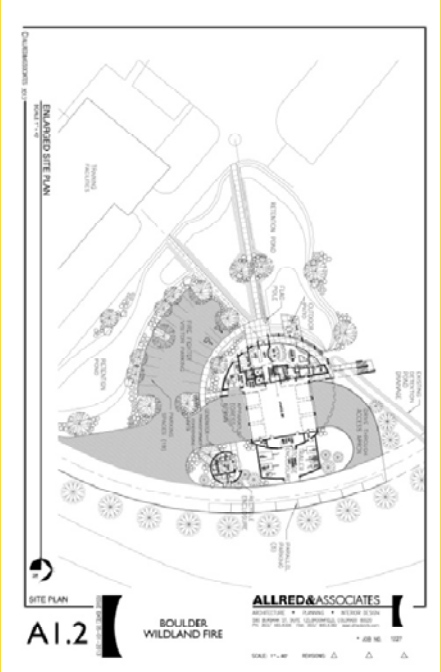


# Boulder Wildland Fire Facility

## *Traffic Access Study*

May 14, 2013

**Prepared For:**

**City of Boulder**

**Submitted By:**

**Fox Tuttle Transportation Group, LLC**
P.O. Box 19768
Boulder, CO 80308
(303) 652-3571

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May 14, 2013

Mr. Frank Young
Deputy Chief
City of Boulder, Fire – Rescue
1805 33rd Street
Boulder, CO 80301

**RE: Boulder Wildland Fire Facility Traffic Study**

Dear Mr. Young:

At your request I have prepared a traffic access study for the proposed Wildland Fire Facility to be located adjacent to the existing Fire Training Center at the Boulder Reservoir site. Figure 1 includes an illustration of the site vicinity. In the process of completing this study I have:

- discussed the proposed site design and uses with you and members of the project team;
- reviewed plans for the new facility;
- discussed traffic access issues with City of Boulder Development Review staff;
- reviewed the previous traffic study that was prepared when the Fire Training Center was being planned;
- discussed the status of current planning efforts at the Boulder Reservoir with Recreation Department staff;
- visited the site access on N. 51st Street.
- projected the daily and peak hour traffic that will be added to area roadways by the Wildland Fire Facility;
- and evaluated the impacts of this additional traffic on the Jay Road/N. 51st Street intersection.

Findings of this evaluation are summarized by topic as follows:

**Site Use and Access**

The proposed new Wildland Fire Facility will be located at the Fire Training Center immediately to the northeast of the existing training building. A current site plan is attached. The building will include an office, a day room, a kitchen and dining facilities, a bunk room for use during periods of high fire danger, and a drive through vehicle garage and storage area. There will be an 18 space parking lot, with additional room for parallel parking if needed, and outdoor space for trailer storage. The site will access the ring road at the Fire Training Center.

The main access to the facility will be the same as for the existing Fire Training Center. Most access will be to/from N. 51st Street at the main driveway to the Boulder Reservoir. A

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secondary access, for use only during fire events is the existing emergency access drive directly onto the southwest-bound leg of the Diagonal Highway (SH 119). Figure 2 depicts these two main access points. Figure 3 includes photographs of the accesses that serve the site. It should be noted that the main access drive to the Boulder Reservoir (which also serves this site) is currently being reconstructed to include a northbound right turn deceleration lane on N. 51st Street.

It is my understanding that there will be a full time staff of 9 individuals during the fire season assigned to this site. The staff will typically arrive on-site in the early AM hours (before 7:00). On non-fire days, a crew will depart for the day (also by 7:00) and will work off-site on forest fire mitigation projects. The crew will return late in the day and depart the site, typically before 5:00 PM. Some staff will have an office on-site and will access the facility during the day. Crews may utilize the bunk room during fire events or times of peak fire danger.

Employees who desire to use alternative modes to access the site can utilize the Bolt regional transit service in the Diagonal corridor between Boulder and Longmont, as there is a transit stop on the Diagonal in the vicinity. Employees that are comfortable with on-road cycling may also access the site by bicycle. The site is not at a pedestrian scale for most of Boulder, but the work by staff in crews may lend itself to access by carpool.

It is my understanding that during a major forest fire event, the Fire Training Center and Wildland Fire Facility site may be used for staging and coordination of a large fire response effort. This was the case during the recent Four Mile Fire, which greatly streamlined the fire response. During a major fire event such as this, it is my understanding that most access to the site will utilize the emergency access drive onto the Diagonal.

## Trip Generation and Assignment

Based on information provided by staff who will be using the facility, the anticipated daily and peak hour traffic accessing the site during a non-fire event summer day is estimated in Table 1.

**Table 1**
***Typical Summer Season Daily Traffic - Full Crew On-Duty (No Fire Event)***

| Time of Day | Inbound Trips | Outbound Trips | Total Trips |
|---|---|---|---|
| AM Peak Hour (7:30 – 8:30) | 1 | 3 | **4** |
| PM Peak Hour (4:30 – 5:30) | 2 | 8 | **10** |
| Off Peak Access | 12 | 4 | **16** |
| **Total Daily Traffic:** | **15** | **15** | **30** |

This is a very low level of traffic, with 4 trips during the AM peak hour (of the adjacent roadway system), 10 trips during the PM peak hour, and 16 other trips spread throughout the day, for a total of 30 trips per day.

Table 2 details the estimated additional peak hour turning traffic accessing the site through the Jay Road/N.51st Street intersection (if all peak hour traffic on a given day was destined to/from the south on N. 51st Street).

**Table 2**
***Wildland Fire Facility Peak Hour Traffic Added at Jay Road/N. 51st Street***

| Traffic Approach Movement | AM Peak Hour | PM Peak Hour |
|---|---|---|
| Southbound Right | 1 | 3 |
| Southbound Left | 2 | 5 |
| Westbound Right | 1 | 1 |
| Eastbound Left | 0 | 1 |
| **Total:** | **4** | **10** |

## Traffic Operations in the N. 51st Street Corridor and the Jay Road/51st Street Intersection

On typical weekdays throughout the year, N. 51st Street carries less than 1,500 vehicle trips per day and will be able to easily accommodate the additional traffic from the Wildland Fire Facility. Even on peak summer days when Boulder Reservoir use is high the additional 30 trips per day will be hardly noticeable.

To evaluate the peak hour impacts of the Wildland Fire Facility on the Jay Road/N. 51st Street intersection we have added the peak hour traffic from Table 2 to the peak hour traffic from the previous traffic study for the Fire Training Facility (traffic volume graphics from previous study are attached). This then includes the projected traffic from both facilities during the peak hours when background roadway traffic is highest. The Level of Service (LOS) results are summarized in Table 3. A description of LOS thresholds and the detailed LOS calculation sheets are attached for reference.

It can be seen that this intersection will operate at LOS A overall, with all approach movements in the LOS A – B range for all scenarios tested. This indicates that the Jay Road/N. 51st Street intersection will be able to easily accommodate the additional Wildland Fire Facility traffic during peak traffic times.

## Conclusions

This traffic study has projected and evaluated the traffic that will be added to the N. 51st Street corridor by the proposed Boulder Wildland Fire Facility to be located at the existing Fire Training Center at the Boulder Reservoir. Significant observations and conclusions include:

- The Wildland Fire Facility will generate approximately 30 trips per day during summer months on days with no fire events.
- Due to staffing and scheduling patterns, it is anticipated that the site will only generate 4 vehicle trips during the AM peak hour and 10 vehicle trips during the PM peak hour when background traffic on area roadways is highest.
- This level of traffic will be easily accommodated on N. 51st Street and in the Jay Road/N. 51st Street intersection (LOS A – B range).
- During peak fire events, most of the traffic accessing the site will likely utilize the emergency access onto the Diagonal Highway.

- The City of Boulder is currently improving the main entrance to the Boulder Reservoir, which will also serve the Wildland Fire Facility. A northbound right turn deceleration lane on N. 51st Street is being added.
- No physical roadway improvements beyond the limits of the project site are warranted based on the traffic volumes projected.

I hope this information is helpful as you continue planning for the new Boulder Wildland Fire Facility. Please let me know if you have any questions.

Sincerely,
**Fox Tuttle Transportation Group, LLC**

William C. Fox, P.E.
Principal

Attachments – Tables, Figures, and LOS Reports

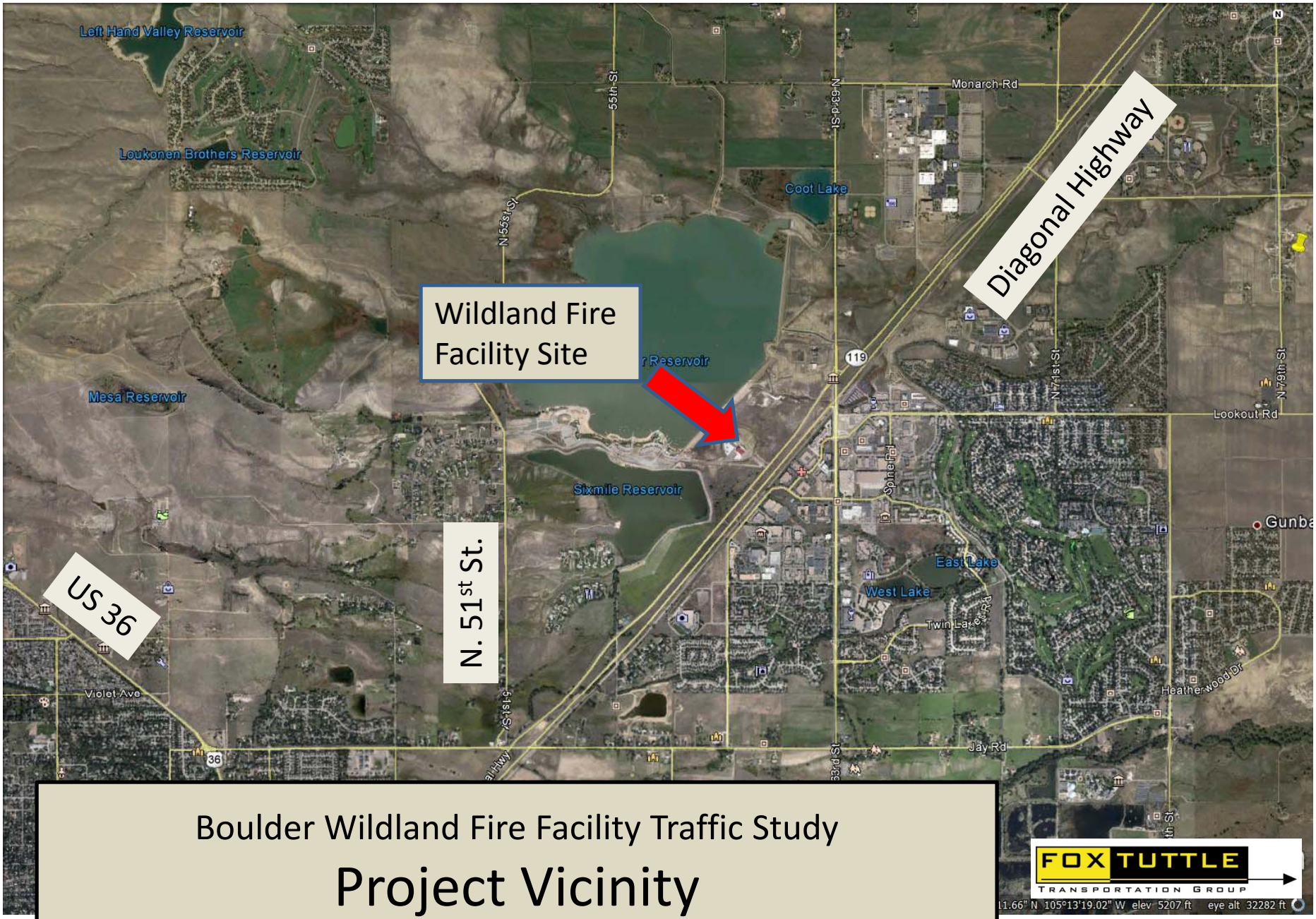
**Table 3**

***Boulder Wildland Fire Facility (Plus Regional Fire Training Center) - Boulder Reservoir Site***

# Peak Hour Intersection Level of Service Summary

| Intersection and Critical Movements | Existing | | Existing | | Existing Plus Typical FTC Plus Wildland Fire | | Existing Plus Typical FTC Plus Wildland Fire | | Existing Plus Worst Case FTC Plus Wildland Fire | | Existing Plus Worst Case FTC Plus Wildland Fire | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | Delay (a) | LOS | Delay (a) | LOS | Delay (a) | LOS | Delay (a) | LOS | Delay (a) | LOS | Delay (a) | LOS |
| **STOP SIGN CONTROL** | | | | | | | | | | | | |
| Jay Road / 51st St. Intersection | **1.9** | **A** | **1.0** | **A** | **2.0** | **A** | **1.2** | **A** | **2.0** | **A** | **1.5** | **A** |
| Eastbound Left | *0.4* | *A* | *0.9* | *A* | *0.5* | *A* | *0.9* | *A* | *0.6* | *A* | *1.1* | *A* |
| Southbound Left | *12.3* | *B* | *11.6* | *B* | *12.4* | *B* | *11.7* | *B* | *12.4* | *B* | *12.0* | *B* |
| Southbound Right | *10.7* | *B* | *10.3* | *B* | *10.7* | *B* | *10.3* | *B* | *10.7* | *B* | *10.4* | *B* |

(a) Delay represented in average seconds per vehicle.




Boulder Wildland Fire Facility Traffic Study

# Project Vicinity

Figure 1

Boulder Wildland Fire Facility Traffic Study

# Site Access

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Figure 2

Boulder Wildland Fire Facility Traffic Study

# Area Photographs

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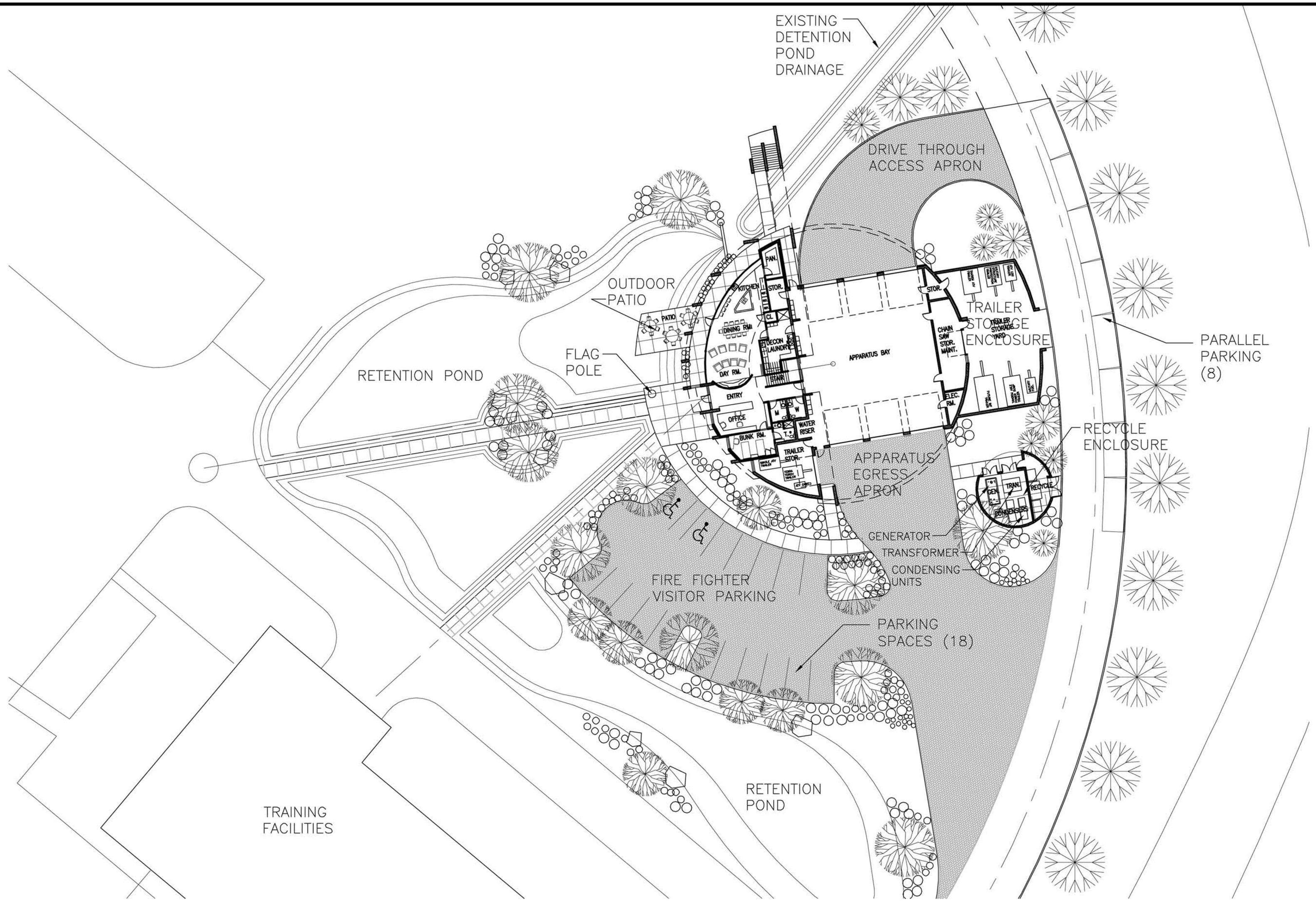
Figure 3




## ENLARGED SITE PLAN

SCALE 1" = 40'

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• JOB NO. 1227

SCALE: 1" = 40'  REVISIONS: △ △ △

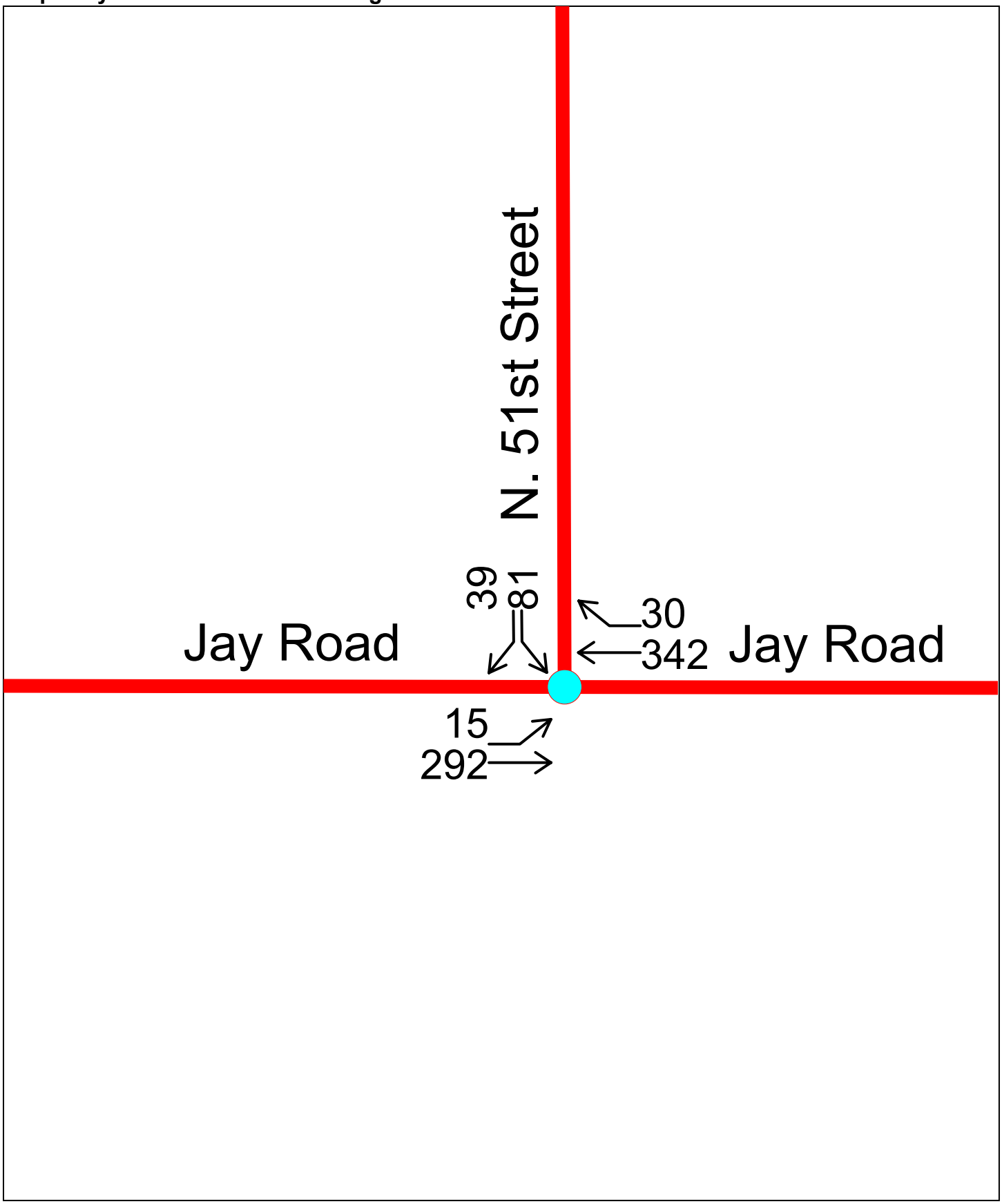
BOULDER WILDLAND FIRE

ISSUE DATE: 05-01-2013

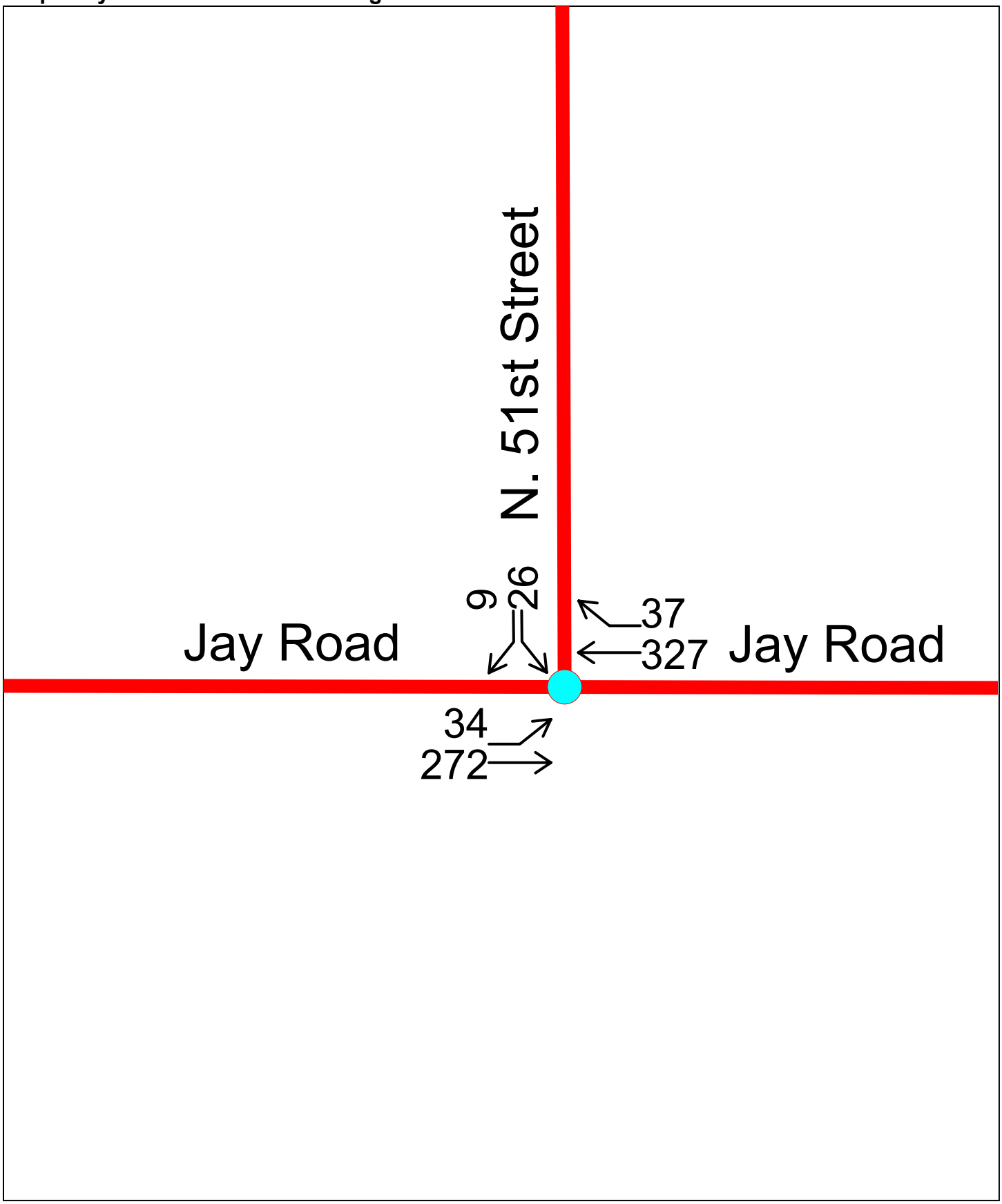
SITE PLAN

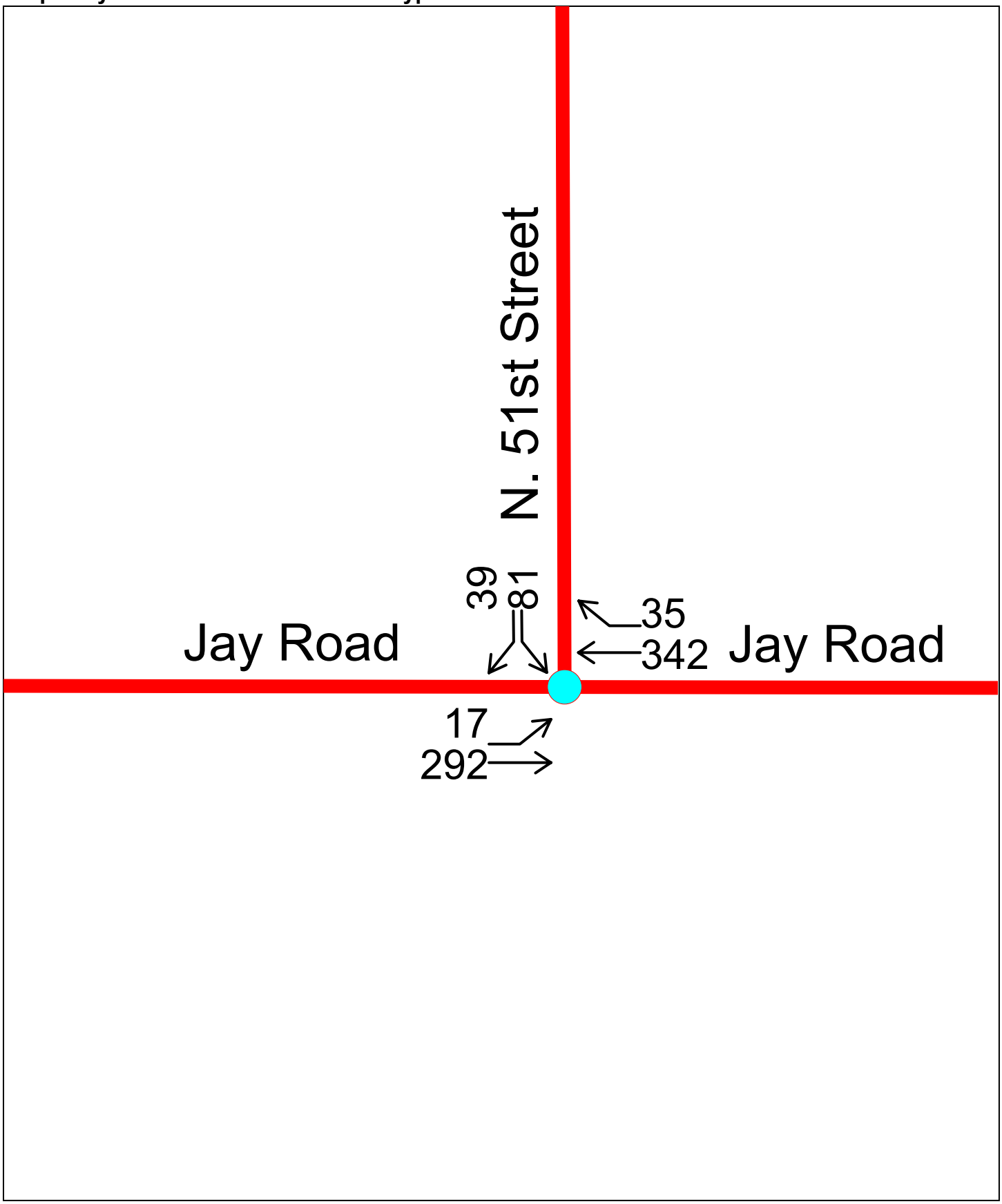
A1.2

**Map - Jay Road/51st Street Existing AM** **Volumes**

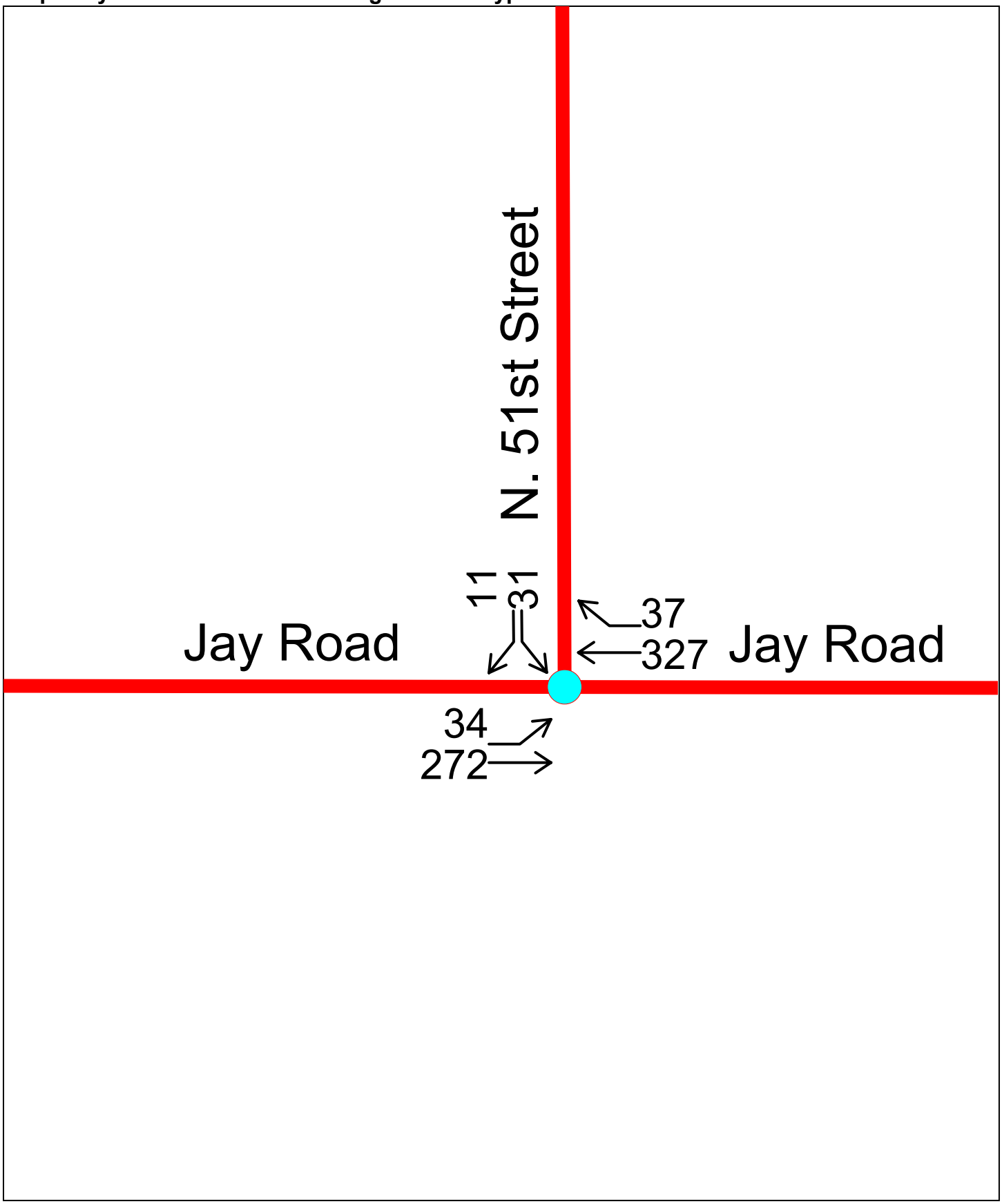



**Jay Road/51st Street Existing AM Existing AM**

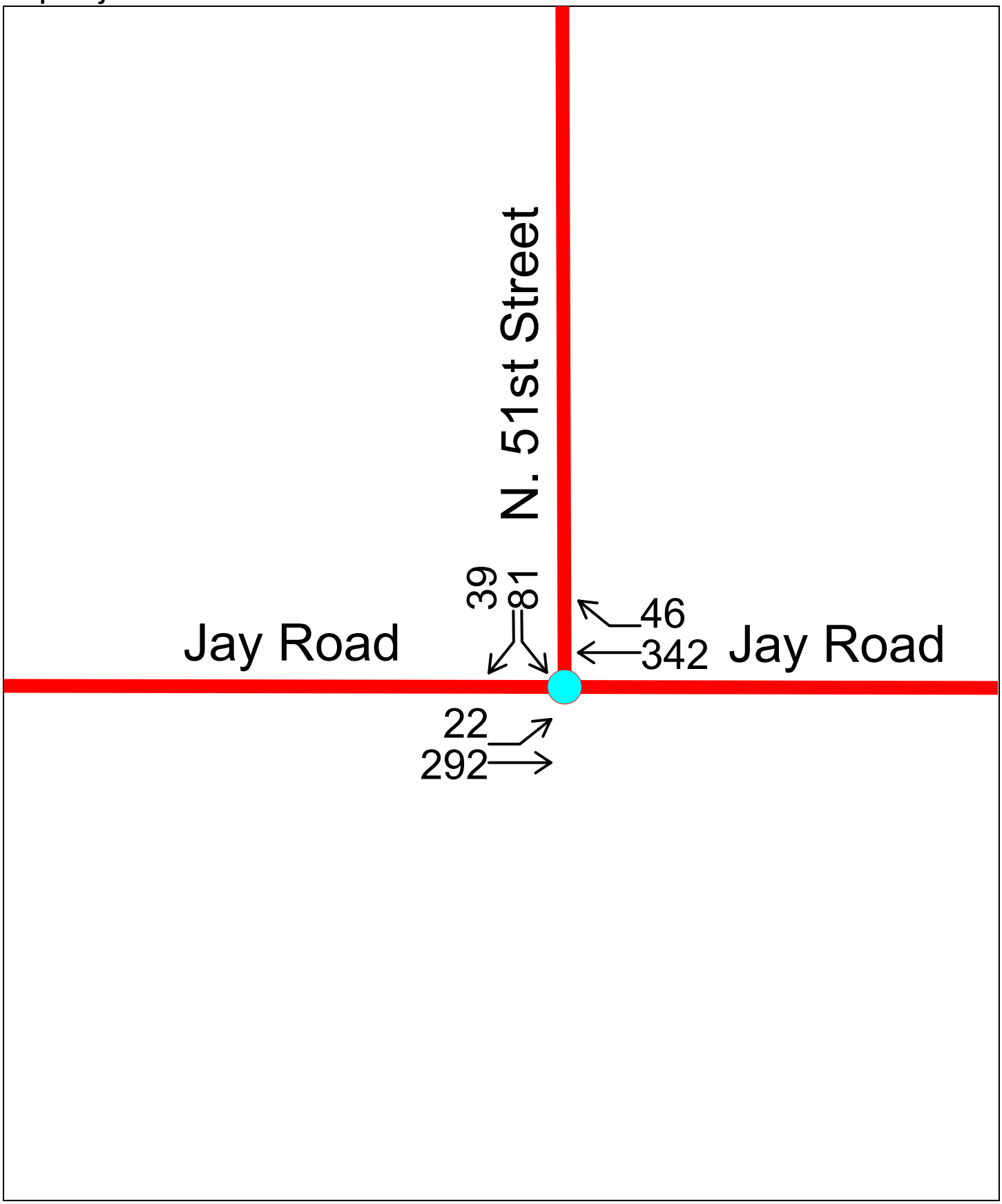

N. 51st Street
Jay Road
Jay Road
9
26
37
327
34
272


N. 51st Street
Jay Road
Jay Road
39
81
35
342
17
292

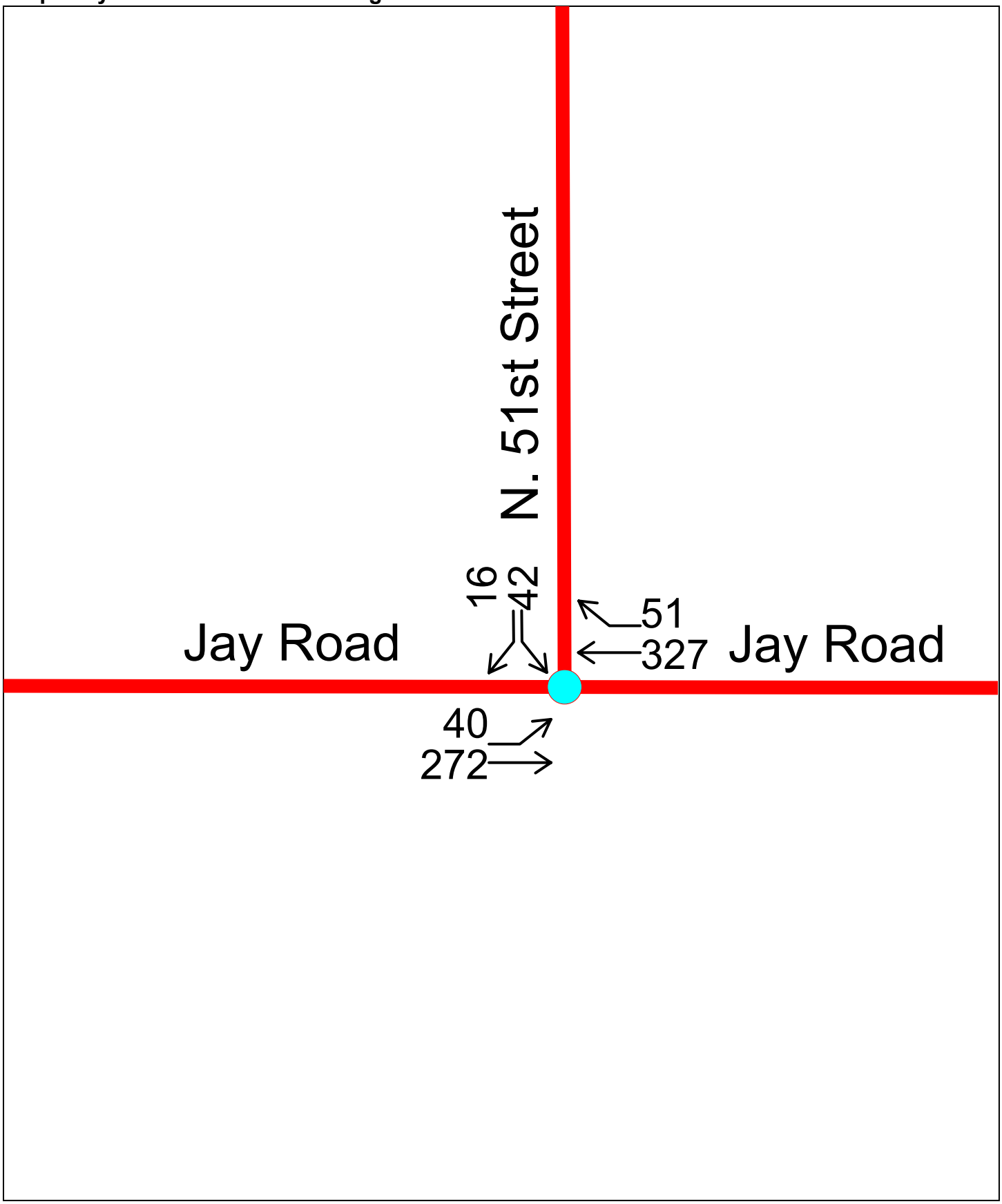
**Map - Jay Road/51st Street Existing PM Plus Typical FTC** **Volumes**




**Jay Road/51st Street Existing PM Plus Typical FTC**


N. 51st Street
Jay Road
Jay Road
39
81
46
342
22
292

**Map - Jay Road/51st Street Existing PM Plus Worst Case FTC** **Volumes**




**Jay Road/51st Street Existing PM Plus Worst Case FTC**

# LEVEL OF SERVICE DEFINITIONS

In rating roadway and intersection operating conditions with existing or future traffic volumes, "Levels of Service" (LOS) A through F are used, with LOS A indicating very good operation and LOS F indicating poor operation. Levels of service at signalized and unsignalized intersections are closely associated with vehicle delays experienced in seconds per vehicle. More complete level of service definitions and delay data for signal and stop sign controlled intersections are contained in the following table for reference.

| Level of Service Rating | Delay in seconds per vehicle *(a)* | | Definition |
|---|---|---|---|
| | Signalized | Unsignalized | |
| A | 0.0 to 10.0 | 0.0 to 10.0 | Low vehicular traffic volumes; primarily free flow operations. Density is low and vehicles can freely maneuver within the traffic stream. Drivers are able to maintain their desired speeds with little or no delay. |
| B | 10.1 to 20.0 | 10.1 to 15.0 | Stable vehicular traffic volume flow with potential for some restriction of operating speeds due to traffic conditions. Vehicle maneuvering is only slightly restricted. The stopped delays are not bothersome and drivers are not subject to appreciable tension. |
| C | 20.1 to 35.0 | 15.1 to 25.0 | Stable traffic operations, however the ability for vehicles to maneuver is more restricted by the increase in traffic volumes. Relatively satisfactory operating speeds prevail, but adverse signal coordination or longer vehicle queues cause delays along the corridor. |
| D | 35.1 to 55.0 | 25.1 to 35.0 | Approaching unstable vehicular traffic flow where small increases in volume could cause substantial delays. Most drivers are restricted in ability to maneuver and selection of travel speeds due to congestion. Driver comfort and convenience are low, but tolerable. |
| E | 55.1 to 80.0 | 35.1 to 50.0 | Traffic operations characterized by significant approach delays and average travel speeds of one-half to one-third the free flow speed. Vehicular flow is unstable and there is potential for stoppages of brief duration. High signal density, extensive vehicle queuing, or corridor signal progression/timing are the typical causes of vehicle delays at signalized corridors. |
| F | > 80.0 | > 50.0 | Forced vehicular traffic flow and operations with high approach delays at critical intersections. Vehicle speeds are reduced substantially and stoppages may occur for short or long periods of time because of downstream congestion. |

*(a)* Delay ranges based on 2010 Highway Capacity Manual criteria.

# HCM Unsignalized Intersection Capacity Analysis
## 3: Jay Road & N. 51st Street

5/14/2013

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 15 | 292 | 342 | 30 | 81 | 39 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 16 | 317 | 372 | 33 | 88 | 42 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | TWLTL | | | |
| Median storage veh) | | | 2 | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 404 | | | | 722 | 372 |
| vC1, stage 1 conf vol | | | | | 372 | |
| vC2, stage 2 conf vol | | | | | 350 | |
| vCu, unblocked vol | 404 | | | | 722 | 372 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | 5.4 | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 99 | | | | 85 | 94 |
| cM capacity (veh/h) | 1154 | | | | 582 | 674 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
|---|---|---|---|---|---|---|
| Volume Total | 16 | 317 | 372 | 33 | 88 | 42 |
| Volume Left | 16 | 0 | 0 | 0 | 88 | 0 |
| Volume Right | 0 | 0 | 0 | 33 | 0 | 42 |
| cSH | 1154 | 1700 | 1700 | 1700 | 582 | 674 |
| Volume to Capacity | 0.01 | 0.19 | 0.22 | 0.02 | 0.15 | 0.06 |
| Queue Length 95th (ft) | 1 | 0 | 0 | 0 | 13 | 5 |
| Control Delay (s) | 8.2 | 0.0 | 0.0 | 0.0 | 12.3 | 10.7 |
| Lane LOS | A | | | | B | B |
| Approach Delay (s) | 0.4 | | 0.0 | | 11.8 | |
| Approach LOS | | | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.9 | | |
| Intersection Capacity Utilization | 29.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

# HCM Unsignalized Intersection Capacity Analysis
## 3: Jay Road & N. 51st Street

5/14/2013

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 34 | 272 | 327 | 37 | 26 | 9 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 37 | 296 | 355 | 40 | 28 | 10 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | TWLTL | | | |
| Median storage veh) | | | 2 | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 396 | | | | 725 | 355 |
| vC1, stage 1 conf vol | | | | | 355 | |
| vC2, stage 2 conf vol | | | | | 370 | |
| vCu, unblocked vol | 396 | | | | 725 | 355 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | 5.4 | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 97 | | | | 95 | 99 |
| cM capacity (veh/h) | 1163 | | | | 574 | 689 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
|---|---|---|---|---|---|---|
| Volume Total | 37 | 296 | 355 | 40 | 28 | 10 |
| Volume Left | 37 | 0 | 0 | 0 | 28 | 0 |
| Volume Right | 0 | 0 | 0 | 40 | 0 | 10 |
| cSH | 1163 | 1700 | 1700 | 1700 | 574 | 689 |
| Volume to Capacity | 0.03 | 0.17 | 0.21 | 0.02 | 0.05 | 0.01 |
| Queue Length 95th (ft) | 2 | 0 | 0 | 0 | 4 | 1 |
| Control Delay (s) | 8.2 | 0.0 | 0.0 | 0.0 | 11.6 | 10.3 |
| Lane LOS | A | | | | B | B |
| Approach Delay (s) | 0.9 | | 0.0 | | 11.3 | |
| Approach LOS | | | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.0 | | |
| Intersection Capacity Utilization | 33.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

# HCM Unsignalized Intersection Capacity Analysis
## 3: Jay Road & N. 51st Street

5/14/2013

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 17 | 292 | 342 | 36 | 83 | 40 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 18 | 317 | 372 | 39 | 90 | 43 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | TWLTL | | | |
| Median storage veh) | | | 2 | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 411 | | | | 726 | 372 |
| vC1, stage 1 conf vol | | | | | 372 | |
| vC2, stage 2 conf vol | | | | | 354 | |
| vCu, unblocked vol | 411 | | | | 726 | 372 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | 5.4 | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 98 | | | | 84 | 94 |
| cM capacity (veh/h) | 1148 | | | | 580 | 674 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
|---|---|---|---|---|---|---|
| Volume Total | 18 | 317 | 372 | 39 | 90 | 43 |
| Volume Left | 18 | 0 | 0 | 0 | 90 | 0 |
| Volume Right | 0 | 0 | 0 | 39 | 0 | 43 |
| cSH | 1148 | 1700 | 1700 | 1700 | 580 | 674 |
| Volume to Capacity | 0.02 | 0.19 | 0.22 | 0.02 | 0.16 | 0.06 |
| Queue Length 95th (ft) | 1 | 0 | 0 | 0 | 14 | 5 |
| Control Delay (s) | 8.2 | 0.0 | 0.0 | 0.0 | 12.4 | 10.7 |
| Lane LOS | A | | | | B | B |
| Approach Delay (s) | 0.5 | | 0.0 | | 11.8 | |
| Approach LOS | | | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 2.0 | | |
| Intersection Capacity Utilization | 29.3% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

# HCM Unsignalized Intersection Capacity Analysis
## 3: Jay Road & N. 51st Street

5/14/2013

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 35 | 272 | 327 | 38 | 36 | 14 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 38 | 296 | 355 | 41 | 39 | 15 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | TWLTL | | | |
| Median storage veh) | | | 2 | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 397 | | | | 727 | 355 |
| vC1, stage 1 conf vol | | | | | 355 | |
| vC2, stage 2 conf vol | | | | | 372 | |
| vCu, unblocked vol | 397 | | | | 727 | 355 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | 5.4 | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 97 | | | | 93 | 98 |
| cM capacity (veh/h) | 1162 | | | | 573 | 689 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
|---|---|---|---|---|---|---|
| Volume Total | 38 | 296 | 355 | 41 | 39 | 15 |
| Volume Left | 38 | 0 | 0 | 0 | 39 | 0 |
| Volume Right | 0 | 0 | 0 | 41 | 0 | 15 |
| cSH | 1162 | 1700 | 1700 | 1700 | 573 | 689 |
| Volume to Capacity | 0.03 | 0.17 | 0.21 | 0.02 | 0.07 | 0.02 |
| Queue Length 95th (ft) | 3 | 0 | 0 | 0 | 5 | 2 |
| Control Delay (s) | 8.2 | 0.0 | 0.0 | 0.0 | 11.7 | 10.3 |
| Lane LOS | A | | | | B | B |
| Approach Delay (s) | 0.9 | | 0.0 | | 11.4 | |
| Approach LOS | | | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.2 | | |
| Intersection Capacity Utilization | 33.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

# HCM Unsignalized Intersection Capacity Analysis
## 3: Jay Road & N. 51st Street

5/14/2013

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 22 | 292 | 342 | 47 | 83 | 40 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 24 | 317 | 372 | 51 | 90 | 43 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | TWLTL | | | |
| Median storage veh) | | | 2 | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 423 | | | | 737 | 372 |
| vC1, stage 1 conf vol | | | | | 372 | |
| vC2, stage 2 conf vol | | | | | 365 | |
| vCu, unblocked vol | 423 | | | | 737 | 372 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | 5.4 | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 98 | | | | 84 | 94 |
| cM capacity (veh/h) | 1136 | | | | 573 | 674 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
|---|---|---|---|---|---|---|
| Volume Total | 24 | 317 | 372 | 51 | 90 | 43 |
| Volume Left | 24 | 0 | 0 | 0 | 90 | 0 |
| Volume Right | 0 | 0 | 0 | 51 | 0 | 43 |
| cSH | 1136 | 1700 | 1700 | 1700 | 573 | 674 |
| Volume to Capacity | 0.02 | 0.19 | 0.22 | 0.03 | 0.16 | 0.06 |
| Queue Length 95th (ft) | 2 | 0 | 0 | 0 | 14 | 5 |
| Control Delay (s) | 8.2 | 0.0 | 0.0 | 0.0 | 12.4 | 10.7 |
| Lane LOS | A | | | | B | B |
| Approach Delay (s) | 0.6 | | 0.0 | | 11.9 | |
| Approach LOS | | | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 2.0 | | |
| Intersection Capacity Utilization | 29.5% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

# HCM Unsignalized Intersection Capacity Analysis
## 3: Jay Road & N. 51st Street

5/14/2013

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 41 | 272 | 327 | 52 | 47 | 19 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 45 | 296 | 355 | 57 | 51 | 21 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | TWLTL | | | |
| Median storage veh) | | | 2 | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 412 | | | | 740 | 355 |
| vC1, stage 1 conf vol | | | | | 355 | |
| vC2, stage 2 conf vol | | | | | 385 | |
| vCu, unblocked vol | 412 | | | | 740 | 355 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | 5.4 | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 96 | | | | 91 | 97 |
| cM capacity (veh/h) | 1147 | | | | 564 | 689 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
|---|---|---|---|---|---|---|
| Volume Total | 45 | 296 | 355 | 57 | 51 | 21 |
| Volume Left | 45 | 0 | 0 | 0 | 51 | 0 |
| Volume Right | 0 | 0 | 0 | 57 | 0 | 21 |
| cSH | 1147 | 1700 | 1700 | 1700 | 564 | 689 |
| Volume to Capacity | 0.04 | 0.17 | 0.21 | 0.03 | 0.09 | 0.03 |
| Queue Length 95th (ft) | 3 | 0 | 0 | 0 | 7 | 2 |
| Control Delay (s) | 8.3 | 0.0 | 0.0 | 0.0 | 12.0 | 10.4 |
| Lane LOS | A | | | | B | B |
| Approach Delay (s) | 1.1 | | 0.0 | | 11.5 | |
| Approach LOS | | | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.5 | | |
| Intersection Capacity Utilization | 33.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |