	0	6	26	19	53	81	15:45	9	44	24	114	252	918	164	744	1820
04:00	1		0		9		13			16:00	7		28		279		176		
04:15	0		1		13		16			16:15	9		24		285		199		
04:30	3		0		16		21			16:30	11		41		276		181		
04:45	1	5	1	2	14	52	41	91	150	16:45	20	47	42	135	296	1136	187	743	2061
05:00	2		1		21		54			17:00	21		29		333		174		
05:15	4		1		28		60			17:15	14		11		325		155		
05:30	7		2		42		76			17:30	8		20		222		151		
05:45	5	18	3	7	41	132	74	264	421	17:45	9	52	10	70	201	1081	141	621	1824
06:00	8		1		54		85			18:00	11		14		185		107		
06:15	10		2		50		104			18:15	10		8		174		92		
06:30	11		4		66		117			18:30	7		5		146		86		
06:45	12	41	7	14	74	244	120	426	725	18:45	4	32	9	36	133	638	80	365	1071
07:00	17		9		89		115			19:00	5		6		120		79		
07:15	17		8		99		133			19:15	2		3		104		70		
07:30	18		11		111		161			19:30	1		2		105		76		
07:45	16	68	10	38	125	424	154	563	1093	19:45	3	11	5	16	87	416	60	285	728
08:00	20		14		155		174			20:00	2		2		85		65		
08:15	21		15		151		175			20:15	1		1		86		52		
08:30	19		13		154		158			20:30	0		0		60		53		
08:45	16	76	9	51	174	634	166	673	1434	20:45	0	3	1	4	54	285	39	209	501
09:00	11		17		146		151			21:00	1		2		43		30		
09:15	10		12		166		154			21:15	0		1		33		32		
09:30	8		8		161		147			21:30	0		0		30		25		
09:45	5	34	11	48	154	627	141	593	1302	21:45	0	1	1	4	21	127	22	109	241
10:00	9		10		152		122			22:00	2		2		19		20		
10:15	11		14		155		131			22:15	0		1		16		19		
10:30	13		16		151		125			22:30	1		0		13		16		
10:45	16	49	13	53	158	616	151	529	1247	22:45	2	5	1	4	11	59	13	68	136
11:00	13		13		154		147			23:00	1		2		10		9		
11:15	9		9		141		141			23:15	0		1		14		11		
11:30	6		6		143		139			23:30	1		1		12		10		
11:45	8	36	8	36	139	577	133	560	1209	23:45	0	2	0	4	8	44	7	37	87
Total Vol.	340		259		3420		3855		**7874**		313		612		6578		5003		**12506**

GPS Coordinates: 33.625607, -111.899234

Daily Totals

NB	SB	EB	WB	Combined
653	871	9998	8858	**20380**

	AM					PM				
Split %	4.3%	3.3%	43.4%	49.0%	**38.6%**	2.5%	4.9%	52.6%	40.0%	**61.4%**
Peak Hour	07:45	10:15	08:45	08:00	**08:00**	16:30	16:15	16:30	15:00	**16:15**
Volume	76	56	647	673	**1434**	66	136	1230	744	**2128**
P.H.F.	0.90	0.88	0.93	0.96	**0.98**	0.79	0.81	0.92	0.93	**0.96**

19-ZN-2013#2
8/8/2019

APPENDIX C

EXISTING PEAK HOUR ANALYSIS AND SIGNAL TIMING

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	19	538	44	429	27	26	76	18	17
Future Volume (vph)	19	538	44	429	27	26	76	18	17
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		6		2	7	4			8
Permitted Phases	6		2		4		4	8	
Detector Phase	6	6	2	2	7	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	26.9	26.9	26.9	26.9	9.6	32.4	32.4	32.4	32.4
Total Split (s)	76.0	76.0	76.0	76.0	24.0	44.0	44.0	20.0	20.0
Total Split (%)	63.3%	63.3%	63.3%	63.3%	20.0%	36.7%	36.7%	16.7%	16.7%
Yellow Time (s)	4.7	4.7	4.7	4.7	3.0	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.2	1.6	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	4.6	5.4	5.4	5.4	5.4
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	93.1	93.1	93.1	93.1	16.4	15.6	15.6	8.0	8.0
Actuated g/C Ratio	0.78	0.78	0.78	0.78	0.14	0.13	0.13	0.07	0.07
v/c Ratio	0.03	0.22	0.09	0.19	0.22	0.13	0.35	0.33	0.27
Control Delay	4.8	4.5	5.1	4.3	45.1	43.4	11.5	63.3	47.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	4.5	5.1	4.3	45.1	43.4	11.5	63.3	47.5
LOS	A	A	A	A	D	D	B	E	D
Approach Delay		4.5		4.3		25.0			54.4
Approach LOS		A		A		C			D

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 72 (60%), Referenced to phase 2:WBTL, Start of Green		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.35		
Intersection Signal Delay: 9.0	Intersection LOS: A	
Intersection Capacity Utilization 45.6%	ICU Level of Service A	
Analysis Period (min) 15		

Splits and Phases: 1: 83rd Place & Hayden Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	538	20	44	429	46	27	26	76	18	17	6
Future Volume (veh/h)	19	538	20	44	429	46	27	26	76	18	17	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	21	604	10	49	477	34	35	34	67	28	27	3
Peak Hour Factor	0.89	0.89	0.89	0.90	0.90	0.90	0.77	0.77	0.77	0.64	0.64	0.64
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	697	2971	49	633	2794	199	154	230	176	121	87	10
Arrive On Green	0.79	0.79	0.79	0.79	0.79	0.79	0.03	0.12	0.12	0.05	0.05	0.05
Sat Flow, veh/h	842	3766	62	766	3542	252	1688	1969	1502	1226	1741	193
Grp Volume(v), veh/h	21	300	314	49	251	260	35	34	67	28	0	30
Grp Sat Flow(s),veh/h/ln	842	1870	1958	766	1870	1923	1688	1969	1502	1226	0	1934
Q Serve(g_s), s	0.7	4.8	4.8	2.1	3.9	4.0	2.3	1.9	4.9	2.7	0.0	1.8
Cycle Q Clear(g_c), s	4.7	4.8	4.8	6.9	3.9	4.0	2.3	1.9	4.9	2.7	0.0	1.8
Prop In Lane	1.00		0.03	1.00		0.13	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	697	1476	1544	633	1476	1517	154	230	176	121	0	96
V/C Ratio(X)	0.03	0.20	0.20	0.08	0.17	0.17	0.23	0.15	0.38	0.23	0.00	0.31
Avail Cap(c_a), veh/h	697	1476	1544	633	1476	1517	378	633	483	209	0	235
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	3.7	3.2	3.2	4.1	3.1	3.1	50.2	47.6	49.0	55.4	0.0	55.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.2	0.3	0.2	0.3	0.1	0.5	0.4	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.5	1.6	0.3	1.3	1.4	1.0	0.9	1.9	0.8	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.7	3.2	3.2	4.3	3.3	3.3	50.5	47.7	49.5	55.8	0.0	55.7
LnGrp LOS	A	A	A	A	A	A	D	D	D	E	A	E
Approach Vol, veh/h		635			560			136			58	
Approach Delay, s/veh		3.2			3.4			49.3			55.7	
Approach LOS		A			A			D			E	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		100.6		19.4		100.6	8.0	11.4				
Change Period (Y+Rc), s		* 5.9		* 5.4		* 5.9	* 4.6	* 5.4				
Max Green Setting (Gmax), s		* 70		* 39		* 70	* 19	* 15				
Max Q Clear Time (g_c+I1), s		8.9		6.9		6.8	4.3	4.7				
Green Ext Time (p_c), s		1.2		0.2		1.4	0.0	0.1				

Intersection Summary		
HCM 6th Ctrl Delay	10.0	
HCM 6th LOS	B	

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

19-ZN-2013#2
8/8/2019

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	37	554	26	96	500	12	0	0	92	8	0	11
Future Vol, veh/h	37	554	26	96	500	12	0	0	92	8	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	135	175	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	96	96	96	72	72	72	43	43	43
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	41	609	29	100	521	13	0	0	128	19	0	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	534	0	0	638	0	0	-	-	305	1115	1448	267
Stage 1	-	-	-	-	-	-	-	-	-	728	728	-
Stage 2	-	-	-	-	-	-	-	-	-	387	720	-
Critical Hdwy	4.14	-	-	4.14	-	-	-	-	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	-	-	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1030	-	-	942	-	-	0	0	691	163	130	731
Stage 1	-	-	-	-	-	-	0	0	-	381	427	-
Stage 2	-	-	-	-	-	-	0	0	-	608	430	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1030	-	-	942	-	-	-	-	691	118	112	731
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	223	207	-
Stage 1	-	-	-	-	-	-	-	-	-	366	382	-
Stage 2	-	-	-	-	-	-	-	-	-	476	413	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	1.5	11.4	15.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	691	1030	-	-	942	-	-	373
HCM Lane V/C Ratio	0.185	0.039	-	-	0.106	-	-	0.118
HCM Control Delay (s)	11.4	8.6	-	-	9.3	-	-	15.9
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.4	-	-	0.4

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	597	10	16	594	74	16	2	54	27	0	13
Future Vol, veh/h	18	597	10	16	594	74	16	2	54	27	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	100	145	-	-	45	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	90	90	90	56	56	56
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	628	11	17	639	80	18	2	60	48	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	719	0	0	639	0	0	1020	1419	314	1066	1390	360
Stage 1	-	-	-	-	-	-	666	666	-	713	713	-
Stage 2	-	-	-	-	-	-	354	753	-	353	677	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	878	-	-	941	-	-	191	136	682	177	141	637
Stage 1	-	-	-	-	-	-	415	456	-	389	434	-
Stage 2	-	-	-	-	-	-	636	416	-	637	450	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	878	-	-	941	-	-	179	131	682	156	135	637
Mov Cap-2 Maneuver	-	-	-	-	-	-	296	249	-	273	255	-
Stage 1	-	-	-	-	-	-	406	446	-	380	426	-
Stage 2	-	-	-	-	-	-	602	409	-	566	440	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.2	12.7	18.6
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	296	642	878	-	-	941	-	-	335
HCM Lane V/C Ratio	0.06	0.097	0.022	-	-	0.018	-	-	0.213
HCM Control Delay (s)	17.9	11.2	9.2	-	-	8.9	-	-	18.6
HCM Lane LOS	C	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.2	0.3	0.1	-	-	0.1	-	-	0.8

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	680	0	0	684	0	0
Future Vol, veh/h	680	0	0	684	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	135	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	739	0	0	735	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	370
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	627
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	627
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱		✣			✣	
Traffic Vol, veh/h	4	633	44	43	651	12	13	0	15	3	0	2
Future Vol, veh/h	4	633	44	43	651	12	13	0	15	3	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	75	90	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	96	96	96	78	78	78	63	63	63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	681	47	45	678	13	17	0	19	5	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	691	0	0	728	0	0	1118	1470	341	1117	1504	339
Stage 1	-	-	-	-	-	-	689	689	-	768	768	-
Stage 2	-	-	-	-	-	-	429	781	-	349	736	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	900	-	-	871	-	-	162	126	655	162	120	657
Stage 1	-	-	-	-	-	-	402	445	-	360	409	-
Stage 2	-	-	-	-	-	-	574	403	-	640	423	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	900	-	-	871	-	-	154	119	655	150	113	657
Mov Cap-2 Maneuver	-	-	-	-	-	-	278	240	-	150	113	-
Stage 1	-	-	-	-	-	-	400	443	-	359	388	-
Stage 2	-	-	-	-	-	-	542	382	-	618	421	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	14.8	22.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	402	900	-	-	871	-	-	217
HCM Lane V/C Ratio	0.089	0.005	-	-	0.051	-	-	0.037
HCM Control Delay (s)	14.8	9	-	-	9.4	-	-	22.2
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0.1

Intersection	
Intersection Delay, s/veh	7.0
Intersection LOS	A

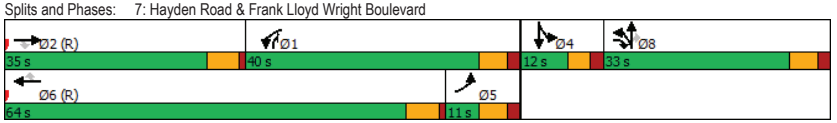
Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	550	642	351	328
Demand Flow Rate, veh/h	561	655	357	334
Vehicles Circulating, veh/h	265	345	493	714
Vehicles Exiting, veh/h	783	505	333	286
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.8	6.9	6.2	10.4
Approach LOS	A	A	A	B

Lane	Left	Right	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LT	R	LTR
Assumed Moves	LT	TR	LT	TR	LT	R	LTR
RT Channelized							
Lane Util	0.471	0.529	0.470	0.530	0.538	0.462	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	264	297	308	347	192	165	334
Cap Entry Lane, veh/h	1058	1134	983	1059	858	934	774
Entry HV Adj Factor	0.980	0.982	0.980	0.981	0.983	0.982	0.982
Flow Entry, veh/h	259	292	302	340	189	162	328
Cap Entry, veh/h	1037	1114	963	1039	843	917	760
V/C Ratio	0.250	0.262	0.313	0.328	0.224	0.177	0.432
Control Delay, s/veh	5.9	5.7	7.0	6.8	6.6	5.7	10.4
LOS	A	A	A	A	A	A	B
95th %tile Queue, veh	1	1	1	1	1	1	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	4	1078	196	368	1295	28	209	12	266	12	8
Future Volume (vph)	4	1078	196	368	1295	28	209	12	266	12	8
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA
Protected Phases	5	2	8	1	6		8	8	1	4	4
Permitted Phases			2			6			8		
Detector Phase	5	2	8	1	6	6	8	8	1	4	4
Switch Phase											
Minimum Initial (s)	5.0	10.0	5.0	5.0	10.0	10.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)	11.0	38.7	47.0	11.0	25.7	25.7	47.0	47.0	11.0	44.3	44.3
Total Split (s)	11.0	35.0	33.0	40.0	64.0	64.0	33.0	33.0	40.0	12.0	12.0
Total Split (%)	9.2%	29.2%	27.5%	33.3%	53.3%	53.3%	27.5%	27.5%	33.3%	10.0%	10.0%
Yellow Time (s)	4.0	4.7	4.0	4.0	4.7	4.7	4.0	4.0	4.0	3.3	3.3
All-Red Time (s)	2.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.7	6.0	6.0	5.7	5.7	6.0	6.0	6.0	5.3	5.3
Lead/Lag	Lag	Lead		Lag	Lead	Lead			Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes			Yes		
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	5.0	57.9	75.9	25.2	86.9	86.9	12.4	12.4	40.0	6.1	6.1
Actuated g/C Ratio	0.04	0.48	0.63	0.21	0.72	0.72	0.10	0.10	0.33	0.05	0.05
v/c Ratio	0.07	0.49	0.22	0.60	0.37	0.03	0.72	0.64	0.47	0.18	0.14
Control Delay	57.5	24.2	2.3	46.4	8.3	0.0	75.2	66.5	12.7	59.5	47.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	24.2	2.3	46.4	8.3	0.0	75.2	66.5	12.7	59.5	47.7
LOS	E	C	A	D	A	A	E	E	B	E	D
Approach Delay		20.9			16.4			39.1			53.8
Approach LOS		C			B			D			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 72 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 21.4	Intersection LOS: C
Intersection Capacity Utilization 58.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Hayden Road & Frank Lloyd Wright Boulevard



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Hayden One
Existing AM

7: Hayden Road & Frank Lloyd Wright Boulevard
HCM 6th Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	1078	196	368	1295	28	209	12	266	12	8	3
Future Volume (veh/h)	4	1078	196	368	1295	28	209	12	266	12	8	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	5	1268	143	409	1439	20	231	0	177	15	10	2
Peak Hour Factor	0.85	0.85	0.85	0.90	0.90	0.90	0.94	0.94	0.94	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	349	1312	496	1468	2611	730	290	0	803	50	47	9
Arrive On Green	0.21	0.24	0.24	0.45	0.49	0.49	0.09	0.00	0.09	0.03	0.03	0.03
Sat Flow, veh/h	1688	5375	1502	3274	5375	1502	3375	0	1502	1688	1593	319
Grp Volume(v), veh/h	5	1268	143	409	1439	20	231	0	177	15	0	12
Grp Sat Flow(s),veh/h/ln	1688	1792	1502	1637	1792	1502	1688	0	1502	1688	0	1911
Q Serve(g_s), s	0.3	28.0	8.5	9.4	22.6	0.8	8.1	0.0	0.0	1.0	0.0	0.7
Cycle Q Clear(g_c), s	0.3	28.0	8.5	9.4	22.6	0.8	8.1	0.0	0.0	1.0	0.0	0.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	349	1312	496	1468	2611	730	290	0	803	50	0	57
V/C Ratio(X)	0.01	0.97	0.29	0.28	0.55	0.03	0.80	0.00	0.22	0.30	0.00	0.21
Avail Cap(c_a), veh/h	349	1312	496	1468	2611	730	759	0	1011	94	0	107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.9	44.9	29.8	20.9	21.7	16.1	53.8	0.0	14.7	57.0	0.0	56.8
Incr Delay (d2), s/veh	0.0	18.0	1.5	0.0	0.8	0.1	1.9	0.0	0.1	1.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	14.5	3.7	3.6	9.5	0.3	3.5	0.0	2.5	0.5	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.9	62.8	31.2	20.9	22.5	16.1	55.7	0.0	14.8	58.2	0.0	57.5
LnGrp LOS	D	E	C	C	C	B	E	A	B	E	A	E
Approach Vol, veh/h		1416			1868			408			27	
Approach Delay, s/veh		59.6			22.1			38.0			57.9	
Approach LOS		E			C			D			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	59.8	35.0		8.9	30.8	64.0		16.3				
Change Period (Y+Rc), s	6.0	5.7		* 5.3	6.0	5.7		6.0				
Max Green Setting (Gmax), s	34.0	29.3		* 6.7	5.0	58.3		27.0				
Max Q Clear Time (g_c+I1), s	11.4	30.0		3.0	2.3	24.6		10.1				
Green Ext Time (p_c), s	0.3	0.0		0.0	0.0	5.0		0.3				

Intersection Summary												
HCM 6th Ctrl Delay			38.4									
HCM 6th LOS			D									

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Hayden One
Existing AM mitigated

1: 83rd Place & Hayden Road
Timings

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	19	538	44	429	27	26	76	18	17
Future Volume (vph)	19	538	44	429	27	26	76	18	17
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		6		2	7	4			8
Permitted Phases	6		2		4		4	8	
Detector Phase	6	6	2	2	7	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	26.9	26.9	26.9	26.9	9.6	32.4	32.4	32.4	32.4
Total Split (s)	76.0	76.0	76.0	76.0	24.0	44.0	44.0	20.0	20.0
Total Split (%)	63.3%	63.3%	63.3%	63.3%	20.0%	36.7%	36.7%	16.7%	16.7%
Yellow Time (s)	4.7	4.7	4.7	4.7	3.0	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.2	1.6	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	4.6	5.4	5.4	5.4	5.4
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	93.1	93.1	93.1	93.1	16.4	15.6	15.6	8.0	8.0
Actuated g/C Ratio	0.78	0.78	0.78	0.78	0.14	0.13	0.13	0.07	0.07
v/c Ratio	0.03	0.22	0.09	0.19	0.22	0.13	0.35	0.33	0.27
Control Delay	4.8	4.5	5.1	4.3	45.1	43.4	11.5	63.3	47.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	4.5	5.1	4.3	45.1	43.4	11.5	63.3	47.5
LOS	A	A	A	A	D	D	B	E	D
Approach Delay		4.5		4.3		25.0			54.4
Approach LOS		A		A		C			D

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 72 (60%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.35
Intersection Signal Delay: 9.0 — Intersection LOS: A
Intersection Capacity Utilization 45.6% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: 83rd Place & Hayden Road

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	538	20	44	429	46	27	26	76	18	17	6
Future Volume (veh/h)	19	538	20	44	429	46	27	26	76	18	17	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	21	604	10	49	477	34	35	34	67	28	27	3
Peak Hour Factor	0.89	0.89	0.89	0.90	0.90	0.90	0.77	0.77	0.77	0.64	0.64	0.64
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	697	2971	49	633	2794	199	154	230	176	121	87	10
Arrive On Green	0.79	0.79	0.79	0.79	0.79	0.79	0.03	0.12	0.12	0.05	0.05	0.05
Sat Flow, veh/h	842	3766	62	766	3542	252	1688	1969	1502	1226	1741	193
Grp Volume(v), veh/h	21	300	314	49	251	260	35	34	67	28	0	30
Grp Sat Flow(s),veh/h/ln	842	1870	1958	766	1870	1923	1688	1969	1502	1226	0	1934
Q Serve(g_s), s	0.7	4.8	4.8	2.1	3.9	4.0	2.3	1.9	4.9	2.7	0.0	1.8
Cycle Q Clear(g_c), s	4.7	4.8	4.8	6.9	3.9	4.0	2.3	1.9	4.9	2.7	0.0	1.8
Prop In Lane	1.00		0.03	1.00		0.13	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	697	1476	1544	633	1476	1517	154	230	176	121	0	96
V/C Ratio(X)	0.03	0.20	0.20	0.08	0.17	0.17	0.23	0.15	0.38	0.23	0.00	0.31
Avail Cap(c_a), veh/h	697	1476	1544	633	1476	1517	378	633	483	209	0	235
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	3.7	3.2	3.2	4.1	3.1	3.1	50.2	47.6	49.0	55.4	0.0	55.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.2	0.3	0.2	0.3	0.1	0.5	0.4	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.5	1.6	0.3	1.3	1.4	1.0	0.9	1.9	0.8	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.7	3.2	3.2	4.3	3.3	3.3	50.5	47.7	49.5	55.8	0.0	55.7
LnGrp LOS	A	A	A	A	A	A	D	D	D	E	A	E
Approach Vol, veh/h		635			560			136			58	
Approach Delay, s/veh		3.2			3.4			49.3			55.7	
Approach LOS		A			A			D			E	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		100.6		19.4		100.6	8.0	11.4				
Change Period (Y+Rc), s		* 5.9		* 5.4		* 5.9	* 4.6	* 5.4				
Max Green Setting (Gmax), s		* 70		* 39		* 70	* 19	* 15				
Max Q Clear Time (g_c+I1), s		8.9		6.9		6.8	4.3	4.7				
Green Ext Time (p_c), s		1.2		0.2		1.4	0.0	0.1				

Intersection Summary		
HCM 6th Ctrl Delay		10.0
HCM 6th LOS		B

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	37	554	26	96	500	12	0	0	92	8	0	11
Future Vol, veh/h	37	554	26	96	500	12	0	0	92	8	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	135	175	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	96	96	96	72	72	72	43	43	43
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	41	609	29	100	521	13	0	0	128	19	0	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	534	0	0	638	0	0	-	-	305	1115	1448	267
Stage 1	-	-	-	-	-	-	-	-	-	728	728	-
Stage 2	-	-	-	-	-	-	-	-	-	387	720	-
Critical Hdwy	4.14	-	-	4.14	-	-	-	-	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	-	-	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1030	-	-	942	-	-	0	0	691	163	130	731
Stage 1	-	-	-	-	-	-	0	0	-	381	427	-
Stage 2	-	-	-	-	-	-	0	0	-	608	430	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1030	-	-	942	-	-	-	-	691	118	112	731
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	223	207	-
Stage 1	-	-	-	-	-	-	-	-	-	366	382	-
Stage 2	-	-	-	-	-	-	-	-	-	476	413	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	1.5	11.4	15.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	691	1030	-	-	942	-	-	373
HCM Lane V/C Ratio	0.185	0.039	-	-	0.106	-	-	0.118
HCM Control Delay (s)	11.4	8.6	-	-	9.3	-	-	15.9
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.4	-	-	0.4

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	597	10	16	594	74	16	2	54	27	0	13
Future Vol, veh/h	18	597	10	16	594	74	16	2	54	27	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	100	145	-	-	45	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	90	90	90	56	56	56
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	628	11	17	639	80	18	2	60	48	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	719	0	0	639	0	0	1020	1419	314	1066	1390	360
Stage 1	-	-	-	-	-	-	666	666	-	713	713	-
Stage 2	-	-	-	-	-	-	354	753	-	353	677	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	878	-	-	941	-	-	191	136	682	177	141	637
Stage 1	-	-	-	-	-	-	415	456	-	389	434	-
Stage 2	-	-	-	-	-	-	636	416	-	637	450	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	878	-	-	941	-	-	179	131	682	156	135	637
Mov Cap-2 Maneuver	-	-	-	-	-	-	296	249	-	273	255	-
Stage 1	-	-	-	-	-	-	406	446	-	380	426	-
Stage 2	-	-	-	-	-	-	602	409	-	566	440	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.2	12.7	17.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	296	642	878	-	-	941	-	-	273	637
HCM Lane V/C Ratio	0.06	0.097	0.022	-	-	0.018	-	-	0.177	0.036
HCM Control Delay (s)	17.9	11.2	9.2	-	-	8.9	-	-	21	10.9
HCM Lane LOS	C	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.2	0.3	0.1	-	-	0.1	-	-	0.6	0.1

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	680	0	0	684	0	0
Future Vol, veh/h	680	0	0	684	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	135	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	739	0	0	735	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	370
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	627
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	627
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	633	44	43	651	12	13	0	15	3	0	2
Future Vol, veh/h	4	633	44	43	651	12	13	0	15	3	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	75	90	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	96	96	96	78	78	78	63	63	63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	681	47	45	678	13	17	0	19	5	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	691	0	0	728	0	0	1118	1470	341	1117	1504	339
Stage 1	-	-	-	-	-	-	689	689	-	768	768	-
Stage 2	-	-	-	-	-	-	429	781	-	349	736	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	900	-	-	871	-	-	162	126	655	162	120	657
Stage 1	-	-	-	-	-	-	402	445	-	360	409	-
Stage 2	-	-	-	-	-	-	574	403	-	640	423	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	900	-	-	871	-	-	154	119	655	150	113	657
Mov Cap-2 Maneuver	-	-	-	-	-	-	278	240	-	150	113	-
Stage 1	-	-	-	-	-	-	400	443	-	359	388	-
Stage 2	-	-	-	-	-	-	542	382	-	618	421	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	14.8	22.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	402	900	-	-	871	-	-	217
HCM Lane V/C Ratio	0.089	0.005	-	-	0.051	-	-	0.037
HCM Control Delay (s)	14.8	9	-	-	9.4	-	-	22.2
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0.1

Intersection	
Intersection Delay, s/veh	7.0
Intersection LOS	A

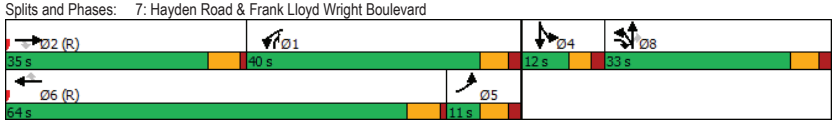
Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	550	642	351	328
Demand Flow Rate, veh/h	561	655	357	334
Vehicles Circulating, veh/h	265	345	493	714
Vehicles Exiting, veh/h	783	505	333	286
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.8	6.9	6.2	10.4
Approach LOS	A	A	A	B

Lane	Left	Right	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LT	R	LTR
Assumed Moves	LT	TR	LT	TR	LT	R	LTR
RT Channelized							
Lane Util	0.471	0.529	0.470	0.530	0.538	0.462	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	264	297	308	347	192	165	334
Cap Entry Lane, veh/h	1058	1134	983	1059	858	934	774
Entry HV Adj Factor	0.980	0.982	0.980	0.981	0.983	0.982	0.982
Flow Entry, veh/h	259	292	302	340	189	162	328
Cap Entry, veh/h	1037	1114	963	1039	843	917	760
V/C Ratio	0.250	0.262	0.313	0.328	0.224	0.177	0.432
Control Delay, s/veh	5.9	5.7	7.0	6.8	6.6	5.7	10.4
LOS	A	A	A	A	A	A	B
95th %tile Queue, veh	1	1	1	1	1	1	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	4	1078	196	368	1295	28	209	12	266	12	8
Future Volume (vph)	4	1078	196	368	1295	28	209	12	266	12	8
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA
Protected Phases	5	2	8	1	6		8	8	1	4	4
Permitted Phases			2			6			8		
Detector Phase	5	2	8	1	6	6	8	8	1	4	4
Switch Phase											
Minimum Initial (s)	5.0	10.0	5.0	5.0	10.0	10.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)	11.0	38.7	47.0	11.0	25.7	25.7	47.0	47.0	11.0	44.3	44.3
Total Split (s)	11.0	35.0	33.0	40.0	64.0	64.0	33.0	33.0	40.0	12.0	12.0
Total Split (%)	9.2%	29.2%	27.5%	33.3%	53.3%	53.3%	27.5%	27.5%	33.3%	10.0%	10.0%
Yellow Time (s)	4.0	4.7	4.0	4.0	4.7	4.7	4.0	4.0	4.0	3.3	3.3
All-Red Time (s)	2.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.7	6.0	6.0	5.7	5.7	6.0	6.0	6.0	5.3	5.3
Lead/Lag	Lag	Lead		Lag	Lead	Lead			Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes			Yes		
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	5.0	57.9	75.9	25.2	86.9	86.9	12.4	12.4	40.0	6.1	6.1
Actuated g/C Ratio	0.04	0.48	0.63	0.21	0.72	0.72	0.10	0.10	0.33	0.05	0.05
v/c Ratio	0.07	0.49	0.22	0.60	0.37	0.03	0.72	0.64	0.47	0.18	0.14
Control Delay	57.5	24.2	2.3	46.4	8.3	0.0	75.2	66.5	12.7	59.5	47.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	24.2	2.3	46.4	8.3	0.0	75.2	66.5	12.7	59.5	47.7
LOS	E	C	A	D	A	A	E	E	B	E	D
Approach Delay		20.9			16.4			39.1			53.8
Approach LOS		C			B			D			D

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 72 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 145			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 21.4		Intersection LOS: C	
Intersection Capacity Utilization 58.4%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 7: Hayden Road & Frank Lloyd Wright Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	1078	196	368	1295	28	209	12	266	12	8	3
Future Volume (veh/h)	4	1078	196	368	1295	28	209	12	266	12	8	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	5	1268	143	409	1439	20	231	0	177	15	10	2
Peak Hour Factor	0.85	0.85	0.85	0.90	0.90	0.90	0.94	0.94	0.94	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	349	1312	496	1468	2611	730	290	0	803	50	47	9
Arrive On Green	0.21	0.24	0.24	0.45	0.49	0.49	0.09	0.00	0.09	0.03	0.03	0.03
Sat Flow, veh/h	1688	5375	1502	3274	5375	1502	3375	0	1502	1688	1593	319
Grp Volume(v), veh/h	5	1268	143	409	1439	20	231	0	177	15	0	12
Grp Sat Flow(s),veh/h/ln	1688	1792	1502	1637	1792	1502	1688	0	1502	1688	0	1911
Q Serve(g_s), s	0.3	28.0	8.5	9.4	22.6	0.8	8.1	0.0	0.0	1.0	0.0	0.7
Cycle Q Clear(g_c), s	0.3	28.0	8.5	9.4	22.6	0.8	8.1	0.0	0.0	1.0	0.0	0.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	349	1312	496	1468	2611	730	290	0	803	50	0	57
V/C Ratio(X)	0.01	0.97	0.29	0.28	0.55	0.03	0.80	0.00	0.22	0.30	0.00	0.21
Avail Cap(c_a), veh/h	349	1312	496	1468	2611	730	759	0	1011	94	0	107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.9	44.9	29.8	20.9	21.7	16.1	53.8	0.0	14.7	57.0	0.0	56.8
Incr Delay (d2), s/veh	0.0	18.0	1.5	0.0	0.8	0.1	1.9	0.0	0.1	1.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	14.5	3.7	3.6	9.5	0.3	3.5	0.0	2.5	0.5	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.9	62.8	31.2	20.9	22.5	16.1	55.7	0.0	14.8	58.2	0.0	57.5
LnGrp LOS	D	E	C	C	C	B	E	A	B	E	A	E
Approach Vol, veh/h		1416			1868			408			27	
Approach Delay, s/veh		59.6			22.1			38.0			57.9	
Approach LOS		E			C			D			E	

Timer - Assigned Phs	1	2	4	5	6	8
Phs Duration (G+Y+Rc), s	59.8	35.0	8.9	30.8	64.0	16.3
Change Period (Y+Rc), s	6.0	5.7	* 5.3	6.0	5.7	6.0
Max Green Setting (Gmax), s	34.0	29.3	* 6.7	5.0	58.3	27.0
Max Q Clear Time (g_c+I1), s	11.4	30.0	3.0	2.3	24.6	10.1
Green Ext Time (p_c), s	0.3	0.0	0.0	0.0	5.0	0.3

Intersection Summary		
HCM 6th Ctrl Delay	38.4	
HCM 6th LOS	D	

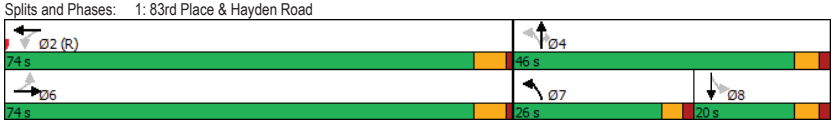
Notes
User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

19-ZN-2013#2
8/8/2019

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	13	810	62	508	145	12	130	90	24
Future Volume (vph)	13	810	62	508	145	12	130	90	24
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		6		2	7	4			8
Permitted Phases	6		2		4		4	8	
Detector Phase	6	6	2	2	7	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	26.9	26.9	26.9	26.9	9.6	32.4	32.4	32.4	32.4
Total Split (s)	74.0	74.0	74.0	74.0	26.0	46.0	46.0	20.0	20.0
Total Split (%)	61.7%	61.7%	61.7%	61.7%	21.7%	38.3%	38.3%	16.7%	16.7%
Yellow Time (s)	4.7	4.7	4.7	4.7	3.0	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.2	1.6	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	4.6	5.4	5.4	5.4	5.4
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	74.4	74.4	74.4	74.4	35.1	34.3	34.3	12.3	12.3
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.29	0.29	0.29	0.10	0.10
v/c Ratio	0.03	0.42	0.24	0.24	0.49	0.03	0.32	0.74	0.25
Control Delay	11.3	13.1	15.1	11.3	37.2	27.6	9.1	82.3	32.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.3	13.1	15.1	11.3	37.2	27.6	9.1	82.3	32.5
LOS	B	B	B	B	D	C	A	F	C
Approach Delay		13.1		11.7		24.1			65.5
Approach LOS		B		B		C			E

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 2 (2%), Referenced to phase 2:WBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 18.3	Intersection LOS: B
Intersection Capacity Utilization 61.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: 83rd Place & Hayden Road



19-ZN-2013#2
8/8/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	810	68	62	508	17	145	12	130	90	24	22
Future Volume (veh/h)	13	810	68	62	508	17	145	12	130	90	24	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	14	890	48	65	535	7	188	16	59	100	27	7
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.77	0.77	0.77	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	553	2376	128	369	2488	33	355	488	372	179	143	37
Arrive On Green	0.66	0.66	0.66	0.66	0.66	0.66	0.11	0.25	0.25	0.09	0.09	0.09
Sat Flow, veh/h	818	3609	195	566	3781	49	1688	1969	1502	1255	1508	391
Grp Volume(v), veh/h	14	461	477	65	265	277	188	16	59	100	0	34
Grp Sat Flow(s),veh/h/ln	818	1870	1934	566	1870	1960	1688	1969	1502	1255	0	1898
Q Serve(g_s), s	0.8	13.4	13.4	7.1	6.8	6.8	11.6	0.7	3.7	9.4	0.0	2.0
Cycle Q Clear(g_c), s	7.6	13.4	13.4	20.5	6.8	6.8	11.6	0.7	3.7	9.4	0.0	2.0
Prop In Lane	1.00		0.10	1.00		0.03	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	553	1231	1273	369	1231	1290	355	488	372	179	0	180
V/C Ratio(X)	0.03	0.37	0.37	0.18	0.21	0.22	0.53	0.03	0.16	0.56	0.00	0.19
Avail Cap(c_a), veh/h	553	1231	1273	369	1231	1290	463	666	508	213	0	231
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.7	9.3	9.3	14.0	8.2	8.2	40.5	34.2	35.3	53.4	0.0	50.1
Incr Delay (d2), s/veh	0.0	0.1	0.1	1.0	0.4	0.4	0.5	0.0	0.1	1.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	5.2	5.4	1.0	2.8	2.9	4.9	0.4	1.4	3.0	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.7	9.4	9.4	15.0	8.6	8.6	41.0	34.2	35.4	54.5	0.0	50.3
LnGrp LOS	A	A	A	B	A	A	D	C	D	D	A	D
Approach Vol, veh/h		952			607			263			134	
Approach Delay, s/veh		9.4			9.2			39.3			53.4	
Approach LOS		A			A			D			D	

Timer - Assigned Phs	2	4	6	7	8
Phs Duration (G+Y+Rc), s	84.9	35.1	84.9	18.4	16.7
Change Period (Y+Rc), s	* 5.9	* 5.4	* 5.9	* 4.6	* 5.4
Max Green Setting (Gmax), s	* 68	* 41	* 68	* 21	* 15
Max Q Clear Time (g_c+I1), s	22.5	5.7	15.4	13.6	11.4
Green Ext Time (p_c), s	1.5	0.1	2.2	0.2	0.1

Intersection Summary	
HCM 6th Ctrl Delay	16.4
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	958	57	263	508	5	0	0	237	4	2	87
Future Vol, veh/h	20	958	57	263	508	5	0	0	237	4	2	87
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	135	175	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	96	96	96	90	90	90	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	1041	62	274	529	5	0	0	263	6	3	132

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	534	0	0	1103	0	0	-	-	521	1645	2227	267
Stage 1	-	-	-	-	-	-	-	-	-	1080	1080	-
Stage 2	-	-	-	-	-	-	-	-	-	565	1147	-
Critical Hdwy	4.14	-	-	4.14	-	-	-	-	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	-	-	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1030	-	-	629	-	-	0	0	500	66	43	731
Stage 1	-	-	-	-	-	-	0	0	-	233	293	-
Stage 2	-	-	-	-	-	-	0	0	-	477	272	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1030	-	-	629	-	-	-	-	500	20	24	731
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ -84	~ -16	-
Stage 1	-	-	-	-	-	-	-	-	-	228	165	-
Stage 2	-	-	-	-	-	-	-	-	-	221	266	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	5.1	19.9	3.1
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	500	1030	-	-	629	-	-	+
HCM Lane V/C Ratio	0.527	0.021	-	-	0.436	-	-	-
HCM Control Delay (s)	19.9	8.6	-	-	15.1	-	-	3.1
HCM Lane LOS	C	A	-	-	C	-	-	A
HCM 95th %tile Q(veh)	3	0.1	-	-	2.2	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

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Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	1125	27	36	686	16	10	0	42	69	1	51
Future Vol, veh/h	13	1125	27	36	686	16	10	0	42	69	1	51
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	100	145	-	-	45	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	46	46	46	63	63	63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	1184	28	39	738	17	22	0	91	110	2	81

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	755	0	0	1212	0	0	1660	2045	592	1445	2065	378
Stage 1	-	-	-	-	-	-	1212	1212	-	825	825	-
Stage 2	-	-	-	-	-	-	448	833	-	620	1240	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	851	-	-	571	-	-	64	55	449	~ 93	54	620
Stage 1	-	-	-	-	-	-	193	253	-	333	385	-
Stage 2	-	-	-	-	-	-	560	382	-	442	245	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	851	-	-	571	-	-	52	50	449	~ 69	50	620
Mov Cap-2 Maneuver	-	-	-	-	-	-	140	154	-	176	139	-
Stage 1	-	-	-	-	-	-	190	249	-	328	359	-
Stage 2	-	-	-	-	-	-	452	356	-	346	241	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	19	54.4
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	140	449	851	-	-	571	-	-	251
HCM Lane V/C Ratio	0.155	0.203	0.016	-	-	0.068	-	-	0.765
HCM Control Delay (s)	35.4	15.1	9.3	-	-	11.8	-	-	54.4
HCM Lane LOS	E	C	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.5	0.8	0	-	-	0.2	-	-	5.6

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1236	0	0	738	0	0
Future Vol, veh/h	1236	0	0	738	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	135	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1343	0	0	794	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	672
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	398
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	398
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	1216	42	22	721	19	11	0	19	12	0	18
Future Vol, veh/h	7	1216	42	22	721	19	11	0	19	12	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	75	90	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	96	96	96	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	1351	47	23	751	20	15	0	25	16	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	771	0	0	1398	0	0	1789	2184	676	1489	2211	376
Stage 1	-	-	-	-	-	-	1367	1367	-	797	797	-
Stage 2	-	-	-	-	-	-	422	817	-	692	1414	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	840	-	-	485	-	-	51	45	396	86	44	622
Stage 1	-	-	-	-	-	-	155	213	-	346	397	-
Stage 2	-	-	-	-	-	-	580	388	-	400	202	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	840	-	-	485	-	-	47	42	396	77	41	622
Mov Cap-2 Maneuver	-	-	-	-	-	-	122	139	-	193	126	-
Stage 1	-	-	-	-	-	-	153	211	-	343	378	-
Stage 2	-	-	-	-	-	-	531	370	-	371	200	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	25.3	17.5
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	217	840	-	-	485	-	-	329
HCM Lane V/C Ratio	0.184	0.009	-	-	0.047	-	-	0.122
HCM Control Delay (s)	25.3	9.3	-	-	12.8	-	-	17.5
HCM Lane LOS	D	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.1	-	-	0.4

Intersection	
Intersection Delay, s/veh	13.9
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1274	590	641	415
Demand Flow Rate, veh/h	1300	602	655	423
Vehicles Circulating, veh/h	292	556	1174	651
Vehicles Exiting, veh/h	782	1273	418	507
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	11.6	8.5	24.8	11.8
Approach LOS	B	A	C	B

Lane	Left	Right	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LT	R	LTR
Assumed Moves	LT	TR	LT	TR	LT	R	LTR
RT Channelized							
Lane Util	0.470	0.530	0.470	0.530	0.482	0.518	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	611	689	283	319	316	339	423
Cap Entry Lane, veh/h	1032	1108	809	885	458	523	817
Entry HV Adj Factor	0.980	0.980	0.979	0.980	0.979	0.979	0.982
Flow Entry, veh/h	599	675	277	312	309	332	415
Cap Entry, veh/h	1011	1086	793	867	449	513	802
V/C Ratio	0.592	0.622	0.350	0.360	0.689	0.648	0.518
Control Delay, s/veh	11.6	11.7	8.7	8.3	27.4	22.3	11.8
LOS	B	B	A	A	D	C	B
95th %tile Queue, veh	4	5	2	2	5	5	3

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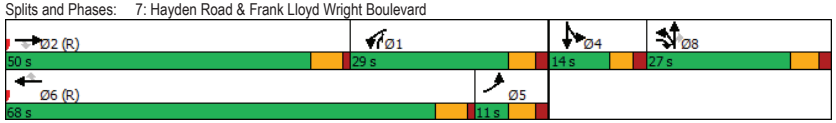
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	5	1675	231	259	1324	13	418	8	687	23	28
Future Volume (vph)	5	1675	231	259	1324	13	418	8	687	23	28
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA
Protected Phases	5	2	8	1	6		8	8	1	4	4
Permitted Phases			2			6			8		
Detector Phase	5	2	8	1	6	6	8	8	1	4	4
Switch Phase											
Minimum Initial (s)	5.0	10.0	5.0	5.0	10.0	10.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)	11.0	38.7	47.0	11.0	25.7	25.7	47.0	47.0	11.0	44.3	44.3
Total Split (s)	11.0	50.0	27.0	29.0	68.0	68.0	27.0	27.0	29.0	14.0	14.0
Total Split (%)	9.2%	41.7%	22.5%	24.2%	56.7%	56.7%	22.5%	22.5%	24.2%	11.7%	11.7%
Yellow Time (s)	4.0	4.7	4.0	4.0	4.7	4.7	4.0	4.0	4.0	3.3	3.3
All-Red Time (s)	2.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.7	6.0	6.0	5.7	5.7	6.0	6.0	6.0	5.3	5.3
Lead/Lag	Lag	Lead		Lag	Lead	Lead			Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes			Yes		
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	5.0	50.0	75.0	23.0	76.8	76.8	19.3	19.3	43.5	7.0	7.0
Actuated g/C Ratio	0.04	0.42	0.62	0.19	0.64	0.64	0.16	0.16	0.36	0.06	0.06
v/c Ratio	0.09	0.86	0.26	0.43	0.40	0.01	0.89	0.80	1.20	0.35	0.50
Control Delay	58.2	38.3	1.9	45.2	12.3	0.0	82.6	68.5	133.3	64.0	56.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.2	38.3	1.9	45.2	12.3	0.0	82.6	68.5	133.3	64.0	56.7
LOS	E	D	A	D	B	A	F	E	F	E	E
Approach Delay		33.9			17.6			111.2			59.3
Approach LOS		C			B			F			E

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 103 (86%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 145			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.20			
Intersection Signal Delay: 47.0		Intersection LOS: D	
Intersection Capacity Utilization 94.8%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 7: Hayden Road & Frank Lloyd Wright Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1675	231	259	1324	13	418	8	687	23	28	13
Future Volume (veh/h)	5	1675	231	259	1324	13	418	8	687	23	28	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	6	1925	134	267	1365	5	451	0	518	34	42	4
Peak Hour Factor	0.87	0.87	0.87	0.97	0.97	0.97	0.94	0.94	0.94	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	155	1984	781	791	2790	780	510	0	590	79	82	8
Arrive On Green	0.09	0.37	0.37	0.24	0.52	0.52	0.15	0.00	0.15	0.05	0.05	0.05
Sat Flow, veh/h	1688	5375	1502	3274	5375	1502	3375	0	1502	1688	1770	169
Grp Volume(v), veh/h	6	1925	134	267	1365	5	451	0	518	34	0	46
Grp Sat Flow(s),veh/h/ln	1688	1792	1502	1637	1792	1502	1688	0	1502	1688	0	1938
Q Serve(g_s), s	0.4	42.2	5.6	8.1	19.6	0.2	15.7	0.0	9.4	2.4	0.0	2.8
Cycle Q Clear(g_c), s	0.4	42.2	5.6	8.1	19.6	0.2	15.7	0.0	9.4	2.4	0.0	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	155	1984	781	791	2790	780	510	0	590	79	0	90
V/C Ratio(X)	0.04	0.97	0.17	0.34	0.49	0.01	0.88	0.00	0.88	0.43	0.00	0.51
Avail Cap(c_a), veh/h	155	1984	781	791	2790	780	591	0	626	122	0	141
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	49.7	37.2	15.2	37.6	18.6	13.9	49.9	0.0	33.8	55.7	0.0	55.9
Incr Delay (d2), s/veh	0.0	14.3	0.5	0.1	0.6	0.0	12.4	0.0	12.3	1.4	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	20.8	2.8	3.3	8.2	0.1	7.5	0.0	15.7	1.0	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.7	51.5	15.6	37.7	19.2	13.9	62.3	0.0	46.1	57.1	0.0	57.5
LnGrp LOS	D	D	B	D	B	B	E	A	D	E	A	E
Approach Vol, veh/h		2065			1637			969			80	
Approach Delay, s/veh		49.2			22.2			53.6			57.3	
Approach LOS		D			C			D			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	35.0	50.0		10.9	17.0	68.0		24.1				
Change Period (Y+Rc), s	6.0	5.7		* 5.3	6.0	5.7		6.0				
Max Green Setting (Gmax), s	23.0	44.3		* 8.7	5.0	62.3		21.0				
Max Q Clear Time (g_c+I1), s	10.1	44.2		4.8	2.4	21.6		17.7				
Green Ext Time (p_c), s	0.2	0.0		0.0	0.0	4.7		0.4				

Intersection Summary		
HCM 6th Ctrl Delay	40.9	
HCM 6th LOS	D	

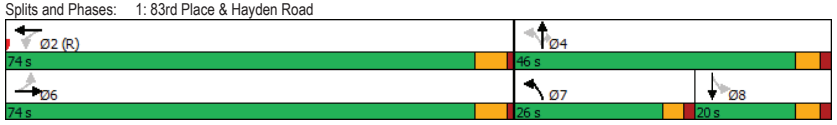
Notes
User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

19-ZN-2013#2
8/8/2019

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	13	810	62	508	145	12	130	90	24
Future Volume (vph)	13	810	62	508	145	12	130	90	24
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		6		2	7	4			8
Permitted Phases	6		2		4		4	8	
Detector Phase	6	6	2	2	7	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	26.9	26.9	26.9	26.9	9.6	32.4	32.4	32.4	32.4
Total Split (s)	74.0	74.0	74.0	74.0	26.0	46.0	46.0	20.0	20.0
Total Split (%)	61.7%	61.7%	61.7%	61.7%	21.7%	38.3%	38.3%	16.7%	16.7%
Yellow Time (s)	4.7	4.7	4.7	4.7	3.0	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.2	1.6	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	4.6	5.4	5.4	5.4	5.4
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	74.4	74.4	74.4	74.4	35.1	34.3	34.3	12.3	12.3
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.29	0.29	0.29	0.10	0.10
v/c Ratio	0.03	0.42	0.24	0.24	0.49	0.03	0.32	0.74	0.25
Control Delay	11.3	13.1	15.1	11.3	37.2	27.6	9.1	82.3	32.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.3	13.1	15.1	11.3	37.2	27.6	9.1	82.3	32.5
LOS	B	B	B	B	D	C	A	F	C
Approach Delay		13.1		11.7		24.1			65.5
Approach LOS		B		B		C			E

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 2 (2%), Referenced to phase 2:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 18.3		Intersection LOS: B	
Intersection Capacity Utilization 61.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: 83rd Place & Hayden Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	810	68	62	508	17	145	12	130	90	24	22
Future Volume (veh/h)	13	810	68	62	508	17	145	12	130	90	24	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	14	890	48	65	535	7	188	16	59	100	27	7
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.77	0.77	0.77	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	553	2376	128	369	2488	33	355	488	372	179	143	37
Arrive On Green	0.66	0.66	0.66	0.66	0.66	0.66	0.11	0.25	0.25	0.09	0.09	0.09
Sat Flow, veh/h	818	3609	195	566	3781	49	1688	1969	1502	1255	1508	391
Grp Volume(v), veh/h	14	461	477	65	265	277	188	16	59	100	0	34
Grp Sat Flow(s),veh/h/ln	818	1870	1934	566	1870	1960	1688	1969	1502	1255	0	1898
Q Serve(g_s), s	0.8	13.4	13.4	7.1	6.8	6.8	11.6	0.7	3.7	9.4	0.0	2.0
Cycle Q Clear(g_c), s	7.6	13.4	13.4	20.5	6.8	6.8	11.6	0.7	3.7	9.4	0.0	2.0
Prop In Lane	1.00		0.10	1.00		0.03	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	553	1231	1273	369	1231	1290	355	488	372	179	0	180
V/C Ratio(X)	0.03	0.37	0.37	0.18	0.21	0.22	0.53	0.03	0.16	0.56	0.00	0.19
Avail Cap(c_a), veh/h	553	1231	1273	369	1231	1290	463	666	508	213	0	231
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.7	9.3	9.3	14.0	8.2	8.2	40.5	34.2	35.3	53.4	0.0	50.1
Incr Delay (d2), s/veh	0.0	0.1	0.1	1.0	0.4	0.4	0.5	0.0	0.1	1.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	5.2	5.4	1.0	2.8	2.9	4.9	0.4	1.4	3.0	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.7	9.4	9.4	15.0	8.6	8.6	41.0	34.2	35.4	54.5	0.0	50.3
LnGrp LOS	A	A	A	B	A	A	D	C	D	D	A	D
Approach Vol, veh/h		952			607			263			134	
Approach Delay, s/veh		9.4			9.2			39.3			53.4	
Approach LOS		A			A			D			D	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		84.9		35.1		84.9	18.4	16.7				
Change Period (Y+Rc), s		* 5.9		* 5.4		* 5.9	* 4.6	* 5.4				
Max Green Setting (Gmax), s		* 68		* 41		* 68	* 21	* 15				
Max Q Clear Time (g_c+I1), s		22.5		5.7		15.4	13.6	11.4				
Green Ext Time (p_c), s		1.5		0.1		2.2	0.2	0.1				

Intersection Summary		
HCM 6th Ctrl Delay	16.4	
HCM 6th LOS	B	

Notes
User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

19-ZN-2013#2
8/8/2019

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	958	57	263	508	5	0	0	237	4	2	87
Future Vol, veh/h	20	958	57	263	508	5	0	0	237	4	2	87
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	135	175	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	96	96	96	90	90	90	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	1041	62	274	529	5	0	0	263	6	3	132

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	534	0	0	1103	0	0	-	-	521	1645	2227	267
Stage 1	-	-	-	-	-	-	-	-	-	1080	1080	-
Stage 2	-	-	-	-	-	-	-	-	-	565	1147	-
Critical Hdwy	4.14	-	-	4.14	-	-	-	-	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	-	-	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1030	-	-	629	-	-	0	0	500	66	43	731
Stage 1	-	-	-	-	-	-	0	0	-	233	293	-
Stage 2	-	-	-	-	-	-	0	0	-	477	272	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1030	-	-	629	-	-	-	-	500	20	24	731
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ -84	~ -16	-
Stage 1	-	-	-	-	-	-	-	-	-	228	165	-
Stage 2	-	-	-	-	-	-	-	-	-	221	266	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	5.1	19.9	3.1
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	500	1030	-	-	629	-	-	+
HCM Lane V/C Ratio	0.527	0.021	-	-	0.436	-	-	-
HCM Control Delay (s)	19.9	8.6	-	-	15.1	-	-	3.1
HCM Lane LOS	C	A	-	-	C	-	-	A
HCM 95th %tile Q(veh)	3	0.1	-	-	2.2	-	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	1125	27	36	686	16	10	0	42	69	1	51
Future Vol, veh/h	13	1125	27	36	686	16	10	0	42	69	1	51
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	100	145	-	-	45	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	46	46	46	63	63	63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	1184	28	39	738	17	22	0	91	110	2	81

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	755	0	0	1212	0	0	1660	2045	592	1445	2065	378
Stage 1	-	-	-	-	-	-	1212	1212	-	825	825	-
Stage 2	-	-	-	-	-	-	448	833	-	620	1240	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	851	-	-	571	-	-	64	55	449	~ 93	54	620
Stage 1	-	-	-	-	-	-	193	253	-	333	385	-
Stage 2	-	-	-	-	-	-	560	382	-	442	245	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	851	-	-	571	-	-	52	50	449	~ 69	50	620
Mov Cap-2 Maneuver	-	-	-	-	-	-	140	154	-	176	139	-
Stage 1	-	-	-	-	-	-	190	249	-	328	359	-
Stage 2	-	-	-	-	-	-	452	356	-	346	241	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	19	36.2
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	140	449	851	-	-	571	-	-	176	581
HCM Lane V/C Ratio	0.155	0.203	0.016	-	-	0.068	-	-	0.622	0.142
HCM Control Delay (s)	35.4	15.1	9.3	-	-	11.8	-	-	54.3	12.2
HCM Lane LOS	E	C	A	-	-	B	-	-	F	B
HCM 95th %tile Q(veh)	0.5	0.8	0	-	-	0.2	-	-	3.5	0.5

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1236	0	0	738	0	0
Future Vol, veh/h	1236	0	0	738	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	135	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1343	0	0	794	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	672
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	398
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	398
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	1216	42	22	721	19	11	0	19	12	0	18
Future Vol, veh/h	7	1216	42	22	721	19	11	0	19	12	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	75	90	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	96	96	96	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	1351	47	23	751	20	15	0	25	16	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	771	0	0	1398	0	0	1789	2184	676	1489	2211	376
Stage 1	-	-	-	-	-	-	1367	1367	-	797	797	-
Stage 2	-	-	-	-	-	-	422	817	-	692	1414	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	840	-	-	485	-	-	51	45	396	86	44	622
Stage 1	-	-	-	-	-	-	155	213	-	346	397	-
Stage 2	-	-	-	-	-	-	580	388	-	400	202	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	840	-	-	485	-	-	47	42	396	77	41	622
Mov Cap-2 Maneuver	-	-	-	-	-	-	122	139	-	193	126	-
Stage 1	-	-	-	-	-	-	153	211	-	343	378	-
Stage 2	-	-	-	-	-	-	531	370	-	371	200	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	25.3	17.5
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	217	840	-	-	485	-	-	329
HCM Lane V/C Ratio	0.184	0.009	-	-	0.047	-	-	0.122
HCM Control Delay (s)	25.3	9.3	-	-	12.8	-	-	17.5
HCM Lane LOS	D	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.1	-	-	0.4

6: Northsight Boulevard & Hayden Road

HCM 6th Roundabout

Intersection	
Intersection Delay, s/veh	13.9
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1274	590	641	415
Demand Flow Rate, veh/h	1300	602	655	423
Vehicles Circulating, veh/h	292	556	1174	651
Vehicles Exiting, veh/h	782	1273	418	507
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	11.6	8.5	24.8	11.8
Approach LOS	B	A	C	B

Lane	Left	Right	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LT	R	LTR
Assumed Moves	LT	TR	LT	TR	LT	R	LTR
RT Channelized							
Lane Util	0.470	0.530	0.470	0.530	0.482	0.518	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	611	689	283	319	316	339	423
Cap Entry Lane, veh/h	1032	1108	809	885	458	523	817
Entry HV Adj Factor	0.980	0.980	0.979	0.980	0.979	0.979	0.982
Flow Entry, veh/h	599	675	277	312	309	332	415
Cap Entry, veh/h	1011	1086	793	867	449	513	802
V/C Ratio	0.592	0.622	0.350	0.360	0.689	0.648	0.518
Control Delay, s/veh	11.6	11.7	8.7	8.3	27.4	22.3	11.8
LOS	B	B	A	A	D	C	B
95th %tile Queue, veh	4	5	2	2	5	5	3

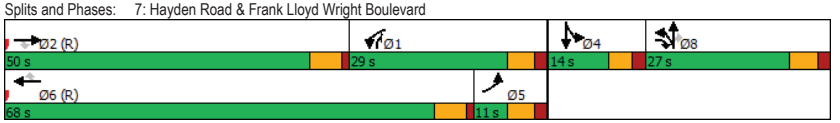
7: Hayden Road & Frank Lloyd Wright Boulevard

Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	5	1675	231	259	1324	13	418	8	687	23	28
Future Volume (vph)	5	1675	231	259	1324	13	418	8	687	23	28
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA
Protected Phases	5	2	8	1	6		8	8	1	4	4
Permitted Phases			2			6			8		
Detector Phase	5	2	8	1	6	6	8	8	1	4	4
Switch Phase											
Minimum Initial (s)	5.0	10.0	5.0	5.0	10.0	10.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)	11.0	38.7	47.0	11.0	25.7	25.7	47.0	47.0	11.0	44.3	44.3
Total Split (s)	11.0	50.0	27.0	29.0	68.0	68.0	27.0	27.0	29.0	14.0	14.0
Total Split (%)	9.2%	41.7%	22.5%	24.2%	56.7%	56.7%	22.5%	22.5%	24.2%	11.7%	11.7%
Yellow Time (s)	4.0	4.7	4.0	4.0	4.7	4.7	4.0	4.0	4.0	3.3	3.3
All-Red Time (s)	2.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.7	6.0	6.0	5.7	5.7	6.0	6.0	6.0	5.3	5.3
Lead/Lag	Lag	Lead		Lag	Lead	Lead			Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes			Yes		
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	5.0	50.0	75.0	23.0	76.8	76.8	19.3	19.3	43.5	7.0	7.0
Actuated g/C Ratio	0.04	0.42	0.62	0.19	0.64	0.64	0.16	0.16	0.36	0.06	0.06
v/c Ratio	0.09	0.86	0.26	0.43	0.40	0.01	0.89	0.80	1.20	0.35	0.50
Control Delay	58.2	38.3	1.9	45.2	12.3	0.0	82.6	68.5	133.3	64.0	56.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.2	38.3	1.9	45.2	12.3	0.0	82.6	68.5	133.3	64.0	56.7
LOS	E	D	A	D	B	A	F	E	F	E	E
Approach Delay		33.9			17.6			111.2			59.3
Approach LOS		C			B			F			E

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 103 (86%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.20	
Intersection Signal Delay: 47.0	Intersection LOS: D
Intersection Capacity Utilization 94.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 7: Hayden Road & Frank Lloyd Wright Boulevard



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7: Hayden Road & Frank Lloyd Wright Boulevard

HCM 6th Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1675	231	259	1324	13	418	8	687	23	28	13
Future Volume (veh/h)	5	1675	231	259	1324	13	418	8	687	23	28	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	6	1925	134	267	1365	5	451	0	518	34	42	4
Peak Hour Factor	0.87	0.87	0.87	0.97	0.97	0.97	0.94	0.94	0.94	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	155	1984	781	791	2790	780	510	0	590	79	82	8
Arrive On Green	0.09	0.37	0.37	0.24	0.52	0.52	0.15	0.00	0.15	0.05	0.05	0.05
Sat Flow, veh/h	1688	5375	1502	3274	5375	1502	3375	0	1502	1688	1770	169
Grp Volume(v), veh/h	6	1925	134	267	1365	5	451	0	518	34	0	46
Grp Sat Flow(s),veh/h/ln	1688	1792	1502	1637	1792	1502	1688	0	1502	1688	0	1938
Q Serve(g_s), s	0.4	42.2	5.6	8.1	19.6	0.2	15.7	0.0	9.4	2.4	0.0	2.8
Cycle Q Clear(g_c), s	0.4	42.2	5.6	8.1	19.6	0.2	15.7	0.0	9.4	2.4	0.0	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	155	1984	781	791	2790	780	510	0	590	79	0	90
V/C Ratio(X)	0.04	0.97	0.17	0.34	0.49	0.01	0.88	0.00	0.88	0.43	0.00	0.51
Avail Cap(c_a), veh/h	155	1984	781	791	2790	780	591	0	626	122	0	141
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	49.7	37.2	15.2	37.6	18.6	13.9	49.9	0.0	33.8	55.7	0.0	55.9
Incr Delay (d2), s/veh	0.0	14.3	0.5	0.1	0.6	0.0	12.4	0.0	12.3	1.4	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	20.8	2.8	3.3	8.2	0.1	7.5	0.0	15.7	1.0	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.7	51.5	15.6	37.7	19.2	13.9	62.3	0.0	46.1	57.1	0.0	57.5
LnGrp LOS	D	D	B	D	B	B	E	A	D	E	A	E
Approach Vol, veh/h		2065			1637			969			80	
Approach Delay, s/veh		49.2			22.2			53.6			57.3	
Approach LOS		D			C			D			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	35.0	50.0		10.9	17.0	68.0		24.1				
Change Period (Y+Rc), s	6.0	5.7		* 5.3	6.0	5.7		6.0				
Max Green Setting (Gmax), s	23.0	44.3		* 8.7	5.0	62.3		21.0				
Max Q Clear Time (g_c+I1), s	10.1	44.2		4.8	2.4	21.6		17.7				
Green Ext Time (p_c), s	0.2	0.0		0.0	0.0	4.7		0.4				

Intersection Summary	
HCM 6th Ctrl Delay	40.9
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

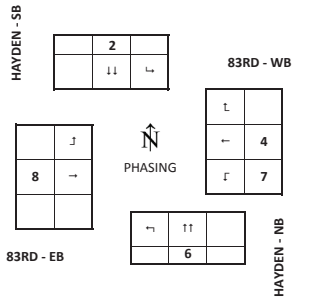
HAYDEN & 83RD

System # 171

BASIC TIMING PLAN

Section #	I.P. Address	Date Designed
	MM1-5-1	
	172.17.11.71	1/24/2017

	Phase		2		4		6	7	8
	Movement		SBT		WBT		NBT	WBL	EBT
	NOTES							L-P&p	
TIMING PLAN - MM-2-1	MIN GRN		10		7		10	5	7
	BK MGRN								
	CS MGRN								
	DLY GRN								
	WALK		7		7		7		7
	WALK2								
	WLK MAX								
	PED CLR/FDW		14		20		14		20
	PD CLR2								
	PC MAX								
	PED CO								
	VEH EXT		1		2		1	2	2
	VH EXT2								
	MAX 1		70		50		70	25	35
	MAX 2		90		55		90	35	50
	MAX 3								
	DYM MAX								
	DYM STP								
	YELLOW		4.7		3.6		4.7	3.0	3.6
	RED CLR		1.2		1.8		1.2	1.6	1.8
	RED MAX								
	RED RVT		2		2		2	2	2
	ACT B4								
	SEC/ACT								
	MAX INT								
	TIME B4								
	CARS WT								
	STPTDUC								
	TTREDUC								
	MIN GAP								
RECALLS - MM-2-8	LOCK DET								
	VEH RECALL								
	PED RECALL		X				X		
	MAX RECALL								
	SOFT RECALL								
	NO REST								
	ADD INIT CAL								



PHASING SEQUENCES					
TOD: MORNING					
R1	2				4
R2	6			8	7
			B		B
Use Timing plan:					
TOD: MIDDAY					
R1	2				4
R2	6			8	7
			B		B
Use Timing plan:					
TOD: EVENING					
R1	2				4
R2	6			8	7
			B		B
Use Timing plan:					
TOD: NIGHT					
R1	2				4
R2	6			8	7
			B		B
Use Timing plan:					
FREE					
R1	2				4
R2	6			8	7
			B		B
Use Timing plan: 254					

NOTES
Night plan is running free.

EXPIRES XX/XX/XXXX

HAYDEN & 83RD

System # 171

COORDINATOR

Section #	Date Updated
0	1/24/2017

	PHASE	1	2	3	4	5	6	7	8	
	FDW		14		20		14		20	
	YELLOW		4.7		3.6		4.7	3	3.6	
	ALL RED		1.2		1.8		1.2	1.6	1.8	
	WALK		14		20		14		20	
PLAN 1 AM PLAN OPERATIVE TIMES	R1	2	↓	0	↑↑↑	0	↑↑↑↑	4	←	COORD PATTERN: OFFSET
	R2	6	↑	0	↑↑↑	8	→	7	↓	Balanced: 2
		RING 1				RING 2				
	PHASE		2		4		6	7	8	
	SPLIT		76		44		76	24	20	Target Cycle Length
	COORD		X				X			120
	RECALLS		P				P			Actual Cycle Length
	GREEN		70.1		38.6		70.1	19.4	14.6	120
PLAN 4 MIDDAY PLAN OPERATIVE TIMES	R1	2	↓	0	↑↑↑	0	↑↑↑↑	4	←	COORD PATTERN: OFFSET
	R2	6	↑			8	→	7	↓	Balanced: 50
		RING 1				RING 2				
	PHASE		2		4		6	7	8	
	SPLIT		68		52		68	27	25	Target Cycle Length
	COORD		X				X			120
	RECALLS		P				P			Actual Cycle Length
	GREEN		62.2		46.6		62.2	22.4	19.6	120
PLAN 7 PM PLAN OPERATIVE TIMES	R1	2	↓	0	↑↑↑	0	↑↑↑↑	4	←	COORD PATTERN: OFFSET
	R2	6	↑			8	→	7	↓	Balanced: 72
		RING 1				RING 2				
	PHASE		2		4		6	7	8	
	SPLIT		74		46		74	26	20	Target Cycle Length
	COORD		X				X			120
	RECALLS		P				P			Actual Cycle Length
	GREEN		68.2		40.6		68.2	21.4	14.6	120

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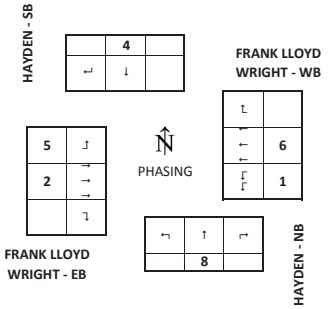
BASIC TIMING PLAN

Section #	I.P. Address	Date Designed
803	MM1-5-1 172.17.11.72	10/11/2016

	Phase	1	2		4	5	6		8
TIMING PLAN - MM-2-1	Movement	WBL	EBT		SBTL	EBL	WBT		NBTL
	NOTES	PROT			SPLIT	PROT			SPLIT
	MIN GRN	5	10		6	5	10		5
	BK MGRN								
	CS MGRN	5							
	DLY GRN								
	WALK		10		4		7		4
	WALK2								
	WLK MAX								
	PED CLR/FDW		23		35		13		37
	PD CLR2								
	PC MAX								
	PED CO								
	VEH EXT	1	1		1	1	1		1
	VH EXT2								
	MAX 1	30	55		50	10	70		55
	MAX 2	50	65		55	35	75		60
	MAX 3								
	DYM MAX								
	DYM STP								
	YELLOW	4	4.7		3.3	4	4.7		4
	RED CLR	2	1.0		2.0	2	1.0		2.0
	RED MAX								
	RED RVT	2	2		2	2	2		2
	ACT B4								
	SEC/ACT								
	MAX INT								
	TIME B4								
	CARS WT								
	STPTDUC								
	TTREDUC								
	MIN GAP								
RECALLS - MM-2-8	LOCK DET								
	VEH RECALL		X				X		
	PED RECALL								
	MAX RECALL								
	SOFT RECALL								
	NO REST								
	ADD INIT CAL								



PHASING SEQUENCES

TOD: MORNING
R1 2 1 4 8
R2 6 5
B B B
Use Timing plan:

TOD: MIDDAY
R1 2 1 4 8
R2 6 5
B B B
Use Timing plan:

TOD: EVENING
R1 2 1 4 8
R2 6 5
B B B
Use Timing plan:

TOD: NIGHT
R1 1 2 4 8
R2 6 5
B B B
Use Timing plan:

FREE
R1 2 1 4 8
R2 6 5
B B B
Use Timing plan: 254

NOTES

Nothbound and southbound are split phases.

EXPIRES XX/XX/XXXX

FRANK LLOYD WRIGHT & HAYDEN

System # 172

COORDINATOR

Section # 803

Date Updated 10/11/2016

	PHASE	1	2	3	4	5	6	7	8	
	FDW		23		35		13		37	
	YELLOW	4	4.7		3.3	4	4.7		4	
	ALL RED	2	1		2	2	1		2	
	WALK		23		35		13		37	
PLAN 1 AM PLAN OPERATIVE TIMES	R1	2	→	1	↱	4	↓	8	↑	COORD PATTERN: OFFSET
	R2	6	←	5	↴					Balanced: 103
		RING 1				RING 2				
	PHASE	1	2		4	5	6		8	
	SPLIT	40	35		12	11	64		33	Target Cycle Length
	COORD		X				X			120
	RECALLS		V				V			Actual Cycle Length
	GREEN	34.0	29.3		6.7	5.0	58.3		27.0	120
PLAN 4 MIDDAY PLAN OPERATIVE TIMES	R1	2	→	1	↱	4	↓	8	↑	COORD PATTERN: OFFSET
	R2	6	←	5	↴					Balanced: 87
		RING 1				RING 2				
	PHASE	1	2		4	5	6		8	
	SPLIT	27	52		12	11	68		29	Target Cycle Length
	COORD		X				X			120
	RECALLS		V				V			Actual Cycle Length
	GREEN	21.0	46.3		6.7	5.0	62.3		23.0	120
PLAN 7 PM PLAN OPERATIVE TIMES	R1	2	→	1	↱	4	↓	8	↑	COORD PATTERN: OFFSET
	R2	6	←	5	↴					Balanced: 72
		RING 1				RING 2				
	PHASE	1	2		4	5	6		8	
	SPLIT	29	50		14	11	68		27	Target Cycle Length
	COORD		X				X			120
	RECALLS		V				V			Actual Cycle Length
	GREEN	23.0	44.3		8.7	5.0	62.3		21.0	120
PLAN 10 MIDNIGHT PLAN OPERATIVE TIMES	R1	1	↱	2	→	4	↓	8	↑	COORD PATTERN: OFFSET
	R2	6	←	5	↴					Balanced: 78
		RING 1				RING 2				
	PHASE	1	2		4	5	6		8	
	SPLIT	24	29		13	11	42		24	Target Cycle Length
	COORD		X				X			90
	RECALLS		V				V			Actual Cycle Length
	GREEN	18.0	23.3		7.7	5.0	36.3		18.0	90

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APPENDIX D

SIGNAL WARRANT ANALYSIS

Warrants 1, 2 & 3
84th St & Hayden Rd

ADOT Traffic Engineering Guidelines and Policies section 611 includes methodology to consider signal warrants for future intersections using projected ADT. The methodology includes multiplying factors to the projected ADT to provide high hour, 4th high hour and 8th high hour volumes to compare with threshold volumes of the peak hour warrant, the 4-hour warrant and the 8-hour warrants The factors are as follows:

High Hour	Hourly Adjustment Factor
1	0.0771
4	0.0656
8	0.0572

Right-turn factor applied

	NB	SB	EB	WB
Existing AM	0%	0%	0%	0%
Existing PM	0%	0%	0%	0%

Determine approach PM peak hour volumes	NB	SB	EB	WB
Existing AM	72	40	625	684
Existing PM	52	121	1165	738

Approximate approach ADT volumes by dividing by the high hour adjustment factor (0.0771)

	NB	SB	EB	WB	NB+SB	EB+WB
Existing AM	934	519	8,106	8,872	**1,453**	**16,978**
Existing PM	674	1,569	15,110	9,572	**2,244**	**24,682**

Apply adjustment factors	8th high hour		4th high hour		High hour	
	Major, both approaches	Minor, larger approach	Major, both approaches	Minor, larger approach	Major, both approaches	Minor, larger approach
Existing AM	**971**	**53**	**1,114**	**61**	**1,309**	**72**
Existing PM	**1,412**	**90**	**1,619**	**103**	**1,903**	**121**

Warrants 1, 2 & 3
84th St & Hayden Rd

Thresholds are dependent on the number of lanes on each street approaching the intersection (prior to auxiliary lanes) and the speed limit on the major roadway.

Number of lanes moving traffic on major street?	2
Number of lanes moving traffic on major approach of minor street?	1
Posted or 85 percentile speed over 40 mph?	yes

Now compare to applicable signal warrant criteria of MUTCD

Warrant 1 (Eight-Hour Vehicular Volume)

Thresholds to pass				
Condition A	Major	420	Minor	105
Condition B	Major	630	Minor	53
Combo (A)	Major	336	Minor	84
Combo (B)	Major	504	Minor	42

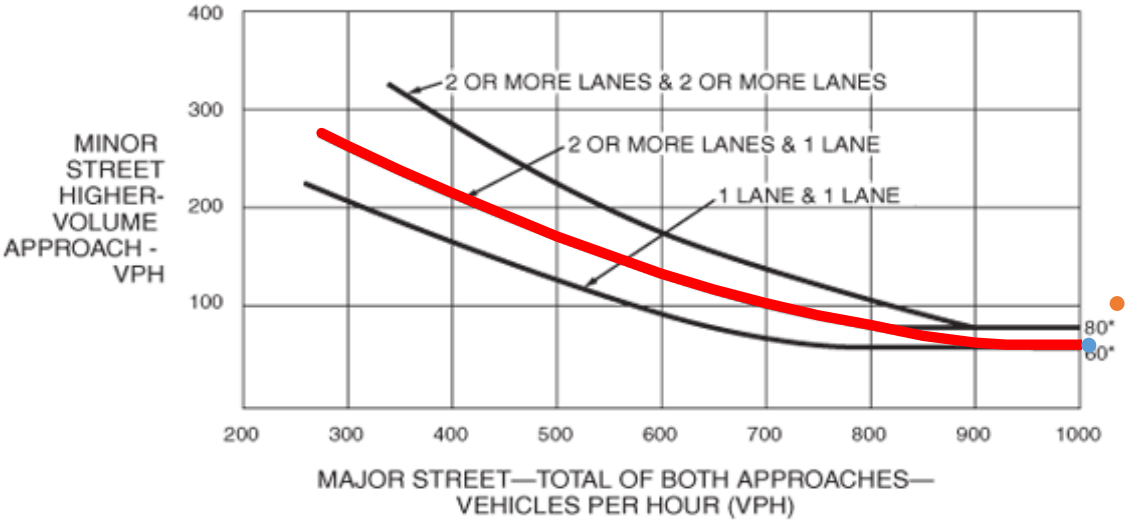
Volumes to compare	Major, both approaches	Minor, larger approach
Existing AM	**971**	**53**
Existing PM	**1,412**	**90**

Compare criteria for each scenario	Condition A	Condition B	Combination	**Signal Warrant met**
Existing AM	No	No	No	**No**
Existing PM	No	Yes	Yes	**Yes**

Signal Warrant 2 (Four-Hour Vehicular Volume)

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

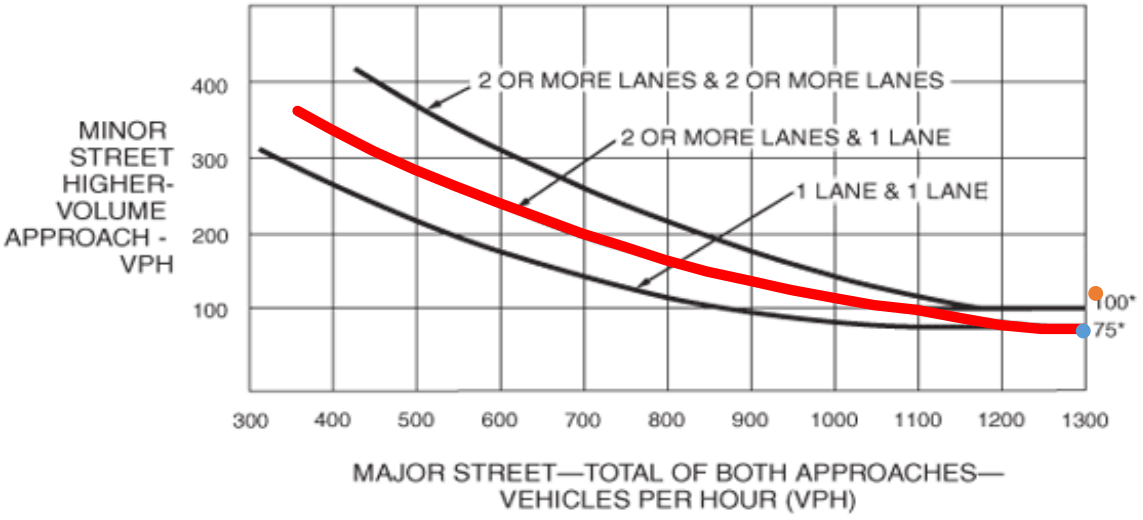
Legend	Major, both approaches	Minor, larger approach	Approximate Threshold for Minor
Existing AM	1,114	61	60
Existing PM	1,619	103	60

Signal Warrant 2 is met?

Existing AM	**Yes**
Existing PM	**Yes**

Signal Warrant 3 (Peak Hour)

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Legend	Major, both approaches	Minor, larger approach	Approximate Threshold for Minor
Existing AM	1,309	72	75
Existing PM	1,903	121	75

Signal Warrant 3 is met?

Existing AM	**No**
Existing PM	**Yes**

CORE CENTER

Signal Warrant Analysis

MUTCD Warrants 1-3

Major Street: Hayden Road — Speed Limit: 45 — Lanes:* 2

Minor Street: 84th Street — Speed Limit: — Lanes:* 2

Locale: City of Scottsdale — *Number of Approach Lanes of Moving Traffic:

Major Street vph - total of both approaches	84	62	49	81	146	404	683	1,007	1,439	1,350	1,168	1,160	1,164	1,256	1,350	1,695	2,050	1,869	1,023	715	504	241	130	83
Minor Street volume - higher-volume approach (vph)	4	5	4	2	5	18	42	69	105	76	54	37	45	71	113	116	260	193	37	16	4	4	5	4
Direction of higher-volume minor approach	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
Beginning of hour	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00

Critical speed of major street traffic above 40 mph **X**

In built-up area of isolated community less than 10,000 population

Urban **x**

Warrant 1, Eight-Hour Vehicular Volume

Condition A *Minimum Vehicular Volume*					Criteria	Hour																					
Lanes (**M**/**m**):	1/1	2+/1	2+/2+	1/2+		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Minimum Reqmts	500	600	600	500																									
(100%[a])	150	150	200	200																									
Lanes (**M**/**m**):	1/1	2+/1	2+/2+	1/2+	**2/2**																								
Minimum Reqmts	350	420	420	350	**420**	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
(70%[c])	105	105	140	140	**140**	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No	No	No	No	No	No
Warrant met?	**No**					**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**

Condition B *Interruption of Cont. Traffic*					Criteria	Hour																					
Lanes (**M**/**m**):	1/1	2+/1	2+/2+	1/2+		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Minimum Reqmts	750	900	900	750																									
(100%[a])	75	75	100	100																									
Lanes (**M**/**m**):	1/1	2+/1	2+/2+	1/2+	**2/2**																								
Minimum Reqmts	525	630	630	525	**630**	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
(70%[c])	53	53	70	70	**70**	No	No	No	No	No	No	No	No	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Warrant met?	**No**					**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**Yes**	**Yes**	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**

Combination *of Conditions A & B*					Criteria	Hour																					
Lanes (**M**/**m**):	1/1	2+/1	2+/2+	1/2+		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Condition A	400	480	480	400																									
(80%[b])	120	120	160	160																									
Condition B	600	720	720	600																									
(80%[b])	60	60	80	80																									
Lanes (**M**/**m**):	1/1	2+/1	2+/2+	1/2+	**2/2**																								
Condition A	280	336	336	280	**336**	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
(56%[d])	84	84	112	112	**112**	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Condition B	420	504	504	420	**504**	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
(56%[d])	42	42	56	56	**56**	No	No	No	No	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Warrant met?	**No**					**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**

Warrant 2, Four Hour Vehicular Volume					Criteria	Hour																					
Lanes (**M**/**m**):	1/1	2+/1	2+/2+	1/2+	**2/2**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
100% *See to the right*																													
70% *See to the right*					**Use**	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Warrant met?	**Yes**					**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**Yes**	**No**	**No**	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**

Warrant 3, Peak Hour					Criteria	Hour																					
Lanes (**M**/**m**):	1/1	2+/1	2+/2+	1/2+	**2/2**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
100% *See to the right*																													
70% *See to the right*					**Use**	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Warrant met?	**Yes**					**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**Yes**	**No**	**No**	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**

CivTech

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Volume-Based Traffic Signal Warrants Analysis Summary

Warrant		Hour(s) of the Day	Hours Required to Meet Warrant	Hours Met	Is Warrant Met?
Warrant 1. Eight-Hour Vehicular Volume	Condition A: Minimum Vehicular Volume	Any Eight Hours	8	2	No
	Condition B: Interruption of Continuous Traffic	Any Eight Hours	8	7	No
	Combination of Condition A & Condition B	Any Eight Hours	8	4	No
	Overall (at least 1 of the 3 conditions required to meet warrant)				**No**
Warrant 2. Four-Hour Vehicular Volume		Any Four Hours	4	5	**Yes**
Warrant 3. Peak Hour		Any One/Peak Hour	1	5	**Yes**

APPENDIX E

TRIP GENERATION

CORE CENTER

Newly Proposed (19-0480)

Trip Generation

May 2019

Methodology Overview

This form facilitates trip generation estimation using data within the Institute of Transportation Engineer's (ITE) *Trip Generation Manual* , 10th Edition and methodology described within ITE's *Trip Generation Handbook* , 3rd Edition. These references will be referred to as *Manual and Handbook* , respectively. The *Manual* contains data collected by various transportation professionals for a wide range of different land uses, with each land use category represented by a land use code (LUC). Average rates and equations have been established that correlate the relationship between an independent variable that describes the development size and generated trips for each categorized LUC in various settings and time periods. The *Handbook* indicates an established methodology for how to use data contained within the Manual when to use the fitted curve instead of the average rate and when to adjustments to the volume of trips are appropriate and how to do so. The methodology steps are represented visually in boxes in Figure 3.1. This worksheet applies calculations for each box if applicable.

Box 1 - Define Study Site Land Use Type & Site Characteristics

The analyst is to pick an appropriate LUC(s) based on the subject's zoning/land use(s)/future land use(s). The size of the land use(s) is described in reference to an independent variable(s) specific to (each) the land use (example: 1,000 square feet of building area is relatively common).

Land Use Types and Size

Proposed Use	Amount	Units	ITE LUC	ITE Land Use Name
General Office Building	124.000	1,000 square feet	710	General Office Building
Shopping Center	35.000	1,000 square feet	820	Shopping Center
Quality Restaurant	35.000	1,000 square feet	931	Quality Restaurant

Equation Type: Equation Used [Equated Rate] (Type Abbreviations: Weighted Average Rate ("WA"), Fitted Curve ("FC"), or Custom ("C"))

Proposed Use	ADT	AM Peak Hour	PM Peak Hour	(not used)
General Office Building	FC: LN(T)=0.97*LN(X)+2.5 [10.54]	FC: T=0.94*X+26.49 [1.15]	FC: LN(T)=0.95*LN(X)+0.36 [1.13]	
Shopping Center	WA: T=X*37.75 [37.75]	WA: T=X*0.94 [0.94]	WA: T=X*3.81 [3.81]	
Quality Restaurant	WA: T=X*83.84 [83.84]	C: T=X* [0.00]	WA: T=X*7.8 [7.80]	

Baseline Vehicular Trips

	ADT				AM Peak Hour				PM Peak Hour				(not used)
Proposed Use	% In	In	Out	Total	% In	In	Out	Total	% In	In	Out	Total	
General Office Building	50%	654	654	1,308	86%	123	20	143	16%	22	118	140	
Shopping Center	50%	661	661	1,322	62%	20	13	33	48%	64	69	133	
Quality Restaurant	50%	1,467	1,467	2,934	85%	22	4	26	67%	183	90	273	
Totals		**2,782**	**2,782**	**5,564**		**165**	**37**	**202**		**269**	**277**	**546**	

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Adjustments for Internal Trips

Proposed Use	ADT Percent	ADT In	ADT Out	ADT Total	AM Peak Hour Percent	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour Percent	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	(not used)
General Office Building	0%	0	0	0	0%	0	0	0	0%	0	0	0	
Shopping Center	22%	145	145	290	19%	4	2	6	24%	15	17	32	
Quality Restaurant	22%	323	323	646	19%	4	1	5	24%	44	22	66	
Totals		**468**	**468**	**936**		**8**	**3**	**11**		**59**	**39**	**98**	

Adjustments for Alternate Mode Trips

Proposed Use	ADT Percent	ADT In	ADT Out	ADT Total	AM Peak Hour Percent	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour Percent	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	(not used)
General Office Building	4%	26	26	52	4%	5	1	6	4%	1	5	6	
Shopping Center	4%	26	26	52	4%	1	0	1	4%	3	2	5	
Quality Restaurant	4%	59	59	118	4%	1	0	1	4%	7	4	11	
Totals	**4%**	**111**	**111**	**222**	**4%**	**7**	**1**	**8**	**4%**	**11**	**11**	**22**	

External Vehicular Trips

Proposed Use	ADT In	ADT Out	ADT Total	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	(not used)
General Office Building	628	628	1,256	118	19	137	21	113	134	
Shopping Center	490	490	980	15	11	26	46	50	96	
Quality Restaurant	1,085	1,085	2,170	17	3	20	132	64	196	
Totals	**2,203**	**2,203**	**4,406**	**150**	**33**	**183**	**199**	**227**	**426**	

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	CORE CENTER	**Organization:**	CivTech Inc.
Project Location:	84th Street & Hayden Road	**Performed By:**	Briallen Rees
Scenario Description:	Newly Proposed	**Date:**	5/29/2019
Analysis Year:		**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				143	123	20
Retail				33	20	13
Restaurant				26	22	4
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
				202	165	37

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	5	0	0	0
Retail	4		2	0	0	0
Restaurant	1	1		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	202	165	37
Internal Capture Percentage	19%	12%	51%
External Vehicle-Trips[5]	164	146	18
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	4%	55%
Retail	35%	46%
Restaurant	32%	50%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

19-ZN-2013#2
8/8/2019

Project Name:	CORE CENTER
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	123	123	1.00	20	20
Retail	1.00	20	20	1.00	13	13
Restaurant	1.00	22	22	1.00	4	4
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	13	0	0	0
Retail	4		2	0	2	0
Restaurant	1	1		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	5	0	0	0
Retail	5		11	0	0	0
Restaurant	17	2		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	3	4	0		0
Hotel	4	1	1	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	5	118	123	118	0	0
Retail	7	13	20	13	0	0
Restaurant	7	15	22	15	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	11	9	20	9	0	0
Retail	6	7	13	7	0	0
Restaurant	2	2	4	2	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	CORE CENTER	**Organization:**	CivTech Inc.
Project Location:	84th Street & Hayden Road	**Performed By:**	Briallen Rees
Scenario Description:	Newly Proposed	**Date:**	5/29/2019
Analysis Year:		**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				140	22	118
Retail				133	64	69
Restaurant				273	183	90
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
				546	269	277

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	4	0	0	0
Retail	1		20	0	0	0
Restaurant	3	32		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	546	269	277
Internal Capture Percentage	24%	24%	23%
External Vehicle-Trips[5]	416	204	212
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	18%	8%
Retail	58%	30%
Restaurant	13%	39%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual* , published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	CORE CENTER
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	22	22	1.00	118	118
Retail	1.00	64	64	1.00	69	69
Restaurant	1.00	183	183	1.00	90	90
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		24	5	0	2	0
Retail	1		20	3	18	3
Restaurant	3	37		7	16	6
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	4	0	0	0
Retail	7		53	0	0	0
Restaurant	7	32		0	0	0
Cinema/Entertainment	1	3	5		0	0
Residential	13	6	26	0		0
Hotel	0	1	9	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	4	18	22	18	0	0
Retail	37	27	64	27	0	0
Restaurant	24	159	183	159	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	9	109	118	109	0	0
Retail	21	48	69	48	0	0
Restaurant	35	55	90	55	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

APPENDIX F

BACKGROUND TRAFFIC CALCULATIONS

Location of counts: Northsight Blvd/Thunderbird Road, southeast of 87th Street

Source(s): https://www.scottsdaleaz.gov/transportation/studies-reports/traffic-volume

	Year	Volume
Start	2014	9,700
End	2016	10,100
AAGR		2.0%
Exp Factor		1.041

Growth Rate Used	2.0%
Per-Year Multiplier	1.020

Year	Expansion Factor(s)	
2019	1.000	
2020	**1.020**	**Opening**
2021	1.040	
2022	1.061	
2023	1.082	
2024	1.104	
2025	1.126	
2026	1.149	
2027	1.172	
2028	1.195	
2029	1.219	
2030	1.243	
2031	1.268	
2032	1.294	
2033	1.319	
2034	1.346	
2035	1.373	
2036	1.400	
2037	1.428	
2038	1.457	
2039	1.486	
2040	1.516	
2041	1.546	
2042	1.577	
2043	1.608	
2044	1.641	
2045	1.673	
2046	1.707	
2047	1.741	
2048	1.776	
2049	1.811	
2050	1.848	
2051	1.885	

APPENDIX G

2020 PEAK HOUR ANALYSIS

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	19	549	45	438	28	27	78	18	17
Future Volume (vph)	19	549	45	438	28	27	78	18	17
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		6		2	7	4			8
Permitted Phases	6		2		4		4	8	
Detector Phase	6	6	2	2	7	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	26.9	26.9	26.9	26.9	9.6	32.4	32.4	32.4	32.4
Total Split (s)	76.0	76.0	76.0	76.0	24.0	44.0	44.0	20.0	20.0
Total Split (%)	63.3%	63.3%	63.3%	63.3%	20.0%	36.7%	36.7%	16.7%	16.7%
Yellow Time (s)	4.7	4.7	4.7	4.7	3.0	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.2	1.6	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	4.6	5.4	5.4	5.4	5.4
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	93.0	93.0	93.0	93.0	16.5	15.7	15.7	8.0	8.0
Actuated g/C Ratio	0.78	0.78	0.78	0.78	0.14	0.13	0.13	0.07	0.07
v/c Ratio	0.03	0.22	0.09	0.19	0.23	0.14	0.36	0.33	0.27
Control Delay	4.9	4.5	5.2	4.3	45.2	43.4	11.5	63.3	47.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.9	4.5	5.2	4.3	45.2	43.4	11.5	63.3	47.5
LOS	A	A	A	A	D	D	B	E	D
Approach Delay		4.6		4.4		25.0			54.4
Approach LOS		A		A		C			D

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 2 (2%), Referenced to phase 2:WBTL, Start of Green		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.36		
Intersection Signal Delay: 9.0	Intersection LOS: A	
Intersection Capacity Utilization 46.0%	ICU Level of Service A	
Analysis Period (min) 15		

Splits and Phases: 1: 83rd Place & Hayden Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	549	20	45	438	47	28	27	78	18	17	6
Future Volume (veh/h)	19	549	20	45	438	47	28	27	78	18	17	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	21	617	10	50	487	35	36	35	69	28	27	3
Peak Hour Factor	0.89	0.89	0.89	0.90	0.90	0.90	0.77	0.77	0.77	0.64	0.64	0.64
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	689	2970	48	625	2791	200	155	231	176	121	87	10
Arrive On Green	0.79	0.79	0.79	0.79	0.79	0.79	0.03	0.12	0.12	0.05	0.05	0.05
Sat Flow, veh/h	834	3767	61	756	3540	254	1688	1969	1502	1222	1741	193
Grp Volume(v), veh/h	21	306	321	50	257	265	36	35	69	28	0	30
Grp Sat Flow(s),veh/h/ln	834	1870	1958	756	1870	1923	1688	1969	1502	1222	0	1934
Q Serve(g_s), s	0.8	5.0	5.0	2.1	4.0	4.1	2.4	1.9	5.1	2.7	0.0	1.8
Cycle Q Clear(g_c), s	4.8	5.0	5.0	7.1	4.0	4.1	2.4	1.9	5.1	2.7	0.0	1.8
Prop In Lane	1.00		0.03	1.00		0.13	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	689	1475	1544	625	1475	1516	155	231	176	121	0	96
V/C Ratio(X)	0.03	0.21	0.21	0.08	0.17	0.17	0.23	0.15	0.39	0.23	0.00	0.31
Avail Cap(c_a), veh/h	689	1475	1544	625	1475	1516	378	633	483	209	0	235
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	3.7	3.2	3.2	4.1	3.1	3.1	50.2	47.6	49.0	55.4	0.0	55.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.1	0.5	0.4	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.5	1.6	0.3	1.3	1.4	1.0	1.0	1.9	0.8	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.7	3.2	3.2	4.4	3.4	3.4	50.5	47.7	49.5	55.8	0.0	55.7
LnGrp LOS	A	A	A	A	A	A	D	D	D	E	A	E
Approach Vol, veh/h		648			572			140			58	
Approach Delay, s/veh		3.3			3.5			49.3			55.7	
Approach LOS		A			A			D			E	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		100.5		19.5		100.5	8.1	11.4				
Change Period (Y+Rc), s		* 5.9		* 5.4		* 5.9	* 4.6	* 5.4				
Max Green Setting (Gmax), s		* 70		* 39		* 70	* 19	* 15				
Max Q Clear Time (g_c+I1), s		9.1		7.1		7.0	4.4	4.7				
Green Ext Time (p_c), s		1.3		0.2		1.4	0.0	0.1				

Intersection Summary		
HCM 6th Ctrl Delay	10.0	
HCM 6th LOS	B	

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

19-ZN-2013#2
8/8/2019

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	565	27	98	510	12	3	0	91	8	0	11
Future Vol, veh/h	38	565	27	98	510	12	3	0	91	8	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	135	175	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	96	96	96	72	72	72	43	43	43
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	42	621	30	102	531	13	4	0	126	19	0	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	544	0	0	651	0	0	1175	-	311	1137	1477	272
Stage 1	-	-	-	-	-	-	705	-	-	742	742	-
Stage 2	-	-	-	-	-	-	470	-	-	395	735	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	-	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	-	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	-	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1021	-	-	931	-	-	147	0	685	157	125	726
Stage 1	-	-	-	-	-	-	393	0	-	374	420	-
Stage 2	-	-	-	-	-	-	543	0	-	602	424	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1021	-	-	931	-	-	126	-	685	114	107	726
Mov Cap-2 Maneuver	-	-	-	-	-	-	126	-	-	218	201	-
Stage 1	-	-	-	-	-	-	377	-	-	359	374	-
Stage 2	-	-	-	-	-	-	466	-	-	471	407	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	1.5	11.4	16.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	685	1021	-	-	931	-	-	366
HCM Lane V/C Ratio	0.185	0.041	-	-	0.11	-	-	0.121
HCM Control Delay (s)	11.4	8.7	-	-	9.3	-	-	16.2
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.4	-	-	0.4

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	609	10	16	606	75	16	2	55	28	0	13
Future Vol, veh/h	18	609	10	16	606	75	16	2	55	28	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	100	145	-	-	45	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	90	90	90	56	56	56
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	641	11	17	652	81	18	2	61	50	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	733	0	0	652	0	0	1039	1446	321	1087	1417	367
Stage 1	-	-	-	-	-	-	679	679	-	727	727	-
Stage 2	-	-	-	-	-	-	360	767	-	360	690	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	868	-	-	930	-	-	185	131	675	170	136	630
Stage 1	-	-	-	-	-	-	408	449	-	381	427	-
Stage 2	-	-	-	-	-	-	631	410	-	631	444	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	868	-	-	930	-	-	173	126	675	149	131	630
Mov Cap-2 Maneuver	-	-	-	-	-	-	290	244	-	266	251	-
Stage 1	-	-	-	-	-	-	399	439	-	373	419	-
Stage 2	-	-	-	-	-	-	597	403	-	558	434	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.2	12.8	19.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	290	636	868	-	-	930	-	-	326
HCM Lane V/C Ratio	0.061	0.1	0.022	-	-	0.018	-	-	0.225
HCM Control Delay (s)	18.2	11.3	9.2	-	-	8.9	-	-	19.2
HCM Lane LOS	C	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.2	0.3	0.1	-	-	0.1	-	-	0.8

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	694	0	0	698	0	0
Future Vol, veh/h	694	0	0	698	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	135	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	754	0	0	751	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	377
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	621
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	621
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱		✣			✣	
Traffic Vol, veh/h	4	646	45	44	664	12	13	0	15	3	0	2
Future Vol, veh/h	4	646	45	44	664	12	13	0	15	3	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	75	90	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	96	96	96	78	78	78	63	63	63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	695	48	46	692	13	17	0	19	5	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	705	0	0	743	0	0	1141	1500	348	1140	1535	346
Stage 1	-	-	-	-	-	-	703	703	-	784	784	-
Stage 2	-	-	-	-	-	-	438	797	-	356	751	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	889	-	-	860	-	-	156	121	648	156	115	650
Stage 1	-	-	-	-	-	-	394	438	-	352	402	-
Stage 2	-	-	-	-	-	-	567	397	-	634	416	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	889	-	-	860	-	-	148	114	648	145	108	650
Mov Cap-2 Maneuver	-	-	-	-	-	-	271	235	-	145	108	-
Stage 1	-	-	-	-	-	-	392	436	-	351	381	-
Stage 2	-	-	-	-	-	-	534	376	-	612	414	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	15.1	22.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	394	889	-	-	860	-	-	210
HCM Lane V/C Ratio	0.091	0.005	-	-	0.053	-	-	0.038
HCM Control Delay (s)	15.1	9.1	-	-	9.4	-	-	22.8
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0.1

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

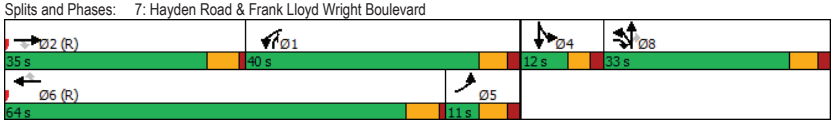
Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	560	655	358	335
Demand Flow Rate, veh/h	571	668	365	341
Vehicles Circulating, veh/h	270	353	502	730
Vehicles Exiting, veh/h	801	514	339	291
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.9	7.0	6.3	10.9
Approach LOS	A	A	A	B

Lane	Left	Right	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LT	R	LTR
Assumed Moves	LT	TR	LT	TR	LT	R	LTR
RT Channelized							
Lane Util	0.469	0.531	0.470	0.530	0.540	0.460	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	268	303	314	354	197	168	341
Cap Entry Lane, veh/h	1053	1129	976	1052	851	927	763
Entry HV Adj Factor	0.983	0.980	0.981	0.981	0.978	0.982	0.982
Flow Entry, veh/h	263	297	308	347	193	165	335
Cap Entry, veh/h	1035	1106	957	1032	832	910	750
V/C Ratio	0.255	0.268	0.322	0.337	0.232	0.181	0.447
Control Delay, s/veh	5.9	5.8	7.1	6.9	6.8	5.7	10.9
LOS	A	A	A	A	A	A	B
95th %tile Queue, veh	1	1	1	1	1	1	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	4	1100	200	375	1321	29	213	12	271	12	8
Future Volume (vph)	4	1100	200	375	1321	29	213	12	271	12	8
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA
Protected Phases	5	2	8	1	6		8	8	1	4	4
Permitted Phases			2			6			8		
Detector Phase	5	2	8	1	6	6	8	8	1	4	4
Switch Phase											
Minimum Initial (s)	5.0	10.0	5.0	5.0	10.0	10.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)	11.0	38.7	47.0	11.0	25.7	25.7	47.0	47.0	11.0	44.3	44.3
Total Split (s)	11.0	35.0	33.0	40.0	64.0	64.0	33.0	33.0	40.0	12.0	12.0
Total Split (%)	9.2%	29.2%	27.5%	33.3%	53.3%	53.3%	27.5%	27.5%	33.3%	10.0%	10.0%
Yellow Time (s)	4.0	4.7	4.0	4.0	4.7	4.7	4.0	4.0	4.0	3.3	3.3
All-Red Time (s)	2.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.7	6.0	6.0	5.7	5.7	6.0	6.0	6.0	5.3	5.3
Lead/Lag	Lag	Lead		Lag	Lead	Lead			Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes			Yes		
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	5.0	57.7	75.9	25.2	86.7	86.7	12.5	12.5	40.1	6.1	6.1
Actuated g/C Ratio	0.04	0.48	0.63	0.21	0.72	0.72	0.10	0.10	0.33	0.05	0.05
v/c Ratio	0.07	0.50	0.23	0.61	0.38	0.03	0.72	0.65	0.48	0.18	0.14
Control Delay	57.5	24.5	2.2	46.7	8.4	0.0	75.0	66.7	13.0	59.5	47.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	24.5	2.2	46.7	8.4	0.0	75.0	66.7	13.0	59.5	47.7
LOS	E	C	A	D	A	A	E	E	B	E	D
Approach Delay		21.2			16.6			39.3			53.8
Approach LOS		C			B			D			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 103 (86%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 21.6	Intersection LOS: C
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Hayden Road & Frank Lloyd Wright Boulevard



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Hayden One
Background AM

7: Hayden Road & Frank Lloyd Wright Boulevard
HCM 6th Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	1100	200	375	1321	29	213	12	271	12	8	3
Future Volume (veh/h)	4	1100	200	375	1321	29	213	12	271	12	8	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	5	1294	147	417	1468	21	236	0	182	15	10	2
Peak Hour Factor	0.85	0.85	0.85	0.90	0.90	0.90	0.94	0.94	0.94	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	347	1312	498	1463	2611	730	295	0	803	50	47	9
Arrive On Green	0.21	0.24	0.24	0.45	0.49	0.49	0.09	0.00	0.09	0.03	0.03	0.03
Sat Flow, veh/h	1688	5375	1502	3274	5375	1502	3375	0	1502	1688	1593	319
Grp Volume(v), veh/h	5	1294	147	417	1468	21	236	0	182	15	0	12
Grp Sat Flow(s),veh/h/ln	1688	1792	1502	1637	1792	1502	1688	0	1502	1688	0	1911
Q Serve(g_s), s	0.3	28.8	8.7	9.7	23.2	0.9	8.2	0.0	0.0	1.0	0.0	0.7
Cycle Q Clear(g_c), s	0.3	28.8	8.7	9.7	23.2	0.9	8.2	0.0	0.0	1.0	0.0	0.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	347	1312	498	1463	2611	730	295	0	803	50	0	57
V/C Ratio(X)	0.01	0.99	0.30	0.28	0.56	0.03	0.80	0.00	0.23	0.30	0.00	0.21
Avail Cap(c_a), veh/h	347	1312	498	1463	2611	730	759	0	1009	94	0	107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.0	45.1	29.7	21.0	21.8	16.1	53.7	0.0	14.8	57.0	0.0	56.8
Incr Delay (d2), s/veh	0.0	21.7	1.5	0.0	0.9	0.1	1.9	0.0	0.1	1.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	15.3	3.8	3.7	9.8	0.3	3.6	0.0	2.6	0.5	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.0	66.9	31.2	21.1	22.7	16.2	55.6	0.0	14.8	58.2	0.0	57.5
LnGrp LOS	D	E	C	C	C	B	E	A	B	E	A	E
Approach Vol, veh/h		1446			1906			418			27	
Approach Delay, s/veh		63.1			22.3			37.9			57.9	
Approach LOS		E			C			D			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	59.6	35.0		8.9	30.6	64.0		16.5				
Change Period (Y+Rc), s	6.0	5.7		* 5.3	6.0	5.7		6.0				
Max Green Setting (Gmax), s	34.0	29.3		* 6.7	5.0	58.3		27.0				
Max Q Clear Time (g_c+I1), s	11.7	30.8		3.0	2.3	25.2		10.2				
Green Ext Time (p_c), s	0.3	0.0		0.0	0.0	5.1		0.3				

Intersection Summary		
HCM 6th Ctrl Delay		39.8
HCM 6th LOS		D

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Hayden One
Background PM

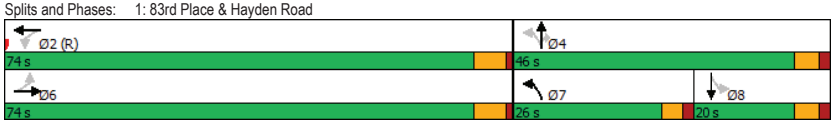
1: 83rd Place & Hayden Road
Timings

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	13	826	63	518	148	12	133	92	24
Future Volume (vph)	13	826	63	518	148	12	133	92	24
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		6		2	7	4			8
Permitted Phases	6		2		4		4	8	
Detector Phase	6	6	2	2	7	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	26.9	26.9	26.9	26.9	9.6	32.4	32.4	32.4	32.4
Total Split (s)	74.0	74.0	74.0	74.0	26.0	46.0	46.0	20.0	20.0
Total Split (%)	61.7%	61.7%	61.7%	61.7%	21.7%	38.3%	38.3%	16.7%	16.7%
Yellow Time (s)	4.7	4.7	4.7	4.7	3.0	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.2	1.6	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	4.6	5.4	5.4	5.4	5.4
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	74.2	74.2	74.2	74.2	35.3	34.5	34.5	12.4	12.4
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.29	0.29	0.29	0.10	0.10
v/c Ratio	0.03	0.43	0.25	0.25	0.50	0.03	0.33	0.75	0.24
Control Delay	11.4	13.4	15.5	11.4	37.2	27.5	10.2	83.6	32.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.4	13.4	15.5	11.4	37.2	27.5	10.2	83.6	32.5
LOS	B	B	B	B	D	C	B	F	C
Approach Delay		13.3		11.8		24.5			66.6
Approach LOS		B		B		C			E

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 72 (60%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 18.6 — Intersection LOS: B
Intersection Capacity Utilization 61.8% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: 83rd Place & Hayden Road



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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	826	69	63	518	17	148	12	133	92	24	22
Future Volume (veh/h)	13	826	69	63	518	17	148	12	133	92	24	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	14	908	49	66	545	7	192	16	63	102	27	7
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.77	0.77	0.77	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	543	2362	127	359	2475	32	361	495	378	181	145	38
Arrive On Green	0.65	0.65	0.65	0.65	0.65	0.65	0.12	0.25	0.25	0.10	0.10	0.10
Sat Flow, veh/h	811	3609	195	556	3782	49	1688	1969	1502	1250	1508	391
Grp Volume(v), veh/h	14	471	486	66	269	283	192	16	63	102	0	34
Grp Sat Flow(s),veh/h/ln	811	1870	1934	556	1870	1960	1688	1969	1502	1250	0	1898
Q Serve(g_s), s	0.9	13.9	13.9	7.5	7.0	7.0	11.9	0.7	3.9	9.6	0.0	2.0
Cycle Q Clear(g_c), s	7.8	13.9	13.9	21.4	7.0	7.0	11.9	0.7	3.9	9.6	0.0	2.0
Prop In Lane	1.00		0.10	1.00		0.02	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	543	1224	1265	359	1224	1283	361	495	378	181	0	183
V/C Ratio(X)	0.03	0.38	0.38	0.18	0.22	0.22	0.53	0.03	0.17	0.56	0.00	0.19
Avail Cap(c_a), veh/h	543	1224	1265	359	1224	1283	465	666	508	212	0	231
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.0	9.6	9.6	14.5	8.4	8.4	40.2	33.9	35.1	53.3	0.0	49.9
Incr Delay (d2), s/veh	0.0	0.1	0.1	1.1	0.4	0.4	0.5	0.0	0.1	1.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	5.4	5.6	1.0	2.9	3.0	5.0	0.4	1.5	3.1	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.0	9.6	9.6	15.6	8.8	8.8	40.7	33.9	35.2	54.4	0.0	50.1
LnGrp LOS	A	A	A	B	A	A	D	C	D	D	A	D
Approach Vol, veh/h		971			618			271			136	
Approach Delay, s/veh		9.7			9.5			39.0			53.3	
Approach LOS		A			A			D			D	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		84.4		35.6		84.4	18.6	17.0				
Change Period (Y+Rc), s		* 5.9		* 5.4		* 5.9	* 4.6	* 5.4				
Max Green Setting (Gmax), s		* 68		* 41		* 68	* 21	* 15				
Max Q Clear Time (g_c+I1), s		23.4		5.9		15.9	13.9	11.6				
Green Ext Time (p_c), s		1.6		0.1		2.3	0.2	0.1				

Intersection Summary	
HCM 6th Ctrl Delay	16.6
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	977	58	268	518	5	4	0	238	4	2	89
Future Vol, veh/h	20	977	58	268	518	5	4	0	238	4	2	89
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	135	175	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	96	96	96	90	90	90	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	1062	63	279	540	5	4	0	264	6	3	135

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	545	0	0	1125	0	0	1936	-	531	1676	2270	273
Stage 1	-	-	-	-	-	-	1106	-	-	1101	1101	-
Stage 2	-	-	-	-	-	-	830	-	-	575	1169	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	-	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	-	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	-	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1020	-	-	617	-	-	40	0	493	62	40	725
Stage 1	-	-	-	-	-	-	224	0	-	226	286	-
Stage 2	-	-	-	-	-	-	331	0	-	470	265	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1020	-	-	617	-	-	22	-	493	18	21	725
Mov Cap-2 Maneuver	-	-	-	-	-	-	22	-	-	~ -114	~ -34	-
Stage 1	-	-	-	-	-	-	219	-	-	221	157	-
Stage 2	-	-	-	-	-	-	145	-	-	213	259	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	5.3	20.4	6.1
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	493	1020	-	-	617	-	-	3293
HCM Lane V/C Ratio	0.536	0.021	-	-	0.452	-	-	0.044
HCM Control Delay (s)	20.4	8.6	-	-	15.6	-	-	6.1
HCM Lane LOS	C	A	-	-	C	-	-	A
HCM 95th %tile Q(veh)	3.1	0.1	-	-	2.3	-	-	0.1

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

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Intersection	
Int Delay, s/veh	6.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	1148	28	37	700	16	10	0	43	70	1	52
Future Vol, veh/h	13	1148	28	37	700	16	10	0	43	70	1	52
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	100	145	-	-	45	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	46	46	46	63	63	63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	1208	29	40	753	17	22	0	93	111	2	83

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	770	0	0	1237	0	0	1694	2086	604	1474	2107	385
Stage 1	-	-	-	-	-	-	1236	1236	-	842	842	-
Stage 2	-	-	-	-	-	-	458	850	-	632	1265	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	840	-	-	559	-	-	60	52	441	~ 88	51	613
Stage 1	-	-	-	-	-	-	187	246	-	325	378	-
Stage 2	-	-	-	-	-	-	552	375	-	435	239	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	840	-	-	559	-	-	48	47	441	~ 65	47	613
Mov Cap-2 Maneuver	-	-	-	-	-	-	135	149	-	170	134	-
Stage 1	-	-	-	-	-	-	184	242	-	319	351	-
Stage 2	-	-	-	-	-	-	441	348	-	337	235	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	19.3	60.4
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	135	441	840	-	-	559	-	-	244
HCM Lane V/C Ratio	0.161	0.212	0.016	-	-	0.071	-	-	0.8
HCM Control Delay (s)	36.7	15.3	9.4	-	-	11.9	-	-	60.4
HCM Lane LOS	E	C	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.6	0.8	0.1	-	-	0.2	-	-	6

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1261	0	0	753	0	0
Future Vol, veh/h	1261	0	0	753	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	135	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1371	0	0	810	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	686
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	390
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	390
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	1240	43	22	735	19	11	0	19	12	0	18
Future Vol, veh/h	7	1240	43	22	735	19	11	0	19	12	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	75	90	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	96	96	96	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	1378	48	23	766	20	15	0	25	16	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	786	0	0	1426	0	0	1823	2226	689	1517	2254	383
Stage 1	-	-	-	-	-	-	1394	1394	-	812	812	-
Stage 2	-	-	-	-	-	-	429	832	-	705	1442	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	829	-	-	473	-	-	48	43	388	82	41	615
Stage 1	-	-	-	-	-	-	149	207	-	339	390	-
Stage 2	-	-	-	-	-	-	574	382	-	393	196	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	829	-	-	473	-	-	44	40	388	73	39	615
Mov Cap-2 Maneuver	-	-	-	-	-	-	118	135	-	188	122	-
Stage 1	-	-	-	-	-	-	148	205	-	336	371	-
Stage 2	-	-	-	-	-	-	525	363	-	364	194	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	26	17.8
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	211	829	-	-	473	-	-	322
HCM Lane V/C Ratio	0.19	0.009	-	-	0.048	-	-	0.124
HCM Control Delay (s)	26	9.4	-	-	13	-	-	17.8
HCM Lane LOS	D	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.2	-	-	0.4

Intersection	
Intersection Delay, s/veh	14.6
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1300	603	652	423
Demand Flow Rate, veh/h	1326	616	666	431
Vehicles Circulating, veh/h	298	565	1196	665
Vehicles Exiting, veh/h	798	1297	428	516
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	12.1	8.7	26.7	12.3
Approach LOS	B	A	D	B

Lane	Left	Right	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LT	R	LTR
Assumed Moves	LT	TR	LT	TR	LT	R	LTR
RT Channelized							
Lane Util	0.470	0.530	0.471	0.529	0.482	0.518	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	623	703	290	326	321	345	431
Cap Entry Lane, veh/h	1026	1102	803	878	449	514	807
Entry HV Adj Factor	0.980	0.980	0.978	0.981	0.979	0.980	0.982
Flow Entry, veh/h	611	689	284	320	314	338	423
Cap Entry, veh/h	1006	1080	785	862	440	503	792
V/C Ratio	0.607	0.638	0.361	0.371	0.715	0.672	0.534
Control Delay, s/veh	12.0	12.2	9.0	8.5	29.7	23.9	12.3
LOS	B	B	A	A	D	C	B
95th %tile Queue, veh	4	5	2	2	6	5	3

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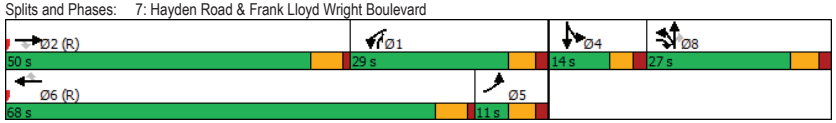
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	5	1709	236	264	1350	13	426	8	701	23	29
Future Volume (vph)	5	1709	236	264	1350	13	426	8	701	23	29
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA
Protected Phases	5	2	8	1	6		8	8	1	4	4
Permitted Phases			2			6			8		
Detector Phase	5	2	8	1	6	6	8	8	1	4	4
Switch Phase											
Minimum Initial (s)	5.0	10.0	5.0	5.0	10.0	10.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)	11.0	38.7	47.0	11.0	25.7	25.7	47.0	47.0	11.0	44.3	44.3
Total Split (s)	11.0	50.0	27.0	29.0	68.0	68.0	27.0	27.0	29.0	14.0	14.0
Total Split (%)	9.2%	41.7%	22.5%	24.2%	56.7%	56.7%	22.5%	22.5%	24.2%	11.7%	11.7%
Yellow Time (s)	4.0	4.7	4.0	4.0	4.7	4.7	4.0	4.0	4.0	3.3	3.3
All-Red Time (s)	2.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.7	6.0	6.0	5.7	5.7	6.0	6.0	6.0	5.3	5.3
Lead/Lag	Lag	Lead		Lag	Lead	Lead			Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes			Yes		
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	5.0	49.6	74.9	23.0	76.4	76.4	19.6	19.6	43.8	7.0	7.0
Actuated g/C Ratio	0.04	0.41	0.62	0.19	0.64	0.64	0.16	0.16	0.36	0.06	0.06
v/c Ratio	0.09	0.89	0.26	0.44	0.41	0.01	0.89	0.80	1.22	0.35	0.51
Control Delay	58.2	39.8	1.9	45.3	12.5	0.0	82.8	68.5	141.3	63.7	57.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.2	39.8	1.9	45.3	12.5	0.0	82.8	68.5	141.3	63.7	57.8
LOS	E	D	A	D	B	A	F	E	F	E	E
Approach Delay		35.3			17.8			116.2			59.9
Approach LOS		D			B			F			E

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 72 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 145			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.22			
Intersection Signal Delay: 48.8		Intersection LOS: D	
Intersection Capacity Utilization 96.4%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 7: Hayden Road & Frank Lloyd Wright Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1709	236	264	1350	13	426	8	701	23	29	13
Future Volume (veh/h)	5	1709	236	264	1350	13	426	8	701	23	29	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	6	1964	139	272	1392	5	459	0	533	34	43	4
Peak Hour Factor	0.87	0.87	0.87	0.97	0.97	0.97	0.94	0.94	0.94	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	151	1984	784	783	2790	780	517	0	589	79	83	8
Arrive On Green	0.09	0.37	0.37	0.24	0.52	0.52	0.15	0.00	0.15	0.05	0.05	0.05
Sat Flow, veh/h	1688	5375	1502	3274	5375	1502	3375	0	1502	1688	1774	165
Grp Volume(v), veh/h	6	1964	139	272	1392	5	459	0	533	34	0	47
Grp Sat Flow(s),veh/h/ln	1688	1792	1502	1637	1792	1502	1688	0	1502	1688	0	1939
Q Serve(g_s), s	0.4	43.6	5.8	8.3	20.2	0.2	16.0	0.0	11.4	2.4	0.0	2.8
Cycle Q Clear(g_c), s	0.4	43.6	5.8	8.3	20.2	0.2	16.0	0.0	11.4	2.4	0.0	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	151	1984	784	783	2790	780	517	0	589	79	0	90
V/C Ratio(X)	0.04	0.99	0.18	0.35	0.50	0.01	0.89	0.00	0.90	0.43	0.00	0.52
Avail Cap(c_a), veh/h	151	1984	784	783	2790	780	591	0	622	122	0	141
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	49.9	37.6	15.1	37.9	18.7	13.9	49.8	0.0	34.3	55.7	0.0	55.9
Incr Delay (d2), s/veh	0.0	17.9	0.5	0.1	0.6	0.0	12.9	0.0	15.6	1.4	0.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	22.0	2.9	3.3	8.4	0.1	7.7	0.0	4.9	1.0	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.0	55.6	15.6	38.0	19.4	13.9	62.7	0.0	49.9	57.0	0.0	57.6
LnGrp LOS	D	E	B	D	B	B	E	A	D	E	A	E
Approach Vol, veh/h		2109			1669			992			81	
Approach Delay, s/veh		52.9			22.4			55.8			57.4	
Approach LOS		D			C			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	34.7	50.0		10.9	16.7	68.0		24.4				
Change Period (Y+Rc), s	6.0	5.7		* 5.3	6.0	5.7		6.0				
Max Green Setting (Gmax), s	23.0	44.3		* 8.7	5.0	62.3		21.0				
Max Q Clear Time (g_c+I1), s	10.3	45.6		4.8	2.4	22.2		18.0				
Green Ext Time (p_c), s	0.2	0.0		0.0	0.0	4.8		0.4				

Intersection Summary		
HCM 6th Ctrl Delay	43.1	
HCM 6th LOS	D	

Notes
User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	19	576	48	444	28	27	93	18	17
Future Volume (vph)	19	576	48	444	28	27	93	18	17
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		6		2	7	4			8
Permitted Phases	6		2		4		4	8	
Detector Phase	6	6	2	2	7	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	26.9	26.9	26.9	26.9	9.6	32.4	32.4	32.4	32.4
Total Split (s)	76.0	76.0	76.0	76.0	24.0	44.0	44.0	20.0	20.0
Total Split (%)	63.3%	63.3%	63.3%	63.3%	20.0%	36.7%	36.7%	16.7%	16.7%
Yellow Time (s)	4.7	4.7	4.7	4.7	3.0	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.2	1.6	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	4.6	5.4	5.4	5.4	5.4
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	93.0	93.0	93.0	93.0	16.5	15.7	15.7	8.0	8.0
Actuated g/C Ratio	0.78	0.78	0.78	0.78	0.14	0.13	0.13	0.07	0.07
v/c Ratio	0.03	0.23	0.10	0.19	0.23	0.14	0.40	0.33	0.27
Control Delay	4.9	4.6	5.2	4.3	45.2	43.4	11.3	63.3	47.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.9	4.6	5.2	4.3	45.2	43.4	11.3	63.3	47.5
LOS	A	A	A	A	D	D	B	E	D
Approach Delay		4.6		4.4		23.5			54.4
Approach LOS		A		A		C			D

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 2 (2%), Referenced to phase 2:WBTL, Start of Green		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.40		
Intersection Signal Delay: 8.9	Intersection LOS: A	
Intersection Capacity Utilization 46.7%	ICU Level of Service A	
Analysis Period (min) 15		

Splits and Phases: 1: 83rd Place & Hayden Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	576	20	48	444	47	28	27	93	18	17	6
Future Volume (veh/h)	19	576	20	48	444	47	28	27	93	18	17	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	21	647	10	53	493	35	36	35	89	28	27	3
Peak Hour Factor	0.89	0.89	0.89	0.90	0.90	0.90	0.77	0.77	0.77	0.64	0.64	0.64
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	685	2973	46	608	2794	198	155	231	176	120	87	10
Arrive On Green	0.79	0.79	0.79	0.79	0.79	0.79	0.03	0.12	0.12	0.05	0.05	0.05
Sat Flow, veh/h	829	3770	58	736	3543	251	1688	1969	1502	1200	1741	193
Grp Volume(v), veh/h	21	321	336	53	260	268	36	35	89	28	0	30
Grp Sat Flow(s),veh/h/ln	829	1870	1958	736	1870	1924	1688	1969	1502	1200	0	1934
Q Serve(g_s), s	0.8	5.3	5.3	2.4	4.1	4.1	2.4	1.9	6.7	2.7	0.0	1.8
Cycle Q Clear(g_c), s	4.9	5.3	5.3	7.6	4.1	4.1	2.4	1.9	6.7	2.7	0.0	1.8
Prop In Lane	1.00		0.03	1.00		0.13	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	685	1475	1544	608	1475	1517	155	231	176	120	0	96
V/C Ratio(X)	0.03	0.22	0.22	0.09	0.18	0.18	0.23	0.15	0.51	0.23	0.00	0.31
Avail Cap(c_a), veh/h	685	1475	1544	608	1475	1517	378	633	483	206	0	235
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	3.7	3.2	3.2	4.2	3.1	3.1	50.2	47.6	49.7	55.5	0.0	55.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.1	0.8	0.4	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.6	1.7	0.4	1.4	1.4	1.0	1.0	2.6	0.8	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.7	3.3	3.3	4.5	3.4	3.4	50.5	47.7	50.5	55.8	0.0	55.7
LnGrp LOS	A	A	A	A	A	A	D	D	D	E	A	E
Approach Vol, veh/h		678			581			160			58	
Approach Delay, s/veh		3.3			3.5			49.9			55.8	
Approach LOS		A			A			D			E	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		100.5		19.5		100.5	8.1	11.4				
Change Period (Y+Rc), s		* 5.9		* 5.4		* 5.9	* 4.6	* 5.4				
Max Green Setting (Gmax), s		* 70		* 39		* 70	* 19	* 15				
Max Q Clear Time (g_c+I1), s		9.6		8.7		7.3	4.4	4.7				
Green Ext Time (p_c), s		1.3		0.2		1.5	0.0	0.1				

Intersection Summary		
HCM 6th Ctrl Delay	10.5	
HCM 6th LOS	B	

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

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Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	607	27	98	519	12	3	0	91	8	0	11
Future Vol, veh/h	38	607	27	98	519	12	3	0	91	8	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	135	175	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	96	96	96	72	72	72	43	43	43
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	42	667	30	102	541	13	4	0	126	19	0	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	554	0	0	697	0	0	1226	-	334	1170	1533	277
Stage 1	-	-	-	-	-	-	751	-	-	752	752	-
Stage 2	-	-	-	-	-	-	475	-	-	418	781	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	-	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	-	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	-	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1012	-	-	895	-	-	135	0	662	148	115	720
Stage 1	-	-	-	-	-	-	369	0	-	368	416	-
Stage 2	-	-	-	-	-	-	539	0	-	583	403	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1012	-	-	895	-	-	115	-	662	106	98	720
Mov Cap-2 Maneuver	-	-	-	-	-	-	115	-	-	209	190	-
Stage 1	-	-	-	-	-	-	354	-	-	353	369	-
Stage 2	-	-	-	-	-	-	461	-	-	452	386	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	1.5	11.7	16.6
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	662	1012	-	-	895	-	-	355
HCM Lane V/C Ratio	0.191	0.041	-	-	0.114	-	-	0.124
HCM Control Delay (s)	11.7	8.7	-	-	9.5	-	-	16.6
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.4	-	-	0.4

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	629	32	121	606	75	25	2	63	28	0	13
Future Vol, veh/h	18	629	32	121	606	75	25	2	63	28	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	100	145	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	90	90	90	56	56	56
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	662	34	130	652	81	28	2	70	50	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	733	0	0	696	0	0	1286	1693	331	1323	1687	367
Stage 1	-	-	-	-	-	-	700	700	-	953	953	-
Stage 2	-	-	-	-	-	-	586	993	-	370	734	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	868	-	-	896	-	-	122	92	665	114	93	630
Stage 1	-	-	-	-	-	-	396	440	-	278	336	-
Stage 2	-	-	-	-	-	-	463	322	-	622	424	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	868	-	-	896	-	-	103	77	665	88	78	630
Mov Cap-2 Maneuver	-	-	-	-	-	-	218	179	-	188	166	-
Stage 1	-	-	-	-	-	-	387	430	-	272	287	-
Stage 2	-	-	-	-	-	-	381	275	-	542	415	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.5	15	26.2
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	218	614	868	-	-	896	-	-	242
HCM Lane V/C Ratio	0.127	0.118	0.022	-	-	0.145	-	-	0.303
HCM Control Delay (s)	23.9	11.6	9.2	-	-	9.7	-	-	26.2
HCM Lane LOS	C	B	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.4	0.4	0.1	-	-	0.5	-	-	1.2

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	707	20	0	803	0	15
Future Vol, veh/h	707	20	0	803	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	135	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	768	22	0	863	0	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	384
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	614
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	614
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	614	-	-	-
HCM Lane V/C Ratio	0.027	-	-	-
HCM Control Delay (s)	11	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱		✣			✣	
Traffic Vol, veh/h	4	669	45	44	769	12	13	0	15	3	0	2
Future Vol, veh/h	4	669	45	44	769	12	13	0	15	3	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	75	90	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	96	96	96	78	78	78	63	63	63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	719	48	46	801	13	17	0	19	5	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	814	0	0	767	0	0	1220	1633	360	1261	1668	401
Stage 1	-	-	-	-	-	-	727	727	-	893	893	-
Stage 2	-	-	-	-	-	-	493	906	-	368	775	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	809	-	-	842	-	-	136	100	637	127	95	599
Stage 1	-	-	-	-	-	-	381	427	-	303	358	-
Stage 2	-	-	-	-	-	-	526	353	-	624	406	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	809	-	-	842	-	-	129	94	637	118	89	599
Mov Cap-2 Maneuver	-	-	-	-	-	-	253	212	-	118	89	-
Stage 1	-	-	-	-	-	-	379	425	-	301	338	-
Stage 2	-	-	-	-	-	-	495	334	-	602	404	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.5	15.6	26.7
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	374	809	-	-	842	-	-	174
HCM Lane V/C Ratio	0.096	0.005	-	-	0.054	-	-	0.046
HCM Control Delay (s)	15.6	9.5	-	-	9.5	-	-	26.7
HCM Lane LOS	C	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0.1

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

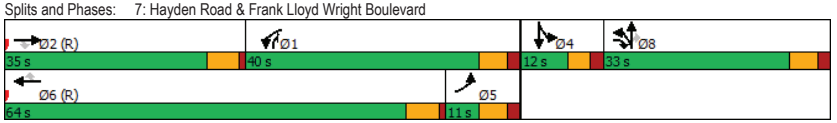
Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	584	718	384	365
Demand Flow Rate, veh/h	596	732	391	372
Vehicles Circulating, veh/h	270	384	520	820
Vehicles Exiting, veh/h	922	527	346	296
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.0	7.8	6.7	13.4
Approach LOS	A	A	A	B

Lane	Left	Right	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LT	R	LTR
Assumed Moves	LT	TR	LT	TR	LT	R	LTR
RT Channelized							
Lane Util	0.470	0.530	0.470	0.530	0.570	0.430	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	280	316	344	388	223	168	372
Cap Entry Lane, veh/h	1053	1129	948	1025	837	913	707
Entry HV Adj Factor	0.980	0.980	0.981	0.981	0.981	0.982	0.981
Flow Entry, veh/h	275	310	337	381	219	165	365
Cap Entry, veh/h	1032	1106	930	1005	820	896	694
V/C Ratio	0.266	0.280	0.363	0.379	0.267	0.184	0.526
Control Delay, s/veh	6.1	5.9	7.9	7.6	7.3	5.8	13.4
LOS	A	A	A	A	A	A	B
95th %tile Queue, veh	1	1	2	2	1	1	3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	4	1100	206	428	1321	29	214	12	283	12	8
Future Volume (vph)	4	1100	206	428	1321	29	214	12	283	12	8
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA
Protected Phases	5	2	8	1	6		8	8	1	4	4
Permitted Phases			2			6			8		
Detector Phase	5	2	8	1	6	6	8	8	1	4	4
Switch Phase											
Minimum Initial (s)	5.0	10.0	5.0	5.0	10.0	10.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)	11.0	38.7	47.0	11.0	25.7	25.7	47.0	47.0	11.0	44.3	44.3
Total Split (s)	11.0	35.0	33.0	40.0	64.0	64.0	33.0	33.0	40.0	12.0	12.0
Total Split (%)	9.2%	29.2%	27.5%	33.3%	53.3%	53.3%	27.5%	27.5%	33.3%	10.0%	10.0%
Yellow Time (s)	4.0	4.7	4.0	4.0	4.7	4.7	4.0	4.0	4.0	3.3	3.3
All-Red Time (s)	2.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.7	6.0	6.0	5.7	5.7	6.0	6.0	6.0	5.3	5.3
Lead/Lag	Lag	Lead		Lag	Lead	Lead			Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes			Yes		
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	5.0	57.6	75.9	25.2	86.6	86.6	12.6	12.6	40.2	6.1	6.1
Actuated g/C Ratio	0.04	0.48	0.63	0.21	0.72	0.72	0.10	0.10	0.34	0.05	0.05
v/c Ratio	0.07	0.50	0.23	0.70	0.38	0.03	0.72	0.64	0.50	0.18	0.14
Control Delay	57.5	24.6	2.2	49.4	8.4	0.0	74.9	66.3	13.9	59.5	47.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	24.6	2.2	49.4	8.4	0.0	74.9	66.3	13.9	59.5	47.7
LOS	E	C	A	D	A	A	E	E	B	E	D
Approach Delay		21.2			18.2			39.1			53.8
Approach LOS		C			B			D			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 103 (86%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 22.3	Intersection LOS: C
Intersection Capacity Utilization 60.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Hayden Road & Frank Lloyd Wright Boulevard



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Hayden One
Total AM

7: Hayden Road & Frank Lloyd Wright Boulevard
HCM 6th Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	1100	206	428	1321	29	214	12	283	12	8	3
Future Volume (veh/h)	4	1100	206	428	1321	29	214	12	283	12	8	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	5	1294	154	476	1468	21	237	0	195	15	10	2
Peak Hour Factor	0.85	0.85	0.85	0.90	0.90	0.90	0.94	0.94	0.94	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	346	1312	499	1462	2611	730	296	0	803	50	47	9
Arrive On Green	0.20	0.24	0.24	0.45	0.49	0.49	0.09	0.00	0.09	0.03	0.03	0.03
Sat Flow, veh/h	1688	5375	1502	3274	5375	1502	3375	0	1502	1688	1593	319
Grp Volume(v), veh/h	5	1294	154	476	1468	21	237	0	195	15	0	12
Grp Sat Flow(s),veh/h/ln	1688	1792	1502	1637	1792	1502	1688	0	1502	1688	0	1911
Q Serve(g_s), s	0.3	28.8	9.2	11.3	23.2	0.9	8.3	0.0	0.0	1.0	0.0	0.7
Cycle Q Clear(g_c), s	0.3	28.8	9.2	11.3	23.2	0.9	8.3	0.0	0.0	1.0	0.0	0.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	346	1312	499	1462	2611	730	296	0	803	50	0	57
V/C Ratio(X)	0.01	0.99	0.31	0.33	0.56	0.03	0.80	0.00	0.24	0.30	0.00	0.21
Avail Cap(c_a), veh/h	346	1312	499	1462	2611	730	759	0	1009	94	0	107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.0	45.1	29.8	21.5	21.8	16.1	53.7	0.0	14.9	57.0	0.0	56.8
Incr Delay (d2), s/veh	0.0	21.7	1.6	0.0	0.9	0.1	1.9	0.0	0.1	1.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	15.3	4.0	4.3	9.8	0.3	3.6	0.0	2.8	0.5	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.0	66.9	31.4	21.5	22.7	16.2	55.6	0.0	15.0	58.2	0.0	57.5
LnGrp LOS	D	E	C	C	C	B	E	A	B	E	A	E
Approach Vol, veh/h		1453			1965			432			27	
Approach Delay, s/veh		63.0			22.4			37.3			57.9	
Approach LOS		E			C			D			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	59.6	35.0		8.9	30.6	64.0		16.5				
Change Period (Y+Rc), s	6.0	5.7		* 5.3	6.0	5.7		6.0				
Max Green Setting (Gmax), s	34.0	29.3		* 6.7	5.0	58.3		27.0				
Max Q Clear Time (g_c+I1), s	13.3	30.8		3.0	2.3	25.2		10.3				
Green Ext Time (p_c), s	0.3	0.0		0.0	0.0	5.1		0.3				

Intersection Summary		
HCM 6th Ctrl Delay		39.5
HCM 6th LOS		D

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Hayden One
Total AM Mitigated

1: 83rd Place & Hayden Road
Timings

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	19	576	48	444	28	27	93	18	17
Future Volume (vph)	19	576	48	444	28	27	93	18	17
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		6		2	7	4			8
Permitted Phases	6		2		4		4	8	
Detector Phase	6	6	2	2	7	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	26.9	26.9	26.9	26.9	9.6	32.4	32.4	32.4	32.4
Total Split (s)	76.0	76.0	76.0	76.0	24.0	44.0	44.0	20.0	20.0
Total Split (%)	63.3%	63.3%	63.3%	63.3%	20.0%	36.7%	36.7%	16.7%	16.7%
Yellow Time (s)	4.7	4.7	4.7	4.7	3.0	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.2	1.6	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	4.6	5.4	5.4	5.4	5.4
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	93.0	93.0	93.0	93.0	16.5	15.7	15.7	8.0	8.0
Actuated g/C Ratio	0.78	0.78	0.78	0.78	0.14	0.13	0.13	0.07	0.07
v/c Ratio	0.03	0.23	0.10	0.19	0.23	0.14	0.40	0.33	0.27
Control Delay	4.9	4.6	4.4	3.5	45.2	43.4	11.3	63.3	47.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.9	4.6	4.4	3.5	45.2	43.4	11.3	63.3	47.5
LOS	A	A	A	A	D	D	B	E	D
Approach Delay		4.6		3.6		23.5			54.4
Approach LOS		A		A		C			D

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 2 (2%), Referenced to phase 2:WBTL, Start of Green		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.40		
Intersection Signal Delay: 8.6	Intersection LOS: A	
Intersection Capacity Utilization 46.7%	ICU Level of Service A	
Analysis Period (min) 15		

Splits and Phases: 1: 83rd Place & Hayden Road

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	576	20	48	444	47	28	27	93	18	17	6
Future Volume (veh/h)	19	576	20	48	444	47	28	27	93	18	17	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	21	647	10	53	493	35	36	35	89	28	27	3
Peak Hour Factor	0.89	0.89	0.89	0.90	0.90	0.90	0.77	0.77	0.77	0.64	0.64	0.64
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	714	2973	46	608	2794	198	155	231	176	120	87	10
Arrive On Green	0.79	0.79	0.79	1.00	1.00	1.00	0.03	0.12	0.12	0.05	0.05	0.05
Sat Flow, veh/h	829	3770	58	736	3543	251	1688	1969	1502	1200	1741	193
Grp Volume(v), veh/h	21	321	336	53	260	268	36	35	89	28	0	30
Grp Sat Flow(s),veh/h/ln	829	1870	1958	736	1870	1924	1688	1969	1502	1200	0	1934
Q Serve(g_s), s	0.7	5.3	5.3	0.5	0.0	0.0	2.4	1.9	6.7	2.7	0.0	1.8
Cycle Q Clear(g_c), s	0.7	5.3	5.3	5.8	0.0	0.0	2.4	1.9	6.7	2.7	0.0	1.8
Prop In Lane	1.00		0.03	1.00		0.13	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	714	1475	1544	608	1475	1517	155	231	176	120	0	96
V/C Ratio(X)	0.03	0.22	0.22	0.09	0.18	0.18	0.23	0.15	0.51	0.23	0.00	0.31
Avail Cap(c_a), veh/h	714	1475	1544	608	1475	1517	378	633	483	206	0	235
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	2.8	3.2	3.2	0.2	0.0	0.0	50.2	47.6	49.7	55.5	0.0	55.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.1	0.8	0.4	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.6	1.7	0.0	0.1	0.1	1.0	1.0	2.6	0.8	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	2.8	3.3	3.3	0.4	0.3	0.3	50.5	47.7	50.5	55.8	0.0	55.7
LnGrp LOS	A	A	A	A	A	A	D	D	D	E	A	E
Approach Vol, veh/h		678			581			160			58	
Approach Delay, s/veh		3.3			0.3			49.9			55.8	
Approach LOS		A			A			D			E	

Timer - Assigned Phs	2	4	6	7	8
Phs Duration (G+Y+Rc), s	100.5	19.5	100.5	8.1	11.4
Change Period (Y+Rc), s	* 5.9	* 5.4	* 5.9	* 4.6	* 5.4
Max Green Setting (Gmax), s	* 70	* 39	* 70	* 19	* 15
Max Q Clear Time (g_c+I1), s	7.8	8.7	7.3	4.4	4.7
Green Ext Time (p_c), s	1.3	0.2	1.5	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	9.2
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	607	27	98	519	12	0	0	94	8	0	11
Future Vol, veh/h	38	607	27	98	519	12	0	0	94	8	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	135	175	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	96	96	96	72	72	72	43	43	43
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	42	667	30	102	541	13	0	0	131	19	0	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	554	0	0	697	0	0	-	-	334	1170	1533	277
Stage 1	-	-	-	-	-	-	-	-	-	752	752	-
Stage 2	-	-	-	-	-	-	-	-	-	418	781	-
Critical Hdwy	4.14	-	-	4.14	-	-	-	-	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	-	-	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*1297	-	-	895	-	-	0	0	662	255	154	*867
Stage 1	-	-	-	-	-	-	0	0	-	633	592	-
Stage 2	-	-	-	-	-	-	0	0	-	583	403	-
Platoon blocked, %	1	-	-		-	-				1	1	1
Mov Cap-1 Maneuver	*1297	-	-	895	-	-	-	-	662	182	132	*867
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	277	222	-
Stage 1	-	-	-	-	-	-	-	-	-	613	525	-
Stage 2	-	-	-	-	-	-	-	-	-	453	390	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	1.5	11.8	13.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	662	* 1297	-	-	895	-	-	457
HCM Lane V/C Ratio	0.197	0.032	-	-	0.114	-	-	0.097
HCM Control Delay (s)	11.8	7.9	-	-	9.5	-	-	13.7
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.4	-	-	0.3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	18	629	32	121	606	25	2	28	0
Future Volume (vph)	18	629	32	121	606	25	2	28	0
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases		2		1	6		8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	2	2	2	1	6	8	8	4	4
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.9	23.9	23.9	9.5	23.9	23.4	23.4	23.4	23.4
Total Split (s)	67.0	67.0	67.0	26.0	93.0	27.0	27.0	27.0	27.0
Total Split (%)	55.8%	55.8%	55.8%	21.7%	77.5%	22.5%	22.5%	22.5%	22.5%
Yellow Time (s)	4.7	4.7	4.7	3.5	4.7	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.0	1.2	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	4.5	5.9	5.4	5.4	5.4	5.4
Lead/Lag	Lag	Lag	Lag	Lead					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	90.8	90.8	90.8	103.7	103.5	8.5	8.5	8.5	8.5
Actuated g/C Ratio	0.76	0.76	0.76	0.86	0.86	0.07	0.07	0.07	0.07
v/c Ratio	0.04	0.25	0.03	0.22	0.24	0.30	0.39	0.35	0.03
Control Delay	5.1	4.9	0.3	2.5	2.1	60.0	18.9	62.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.1	4.9	0.3	2.5	2.1	60.0	18.9	62.8	0.2
LOS	A	A	A	A	A	E	B	E	A
Approach Delay		4.7			2.2		30.4		43.3
Approach LOS		A			A		C		D

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 60		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.39		
Intersection Signal Delay: 5.9	Intersection LOS: A	
Intersection Capacity Utilization 45.1%	ICU Level of Service A	
Analysis Period (min) 15		

Splits and Phases: 3: 84th Street & Hayden Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	629	32	121	606	75	25	2	63	28	0	13
Future Volume (veh/h)	18	629	32	121	606	75	25	2	63	28	0	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	20	699	19	134	673	50	28	2	31	31	0	5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	593	2881	1156	628	2996	222	132	6	90	110	0	95
Arrive On Green	0.77	0.77	0.77	0.04	0.85	0.85	0.06	0.06	0.06	0.06	0.00	0.06
Sat Flow, veh/h	692	3741	1502	1688	3530	262	1337	102	1582	1303	0	1668
Grp Volume(v), veh/h	20	699	19	134	356	367	28	0	33	31	0	5
Grp Sat Flow(s),veh/h/ln	692	1870	1502	1688	1870	1922	1337	0	1684	1303	0	1668
Q Serve(g_s), s	0.8	6.3	0.4	1.8	4.3	4.3	2.4	0.0	2.3	2.8	0.0	0.3
Cycle Q Clear(g_c), s	0.8	6.3	0.4	1.8	4.3	4.3	2.8	0.0	2.3	5.1	0.0	0.3
Prop In Lane	1.00		1.00	1.00		0.14	1.00		0.94	1.00		1.00
Lane Grp Cap(c), veh/h	593	2881	1156	628	1588	1631	132	0	96	110	0	95
V/C Ratio(X)	0.03	0.24	0.02	0.21	0.22	0.22	0.21	0.00	0.34	0.28	0.00	0.05
Avail Cap(c_a), veh/h	593	2881	1156	861	1588	1631	297	0	303	270	0	300
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	3.3	3.9	3.2	2.3	1.7	1.7	54.8	0.0	54.4	56.9	0.0	53.5
Incr Delay (d2), s/veh	0.1	0.2	0.0	0.2	0.3	0.3	0.8	0.0	2.1	1.4	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.8	0.1	0.3	0.8	0.8	0.8	0.0	1.0	1.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.4	4.1	3.2	2.5	2.0	2.0	55.6	0.0	56.5	58.2	0.0	53.7
LnGrp LOS	A	A	A	A	A	A	E	A	E	E	A	D
Approach Vol, veh/h		738			857			61			36	
Approach Delay, s/veh		4.1			2.1			56.1			57.6	
Approach LOS		A			A			E			E	

Timer - Assigned Phs	1	2	4	6	8
Phs Duration (G+Y+Rc), s	9.4	98.3	12.2	107.8	12.2
Change Period (Y+Rc), s	4.5	* 5.9	* 5.4	* 5.9	* 5.4
Max Green Setting (Gmax), s	21.5	* 61	* 22	* 87	* 22
Max Q Clear Time (g_c+I1), s	3.8	8.3	7.1	6.3	4.8
Green Ext Time (p_c), s	0.3	5.3	0.1	4.5	0.2

Intersection Summary		
HCM 6th Ctrl Delay	6.1	
HCM 6th LOS	A	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

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Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	707	20	0	803	0	15
Future Vol, veh/h	707	20	0	803	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	135	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	768	22	0	863	0	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	384
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	*789
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*789
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	789	-	-	-
HCM Lane V/C Ratio	0.021	-	-	-
HCM Control Delay (s)	9.7	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	669	45	44	769	12	13	0	15	3	0	2
Future Vol, veh/h	4	669	45	44	769	12	13	0	15	3	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	75	90	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	96	96	96	78	78	78	63	63	63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	719	48	46	801	13	17	0	19	5	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	814	0	0	767	0	0	1220	1633	360	1261	1668	401
Stage 1	-	-	-	-	-	-	727	727	-	893	893	-
Stage 2	-	-	-	-	-	-	493	906	-	368	775	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	809	-	-	1187	-	-	*273	*141	*815	*250	132	599
Stage 1	-	-	-	-	-	-	*768	*673	-	*303	358	-
Stage 2	-	-	-	-	-	-	*526	*353	-	*768	646	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	809	-	-	1187	-	-	*263	*135	*815	*236	127	599
Mov Cap-2 Maneuver	-	-	-	-	-	-	*387	*256	-	*236	127	-
Stage 1	-	-	-	-	-	-	*764	*670	-	*301	344	-
Stage 2	-	-	-	-	-	-	*503	*339	-	*746	642	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	12.2	16.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	538	809	-	-	1187	-	-	312
HCM Lane V/C Ratio	0.067	0.005	-	-	0.039	-	-	0.025
HCM Control Delay (s)	12.2	9.5	-	-	8.2	-	-	16.8
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.1

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

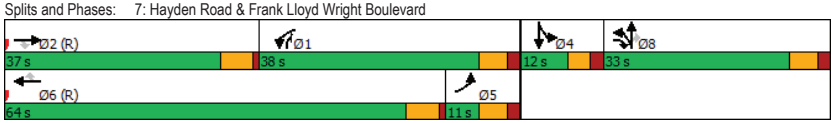
Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	584	718	384	365
Demand Flow Rate, veh/h	596	732	391	372
Vehicles Circulating, veh/h	270	384	520	820
Vehicles Exiting, veh/h	922	527	346	296
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.0	7.8	6.7	13.4
Approach LOS	A	A	A	B

Lane	Left	Right	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LT	R	LTR
Assumed Moves	LT	TR	LT	TR	LT	R	LTR
RT Channelized							
Lane Util	0.470	0.530	0.470	0.530	0.570	0.430	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	280	316	344	388	223	168	372
Cap Entry Lane, veh/h	1053	1129	948	1025	837	913	707
Entry HV Adj Factor	0.980	0.980	0.981	0.981	0.981	0.982	0.981
Flow Entry, veh/h	275	310	337	381	219	165	365
Cap Entry, veh/h	1032	1106	930	1005	820	896	694
V/C Ratio	0.266	0.280	0.363	0.379	0.267	0.184	0.526
Control Delay, s/veh	6.1	5.9	7.9	7.6	7.3	5.8	13.4
LOS	A	A	A	A	A	A	B
95th %tile Queue, veh	1	1	2	2	1	1	3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	4	1100	206	428	1321	29	214	12	283	12	8
Future Volume (vph)	4	1100	206	428	1321	29	214	12	283	12	8
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA
Protected Phases	5	2	8	1	6		8	8	1	4	4
Permitted Phases			2			6			8		
Detector Phase	5	2	8	1	6	6	8	8	1	4	4
Switch Phase											
Minimum Initial (s)	5.0	10.0	5.0	5.0	10.0	10.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)	11.0	38.7	47.0	11.0	25.7	25.7	47.0	47.0	11.0	44.3	44.3
Total Split (s)	11.0	37.0	33.0	38.0	64.0	64.0	33.0	33.0	38.0	12.0	12.0
Total Split (%)	9.2%	30.8%	27.5%	31.7%	53.3%	53.3%	27.5%	27.5%	31.7%	10.0%	10.0%
Yellow Time (s)	4.0	4.7	4.0	4.0	4.7	4.7	4.0	4.0	4.0	3.3	3.3
All-Red Time (s)	2.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.7	6.0	6.0	5.7	5.7	6.0	6.0	6.0	5.3	5.3
Lead/Lag	Lag	Lead		Lag	Lead	Lead			Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes			Yes		
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	5.0	59.1	77.4	23.7	86.6	86.6	12.6	12.6	38.7	6.1	6.1
Actuated g/C Ratio	0.04	0.49	0.64	0.20	0.72	0.72	0.10	0.10	0.32	0.05	0.05
v/c Ratio	0.07	0.49	0.23	0.74	0.38	0.03	0.72	0.64	0.52	0.18	0.14
Control Delay	57.5	23.5	2.1	52.5	8.4	0.0	74.9	66.3	15.3	59.5	47.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	23.5	2.1	52.5	8.4	0.0	74.9	66.3	15.3	59.5	47.7
LOS	E	C	A	D	A	A	E	E	B	E	D
Approach Delay		20.3			18.9			39.9			53.8
Approach LOS		C			B			D			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 103 (86%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 22.4	Intersection LOS: C
Intersection Capacity Utilization 60.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Hayden Road & Frank Lloyd Wright Boulevard



19-ZN-2013#2
8/8/2019

7: Hayden Road & Frank Lloyd Wright Boulevard

HCM 6th Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	1100	206	428	1321	29	214	12	283	12	8	3
Future Volume (veh/h)	4	1100	206	428	1321	29	214	12	283	12	8	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	5	1294	154	476	1468	21	237	0	195	15	10	2
Peak Hour Factor	0.85	0.85	0.85	0.90	0.90	0.90	0.94	0.94	0.94	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	346	1402	524	1408	2611	730	296	0	778	50	47	9
Arrive On Green	0.20	0.26	0.26	0.43	0.49	0.49	0.09	0.00	0.09	0.03	0.03	0.03
Sat Flow, veh/h	1688	5375	1502	3274	5375	1502	3375	0	1502	1688	1593	319
Grp Volume(v), veh/h	5	1294	154	476	1468	21	237	0	195	15	0	12
Grp Sat Flow(s),veh/h/ln	1688	1792	1502	1637	1792	1502	1688	0	1502	1688	0	1911
Q Serve(g_s), s	0.3	28.1	8.9	11.6	23.2	0.9	8.3	0.0	0.0	1.0	0.0	0.7
Cycle Q Clear(g_c), s	0.3	28.1	8.9	11.6	23.2	0.9	8.3	0.0	0.0	1.0	0.0	0.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	346	1402	524	1408	2611	730	296	0	778	50	0	57
V/C Ratio(X)	0.01	0.92	0.29	0.34	0.56	0.03	0.80	0.00	0.25	0.30	0.00	0.21
Avail Cap(c_a), veh/h	346	1402	524	1408	2611	730	759	0	984	94	0	107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.0	43.2	28.4	22.8	21.8	16.1	53.7	0.0	16.0	57.0	0.0	56.8
Incr Delay (d2), s/veh	0.0	11.5	1.4	0.1	0.9	0.1	1.9	0.0	0.1	1.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	13.9	3.9	4.5	9.8	0.3	3.6	0.0	3.0	0.5	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.0	54.7	29.8	22.9	22.7	16.2	55.6	0.0	16.1	58.2	0.0	57.5
LnGrp LOS	D	D	C	C	C	B	E	A	B	E	A	E
Approach Vol, veh/h		1453			1965			432			27	
Approach Delay, s/veh		52.0			22.7			37.8			57.9	
Approach LOS		D			C			D			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	57.6	37.0		8.9	30.6	64.0		16.5				
Change Period (Y+Rc), s	6.0	5.7		* 5.3	6.0	5.7		6.0				
Max Green Setting (Gmax), s	32.0	31.3		* 6.7	5.0	58.3		27.0				
Max Q Clear Time (g_c+I1), s	13.6	30.1		3.0	2.3	25.2		10.3				
Green Ext Time (p_c), s	0.3	0.6		0.0	0.0	5.1		0.3				

Intersection Summary		
HCM 6th Ctrl Delay		35.6
HCM 6th LOS		D

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

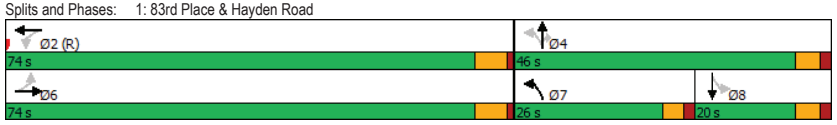
Hayden One
Total PM

1: 83rd Place & Hayden Road
Timings

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	13	862	86	559	148	12	153	92	24
Future Volume (vph)	13	862	86	559	148	12	153	92	24
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		6		2	7	4			8
Permitted Phases	6		2		4		4	8	
Detector Phase	6	6	2	2	7	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	26.9	26.9	26.9	26.9	9.6	32.4	32.4	32.4	32.4
Total Split (s)	74.0	74.0	74.0	74.0	26.0	46.0	46.0	20.0	20.0
Total Split (%)	61.7%	61.7%	61.7%	61.7%	21.7%	38.3%	38.3%	16.7%	16.7%
Yellow Time (s)	4.7	4.7	4.7	4.7	3.0	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.2	1.6	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	4.6	5.4	5.4	5.4	5.4
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	74.2	74.2	74.2	74.2	35.3	34.5	34.5	12.4	12.4
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.29	0.29	0.29	0.10	0.10
v/c Ratio	0.03	0.45	0.37	0.26	0.50	0.03	0.39	0.75	0.24
Control Delay	11.5	13.6	18.7	11.6	37.2	27.5	14.7	83.6	32.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.5	13.6	18.7	11.6	37.2	27.5	14.7	83.6	32.5
LOS	B	B	B	B	D	C	B	F	C
Approach Delay		13.6		12.5		25.8			66.6
Approach LOS		B		B		C			E

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 72 (60%), Referenced to phase 2:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 19.0		Intersection LOS: B	
Intersection Capacity Utilization 62.7%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: 83rd Place & Hayden Road



Hayden One
Total PM

1: 83rd Place & Hayden Road
HCM 6th Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	862	69	86	559	17	148	12	153	92	24	22
Future Volume (veh/h)	13	862	69	86	559	17	148	12	153	92	24	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	14	947	49	91	588	7	192	16	89	102	27	7
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.77	0.77	0.77	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	519	2362	122	344	2471	29	363	498	380	180	148	38
Arrive On Green	0.65	0.65	0.65	0.65	0.65	0.65	0.12	0.25	0.25	0.10	0.10	0.10
Sat Flow, veh/h	779	3618	187	536	3786	45	1688	1969	1502	1221	1508	391
Grp Volume(v), veh/h	14	490	506	91	290	305	192	16	89	102	0	34
Grp Sat Flow(s),veh/h/ln	779	1870	1935	536	1870	1961	1688	1969	1502	1221	0	1898
Q Serve(g_s), s	0.9	14.8	14.8	11.6	7.7	7.7	11.8	0.7	5.6	9.9	0.0	2.0
Cycle Q Clear(g_c), s	8.6	14.8	14.8	26.3	7.7	7.7	11.8	0.7	5.6	9.9	0.0	2.0
Prop In Lane	1.00		0.10	1.00		0.02	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	519	1221	1263	344	1221	1280	363	498	380	180	0	187
V/C Ratio(X)	0.03	0.40	0.40	0.26	0.24	0.24	0.53	0.03	0.23	0.57	0.00	0.18
Avail Cap(c_a), veh/h	519	1221	1263	344	1221	1280	468	666	508	209	0	231
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.3	9.8	9.8	16.0	8.6	8.6	40.1	33.7	35.6	53.2	0.0	49.7
Incr Delay (d2), s/veh	0.0	0.1	0.1	1.9	0.5	0.4	0.4	0.0	0.1	1.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	5.8	6.0	1.6	3.1	3.3	5.0	0.4	2.1	3.1	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.3	9.9	9.9	17.9	9.0	9.0	40.5	33.8	35.7	54.3	0.0	49.8
LnGrp LOS	B	A	A	B	A	A	D	C	D	D	A	D
Approach Vol, veh/h		1010			686			297			136	
Approach Delay, s/veh		9.9			10.2			38.7			53.2	
Approach LOS		A			B			D			D	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		84.2		35.8		84.2	18.6	17.2				
Change Period (Y+Rc), s		* 5.9		* 5.4		* 5.9	* 4.6	* 5.4				
Max Green Setting (Gmax), s		* 68		* 41		* 68	* 21	* 15				
Max Q Clear Time (g_c+I1), s		28.3		7.6		16.8	13.8	11.9				
Green Ext Time (p_c), s		1.9		0.2		2.4	0.2	0.1				

Intersection Summary		
HCM 6th Ctrl Delay	16.8	
HCM 6th LOS	B	

Notes
User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

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Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	1033	58	268	582	5	0	0	242	4	2	89
Future Vol, veh/h	20	1033	58	268	582	5	0	0	242	4	2	89
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	135	175	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	96	96	96	90	90	90	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	1123	63	279	606	5	0	0	269	6	3	135

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	611	0	0	1186	0	0	-	-	562	1773	2397	306
Stage 1	-	-	-	-	-	-	-	-	-	1167	1167	-
Stage 2	-	-	-	-	-	-	-	-	-	606	1230	-
Critical Hdwy	4.14	-	-	4.14	-	-	-	-	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	-	-	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	964	-	-	585	-	-	0	0	470	53	33	690
Stage 1	-	-	-	-	-	-	0	0	-	206	266	-
Stage 2	-	-	-	-	-	-	0	0	-	451	248	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	964	-	-	585	-	-	-	-	470	14	17	690
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ -201	~ -73	-
Stage 1	-	-	-	-	-	-	-	-	-	201	139	-
Stage 2	-	-	-	-	-	-	-	-	-	189	242	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	5.2	22.4	8.5
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	470	964	-	-	585	-	-	1163
HCM Lane V/C Ratio	0.572	0.023	-	-	0.477	-	-	0.124
HCM Control Delay (s)	22.4	8.8	-	-	16.6	-	-	8.5
HCM Lane LOS	C	A	-	-	C	-	-	A
HCM 95th %tile Q(veh)	3.5	0.1	-	-	2.6	-	-	0.4

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	28.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	1176	55	176	700	16	74	0	128	70	1	52
Future Vol, veh/h	13	1176	55	176	700	16	74	0	128	70	1	52
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	100	145	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	46	46	46	63	63	63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	1238	58	189	753	17	161	0	278	111	2	83

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	770	0	0	1296	0	0	2022	2414	619	1787	2464	385
Stage 1	-	-	-	-	-	-	1266	1266	-	1140	1140	-
Stage 2	-	-	-	-	-	-	756	1148	-	647	1324	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	840	-	-	531	-	-	~ 34	32	432	~ 51	30	613
Stage 1	-	-	-	-	-	-	179	238	-	214	274	-
Stage 2	-	-	-	-	-	-	366	272	-	426	224	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	840	-	-	531	-	-	~ 20	20	432	~ 13	19	613
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 92	96	-	~ -54	28	-
Stage 1	-	-	-	-	-	-	176	234	-	210	176	-
Stage 2	-	-	-	-	-	-	202	175	-	149	220	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	3.1	184.2	
HCM LOS			F	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	92	432	840	-	-	531	-	-	+
HCM Lane V/C Ratio	1.749	0.644	0.016	-	-	0.356	-	-	-
HCM Control Delay (s)	$ 455.8	27.2	9.4	-	-	15.5	-	-	-
HCM Lane LOS	F	D	A	-	-	C	-	-	-
HCM 95th %tile Q(veh)	13.2	4.4	0.1	-	-	1.6	-	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	1350	28	0	892	0	74
Future Vol, veh/h	1350	28	0	892	0	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	135	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1467	30	0	959	0	82

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	734
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	363
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	363
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	363	-	-	-
HCM Lane V/C Ratio	0.227	-	-	-
HCM Control Delay (s)	17.8	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.9	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱		✣			✣	
Traffic Vol, veh/h	7	1399	43	22	874	19	11	0	19	12	0	18
Future Vol, veh/h	7	1399	43	22	874	19	11	0	19	12	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	75	90	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	96	96	96	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	1554	48	23	910	20	15	0	25	16	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	930	0	0	1602	0	0	2071	2546	777	1749	2574	455
Stage 1	-	-	-	-	-	-	1570	1570	-	956	956	-
Stage 2	-	-	-	-	-	-	501	976	-	793	1618	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	731	-	-	404	-	-	31	26	340	55	25	552
Stage 1	-	-	-	-	-	-	116	170	-	277	335	-
Stage 2	-	-	-	-	-	-	521	327	-	348	161	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	731	-	-	404	-	-	28	24	340	48	23	552
Mov Cap-2 Maneuver	-	-	-	-	-	-	92	108	-	152	95	-
Stage 1	-	-	-	-	-	-	115	168	-	274	316	-
Stage 2	-	-	-	-	-	-	470	308	-	319	159	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	32.4	20.7
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	171	731	-	-	404	-	-	269
HCM Lane V/C Ratio	0.234	0.011	-	-	0.057	-	-	0.149
HCM Control Delay (s)	32.4	10	-	-	14.4	-	-	20.7
HCM Lane LOS	D	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.9	0	-	-	0.2	-	-	0.5

6: Northsight Boulevard & Hayden Road

HCM 6th Roundabout

Intersection	
Intersection Delay, s/veh	20.3
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1470	691	685	457
Demand Flow Rate, veh/h	1500	705	699	466
Vehicles Circulating, veh/h	298	638	1333	787
Vehicles Exiting, veh/h	955	1394	465	556
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.8	10.6	44.1	16.8
Approach LOS	B	B	E	C

Lane	Left	Right	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LT	R	LTR
Assumed Moves	LT	TR	LT	TR	LT	R	LTR
RT Channelized							
Lane Util	0.470	0.530	0.470	0.530	0.506	0.494	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	705	795	331	374	354	345	466
Cap Entry Lane, veh/h	1026	1102	751	826	396	457	727
Entry HV Adj Factor	0.980	0.980	0.981	0.979	0.981	0.980	0.981
Flow Entry, veh/h	691	779	325	366	347	338	457
Cap Entry, veh/h	1006	1080	736	808	389	448	714
V/C Ratio	0.687	0.721	0.441	0.453	0.894	0.754	0.641
Control Delay, s/veh	14.5	15.0	10.9	10.4	55.4	32.6	16.8
LOS	B	C	B	B	F	D	C
95th %tile Queue, veh	6	7	2	2	9	6	5

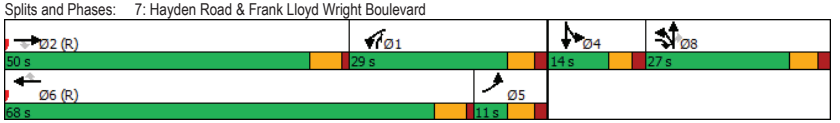
7: Hayden Road & Frank Lloyd Wright Boulevard

Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	5	1709	244	334	1350	13	435	8	780	23	29
Future Volume (vph)	5	1709	244	334	1350	13	435	8	780	23	29
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA
Protected Phases	5	2	8	1	6		8	8	1	4	4
Permitted Phases			2			6			8		
Detector Phase	5	2	8	1	6	6	8	8	1	4	4
Switch Phase											
Minimum Initial (s)	5.0	10.0	5.0	5.0	10.0	10.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)	11.0	38.7	47.0	11.0	25.7	25.7	47.0	47.0	11.0	44.3	44.3
Total Split (s)	11.0	50.0	27.0	29.0	68.0	68.0	27.0	27.0	29.0	14.0	14.0
Total Split (%)	9.2%	41.7%	22.5%	24.2%	56.7%	56.7%	22.5%	22.5%	24.2%	11.7%	11.7%
Yellow Time (s)	4.0	4.7	4.0	4.0	4.7	4.7	4.0	4.0	4.0	3.3	3.3
All-Red Time (s)	2.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.7	6.0	6.0	5.7	5.7	6.0	6.0	6.0	5.3	5.3
Lead/Lag	Lag	Lead		Lag	Lead	Lead			Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes			Yes		
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	5.0	49.3	74.9	23.0	76.1	76.1	19.9	19.9	44.1	7.0	7.0
Actuated g/C Ratio	0.04	0.41	0.62	0.19	0.63	0.63	0.17	0.17	0.37	0.06	0.06
v/c Ratio	0.09	0.89	0.27	0.55	0.41	0.01	0.89	0.80	1.35	0.35	0.51
Control Delay	58.2	40.5	2.9	47.7	12.7	0.0	82.6	68.2	195.0	63.7	57.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.2	40.5	2.9	47.7	12.7	0.0	82.6	68.2	195.0	63.7	57.8
LOS	E	D	A	D	B	A	F	E	F	E	E
Approach Delay		35.8			19.5			151.7			59.9
Approach LOS		D			B			F			E

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 72 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green		
Natural Cycle: 145		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.35		
Intersection Signal Delay: 58.9	Intersection LOS: E	
Intersection Capacity Utilization 101.5%	ICU Level of Service G	
Analysis Period (min) 15		

Splits and Phases: 7: Hayden Road & Frank Lloyd Wright Boulevard



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Hayden One
Total PM

7: Hayden Road & Frank Lloyd Wright Boulevard
HCM 6th Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1709	244	334	1350	13	435	8	780	23	29	13
Future Volume (veh/h)	5	1709	244	334	1350	13	435	8	780	23	29	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	6	1964	148	344	1392	5	469	0	617	34	43	4
Peak Hour Factor	0.87	0.87	0.87	0.97	0.97	0.97	0.94	0.94	0.94	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	114	1984	817	712	2790	780	591	0	589	79	83	8
Arrive On Green	0.07	0.37	0.37	0.22	0.52	0.52	0.17	0.00	0.17	0.05	0.05	0.05
Sat Flow, veh/h	1688	5375	1502	3274	5375	1502	3375	0	1502	1688	1774	165
Grp Volume(v), veh/h	6	1964	148	344	1392	5	469	0	617	34	0	47
Grp Sat Flow(s),veh/h/ln	1688	1792	1502	1637	1792	1502	1688	0	1502	1688	0	1939
Q Serve(g_s), s	0.4	43.6	6.0	11.0	20.2	0.2	16.0	0.0	21.0	2.4	0.0	2.8
Cycle Q Clear(g_c), s	0.4	43.6	6.0	11.0	20.2	0.2	16.0	0.0	21.0	2.4	0.0	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	114	1984	817	712	2790	780	591	0	589	79	0	90
V/C Ratio(X)	0.05	0.99	0.18	0.48	0.50	0.01	0.79	0.00	1.05	0.43	0.00	0.52
Avail Cap(c_a), veh/h	114	1984	817	712	2790	780	591	0	589	122	0	141
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	52.4	37.6	13.8	41.0	18.7	13.9	47.4	0.0	36.4	55.7	0.0	55.9
Incr Delay (d2), s/veh	0.1	17.9	0.5	0.2	0.6	0.0	6.8	0.0	49.9	1.4	0.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	22.0	3.1	4.5	8.4	0.1	7.3	0.0	14.1	1.0	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.4	55.6	14.3	41.2	19.4	13.9	54.2	0.0	86.3	57.0	0.0	57.6
LnGrp LOS	D	E	B	D	B	B	D	A	F	E	A	E
Approach Vol, veh/h		2118			1741			1086			81	
Approach Delay, s/veh		52.7			23.7			72.5			57.4	
Approach LOS		D			C			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	32.1	50.0		10.9	14.1	68.0		27.0				
Change Period (Y+Rc), s	6.0	5.7		* 5.3	6.0	5.7		6.0				
Max Green Setting (Gmax), s	23.0	44.3		* 8.7	5.0	62.3		21.0				
Max Q Clear Time (g_c+I1), s	13.0	45.6		4.8	2.4	22.2		23.0				
Green Ext Time (p_c), s	0.2	0.0		0.0	0.0	4.8		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		47.0
HCM 6th LOS		D

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

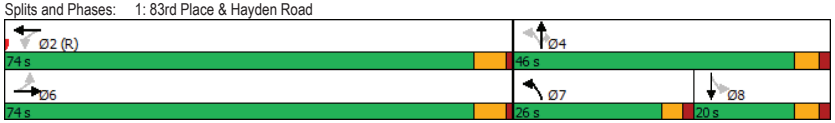
Hayden One
Total PM Mitigated

1: 83rd Place & Hayden Road
Timings

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	13	862	86	559	148	12	153	92	24
Future Volume (vph)	13	862	86	559	148	12	153	92	24
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		6		2	7	4			8
Permitted Phases	6		2		4		4	8	
Detector Phase	6	6	2	2	7	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	26.9	26.9	26.9	26.9	9.6	32.4	32.4	32.4	32.4
Total Split (s)	74.0	74.0	74.0	74.0	26.0	46.0	46.0	20.0	20.0
Total Split (%)	61.7%	61.7%	61.7%	61.7%	21.7%	38.3%	38.3%	16.7%	16.7%
Yellow Time (s)	4.7	4.7	4.7	4.7	3.0	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.2	1.6	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	4.6	5.4	5.4	5.4	5.4
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	74.2	74.2	74.2	74.2	35.3	34.5	34.5	12.4	12.4
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.29	0.29	0.29	0.10	0.10
v/c Ratio	0.03	0.45	0.37	0.26	0.50	0.03	0.39	0.75	0.24
Control Delay	11.5	13.6	23.1	15.3	37.2	27.5	14.7	83.6	32.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.5	13.6	23.1	15.3	37.2	27.5	14.7	83.6	32.5
LOS	B	B	C	B	D	C	B	F	C
Approach Delay		13.6		16.3		25.8			66.6
Approach LOS		B		B		C			E

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 72 (60%), Referenced to phase 2:WBTL, Start of Green		
Natural Cycle: 80		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.75		
Intersection Signal Delay: 20.1	Intersection LOS: C	
Intersection Capacity Utilization 62.7%	ICU Level of Service B	
Analysis Period (min) 15		

Splits and Phases: 1: 83rd Place & Hayden Road



19-ZN-2013#2
8/8/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	862	69	86	559	17	148	12	153	92	24	22
Future Volume (veh/h)	13	862	69	86	559	17	148	12	153	92	24	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	14	947	49	91	588	7	192	16	89	102	27	7
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.77	0.77	0.77	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	519	2362	122	344	2471	29	363	498	380	180	148	38
Arrive On Green	0.65	0.65	0.65	0.65	0.65	0.65	0.12	0.25	0.25	0.10	0.10	0.10
Sat Flow, veh/h	779	3618	187	536	3786	45	1688	1969	1502	1221	1508	391
Grp Volume(v), veh/h	14	490	506	91	290	305	192	16	89	102	0	34
Grp Sat Flow(s),veh/h/ln	779	1870	1935	536	1870	1961	1688	1969	1502	1221	0	1898
Q Serve(g_s), s	0.9	14.8	14.8	11.6	7.7	7.7	11.8	0.7	5.6	9.9	0.0	2.0
Cycle Q Clear(g_c), s	8.6	14.8	14.8	26.3	7.7	7.7	11.8	0.7	5.6	9.9	0.0	2.0
Prop In Lane	1.00		0.10	1.00		0.02	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	519	1221	1263	344	1221	1280	363	498	380	180	0	187
V/C Ratio(X)	0.03	0.40	0.40	0.26	0.24	0.24	0.53	0.03	0.23	0.57	0.00	0.18
Avail Cap(c_a), veh/h	519	1221	1263	344	1221	1280	468	666	508	209	0	231
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.3	9.8	9.8	16.0	8.6	8.6	40.1	33.7	35.6	53.2	0.0	49.7
Incr Delay (d2), s/veh	0.0	0.1	0.1	1.9	0.5	0.4	0.4	0.0	0.1	1.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	5.8	6.0	1.6	3.1	3.3	5.0	0.4	2.1	3.1	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.3	9.9	9.9	17.9	9.0	9.0	40.5	33.8	35.7	54.3	0.0	49.8
LnGrp LOS	B	A	A	B	A	A	D	C	D	D	A	D
Approach Vol, veh/h		1010			686			297			136	
Approach Delay, s/veh		9.9			10.2			38.7			53.2	
Approach LOS		A			B			D			D	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		84.2		35.8		84.2	18.6	17.2				
Change Period (Y+Rc), s		* 5.9		* 5.4		* 5.9	* 4.6	* 5.4				
Max Green Setting (Gmax), s		* 68		* 41		* 68	* 21	* 15				
Max Q Clear Time (g_c+I1), s		28.3		7.6		16.8	13.8	11.9				
Green Ext Time (p_c), s		1.9		0.2		2.4	0.2	0.1				

Intersection Summary		
HCM 6th Ctrl Delay		16.8
HCM 6th LOS		B

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	1033	58	268	582	5	4	0	238	4	2	89
Future Vol, veh/h	20	1033	58	268	582	5	4	0	238	4	2	89
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	135	-	135	175	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	96	96	96	90	90	90	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	1123	63	279	606	5	4	0	264	6	3	135

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	611	0	0	1186	0	0	2030	-	562	1773	2397	306
Stage 1	-	-	-	-	-	-	1167	-	-	1167	1167	-
Stage 2	-	-	-	-	-	-	863	-	-	606	1230	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	-	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	-	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	-	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*1258	-	-	585	-	-	43	0	470	75	33	*841
Stage 1	-	-	-	-	-	-	206	0	-	334	363	-
Stage 2	-	-	-	-	-	-	570	0	-	451	248	-
Platoon blocked, %	1	-	-		-	-	1			1	1	1
Mov Cap-1 Maneuver	*1258	-	-	585	-	-	23	-	470	20	17	*841
Mov Cap-2 Maneuver	-	-	-	-	-	-	23	-	-	~ -127	~ -52	-
Stage 1	-	-	-	-	-	-	202	-	-	328	190	-
Stage 2	-	-	-	-	-	-	246	-	-	194	244	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	5.2	22.1	6.4
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	470	* 1258	-	-	585	-	-	2649
HCM Lane V/C Ratio	0.563	0.017	-	-	0.477	-	-	0.054
HCM Control Delay (s)	22.1	7.9	-	-	16.6	-	-	6.4
HCM Lane LOS	C	A	-	-	C	-	-	A
HCM 95th %tile Q(veh)	3.4	0.1	-	-	2.6	-	-	0.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

19-ZN-2013#2
8/8/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	13	1176	55	176	700	74	0	70	1
Future Volume (vph)	13	1176	55	176	700	74	0	70	1
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases		2		1	6		8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	2	2	2	1	6	8	8	4	4
Switch Phase									
Minimum Initial (s)	2.5	2.5	2.5	1.5	2.5	1.6	1.6	1.6	1.6
Minimum Split (s)	10.0	10.0	10.0	6.0	10.0	7.0	7.0	7.0	7.0
Total Split (s)	71.0	71.0	71.0	22.0	93.0	27.0	27.0	27.0	27.0
Total Split (%)	59.2%	59.2%	59.2%	18.3%	77.5%	22.5%	22.5%	22.5%	22.5%
Yellow Time (s)	4.7	4.7	4.7	3.5	4.7	3.6	3.6	3.6	3.6
All-Red Time (s)	1.2	1.2	1.2	1.0	1.2	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	4.5	5.9	5.4	5.4	5.4	5.4
Lead/Lag	Lag	Lag	Lag	Lead					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	78.1	78.1	78.1	94.6	93.2	15.5	15.5	15.5	15.5
Actuated g/C Ratio	0.65	0.65	0.65	0.79	0.78	0.13	0.13	0.13	0.13
v/c Ratio	0.03	0.54	0.06	0.59	0.28	0.50	0.66	0.67	0.27
Control Delay	16.5	21.7	8.2	12.7	4.4	58.1	63.7	75.2	48.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.5	21.7	8.2	12.7	4.4	58.1	63.7	75.2	48.6
LOS	B	C	A	B	A	E	E	E	D
Approach Delay		21.1			6.0		61.7		63.7
Approach LOS		C			A		E		E

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 23 (19%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 21.1	Intersection LOS: C
Intersection Capacity Utilization 70.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: Hayden Road

Min green cannot be less than 2 seconds, (Phase 1).

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1350	28	0	892	0	74
Future Vol, veh/h	1350	28	0	892	0	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	135	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1467	30	0	959	0	82

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	734
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	*502
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*502
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	13.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	502	-	-	-
HCM Lane V/C Ratio	0.164	-	-	-
HCM Control Delay (s)	13.6	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.6	-	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	1399	43	22	874	19	11	0	19	12	0	18
Future Vol, veh/h	7	1399	43	22	874	19	11	0	19	12	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	75	90	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	96	96	96	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	1554	48	23	910	20	15	0	25	16	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	930	0	0	1602	0	0	2071	2546	777	1749	2574	455
Stage 1	-	-	-	-	-	-	1570	1570	-	956	956	-
Stage 2	-	-	-	-	-	-	501	976	-	793	1618	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	731	-	-	*751	-	-	*92	*26	*502	*291	25	552
Stage 1	-	-	-	-	-	-	*474	*415	-	*277	335	-
Stage 2	-	-	-	-	-	-	*521	*327	-	*474	407	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	731	-	-	*751	-	-	*85	*25	*502	*268	24	552
Mov Cap-2 Maneuver	-	-	-	-	-	-	*254	*172	-	*250	171	-
Stage 1	-	-	-	-	-	-	*468	*411	-	*274	325	-
Stage 2	-	-	-	-	-	-	*483	*317	-	*445	403	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	15.9	15.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	370	731	-	-	* 751	-	-	372
HCM Lane V/C Ratio	0.108	0.011	-	-	0.031	-	-	0.108
HCM Control Delay (s)	15.9	10	-	-	9.9	-	-	15.8
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	0.4

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

6: Northsight Boulevard & Hayden Road

HCM 6th Roundabout

Intersection	
Intersection Delay, s/veh	20.3
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1470	691	685	457
Demand Flow Rate, veh/h	1500	705	699	466
Vehicles Circulating, veh/h	298	638	1333	787
Vehicles Exiting, veh/h	955	1394	465	556
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.8	10.6	44.1	16.8
Approach LOS	B	B	E	C

Lane	Left	Right	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LT	R	LTR
Assumed Moves	LT	TR	LT	TR	LT	R	LTR
RT Channelized							
Lane Util	0.470	0.530	0.470	0.530	0.506	0.494	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	705	795	331	374	354	345	466
Cap Entry Lane, veh/h	1026	1102	751	826	396	457	727
Entry HV Adj Factor	0.980	0.980	0.981	0.979	0.981	0.980	0.981
Flow Entry, veh/h	691	779	325	366	347	338	457
Cap Entry, veh/h	1006	1080	736	808	389	448	714
V/C Ratio	0.687	0.721	0.441	0.453	0.894	0.754	0.641
Control Delay, s/veh	14.5	15.0	10.9	10.4	55.4	32.6	16.8
LOS	B	C	B	B	F	D	C
95th %tile Queue, veh	6	7	2	2	9	6	5

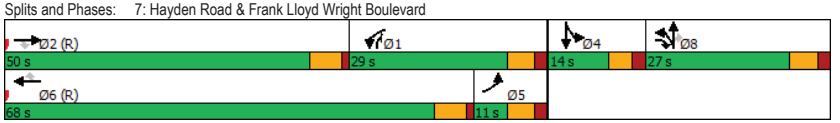
7: Hayden Road & Frank Lloyd Wright Boulevard

Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	5	1709	244	334	1350	13	435	8	780	23	29
Future Volume (vph)	5	1709	244	334	1350	13	435	8	780	23	29
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA
Protected Phases	5	2	8	1	6		8	8	1	4	4
Permitted Phases			2			6			8		
Detector Phase	5	2	8	1	6	6	8	8	1	4	4
Switch Phase											
Minimum Initial (s)	5.0	10.0	5.0	5.0	10.0	10.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)	11.0	38.7	47.0	11.0	25.7	25.7	47.0	47.0	11.0	44.3	44.3
Total Split (s)	11.0	50.0	27.0	29.0	68.0	68.0	27.0	27.0	29.0	14.0	14.0
Total Split (%)	9.2%	41.7%	22.5%	24.2%	56.7%	56.7%	22.5%	22.5%	24.2%	11.7%	11.7%
Yellow Time (s)	4.0	4.7	4.0	4.0	4.7	4.7	4.0	4.0	4.0	3.3	3.3
All-Red Time (s)	2.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.7	6.0	6.0	5.7	5.7	6.0	6.0	6.0	5.3	5.3
Lead/Lag	Lag	Lead		Lag	Lead	Lead			Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes			Yes		
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	5.0	49.3	74.9	23.0	76.1	76.1	19.9	19.9	44.1	7.0	7.0
Actuated g/C Ratio	0.04	0.41	0.62	0.19	0.63	0.63	0.17	0.17	0.37	0.06	0.06
v/c Ratio	0.09	0.89	0.27	0.55	0.41	0.01	0.89	0.80	1.35	0.35	0.51
Control Delay	58.2	40.5	2.9	47.7	12.7	0.0	82.6	68.2	195.0	63.7	57.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.2	40.5	2.9	47.7	12.7	0.0	82.6	68.2	195.0	63.7	57.8
LOS	E	D	A	D	B	A	F	E	F	E	E
Approach Delay		35.8			19.5			151.7			59.9
Approach LOS		D			B			F			E

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 72 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.35	
Intersection Signal Delay: 58.9	Intersection LOS: E
Intersection Capacity Utilization 101.5%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 7: Hayden Road & Frank Lloyd Wright Boulevard



19-ZN-2013#2
8/8/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1709	244	334	1350	13	435	8	780	23	29	13
Future Volume (veh/h)	5	1709	244	334	1350	13	435	8	780	23	29	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1969	1772	1772	1969	1772	1772	1969	1772	1772	1969	1772
Adj Flow Rate, veh/h	6	1964	148	344	1392	5	469	0	617	34	43	4
Peak Hour Factor	0.87	0.87	0.87	0.97	0.97	0.97	0.94	0.94	0.94	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	114	1984	817	712	2790	780	591	0	589	79	83	8
Arrive On Green	0.07	0.37	0.37	0.22	0.52	0.52	0.17	0.00	0.17	0.05	0.05	0.05
Sat Flow, veh/h	1688	5375	1502	3274	5375	1502	3375	0	1502	1688	1774	165
Grp Volume(v), veh/h	6	1964	148	344	1392	5	469	0	617	34	0	47
Grp Sat Flow(s),veh/h/ln	1688	1792	1502	1637	1792	1502	1688	0	1502	1688	0	1939
Q Serve(g_s), s	0.4	43.6	6.0	11.0	20.2	0.2	16.0	0.0	21.0	2.4	0.0	2.8
Cycle Q Clear(g_c), s	0.4	43.6	6.0	11.0	20.2	0.2	16.0	0.0	21.0	2.4	0.0	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	114	1984	817	712	2790	780	591	0	589	79	0	90
V/C Ratio(X)	0.05	0.99	0.18	0.48	0.50	0.01	0.79	0.00	1.05	0.43	0.00	0.52
Avail Cap(c_a), veh/h	114	1984	817	712	2790	780	591	0	589	122	0	141
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	52.4	37.6	13.8	41.0	18.7	13.9	47.4	0.0	36.4	55.7	0.0	55.9
Incr Delay (d2), s/veh	0.1	17.9	0.5	0.2	0.6	0.0	6.8	0.0	49.9	1.4	0.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	22.0	3.1	4.5	8.4	0.1	7.3	0.0	14.1	1.0	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.4	55.6	14.3	41.2	19.4	13.9	54.2	0.0	86.3	57.0	0.0	57.6
LnGrp LOS	D	E	B	D	B	B	D	A	F	E	A	E
Approach Vol, veh/h		2118			1741			1086			81	
Approach Delay, s/veh		52.7			23.7			72.5			57.4	
Approach LOS		D			C			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	32.1	50.0		10.9	14.1	68.0		27.0				
Change Period (Y+Rc), s	6.0	5.7		* 5.3	6.0	5.7		6.0				
Max Green Setting (Gmax), s	23.0	44.3		* 8.7	5.0	62.3		21.0				
Max Q Clear Time (g_c+I1), s	13.0	45.6		4.8	2.4	22.2		23.0				
Green Ext Time (p_c), s	0.2	0.0		0.0	0.0	4.8		0.0				

Intersection Summary	
HCM 6th Ctrl Delay	47.0
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

LAND DEVELOPMENT SERVICES

August 6, 2019

Brad Carr, Senior Planner
City of Scottsdale
7447 East Indian School
Scottsdale, AZ 85251

Re: 19-ZN-2013 #2, 906-PA-2018

Mr. Carr-
I wanted to update you regarding Yam's concerns over the Impact Church's proposed amendments to the Approved Development Plan (19-ZN-2019 #2). We have had an opportunity to meet with Mr. Leary and his client regarding Yam's issues with the proposed entitlement changes to the vacant 6.6 acres fronting on Hayden Road at 84th Street.

As a result of this discussion, we offer the following comments-

1. Both parties agree that a traffic signal is necessary at the entrance located at 84th street and Hayden Road to control traffic movements at this intersection. The subject project will be responsible for the design and installation of this traffic signal.

2. There is considerable concern regarding the amount of floor area that is available for retail/restaurant uses. As a result, we feel it is imperative that the proposed uses and their respective allowable maximum floor areas be identified and stipulated as part of the overall entitlement approval.
   We believe the overall proposed retail/restaurant area should not exceed 35% of the total building square footage that is physically built and the total restaurant use should be limited to 35% of the total retail use. Should the overall square footage built decrease, we believe the allowable retail/restaurant square footage should decrease in proportion to maintain the aforementioned percentages.

At the current total square footage of 194,000 SF, the allowable maximum area for the 3 uses would breakdown as follows-

• **Office**	**126,100 SF**
• **Retail**	**44,135 SF**
• **Restaurant**	**23,765 SF**
• **Total**	**194,000 SF**

However, if the total building square footage were to decease to 130,000 SF, for example, then the allowable maximum area for the 3 uses would adjust in proportion and breakdown as follows-

- **Office** **84,500 SF**
- **Retail** **29,575 SF**
- **Restaurant** **15,925 SF**
- **Total** **130,000 SF**

We appreciate your time and attention to our concerns. Please contact me at your earliest convenience to discuss.

Thank you,

David Gulino
Land Development Services, LLC
(602) 330-5252
DGULINO@LDSERVICES.NET

c. Dan Dahl, Yam Properties, LLC

Michael P. Leary, LTD

10278 E. Hillery Drive
Scottsdale, Arizona 85255

cell (480) 991-1111
michaelpleary@cox.net

DATE: August 4, 2019

TO: Brad Carr, Senior Planner

FROM: Mike Leary

RE: CORE CENTER – 19-ZN-2013 #2
Response to 1st review letter/PC meeting in September

Brad below are the responses to the 1st review letter. Based upon our responses we would appreciate being scheduled for the first available Planning Commission meeting in order for our project being considered by City Council as anticipated in October due to contractual obligations. Discussions on any areas of disagreement can continue and, if needed, resolved at public hearing.

Thanks again for all the help Brad. ML

7/12/2019

Michael P. Leary, LTD
10278 E Hillery Dr
Scottsdale, AZ 85255

RE: 19-ZN-2013#2
Core Center
H4145 (Key Code)

Dear Mr. Leary:

The Planning & Development Services Division has completed the review of the above referenced development application submitted on 6/5/2019. The following **1st Review Comments** represent the review performed by our team, and is intended to provide you with guidance for compliance with city codes, policies, and guidelines related to this application.

Zoning Ordinance and Scottsdale Revise Code Significant Issues

The following code and ordinance related issues have been identified in the first review of this application, and shall be addressed in the resubmittal of the revised application material. Addressing these items is critical to scheduling the application for public hearing, and may affect the City Staff's recommendation. Please address the following:

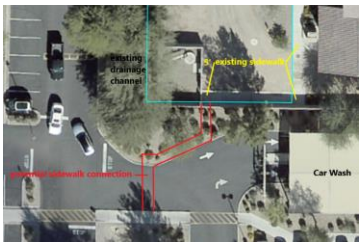
Zoning:

1. Please revise the Project Narrative to include a discussion of the use of the PCP district bonus provisions. Discussion should include the proposed bonus to be requested, the justification for the proposed bonus, calculations for the estimated value of the bonus, as well as a plan for community benefit related to the estimated value of the bonus. (Zoning Ordinance, Sec. 5.4008. and 7.1200.) ***Done***

2. Please revise the project plans to demonstrate compliance with the setback and stepback requirements of the PCP zoning district. The setback requirement is a minimum of 25 feet from the curb line along N. Hayden Road. The stepback requirements starts at the minimum setback line. (Zoning Ordinance, Sec. 5.4007.D. & 5.4007.E.) ***Done***

3. Please revise the project plans to include the calculations for floor area ratio (FAR) in compliance with the Zoning Ordinance, Sec. 5.4007.A. ***Done***

4. The site and Core Apartments as part of case 19-ZN-2013 appears to not have complied with stipulation 7 "PEDESTRIAN CONNECTIONS. The site shall provide a minimum of three (3) pedestrian connections to existing properties surrounding the site. A minimum of one (1) connection having a minimum with of six (6) feet shall be provided to each of the west, south and east sides of the site. Pedestrian connections shall be reviewed and approved by city transportation staff." Please revise the project plans to identify compliance with these requirements. ***According to the Sunrise apartments developer, no response was received from the adjoining properties (Costco and Home Depot) to requests for approval to make pedestrian connections. The apartments did provide a sidewalk that connects to the walled-in stormwater pumps. The sidewalk appears to be a possibly route for future access to a nearby sidewalk in Costco's parking lot. No potential access is possible on the gas station side of the Costco property due to an existing wash. The proposed plan does show a possible connection to an existing Burger King sidewalk which then leads to a series of striped pedestrian crossings including one that winds around the side of the Home Depot building. In addition to the existing 5' sidewalk from Hayden a pedestrian crossing from Buildings D and E is provided to the existing 5' apartment sidewalk.***



5. Please submit a revised copy of the Citizen Review Report summary to include details of the most recent public outreach efforts, including any additional public comments that may have been received. (Zoning Ordinance, Sec. 1.305.C.2.b.) ***Done***

6. Please provide conceptual elevations in conformance with the district requirements with the next submittal. (Zoning Ordinance, Sec. 1.303.) ***Elevations are provided demonstrating compliance with development standards of setback, stepbacks and heights.***

<u>2001 General Plan & Greater Airpark Character Area Plan (GAPCAP) Analysis:</u>

7. The first submittal narrative/ development master plan- a document that is intended to provide overall coordination of urban design character, buffering to adjacent uses, transportation systems, and infrastructure necessary for the proposed development – includes unnecessary/oppositional statements that are not material in any manner to the application request; please see applicant responses to General Plan Growth Area Element

Goal #2, Bullet #1, and Community Mobility Element Goal #5, Bullet#3 regarding light-rail transit and equestrians. Please revise the Project Narrative to include only necessary statements are in direction relation to the proposed development be included in the development master plan upon resubmittal. ***Done***

To this end, please ensure that responses that are completed with "refer to prior responses" (found throughout the document) indicate by numerical identification, and page number, reference to the response the applicant is directing the reader to. Additionally, please remove responses that indicate "not applicable". ***Done***

8. The General Plan Character and Design Element (Goal 4, bullets 10, 14, and 15) encourage "streetscapes for major roadways that promote the city's visual quality and character; and blend into the character of the surrounding area. The Greater Airpark Character Area Plan Character and Design Element (Goal CD2, Policy CD 2.1.6, CD 2.2, and CD2.7), and Economic Vitality Element (Goal 5, bullet 6) promotes vibrant Signature Corridors in the Greater Airpark to provide a distinct identify and design theme in the area. Although the first submittal discusses Hayden Road being designated as a Signature Corridor, there appears to be no indication as to what that means as a result of this development proposal – details of such are expected of a formal Development Plan. Please note Hayden Road at the subject site's frontage is a designated Signature Corridor and Buffered Roadway – an area in which 50' foot minimum setback, measured from back of curb line, is expected to be maintained as per CD2.7 of the GACAP. Please respond both graphically and narratively as to how the proposed development will provide this dimension and enhance the Streetscape in response to the cited considerations. Please consider additions of areas of pedestrian lighting, public art, bus shelters, and other public amenities to enhance the pedestrian environment and streetscape. ***The 2014 zoning approval established the landscaped setbacks for the Hayden Road streetscape (Stipulation #6) and the specifics of the Signature Cooridor streetscape plan were approved by the Development Review Board. The streetscape landscaping and new sidewalks were installed and constructed with the development of the apartments. Enclosed are the zoning stipulations for reference***.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9. Please respond to Goal 10, along with any applicable bullets, of the of the General Plan Preservation and Environmental Planning Element, and Goal EP5 of the Greater Airpark Character Area Plan addressing how the proposed development may, if at all, utilize green building alternatives that support sustainable desert living***. Done – see revised comments Attachment B***

a. Please note***, (Noted)*** Scottsdale is progressively attempting to install in capital projects, and request from private development applications, Low Impact Development (LID) and Green Infrastructure (GI) as a method of stormwater control, water harvesting, and cleansing for the first flush requirements of the City's Floodplain Ordnance. Accordingly, please consider utilization of this resource. More information on this initiative can be found at:

https://sustainability.asu.edu/sustainable-cities/resources/lid-handbook/

10. As a respond to Goal 1 of the Community Involvement Element, with a resubmittal, please provide an updated Citizen Involvement Report that describes the key issues that have been identified through the public involvement process. ***Done***

Fire:

11. Please revise the project plans to demonstrate hydrant spacing, existing and proposed (Fire Ord. 4283, 507.5.1.2) ***Hydrants are shown on the Preliminary Site Utility Plan.***

12. Please revise the project plans to demonstrate the location of Fire Department Connection(s). (Fire Or. 4283, 912) ***Done***

Drainage:

13. Please submit a copy of the revised Drainage Report with the remainder of the resubmittal material identified in Attachment A. Please see comments within the red-lined 1st submittal of the Drainage Report and Preliminary G&D and address accordingly. ***There were no comments on the Drainage Plan***

Water and Wastewater:

14. Please submit a revised Water and Wastewater Design Report with the remainder of the resubmittal material identified in Attachment A. Please see comments within the red-lined 1st submittal of the Report. The Preliminary Basis of Design Report must be accepted by the Water Resources Department prior to scheduling of first hearing of project. ***Comments addressed see report dated 7/30/19.***

15. Please submit flow monitoring results of northern 8-inch sewer in Hayden Road with next submittal. ***Added flow monitoring from the Wood/Patel report in Appendix E. Because the possible sewer capacity issues to the "north" sewer main, the site sewer design was changed in Figure 2 so that wastewater discharge is to the "south" main.***

Airport:

16. The subject site is within Airport noise compatibility study AC-2 area. Please note that a signed Avigation Easement along with the required legal descriptions and graphic, and a copy of the Noise Disclosure statement will be required with the final plans submittal. ***Noted***

Engineering:

17. All waste shall be placed in suitable containers to facilitate waste removal in a sanitary condition. Please revise the project plans accordingly. (SRC, Sec. 24-13) ***Noted. As the project is at the concept zoning stage, waste removal will be demonstrated in subsequent development plans.***

18. Off-site transportation, stormwater and water resources improvements along property frontages to existing supporting infrastructure, with associated dedications, is required. Please update the project plans accordingly. (SRC, Sec. 48-7, 47-10 & 49-219) ***Done***

Significant Policy Related Issues

The following policy related issues have been identified in the first review of this application. While these issues may not be critical to scheduling the application for public hearing, they may affect the City Staff's recommendation pertaining to the application and should be addressed with the resubmittal of the revised application material. Please address the following:

Transportation:

19. The entry drive should be redesigned to be in conformance with COS Standard Detail #2257, CH-2. The proposed raised median creates offset lanes alignments with the existing driveway to the northwest. An entry drive of 48 feet of pavement width transitioning to 55 feet is unnecessary. Please revise the project plans accordingly. (DSPM, Sec. 5-3.200 & 5-3.205***) Please refer to response included with the revised traffic study.***

20. The north end of the site is designed poorly. The driveway leading from Hayden Road directs vehicles into the pedestrian courtyard. The short turning radius on the site drive leading to this driveway will create issues with vehicle queuing and blocking inbound traffic. Please revise the project plans to correct these issues. (Zoning Ordinance, Sec. 1.204.) ***The geometry has been modified to increase the turning radii***.

Traffic Study:

21. Transportation staff is not fully supportive of the installation of a traffic signal at 84th Street/Hayden Road due to signal spacing. The proposed change from a church to offices and restaurants result in ~ 4x the daily and AM peak hour trips generated and ~10X the PM peak hour trips generated. This has profound impacts on traffic, particularly at the 84th Street/Hayden Road intersection. Signalization was not intended/planned for this location. DSPM 5-3.123 G3 indicates that "At Minor Arterial/Minor Arterial (or smaller designated streets) intersections the designer should evaluate using a roundabout as an alternative to a traffic signal for all new or significantly rebuilt intersections." The TIMA appears to include no indication that a roundabout option was evaluated. Please address these issues with the next submittal. (DSPM, Sec. 5-3.123) ***Please refer to response included with the revised traffic study.***

22. Please revise the traffic study to add a queue analysis for site driveways due to the substantial increase in projected trip generation as well as queue analysis for the intersection of 84th Street and Hayden Road due to the proposed control change (signalization). (Zoning Ordinance, Sec. 1.303.) ***Done - Please refer to response included with the revised traffic study.***

23. Please revise the traffic study to provide project site & total ADT on major street(s) within the study area. (DSPM, Sec. 5-1.701***) Done***

24.

Page 31, 1st bullet (84th Street & Hayden Road), 3rd sentence - the site plan depicts a redesign of the existing site driveway. The developer is responsible for correct alignment of their proposed new driveway to prevent negative offset of left turning vehicles. Should the intersection be signalized, the developer will be responsible for improvements associated with

the traffic signal, including and not limited to providing a left turn lane on all approaches. Please revise the project plans to address this comment. (Zoning Ordinance, Sec. 1.204.) ***Done***

_____

New comments received after July 12th 1st review letter_____

From: Ostler, Douglas <DOstler@Scottsdaleaz.gov>
Sent: Monday, **July 29, 2019 11:58 AM**
To: Tove White
Cc: Kercher, Phillip; Guntupalli, Kiran; Carr, Brad
Subject: Core Center Traffic Study Comments, 19-ZN-2013 #2

Transportation staff had additional discussions and review of the proposed CORE Center project and associated TIMA. In addition to the comments already provided, please address the following items related to evaluation of appropriate traffic control at the 84th Street and Hayden Road intersection:

- Please use the 24-hour counts that were collected at the 84th Street and Hayden Road intersection for evaluating the signal warrants in existing conditions.
- A reduction for right turning traffic is expected to be applied to the minor street approach volumes (see MUTCD Section 4C.01 Paragraph 8).
- Staff recommends consideration of restricting left turns out of the driveway as an alternative to signalization, even if signal warrants are met (see MUTCD Section 4B.04 Paragraph 2J). This restriction would be for the driveway by means of a pork-chop median or channelization, etc.; 84th Street would remain full access.
    - Note: this does not retract comment 21 in the comment letter. You may state the circumstances and/or reference discussion(s) indicating compliance with DSPM 5-30123 G3.
- Correct reference to Sarival Avenue (instead of Hayden Road) on page 17 of the study.
- Using the 24-hour counts that were collected at the 84th Street and Hayden Road intersection, state the 24-hour volume on Hayden Road in existing conditions as well as the projected ADT added by the site.

Please refer to responses included with the revised traffic study_____

_____

_____

Engineering:

25. Please review the Context Aerial with corrections provided by Engineering for existing easement conflicts that will need to be modified or released prior to permit issuance, including:

a. Any GLO easements in conflict with proposed development and not required by city LAIPS or TMP will need to be abandoned by property owner prior to any permit issuance. Specifically for this project, the supplied ALTA survey identified GLOs per the following recording information: docket 1443 page 63 and docket 3025 page 473. Please call out required abandonments on site plan. (DSPM, Sec. 1-2.400) ***Noted.***

b. Water lines located outside of a public right-of-way or street tract must be placed in a minimum 20' wide easement:

   i. Horizontally, a minimum of 6' is required between the water line and the edge of easement. ***Modified the proposed water easement accordingly. Please see updated Preliminary Site Utility Plan (Figure 2) in the water/sewer BOD report***

   ii. The easement will be free of obstructions, shall not be in a fenced area, and shall be accessible always to city service equipment such as trucks and backhoes. ***Noted***

   iii. Easements outside of paved areas shall have a 10' wide hardened patch with a cross-slope not greater than 10% and a longitudinal slope not greater than 20%. Hardened paths shall consist of native soil compacted to 95% to a depth of 1'. ***Noted***

   iv. Revegetation within the easement shall consist of low growing shrubs. Update site plan accordingly. ***Noted – As the plan is at a conceptual zoning stage these items will be addressed and incorporated into subsequent plans.***

c. Existing cross access and emergency services access easement through project parcel to abutting parcel in conflict with proposed development will need to be relocated to provide cross access to southern and eastern abutting parcels. Please update the project plans accordingly. (DSPM, Sec. 5-3.201) ***Noted – As the plan is conceptual zoning stage cross-access and emergency access will be addressed and incorporated into subsequent plans.***

26. Please revise the project plans to comply with the following location and design requirements for non-residential, mixed-use, and multi-family residential refuse and recycling enclosures. Please locate and position the enclosure(s): (DSPM, Sec. 2-1.309)

    a. A minimum of one (1) enclosure shall be provided for every 20,000 square feet of office/retail space.

    b. So that the approach pad for the enclosure(s) is located that the refuse truck route to and from the public street has a minimum unobstructed vertical clearance of 13 feet 6 inches (14 feet is recommended), and unobstructed minimum vertical clearance above the approach pad and refuse enclosure of 25 feet. (The vertical clearances are subject to modification based on enclosure container size, location, and positioning as determined by the Sanitation Director, or designee.);

    c. In a location that is easily accessible for collection, and does not require the refuse truck to "backtrack";

    d. A maximum 100 feet distance from building service exit to refuse enclosure;

    e. So that collection vehicles do not back up more than 35 feet;

    f. So that the path of travel for the refuse truck accommodates a minimum vehicle turning radius of 45 feet, and a minimum length of 40 feet;

g. So that the approach pad is level, with a maximum of 2 percent slope;

h. So that the enclosure(s) are not placed between the on-site buildings and adjacent lower density residential unless there is no reasonable alternative. In these situations, orient the enclosure(s) towards the interior of the property;

i. So that the enclosure(s) are not placed next to drainage ways or basins, unless there is no reasonable alternative;

j. So that the enclosure(s) are not placed between the street and the front of the building, unless there is no reasonable alternative; and

k. So that the enclosure(s) are not placed at the end of a dead-end parking aisle.

Noted – As the plan is at the conceptual zoning stage these items including the provision for compactors will be addressed and incorporated into subsequent plans.

27. Compactors may be used as an alternative to refuse or recycling containers. To determine adequacy and site location of compactors, if proposed, please provide the following on a refuse plan:

    a. Compactor type,

    b. Compactor capacity – state on site plan compactor capacity conversion equating to the city's required 1 enclosure for every 20,000 square feet with no recycling,

    c. Compactor location, addressing the following:

        i. Place the refuse compactor container and approach pad so that the refuse truck route to and from the public street has a minimum unobstructed vertical clearance of thirteen (13) feet six (6) inches (fourteen (14) feet is recommended), and unobstructed minimum vertical clearance above the concrete approach slab and refuse compactor container storage area concrete slab of twenty-five (25) feet,
        ii. Place the refuse compactor container in a location that does not require the bin to be maneuvered or relocated from the bin's storage location to be loaded on to the refuse truck,
        iii. Provide a refuse compactor container approach area that has a minimum width of fourteen (14) feet and length of sixty (60) feet in front of the container, and
        iv. Demonstrate path of travel for refuse truck accommodates a minimum vehicle turning radius of 45', and vehicle length of 40'.

Noted – As the plan is at the conceptual zoning stage the provision for compactors will be addressed and incorporated into subsequent plans.

28. Although not a requirement, recycling is an amenity found to be desired by Scottsdale residents. Please note if recycling containers will be provided for the development project. ***Noted – As this project is at the conceptual zoning stage recycling will be addressed with subsequent development plans.***

29. Please revise the project plans with a 6' width accessible pedestrian route from the main entry of the development to each Hayden. (DSPM, Sec. 2-1.310) ***The apartments constructed a 5' sidewalk from its building entrance to Hayden Road and a new 8' sidewalk along portions of Hayden Road transitioning into existing 5' wide sidewalks leading from Costco and Burger King/Home Depot. Consistent with these recently constructed improvements, 5' sidewalks are also proposed from the development to***

Hayden Road at both driveway entrances.

30. Please revise the project plans to provide an eight (8) foot wide minimum, curb-separated sidewalk along the project boundary. (DSPM, Sec. 5-3.102 and 5-3.110) ***Per Item 29 above, an 8' wide sidewalk was constructed along portions of the Hayden Road frontage as part of the construction of the apartment project.***

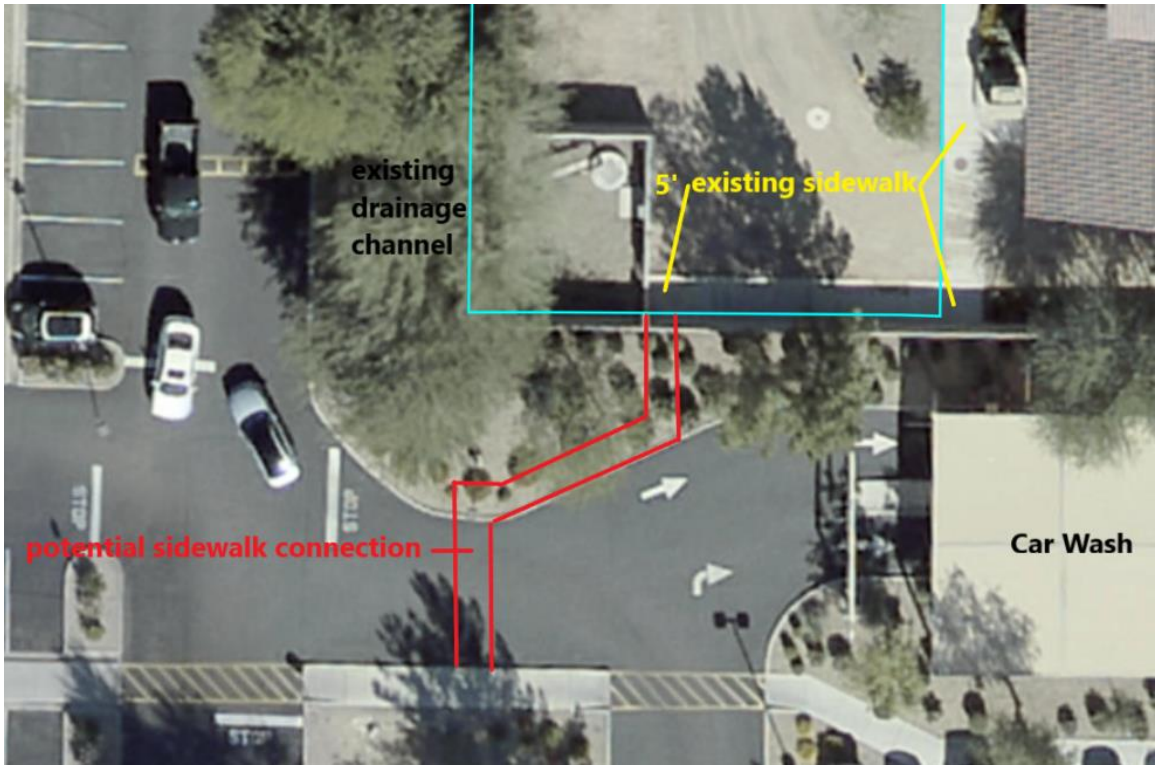
Technical Corrections

The following technical ordinance or policy related corrections have been identified in the first review of the project. While these items are not as critical to scheduling the case for public hearing, they will likely affect a decision on the final plans submittal (construction and improvement documents) and should be addressed as soon as possible. Correcting these items before the hearing may also help clarify questions regarding these plans. Please address the following:

Site:

31. Please revise the project plans to identify pedestrian connections to the surrounding commercial businesses. (Zoning Ordinance, Sec. 1.303.) ***According to the developer of the Sunrise apartments, no response was received from the adjoining properties (Costco and Home Depot) to requests for approval to make pedestrian connections. The proposed plan shows a possible connection to the Burger King property which leads to a striped pedestrian path that winds around the side of the Home Depot building. Two connections to existing sidewalks on the apartment project are proposed. The apartments constructed a sidewalk leading to the stormwater pump house for a possible connection to the Costco parking lot***

sidewalk.



Transportation:

32. Please revise the project plans to identify what measures will be provided to ensure a safe pedestrian crossing of the main entry drive. (Zoning Ordinance, Sec. 1.303.) ***Done – At-grade pedestrian refuge provided within median.***

33. The proposed entry drive is showing a raised median. Please note that this will require the reconstruction of the existing curb returns on Hayden Road. Please revise the project plans to identify this. (Zoning Ordinance, Sec. 1.204.)

Traffic Study:

34. Potential errors were noticed in the study which may not necessarily affect the final recommendations of the study nor necessitate a revised study. Please verify the following items prior to a future resubmittal:

a. Page 7, 3rd paragraph (Hayden Road), 1st Sentence - Hayden Road is a minor arterial within the vicinity of the site, not a major arterial.

b. Page 7, 4th paragraph (83rd Place), 2nd & 3rd sentences - these two sentences likely belong in the next paragraph (83rd Way/Costco Driveway) Please verify.

c. Page 7, 5th paragraph (83rd Way/Costco Driveway), 2nd & 3rd sentences - these two sentences likely belong in the prior paragraph (83rd Place). Please verify.

d. Page 8, 4th paragraph (Costco/Hayden), last sentence - missing "lane" after "deceleration".

e. Page 13-14, 83rd Place & Hayden Road, last sentence - intersection is operating acceptably per DSPM 5-1.801 B.1, please verify recommendation to monitor the intersection.

f. Page 14, 2nd full paragraph (84th Street & Hayden Road), 2nd sentence. See DSPM 5-1.801 B for correct threshold requirements (Generally LOS D or better overall, individual/approach should be LOS D or better, must be LOS E or better). This comment may be applicable to other locations that are not marked. Please revise the Traffic Study and project plans to address this.

Please refer to responses included with the revised traffic study.

Other:

35. Please revise the Zoning Boundary Exhibit to include half of the right-of-way for N. Hayden Road as it fronts the site. All zoning boundaries include adjacent right-of-way. (Zoning Ordinance, Sec. 1.303.) ***Done***

Please resubmit the revised application requirements and additional/supplemental information identified in Attachment A, Resubmittal Checklist, and a written summary response addressing the comments/corrections identified above as soon as possible for further review. The City will then review the revisions to determine if the application is to be scheduled for a hearing date, or if additional modifications, corrections, or additional/supplemental information is necessary.

PLEASE CALL 480-312-7767 TO SCHEDULE A RESUBMITTAL MEETING WITH ME PRIOR TO YOUR PLANNED RESUBMITTAL DATE. DO NOT DROP OFF ANY RESUBMITTAL MATERIAL WITHOUT A SCHEDULED MEETING. THIS WILL HELP MAKE SURE I'M AVAILABLE TO REVIEW YOUR RESUBMITTAL AND PREVENT ANY UNNECESSARY DELAYS. RESUBMITTAL MATERIAL THAT IS DROPPED OFF MAY NOT BE ACCEPTED AND RETURNED TO THE APPLICANT.

The Planning & Development Services Division has had this application in review for 28 Staff Review Days since the application was determined to have the minimal information to be reviewed.

These **1st Review Comments** are valid for a period of 180 days from the date on this letter. The Zoning Administrator may consider an application withdrawn if a revised submittal has not been received within 180 days of the date of this letter (Section 1.305. of the Zoning Ordinance).

If you have any questions, or need further assistance please contact me at 480-312-7713 or at bcarr@ScottsdaleAZ.gov.

Sincerely,

Brad Carr, AICP
Principal Planner

Stipulations for the Zoning Application: Impact Church/Sunrise Commons Case Number: 19-ZN-2013

These stipulations are in order to protect the public health, safety, welfare, and the City of Scottsdale.

GOVERNANCE

1. APPLICABILITY. All stipulations of cases 19-ZN-2013 supersede all of the stipulations of case numbers 42-ZN-1997.

SITE DESIGN

2. CONFORMANCE TO DEVELOPMENT PLAN. Development shall conform with the Development Plan, entitled "Impact Church/Sunrise Commons Development Plan," which is on file with the City Clerk and made a public record by Resolution No. 9665 and incorporated into these stipulations and ordinance by reference as if fully set forth herein. The Development Plan is contingent upon special public improvements, drainage, airport requirements, pedestrian and vehicular circulation improvements, landscaping and other site planning concerns to be addressed at the time of Development Review Board approval. Any proposed significant change to the Development Plan, as determined by the Zoning Administrator, prior to the Development Review Board approval shall be subject to additional public hearings before the Planning Commission and City Council.
3. DEVELOPMENT AGREEMENT. Within six (6) months of City Council approval of the zoning district map amendment, the owner of the residential portion of the Development Plan shall enter into a special public improvements development agreement with the City to execute the bonus floor area as outlined in the Development Plan. The special public improvements development agreement shall require a minimum improvement contribution equal to or greater than the value determined by the Special Public Improvements Contribution Calculation. If a special public improvements development agreement is not executed with the City prior to the expiration of the six (6) months requirement, then all bonus development standards, as outlined in the Development Plan, shall become null and void.
4. SPECIAL PUBLIC IMPROVEMENTS CONTRIBUTION CALCULATION. The special public improvements contribution shall be the value as determined by the following equation: \$100,000 times $(1.035^{(CY-2014)})$, whereas CY = Current Year.
5. MAXIMUM DWELLING UNITS/MAXIMUM DENSITY. Maximum dwelling units and maximum density for that portion of the site zoned Planned Airpark Core Development, Airpark Mixed Use – Residential (PCP-AMU-R) shall be as indicated on the Land Use Budget Table below.

Parcel	Gross Acres	Zoning	Maximum Dwelling Units	Maximum DU/Gross Acre
Sunrise Commons	4.59 +/-	PCP-AMU-R	311	67.8 DU/Gross Acre

6. HAYDEN ROAD LANDSCAPE SETBACK. A minimum thirty-five (35) foot, with an average (40) foot, landscape setback shall be provided between N. Hayden Road and parking improvements on the site. Setback shall be measured from existing curb line.
7. PERIMETER LANDSCAPING AREAS. The developer shall be responsible to maintain, where possible, any existing mature landscaping along the west, south and east portions of the site. With the Development Review Board submittal, the developer shall submit a detailed plant salvage plan that identifies existing tree locations on, and adjacent to, the site's west, south and east property lines.
8. PEDESTRIAN CONNECTIONS. The site shall provide a minimum of three (3) pedestrian connections to existing properties surrounding the site. A minimum of one (1) connection having a minimum with of six (6) feet shall be provided to each of the west, south and east sides of the site. Pedestrian connections shall be reviewed and approved by city transportation staff.
9. BUILDING HEIGHT LIMITATIONS. No building on the site shall exceed 75 feet in height, inclusive of mechanical, measured as provided in the applicable section of the Zoning Ordinance.
10. PERIMETER EXCEPTION. Concurrent or prior to any land division on the site, a perimeter exception development agreement shall be executed with the City recognizing the shared Development Plan of the site.

AIRPORT

11. AIRCRAFT NOISE AND OVERFLIGHT DISCLOSURE. With the final plans submittal, the owner shall provide noise disclosure notice to occupants, potential homeowners, employees and/or students in a form acceptable to the Scottsdale Aviation Director.
12. AVIGATION EASEMENT. With the Development Review Board submittal, the owner shall provide a signed and completed Avigation Easement in a form acceptable to the City for recording.
13. AVIGATION EASEMENT AND LAND RESTRICTION. With the Development Review Board submittal, the owner shall provide a signed and completed Avigation Easement in a form acceptable to the City for recording. Owner has agreed to and therefore shall record a restriction on the southern portion of the site (the residential property) prohibiting the property from being subdivided into parcels, lots or units that would allow for separate individuals to own each such parcel, lot or unit individually.
14. SOUND ATTENUATION MEASURES. With the final plans submittal, the developer shall provide sound attenuation measures that are limited to a sound transmission class of not less than 50 (45 if field tested) as provided in the International Building Code (IBC).

INFRASTRUCTURE AND DEDICATIONS

15. CIRCULATION IMPROVEMENTS. Before any certificate of occupancy is issued for the site, the owner shall make the required dedications and provide the following improvements in conformance with the Design Standards and Policies Manual and all other applicable city codes and policies.
    a. STREETS. Dedicate the following right-of-way and construct the following street improvements:

Street Name	Street Type	Dedications	Improvements	Notes
Hayden Road	Minor Arterial	55 feet half-street Right-of-Way (existing)	Deceleration lane at northeastern driveway, sidewalk, signing and striping	a.1., a.2., a.3.

a.1. The owner shall construct a deceleration lane and provide striping and signing at the northeastern site driveway.

a.2. The owner shall construct an 8 foot wide sidewalk along the site's N. Hayden Road frontage. Sidewalk shall be separated from the back of curb, except at deceleration lane locations.

a.3. The owner shall provide pavement striping at the southwestern site driveway to show inbound, left, right/through lanes.

b. VEHICLE NON-ACCESS EASEMENT. Dedicate a one foot wide vehicular non-access easement along the site's E. Hayden Road frontage, except at the approved street entrance.

c. CROSS ACCESS EASEMENT. With the final plans submittal, the owner shall dedicate a cross access easement dedicated to the adjoining property owner east of the site. The cross access easement shall be located along the drive aisle of the northern most row of parking adjacent to N. Hayden Road, to the satisfaction of Transportation Department staff.

16. RESIDENCE SIDEWALK. With the Development Review Board submittal, the developer shall modify the site plan to include a continuous sidewalk along the southern and eastern portions of the residential development. In areas where sidewalk overlaps required 24-foot fire lane, sidewalk shall be designed to accommodate fire truck loads. Design and location of sidewalk shall be reviewed and approved by transportation staff.

17. SITE ACCESS. Access to the site shall be limited to the two (2) existing site driveways on N. Hayden Road.

18. RESIDENTIAL REFUSE COLLECTION. The owner shall provide a minimum of one (1) refuse compactor on site for the residential development. Refuse compactor location(s) shall be reviewed and approved by city engineering and solid waste staff.

19. SEWER INFRASTRUCTURE. Discharge flow from on-site sewer system lift station to public sewer system in Hayden Road shall not exceed 80 gallons per minute (gpm). If the discharge from the on-site sewer system lift station exceeds 80 gpm, as determined by Water Resources staff, improvements to the off-site public sewer system shall be required.

20. BASIS OF DESIGN REPORTS (WATER and WASTEWATER). The owner shall submit Basis of Design reports (Water and Wastewater) for review and acceptance by City of Scottsdale Water Resources staff prior to submitting final improvement plans for review.

ATTACHMENT A
Resubmittal Checklist

Case Number: **19-ZN-2013#2**

Please provide the following documents, in the quantities indicated, with the resubmittal (all plans larger than 8 ½ x11 shall be folded):

Digital submittals shall include one copy of each item identified below.

☒ One copy: COVER LETTER – Respond to all the issues identified in the first review comment letter.
☒ One copy: Revised Narrative for Project
☒ One copy: Revised Traffic Impact Mitigation Analysis (TIMA)

☒ Context Aerial with the proposed Site Plan superimposed

Color	1	24" x 36"		11" x 17"		8 ½" x 11"

☒ Site Plan:

1	24" x 36"		11" x 17"		8 ½" x 11"

☒ Open Space Plan:

1	24" x 36"		11" x 17"		8 ½" x 11"

☒ Elevations:

Color	1	24" x 36"		11" x 17"		8 ½" x 11"
B/W	1	24" x 36"		11" x 17"		8 ½" x 11"

☒ Elevation Worksheet(s):

1	24" x 36"		11" x 17"		8 ½" x 11"

☒ Perspectives:

Color	1	24" x 36"		11" x 17"		8 ½" x 11"

☒ Color Site Plan:

Color 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Landscape Plan:

B/W 1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Site Cross Sections:

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Preliminary Grading & Drainage Plan:

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Pedestrian & Vehicular Circulation Plan

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Dimensioned Zoning Boundary Exhibit

1 24" x 36" _____ 11" x 17" _____ 8 ½" x 11"

☒ Slope Analysis (superimposed on a topography map)

☒ Development Plan Booklets
The Development Plan booklets shall be clipped together separately, and not be bounded.

Color _____ 11" x 17" 1 8 ½" x 11"

- 8 ½" x 11" – 3 color copy on archival (acid free paper) (To be submitted after the Planning Commission hearing.)

Technical Reports: Please include one (1) digital copy of each report

☒ 1 copy of Revised Drainage Report
☒ 1 copy of Revised Water and Wastewater Design Report

Resubmit the revised Drainage Report and Water and Wastewater Design Report to your Project Coordinator.

CITY OF SCOTTSDALE

7/12/2019

Michael P. Leary, LTD
10278 E Hillery Dr
Scottsdale, AZ 85255

RE: 19-ZN-2013#2
Core Center
H4145 (Key Code)

Dear Mr. Leary:

The Planning & Development Services Division has completed the review of the above referenced development application submitted on 6/5/2019. The following **1st Review Comments** represent the review performed by our team, and is intended to provide you with guidance for compliance with city codes, policies, and guidelines related to this application.

Zoning Ordinance and Scottsdale Revise Code Significant Issues

The following code and ordinance related issues have been identified in the first review of this application, and shall be addressed in the resubmittal of the revised application material. Addressing these items is critical to scheduling the application for public hearing, and may affect the City Staff's recommendation. Please address the following:

Zoning:

1. ML Please revise the Project Narrative to include a discussion of the use of the PCP district bonus provisions. Discussion should include the proposed bonus to be requested, the justification for the proposed bonus, calculations for the estimated value of the bonus, as well as a plan for community benefit related to the estimated value of the bonus. (Zoning Ordinance, Sec. 5.4008. and 7.1200.)
2. JE/ML Please revise the project plans to demonstrate compliance with the setback and stepback requirements of the PCP zoning district. The setback requirement is a minimum of 25 feet from the curb line along N. Hayden Road. The stepback requirements starts at the minimum setback line. (Zoning Ordinance, Sec. 5.4007.D. & 5.4007.E.)
3. JE Please revise the project plans to include the calculations for floor area ratio (FAR) in compliance with the Zoning Ordinance, Sec. 5.4007.A.
4. ML/JE The site and Core Apartments as part of case 19-ZN-2013 appears to not have complied with stipulation 7 "PEDESTRIAN CONNECTIONS. The site shall provide a minimum of three (3) pedestrian connections to existing properties surrounding the site. A minimum

of one (1) connection having a minimum with of six (6) feet shall be provided to each of the west, south and east sides of the site. Pedestrian connections shall be reviewed and approved by city transportation staff." Please revise the project plans to identify compliance with these requirements.

5. ML Please submit a revised copy of the Citizen Review Report summary to include details of the most recent public outreach efforts, including any additional public comments that may have been received. (Zoning Ordinance, Sec. 1.305.C.2.b.)

6. JE/ML Please provide conceptual elevations in conformance with the district requirements with the next submittal. **(Zoning Ordinance, Sec. 1.303.)**

<u>2001 General Plan & Greater Airpark Character Area Plan (GAPCAP) Analysis:</u>

7. ML The first submittal narrative/ development master plan- a document that is intended to provide overall coordination of urban design character, buffering to adjacent uses, transportation systems, and infrastructure necessary for the proposed development – includes unnecessary/oppositional statements that are not material in any manner to the application request; please see applicant responses to General Plan Growth Area Element Goal #2, Bullet #1, and Community Mobility Element Goal #5, Bullet#3 regarding light-rail transit and equestrians. Please revise the Project Narrative to include only necessary statements are in direction relation to the proposed development be included in the development master plan upon resubmittal.

   To this end, please ensure that responses that are completed with "refer to prior responses" (found throughout the document) indicate by numerical identification, and page number, reference to the response the applicant is directing the reader to. Additionally, please remove responses that indicate "not applicable".

8. ML The General Plan Character and Design Element (Goal 4, bullets 10, 14, and 15) encourage "streetscapes for major roadways that promote the city's visual quality and character; and blend into the character of the surrounding area. The Greater Airpark Character Area Plan Character and Design Element (Goal CD2, Policy CD 2.1.6, CD 2.2, and CD2.7), and Economic Vitality Element (Goal 5, bullet 6) promotes vibrant Signature Corridors in the Greater Airpark to provide a distinct identify and design theme in the area. Although the first submittal discusses Hayden Road being designated as a Signature Corridor, there appears to be no indication as to what that means as a result of this development proposal – details of such are expected of a formal Development Plan. Please note Hayden Road at the subject site's frontage is a designated Signature Corridor and Buffered Roadway – an area in which 50' foot minimum setback, measured from back of curb line, is expected to be maintained as per CD2.7 of the GACAP.

   ML/JE Please respond both graphically and narratively as to how the proposed development will provide this dimension and enhance the Streetscape in response to the cited considerations. Please consider additions of areas of pedestrian lighting, public art, bus shelters, and other public amenities to enhance the pedestrian environment and streetscape.

9. ML Please respond to Goal 10, along with any applicable bullets, of the of the General Plan Preservation and Environmental Planning Element, and Goal EP5 of the Greater Airpark

Character Area Plan addressing how the proposed development may, if at all, utilize green building alternatives that support sustainable desert living.

a. ML/WC Please note, Scottsdale is progressively attempting to install in capital projects, and request from private development applications, Low Impact Development (LID) and Green Infrastructure (GI) as a method of stormwater control, water harvesting, and cleansing for the first flush requirements of the City's Floodplain Ordnance. Accordingly, please consider utilization of this resource. More information on this initiative can be found at:

https://sustainability.asu.edu/sustainable-cities/resources/lid-handbook/

Noted

10. ML As a respond to Goal 1 of the Community Involvement Element, with a resubmittal, please provide an updated Citizen Involvement Report that describes the key issues that have been identified through the public involvement process.

Fire:

11. WC/JE Please revise the project plans to demonstrate hydrant spacing, existing and proposed (Fire Ord. 4283, 507.5.1.2)

Fire hydrants are shown in the Preliminary Site Utility Plan

12. WC/JE Please revise the project plans to demonstrate the location of Fire Department Connection(s). (Fire Or. 4283, 912)

Drainage:

13. WC Please submit a copy of the revised Drainage Report with the remainder of the resubmittal material identified in Attachment A. Please see comments within the red-lined 1st submittal of the Drainage Report and Preliminary G&D and address accordingly.

Did not receive any comments on the Drainage Report.

Water and Wastewater:

14. WC Please submit a revised Water and Wastewater Design Report with the remainder of the resubmittal material identified in Attachment A. Please see comments within the red-lined 1st submittal of the Report. The Preliminary Basis of Design Report must be accepted by the Water Resources Department prior to scheduling of first hearing of project.

Comments addressed. See Report dated 7/30/19.

15. WC Please submit flow monitoring results of northern 8-inch sewer in Hayden Road with next submittal.

Added flow monitoring results from the Wood/Patel report in Appendix E. Because of the possible sewer capacity issues in the "north" sewer main, the site sewer design was changed in Figure 2 so that wastewater discharge is to the "south" main.

Airport:

16. ML NOTED The subject site is within Airport noise compatibility study AC-2 area. Please note that a signed Avigation Easement along with the required legal descriptions and

graphic, and a copy of the Noise Disclosure statement will be required with the final plans submittal.

Engineering:

17. JE All waste shall be placed in suitable containers to facilitate waste removal in a sanitary condition. Please revise the project plans accordingly. (SRC, Sec. 24-13)

18. WC Off-site transportation, stormwater and water resources improvements along property frontages to existing supporting infrastructure, with associated dedications, is required. Please update the project plans accordingly. (SRC, Sec. 48-7, 47-10 & 49-219)

    OK

Significant Policy Related Issues

The following policy related issues have been identified in the first review of this application. While these issues may not be critical to scheduling the application for public hearing, they may affect the City Staff's recommendation pertaining to the application and should be addressed with the resubmittal of the revised application material. Please address the following:

Transportation:

19. WC/TW/JE The entry drive should be redesigned to be in conformance with COS Standard Detail #2257, CH-2. The proposed raised median creates offset lanes alignments with the existing driveway to the northwest. An entry drive of 48 feet of pavement width transitioning to 55 feet is unnecessary. Please revise the project plans accordingly. (DSPM, Sec. 5-3.200 & 5-3.205)

20. TW/JE/WC The north end of the site is designed poorly. The driveway leading from Hayden Road directs vehicles into the pedestrian courtyard. The short turning radius on the site drive leading to this driveway will create issues with vehicle queuing and blocking inbound traffic. Please revise the project plans to correct these issues. (Zoning Ordinance, Sec. 1.204.)

Traffic Study:

21. TW Transportation staff is not fully supportive of the installation of a traffic signal at 84th Street/Hayden Road due to signal spacing. The proposed change from a church to offices and restaurants result in ~ 4x the daily and AM peak hour trips generated and ~10X the PM peak hour trips generated. This has profound impacts on traffic, particularly at the 84th Street/Hayden Road intersection. Signalization was not intended/planned for this location. DSPM 5-3.123 G3 indicates that "At Minor Arterial/Minor Arterial (or smaller designated streets) intersections the designer should evaluate using a roundabout as an alternative to a traffic signal for all new or significantly rebuilt intersections." The TIMA appears to include no indication that a roundabout option was evaluated. Please address these issues with the next submittal. (DSPM, Sec. 5-3.123)

22. TW Please revise the traffic study to add a queue analysis for site driveways due to the substantial increase in projected trip generation as well as queue analysis for the

intersection of 84th Street and Hayden Road due to the proposed control change (signalization). (Zoning Ordinance, Sec. 1.303.)

23. TW Please revise the traffic study to provide project site & total ADT on major street(s) within the study area. (DSPM, Sec. 5-1.701)

24. TW/JE/WC Page 31, 1st bullet (84th Street & Hayden Road), 3rd sentence - the site plan depicts a redesign of the existing site driveway. The developer is responsible for correct alignment of their proposed new driveway to prevent negative offset of left turning vehicles. Should the intersection be signalized, the developer will be responsible for improvements associated with the traffic signal, including and not limited to providing a left turn lane on all approaches. Please revise the project plans to address this comment. (Zoning Ordinance, Sec. 1.204.)

Engineering:

25. ML/WC Please review the Context Aerial with corrections provided by Engineering for existing easement conflicts that will need to be modified or released prior to permit issuance, including:

    a. Any GLO easements in conflict with proposed development and not required by city LAIPS or TMP will need to be abandoned by property owner prior to any permit issuance. Specifically for this project, the supplied ALTA survey identified GLOs per the following recording information: docket 1443 page 63 and docket 3025 page 473. Please call out required abandonments on site plan. (DSPM, Sec. 1-2.400)

    b. WC Water lines located outside of a public right-of-way or street tract must be placed in a minimum 20' wide easement:

        i. Horizontally, a minimum of 6' is required between the water line and the edge of easement.

        Modified the proposed water easement accordingly. See updated *Preliminary Site Utility Plan* (Figure 2) in the water/sewer BOD report.

        ii. The easement will be free of obstructions, shall not be in a fenced area, and shall be accessible always to city service equipment such as trucks and backhoes.

        Will comply.

        iii. Easements outside of paved areas shall have a 10' wide hardened patch with a cross-slope not greater than 10% and a longitudinal slope not greater than 20%. Hardened paths shall consist of native soil compacted to 95% to a depth of 1'.

        Will comply.

        iv. Revegetation within the easement shall consist of low growing shrubs. Update site plan accordingly.

        Will comply.

    c. ML/JE Existing cross access and emergency services access easement through project parcel to abutting parcel in conflict with proposed development will need to be relocated to provide cross access to southern and eastern abutting parcels. Please update the project plans accordingly. (DSPM, Sec. 5-3.201)

26. JE Please revise the project plans to comply with the following location and design requirements for non-residential, mixed-use, and multi-family residential refuse and recycling enclosures. Please locate and position the enclosure(s): (DSPM, Sec. 2-1.309)

    a. A minimum of one (1) enclosure shall be provided for every 20,000 square feet of office/retail space.

    b. So that the approach pad for the enclosure(s) is located that the refuse truck route to and from the public street has a minimum unobstructed vertical clearance of 13 feet 6 inches (14 feet is recommended), and unobstructed minimum vertical clearance above the approach pad and refuse enclosure of 25 feet. (The vertical clearances are subject to modification based on enclosure container size, location, and positioning as determined by the Sanitation Director, or designee.);

    c. In a location that is easily accessible for collection, and does not require the refuse truck to "backtrack";

    d. A maximum 100 feet distance from building service exit to refuse enclosure;

    e. So that collection vehicles do not back up more than 35 feet;

    f. So that the path of travel for the refuse truck accommodates a minimum vehicle turning radius of 45 feet, and a minimum length of 40 feet;

    g. So that the approach pad is level, with a maximum of 2 percent slope;

    h. So that the enclosure(s) are not placed between the on-site buildings and adjacent lower density residential unless there is no reasonable alternative. In these situations, orient the enclosure(s) towards the interior of the property;

    i. So that the enclosure(s) are not placed next to drainage ways or basins, unless there is no reasonable alternative;

    j. So that the enclosure(s) are not placed between the street and the front of the building, unless there is no reasonable alternative; and

    k. So that the enclosure(s) are not placed at the end of a dead-end parking aisle.

27. JE Compactors may be used as an alternative to refuse or recycling containers. To determine adequacy and site location of compactors, if proposed, please provide the following on a refuse plan:

    a. Compactor type,

    b. Compactor capacity – state on site plan compactor capacity conversion equating to the city's required 1 enclosure for every 20,000 square feet with no recycling,

    c. Compactor location, addressing the following:

        i. Place the refuse compactor container and approach pad so that the refuse truck route to and from the public street has a minimum unobstructed vertical clearance of thirteen (13) feet six (6) inches (fourteen (14) feet is recommended), and unobstructed minimum vertical clearance above the concrete approach slab and refuse compactor container storage area concrete slab of twenty-five (25) feet,

ii. Place the refuse compactor container in a location that does not require the bin to be maneuvered or relocated from the bin's storage location to be loaded on to the refuse truck,
iii. Provide a refuse compactor container approach area that has a minimum width of fourteen (14) feet and length of sixty (60) feet in front of the container, and
iv. Demonstrate path of travel for refuse truck accommodates a minimum vehicle turning radius of 45', and vehicle length of 40'.

28. ML Although not a requirement, recycling is an amenity found to be desired by Scottsdale residents. Please note if recycling containers will be provided for the development project.

29. JE Please revise the project plans with a 6' width accessible pedestrian route from the main entry of the development to each Hayden. (DSPM, Sec. 2-1.310)

30. ML (sidewalk existing) Please revise the project plans to provide an eight (8) foot wide minimum, curb-separated sidewalk along the project boundary. (DSPM, Sec. 5-3.102 and 5-3.110)

Technical Corrections

The following technical ordinance or policy related corrections have been identified in the first review of the project. While these items are not as critical to scheduling the case for public hearing, they will likely affect a decision on the final plans submittal (construction and improvement documents) and should be addressed as soon as possible. Correcting these items before the hearing may also help clarify questions regarding these plans. Please address the following:

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31. JE/ML Please revise the project plans to identify pedestrian connections to the surrounding commercial businesses. (Zoning Ordinance, Sec. 1.303.)

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32. TW/JE/ML Please revise the project plans to identify what measures will be provided to ensure a safe pedestrian crossing of the main entry drive. (Zoning Ordinance, Sec. 1.303.)

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34. TW Potential errors were noticed in the study which may not necessarily affect the final recommendations of the study nor necessitate a revised study. Please verify the following items prior to a future resubmittal:
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    b. Page 7, 4th paragraph (83rd Place), 2nd & 3rd sentences - these two sentences likely belong in the next paragraph (83rd Way/Costco Driveway) Please verify.

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e. Page 13-14, 83rd Place & Hayden Road, last sentence - intersection is operating acceptably per DSPM 5-1.801 B.1, please verify recommendation to monitor the intersection.

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Other:

35. JE Please revise the Zoning Boundary Exhibit to include half of the right-of-way for N. Hayden Road as it fronts the site. All zoning boundaries include adjacent right-of-way. (Zoning Ordinance, Sec. 1.303.)

Please resubmit the revised application requirements and additional/supplemental information identified in Attachment A, Resubmittal Checklist, and a written summary response addressing the comments/corrections identified above as soon as possible for further review. The City will then review the revisions to determine if the application is to be scheduled for a hearing date, or if additional modifications, corrections, or additional/supplemental information is necessary.

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If you have any questions, or need further assistance please contact me at 480-312-7713 or at bcarr@ScottsdaleAZ.gov.

Sincerely,

Brad Carr, AICP
Principal Planner

ATTACHMENT A
Resubmittal Checklist

Case Number: **19-ZN-2013#2**

Please provide the following documents, in the quantities indicated, with the resubmittal (all plans larger than 8 ½ x11 shall be folded):

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☒ One copy: COVER LETTER – Respond to all the issues identified in the first review comment letter.
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☒ One copy: Revised Traffic Impact Mitigation Analysis (TIMA)

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Technical Reports: Please include one (1) digital copy of each report

☒ 1 copy of Revised Drainage Report
☒ 1 copy of Revised Water and Wastewater Design Report

Resubmit the revised Drainage Report and Water and Wastewater Design Report to your Project Coordinator.

CITY OF SCOTTSDALE

7/12/2019

Michael P. Leary, LTD
10278 E Hillery Dr
Scottsdale, AZ 85255

RE: 19-ZN-2013#2
Core Center
H4145 (Key Code)

Dear Mr. Leary:

The Planning & Development Services Division has completed the review of the above referenced development application submitted on 6/5/2019. The following **1st Review Comments** represent the review performed by our team, and is intended to provide you with guidance for compliance with city codes, policies, and guidelines related to this application.

Zoning Ordinance and Scottsdale Revise Code Significant Issues

The following code and ordinance related issues have been identified in the first review of this application, and shall be addressed in the resubmittal of the revised application material. Addressing these items is critical to scheduling the application for public hearing, and may affect the City Staff's recommendation. Please address the following:

Zoning:

1. Please revise the Project Narrative to include a discussion of the use of the PCP district bonus provisions. Discussion should include the proposed bonus to be requested, the justification for the proposed bonus, calculations for the estimated value of the bonus, as well as a plan for community benefit related to the estimated value of the bonus. (Zoning Ordinance, Sec. 5.4008. and 7.1200.)
2. Please revise the project plans to demonstrate compliance with the setback and stepback requirements of the PCP zoning district. The setback requirement is a minimum of 25 feet from the curb line along N. Hayden Road. The stepback requirements starts at the minimum setback line. (Zoning Ordinance, Sec. 5.4007.D. & 5.4007.E.)
3. Please revise the project plans to include the calculations for floor area ratio (FAR) in compliance with the Zoning Ordinance, Sec. 5.4007.A.
4. The site and Core Apartments as part of case 19-ZN-2013 appears to not have complied with stipulation 7 "PEDESTRIAN CONNECTIONS. The site shall provide a minimum of three (3) pedestrian connections to existing properties surrounding the site. A minimum of one (1) connection having a minimum with of six (6) feet shall be provided to each of the west, south and east sides of the site. Pedestrian connections shall be reviewed and approved by

city transportation staff." Please revise the project plans to identify compliance with these requirements.

5. Please submit a revised copy of the Citizen Review Report summary to include details of the most recent public outreach efforts, including any additional public comments that may have been received. (Zoning Ordinance, Sec. 1.305.C.2.b.)

6. Please provide conceptual elevations in conformance with the district requirements with the next submittal. (Zoning Ordinance, Sec. 1.303.)

<u>2001 General Plan & Greater Airpark Character Area Plan (GAPCAP) Analysis:</u>

7. The first submittal narrative/ development master plan- a document that is intended to provide overall coordination of urban design character, buffering to adjacent uses, transportation systems, and infrastructure necessary for the proposed development – includes unnecessary/oppositional statements that are not material in any manner to the application request; please see applicant responses to General Plan Growth Area Element Goal #2, Bullet #1, and Community Mobility Element Goal #5, Bullet#3 regarding light-rail transit and equestrians. Please revise the Project Narrative to include only necessary statements are in direction relation to the proposed development be included in the development master plan upon resubmittal.

   To this end, please ensure that responses that are completed with “refer to prior responses” (found throughout the document) indicate by numerical identification, and page number, reference to the response the applicant is directing the reader to. Additionally, please remove responses that indicate “not applicable”.

8. The General Plan Character and Design Element (Goal 4, bullets 10, 14, and 15) encourage “streetscapes for major roadways that promote the city’s visual quality and character; and blend into the character of the surrounding area. The Greater Airpark Character Area Plan Character and Design Element (Goal CD2, Policy CD 2.1.6, CD 2.2, and CD2.7), and Economic Vitality Element (Goal 5, bullet 6) promotes vibrant Signature Corridors in the Greater Airpark to provide a distinct identify and design theme in the area. Although the first submittal discusses Hayden Road being designated as a Signature Corridor, there appears to be no indication as to what that means as a result of this development proposal – details of such are expected of a formal Development Plan. Please note Hayden Road at the subject site’s frontage is a designated Signature Corridor and Buffered Roadway – an area in which 50’ foot minimum setback, measured from back of curb line, is expected to be maintained as per CD2.7 of the GACAP.

   Please respond both graphically and narratively as to how the proposed development will provide this dimension and enhance the Streetscape in response to the cited considerations. Please consider additions of areas of pedestrian lighting, public art, bus shelters, and other public amenities to enhance the pedestrian environment and streetscape.

9. Please respond to Goal 10, along with any applicable bullets, of the of the General Plan Preservation and Environmental Planning Element, and Goal EP5 of the Greater Airpark Character Area Plan addressing how the proposed development may, if at all, utilize green building alternatives that support sustainable desert living.

   a. Please note, Scottsdale is progressively attempting to install in capital projects, and request from private development applications, Low Impact Development (LID) and Green Infrastructure (GI) as a method of stormwater control, water harvesting, and

cleansing for the first flush requirements of the City's Floodplain Ordnance. Accordingly, please consider utilization of this resource. More information on this initiative can be found at:

https://sustainability.asu.edu/sustainable-cities/resources/lid-handbook/

10. As a respond to Goal 1 of the Community Involvement Element, with a resubmittal, please provide an updated Citizen Involvement Report that describes the key issues that have been identified through the public involvement process.

Fire:

11. Please revise the project plans to demonstrate hydrant spacing, existing and proposed (Fire Ord. 4283, 507.5.1.2)

12. Please revise the project plans to demonstrate the location of Fire Department Connection(s). (Fire Or. 4283, 912)

Drainage:

13. Please submit a copy of the revised Drainage Report with the remainder of the resubmittal material identified in Attachment A. Please see comments within the red-lined 1st submittal of the Drainage Report and Preliminary G&D and address accordingly.

Water and Wastewater:

14. Please submit a revised Water and Wastewater Design Report with the remainder of the resubmittal material identified in Attachment A. Please see comments within the red-lined 1st submittal of the Report. The Preliminary Basis of Design Report must be accepted by the Water Resources Department prior to scheduling of first hearing of project.

15. Please submit flow monitoring results of northern 8-inch sewer in Hayden Road with next submittal.

Airport:

16. The subject site is within Airport noise compatibility study AC-2 area. Please note that a signed Avigation Easement along with the required legal descriptions and graphic, and a copy of the Noise Disclosure statement will be required with the final plans submittal.

Engineering:

17. All waste shall be placed in suitable containers to facilitate waste removal in a sanitary condition. Please revise the project plans accordingly. (SRC, Sec. 24-13)

18. Off-site transportation, stormwater and water resources improvements along property frontages to existing supporting infrastructure, with associated dedications, is required. Please update the project plans accordingly. (SRC, Sec. 48-7, 47-10 & 49-219)

Significant Policy Related Issues

The following policy related issues have been identified in the first review of this application. While these issues may not be critical to scheduling the application for public hearing, they may affect the City Staff's recommendation pertaining to the application and should be addressed with the resubmittal of the revised application material. Please address the following:

Transportation:

19. The entry drive should be redesigned to be in conformance with COS Standard Detail #2257, CH-2. The proposed raised median creates offset lanes alignments with the existing driveway to the northwest. An entry drive of 48 feet of pavement width transitioning to 55 feet is unnecessary. Please revise the project plans accordingly. (DSPM, Sec. 5-3.200 & 5-3.205)

20. The north end of the site is designed poorly. The driveway leading from Hayden Road directs vehicles into the pedestrian courtyard. The short turning radius on the site drive leading to this driveway will create issues with vehicle queuing and blocking inbound traffic. Please revise the project plans to correct these issues. (Zoning Ordinance, Sec. 1.204.)

Traffic Study:

21. Transportation staff is not fully supportive of the installation of a traffic signal at 84th Street/Hayden Road due to signal spacing. The proposed change from a church to offices and restaurants result in ~ 4x the daily and AM peak hour trips generated and ~10X the PM peak hour trips generated. This has profound impacts on traffic, particularly at the 84th Street/Hayden Road intersection. Signalization was not intended/planned for this location. DSPM 5-3.123 G3 indicates that "At Minor Arterial/Minor Arterial (or smaller designated streets) intersections the designer should evaluate using a roundabout as an alternative to a traffic signal for all new or significantly rebuilt intersections." The TIMA appears to include no indication that a roundabout option was evaluated. Please address these issues with the next submittal. (DSPM, Sec. 5-3.123)

22. Please revise the traffic study to add a queue analysis for site driveways due to the substantial increase in projected trip generation as well as queue analysis for the intersection of 84th Street and Hayden Road due to the proposed control change (signalization). (Zoning Ordinance, Sec. 1.303.)

23. Please revise the traffic study to provide project site & total ADT on major street(s) within the study area. (DSPM, Sec. 5-1.701)

24. Page 31, 1st bullet (84th Street & Hayden Road), 3rd sentence - the site plan depicts a redesign of the existing site driveway. The developer is responsible for correct alignment of their proposed new driveway to prevent negative offset of left turning vehicles. Should the intersection be signalized, the developer will be responsible for improvements associated with the traffic signal, including and not limited to providing a left turn lane on all approaches. Please revise the project plans to address this comment. (Zoning Ordinance, Sec. 1.204.)

Engineering:

25. Please review the Context Aerial with corrections provided by Engineering for existing easement conflicts that will need to be modified or released prior to permit issuance, including:
    a. Any GLO easements in conflict with proposed development and not required by city LAIPS or TMP will need to be abandoned by property owner prior to any permit issuance. Specifically for this project, the supplied ALTA survey identified GLOs per the following recording information: docket 1443 page 63 and docket 3025 page 473. Please call out required abandonments on site plan. (DSPM, Sec. 1-2.400)

b. Water lines located outside of a public right-of-way or street tract must be placed in a minimum 20’ wide easement:

   i. Horizontally, a minimum of 6’ is required between the water line and the edge of easement.

   ii. The easement will be free of obstructions, shall not be in a fenced area, and shall be accessible always to city service equipment such as trucks and backhoes.

   iii. Easements outside of paved areas shall have a 10’ wide hardened patch with a cross-slope not greater than 10% and a longitudinal slope not greater than 20%. Hardened paths shall consist of native soil compacted to 95% to a depth of 1’.

   iv. Revegetation within the easement shall consist of low growing shrubs. Update site plan accordingly.

c. Existing cross access and emergency services access easement through project parcel to abutting parcel in conflict with proposed development will need to be relocated to provide cross access to southern and eastern abutting parcels. Please update the project plans accordingly. (DSPM, Sec. 5-3.201)

26. Please revise the project plans to comply with the following location and design requirements for non-residential, mixed-use, and multi-family residential refuse and recycling enclosures. Please locate and position the enclosure(s): (DSPM, Sec. 2-1.309)

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