

MEMORANDUM

DATE: June 3, 2015

TO: Kurt Seemann, P.E.
City of Redmond

FROM: Jeff Schramm
TENW

SUBJECT: Traffic Assessment for the proposed
Duke's Landing Residential – City of Redmond
TENW Project No. 5020

This memorandum summarizes the traffic assessment conducted for the proposed Duke's Landing residential development which includes a project description, trip generation estimate, traffic volumes on adjacent streets, and LOS at adjacent intersections.

Project Description

The proposed Duke's Landing site is located west of West Lake Sammamish Parkway NE between NE 46th Street and NE 48th Street as shown in the Attachment A site plan. The project proposal includes the development of up to 17 single-family detached dwelling units and one duplex on a site that includes one single-family home and barn that will be removed.

Vehicular access to the site would be provided onto NE 48th Street via a new residential road that currently exists as a road stub. As a result of this development, the existing 15 homes that access NE 47th Street from W Lake Sammamish Parkway NE would be re-routed through the site and no direct access allowed to W Lake Sammamish Parkway NE. The anticipated year of occupancy is 2017.

Trip Generation

The weekday daily, AM and PM peak hour trip generation estimates for the proposed Duke's Landing residential development were based on trip equations published in the Institute of Transportation Engineers (ITE) *Trip Generation* manual, 9th edition. The resulting weekday daily, AM and PM peak hour trips are summarized in Table 1. A detailed trip generation estimate is included in Attachment B.

Table 1
Duke's Landing – Trip Generation Summary

| Time Period | Net Trips Generated | | |
|----------------------|---------------------|-----|-------|
| | In | Out | Total |
| Weekday Daily | 102 | 101 | 203 |
| Weekday AM Peak Hour | 3 | 10 | 13 |
| Weekday PM Peak Hour | 13 | 7 | 20 |

As shown in Table 1, the Duke’s Landing residential development is estimated to generate 203 weekday daily trips with 13 trips occurring during the weekday AM peak hour (3 in, 10 out) and 20 trips during the weekday PM peak hour (13 in, 7 out).

Traffic Volumes

To estimate future traffic volumes in the vicinity of the proposed Duke’s Landing project, weekday PM peak period counts were collected at the following two intersections on May 19, 2015:

- W Lake Sammamish Parkway NE / NE 48th Street
- 164th Place NE / NE 46th Street

With the Duke’s Landing project, vehicle access to W Lake Sammamish Parkway NE from NE 47th Street would be eliminated based on a prior development approval. As a result, the 15 existing single family homes would be re-routed west on NE 47th Street to a new road connection through the Duke’s Landing project. For purposes of estimating future traffic, the existing trips at the W Lake Sammamish Parkway NE & NE 47th Street intersection were re-routed through Duke’s Landing to utilize NE 48th Street and NE 46th Street. Duke’s Landing project trips and the re-route of NE 47th Street existing traffic were added to the existing traffic volumes to estimate future 2017 traffic volumes with the Duke’s Landing project. Existing volumes, Duke’s Landing project trips, re-routed existing NE 47th Street traffic, and future 2017 with-project volumes are summarized in Attachment C. The resulting future traffic volume estimates in the vicinity of the Duke’s Landing project are summarized below in Table 2.

Table 2
Duke’s Landing – Volume Summary

| Location | Existing Volume ¹ | Duke's Landing Project Traffic | Re-Routed Traffic ² | Total Traffic | % Change |
|---|------------------------------|--------------------------------|--------------------------------|---------------|----------|
| W Lk Sammamish Pkwy NE n/o NE 48 th Street | 2,197 | 11 | 0 | 2,208 | < 1% |
| W Lk Sammamish Pkwy NE s/o NE 48 th Street | 2,171 | 1 | -13 | 2,159 | < -1% |
| NE 48 th Street w/o W Lk Sammamish Pkwy NE | 44 | 12 | 15 | 71 | 61% |
| NE 46 th Street w/o 164 th Place NE | 45 | 7 | 0 | 52 | 16% |
| NE 46 th Street e/o 164 th Place NE | 23 | 1 | 4 | 28 | 22% |

1. Based on counts collected on 5/19/15.

2. As a result of removal of NE 47th Street access to W Lake Sammamish Parkway NE.

Level of Service Analysis

Future PM peak hour LOS analyses were conducted at the intersection of W Lake Sammamish Parkway NE & NE 48th Street for the anticipated year of opening (2017). The roadway network assumed in the future year 2017 LOS analyses is based on existing intersection geometry since there are no planned improvements at the intersection by 2017. The 2017 weekday PM peak hour LOS results at the study intersection are summarized in Table 3. The detailed LOS worksheets are included in Attachment D.

**Table 3
Year 2017 PM Peak Hour LOS Summary**

| Study Intersection | 2017 Without-Project | | 2017 With-Project | |
|--|----------------------|-------|-------------------|-------|
| | LOS ¹ | Delay | LOS | Delay |
| W Lake Sammamish Parkway NE / NE 48 th St | | | | |
| Eastbound Shared Left-Right | D | 31.1 | D | 33.1 |
| Northbound Left-Turn | B | 10.4 | B | 10.5 |
| W Lake Sammamish Parkway NE / NE 47 th St | | | | |
| Eastbound Shared Left-Right | D | 29.1 | closed | |
| Northbound Left-Turn | B | 10.6 | closed | |

1. Based on HCM 2010 methodologies.

As shown in Table 3, the side-street turns at the intersection of W Lake Sammamish Parkway NE & NE 48th Street are anticipated to operate at LOS D in 2017 with or without the Duke’s Landing project.

While there would be an increase in traffic on NE 48th Street west of W Lake Sammamish Parkway NE with the Duke’s Landing project, the resulting total traffic on NE 48th Street is expected to be less than 75 vehicles per hour during the PM peak hour.

If you have any questions, please feel free to contact me at (425) 250-0581 or schramm@tenw.com.

cc: Jeff Haynie, P.E. Principal TENW

- Attachments:
- A. Preliminary Site Plan Concept
 - B. Trip Generation Estimate
 - C. PM Peak Hour Traffic Volumes
 - D. LOS Calculations

ATTACHMENT A

Site Plan Concept



Attachment A: Site Plan Concept



ATTACHMENT B

Trip Generation Calculations

Duke's Landing - Redmond Trip Generation

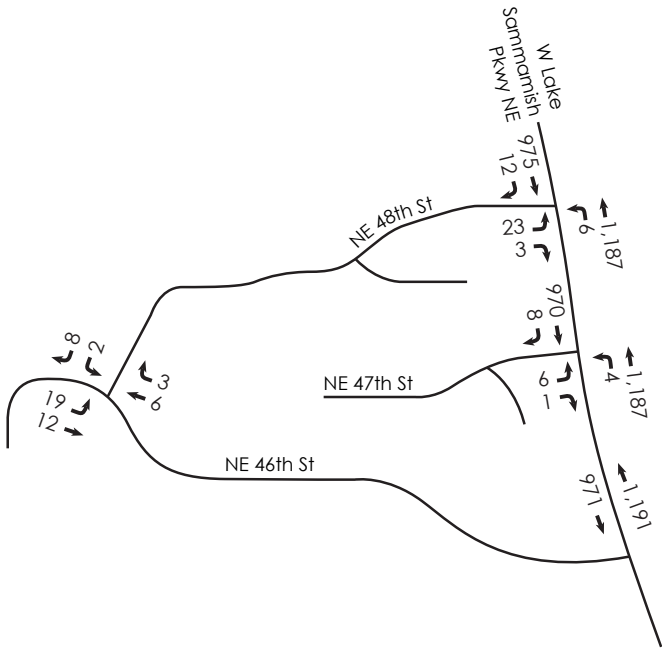
| DAILY | | | | | | | | | |
|--|-------|----------------|-------------------------|-------------------|-----|--------------------|-----------------|------------|------------|
| Land Use | Units | | ITE LUC ¹ | Directional Split | | Trip Rate Total | Trips Generated | | |
| | | | | In | Out | | In | Out | Total |
| Proposed Use | | | | | | | | | |
| Single-Family | 17 | Dwelling Units | 210 | 50% | 50% | Equation | 103 | 103 | 206 |
| Multi-Family | 1 | Dwelling Units | 230 | 50% | 50% | Equation | 6 | 6 | 12 |
| Existing Use | | | | | | | | | |
| Single-Family | 1 | Dwelling Units | 210 | 50% | 50% | Equation | -7 | -8 | -15 |
| Net New Weekday Daily Trips Generated = | | | | | | | 102 | 101 | 203 |
| AM PEAK HOUR | | | | | | | | | |
| Land Use | Units | | ITE LUC ¹ | Directional Split | | Trip Rate Total | Trips Generated | | |
| | | | | In | Out | | In | Out | Total |
| Proposed Use | | | | | | | | | |
| Single-Family | 17 | Dwelling Units | 210 | 25% | 75% | Equation | 5 | 17 | 22 |
| Multi-Family | 1 | Dwelling Units | 230 | 17% | 83% | Equation | 0 | 1 | 1 |
| Existing Use | | | | | | | | | |
| Single-Family | 1 | Dwelling Units | 210 | 25% | 75% | Equation | -2 | -8 | -10 |
| Net New AM Peak Hour Trips Generated = | | | | | | | 3 | 10 | 13 |
| PM PEAK HOUR | | | | | | | | | |
| Land Use | Units | | ITE LUC ¹ | Directional Split | | Trip Rate Total | Trips Generated | | |
| | | | | In | Out | | In | Out | Total |
| Proposed Use | | | | | | | | | |
| Single-Family | 17 | Dwelling Units | 210 | 63% | 37% | Equation | 13 | 8 | 21 |
| Multi-Family | 1 | Dwelling Units | 230 | 67% | 33% | Equation | 1 | 0 | 1 |
| Existing Use | | | | | | | | | |
| Single-Family | 1 | Dwelling Units | 210 | 63% | 37% | Equation | -1 | -1 | -2 |
| Net New PM Peak Hour Trips Generated = | | | | | | | 13 | 7 | 20 |

Notes:

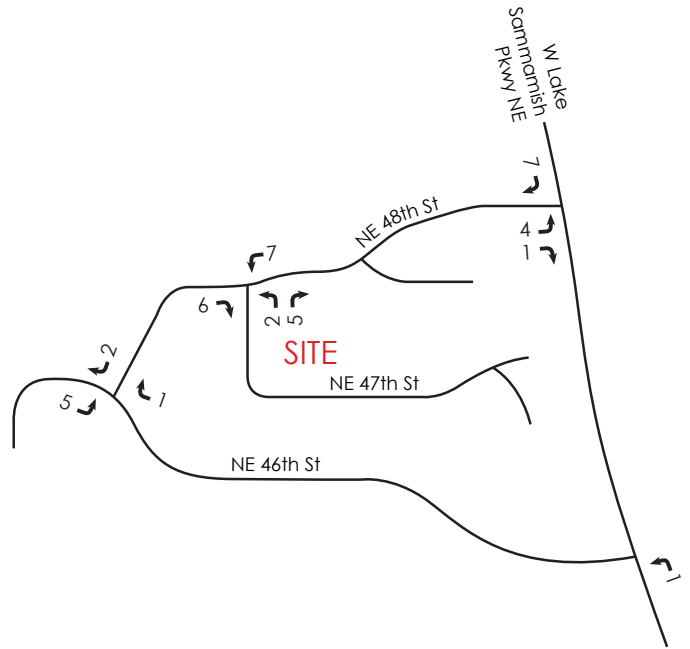
¹ Institute of Transportation Engineers, *Trip Generation* Manual, 9th Edition, 2012 Land Use Codes.

ATTACHMENT C

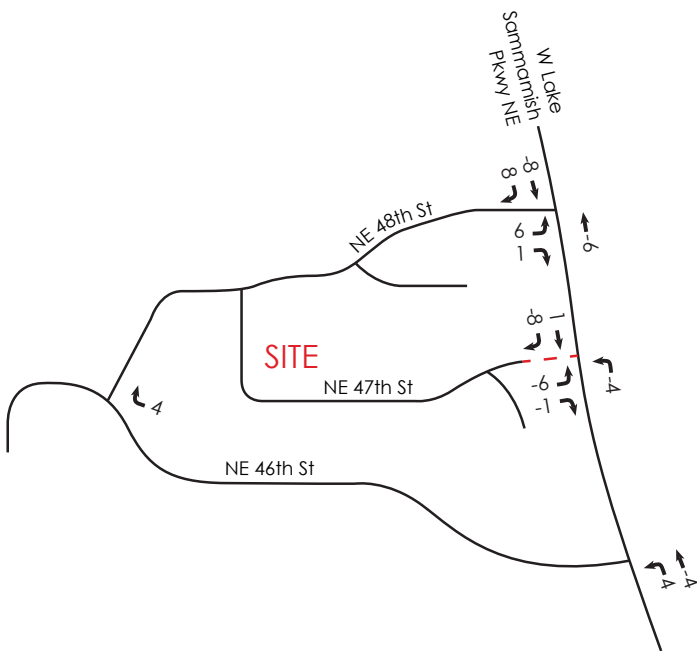
PM Peak Hour Traffic Volumes



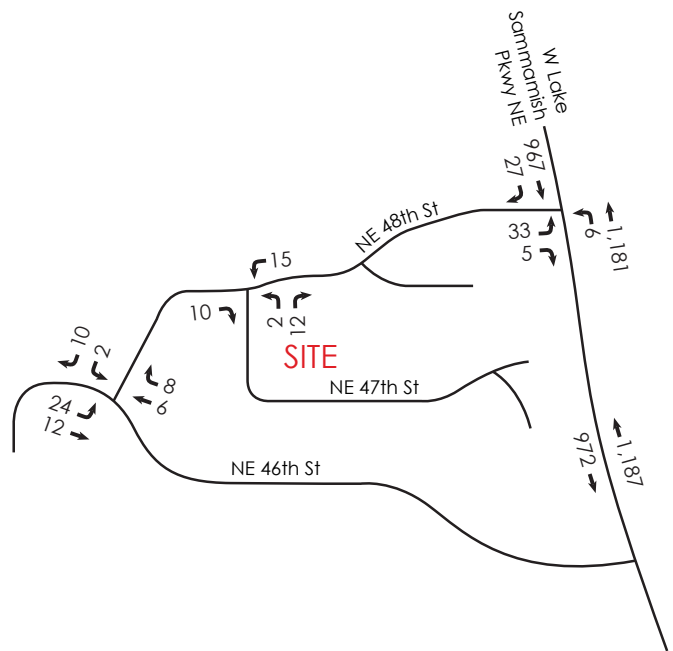
2015 Existing



Duke's Landing Project Trip Assignment



NE 47th Street Traffic Re-Route
(removal of access to W Lake Sammamish Parkway)



Total Volumes 2017 With-Project














ATTACHMENT D

LOS Calculations

Lanes, Volumes, Timings

1: W Lake Sammamish Parkway NE & NE 48th St

6/2/2015

| |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | |  |  |  |  |
| Volume (vph) | 23 | 3 | 6 | 1187 | 975 | 12 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 0 | 0 | 50 | | | 0 |
| Storage Lanes | 1 | 0 | 1 | | | 0 |
| Taper Length (ft) | 25 | | 25 | | | |
| Link Speed (mph) | 25 | | | 35 | 35 | |
| Link Distance (ft) | 1474 | | | 335 | 355 | |
| Travel Time (s) | 40.2 | | | 6.5 | 6.9 | |
| Confl. Peds. (#/hr) | 10 | 10 | 10 | | | 10 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Heavy Vehicles (%) | 0% | 0% | 1% | 1% | 1% | 1% |
| Shared Lane Traffic (%) | | | | | | |
| Sign Control | Stop | | | Free | Free | |

Intersection Summary

Area Type: Other

Control Type: Unsignalized

HCM 2010 TWSC

1: W Lake Sammamish Parkway NE & NE 48th St

6/2/2015

Intersection

Int Delay, s/veh 0.4

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|--------------------------|------|------|------|------|------|------|
| Vol, veh/h | 23 | 3 | 6 | 1187 | 975 | 12 |
| Conflicting Peds, #/hr | 10 | 10 | 10 | 0 | 0 | 10 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 0 | - | 50 | - | - | - |
| Veh in Median Storage, # | 1 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 96 | 96 | 96 | 96 | 96 | 96 |
| Heavy Vehicles, % | 0 | 0 | 1 | 1 | 1 | 1 |
| Mvmt Flow | 24 | 3 | 6 | 1236 | 1016 | 12 |











| Major/Minor | Minor2 | Major1 | Major2 |
|----------------------|--------|--------|---------|
| Conflicting Flow All | 2281 | 1042 | 1038 0 |
| Stage 1 | 1032 | - | - - |
| Stage 2 | 1249 | - | - - |
| Critical Hdwy | 6.4 | 6.2 | 4.11 - |
| Critical Hdwy Stg 1 | 5.4 | - | - - |
| Critical Hdwy Stg 2 | 5.4 | - | - - |
| Follow-up Hdwy | 3.5 | 3.3 | 2.209 - |
| Pot Cap-1 Maneuver | 44 | 281 | 674 - |
| Stage 1 | 347 | - | - - |
| Stage 2 | 273 | - | - - |
| Platoon blocked, % | | | - - |
| Mov Cap-1 Maneuver | 43 | 276 | 668 - |
| Mov Cap-2 Maneuver | 157 | - | - - |
| Stage 1 | 344 | - | - - |
| Stage 2 | 268 | - | - - |

| Approach | EB | NB | SB |
|----------------------|------|-----|----|
| HCM Control Delay, s | 31.1 | 0.1 | 0 |
| HCM LOS | D | | |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|-----------------------|-------|-----|-------|-----|-----|
| Capacity (veh/h) | 668 | - | 165 | - | - |
| HCM Lane V/C Ratio | 0.009 | - | 0.164 | - | - |
| HCM Control Delay (s) | 10.4 | - | 31.1 | - | - |
| HCM Lane LOS | B | - | D | - | - |
| HCM 95th %tile Q(veh) | 0 | - | 0.6 | - | - |

Lanes, Volumes, Timings
 2: W Lake Sammamish Parkway NE & NE 47th Street

6/2/2015

| |  |  |  |  |  |  |
|-----------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | |  |  |  | |
| Volume (vph) | 6 | 1 | 4 | 1187 | 970 | 8 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 0 | 0 | 50 | | | 0 |
| Storage Lanes | 1 | 0 | 1 | | | 0 |
| Taper Length (ft) | 25 | | 25 | | | |
| Link Speed (mph) | 25 | | | 35 | 35 | |
| Link Distance (ft) | 377 | | | 696 | 335 | |
| Travel Time (s) | 10.3 | | | 13.6 | 6.5 | |
| Confl. Peds. (#/hr) | 10 | 10 | 10 | | | 10 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Shared Lane Traffic (%) | | | | | | |
| Sign Control | Stop | | | Free | Free | |
| Intersection Summary | | | | | | |
| Area Type: | Other | | | | | |
| Control Type: | Unsignalized | | | | | |

HCM 2010 TWSC

2: W Lake Sammamish Parkway NE & NE 47th Street











6/2/2015

| Intersection | | | | | | |
|--------------------------|--------|-------|--------|------|--------|------|
| Int Delay, s/veh | 0.1 | | | | | |
| | | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Vol, veh/h | 6 | 1 | 4 | 1187 | 970 | 8 |
| Conflicting Peds, #/hr | 10 | 10 | 10 | 0 | 0 | 10 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 0 | - | 50 | - | - | - |
| Veh in Median Storage, # | 1 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 7 | 1 | 4 | 1290 | 1054 | 9 |
| | | | | | | |
| Major/Minor | Minor2 | | Major1 | | Major2 | |
| Conflicting Flow All | 2368 | 1079 | 1073 | 0 | - | 0 |
| Stage 1 | 1069 | - | - | - | - | - |
| Stage 2 | 1299 | - | - | - | - | - |
| Critical Hdwy | 6.42 | 6.22 | 4.12 | - | - | - |
| Critical Hdwy Stg 1 | 5.42 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.42 | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 3.318 | 2.218 | - | - | - |
| Pot Cap-1 Maneuver | 39 | 265 | 650 | - | - | - |
| Stage 1 | 330 | - | - | - | - | - |
| Stage 2 | 256 | - | - | - | - | - |
| Platoon blocked, % | | | | - | - | - |
| Mov Cap-1 Maneuver | 38 | 261 | 645 | - | - | - |
| Mov Cap-2 Maneuver | 147 | - | - | - | - | - |
| Stage 1 | 327 | - | - | - | - | - |
| Stage 2 | 252 | - | - | - | - | - |
| | | | | | | |
| Approach | EB | | NB | | SB | |
| HCM Control Delay, s | 29.1 | | 0 | | 0 | |
| HCM LOS | D | | | | | |
| | | | | | | |
| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR | |
| Capacity (veh/h) | 645 | - | 157 | - | - | |
| HCM Lane V/C Ratio | 0.007 | - | 0.048 | - | - | |
| HCM Control Delay (s) | 10.6 | - | 29.1 | - | - | |
| HCM Lane LOS | B | - | D | - | - | |
| HCM 95th %tile Q(veh) | 0 | - | 0.2 | - | - | |

Lanes, Volumes, Timings

1: W Lake Sammamish Parkway NE & NE 48th St

6/2/2015

| |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | |  |  |  | |
| Volume (vph) | 33 | 5 | 6 | 1181 | 967 | 27 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 0 | 0 | 50 | | | 0 |
| Storage Lanes | 1 | 0 | 1 | | | 0 |
| Taper Length (ft) | 25 | | 25 | | | |
| Link Speed (mph) | 25 | | | 35 | 35 | |
| Link Distance (ft) | 1474 | | | 335 | 355 | |
| Travel Time (s) | 40.2 | | | 6.5 | 6.9 | |
| Confl. Peds. (#/hr) | 10 | 10 | 10 | | | 10 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Heavy Vehicles (%) | 0% | 0% | 1% | 1% | 1% | 1% |
| Shared Lane Traffic (%) | | | | | | |
| Sign Control | Stop | | | Free | Free | |

Intersection Summary

Area Type: Other

Control Type: Unsignalized

HCM 2010 TWSC

1: W Lake Sammamish Parkway NE & NE 48th St

6/2/2015

Intersection

Int Delay, s/veh 0.6

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|--------------------------|------|------|------|------|------|------|
| Vol, veh/h | 33 | 5 | 6 | 1181 | 967 | 27 |
| Conflicting Peds, #/hr | 10 | 10 | 10 | 0 | 0 | 10 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 0 | - | 50 | - | - | - |
| Veh in Median Storage, # | 1 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 96 | 96 | 96 | 96 | 96 | 96 |
| Heavy Vehicles, % | 0 | 0 | 1 | 1 | 1 | 1 |
| Mvmt Flow | 34 | 5 | 6 | 1230 | 1007 | 28 |

| Major/Minor | Minor2 | Major1 | Major2 |
|----------------------|--------|--------|---------|
| Conflicting Flow All | 2274 | 1041 | 1045 0 |
| Stage 1 | 1031 | - | - - |
| Stage 2 | 1243 | - | - - |
| Critical Hdwy | 6.4 | 6.2 | 4.11 - |
| Critical Hdwy Stg 1 | 5.4 | - | - - |
| Critical Hdwy Stg 2 | 5.4 | - | - - |
| Follow-up Hdwy | 3.5 | 3.3 | 2.209 - |
| Pot Cap-1 Maneuver | 45 | 282 | 670 - |
| Stage 1 | 347 | - | - - |
| Stage 2 | 275 | - | - - |
| Platoon blocked, % | | | - - |
| Mov Cap-1 Maneuver | 44 | 277 | 664 - |
| Mov Cap-2 Maneuver | 158 | - | - - |
| Stage 1 | 344 | - | - - |
| Stage 2 | 270 | - | - - |

| Approach | EB | NB | SB |
|----------------------|------|-----|----|
| HCM Control Delay, s | 33.1 | 0.1 | 0 |
| HCM LOS | D | | |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|-----------------------|-------|-----|-------|-----|-----|
| Capacity (veh/h) | 664 | - | 167 | - | - |
| HCM Lane V/C Ratio | 0.009 | - | 0.237 | - | - |
| HCM Control Delay (s) | 10.5 | - | 33.1 | - | - |
| HCM Lane LOS | B | - | D | - | - |
| HCM 95th %tile Q(veh) | 0 | - | 0.9 | - | - |