



CITY of NOVI CITY COUNCIL

Agenda Item C
July 22, 2013

SUBJECT: Approval to award an engineering services agreement with URS Corporation for design engineering services related to the Westbound Grand River at Beck Right Turn Lane Extension Project in the amount of \$13,190.

SUBMITTING DEPARTMENT: Department of Public Services, Engineering Division ^{PA} *BLC*

CITY MANAGER APPROVAL: *[Signature]*

EXPENDITURE REQUIRED	\$ 13,190
AMOUNT BUDGETED	\$ 24,000
LINE ITEM NUMBER	204-204.00-805.623

BACKGROUND INFORMATION:

A traffic analysis was completed by Birchler Arroyo in December 2011 to study the traffic and crash history of the Grand River Avenue and Beck Road intersection. The study recommends that the existing right turn lane for westbound Grand River Avenue to northbound Beck Road be extended several hundred feet to increase the capacity of the intersection. This project would alleviate the traffic back-ups that occur for westbound Grand River during the afternoon peak hours. The project has received a federal congestion mitigation/air quality (CMAQ) improvement grant for 2014 construction. The grant covers 80% of the construction cost with the remaining construction and all of the engineering and right-of-way costs to be the City's responsibility. The City's share of the project costs was included in the approved FY2013-14 budget. The study and a map of the area are attached for reference.

URS' engineering fees are based on the fixed fee schedule established in the Agreement for Professional Engineering Services for Public Projects. The design fees for this project will be \$12,190 (10.6% of the estimated construction cost of \$115,000), plus an additional \$1,000 to delineate the wetlands adjacent to this project, for a total design fee of \$13,190. The construction phase engineering fees will be awarded at the time of construction award and will be based on the contractor's bid price and the fee percentage established in the Agreement for Professional Engineering Services for Public Projects. A draft of the Supplemental Professional Engineering Services Agreement for this project is enclosed and includes the project scope and schedule.

The project will require an easement from the adjacent property owner and a permit for the wetland impact. It is anticipated that the project would be ready for construction in summer 2014.

RECOMMENDED ACTION: Approval to award an engineering services agreement with URS Corporation for design engineering services related to the Westbound Grand River at Beck Right Turn Lane Extension Project in the amount of \$13,190.

	1	2	Y	N
Mayor Gatt				
Mayor Pro Tem Staudt				
Council Member Casey				
Council Member Fischer				

	1	2	Y	N
Council Member Margolis				
Council Member Mutch				
Council Member Wrobel				

Grand River/Beck Right Turn Lane Extension

Westbound Grand River Ave at Beck Rd



Map Author: Croy
Date: 7/9/2013
Project: GR/Beck RT Trn Lane Ext
Version #: v1.0



1 inch = 250 feet



City of Novi
Engineering Division
Department of Public Services
26300 Lee BeGole Drive
Novi, MI 48375
cityofnovi.org

MAP INTERPRETATION NOTICE

Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and use the most recent, accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.

SUPPLEMENTAL PROFESSIONAL ENGINEERING SERVICES AGREEMENT

**WESTBOUND GRAND RIVER AT BECK RIGHT TURN
LANE EXTENSION PROJECT**

This Agreement shall be considered as made and entered into as of the date of the last signature hereon, and is between the City of Novi, 45175 W. Ten Mile Road, Novi, MI 48375-3024, hereafter, "City," and URS Corporation – Great Lakes., whose address is 27777 Franklin Road, Suite 2000, Southfield, MI 48034, hereafter, "Consultant."

RECITALS:

This Agreement shall be supplemental to, and hereby incorporates the terms and conditions of the AGREEMENT FOR PROFESSIONAL ENGINEERING SERVICES FOR PUBLIC PROJECTS, and attached exhibits, entered into between the City and the Consultant on December 17, 2012.

The project includes the design and the preparation of plans and specifications for the extension of the westbound right turn lane on Grand River Avenue at Beck Road. Plans shall be prepared in accordance with MDOT Local Agency Program requirements. This project includes delineation of the wetland adjacent to the project area.

NOW, THEREFORE, in consideration of the foregoing, the City and Consultant agree as follows:

Section 1. Professional Engineering Services.

For and in consideration of payment by the City as provided under the "Payment for Engineering Services" section of this Agreement, Consultant shall perform the work described in the manner provided or required by the following Scope of Services, which is attached to and made a part of this Agreement as Exhibit A, all of said services to be done in a competent, efficient, timely, good and workmanlike manner and in compliance with all terms and conditions of this Agreement.

Exhibit A Scope of Services

Section 2. Payment for Professional Engineering Services.

1. Basic Fee.

- a. Design Phase Services: The Consultant shall complete the design phase services as described herein for a lump sum fee of \$12,190, which is 10.6% of the estimated construction cost (\$115,000) as indicated on the Design and Construction Engineering Fee Curve.

- b. Wetland Delineation and Impact Evaluation: The Consultant shall delineate the wetland adjacent to the project for a lump sum fee of \$1,000, as indicated in the attached Scope of Services.
- c. Construction Phase Services will be awarded at the time of construction award, should it occur.

2. Payment Schedule for Professional Engineering Services Fee.

Consultant shall submit monthly statements for professional engineering services rendered. The statements shall be based on Consultant's estimate of the proportion of the total services actually completed for each task at the time of billing. The City shall confirm the correctness of such estimates, and may use the City's own engineer for such purposes. The monthly statements should be accompanied by such properly completed reporting forms and such other evidence of progress as may be required by the City. Upon such confirmation, the City shall pay the amount owed within 30 days.

Final billing under this agreement shall be submitted in a timely manner but not later than three (3) months after completion of the services. Billings for work submitted later than three (3) months after completion of services will not be paid. Final payment will be made upon completion of audit by the City.

3. Payment Schedule for Expenses.

All expenses required to complete the scope of services described herein, including but not limited to costs related to mileage, vehicles, reproduction, computer use, etc., shall be included in the basic fee and shall not be paid separately. However, as compensation for expenses that are not included in the standard scope of services, when incurred in direct connection with the project, and approved by the City, the City shall pay the Consultant its actual cost times a factor of 1.15.

Section 4. Ownership of Plans and Documents; Records.

1. Upon completion or termination of this agreement, all documents prepared by the Consultant, including tracings, drawings, estimates, specifications, field notes, investigations, studies, etc., as instruments of service shall become the property of the City.

2. The City shall make copies, for the use of the Consultant, of all of its maps, records, laboratory tests, or other data pertinent to the work to be performed by the Consultant under this Agreement, and also make available any other maps, records, or other materials available to the City from any other public agency or body.

3. The Consultant shall furnish to the City, copies of all maps, records, field notes, and soil tests that were developed in the course of work for the City and for which compensation has been received by the Consultant.

Section 5. Termination.

1. This Agreement may be terminated by either party upon 7- days' prior written notice to the other party in the event of substantial failure by the other party to fulfill its obligations under this agreement through no fault of the terminating party.

2. This Agreement may be terminated by the City for its convenience upon 90 days' prior written notice to the Consultant.

3. In the event of termination, as provided in this Article, the Consultant shall be paid as compensation in full for services performed to the date of that termination, an amount calculated in accordance with Section 2 of this Agreement. Such amount shall be paid by the City upon the Consultant's delivering or otherwise making available to the City, all data, drawings, specifications, reports, estimates, summaries, and that other information and materials as may have been accumulated by the Consultant in performing the services included in this Agreement, whether completed or in progress.

Section 6. Disclosure.

The Consultant affirms that it has not made or agreed to make any valuable gift whether in the form of service, loan, thing, or promise to any person or any of the person's immediate family, having the duty to recommend, the right to vote upon, or any other direct influence on the selection of consultants to provide professional engineering services to the City within the two years preceding the execution of this Agreement. A campaign contribution, as defined by Michigan law shall not be considered as a valuable gift for the purposes of this Agreement.

Section 7. Insurance Requirements.

1. The Consultant shall maintain at its expense during the term of this Agreement, the following insurance:

- A. Worker's Compensation insurance relative to all Personnel engaged in performing services pursuant to this Agreement, with coverage not less than that required by applicable law.
- B. Comprehensive General Liability insurance with maximum bodily injury limits of \$1,000,000 (One Million Dollars) each occurrence and/or aggregate and minimum Property Damage limits of \$1,000,000 (One Million Dollars) each occurrence and/or aggregate.
- C. Automotive Liability insurance covering all owned, hired, and non-owned vehicles with Personal Protection insurance to comply with the provisions of the Michigan No Fault Insurance Law including Residual Liability insurance with minimum bodily injury limits of \$1,000,000 (One Million Dollars) each occurrence and/or aggregate minimum property damage limits of \$1,000,000 (One Million Dollars) each occurrence and/or aggregate.
- D. The Consultant shall provide proof of Professional Liability coverage in the amount of not less than \$1,000,000 (One Million Dollars) per claim and/or aggregate, and Environmental Impairment coverage. The retroactive date indicated on the policy shall either be unlimited, or, shall be the date that the Consultant established its initial coverage.

In the event that Consultant is sold or dissolved, Consultant shall provide purchase, at its expense, a "tail" or extended reporting period for the professional liability coverage for a period not less than 5 years.

2. The Consultant shall be responsible for payment of all deductibles contained in any insurance required hereunder.

3. If during the term of this Agreement changed conditions or other pertinent factors should in the reasonable judgment of the City render inadequate insurance limits, the Consultant will furnish on demand such additional coverage as may reasonably be required under the circumstances. All such insurance shall be effected at the Consultant's expense, under valid and enforceable policies, issued by the insurers of recognized responsibility which are well-rated by national rating organizations and are acceptable to the City.

4. All policies shall name the Consultant as the insured and shall be accompanied by a commitment from the insurer that such policies shall not be canceled or reduced without at least thirty (30) days prior notice to the City.

With the exception of professional liability, all insurance policies shall name the City of Novi, its officers, agents, and employees as additional insured. Certificates of Insurance evidencing such coverage shall be submitted to Sue Morianti, Purchasing Manager, City of Novi, 45175 West Ten Mile Road, Novi, MI 48375-3024 prior to commencement of performance under this Agreement and at least fifteen (15) days prior to the expiration dates of expiring policies.

5. If any work is sublet in connection with this Agreement, the Consultant shall require each subconsultant to effect and maintain at least the same types and limits of insurance as fixed for the Consultant.

6. The provisions requiring the Consultant to carry said insurance shall not be construed in any manner as waiving or restricting the liability of the Consultant under this Agreement.

Section 8. Indemnity and Hold Harmless.

A. The Consultant agrees to hold harmless and indemnify the City, its officers, agents, employees from and against all claims, demands, suits liability, losses, damages or costs (including reasonable attorney fees and costs) arising out, of or resulting from the Consultant's tortious or negligent acts, errors, or omissions in performing this Agreement.

B. The City agrees, to the extent permitted by law, to indemnify and hold harmless the Consultant, its officers, partners, employees, stockholders, and sub-consultants (collectively Consultant) from and against any and all claims, suits, demands, liability, losses, damages or costs, including reasonable attorney's fees and costs arising out of or resulting from the City's tortious or negligent acts or errors in performing this Agreement.

C. Section 8(B) of this Agreement shall not apply to individual design and/or construction management projects.

The Consultant agrees that it is its responsibility and not the responsibility of the City to safeguard the property and materials used in performing this Agreement. Further, this Consultant agrees to hold the City harmless for any loss of such property and materials used pursuant to the Consultant's performance under this Agreement.

Section 9. Nondiscrimination.

The Consultant shall not discriminate against any employee, or applicant for employment because of race, color, sex, age or handicap, religion, ancestry, marital status, national origin, place of birth, or sexual preference. The Consultant further covenants that it will comply with the Civil Rights Act of 1973, as amended; and the Michigan Civil Rights Act of 1976 (78. Stat. 252 and 1976 PA 4563) and will require a similar covenant on the part of any consultant or subconsultant employed in the performance of this Agreement.

Section 10. Applicable Law.

This Agreement is to be governed by the laws of the State of Michigan and the City of Novi Charter and Ordinances.

Section 11. Approval; No Release.

Approval of the City shall not constitute nor be deemed release of the responsibility and liability of Consultant, its employees, associates, agents and subconsultants for the accuracy and competency of their designs, working drawings, and specifications, or other documents and services; nor shall that approval be deemed to be an assumption of that responsibility by the City for any defect in the designs, working drawings and specifications or other documents prepared by Consultant, its employees, subconsultants, and agents.

After acceptance of final plans and special provisions by the City, Consultant agrees, prior to and during the construction of this project, to perform those engineering services as may be required by City to correct errors or omissions on the original plans prepared by Consultant and to change the original design as required.

Section 12. Compliance With Laws.

This Contract and all of Consultants professional services and practices shall be subject to all applicable state, federal and local laws, rules or regulations, including without limitation, those which apply because the City is a public governmental agency or body. Consultant represents that it is in compliance with all such laws and eligible and qualified to enter into this Agreement.

Section 13. Notices.

Written notices under this Agreement shall be given to the parties at their addresses on page one by personal or registered mail delivery to the attention of the following persons:

City: Rob Hayes, P.E., Director of Public Services and Maryanne
Cornelius, Clerk, with a copy to Thomas R. Schultz, City Attorney

Consultant: Jan M. Hauser, P.E., Vice President Water/Wastewater

Section 14. Waivers.

No waiver of any term or condition of this Agreement shall be binding and effective unless in writing and signed by all parties, with any such waiver being limited to that circumstance only and not applicable to subsequent actions or events.

Section 15. Inspections, Notices, and Remedies Regarding Work.

During the performance of the professional services by Consultant, City shall have the right to inspect the services and its progress to assure that it complies with this Agreement. If such inspections reveal a defect in the work performed or other default in this Agreement, City shall provide Consultant with written notice to correct the defect or default within a specified number of days of the notice. Upon receiving such a notice, Consultant shall correct the specified defects or defaults within the time specified. Upon a failure to do so, the City may terminate this Agreement by written notice and finish the work through whatever method it deems appropriate, with the cost in doing so being a valid claim and charge against Consultant; or, the City may preserve the claims of defects or defaults without termination by written notice to Consultant.

All questions which may arise as to the quality and acceptability of work, the manner of performance and rate of progress of the work, and the interpretation of plans and specifications shall be decided by the City. All questions as to the satisfactory and acceptable fulfillment of the terms of this agreement shall be decided by the City.

Section 16. Delays.

No charges or claims for damages shall be made by the Consultant for delays or hindrances from any cause whatsoever during the progress of any portions of the services specified in this agreement, except as hereinafter provided.

In case of a substantial delay on the part of the City in providing to the Consultant either the necessary information or approval to proceed with the work, resulting, through no fault of the Consultant, in delays of such extent as to require the Consultant to perform its work under changed conditions not contemplated by the parties, the City will consider supplemental compensation limited to increased costs incurred as a direct result of such delays. Any claim for supplemental compensation must be in writing and accompanied by substantiating data.

When delays are caused by circumstances or conditions beyond the control of the Consultant as determined by the City, the Consultant shall be granted an extension of time for such reasonable period as may be mutually agreed upon between the parties, it being understood, however, that the permitting of the Consultant to proceed to complete the services, or any part of them, after the date to which the time of completion may have been extended, shall in no way operate as a waiver on the part of the City of any of its rights herein set forth.

Section 17. Assignment.

No portion of the project work, heretofore defined, shall be sublet, assigned, or otherwise disposed of except as herein provided or with the prior written consent of the City. Consent to sublet, assign, or otherwise dispose of any portion of the services shall not be construed to relieve the Consultant of any responsibility for the fulfillment of this agreement.

Section 18. Dispute Resolution.

The parties agree to try to resolve any disputes as to professional engineering services or otherwise in good faith. In the event that the parties cannot resolve any reasonable dispute, the parties agree to seek alternative dispute resolution methods agreeable to both parties and which are legally permissive at the time of the dispute. The parties agree to use their best efforts to resolve any good faith dispute within 90 (ninety) days notice to the other party. In the event the parties cannot resolve that dispute as set forth above, they may seek such remedies as may be permitted by law.

WITNESSES

URS Corporation – Great Lakes

By: Jan M. Hauser
Its: Vice President

The foregoing _____ was acknowledged before me this ____ day of _____,
20____, by _____ on behalf of _____
_____.

Notary Public

_____ County, Michigan

My Commission Expires: _____

WITNESSES

CITY OF NOVI

By:
Its:

The foregoing _____ was acknowledged before me this ____ day of _____, 20____,
by _____ on behalf of the City of Novi.

Notary Public
Oakland County, Michigan
My Commission Expires: _____

DRAFT

EXHIBIT A - SCOPE OF SERVICES

Consultant shall provide the City professional engineering services in all phases of the Project to which this Agreement applies as hereinafter provided. These services will include serving as the City's professional engineering representative for the Project, providing professional engineering consultation and advice and furnishing customary civil, structural, mechanical and electrical engineering services and customary engineering services incidental thereto, as described below.

A. Basic Services.

1. See attached.

B. Performance.

1. The Consultant agrees that, immediately upon the execution of this Agreement, it will enter upon the duties prescribed in this agreement, proceed with the work continuously, and make the various submittals on or before the dates specified in the attached schedule. The City is not liable and will not pay the Consultant for any services rendered before written authorization is received by the Consultant.
2. The Consultant shall submit, and the City shall review and approve a timeline for submission of plans and/or the completion of any other work required pursuant to this Scope of Services. The Consultant shall use its best efforts to comply with the schedule approved by the City.
3. If any delay is caused to the Consultant by order of the City to change the design or plans; or by failure of the city to designate right-of-way, or to supply or cause to be supplied any data not otherwise available to the Consultant that is required in performing the work described; or by other delays due to causes entirely beyond the control of the Consultant; then, in that event, the time schedules will be adjusted equitably in writing, as mutually agreed between the City and the Consultant at the moment a cause for delay occurs.
4. Since the work of the Consultant must be coordinated with the activities of the City (including firms employed by and governmental agencies and subdivisions working with the City), the Consultant shall advise the City in advance, of all meetings and conferences between the Consultant and any party, governmental agency, political subdivision, or third party which is necessary to the performance of the work of the Consultant.



July 11, 2013

Mr. Ben Croy, PE
City of Novi
Field Services Complex
26300 Delwal Drive
Novi, MI 48375

Reference: Grand River Ave./ Beck Rd. Right Turn Lane Extension

Dear Mr. Croy,

As requested, URS is pleased to submit this proposal for the above referenced project. The following tasks will be completed for the project:

Initial Meeting and Scope Verification

The intent of this task is to meet with the City and verify the limits and scope of work for the project. The need for and location of soil borings and pavement cores will also be discussed and determined at the scope verification meeting.

Upon completion of this task, the URS team will move forward with the surveying and preliminary design.

Survey and Base Plans

The intent of this task is to provide topographic survey and base mapping as needed for the proposed design work. A full topographic survey will be completed for the project area. Wetlands will be delineated by our environmental planners and the survey work will include picking up of the wetland flags.

After completion of the surveying work, URS will prepare base plans (30%-40% complete) to identify the major design features. These plans will also be used to further the utility investigation and resolution of potential conflicts and geotechnical investigations.

The base plans submittal will include the results of the survey information, utility information received as a result of our solicitations, wetland impact area, and a preliminary estimate.

URS will distribute the base plan design set to the utility companies that have indicated that they have facilities in the project area. URS will incorporate the additional information that utility companies provide into the plan set. On-site meetings may be necessary to further clarify coordination and clearance of particular underground utility facilities. The base plans will also be submitted to Geotechnical firms and proposals solicited for Soil Borings and a Geotechnical Report for the project, as required.

Preliminary Plans

Incorporating the information obtained from the above tasks, URS will prepare the preliminary plan set (90%) in accordance with City, Road Commission, and MDOT requirements. This submittal will include items such as the typical cross sections, materials/quantities and details. Soil boring logs will also be included and the results of the Geotechnical Investigation incorporated into the design. After review by the City, the preliminary plans will be forwarded to MDOT Local Agency Programs and scheduling of a Grade Inspection meeting requested. The



Mr. Ben Croy
July 11, 2013
Page 2

preliminary plan submittal will also include required Special Provisions and an estimate of cost. An MDEQ Permit will be prepared and submitted at this stage of work, if required. Plans and, if needed, a permit application will be forwarded to the Road Commission for Oakland County.

Final Plans and Proposal

Incorporating comments from the City, MDOT, and the Road Commission, URS will develop the final plans submittal, including the plan set, special provisions, and cost estimate.

Final Submittal

URS will respond to any final comments received from the City, Road Commission, and MDOT and submit the final package to MDOT for advertising. URS will also respond to any inquiries received from MDOT during the advertising phase.

Construction

URS will provide full time inspection, contract administration, and staking as required for the project and will solicit and coordinate the efforts of the Materials Testing firm hired for the construction phase.

Schedule

Upon notification to proceed, it is estimated that the following schedule could be maintained:

Scope Verification Meeting	August 8, 2013
Survey & Base Plans Submittal	October 1, 2013
Preliminary Plans Submittal	November 22, 2012
Grade Inspection Meeting	December 23, 2013
Final Plans Submittal to MDOT	January 23, 2014
Advertise for Bids (MDOT)	February 17, 2014
Bid Letting (MDOT)	April 7, 2014
Begin Construction	May 20, 2014
End Construction	June 30, 2014

Estimated Design Fees

The estimate of cost included in the CMAQ application and provided by the City for the project (\$115,000) was used to determine the design fees for the work.

DESIGN 10.6% of \$115,000=	\$12,190
WETLAND DELINEATION AND IMPACT EVALUATION =	\$ 1,000
TOTAL DESIGN FEE	\$13,190

The fee for construction phase services will be determined based upon the awarded contract cost.

The following assumptions were made in determining the design fee for the project.

- An MDEQ Permit may be required for impacts to wetlands and, if needed, the required minor permit application will be prepared. Wetland Mitigation plans, if required by MDEQ are not included but could be added if needed.



Mr. Ben Croy
July 11, 2013
Page 3

- Drainage improvements will be incorporated into the design as required to maintain existing drainage patterns. Detention ponds, if required or desired to improve drainage, are not included in the scope of services but could be added if desired.
- There is an existing right turn arrow signal for the westbound to northbound movement. Traffic signal work does not appear to be needed for the project and the design of signal improvements is not included.
- Geotechnical Investigation and Materials Testing work will be solicited by and the work coordinated by URS. Payment for the work will be by the City and is not included in the design fee.

Please contact our project manager Sean Kelsch if you have any questions or wish to discuss this submittal. .

Sincerely

URS Corporation -- Great Lakes

A handwritten signature in blue ink that reads "Jan M. Hauser".

Jan Hauser, PE
Vice President

A handwritten signature in blue ink that reads "Sean Kelsch".

Sean Kelsch, PE
Manager, Highway Engineering Services

MEMORANDUM



BIRCHLER ARROYO
ASSOCIATES, INC.

DATE: December 16, 2011

TO: Brian T. Coburn, P.E.
Nathan Bouvy
Engineering Division, City of Novi

FROM: Rodney L. Arroyo
William A. Stimpson, P.E.

SUBJECT: Grand River and Beck: Traffic Analysis of Extended WB Right-Turn-Only Lane

Birchler Arroyo Associates has completed both traffic modeling and crash analysis in support of the City's request for CMAQ funding to extend the existing westbound right-turn-only lane (see existing geometrics in Figures 1-2). This memo summarizes the study's recommendation and supporting analyses and findings.

Recommendations

The existing 175-ft-long westbound right-turn-only lane should be lengthened by 260 ft and equipped with a 150-ft-long entry taper. Since the lane extension will require at least a partial reconstruction of the bank driveway, the City should consider rebuilding the entire driveway to more effectively deter illegal entering and exiting left turns (a proposed driveway redesign has been provided you under separate cover).

Traffic Modeling

Data Collection – Due to the intersection's proximity to both the Suburban Collection Showplace and the I-96 / Beck Road interchange, traffic operations on any given day are sensitive to the level of activity at the Showplace. To investigate this sensitivity, we examined two days in late April 2011 – when there were no significant events at the Showplace – as well as two days in late October 2011 – when both the Testing Expo and Battery Show (with a combined total of up to 2,500 delegates attending) were underway. We also evaluated potential redesign requirements under the assumption that the movements most impacted by Showplace event traffic – the southbound left turn (for approaching traffic) and all westbound movements (for departing traffic) hypothetically could be as much as 20% higher than it was in October.

Lane-specific traffic counts from the SCATS signal system were obtained from the Road Commission for Oakland County. We have summarized RCOC's raw data in appendix Tables A-1 through A-4.

Since the curb lane on the eastbound and northbound approaches serves both through and right-turn traffic, the SCATS counts were split into through and right-turn movements based on the average splits observed in two previous sets of manual turning-movement counts (for the USA 2 Go impact study in February 2010 and for the Corradino study in April 2010). The resulting through and turning-movement volumes for the selected PM peak and late-AM off-peak analysis hours are summarized in appendix Tables B-1 through B-4, and the average hourly volumes are illustrated in Figures 3-6 (below).



Figure 1. Aerial Photo of Subject Intersection

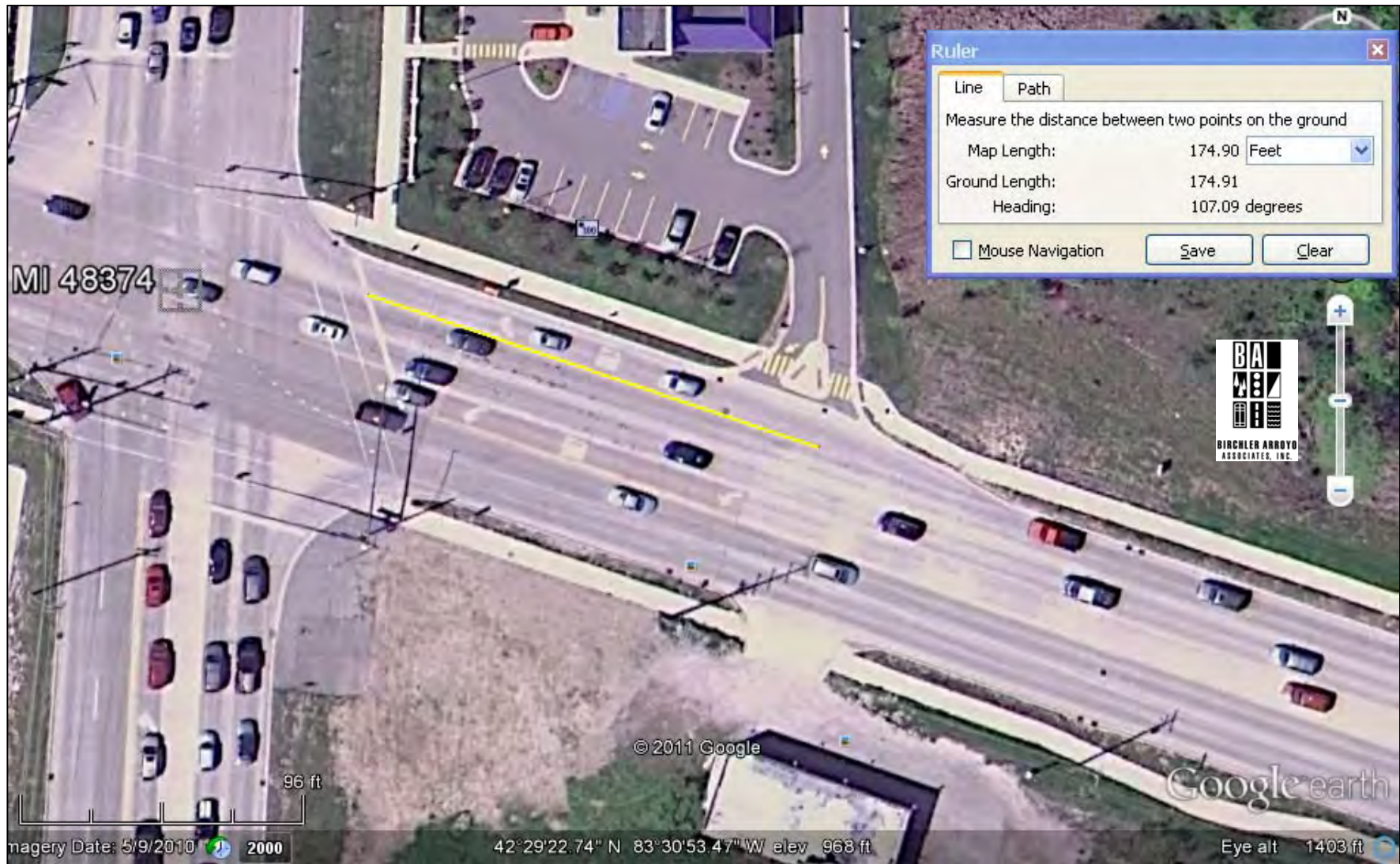


Figure 2. Aerial Photo of Subject Approach

Grand River & Beck
PM Peak Hour in April 2011

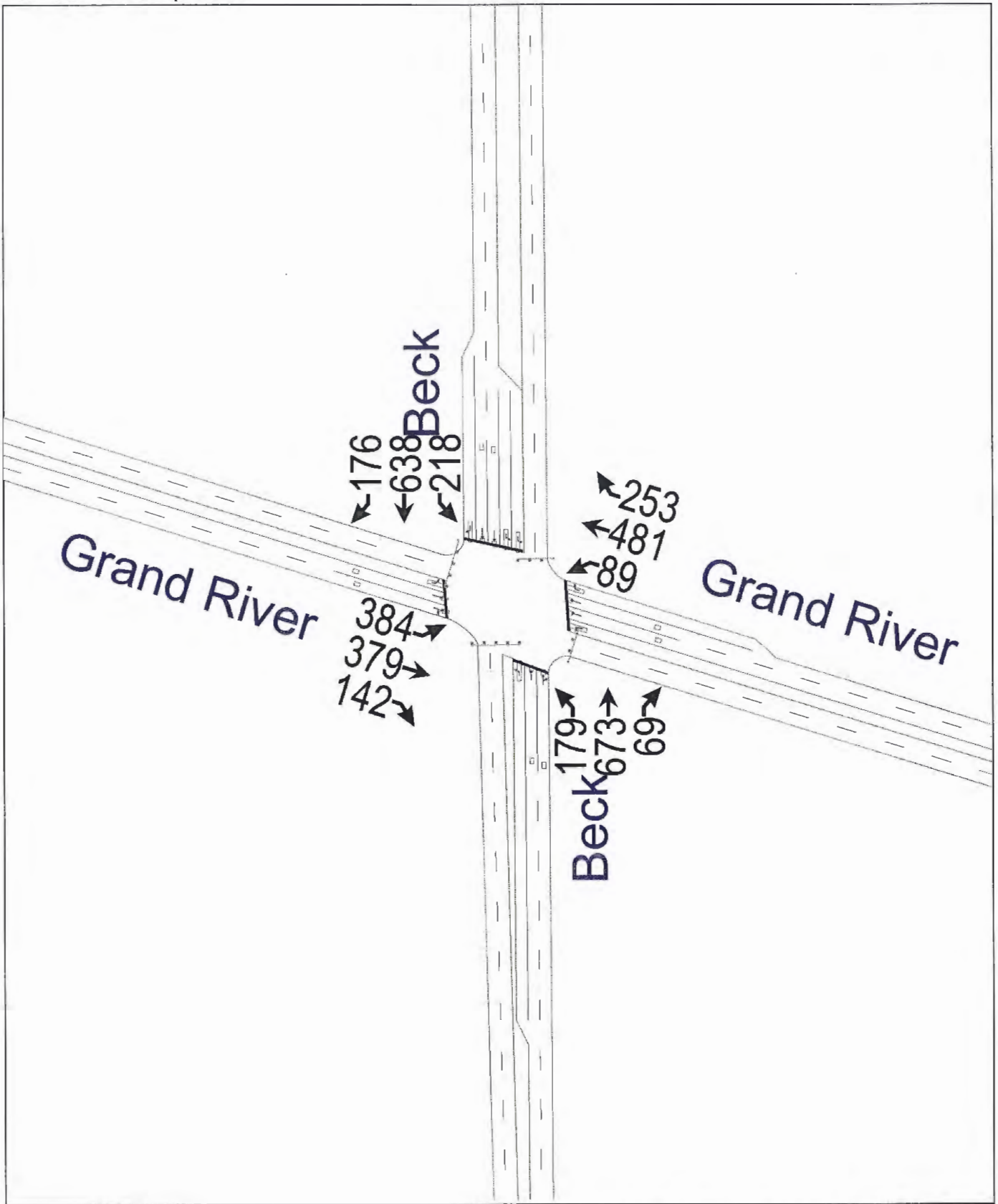


Figure 3. Peak-Hour Volumes in April 2011

Grand River & Beck
Late-AM Off-Peak Hour in April 2011

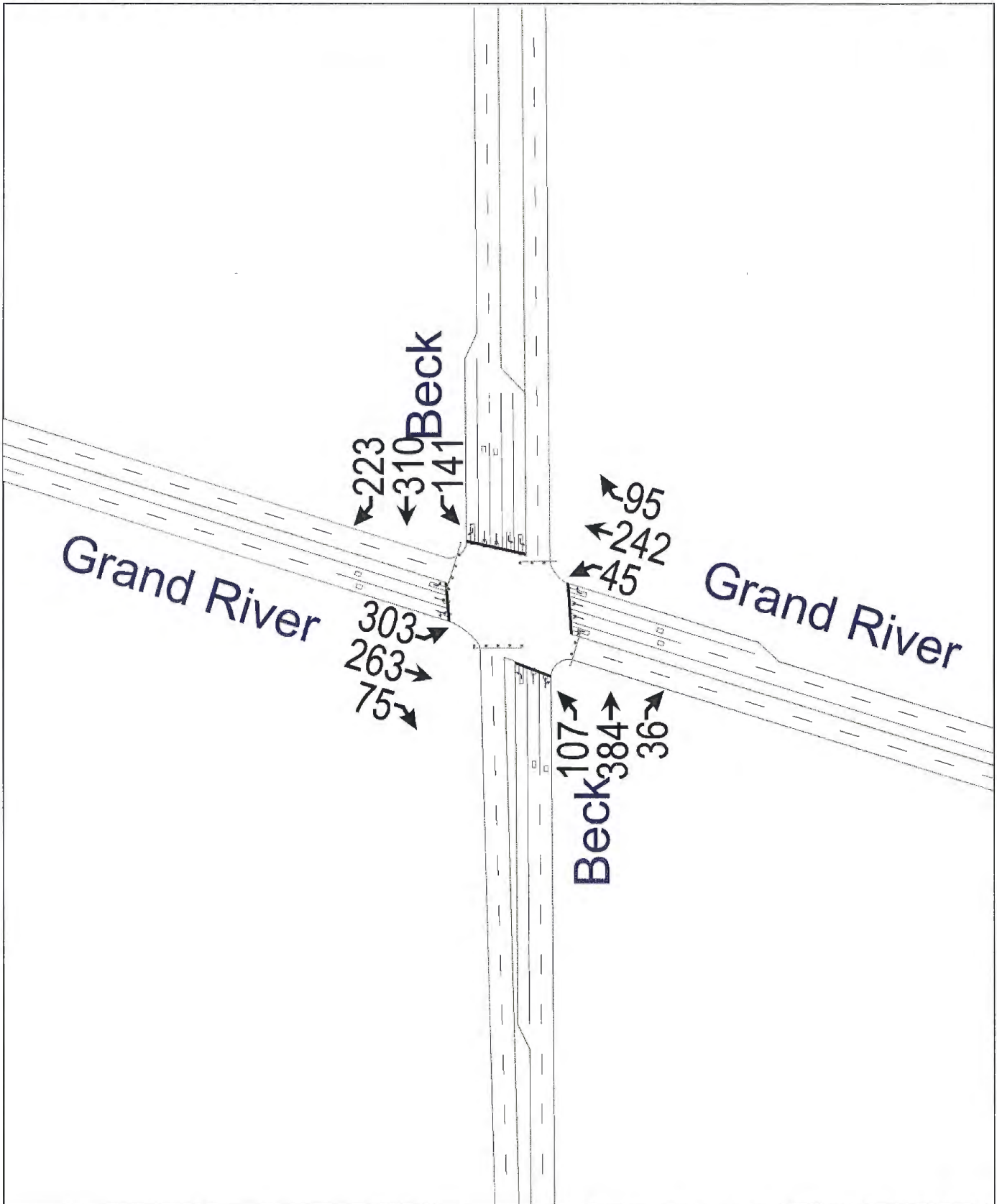


Figure 4. Off-Peak-Hour Volumes in April 2011

Grand River & Beck
PM Peak Hour in October 2011

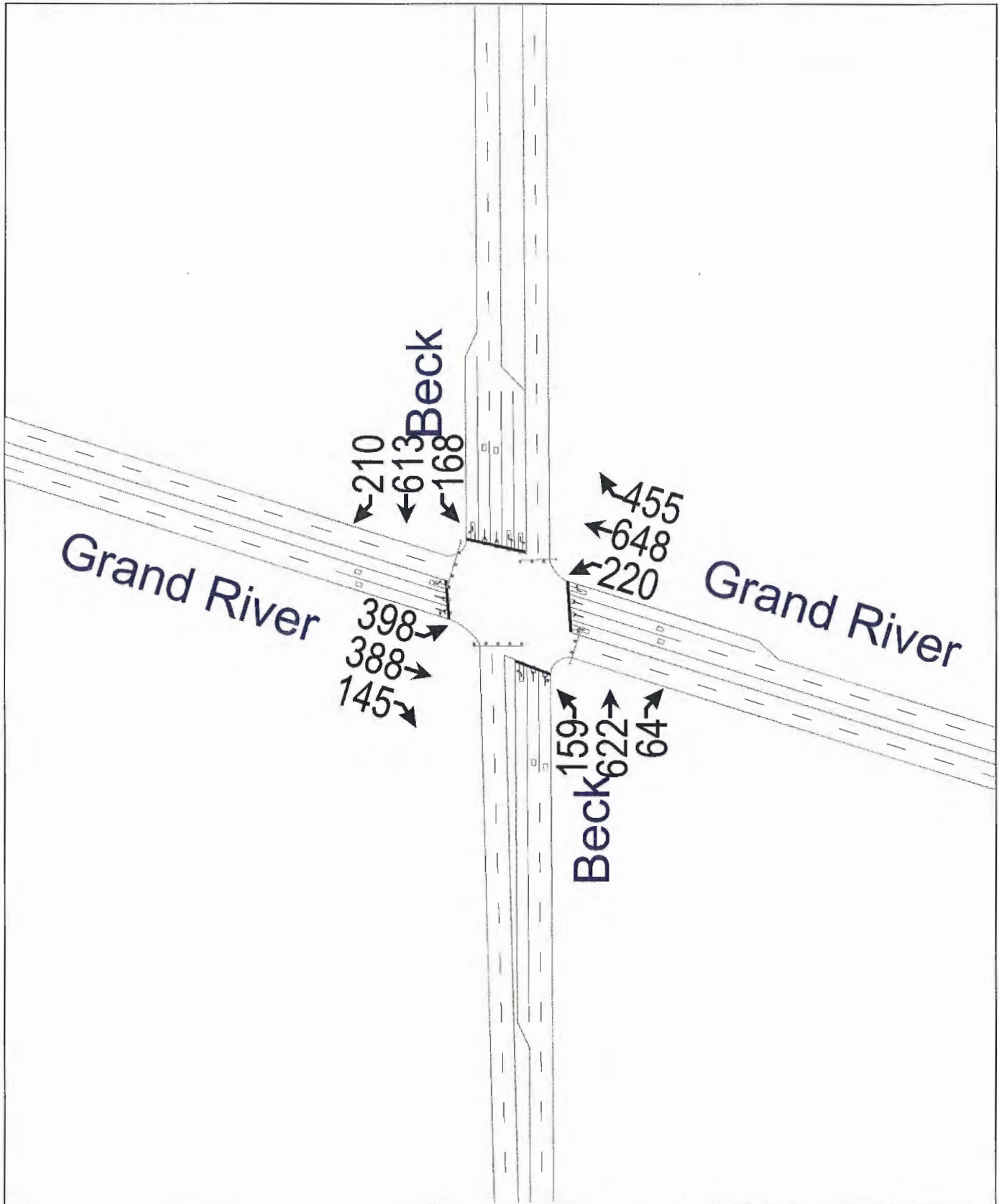


Figure 5. Peak-Hour Volumes in October 2011

Grand River & Beck
Late-AM Off-Peak Hour in October 2011

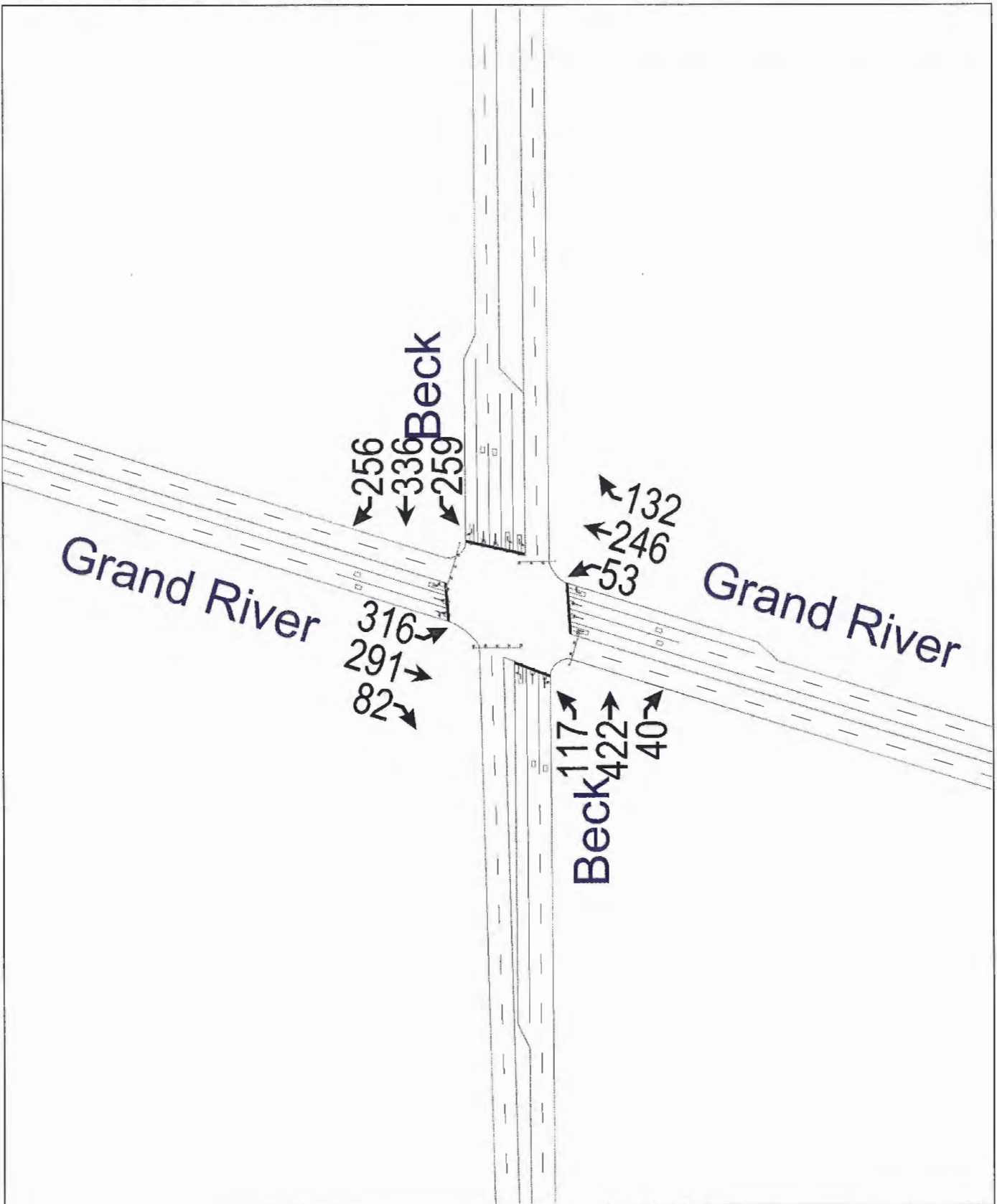


Figure 6. Off-Peak-Hour Volumes in October 2011

Also needed for the traffic modeling were the timing parameters for the existing fully-actuated (SCATS) signal operation; these were also obtained from RCOC. In addition, we measured the existing lengths of all dedicated turn lanes in the field; these included 175-ft and 185-ft-long right-turn-only lanes on the westbound and southbound approaches, respectively, and 350-ft and 150-ft-long left-turn-only lanes on the northbound and southbound approaches, respectively (the latter being dual). The left-turn lanes on the eastbound and westbound approaches were considered as long as the link coded in the traffic model (600 ft), since the dedicated left-turn lane in each case transitions to a two-way left-turn lane generally available to left turns approaching the signal during the busiest times.

Modeling Methodology – The above information was input to our Synchro 7 / SimTraffic software. Synchro 7 provides macroscopic analysis based on nationally recognized methodology found in the *Highway Capacity Manual (HCM)*. Synchro also serves as the input platform for SimTraffic, a more detailed traffic simulation/analysis application. Synchro typically is relied upon for estimating average delay per vehicle and the associated level of service (on a grading scale of A-F), for individual movements, approaches, and the overall intersection. SimTraffic – on the other hand – creates an animated view of traffic moving through the intersection, typically provides more realistic estimates of vehicle queuing, and gives outputs relevant to an environmental assessment, such as average speed.

Modeling Results – Included in Appendix C of this report are selected Synchro and SimTraffic printouts for existing traffic conditions. Grouped by analysis hour (PM peak v. late-AM off-peak) and timeframe (average day in late April 2011 v. average day in late October 2011) are the following output pages:

- ❑ Synchro's "HCM Signals" analysis summary, providing numerous input and output variables, among them volume and capacity by movement, key signal timing values (such as clearance intervals), average delay, and level of service.
- ❑ SimTraffic's "Performance Report" for the "Entire Run." To improve the realism of the simulation, it was repeated three times using different random number "seeds"; the average results from the three iterations are provided on this page. The most important single output is average speed, pre-selected to be reported by movement, from which we manually computed a weighted-average speed for the westbound approach (see handwritten annotation).
- ❑ SimTraffic's "Queuing and Blocking Report" for "All Intervals" (equivalent to the Entire Run). Of greatest interest is the Maximum Queue length observed during the simulation.

Table 1 (on the next page) summarizes key results of the traffic modeling.

Length of Extended Right-Turn Lane and Taper – To ensure unimpeded access to the future westbound right-turn lane, mitigated conditions were modeled assuming a 310-ft extension of the existing lane. This would be the maximum feasible extension given existing and planned road conditions (it would bring the upstream end of an assumed 100-ft-long entry taper to within 100 ft of the exiting curb return of a planned new side street; by ordinance, 100 ft is the minimum distance permitted between tapers). However, the simulation results in Table 1 suggest that a 260-ft extension of the existing right-turn-only lane would be adequate and appropriate, reasoned as follows:

Table 1. Key Results of Traffic Modeling

Analysis Month	Analysis Hour	Westbound Approach			Westbound Right Turns		
		Volume (veh)	Avg Speed (mph)	Maximum Queue (ft) ¹	Volume (veh)	Avg Speed (mph)	Maximum Queue (ft)
Existing Conditions							
April 2011	Peak	823	7.6	360	253	13	200
	Off-Peak	382	10.5	95	95	19	64
October 2011	Peak	1323	6.4	545	455	9	200
	Off-Peak	431	10.8	138	132	18	49
With Amply Extended WB Right-Turn-Only Lane							
April 2011	Peak	823	8.8	331	253	15	136
	Off-Peak	382	10.7	95	95	20	64
October 2011	Peak	1323	7.9	357	455	13	239
	Off-Peak	431	11.1	139	132	19	47
Oct 2011 Expanded ²	Peak	1588	-	420	546	-	305
	Off-Peak	-	-	-	-	-	-

¹ The longer queue within the two through-traffic lanes, which would have to be cleared by vehicles intending to turn right, if the latter are to be unimpeded in their access to the right-turn-only lane (volume and speed are for all approach movements combined, however).

² Assuming additional event traffic increases the SB left and WB approach volumes by 20%.

- ❑ Access to the right-turn lane would generally not be impeded by stopped westbound through traffic if the right-turn lane extended east to a point defined by through traffic's "Maximum Queue." Per Table 1, the modeling predicted the worst-case Maximum Queue to be 357 ft long for the mitigated October peak hour and 420 ft long for the mitigated October peak hour with selected movement volumes hypothetically increased by 20% (bolded values).
- ❑ Scaled along the south edge of the westbound right-turn lane, it appears that that lane extends about 18 ft closer to the intersection than the westbound inner through lane. Hence, to conservatively satisfy the preceding objective, the right-turn lane would have to be at least (357+18=) 375 ft long or – preferably – (420+18=) 438 ft long. This indicates a minimum lane lengthening of (375-175=) 200 ft and a preferred lane lengthening of (438-175=) 263 ft.
- ❑ Given the 50-mph speed limit on Grand River, the entry taper for the westbound right-turn lane should be significantly longer than the existing 75-ft taper. The RCOC's maximum standard entry taper of 150 ft should be used.
- ❑ In summary – given the simulation findings and the 410 ft available between the existing right-turn lane and the easternmost point at which improvements should end relative to the future side street – it would be appropriate to extend the existing lane 260 ft and equip it with a 150-ft-long entry taper.

Unimpeded access to the right-turn-only lane would:

- ❑ Maximize use of the signal's right-turn overlap (where this movement is provided a green arrow simultaneous with those displayed to southbound left-turn traffic), or alternatively – when the overlap arrow is not displayed – maximize the use of right-turn-on-red. Expediting right-turn traffic at the stop bar reduces motorist delay and the associated fuel use and emissions.
- ❑ Shorten the queue lengths in the through lanes by removing right-turn traffic earlier. As can be seen in Table 1, this reduction would be especially notable in the October peak hour (with its maximum predicted through-traffic queues of 357 ft mitigated v. 545 ft unmitigated).
- ❑ Minimize conflicts and potential crashes between right-turn and through traffic.

As can be seen in Figures 1-2, extending the existing right-turn lane would provide a deceleration lane for the bank driveway. It would also provide an opportunity to reconstruct the bank driveway to more effectively deter entering and exiting left turns (the existing curb returns and island are too small, and numerous violations of the signed turn restrictions have been observed).

Emissions Worksheets

Following on the next four pages are partially completed Emissions Worksheets for the April 2011 and October 2011 traffic conditions simulated (two pages for each timeframe). Electronic versions will be emailed to you so that you can complete lines 23 and 24 with respect to project design life and cost. To comply with the expected evaluation process, you may have to select one scenario (April or October) or the other to include in your application.

Evaluation of Crash History

As documented in a recent report for the City of Novi (now in draft form), our application of methodology found in the *SEMCOG Traffic Safety Manual – 2nd Edition* found that over the years 2006-2010, the intersection of Grand River and Beck was a High-Crash Intersection (i.e., its overall crash rate was significantly higher than the average rate for comparable intersections in Southeast Michigan). It is reasonable to conclude that a physical improvement of the type proposed in this CMAQ application, by improving traffic flow, will also improve safety at an intersection clearly in need of crash mitigation.

Individual (UD-10) reports were obtained and reviewed for all 2006-2010 crashes involving at least one westbound vehicle. The resulting 34 crashes are summarized in Table 2 (below, following the Emissions Worksheets). As can be seen, the 14 rear-end crashes tied with angle crashes as the most predominate (at 41% of the total), and it appears that at least four crashes (those in shaded rows) involved the westbound right-turn lane or attempted entry to that lane.

Table 2. Summary of 2006-2010 Crashes at Grand River and Beck Involving at Least One Westbound Vehicle

Year	Date	Time	Distance from Beck Rd	Crash Type						Crash Severity (# Persons)					Contributing Factors / Comments
				Angle	Head-On	Sideswipe		Rear-End	Single-Vehicle	Fatal	Personal Injury			Property Damage Only	
						Opposite Direction	Same Direction				A	B	C		
2010 (3)	06/25	17:43	10' E					WB						2	In RT pocket; V#2 stopped for bicyclist
	05/30	02:38	0'	WB-NB										5	V#1 failed to yield while making RTOR
	03/08	07:51	75' E					WB						2	In inner thru lane; V#2 stopped for yellow
2009 (6)	12/28	16:45	100' E					WB						2	D#1 foot slipped from brake to gas; snow
	12/17	15:46	20' E					WB						2	D#1 thought V#2 was making a RTOR
	10/02	06:38	200' W		WB-EB									1	In LT lane; V#2 unoccupied; dark & rainy
	09/25	18:12	20' E					WB				1		1	V#2 slowing for red, rear-ended in RT In
	06/05	17:45	100' E					WB						4	3-veh crash in outer thru lane; hit rt-rear
	01/24	13:20	40' E					WB						2	Both waiting to turn right; V#1 started 1 st
2008 (6)	08/29	13:40	50' E					WB						2	V#1 changing from right to left thru lane
	05/09	22:13	0'	WB-EBL										2	V#1 ran red, into V#2 turning on green
	04/05	19:12	0'	WBT-SBL								2		7	V#2 started on red as V#2 started on grn
	03/12	15:22	50' W					WB						2	V#2 probably slowing for driveway
	03/05	17:14	100' E					WB						2	Stopped V#2 not entirely in RT lane
	02/02	23:45	0'	SB-NBL										3	SB V#1 ran red; UD-10 narrative illegible
2007 (9)	10/25	15:30	100' E					WB						2	Apparently in RT lane; causation unclear
	10/01	10:08	0'	SB-NBL										4	SB V#1 ran red; V#2 had green arrow
	08/25	18:47	200' W	SB-WB										2	V#1 pulling out of driveway west of Beck

Table 2. Summary of 2006-2010 Crashes at Grand River and Beck Involving at Least One Westbound Vehicle, cont'd

Year	Date	Time	Distance from Meadowbrook	Crash Type						Crash Severity (# Persons)					Contributing Factors / Comments
				Angle	Head-On	Sideswipe		Rear-End	Single-Vehicle	Fatal	Personal Injury			Property Damage Only	
						Opposite Direction	Same Direction				A	B	C		
2007	07/08	18:00	50' E					WB						3	89-yr-old D#1 unable to stop; not RT lane
	05/18	23:01	0'	WB-SB										3	V#1, WB thru, ran red light
	03/03	10:52	0'	WBL-EB										2	V#1, LT on flashing red and didn't yield
	02/27	21:14	0'	WB-SB										2	V#1, WB thru, ran red light
	02/13	17:30	60' E			NBR-WB					2			2	V#1, RT too fast on snow, 2 WB veh hit
	01/24	09:58	0'	EBL-WB							3			1	LT hit by WBT; latter rebounded into V#3
2006 (10)	10/21	00:04	0'	EBL-WB							1	1	1	1	V#1, LT on flashing red and didn't yield
	09/29	20:18	0'	EBL-WB										5	WB V#1 ran light; V#2 had green arrow
	09/12	19:03	200' E				WB							2	V#1 changing from inner to outer thru ln
	09/04	21:15	0'					WB						5	V#1 didn't stop for V#2,#3; lane unclear
	08/19	05:38	0'						WB					1	Too fast / wet; slid into curb, NW corner
	05/06	13:55	20' E					WB						4	V#2 changed lanes, then signal changed
	04/28	08:10	0'	WB-SBL								1		1	WB V#1 ran red; V#2 had green arrow
	03/09	13:20	0'	NB-WB										2	NB V#! ran red and fled scene after crash
	01/30	14:20	40' W						WB					1	Vehicle under tow, lost control on SB RT
	01/04	17:25	30' E					WB						2	V#1 in outer thru lane, on wet pavement
Totals				14	1	1	2	14	2	0	3	3	5	84	