

DATE: September 24, 2008

TO: Mr. Ted Shekell, P.E.
City of O'Fallon, IL

FROM: Lee Cannon, P.E., PTOE
Dustin Riechmann, P.E., PTOE

SUBJECT: **Work Order #11**
Proposed Office Park – Rasp Farm
CBB Job No. 118-05-11

In accordance with our contract with the City of O'Fallon, Illinois dated April 29, 2005 and subsequent work order #11, Crawford, Bunte, Brammeier has prepared a traffic assessment pertaining to the proposed Rasp Farms office development in O'Fallon, Illinois. The development site is located on the east side of Lincoln Avenue between Dartmouth Avenue and I-64.

It is our understanding that approximately 350,000 square feet (s.f.) of office space is proposed on the subject 51-acre tract. Access to the site is proposed via a new drive on Lincoln Avenue as well as a single connection to the existing Dartmouth Drive (approximately midway between Yale and Princeton Drives). It appears that the redevelopment of an existing retail building to the southeast of the intersection of Lincoln Avenue and Dartmouth Drive may also be included in the proposed development plan, though the developed square footage and access appear to be consistent with the existing use on that parcel. A concept site plan provided by the developer is depicted in **Exhibit 1**.

It should be noted that this site was previously evaluated in 2007 under Work Order #4. At that time, a residential site plan was under consideration. A copy of the report and an addendum prepared under Work Order #4 is attached for reference.

Purpose and Scope

The purpose and scope was defined in the work order "Project Specific Issues to be Addressed and Project Deliverables" as noted below:

- *Calculate site generated trips for daily, a.m. peak hour and p.m. peak hour.*
- *Review machine counts for Lincoln Avenue from Work Order #4.*
- *Evaluate the ability of Dartmouth Drive and/or South Lincoln Avenue to accommodate site generated trips from a capacity and residential character perspective.*
- *Recommend appropriate off-site improvements and/or modifications anticipated to allow acceptable operations at the intersection of Lincoln Avenue with Dartmouth Drive/Pierce*

- Boulevard, the existing driveway serving the commercial property, any proposed new connections to serve the site, Frank Scott Parkway and North Main Street.*
- *Recommend an appropriate access configuration for the site including opinions on the appropriateness of connecting to existing stub streets for access via Dartmouth Drive and Edgewood Drive as well as the number and use of lanes at those intersections.*
 - *Comment on the potential for increased through traffic on primarily residential streets as a result of the proposed development and the recommended access configuration.*
 - *Recommend appropriate locations and configurations for a secondary access to the site which may be reserved for emergency access only.*
 - *Prepare concept schematics for potential alternative access configurations (hand-drawn over publicly available maps or aerial photos).*
 - *A written summary memo will be prepared to document our findings and conclusions.*

Existing Roadway Traffic Volumes

Under Work Order #4, machine traffic counters were placed on Lincoln Avenue and Dartmouth Drive for a period of seven days to determine existing daily and peak hour traffic volumes. **Table 1** summarizes the average daily traffic volumes along both roadways as well as the traffic during both the morning and afternoon peak hours.

Table 1			
Existing Traffic Volumes			
<i>Direction of Travel</i>	<i>Average Weekday Traffic (24-Hours)</i>	<i>AM Peak Hour Traffic</i>	<i>PM Peak Hour Traffic</i>
Lincoln Avenue North of Dartmouth Drive			
Northbound	4,250 vpd	260 vph	445 vph
Southbound	5,140 vpd	350 vph	445 vph
Total	9,390 vpd	610 vph	890 vph
Dartmouth Drive East of Lincoln Avenue			
Eastbound	515 vpd	65 vph	60 vph
Westbound	475 vpd	45 vph	40 vph
Total	990 vpd	110 vph	100 vph

Trip Generation

It is our understanding that approximately 10% of the proposed development would be used for medical office uses, while the remainder of the site is intended for general office use. Consequently, approximately 35,000 s.f. of medical office and 315,000 s.f. of general office space were assumed for the purposes of this assessment. As noted above, the proposed redevelopment of approximately 25,000 s.f. of retail space in the northwest corner of the site appears similar in size to the existing building on that parcel, so no net trip generation change is included for that use.

The number of trips that would be generated by the proposed office development was estimated based upon information provided in the “Trip Generation Manual”, Seventh Edition, published by the Institute of Transportation Engineers (ITE). The manual, which is a standard resource for transportation engineers, is based on a compilation of nationwide studies documenting the characteristics of various land uses.

The trip generation estimate is summarized in **Table 2**. As can be seen, the proposed office development is expected to generate approximately 4,495 daily trips, 555 trips during the a.m. peak hour and 560 trips during the p.m. peak hour.

Table 2									
Trip Generation Estimate									
Rasp Farm O’Fallon, Illinois									
<i>Land Use</i>	<i>ITE Code</i>	<i>Size</i>	<i>Total Daily Trips</i>	<i>AM Peak Period</i>			<i>PM Peak Period</i>		
				<i>In</i>	<i>Out</i>	<i>Total</i>	<i>In</i>	<i>Out</i>	<i>Total</i>
General Office	710	315,000 SF	3,230	415	55	470	75	355	430
Medical Office	720	35,000 SF	1,265	65	20	85	35	95	130
Total Trips			4,495	480	75	555	110	450	560

Anticipated Trip Distribution

While it is difficult to specifically determine route choices for a development with multiple access points, an estimate is necessary to consider potential traffic impacts. Based on a review of the location of each proposed building/lot and the location of their access alternatives to the existing public roadways, it is estimated that up to 20% of the development’s traffic may choose to use the cross-access connection to Dartmouth Drive for access to Lincoln Avenue. Consequently, new trips to and from the proposed offices may increase the daily trips by nearly 900 vehicles per day (vpd) on the west end of Dartmouth Drive.

Conversely, it is anticipated that a majority of the traffic generated by the development would utilize the proposed new roadway bisecting the site for access to/from Lincoln Avenue. The layout of the site would encourage the use of this roadway, and there would be little incentive for the majority of the site’s visitors to use Dartmouth Drive for trips to/from the north, south or west.

However, a portion those motorists with origins or destinations to the east (particularly the northeast) of the site would be expected to utilize the public street system within the adjoining neighborhood to make through trips using the several available connections to U.S. Route 50. Given that the majority of the traffic from office developments is employee-generated, those motorists tend to find and utilize paths that minimize travel time. It is estimated that up to 10% of the site’s traffic could utilize the existing neighborhood streets to the east and north for access to the development. These trips would occur primarily during the a.m. and p.m. peak hours when office uses generate the majority of their traffic.

It was previously brought to our attention by the City staff that Edgewood Drive to the east of the development site has been planned as an east-west collector street, constructed as a 42-foot wide pavement, and stubbed near the east side of the subject property. A connection to Edgewood Drive

would provide alternative signalized access to Route 50 via Timber Creek Lane (opposite Seven Hills Road). A third access connection for the site (besides Dartmouth Drive and Lincoln Avenue) would help to dilute the traffic impacts to the other two roadways and lessen the use of other neighborhood streets for site traffic. However, based on the current site plan, it appears that no connection to Edgewood Drive is proposed.

Capacity of Dartmouth Drive

Since Dartmouth Drive is a residential street with on-street parking and direct driveway access, it is considered a residential mini-collector. Residential mini-collectors generally carry approximately 2,000 to 2,500 vehicles per day (vpd) before the “character” of the road changes to a system-level minor collector street. The “Green Book”¹ states that a 26-foot wide (or greater) residential street is designed to accommodate up to 2,000 vpd. In general, a system collector has fewer curb cuts and restricts or eliminates on-street parking to allow better traffic flow.

The existing traffic volumes on Dartmouth Drive are approximately 1,000 daily trips, which is within the limits of a 28-foot wide, residential mini-collector. Based on the anticipated traffic to be added by the proposed development (900 vpd), it appears that the proposed access configuration would discourage the use of Dartmouth Drive by site traffic sufficiently such that its residential character could be maintained. Although the current residents along Dartmouth Drive may not find the additional traffic desirable in front of their homes, the street’s character and physical dimensions would be acceptable for the projected volumes. Conversely, the City ultimately may choose to restrict site access to/from Dartmouth Drive.

It is recommended that the single connection point to Dartmouth Drive be retained as depicted on the concept site plan. This connection provides a valuable secondary access for emergency response purposes. It also provides a means for local traffic to access the site without the need to turn on and off of Lincoln Avenue. At the very least, we recommend that this connection be provided for emergency access and restricted if deemed appropriate using gates or other methods.

Capacity of Lincoln Avenue

In general, the capacity of a two-lane arterial road is 10,000 to 15,000 vpd. Lincoln Avenue has an existing AWDT of approximately 10,000 vpd, which is within these limits. The addition of the trips generated by the subject development (less than half of which would travel to/from the north of Dartmouth Drive) would still remain under the roadway’s capacity.

The existing traffic volumes were compared against the volume warrants for separate left-turn lanes along Lincoln Avenue. The left-turn lane guidelines consider the auxiliary lanes as an asset in promoting safety and improved traffic flow at relatively high conflict locations. Separate turn lanes are intended to remove turning vehicles from the through lane to reduce the potential number of rear-end collisions where considerable left-turn ingress activity occurs at intersections.

¹ The “Green Book” refers to A Policy on Geometric Design of Highways and Streets published by the American Association of State Highway and Transportation Officials (AASHTO) Fourth Edition - 2001

The IDOT BDE² methodologies for separate left-turn lanes on a two-lane roadway were referenced. The methodology compares the total advancing volume on the major road (which includes all turning traffic) to the total opposing volume on the major road (which includes all turning traffic) during the peak hour with respect to the number of mainline left turns. The total advancing and opposing volumes are plotted on the graph with respect to the design speed.

According to the IDOT BDE requirements within a 40 mph design speed (35 posted speed limit plus 5 mph to serve as a “safety cushion”), approximately 6% left-turns (or 31 lefts) during the a.m. peak hour would warrant a separate left-turn lane. The “Volume Guidelines for Left-Turn Lanes at Unsignalized Intersections on Two-Lane Highways” from the BDE manual are attached for your reference (Figure 36-3G).

The new Rasp Farm office development is expected to generate 480 inbound trips during the a.m. peak hour. Therefore, only approximately 6% of the development trips would need to turn left from Lincoln Avenue to generate enough traffic to warrant a separate left-turn lane along Lincoln Avenue.

The IDOT BDE Manual also provides warrants for separate right-turn lanes on two lane roadways. The right turn warrants compare the design hourly volume in one direction (vph) to the right-turn volume during the design hour (vph). Assuming the 260 vph northbound, as previously identified during the a.m. peak hour, approximately 85 right turns from Lincoln Avenue would warrant the installation of a separate right-turn lane. The “Volume Guidelines for Right-Turn Lanes at Unsignalized Intersections on Two-Lane Highways” from the BDE manual are attached for your reference (Figure 36-3A).

The new development is expected to generate 480 inbound trips during the a.m. peak hour. Therefore, approximately 18% of the development trips would be needed to turn right into the site to generate enough traffic to warrant a separate right-turn lane along Lincoln Avenue.

Although no specific assignments of traffic were performed as part of this evaluation, it appears that both left and right-turn lanes will be warranted at the primary intersection on Lincoln Avenue serving the development. A southbound left-turn lane may also be warranted at Dartmouth Drive, although the need for that auxiliary lane would be subject to further evaluation and the determination of needs at the intersection based on existing traffic. It should be noted that the provision of separate turn lanes on Lincoln Avenue at the proposed site drive may further encourage its use and lessen site traffic flows on Dartmouth Drive.

Sight Distance Review

It is our understanding that a new connection to Lincoln Avenue is proposed proximately 170 feet south of the existing retail entrance on the east side of Lincoln Avenue (south of Dartmouth Drive). Any connection to Lincoln Avenue should be designed to provide adequate sight distance to the north and south of the entrance for safe operating visibility.

² Bureau of Design and Environment Manual (BDE) published by Illinois Department of Transportation (Rev. 12/2002)

A sight distance evaluation was previously conducted at this location as part of Work Order #4, and the findings of that review remain applicable to the current site plan. In short, based on our visual inspection, it appears that the sight distance to the north is more than adequate (beyond Dartmouth Drive). The sight distance to the south was measured and found to be adequate as well, assuming less than a three percent grade for the new approach to Lincoln Avenue. It should be noted that the available sight distance to the south crosses the north side of the bridge over I-64, where the speed limit is reduced from 50 mph to 35 mph. It would be advisable to move the 35 mph speed zone to the south end of the bridge in order to ensure adequate sight distance. It should be noted that some motorists may view the 35 mph speed zone as unreasonable and may not obey the reduced speed limits approaching the new intersection.

Careful consideration should be given to sight distance obstructions when planning structures, parking areas, signs and any aesthetics enhancements, such as berms, fencing and landscaping, to ensure that these improvements do not obstruct the view of entering and exiting traffic at the intersection. CBB typically recommend that all improvements higher than 3.5 feet above the elevation of the nearest pavement edge be held back at least 20 feet from the traveled roadway.

Traffic Signal Warrant Analysis

The need for a traffic signal along Lincoln Avenue was evaluated using criteria outlined in the Manual on Uniform Traffic Control Devices (MUTCD), published by the Federal Highway Administration, United States Department of Transportation. Part Four of the MUTCD provides eight different warrants for signalization that are based on hourly traffic volumes, traffic operations, pedestrian volumes, or crash experience. The MUTCD further states that a traffic signal should not be installed unless one or more warrants are satisfied, an engineering study indicates that the installation will improve the overall safety and/or operation of the intersection, and that a traffic signal will not seriously disrupt progressive traffic flow.

Warrant 1A (Minimum Vehicular Volume) requires hourly approach volumes of at least 500 vpd (vehicles per day) on major streets with one lane per direction for any eight hours of a typical day. During this same period, the volume of traffic entering from the minor street must exceed 200 vph (assuming a two-lane exit). Warrant 1B (Interruption of Continuous Traffic) requires approach volumes of at least 750 vph on the major street and a minimum of 100 vph (assuming a two-lane approach) on the minor street. A reduction in the requirement is allowed when the major street speed exceeds 40 mph; however, this is not the case at this location.

Lincoln Avenue has an eighth highest hour volume of 560 vph. As a result, the mainline traffic would exceed the traffic signal warrants for Warrant 1A only. Therefore, the side-street traffic volumes would need to exceed 200 vph for eight hours of a day to meet the signal requirements. The development is expected to generate 450 total exiting trips during the p.m. peak hour, though only 300-350 of these trips would be expected to utilize the proposed main access drive if secondary access is approved via Dartmouth Drive. The traffic generated by office developments is highly concentrated during the peak hours when employees are arriving and leaving the site. Therefore, it is anticipated that the side-street threshold would only be satisfied for one or two hours each day, which would not satisfy the eight-hour warrant requirements to justify a traffic signal.



It should be noted that Warrant 3: Peak Hour Warrant was also reviewed, although it is intended for application only in unusual circumstances. This warrant also was not satisfied even during the heaviest p.m. peak hour of traffic exiting the site. Therefore, it was concluded that the development traffic will not warrant the installation of a traffic signal at either intersection on Lincoln Avenue.

However, that is not to say that there will not be lengthy delays for motorists exiting the site. Although capacity analyses were not included as part of this assessment, we would anticipate that traffic turning left to exit the development will be subject to lengthy delays, particularly during the p.m. peak hour when flows along Lincoln Avenue are heaviest. In order to minimize delays and improve the efficiency of the intersection, it is recommended that the proposed main access roadway be constructed to provide separate westbound left- and right-turn lanes at its intersection with Lincoln Avenue.

Traffic Impacts on Other Routes

Based on the location of the development site in relation to the area roadway network, there are limited route choices for access. We anticipate that a substantial number of the trips will be oriented to Greenmount Road and Route 158, and many of those motorists will access the site using Lincoln Avenue/Cross Street to the south and Frank Scott Parkway. Some of the trips oriented to/from Greenmount Road will cut through the neighborhood west of the site using Pierce Boulevard as a direct route. Similar to residents along Dartmouth Drive, residents along Pierce Boulevard will not find the addition of commercial traffic in front of their homes desirable. Traffic calming mitigation measures may be necessary along Pierce Boulevard if traffic from the proposed development is found to use that route in excess.

If connected to the site, Edgewood Drive would also provide a convenient alternative for access to the north and northeast along Route 50. Edgewood Drive has plenty of surplus capacity based upon its substantial width and number of homes being served. However, the residents will not likely support the incursion of commercial trips in their neighborhood. Any future extension of Edgewood Drive to the north or east may increase the use by site development trips and exacerbate the concerns of the residents.

For traffic traveling to and from Route 50, Lincoln Avenue north of the site provides a direct and convenient connection. We do not anticipate that the addition of site generated trips will require any physical improvements to the existing signalized intersection of Route 50 and Lincoln Avenue.

Summary of Findings

Based upon the preceding discussion, the following may be concluded regarding the traffic impacts associated with the proposed office development at Rasp Farm:

1. The proposed office development is expected to generate approximately 4,495 daily trips, 555 trips during the a.m. peak hour and 560 trips during the p.m. peak hour.

2. It is anticipated that the proposed access configuration and site layout would discourage the use of Dartmouth Drive by site traffic sufficiently such that its residential character could be maintained. Conversely, the City ultimately may choose to restrict site access to/from Dartmouth Drive since local residents will undoubtedly be opposed to the incursion of commercial traffic into their neighborhood.
3. It is recommended that the single connection point to Dartmouth Drive be retained as depicted on the concept site plan. The proposed site layout should appropriately encourage the use of the new east-west street internal to the site for the majority of the development's traffic, while providing a secondary means of access for local residents and emergency response. At the very least, we recommend that this connection be provided for emergency access and restricted if deemed appropriate using gates or other methods.
4. A third access connection for the site (besides Dartmouth Drive and Lincoln Avenue) would help to dilute the traffic impacts to the other two roadways and lessen the use of other neighborhood streets for site traffic. However, based on the current site plan, it appears that no connection to Edgewood Drive to the east is proposed. Local residents with homes along that route may be similarly opposed to the incursion of commercial traffic into their neighborhood.
5. Traffic traveling between the site and Greenmount Road will cut through the neighborhood west of the site using Pierce Boulevard as a direct route. Similar to residents along Dartmouth Drive, residents along Pierce Boulevard will not find the addition of commercial traffic in front of their homes desirable. Traffic calming mitigation measures may be necessary along Pierce Boulevard if traffic from the proposed development is found to use that route in excess.
6. It appears that both left and right-turn lanes will be warranted at the primary intersection on Lincoln Avenue serving the development. A southbound left-turn lane may also be warranted at Dartmouth Drive, although the need for that auxiliary lane would be subject to further evaluation and the determination of needs at the intersection based on existing traffic.
7. At the proposed main site drive's intersection with Lincoln Avenue, adequate sight distance is available to the north and can be obtained to the south, if the 35 mph speed limit zone is moved to the south end of the bridge (south of I-64).
8. A signal would not be warranted at either intersection on Lincoln Avenue based on MUTCD warrants. However, we would anticipate lengthy delays for motorists turning left to exit the site, particularly during the p.m. peak hour
9. In order to minimize delays and improve the efficiency of the intersection, it is recommended that the proposed main access roadway be constructed to provide separate westbound left- and right-turn lanes at its intersection with Lincoln Avenue.



We trust that you will find this information useful in your planning processes. We acknowledge that there are many other factors that must be considered with respect to site planning. However, we have attempted to provide recommendations in accordance with generally accepted traffic engineering principles and sound engineering judgment. Consequently, it is understood that not all of the concepts presented herein will be feasible when weighed against those other considerations.

Should there be any questions or need for additional information, please contact Lee Cannon in our St. Louis office by phone at 314-878-6644 ext. 12 or via electronic mail at LCannon@CBBTraffic.com or Dustin Riechmann in our Glen Carbon office at 618-656-2612 ext. 11 or DRiechmann@CBBTraffic.com.

Attachments (Exhibit 1, IDOT BDE Figures 36-3G & 36-3A)

- CONCEPT PLAN -
RASP FARM
PART OF LOT OF 6 OF THE S.W. 1/4 AND PART OF THE N.W. 1/4 OF THE S.E. 1/4
ALL IN SECTION 32, T. 2N., R. 7W. OF THE 3RD P.M.,
ST. CLAIR COUNTY, ILLINOIS

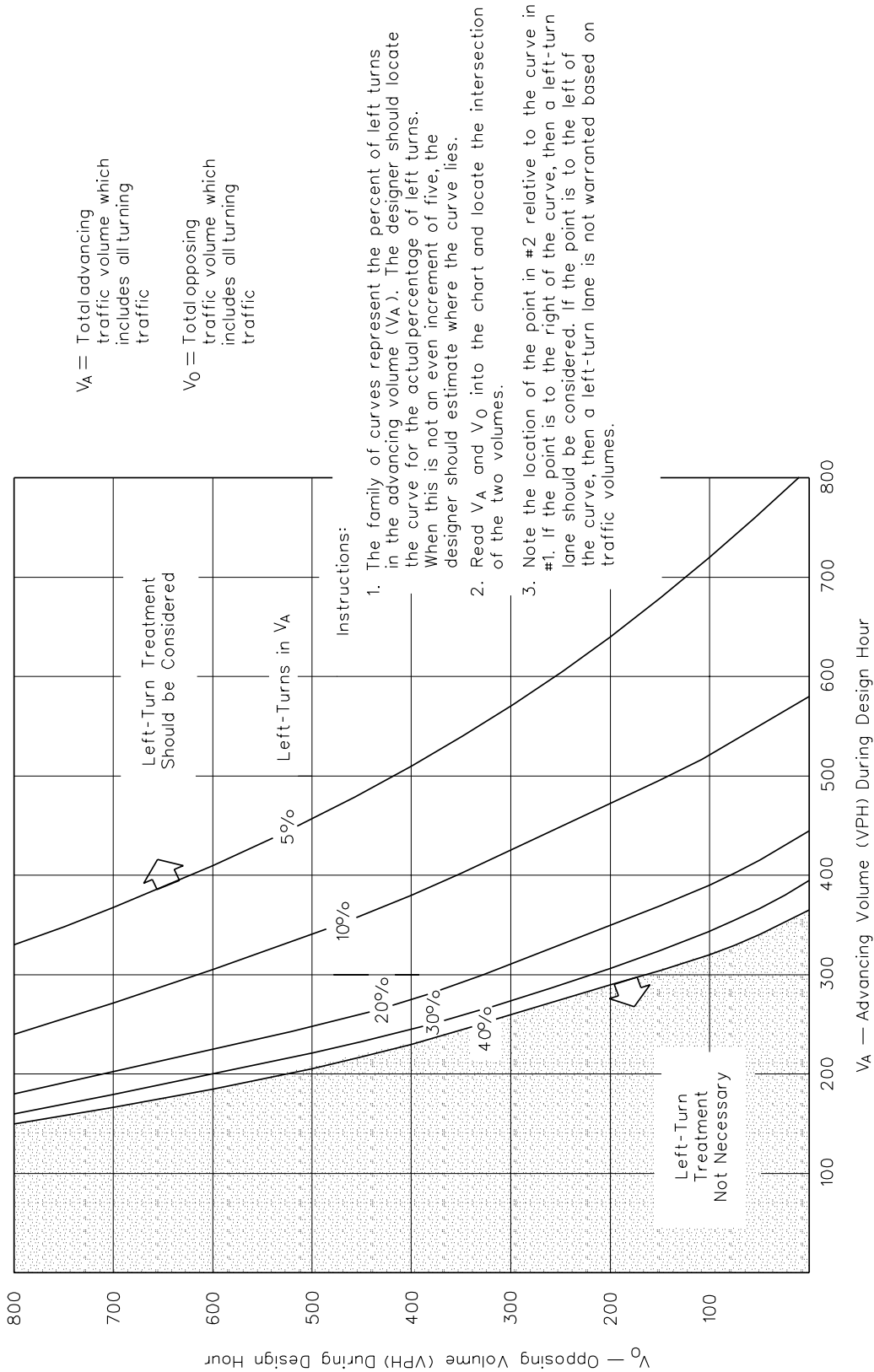
OPTION "C" Development Summary, Southern Province
All Two-story Building with Parking Provision of 57,000 GSF

Building A	37,500 GSF	188 Con
Building B	25,000 GSF	125 Con
Building C	25,000 GSF	125 Con
Building D	25,000 GSF	125 Con
Building E	25,000 GSF	125 Con
Building F	25,000 GSF	125 Con
Building G	25,000 GSF	125 Con
Building H	25,000 GSF	125 Con
Building I	27,500 GSF	138 Con
Totals	250,000 GSF	1,251 Con



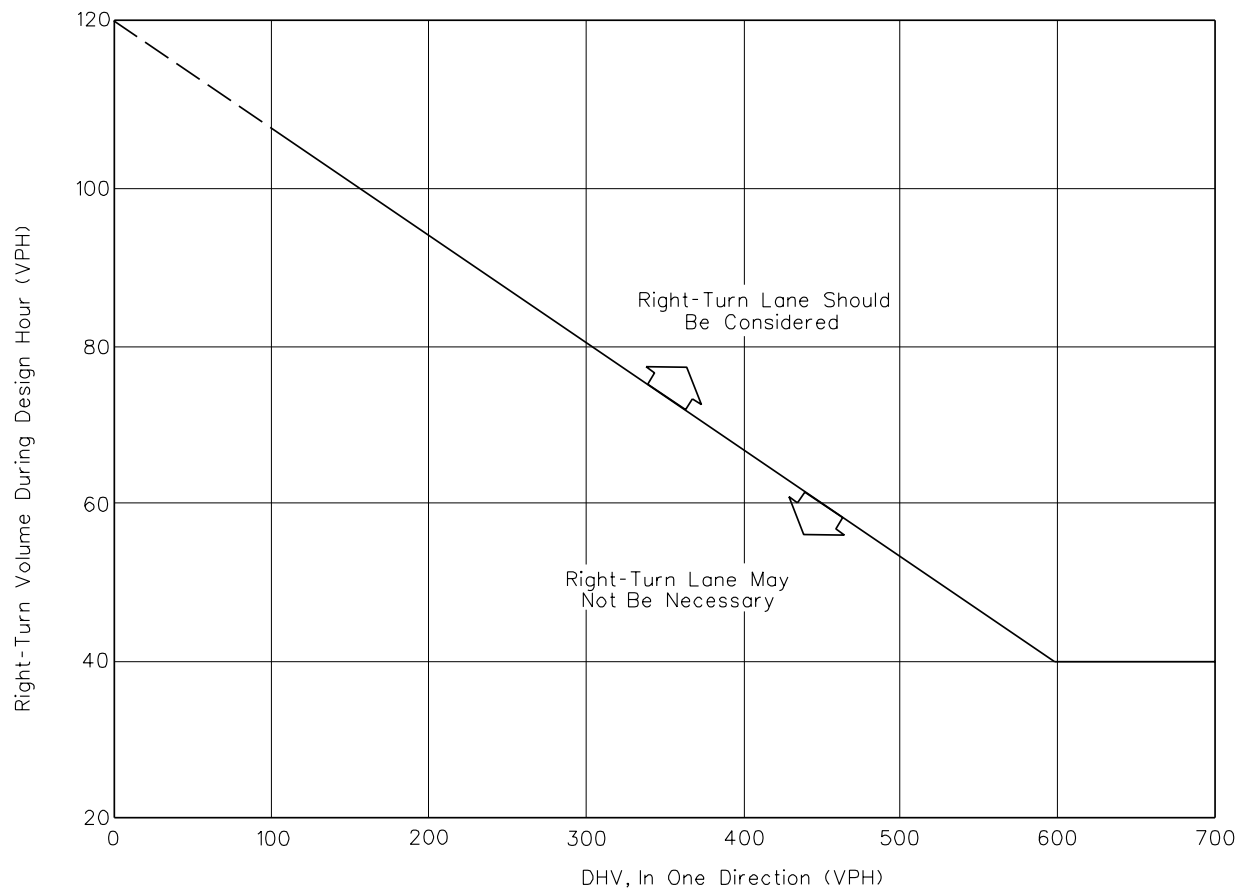
LINCOLN AVE. - INTERSTATE 64 OFFICE PARK
ILLINOIS
O'FALLON





VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON TWO-LANE HIGHWAYS (40 mph Design Speed)

Figure 36-3G



Note: For highways with a design speed below 50 mph (80 km/h), with a DHV in one direction of less than 300, and where right turns are greater than 40, an adjustment should be used. To read the vertical axis of the chart, subtract 20 from the actual number of right turns.

Example

Given: Design Speed = 35 mph (60 km/h)
 DHV (in one direction) = 250 vph
 Right Turns = 100 vph

Problem: Determine if a right-turn lane is warranted.

Solution: To read the vertical axis, use $100 - 20 = 80$ vph. The figure indicates that right-turn lane is not necessary, unless other factors (e.g., high crash rate) indicate a lane is needed.

GUIDELINES FOR RIGHT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON TWO-LANE HIGHWAYS

Figure 36-3A