KOCH INDUSTRIES INC

WICHITA CAMPUS EXPANSION

CIVIL ENGINEERING FEASIBILITY STUDY
DECEMBER 2012

PREPARED BY

PEC
SCIENCE APPLIED
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

KOCH INDUSTRIES, INC.
WICHITA CAMPUS EXPANSION
CIVIL ENGINEERING FEASIBILITY STUDY
DECEMBER 2012

PEC PROJECT NO. 32-12275

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INTRODUCTION

PROJECT OVERVIEW

PEC received the project Request for Proposals (RFP) dated April 17, 2012 via Howard + Helmer Architecture, who is serving as architect for Koch Industries (herein referred to as "Koch"). The RFP sought qualified consultants to provide engineering services related to the expansion of Koch's Wichita Campus. PEC responded with a proposal submitted on April 30, 2012. Subsequently, PEC was selected as the project's civil engineering consultant and entered into a contract with Koch Real Estate Holdings, Inc. on May 8, 2012.

The project objective is to expand the Wichita Campus of Koch Industries to accommodate additional employment and corporate growth within a unified corporate campus, which will allow for enhanced security and logistical feasibility consistent with a master building plan that can accommodate a total of 800,000 square feet (s.f.) of new office space and required parking to be constructed in a phased approach. The existing campus is bisected by 37th St. North, which impedes northward campus expansion. Therefore, rerouting 37th St. is required to facilitate the establishment of a unified, secure campus environment that can be maintained with expansion.

Koch has established an aggressive schedule for the expansion with several concurrent project activities. Howard + Helmer is providing architecture services and designing a campus master plan to guide future site development that accounts for the 37th St. relocation. PEC is supporting Howard + Helmer with mechanical, electrical and plumbing (MEP) engineering, but is also providing civil engineering and site design services under the previously mentioned contract directly with Koch. The ongoing tasks have been conducted in a highly collaborative manner between the three parties to help ensure successful and timely project completion.

SCOPE OF STUDY

PEC's current scope of civil engineering work includes a transportation feasibility study and concept level design of the relocated 37th St. along with concept level site design related to campus expansion. Contracts for future project design phases may be offered at Koch's discretion as the project proceeds.

This document serves as the deliverable work product for the transportation feasibility study scope task. The original intent of this task was to determine the feasibility of relocating 37th St. and, if feasible, define the process and criteria by which the improvements would be designed and constructed. Specifically, the task's activities were stated as follows:

- Definition of Authority Having Jurisdiction (AHJ) planning approval process and preliminary stakeholder involvement.
- Traffic impact analysis, lane configurations, intersection locations, signalization and security control locations off 37th St.
- Develop design criteria (City of Wichita, AASHTO, MUTCD, etc.).
- Confirm 37th St. construction management process (City of Wichita or private project).

This document includes sufficient information to satisfy the outlined work activity requirements plus additional information pertinent to the site development component of the project. PEC has expanded the study's content and entitled it "Civil Engineering Feasibility Study" for the following reasons:

- The approval processes for relocating 37th St. and site development are essentially one in the same.
- Some of the information gathered for the study is critical to site design and perhaps to Koch's final project decisions.
- The feasibility study is an appropriate means of transmitting information for which there is no contractually defined requirement to provide documentation.

SUMMARY OF KEY ITEMS

1. The contractual deadline for the delivery of this study is 30 calendar days following the receipt of the campus survey. At the time of this writing, PEC has only received preliminary survey from the surveyor. Final survey has not yet been received. However, the project has reached a critical point for decision-making. Therefore, PEC is providing the study in advance of the deadline to ensure Koch has the necessary information to make vital project decisions.
2. All calculations of areas, distances, fees, quantities, volumes, etc. contained in this report are based on preliminary survey data and other information available at the time of writing. Necessary revisions will be made during design phases after final survey has been delivered.
3. PEC scheduled an initial meeting with the City of Wichita on May 15, 2012 to formally present the campus expansion concept. The meeting was scheduled and conducted as an economic development matter.
4. PEC has coordinated with the appropriate city engineering and planning staff on several occasions to clarify project approval criteria and design requirements.
5. City Manager Robert Layton provided Koch a preliminary approval letter (see Appendix 1) dated June 19, 2012 expressing City Council support for the campus expansion and 37th St. relocation project. The letter also outlined several design and process items including:
   - The 20" water main located in the existing 37th St. R/W will be relocated to the new street R/W.
   - Construction management for 37th St. relocation will be conducted by the city including advertising, bidding, construction survey, inspections and materials testing. This will require a formal agreement between Koch and the city specifying terms and responsibilities.
   - The street configuration will include four travel lanes with left and right turn lanes at the entrance locations.
   - PEC as Koch's engineer will coordinate utility relocations and Koch assuming all utility relocation costs.
6. Under approval by Koch, PEC has initiated contact with the US Army Corps of Engineers (USACE) to ascertain the specific permitting requirements, application procedure and approval process related to the project's drainage component. Required permitting must be complete before construction of the drainage component may begin. However, the design process may continue and necessary City of Wichita approvals can be received prior to final permitting.
7. PEC has provided a recommended site configuration for platting and zoning in Section 3 of this study. The recommended configuration includes maintaining the existing Proctective Overlay (PO #215) established in 2008. PO #215 (Appendix 2) covers the location of the Pilot Plant and limits allowable land use and activities occuring on that site to those associated with the Pilot Plant. This area has also been designated as a separate lot as recommended. PEC was informed by Koch that the parcel must be separate from other campus lots for internal accounting purposes.
8. The traffic analysis conducted has identified impacts related to three campus expansion scenarios:
   - Two new buildings being developed on opposite sides of the campus (east and west).
   - Two new buildings being developed on the west side of the campus.
   - Four new buildings being developed with two on the west side of the campus and two on the east.

   Results of the traffic analysis have been used to inform the concept level design of 37th St. and the master plan being completed by Howard + Helmer. This includes recommendations for lane configurations, entrance locations and layouts, turn lane lengths and locations, signalization and site circulation.

APPROVAL PROCESS

Prior to proceeding with the realignment of 37th Street and Koch campus expansion, the project must obtain formal development approval from the City of Wichita. There are two individual components to the approval process as related to the project: subdivision and zoning. Property is platted through the subdivision process. The plat dictates the development's physical configuration by specifying the legally-recognized boundaries of onsite property parcels, determining the infrastructure needs of the site, and dedicating easements and R/W for necessary utilities and infrastructure. Zoning dictates the types of land uses and human activities that will be allowed to occur on the site. Together, the basic purpose of these planning approval processes is help ensure the growth can be accommodated by public infrastructure and that potential negative impacts to the community and adjacent properties are minimized.

Applications for both the platting and zoning processes are submitted along with the application fees to the Wichita-Sedgwick County Metropolitan Area Planning Department (MAPD), which is the consolidated planning department for the City of Wichita and Sedgwick County. The Wichita-Sedgwick County Metropolitan Area Planning Commission (MAPC) is the official board designated to review development applications and provide approval/denial recommendations to the elected bodies of both local governments. As Koch's agent, it is anticipated that PEC would submit development applications and represent Koch at the subsequent proceedings. PEC has the necessary information to initiate development approvals and is prepared to move forward upon receiving notification to proceed. However, coordination will be necessary to obtain the proper authorization signatures and receive guidance to ensure we appropriately represent Koch's interests.

The Koch campus expansion project is within the City of Wichita's planning jurisdiction and final approval will be a City Council decision. However, the campus abuts Bel Aire city limits and Bel Aire R/W and several properties within the likely notification area are located in Bel Aire. Therefore, PEC recommends a presentation to Bel Aire Planning Commission be included as part of the approval process. This would not be required, but as a gesture of goodwill it may help facilitate the process and clarify potential misconceptions.

SUBDIVISION PROCESS

The City of Wichita subdivision or platting process is governed by the Wichita-Sedgwick County Subdivision Regulations December 4, 2008 Edition, as amended[1]. The regulations are referred to herein as the Sub Regs. The subdivision process is especially critical to the project because of the realignment of 37th Street. The process outlined in this section is a general description only. The Sub Regs should be referenced for specific details. Rather than going through a separate process to vacate the existing 37th Street and dedicating new R/W to the City of Wichita, both can be accomplished by platting. The street improvements need to be in service before the campus improvements can begin, but the street cannot be constructed until the R/W dedication is accepted by way of plat approval. Therefore, obtaining plat approval is vital to the timely completion of the project.

The Sub Regs provide two options for platting that are applicable to the project. The first option is the traditional two-step process wherein a detailed preliminary plat must be submitted and approved prior to the consideration of a final plat. The second option is the "one-step plat," which combines the submittal requirements and processes of both the preliminary and final plats. Applicants may also choose to submit a sketch plat prior to proceeding with either option. A sketch plat provides a preliminary review of the proposed development configuration, which sometimes expedites development approval by identifying potential issues, clarifying requirements and outlining conditions before submitting the formal plat application. Also, applicants are required to post a sign (or signs) on the property notifying the public of the proposed subdivision. Signs are provided by MAPD at the time of application. The signs should be placed in a high visibility location adjacent to the roadway, but outside of the public R/W.

[1] Incorporated by reference into the City of Wichita Code of Ordinances, Chapter 28.05

Traditional Two-Step Platting

There are two main steps in the traditional platting option. The first step is preliminary platting. A preliminary plat is essentially a map of the development site that documents existing parcel legal descriptions, existing conditions and the proposed development configuration. It goes through the application procedure, staff level review, Utility Advisory Committee review and MAPC Subdivision Committee review. The Subdivision Committee will either approve or disapprove the application.

The second step is final platting. The final plat contains only the legal descriptions and development configuration of the proposed development, with certain site information pertinent to development, such as base elevations as listed in the Sub Regs. Once prepared, the final plat then goes through the same basic process as a preliminary plat through the Subdivision Committee review. The application is then sent to MAPC for approval or denial and finally to City Council for acceptance of dedications. City Council's only action is to approve or deny the dedications, covenants and guarantees for improvements associated with the plat. City Council acceptance is noted on the plat by way of attested signature of the Mayor.

One-Step Platting

As its name indicates, the one-step plat process combines the submittal requirements and processes of both the preliminary and final platting steps into one. Therefore, the one-step process takes about half the time to complete from submittal to approval. In addition to the time savings, the one-step plat application fees are about two-thirds of those associated with traditional two-step platting.

Subdivision Application Fee Schedule

APPLICATION TYPE	APPLICATION FEE
Sketch Plat	$165 flat fee
Preliminary Plat	$660 + $14 per acre
One-Step Final Plat	$660 + $14 per acre
Final Plat	$330 + $7 per acre

ZONING PROCESS

The City of Wichita zoning process is governed by the Wichita-Sedgwick County Unified Zoning Code July 9, 2009 Edition, as amended[2]. The process outlined in this section is a general description only. The Code should be referenced for specific details. The Code specifies numerous zoning districts and lists the allowable land uses and activities, development standards and design requirements applicable to each zoning district. The zoning districts separate land uses into broad categories such as single-family residential, multiple-family residential, commercial and industrial. Some categories are further broken down to indicate subcategories with like development standards or compatible land uses. Single family zoning districts are an example that is broken down by development standards. The SF-5 zoning district allows for single-family residences with a minimum lot size of 5,000 square feet while the SF-10 zoning district specifies a minimum lot size of 10,000 square feet. Industrial zoning districts are broken down by compatible land uses. For example, the LI "Limited Industrial" zoning district allows for low to moderate intensity manufacturing, industrial and commercial uses. Meanwhile, the GI "General Industrial" zoning district allows for higher intensity industrial uses and the processing of raw materials or resources.

As a first step in the zone change process, applicants may consult with MAPD prior to application submittal regarding the property, proposed uses, appropriate zoning district or applicable standards. This is an advisable, although optional step. The zone change application form is then submitted to MAPD with the application fee.

[2] Incorporated by reference into the City of Wichita Code of Ordinances, Chapter 28.04

For zoning applications within the City of Wichita, owners of all properties within a specified distance of the application area's perimeter must be notified by mail of the proposed zoning change. A list of these property owners certified by a title company must be submitted with the zoning application. Additional supporting materials, such as site plans, should also be submitted with the application.

Applicants are required to post a sign (or signs) on the property notifying the public of the proposed change in zoning. Signs are provided by MAPD at the time of application. The signs should be placed in a high visibility location adjacent to the roadway, but outside of the public R/W.

Applications are reviewed by MAPD staff and a staff recommendation is prepared, which is provided to the decision making bodies for consideration prior to their respective public hearing dates. Generally, the District Advisory Board (DAB) for the City Council district wherein the site is located will hear the case and provide a recommendation in advance of the MAPC hearing. Next, MAPC will hear the case, conduct a public hearing and provide a recommendation for City Council. City Council will take the final action, which constitutes approval, approval with conditions or denial. City Council approvals are made in the form of an ordinance that amends the official city zoning map. The amendment becomes effective upon publication of the ordinance and the proposed development may only occur after the effective date.

Zoning Notification Distance

The property owner notification distance for zoning applications is based on the acreage of the application area.

APPLICATION AREA SIZE	NOTIFICATION AREA
Up to and including 1 acre	200 feet
Over 1 acre to 6 acres	350 feet
Over 6 acres to 15 acres	500 feet
Over 15 acres to 25 acres	750 feet
Over 25 acres	1,000 feet

Zoning Application Fee Schedule

Zoning application fees are determined by the requested zoning district for the subject property.

PROPOSED ZONING DISTRICT	APPLICATION FEE
RR, SF-20, SF-10, SF-5, TF-3	$440 + $22 per acre + sign fee
MF-18, MF-29, B, MH, U, NO, GO, NR	$660 + $22 per acre + sign fee
LC, GC, CBD, OW, IP, LI, GI, AFB	$880 + $22 per acre + sign fee

PROCESS RECOMMENDATIONS

PEC recommends using the one-step platting process for the subdivision component of approval. This would result in lower overall application fees and save time over the traditional platting process. Furthermore, it is recommended that the subdivision and zoning applications be submitted together allowing the two processes to be conducted concurrently. This is a common local practice for projects with time constraints. Hearings for both applications can then be scheduled together, which provides a more efficient process and reduces the level of effort associated with presenting the case.

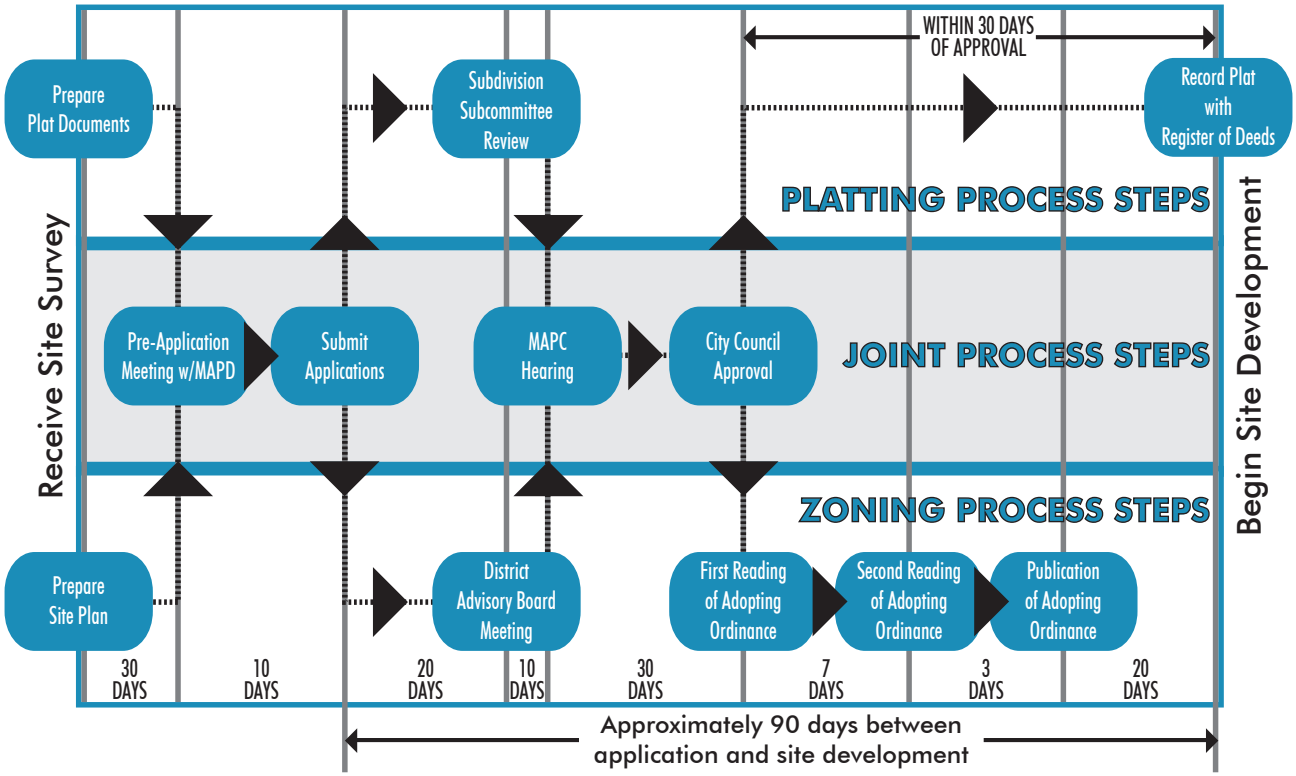
This process refers only to approval of the site development and does not include permits such as building permits and/or USACE permits. Upon completion of the recommended process and plat recordation, applications for building permits can be submitted. The applicable USACE permit(s) would need to be received by Koch prior to construction of improvements that occur within the applicable permit area, as described in Section 3: Site Development Analysis.

Process Timeline as Recommended

Application submittal deadlines for each MAPC hearing date are established on the published MAPC calendar. The desired MAPC hearing date will be provided on the application when submitted. Upcoming application deadlines with their corresponding MAPC hearing dates are shown below. The official 2013 MAPC calendar is included as Appendix 2.

APPLICATION DEADLINE	MAPC HEARING DATE
December 31, 2012	February 7, 2013
January 14, 2013	February 21, 2013
January 28, 2012	March 7, 2013

FIGURE 2.1
Approval Process Timeline



Process Timeline as Recommended

Figure 2.1 above is the basic approval process timeline as recommended. It assumes all actions taken by MAPC and City Council are approvals. Any other actions taken, such as denials or deferrals, would delay the process. If City Council denies a development request, the application would need to be revised accordingly and could not be resubmitted for six months. Since the precise application and hearing dates are unknown at this time, the process timeline is shown in terms of approximate days between each step rather than actual dates.

SITE DEVELOPMENT ANALYSIS

This section examines existing conditions and constraints on the development site, outlines recommendations for site configuration and zoning, and provides estimated application fees for the recommended development approach.

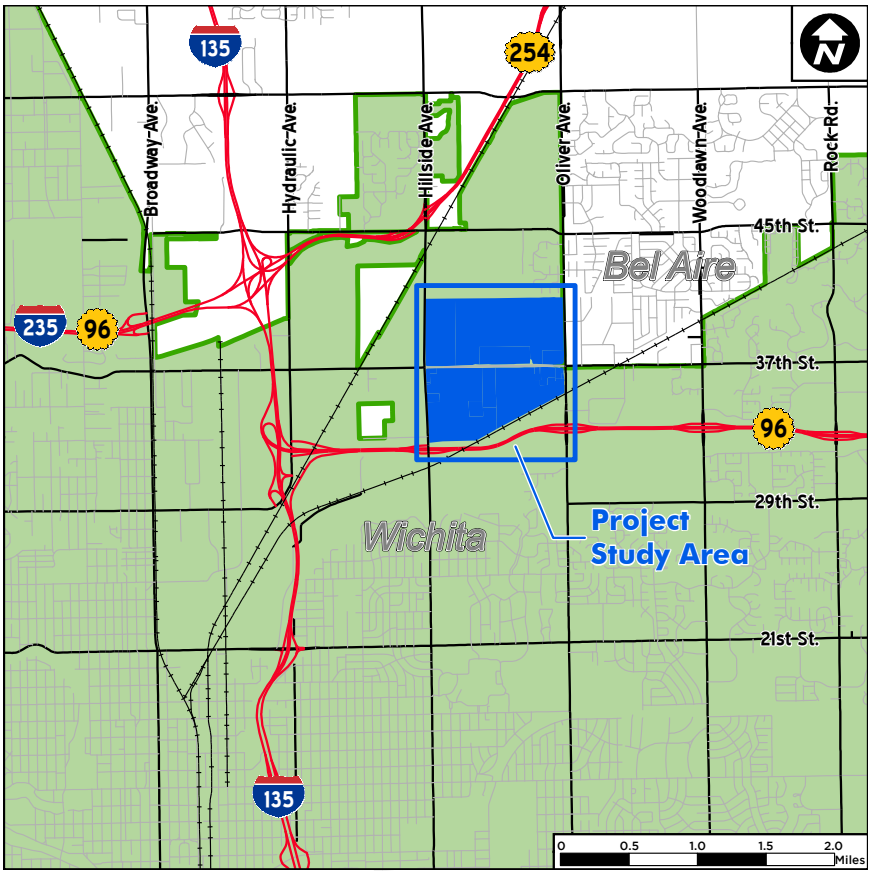
SITE CONDITIONS

Existing Site

Wichita is the most populous city in Kansas with a population of 382,368[1]. It is the county seat of Sedgwick County in the south-central region of the state. The study area for the proposed expansion of the Koch campus is located in the northeast quadrant of Wichita, as shown in Figure 3.1 below.

The Koch campus as it exists today is comprised of eight primary buildings. The campus is bisected by 37th St. North, which is an urban minor arterial street. The primary structures are located south of 37th St. and a paved surface parking lot is constructed to the north. A "pilot plant" is located immediately southwest of the main campus. Several ancillary structures and outbuildings are also located on the campus. Additionally, an occupied single-family home remains on the site, predating the current Koch ownership.

FIGURE 3.1
Study Area Location Map



The campus is served by all typical public and private utilities, including arterial street access. A private street network provides site circulation. The private streets have an urban cross section with concrete curbs and gutters and asphaltic concrete pavement. The network is in good overall condition. Site drainage is accomplished by a mixed system of underground storm sewer pipes and open ditches, which channel into a small stream west of the campus. The stream flows to the southwest into a larger channel adjacent to K-96 highway. There are no known floodplain concerns on the campus site.

The main campus is situated on three platted lots. The pilot plant is not platted, having been granted a platting exemption in conjunction with a protective zoning overlay (PO #215) in 2008[2]. PO #215,

[1] US Census Bureau, 2010 Census of the Population, http://factfinder2.census.gov
[2] City of Wichita, Kansas, Ordinance No. 47.957 (2008)

included as Appendix 3, restricts the use of this parcel to activities associated with the pilot plant. The existing home is also located on an unplatted lot. All current Koch primary business related activities are conducted on properties appropriately zoned "LI" Limited Industrial. The existing site development configuration is depicted in Figure 3.2 below.

Proposed Development

As mentioned in Section 1, Koch wishes to expand the campus to accommodate business growth. Establishing a unified, secure campus environment consistent with a master plan that can accommodate a total of 800,000 s.f. of office space and required parking is a prime objective of the proposed expansion. The initial phase

FIGURE 3.2
Existing Site Conditions

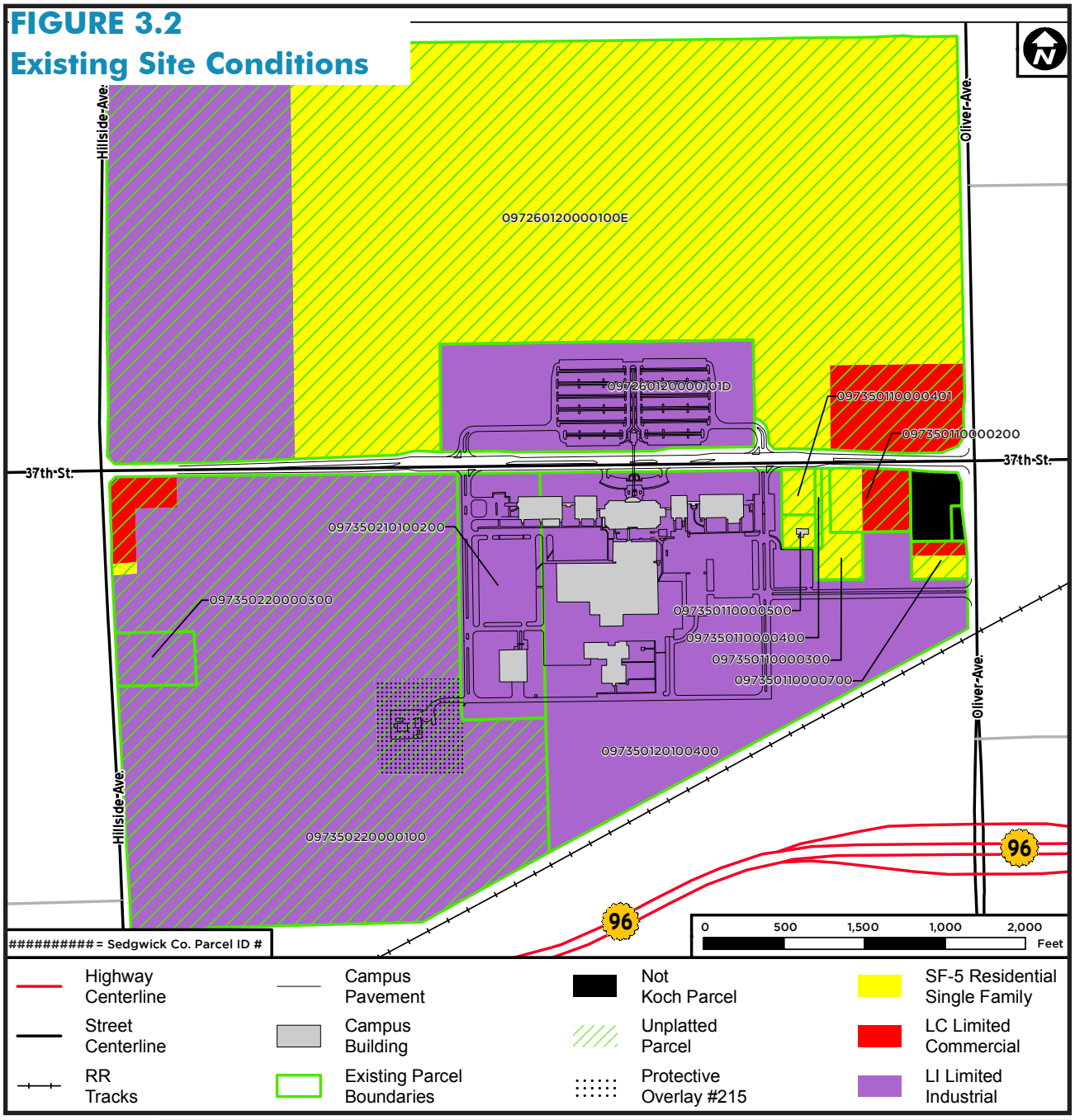


Table 3.1
Koch Redevelopment Parcels

SEDGWICK CO. PARCEL ID #	CURRENT ZONING	CURRENT PLAT STATUS	AREA (AC.)
097260120000100E	- -	Not Platted	283.66
A	SF-5 Residential		204.22
B	LI Limited Industrial		69.06
C	LC Limited Commercial		10.37
097260120000101D	LI Limited Industrial	Platted	30.30
097350110000200	- -	Not Platted	4.54
A	LC Limited Commercial		2.72
B	SF-5 Residential		1.82
097350110000300	SF-5 Residential	Not Platted	2.38
097350110000400	SF-5 Residential	Not Platted	0.46
097350110000401	SF-5 Residential	Not Platted	1.36
097350110000500	SF-5 Residential	Not Platted	1.00
097350110000700	- -	Not Platted	1.87
A	SF-5 Residential		1.16
B	LC Limited Commercial		0.71
097350120100400	LI Limited Industrial	Platted	87.13
097350210000200	LI Limited Industrial	Platted	18.32
097350220000100	- -	Not Platted	145.22
A	LI Limited Industrial		134.60
B	LI Limited Industrial w/PO #215		7.28
C	LC Limited Commercial		3.09
D	SF-5 Residential		0.25
097350220000300	LI Limited Industrial	Not Platted	3.74
TOTAL AREA			**549.67 AC.**

scheduled for 2015 completion calls for the relocation of 37th St., construction of a 200,000 s.f. office building, installation of site amenities and supporting infrastructure. Future expansion phases may proceed according to business needs as determined by Koch.

The proposal will impact a total of 12 Koch owned properties, of which only the three campus parcels are platted. The remaining parcels are mostly undeveloped and used for agricultural purposes. However, a former industrial/warehouse building in moderate condition is located on the southeast corner of 37th St. and Hillside Ave. Also, a commercial nursery operation (John Deere Nursery) of recent construction is located along Hillside on property leased from Koch.

The 12 parcels of record contain 18 zoning lots covering approximately 550 acres in total. Six lots with over 320 acres are zoned “LI” Limited Industrial. Eight lots with about 213 acres are zoned “SF-5” Single-Family Residential. The remaining four lots cover nearly 17 acres of “LC” Limited Commercial zoning. Table 3.1 above is a listing of affected properties along with the development status of each parcel.

PLATTING AND ZONING RECOMMENDATIONS

The recommended platting and zoning configuration for campus development is illustrated in Figure 3.3 below with a summary and estimated fees found in Table 3.2 on the next page. The recommendation would vacate the existing 37th St. R/W, dedicate new 37th St. R/W, dedicate a drainage easement and plat two lots. As previously indicated, this action would impact 12 existing lots, nine of which are currently unplatted and three of which are platted. The total area of the new plat would be 343.11 acres. Lot 1 would incorporate all or part of all twelve parcels. As directed by Koch, Lot 2 would contain only the area covered by PO #215. Therefore, the pilot plant would be identified as a separate parcel for internal accounting/tax purposes.

FIGURE 3.3
Recommended Platting and Zoning

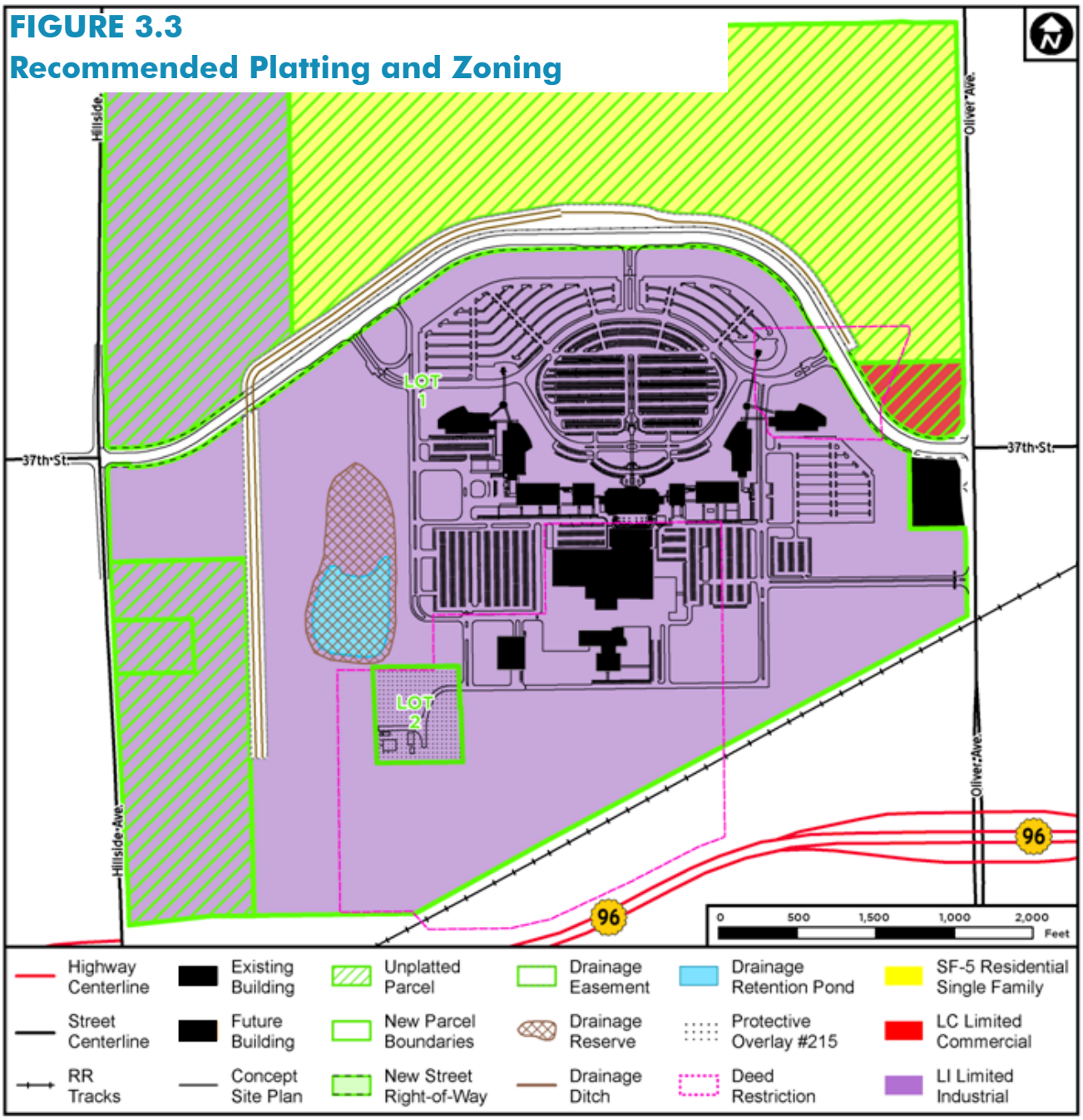


TABLE 3.2
Recommended Platting and Zoning

NEW PLAT LOT #	ZONING	AREA (AC.)	
		PLAT	REZONE
LOT 1	LI Limited Industrial (partial rezone)	310.66	73.67
LOT 2*	LI Limited Industrial	7.28	0.00
EASEMENT	- -	8.41	0.00
ROW	- -	16.76	0.00
AREA TOTALS		343.11	73.67
ESTIMATED APPLICATION FEES		$5,814	$3,006
TOTAL ESTIMATED APPLICATION FEES			$8,820

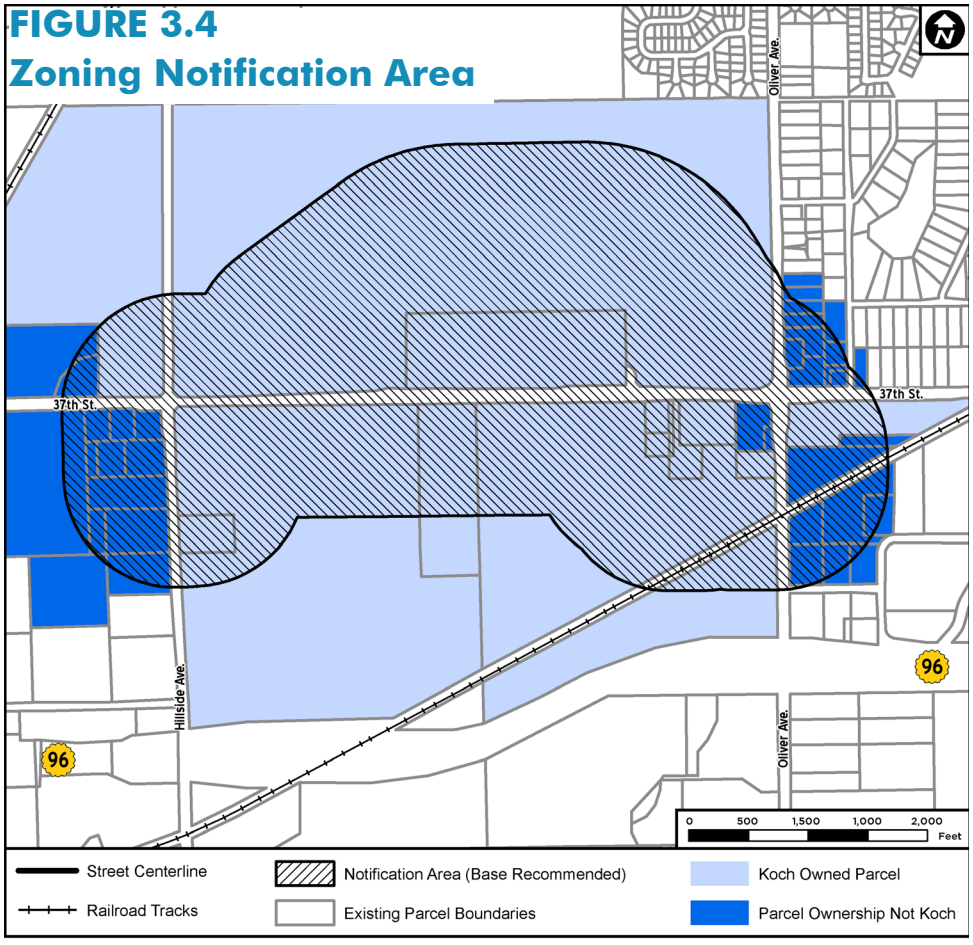
*** Protective Overlay #215 stays in place.**

All of Lot 1 would be zoned as "LI" Limited Industrial consistent with current campus zoning, which will provide one zoning lot that is consistent with the plat boundaries. This would require rezoning a 73.67 acres comprised of the entirety of ten existing zoning lots, including the Hillside Ave. frontage now zoned "LC" Limited Commercial and "SF-5" Single-Family Residential, and portions of two other lots.

The estimated application fees summarized in Table 3.2 were calculated using the criteria in Section 2. The plat application fee is $660 plus $14 per acre. Additional platting costs are included for preparing the plat binder ($250) and recording the plat ($20 per sheet, with five sheets assumed). The zoning fee is $880 plus $22 per acre. Additional costs are included for preparing the property ownership list ($10 per tract) for zoning notification.

Figure 3.4 on the right shows the estimated 1,000-foot required zoning notification perimeter and affected lots. The recommendation would require notifying the owners of 51 properties, 15 of which are Koch-owned and 36 of which are owned by others.

FIGURE 3.4
Zoning Notification Area



UTILITY CONSIDERATIONS

As with most arterial street improvements and development projects, utility relocation may be a fairly significant aspect of this project. Any necessary utility easements associated with public and private utilities will need to be dedicated during the platting process.

Private Utilities

Known private utilities located in the existing 37th St. R/W include:

- Westar Energy electricity transmission and distribution lines
- Kansas Gas Service distribution lines
- Cox Communications cable television/data lines
- AT&T telephone lines

Under the terms of City of Wichita standard franchise agreements with private utilities, relocation costs would be assumed by the utility for municipal street projects. However, this project is not necessitated by functional or structural obsolescence, nor has it been initiated as a City project. Therefore, the City has indicated that Koch will assume the costs for private utility relocation. Generally, the property owner/developer will enter into an agreement with each private utility that outlines the terms and costs associated with relocating that specific utility. PEC's Facilities Department has assessed the issues related to providing electric service to the Koch campus. That assessment should be referenced for information regarding campus electric utilities.

Public Utilities

Known public utilities located in the existing 37th St. R/W include:

- City of Bel Aire
  - Abandoned water line
  - Traffic signal wiring (included in the street construction cost estimate)
- Chisholm Creek Utility Authority
  - Sanitary sewer force main (along Oliver north of 37th Street)
- City of Wichita
  - Water main and distribution lines
  - Sanitary sewer service lines
  - Storm sewer

Relocating public utility service lines is a fairly routine aspect of most development projects. Primarily, this involves providing utility services to the development site and buildings. As such, they should have little impact on the relocation of 37th Street.

Onsite, a new looped waterline system with service connections will be necessary to serve the campus. Most onsite service lines that provide service to existing buildings should be able to remain in place. However, some may need to be relocated to accommodate new development. New services would need to be provided only to any new facilities built. The full extent and cost of new and relocated utility service lines will be examined as the site concept and building program are further developed.

Utility distribution mains are generally located within street rights-of-way since they may need to be accessed for maintenance and repairs. It is not anticipated that the project will require the relocation of the Chisholm Creek Utility Authority (CCUA) sanitary sewer force main, but coordination with CCUA may be needed during design and construction of 37th Street.

City of Wichita Water Utilities currently has a 20-inch prestressed concrete steel cylinder water main located

within the existing 37th St. R/W through the project extent. The Preliminary Approval Letter (Appendix 1) included relocation of this water main to the new 37th St. R/W as a condition of project approval by the City. The main has the capacity to handle water distribution needs well into the future. Beyond normal and routine maintenance, there are no immediate plans for repair or replacement of the main since it is relatively new.

By policy, the City would normally pay for costs of relocating or replacing a water main when the project is associated with a City-initiated street improvement. Developer-initiated relocation expenses are assumed by the developer, although additional costs associated with upsizing the main's capacity are typically the City's responsibility. Koch has agreed that the water main relocation will be included in the project costs and PEC will design the main as part of the project.

ENVIRONMENTAL CONSIDERATIONS

Figure 3.5 on page 15 illustrates the environmental considerations for the Koch campus expansion site along with the drainage design alternatives that have been examined. A primary environmental concern is site drainage and minimizing possible development impacts to water resources. Land development may also affect cultural resources, archaeological resources and wildlife habitat. For these reasons, a variety of permits may be required from one or more governmental agencies. As part of our scope of work, PEC has begun environmental investigations and initiated contact with the appropriate governmental agencies in coordination with Koch representatives. This study only contains a brief summary of main environmental considerations and permitting.

Deed Restrictions

During PEC's project investigations, it was identified that portions of the project site are impacted by restrictive covenants filed with the Sedgwick County Register of Deeds in 1997 (Film 1671, Pages 2011-2020). Additionally, environmental use controls were enacted by the Kansas Department of Health and Environment (KDHE) in 2006 (Document No. 06-EUC-0006). The areas subject to these measures are identified as "Deed Restrictions" in Figure 3.5. They will need to be illustrated on the final plat documents to be filed.

These documents contain several requirements that need to be followed during the course of the campus expansion project. None of which should prohibit campus expansion as proposed. The following is a summary of the requirements that may impact the project:

- Notify KDHE prior to any excavation, with 15 day advanced notification required for depths greater than 12 feet.
- Provide notification to contractors of potential hazards and soil handling requirements (example specification language included as Appendix 4).
- Notify KDHE at least 15 days prior to submitting rezoning application to City of Wichita.
- Preserve, protect or replace as necessary all permanent survey markers, benchmarks and environmental monitoring stations.
- Prohibition on the reconstruction, remodeling or modification of any existing structure in the area of restrictions.

Potential Jurisdictional Waters

PEC contracted Geotechnical Services, Inc. (GSI) to identify the potential of jurisdictional "waters of the United States" being located within the area of campus expansion. Such waters, which include streams and wetlands, are subject to USACE Section 404 permitting requirements if they are to be changed or impacted. GSI identified two possible wetlands and up to 15,055 linear feet of potentially jurisdictional stream within the project study area. However, only USACE can determine if these waters are subject to their permitting jurisdiction.

One of the two wetlands, which was identified in the report as "Wetland A" has the potential of being impacted by project improvements. It is located adjacent to an existing stream that may need to be realigned. PEC has considered Wetland A in preliminary site design concepts.

In addition, as detailed in the following Drainage Considerations and Alternatives subsection, a total of 4,083 linear feet of stream could potentially be impacted by the development. Portions of this stream length have preliminarily been determined as jurisdictional by the USACE El Dorado Regulatory Office.

The proposed stream crossing may also be subject to Section 404 permitting if it results in stream impacts. The crossing will be designed to avoid and then minimize impacts to the greatest practicable extent. Nevertheless, specific impacts are indeterminable until final survey is received and preliminary structural design is completed. Impacts to stream lengths deemed jurisdictional would require USACE permitting and possibly mitigation. This is true of impacts resulting from stream crossings or stream relocations.

Drainage Considerations and Alternatives

Drainage Conditions

Soils in the study area are of Hydrologic Soil Group B. The improvements would increase the Curve Number from 84 to 92, which would require the site to address runoff from the 100-year, 24-hour (7.8 inches) precipitation event. The peak 100-year discharge from storm water detention would not be allowed exceed that of the existing condition from the entire site. Peak discharge of storms of the two-, five-, 10-, and 25-year return frequencies are also required to be lower than the peak discharge rate of the existing condition.

Drainage Alternative 1

Drainage Alternative 1 located a retention pond in the southwest quadrant of the development site as shown in Figure 3.5. This location was originally chosen because most of the existing site drains to this point and adequate site drainage could have been achieved with a relatively simple system design. Alternative 1 was eliminated from consideration when the existence of the previously discussed environmental use controls and deed restrictions were discovered. The use controls prohibit excavation to the extent that would have been required for construction of the retention pond. This discovery was made early in the concept development phase before full drainage analysis was performed.

Drainage Alternative 2

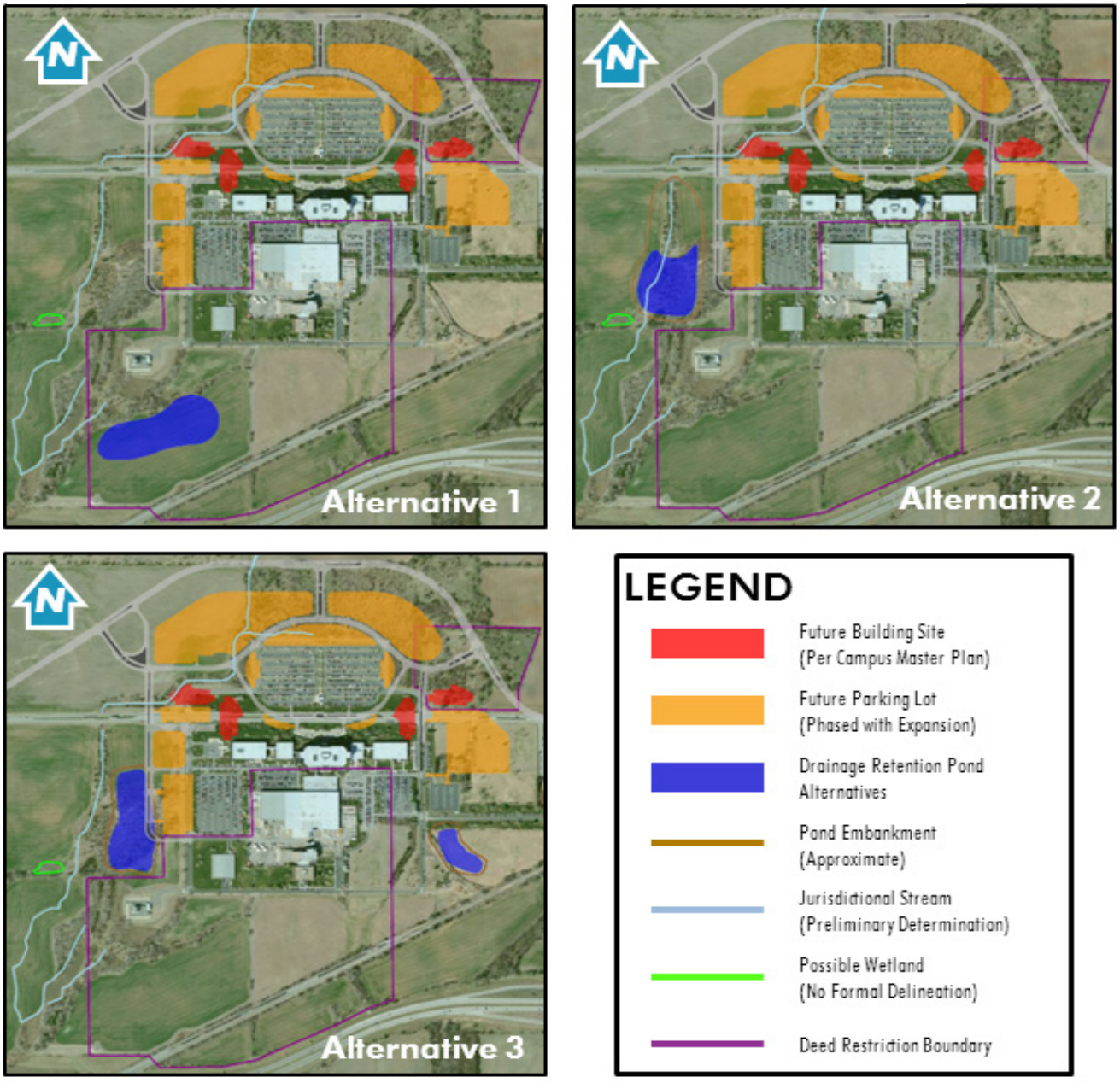
Immediately after Alternative 1 was eliminated from further consideration, Alternative 2 was developed. This is the prevailing drainage alternative that is included in the current master plan configuration and illustrated in site depictions.

The project drainage area will be approximately 167 acres, with impervious surface area of 109 acres. This requires a retention pond with a minimum surface area of six acres with a surface elevation of 1,350 feet. The pond would be approximately eight feet deep with a permanent pool volume of 48 acre-feet. The outfall structure of the pond would need a 24-inch weir slot to route the one-year storm and a larger 10-foot spillway to route the 100-year storm. With such a discharge configuration the one-year storm would rise approximately 1.5 feet and the 100-year storm would rise approximately six feet. So, excavation will include an embankment encompassing about 11 acres of land to allow the pond to rise during the 100-year storm.

The pond would require a water appropriations permit from the Kansas Division of Water Resources (DWR) since it's size would exceed the 15 acre-feet permit threshold.

The City of Wichita channel bank protection volume regulation would require retaining runoff from the one-year, 24-hour storm (2.8 inches) for a period of 24 to 96 hours. This regulation supersedes the water quality regulation that would otherwise apply to runoff of the first 1.2 inches of rainfall. The water quality regulation would be met by the permanent pool volume of the pond.

FIGURE 3.5
Environmental Considerations and Drainage Alternatives



The City of Wichita has agreed that the design of the retention pond could account for new parking areas that would not drain into the pond. The pond would offer sufficient storage volume and water quality benefits to offset what would otherwise be required to account for these areas under Wichita stormwater regulations.

Storm runoff from the remainder of the existing site plus new improvements would be directed into the retention pond on the west side of the property. In this manner, most of the development site can be directed to a new retention pond meeting Wichita's stormwater regulations.

This alternative would relocate about 4,000 linear feet of stream channel to the west of its existing location. Such a relocation would bypass the pond's water quality treatment measures with 4,400 linear feet of channel. The drainage basin to the stream is less than 240 acres and will not require a stream modification permit through DWR. However, the previously discussed USACE Section 404 requirements will likely apply to the stream. Other offsite drainage north of the relocated 37th St. would be diverted along the new street alignment away from the project site.

Drainage Alternative 3

The Drainage Alternative 3 concept includes two retention ponds. Construction of one pond would occur near the location of the Alternative 2 pond as part of the first campus expansion phase. A second retention pond in the southeast quadrant of the development site would be planned for construction in a future expansion phase. The combined project drainage area for both retention ponds is approximately 158 acres. Full campus buildout would add 54 acres of new impervious surface to the site at which point about 105 acres will be impervious area. The balance of 53 acres would remain in a pervious land condition.

Under Alternative 3 the western retention pond would be moved off-channel between the existing stream and the western edge of proposed site development. This modification would result in impacts to 2,233 linear feet of stream versus the 4,000 feet of impacts seen with Alternative 2. This length of stream could be replaced with a channel measuring 2,450 feet in length.

A retention pond with a minimum surface area of six acres and a surface elevation of 1,350 feet above sea level would be required. The pond would be approximately 12 feet deep with a permanent pool volume of 52 acre-feet. The outfall structure of the pond would need a 15-inch weir slot to route the one-year storm and a larger 10-foot spillway to route the 100-year storm. The pond's embankment will encompass sufficient area to account for a rise of approximately two feet from static level associated with the one-year storm and a rise of five feet for the 100-year storm.

The pond's size would exceed the 15 acre-feet water appropriations threshold, which would require a DWR permit. However, the drainage basin to the stream is under the 240-acre threshold for a stream modification permit through DWR.

The design of the west retention pond may accommodate the irrigation use of retained water, per Koch's request. Specific details regarding the pond's design and usage for irrigation along with applicable regulatory permitting requirements will be included in a separate report currently under development.

The eastern retention pond constructed in future phases would have a minimum surface area of 1.8 acres at a water surface elevation of 1,369 feet above sea level. The pond will be approximately 6 feet deep and would create a permanent pool volume of 6 acre-feet. The outfall structure of the lake will need a 12-inch weir slot to route the 1-year storm and a larger 20-foot spillway to route the 100-year storm. With such a discharge configuration, the one-year storm will rise approximately 1.2 feet over static level and the 100-year storm will rise up approximately 2.7 feet. The pond embankment will be designed to accommodate these storm events. This pond will not require a DWR water appropriations permit.

Both retention ponds would be designed to meet the City of Wichita water quality and channel bank protection regulations that were described in the Drainage Alternative 2 discussion. Additionally, neither retention pond structure would be classified as a dam under state regulations, which would avoid the need for a DWR dam permit.

Moving the western retention pond off-channel east of the Alternative 2 location would necessitate site design modifications to the campus street system and reallocation of required parking stalls, as can be seen in Figure 3.5. PEC has developed a preliminary layout that would accommodate Drainage Alternative 3, but the resulting impacts to onsite circulation, delivery truck traffic, site utilities and building infrastructure have not been fully analyzed and discussed with Koch and the project architects, Howard + Helmer.

PRELIMINARY COST ESTIMATES

Preliminary planning level cost estimates for full build out site development are included in Table 3.3 below. Costs are shown in 2012 dollars. The costs were calculated assuming Drainage Alternative 2. If it is agreed that site design should be modified according to Drainage Alternative 3, revised cost estimates will be provided. A detailed cost estimate with line items for the entire civil engineering, site design and public and private utility construction/relocation components is included as Appendix 6. Permitting fees are not included in the cost estimate because they cannot be determined based on currently available information.

TABLE 3.3
Preliminary Site Development Costs

ITEM DESCRIPTION	ESTIMATED COST
Water Main Relocation	$ 1,568,627.20
Site Development and Utilities	$ 10,925,838.43
Landscape / Irrigation / Perimeter Fence	$ 3,801,325.00
TOTAL SITE DEVELOPMENT COSTS	**$ 16,295,790.63**

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TRAFFIC ANALYSIS

This section evaluates potential roadway improvements to 37th St., Hillside Ave. and Oliver Ave. associated with the campus expansion project. The main focus of our analysis was to determine the traffic impacts associated with the site expansion and identify any operational or roadway geometric improvements that would be necessary to minimize those impacts. The data supporting the analysis is found in Appendix 5: Supplemental Traffic Data. The traffic analysis provides sufficient information needed to design the improvements including:

- Description of existing roadway and intersection conditions
- Current and forecasted average daily traffic (ADT) and peak-hour turning movement volumes
- Complete intersection analysis on existing and future traffic conditions
- Recommended geometric improvements such as lane configurations, turn bay lengths, etc.

EXISTING TRANSPORTATION CONDITIONS

Roadway Descriptions

Within the study area, 37th St. is an east-west minor urban arterial street and currently provides two lanes in each direction. At the major intersections, the roadway widens to accommodate left turn lanes. In front of the Koch site, the roadway widens to provide left turn and right turn lanes into onsite streets and parking lots. The current posted speed limit is 40 mph. There are no sidewalks in this location.

Both Oliver Ave. and Hillside Ave. are north-south minor urban arterial streets with two lanes in each direction south of 37th St. The roadways widen to accommodate left turn lanes at major intersections. North of the 37th St. intersection the roadways narrow to one lane in each direction with shoulders and ditches replacing curbs and gutters. There are sidewalks with widths between five and six feet located on both sides of the streets north of K-96 Highway to approximately 400 feet south of the 37th St. intersection. The current posted speed limit is 40 mph.

Intersection Descriptions

37th St. and Hillside Ave.

This intersection is currently signalized and operating with a full eight-phase signal timing plan, allowing protected/permissive left turns on all four approaches. On all approaches, the traffic signals are mounted on the mast arm. There are no sidewalks present in the immediate area and no pedestrian signals or marked crosswalks are provided at the intersection. However, sidewalk ramps are provided.

The nearest traffic signal west of the intersection is approximately two miles away at Broadway St. and the nearest traffic signal east is approximately one mile away at Oliver Ave. No signalized intersections are located north of the intersection and the nearest signal to the south is approximately two miles away at 21st St. North. The City of Wichita has plans to install traffic signals at the K-96 interchange, approximately six-tenths of a mile south of the intersection.

37th St. and Oliver Ave.

This intersection is located within Bel Aire city limits while the remainder of the study area is in the City of Wichita. The intersection is currently signalized and operating with a with a full eight-phase signal timing plan, allowing protected/permissive left turns on all four approaches. On all approaches, the traffic signals are mounted on the mast arm in addition to pedestrian push buttons and signals mounted on each of the poles. There are no sidewalks present in the immediate area and no pedestrian signals or marked crosswalks are provided at the intersection. However, sidewalk ramps are provided.

The nearest traffic signals west and east of the intersection are approximately one mile away at Hillside Ave. and Woodlawn Ave. respectively. No signalized intersections are located north of the intersection and the nearest traffic signal to the south is approximately one mile away at 29th St. North. The City of Wichita has plans to install traffic signals at the K-96 interchange, approximately one-half mile south of the intersection.

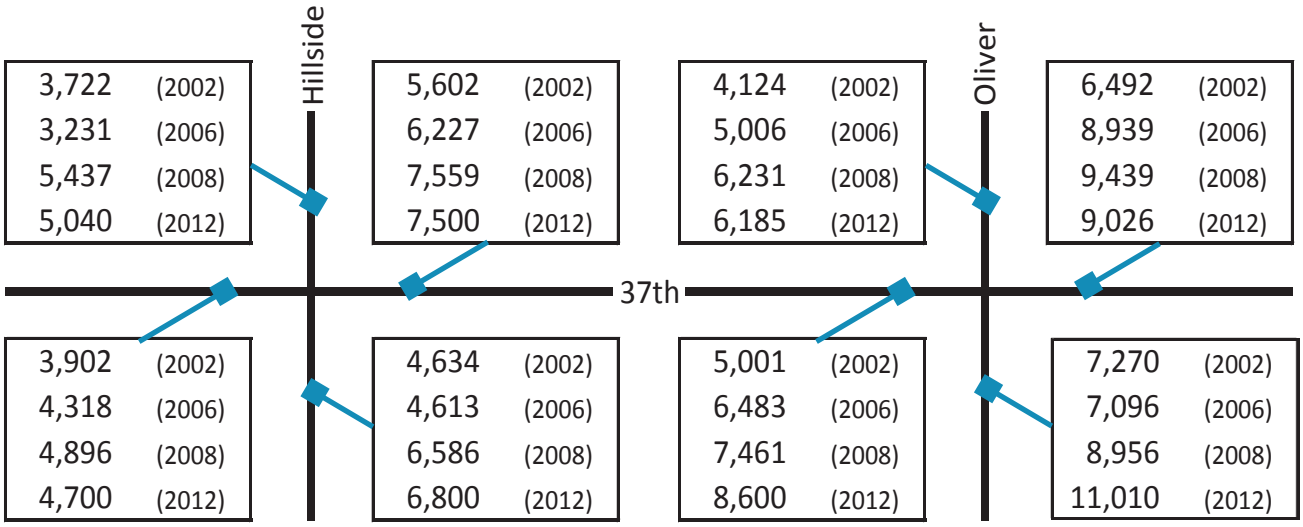
A Union Pacific (UP) railroad crossing is located on Oliver Ave. about midway between 37th St. and the K-96 interchange. This crossing has overhead and post-mounted flashing signals, but does not have crossing gates.

Koch has two main driveways onto 37th St. and one onto Oliver Ave. The east driveway onto 37th St. is approximately one-quarter mile west of the Oliver Ave. intersection and the west driveway is approximately one-tenth mile further west. The driveway onto Oliver Ave. is approximately 820 feet south of the 37th St. intersection and approximately 250 feet north of the railroad crossing. Each of these driveways has a stop sign for driveway traffic entering the arterials.

Traffic Volumes

Historical traffic volumes for each approach of the 37th St. arterial intersections (Hillside Ave. and Oliver Ave.) were gathered from the City of Wichita. Current year counts were conducted with road-tube count machines for a 24-hour period starting on June 18, 2012. The counts are summarized in Figure 4.1, which shows 37th St. running east-west as the horizontal line.

FIGURE 4.1
Study Area Traffic Volume History (in ADT)



Year	ADTs
(2002)	8,930
(2006)	9,195
(2008)	12,239
(2012)	12,020

Year	ADTs
(2002)	11,444
(2006)	13,762
(2008)	16,044
(2012)	17,411

Vehicular turning movements were recorded from field observations May 23rd - 24th, 2012 and on June 6th, 2012. Turning movement diagrams are included in Appendix 5.

No pedestrian movements were observed during the peak hours. Since there are no schools nearby, the crossings at the intersection are not considered to be school crossings.

ANALYSIS METHODOLOGY

Traffic Forecasting

It is standard practice to design for traffic conditions forecasted after the project's completion. Building H is included in the first phase of campus expansion with Building I final build-out anticipated within 10 years. Based on the historical data, a moderate growth rate of 2.0% was used to forecast traffic at the Hillside Ave. intersection. A higher growth rate of 4.0% was used at the Oliver Ave. intersection. The traffic volumes for the future AM and PM peak hours are summarized in Appendix 5**.**

Trip generation for the four potential future Buildings H, I, J and K was based on the latest edition of the Institute of Transportation Engineer's (ITE) *Trip Generation Handbook* for General Office Buildings. Table 4.1 below summarizes the AM peak hour, PM peak hour and total weekday trip generation for each future building.

TABLE 4.1
Trip Generation for Future Buildings

EACH BUILDING	WEEKDAY			AM PEAK HR			PM PEAK HR		
SIZE (sf)	TRIPS	ENTER	EXIT	TRIPS	ENTER	EXIT	TRIPS	ENTER	EXIT
200,000	2,274	1,137	1,137	326	287	39	303	51	251

Operational Analysis

The quality of traffic flow, or Level of Service (LOS), is rated from LOS A to LOS F, see Table 4.2 on the right. LOS A represents the best condition, when little or no vehicle delay occurs. LOS F represents the worst condition when traffic demand exceeds the capacity resulting in vehicle queues that interfere with other traffic movements near the intersection. Acceptable design LOS values for future conditions are generally in the range of LOS C to LOS D.

LEVEL OF SERVICE (LOS)	INTERSECTION DELAY IN SECONDS	
	TWO-WAY STOP CONTROLLED	SIGNALIZED
A	0 – 10	≤10
B	>10 ≤15	>10 ≤20
C	>15 ≤25	>20 ≤35
D	>25 ≤35	>35 ≤55
E	>35 ≤50	>55 ≤80
F	>50	>80

SOURCE: Transportation Research Board, 2010 Highway Capacity Manual

TABLE 4.2
Level of Service Definitions

Highway Capacity Manual 2010 LOS capacity analysis for the intersections around the development was completed utilizing *Synchro* software for the Existing, Projected 10-year Future and Projected 10-year Future + Expansion traffic volumes during the AM and PM peak hours. For Projected 10-year Future and Projected 10-year Future + Expansion, the analysis at the intersection of 37th St. with Oliver Ave. included the addition of a right turn lane for eastbound traffic.

For the campus expansion, three scenarios were analyzed as described below:

Scenario 1 ..... Building H on the west side; Building I on the east side
Scenario 2 .....Buildings H and I both on the west side
Scenario 3 .....Buildings H and I on the west side; Buildings J and K on the east side

Campus driveways are referred to in the analysis as follows:

Gate A .....New 37th St. entrance on the west side of campus
Gate B .....New 37th St. entrance on the north side of campus (center drive)
Gate C ..... New 37th St. entrance on the east side of campus
Gate D .....Existing Oliver Ave. entrance (remains in future scenarios)

Estimates of the expected trip distribution to and from the study area were based on the available data and proposed street improvements. The vehicle reassignments for existing/future traffic and the directional distributions for the new buildings are listed in Table 4.3 below and peak hour traffic volumes are summarized in Appendix 5.

TABLE 4.3
Trip Reassignment (by % of Volume)

DISTRIBUTION FACTOR	TRAFFIC PERCENTAGE				
	ENTRY GATE				TOTAL
MOVEMENT	A	B	C	D	
EB on 37th - LT at W Drive	70.0%	30.0%			100.0%
EB on 37th - RT at W Drive	100.0%				100.0%
EB on 37th - LT at E Drive	50.0%	50.0%			100.0%
EB on 37th - RT at E Drive	45.0%		45.0%	10.0%	100.0%
WB on 37th - LT at E Drive			90.0%	10.0%	100.0%
WB on 37th - RT at E Drive		30.0%	70.0%		100.0%
WB on 37th - LT at W Drive	10.0%	10.0%	75.0%	5.0%	100.0%
WB on 37th - RT at W Drive		50.0%	50.0%		100.0%
NB on Oliver - LT at Drive				100.0%	100.0%
SB on Oliver - RT at Drive				100.0%	100.0%
BUILDING	**A**	**B**	**C**	**D**	**TOTAL**
Proposed Buildings H and I	35.0%	35.0%	30.0%		100.0%
Proposed Buildings J and K	25.0%	30.0%	40.0%	5.0%	100.0%

ANALYSIS RESULTS

Scenario 1

Reference Table 4.4 for intersection levels of service. AM peak hour analysis shows both the signalized Hillside Ave. and Oliver Ave. intersections operating at LOS E/F after campus expansion, as the traffic volumes of

turning traffic will begin to exceed the capacity of the intersection. The Hillside Ave. intersection will operate at LOS C during the PM peak hour causing minimal delay to the traveling public and having excess capacity through the analysis period. The Oliver Ave. intersection will also operate at LOS C during the AM peak in the future no-build condition, but will drop to LOS D with the campus expansion. This drop in LOS would be acceptable due to the short duration of additional delay.

Future AM peak hour operations for the southbound left turn movement from Hillside Ave. onto 37th St. would warrant a dual left turn configuration. Northbound right turn movements would warrant an exclusive right turn lane. Suggested northbound improvements would likely involve changes to the traffic signal, pavement markings and signing. With these additional improvements, the intersection will improve to operate at a LOS D.

The analysis showed that AM peak hour northbound left turn movement from Oliver Ave. to 37th St. will warrant a dual left-turn lane configuration, which would improve operations to LOS D. However, any improvements to the intersection will have to be coordinated with the City of Bel Aire. Additionally, constraints at this location (R/W, drainage, existing development) may inhibit recommended dual left turn improvements. Other options that yield similar operational results will be examined during the concept design phase.

Scenario 2 Analysis

Scenario 2 redistributes a portion of Scenario 1 traffic from Oliver Ave. to Hillside Ave. and the analysis yields similar operational results. Therefore, suggested improvements under Scenario 1 were assumed as the basis of analysis for Scenarios 2 and 3.

The Hillside Ave. intersection will operate at LOS D in the AM peak hour and LOS C in the PM peak hour. The Oliver Ave. intersection will operate at LOS D in the AM peak hour. During the PM peak hour, the intersection will operate at LOS C, slightly better than Scenario 1. With both buildings on the west side of the campus site, the traffic volumes at the intersection in the PM peak hour were reduced enough to improve the LOS.

Scenario 3 Analysis

Both intersections will operate similarly to the other options in the AM peak hour at LOS D. With increased exiting volumes during the PM peak hour, the Hillside Ave. intersection will drop to LOS D and the Oliver Ave. intersection of 37th St. with will drop to LOS E. This drop in LOS may be acceptable due to the short duration of this additional delay.

TABLE 4.4
Intersection LOS Summary

INTERSECTION LOCATION ON 37TH ST.	PEAK HOUR LEVELS OF SERVICE									
	EXISTING CONDITIONS		FUTURE CONDITIONS							
			NO-BUILD		SCENARIO 1		SCENARIO 2		SCENARIO 3	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Hillside	D	B	E	C	F (D*)	C	D	C	D	D
Oliver	D	C	E	C	E (D*)	D	D	C	D	E
Gate A	A	C	A	F	A	F	A	F	A	F
Gate B	-	-	A	A	A	E	A	D	B	F
Gate C	A	A	B	A	F	E	F	D	F	F
Gate D	A	A	C	C	D	D	A	C	B	E

* LOS after suggested improvements added to simulation model.

Entry Gate Analysis

Analysis was also performed for the unsignalized access points to the site. Regardless of building option or entry point, the critical movement influencing intersection LOS was the left turning traffic into the site during the AM peak hour and exiting the site at the PM peak. This results in some of the entry points operating well in the AM peak hour and then drastically changing in the PM peak hour. For example, Gate A had hardly any left turns in the AM peak hour, but a significant number during the PM peak.

Although an entry point may appear to have an acceptable LOS, there are some factors that will influence the traffic flow and consequently the LOS. The analysis assumes that once a vehicle clears the intersection, it will have free-flow movement away from the intersection, but with an entry gate in close proximity, this may not be the case.

An example is Gate A, where over 90% of the AM peak hour entering vehicles (regardless of building option) turn right from 37th St. into the site. Table 4.5 below shows the average time interval (in seconds) of entering vehicles. If it takes vehicles longer than the average entering time to pass through the security point, vehicles will begin to queue back up the driveway and then onto 37th St.

TABLE 4.5
Gate A Vehicle Entries

FUTURE CONDITION	ENTERING VEHICLES			OPTIMAL AVG. ENTRY TIME PER VEHICLE[3]
	PEAK HOUR	PEAK 30 MINUTES[1]	AVG. VEHICLES PER MINUTE[2]	
No Additional Buildings	770	483	16.1	3.7
Scenario 1	870	545	18.2	3.3
Scenario 2	970	610	20.3	2.9
Scenario 3	1,115	700	23.3	2.6

1. 63% of peak hour traffic arrives in 30 minutes.

2. For the peak 30 minute period.

3. To avoid significant vehicle queuing onto 37th St.

PRIORITIZED ENTRY RECOMMENDATIONS

The following recommendations have been provided to maximize employee vehicular safety and traffic flow onto the Koch campus from 37th St. Recommendations are prioritized in the progressive order which they should be considered for implementation.

Priority 1: Rapid Security Mechanisms

The first and foremost recommendation is the initial installation of rapid operation entry gate/security control mechanisms. An automated gate system is highly recommended. A system similar to the K-Tag toll gates used by the Kansas Turnpike Authority would likely perform acceptably since they allow rapid vehicle passage. This radio frequency identification (RFID) system uses a sensor located near the gate to detect a windshield mounted transponder, which triggers the gate opening. The transponder is coded to a customer account from which toll charges are deducted. While Koch wouldn't likely charge employees for parking, such a system would allow Koch security staff to track gate activations to a specific device issued to a specific employee. This feature could prove to be a valuable security enhancement.

Pass cards or ID badge operation would slow down performance, but might operate effectively enough during the first development phase. Physical security verification (i.e. guard checking credentials) would not be recommended as the primary employee entrance security measure under any circumstances. For exiting lanes, it would be advisable to avoid a gated option altogether and opt for the retractable "tire shredder" mechanisms often used at secured vehicle driveways. These are installed to allow quick passage in the direction of traffic flow, but cause severe tire damage to a vehicle attempting to pass in the opposing direction.

Priority 2: Offsite Wayfinding Signage

Given the proposed site layout, which assigns four employee entrances, two visitor entrances and one truck only entrance, offsite wayfinding signage is highly recommended. These signs would indicate directions to motorists destined for the Koch campus on Oliver Ave. at the Gate D entrance and to each entrance on 37th St. These signs will help to minimize confusion, particularly for visitors and delivery truck drivers.

Wayfinding sign would need to be designed and spaced according to guidelines in the Manual on Uniform Traffic Control Devices (MUTCD). Additionally, because they would need to be placed in the street R/W they would require a Minor Street Privilege permit from the City of Wichita. Please note that costs for wayfinding signs and privilege permits are not included in the cost estimate.

Priority 3: Distribute Access Demand

Distributing the demand for access between the four entry points to equalize the traffic impacts onto the adjacent arterial streets is recommended as an early intervention method. There are two suggested means of distributing the demand. One would be to assign employee parking spaces or parking lots, which would affect the decision on entry point and route to and from work. Generally, the entry closest to the parking assignment will be preferred to one farther away. However, coordination with Koch representatives has revealed that this option may conflict with the corporate culture. A more effective and acceptable option might be encoded employee pass cards or "K-Tag" devices used in conjunction with automated gates. Such devices could be programmed to only allow campus access through an assigned entry gate while still allowing for an open parking policy.

Priority 4: Ingress/Egress Controls

The next recommended line of defense would be to control entry and exit movements. This might be as simple as having security staff direct traffic during the peak hours, a technique sometimes used when peak traffic exceeds capacity at a predictable time. Alternatively, warrants might eventually be met for a traffic signal at one or more entry locations. This is generally not preferred at spacing tighter than one-half mile on an arterial roadway, but may be allowed if the LOS degrades sufficiently.

Priority 5: Add Turn Lane Capacity

If campus expansion eventually reaches the level of Scenario 3 development with four new buildings, it may become necessary to add turn lane storage capacity. This might involve moving the security mechanisms farther onto campus. The preliminary site concepts illustrate the gates being located between 250 feet and 320 feet inside of the campus perimeter. This allows for about 10 – 15 queuing vehicles before backing up onto the arterial roadway. Alternatively, increasing the storage capacity of the 37th St. turn lanes (adding a lane or increasing the length) would yield similar results. The turn lanes onto campus are also 250 feet in length. If congestion exceeds the forecasts and frequently begins to back up beyond the designed storage capacity into the arterial through lanes, adding turn lane capacity may be the only viable remaining option.

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37TH STREET RELOCATION

CONSTRUCTION MANAGEMENT

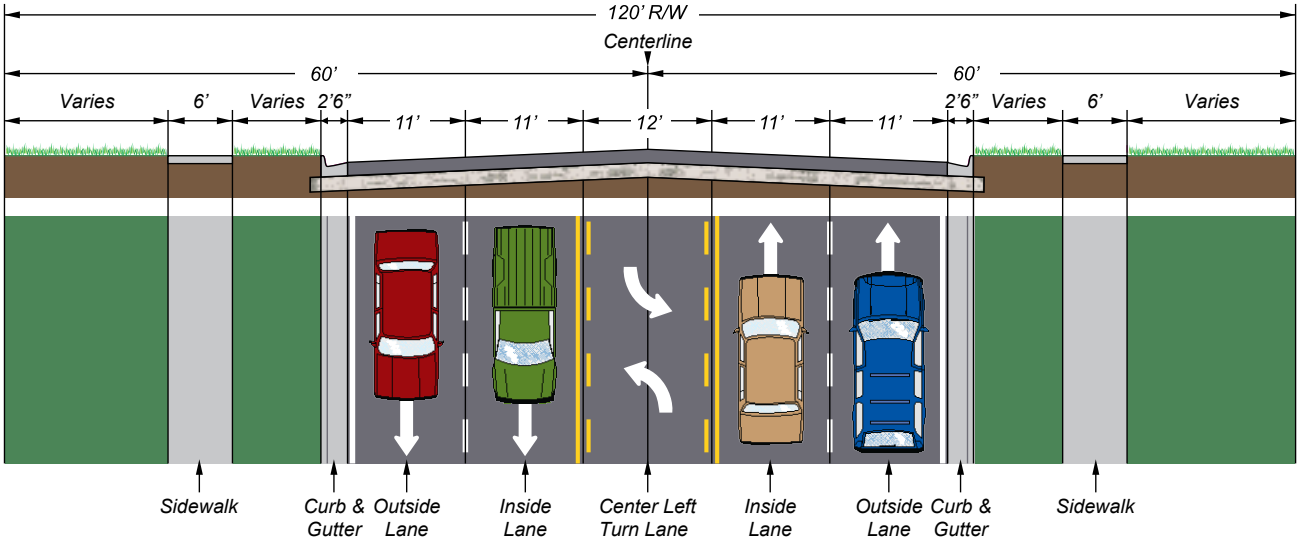
A critical question that needed to be answered is whether Koch or the City of Wichita would conduct bidding, construction and construction management of the 37th St. relocation. Per the Preliminary Approval Letter (Appendix 1), as a condition of project approval the City of Wichita would assume construction management responsibilities and conduct the process as it would any typical arterial street project with Koch reimbursing the City for project costs. This would include bid advertising, bidding, construction survey, inspections and materials testing for the 37th St. relocation, storm water sewer and water main (see Section 3) project components. A formal agreement between the City and Koch will be required to specify terms and responsibilities.

Based on PEC's experience with public and private bidding, we know there are arguments for both construction management arrangements. With no extenuating circumstances, Koch could likely conduct a streamlined process that would result in expedited construction. Also, they would be able to bid the site and 37th St. construction at the same time. They would not be bound by public bidding and contracting requirements and would be free to select the contractor of their choice. Meanwhile, the local contractors are familiar with the City processes and expectations since the City bids dozens of similar projects each year.

If Koch handles the process, there are no guarantees the City would approve vacation of the existing 37th St. as part of platting and no assurances they would accept the improvements upon project completion. The City is experienced with inspection of public improvements and they understand the risks assumed when managing construction of public infrastructure. Furthermore, extenuating circumstances do exist. The USACE Section 404 permitting is still somewhat ambiguous and any delays caused by the permitting would affect project timing regardless of which party conducts the process.

After consideration of the pros, cons and risks associated with construction management, PEC recommends allowing the City to conduct the process. We believe the uncertainty of Section 404 permitting and the resulting impacts to the construction time line could negate schedule efficiencies Koch could potentially realize by managing construction. Also, it is our opinion that overall project costs would be lower with the City managing construction versus Koch handling the responsibilities in-house. However, final decisions have not been made.

FIGURE 5.1
37th Street Realignment Typical Section



STREET DESCRIPTION

The functional classification of 37th St. is Minor Arterial. It is currently a four lane roadway with dedicated left/right turn and acceleration/deceleration lanes at high volume turning locations, such as parking lot entrances. The roadway segment adjacent to the existing Koch campus has raised, landscaped medians 12 - 16 feet in width that separate directional traffic and channelize left turn movements into campus entry drives. There are no sidewalks in the 37th St. R/W.

Design of the realigned 37th St. is anticipated to follow the City of Wichita standard urban arterial cross section. Located on 120 feet of R/W width will be with two traffic lanes in each direction, a continuous center left turn lane (CLTL) and sidewalks on each side of the street. Utilities may be located within the R/W between the roadway and property line. This typical section is illustrated below in Figure 5.1, although some left turn lanes at entrance locations may be channelized to improve operational safety. The design speed will be 35 mph, which will also be the posted speed limit.

ROADWAY DESIGN CRITERIA

Per City of Wichita Standard Specifications for Arterial Streets, the 37th St. relocation will be designed and constructed to the criteria listed below.

Typical Section

- Pavement Section – 15” thick
  - Mainline Arterial – 7” thick asphaltic concrete over 8” thick reinforced crushed rock base (RCRB)
    - Surface Course – 2” thick (BM-2, PG 70-28)
    - Base Course – 5” thick (BM-2, PG 64-22)
  - Arterial Intersections – 9” thick reinforced concrete over 6” thick RCRB
  - Sideroad Intersections – 8” thick reinforced concrete with reinforced concrete valley gutters (RCVG) over 7” thick RCRB
  - Commercial & Residential Entrances – 8” thick reinforced concrete
- Lane Widths
  - Four (4) Thru Lanes – 11’ width
  - Auxiliary Turn Lanes – 12’ width
- 3% Standard Pavement Cross Slope (max.)
- Concrete Curb & Gutter
  - Mainline – 2’6” width Type I (6” height with 1 ½” height at openings)
  - Median – 1’9” width Type 3 (8” height with 1 ½” height at openings)
- ½” per foot Parking Slope (between curb and sidewalk)
- 6:1 Standard Cut/Fill Slope (between sidewalk and construction limit)
- Sidewalks – located on both sides of the street near the R/W line
  - 4” thick concrete
  - 6’ standard width (min.)

Storm Water Sewer

- Five year design storm return period (15 minute top-of-curb min.)
- Flooded pavement width to allow one (1) 8’ thru lane width free of water without curb overtopping
- HEC-22 procedures for gutter flow and inlet capacity
- Type I curb inlets for interception
- Reinforced concrete piping (RCP) (15” diameter min. for cleaning)
- Maximum run lengths
  - 300’ for 18” diameter and smaller pipe
  - 400’ for 24” diameter and larger pipe

Cross Road Drainage (Culverts)

- 100 year design storm return period
- FHWA HDS-5 procedures using HY-8 programming
- Only RCP or reinforced concrete box (RCB) allowed under roadway

Signing, Marking, Traffic Control

- Per current edition of the Manual on Uniform Traffic Control Devices (MUTCD)

PRELIMINARY CONSTRUCTION COST ESTIMATE

The preliminary cost estimate for construction of the new segment of 37th Street is $5,315,962. This estimate is sufficient for project planning purposes. The amount includes all costs of construction activities, materials, labor, inspections, testing, staking and 15% contingency. Permitting fees are not included in the cost estimate because they cannot be determined based on currently available information. More precise costs will become known as design proceeds through the concept, field check, office check and final plan phases. Updated cost estimates will be prepared and submitted with each phase. The detailed preliminary cost estimate is included in Appendix 6.

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CITY OF WICHITA

June 19, 2012

Craig Highfill
Vice President, Facilities Solutions
Koch Industries, Inc.
4111 E 37th St North
Wichita, KS 67220-3203

Dear Mr. Highfill:

The City of Wichita is excited to partner with Koch Industries in facilitating improvements to 37th Street North between Hillside and Oliver to accommodate the expansion of the Koch campus. Per our previous discussions, the City desires the following in order to make this a successful project.

1. The City desires to have the existing 20" waterline relocated to the new 37th street alignment rather than leaving it in easement across Koch's campus. Future access of the existing line would be difficult and necessary repairs could cause a negative impact to your property.

2. The City will advertise the project for bidding and will provide construction surveying, inspection and materials testing for all paving, drainage and waterline relocation work associated with the relocation of 37th Street. Koch will be required to reimburse the City for construction, surveying, inspection and materials testing costs. We can provide an estimate for all costs once more detailed plans have been developed. An agreement between the City and Koch will be required.

3. 37th Street shall be a 4-lane roadway, with left and right turn deceleration lanes provided at the 3 proposed entrances.

4. Professional Engineering Consultants will coordinate all utility relocations and Koch will be responsible for costs to relocate all utilities as required.

City Manager's Office

City Hall • 13th Floor • 455 North Main • Wichita, Kansas 67202-1667

T 316.268.4351 **F** 316.858.7712

www.wichita.gov

Craig Highfill
June 19, 2012
Page 2

The Wichita City Council is in support of the project concept and will consider a formal endorsement of the same as soon as design concepts are developed. Please consider this letter preliminary approval to move forward with the project as currently presented.

Our contact for this project is Gary Janzen, P.E., interim City Engineer. He can be reached at gjanzen@wichita.gov or 316-268-4450.

Sincerely,

Robert Layton
City Manager

cc: Gary Janzen
Alan King

Wichita-Sedgwick County
Metropolitan Area Planning Commission / Board of Zoning Appeals
2013 Calendar

CLOSING DATE (Monday by 4:00 p.m.)	**NOTICE** TO OFFICIAL NEWSPAPER (Monday 9:00 a.m.)	**ADVERTISING** DATE (Thursday)	**MAPC HEARING** DATE (1:30 p.m. Thursday)
December 3, 2012	December 17, 2012	December 20, 2012	January 10, 2013
Friday, December 17, 2012	Friday, December 28, 2012	January 3, 2013	January 24, 2013
December 31, 2012	January 14, 2013	January 17, 2013	February 7, 2013
January 14, 2013	January 28, 2013	January 31, 2013	February 21, 2013
January 28, 2013	February 11, 2013	February 14, 2013	March 7, 2013
February 11, 2013	February 25, 2013	February 28, 2013	March 21, 2013
February 25, 2013	March 11, 2013	March 14, 2013	April 4, 2013
March 11, 2013	March 25, 2013	March 28, 2013	April 18, 2013
April 1, 2013	April 15, 2013	April 18, 2013	May 9, 2013
April 15, 2013	April 29, 2013	May 2, 2013	May 23, 2013
April 29, 2013	May 13, 2013	May 16, 2013	June 6, 2013
May 13, 2013	Friday, May 24, 2013	May 30, 2013	June 20, 2013
June 3, 2013	June 17, 2013	June 20, 2013	July 11, 2013
June 17, 2013	July 1, 2013	Wednesday, July 3, 2013	July 25, 2013
July 1, 2013	July 15, 2013	July 18, 2013	August 8, 2013
July 15, 2013	July 29, 2013	August 1, 2013	August 22, 2013
August 5, 2013	August 19, 2013	August 22, 2013	September 12, 2013
August 19, 2013	Friday, August 30, 2013	September 5, 2013	September 26, 2013
Friday August 30, 2013	September 16, 2013	September 19, 2013	October 10, 2013
September 9, 2013	September 30, 2013	October 3, 2013	October 24, 2013
September 30, 2013	October 14, 2013	October 17, 2013	November 7, 2013
October 14 2013	October 28, 2013	October 31, 2013	November 21, 2013
October 28, 2013	Friday, November 8, 2013	November 14, 2013	December 5, 2013
Friday November 8, 2013	November 25, 2013	Wednesday, November 27, 2013	December 19, 2013
December 2, 2013	December 16, 2013	December 19, 2013	January 9, 2014

The MAPC and Board of Zoning Appeals generally meets at 1:30 p.m. on the dates indicated above in the Planning Department Conference Room, 10th Floor, Wichita City Hall, 455 North Main Street, Wichita, Kansas.

11/15/2012 le

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ORDINANCE NO. 47-957

AN ORDINANCE CHANGING THE ZONING CLASSIFICATIONS OR DISTRICTS OF CERTAIN LANDS LOCATED IN THE CITY OF WICHITA, KANSAS, UNDER THE AUTHORITY GRANTED BY THE WICHITA-SEDGWICK COUNTY UNIFIED ZONING CODE, SECTION V-C, AS ADOPTED BY SECTION 28.04.010, AS AMENDED.

BE IT ORDAINED BY THE GOVERNING BODY
OF THE CITY OF WICHITA, KANSAS.

SECTION 1. That having received a recommendation from the Planning Commission, and proper notice having been given and hearing held as provided by law and under authority and subject to the provisions of The Wichita-Sedgwick County Unified Zoning Code, Section V-C, as adopted by Section 28.04.010, as amended, the zoning classification or districts of the lands legally described hereby are changed as follows:

Case No. ZON2008-00029

Zone change from SF-5 single-family Residential ("SF-5") to LI Limited Industrial ("LI") subject to Protective Overlay #215 on property described as:

The E1/2 of the NW1/4 of Section 35, T26S, R1E of the 6th P.M., Sedgwick County, Kansas, EXCEPT Railroad right of way, AND EXCEPT the north 40 feet for Road right of way, AND EXCEPT Koch Office Park, An addition to Sedgwick County, Kansas; Together with the E1/2 of the SW1/4 of said Section 35 lying north of the Highway right of way, EXCEPT Railroad right of way. Generally located east of North Hillside, on the south side of East 37th Street North.

SUBJECT TO THE FOLLOWING PROVISIONS OF PROTECTIVE OVERLAY DISTRICT #215:

1. A platting exemption for this parcel has been approved by the Wichita-Sedgwick County Metropolitan Area Planning Department which will allow the development of a single site product testing facility, generally located south and west of the southwest corner of Lot 1, Koch Office Park Addition, more specifically described as:

   That part of the NW1/4 of Section 35, T26S, R1E of the 6th P.M., Sedgwick County, Kansas, described as beginning at the southwest corner of Lot 1, Block 1, Koch Office Park, an Addition to Sedgwick County, Kansas; thence North along the west line of said Lot 1, 190.00 feet; thence West with a deflection angle of 90°00'00" to the left, 450.00 feet; thence South with a deflection angle of 90°00'00" to the left, 425.00 feet; thence East with a deflection angle of 90°00'00" to the left, 450.00 feet; thence North with a deflection angle of 90°00'00" to the left, 235.00 feet to the place of beginning.

   The product testing facility site shall include structures, parking, and fencing in compliance with a site plan to be approved by the Office of Central Inspection, Wichita, Kansas.

2. The Office of Central Inspection, Wichita, Kansas, agrees to issue a building permit for the product testing facility site subject to the following conditions:

a) The proposed building site is not landlocked, i.e., has proper access by way of a public or private road to a city, county, township, or state highway system.
b) The proposed building site has access to all utility and telephone services by way of a recorded easement dedicated to the public. The easement serving the property shall not be less than 20 feet in width adjacent to a rear property line or 10 feet in width adjacent to a side property line. The easement shall extend continuously to a service entrance point and exit point for all the utilities and telephone services.
c) Provision for sanitary sewer service has been obtained.
d) Provision for water services has been obtained.
e) All required permits from the State such as, but not limited to, the creation of dams and lakes have been obtained for the site being developed.
f) The proposed building site, as designated on a plot plan submitted for building permit review, is not located on land subject to flooding as described in Section 7-103 of these Regulations.
g) If any portion of the proposed building site lies in a flood hazard area as shown on the Flood Boundary and Floodway Map published by the Federal Emergency Management Agency, or if drainage channels and waterways exist on the site being developed that carry runoff from adjacent property or public roads, the flood hazard area or drainage channel shall be protected by grant of easement, dedication or other similar devise as may be required by the City of Wichita.
h) If the proposed building site is located adjacent to a public road right-of-way that does not conform to the requirements of Section 7-201, additional right-of-way shall be granted by dedication or easement as may be required to conform to Section 7-201.

3. Other than the building site for the product testing facility, no other structure requiring a building permit from the Office of Central Inspection, Wichita, Kansas, will be allowed to be constructed on the property subject to this zone change and protective overlay without platting of the entire property subject to this zone change and protective overlay.

SECTION 2. That upon the taking effect of this ordinance, the above zoning changes shall be entered and shown on the "Official Zoning Map" previously adopted by reference, and said official zoning map is hereby reincorporated as a part of the Wichita -Sedgwick County Unified Zoning Code as amended.

SECTION 3. That this Ordinance shall take effect and be in force from and after its adoption and publication in the official City paper.

ADOPTED AT WICHITA, KANSAS, August 19, 2008.

Carl Brewer Mayor

ADDENDUM NO. #
TO
PLANS AND SPECIFICATIONS

INSERT PROJECT NAME
CITY NAME, KANSAS

PEC PROJECT NO. ##-#####-###

The items contained herein now become a part of the referenced Plans and Specifications. Please read the following items and acknowledge receipt of this addendum on the proposal form when submitting bids.

Potential Borrow Area graphic.

ITEM NO. 1 Sheet (#), note (#) shall be eliminated in its entirety.

ITEM NO. 2 Sheets (#), (#) and (#) the note of "Contaminated Soil Area (#), Soil excavated within the contamination zone will be used as future fill material under future pavement within the limits of Contaminated Soil Area (#). See general notes and specifications for additional information" shall read as follows:

Contaminated Soil Area (#), Soil excavated within the contamination zone will be removed from the site to an approved landfill or land farming operation.

Other Site Contamination procedural notes the bidder should be award of:

1. Scarified vegetation and topsoil within Zone (#) may not be used as fill material within parking lots.
2. Contractor shall provide employees safety clothing as necessary when dealing with contaminated soils per OSHA regulations.
3. Excavated soil that is contaminated shall not be used as fill material on the site. Such excavated contaminated soil shall be truck hauled to an approved landfill or an approved land farm for remediation. Contractor to contact (CONTACT NAME) at KDHE for direction if necessary.
4. Temporarily stockpiled contaminated material shall be kept within Zone (#) and shall be covered nightly to eliminate rainfall runoff from the site. Visqueen material or equal shall be used.
5. Rainfall in the temporarily open sanitary sewer trench and a groundwater dewatering operation shall be pumped through an oil/water separator or frac tank prior to discharge into the existing wetlands to the east of the project. Contractor can laboratory test the pumped discharge and if found to be acceptable to the (OWNER), trench water flow could be pumped into the local sanitary sewer system south of the project. An additional option, if laboratory tests are not acceptable to the (OWNER), would allow the contractor to haul the pumped flow in tanker trucks to the (LOCATION).
6. The existing drainage line from the sink hole to the creek shall remain in place. Access ports to this line shall be covered with a 3/8" thick steel plate prior to the placement of fill material over the drainage line. Contractor shall insure the pipe remains intact during construction.

7. Dust suppression methods will be implemented whenever soil is excavated or the vegetation covering is removed. Dust control methods that can be used include, but are not limited to, water spray, traffic control, wheel washing, and sweeping of paved surfaces. Application of water will be the primary dust control mechanism, applied by a hand held spray mister for small areas or by a high-pressure spray mister or water truck with a spray bar for larger areas. Calcium chloride or other chemical suppressants may also be used when water alone is not sufficient. Vehicular traffic will be kept at low speeds to minimize dust migration.

8. Earthwork moving equipment used within Area (#) will be decontaminated by steam cleaning the equipment at the end of each work day. Equipment shall be placed on a designated earthen decontamination pad in a specified area within Area (#). Wash water from the steam cleaning procedure will be collected in a containment area and pumped through an oil/water separator per No. 5 above.

Last Item

End of Addendum No. #

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

(PM NAME)
Project Manager

JEH/jdd

(DATE)

SITE CODE: 2012052302
LOCATION: 37th & Koch Dr. (East)
START DATE: 5/23/2012
WEATHER: Clear/Dry/Windy
COLLECTED BY: K. Raymond

PEC PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

START	SOUTHBOUND					WESTBOUND					NORTHBOUND					EASTBOUND					INT
TIME	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	TOTAL
6:45 AM					0					0					0					0	0
7:00 AM	0	0	0		0	9	42	27		78	5	0	1		6	1	34	8		43	127
7:15 AM	0	0	1		1	11	51	51		113	0	0	2		2	2	41	31		74	190
7:30 AM	1	0	1		2	18	103	125		246	0	0	0		0	3	58	31		92	340
7:45 AM	1	0	0		1	32	88	150		270	1	0	3		4	7	75	31		113	388
8:00 AM	1	0	1		2	8	55	22		85	1	0	0		1	2	66	15		83	171
8:15 AM	0	0	0		0	0	33	4		37	1	0	2		3	0	31	3		34	74
8:30 AM	0	0	0		0	3	44	5		52	0	0	0		0	0	36	4		40	92
8:45 AM	0	0	0		0	0	29	1		30	0	4	0		4	1	37	2		40	74
9:00 AM	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		0	0
9:15 AM					0					0					0					0	0
9:30 AM					0					0					0					0	0
9:45 AM					0					0					0					0	0
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3:15 PM					0					0					0					0	0
3:30 PM					0					0					0					0	0
3:45 PM					0					0					0					0	0
4:00 PM	3	0	1		4	0	51	0		51	0	0	4		4	0	56	2		58	117
4:15 PM	17	0	5		22	2	30	1		33	5	0	10		15	0	59	2		61	131
4:30 PM	25	0	1		26	0	57	1		58	6	0	7		13	0	93	1		94	191
4:45 PM	61	1	7		69	1	46	1		48	18	1	28		47	0	117	4		121	285
5:00 PM	70	0	7		77	0	79	2		81	14	0	22		36	1	199	1		201	395
5:15 PM	57	0	5		62	1	50	1		52	5	1	16		22	0	158	1		159	295
5:30 PM	45	1	0		46	0	56	0		56	14	1	17		32	0	108	0		108	242
5:45 PM	31	0	5		36	1	42	1		44	11	1	5		17	0	72	0		72	169
6:00 PM					0					0					0					0	0
6:15 PM					0					0					0					0	0

GRAND TOTAL	312	2	34	0	348	86	856	392	0	1334	81	8	117	0	206	17	1240	136	0	1393	3281
APPR %	89.7	0.6	9.8			6.4	64.2	29.4			39.3	3.9	56.8			1.2	89.0	9.8			
TOTAL %	9.5	0.1	1.0			2.6	26.1	11.9			2.5	0.2	3.6			0.5	37.8	4.1			
AM PK HR	7:15 AM																				
TOTAL	3	0	3	0	6	69	297	348	0	714	2	0	5	0	7	14	240	108	0	362	1089
PHF					0.750					0.661					0.438					0.801	0.702
APPR %	50.0	0.0	50.0			9.7	41.6	48.7			28.6	0.0	71.4			3.9	66.3	29.8			
TOTAL %	0.3	0.0	0.3			6.3	27.3	32.0			0.2	0.0	0.5			1.3	22.0	9.9			
MID PK HR																					
TOTAL																					
PHF																					
APPR %																					
TOTAL %																					
PM PK HR	4:45 PM																				
TOTAL	233	2	19	0	254	2	231	4	0	237	51	3	83	0	137	1	582	6	0	589	1217
PHF					0.825					0.731					0.729					0.733	0.770
APPR %	91.7	0.8	7.5			0.8	97.5	1.7			37.2	2.2	60.6			0.2	98.8	1.0			
TOTAL %	19.1	0.2	1.6			0.2	19.0	0.3			4.2	0.2	6.8			0.1	47.8	0.5			

SITE CODE: 2012052401
LOCATION: Hillside & 37th
START DATE: 5/24/2012
WEATHER: Clear/Dry
COLLECTED BY: J. Templin

PEC PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

START	SOUTHBOUND					WESTBOUND					NORTHBOUND					EASTBOUND					INT
TIME	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	TOTAL
6:45 AM					0					0					0					0	0
7:00 AM	78	22	2		102	13	13	8		34	11	8	38		57	1	31	4		36	229
7:15 AM	87	44	5		136	14	13	5		32	8	7	43		58	4	38	16		58	284
7:30 AM	144	34	4		182	19	26	3		48	17	12	92		121	2	77	21		100	451
7:45 AM	125	46	1		172	17	31	3		51	19	16	146		181	1	82	14		97	501
8:00 AM	32	22	7		61	8	20	6		34	16	12	35		63	2	21	14		37	195
8:15 AM	16	24	8		48	13	13	2		28	16	11	11		38	0	23	7		30	144
8:30 AM	9	20	5		34	12	8	5		25	9	19	10		38	1	11	9		21	118
8:45 AM	13	37	8		58	12	12	3		27	19	10	7		36	4	12	11		27	148
9:00 AM					0					0					0					0	0
9:15 AM					0					0					0					0	0
9:30 AM					0					0					0					0	0
9:45 AM					0					0					0					0	0
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3:45 PM					0					0					0					0	0
4:00 PM	5	22	0		27	16	22	22		60	10	32	16		58	2	28	13		43	188
4:15 PM	7	19	0		26	19	18	25		62	5	21	17		43	5	27	10		42	173
4:30 PM	6	28	3		37	19	29	38		86	12	43	23		78	2	22	11		35	236
4:45 PM	9	14	0		23	63	43	92		198	11	32	22		65	2	20	10		32	318
5:00 PM	10	21	1		32	89	60	94		243	15	36	25		76	6	40	39		85	436
5:15 PM	7	30	3		40	55	57	64		176	13	32	36		81	3	48	15		66	363
5:30 PM	8	29	3		40	44	44	71		159	5	32	21		58	5	30	12		47	304
5:45 PM	18	21	1		40	27	24	42		93	3	23	16		42	5	19	8		32	207
6:00 PM					0					0					0					0	0
6:15 PM					0					0					0					0	0

GRAND TOTAL	574	433	51	0	1058	440	433	483	0	1356	189	346	558	0	1093	45	529	214	0	788	4295
APPR %	54.3	40.9	4.8			32.4	31.9	35.6			17.3	31.7	51.1			5.7	67.1	27.2			
TOTAL %	13.4	10.1	1.2			10.2	10.1	11.2			4.4	8.1	13.0			1.0	12.3	5.0			
AM PK HR	7:00 AM																				
TOTAL	434	146	12	0	592	63	83	19	0	165	55	43	319	0	417	8	228	55	0	291	1465
PHF					0.813					0.809					0.576					0.728	0.731
APPR %	73.3	24.7	2.0			38.2	50.3	11.5			13.2	10.3	76.5			2.7	78.4	18.9			
TOTAL %	29.6	10.0	0.8			4.3	5.7	1.3			3.8	2.9	21.8			0.5	15.6	3.8			
MID PK HR																					
TOTAL																					
PHF																					
APPR %																					
TOTAL %																					
PM PK HR	4:45 PM																				
TOTAL	34	94	7	0	135	251	204	321	0	776	44	132	104	0	280	16	138	76	0	230	1421
PHF					0.844					0.798					0.864					0.676	0.815
APPR %	25.2	69.6	5.2			32.3	26.3	41.4			15.7	47.1	37.1			7.0	60.0	33.0			
TOTAL %	2.4	6.6	0.5			17.7	14.4	22.6			3.1	9.3	7.3			1.1	9.7	5.3			

SITE CODE: 2012052402
LOCATION: Oliver & 37th
START DATE: 5/24/2012
WEATHER: Clear/Dry
COLLECTED BY: K. Raymond

PEC
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

START	SOUTHBOUND					WESTBOUND					NORTHBOUND					EASTBOUND					INT
TIME	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	TOTAL
6:45 AM					0					0					0					0	0
7:00 AM	4	38	9		51	21	33	2		56	35	14	11		60	1	30	10		41	208
7:15 AM	11	68	18		97	28	49	6		83	59	11	20		90	3	39	10		52	322
7:30 AM	17	77	23		117	50	99	7		156	118	17	20		155	2	54	14		70	498
7:45 AM	15	63	39		117	46	93	5		144	93	36	28		157	1	41	18		60	478
8:00 AM	11	50	11		72	37	43	9		89	30	19	19		68	0	31	10		41	270
8:15 AM	11	31	7		49	25	20	6		51	21	12	15		48	3	28	5		36	184
8:30 AM	14	27	8		49	19	25	2		46	8	10	12		30	2	18	7		27	152
8:45 AM	8	34	11		53	26	16	5		47	4	19	18		41	1	11	2		14	155
9:00 AM					0					0					0					0	0
9:15 AM					0					0					0					0	0
9:30 AM					0					0					0					0	0
9:45 AM					0					0					0					0	0
10:00 AM					0					0					0					0	0
10:15 AM					0					0					0					0	0
10:30 AM					0					0					0					0	0
10:45 AM					0					0					0					0	0
11:00 AM					0					0					0					0	0
11:15 AM					0					0					0					0	0
11:30 AM					0					0					0					0	0
11:45 AM					0					0					0					0	0
12:00 PM					0					0					0					0	0
12:15 PM					0					0					0					0	0
12:30 PM					0					0					0					0	0
12:45 PM					0					0					0					0	0
1:00 PM					0					0					0					0	0
1:15 PM					0					0					0					0	0
1:30 PM					0					0					0					0	0
1:45 PM					0					0					0					0	0
2:00 PM					0					0					0					0	0
2:15 PM					0					0					0					0	0
2:30 PM					0					0					0					0	0
2:45 PM					0					0					0					0	0
3:00 PM					0					0					0					0	0
3:15 PM					0					0					0					0	0
3:30 PM					0					0					0					0	0
3:45 PM					0					0					0					0	0
4:00 PM	10	29	2		41	26	37	15		78	7	43	34		84	10	41	12		63	266
4:15 PM	9	23	0		32	28	29	27		84	3	41	29		73	13	40	14		67	256
4:30 PM	14	25	3		42	35	40	38		113	11	59	31		101	9	47	18		74	330
4:45 PM	6	29	7		42	25	33	21		79	9	48	42		99	20	98	92		210	430
5:00 PM	7	33	4		44	39	48	34		121	17	83	43		143	26	110	118		254	562
5:15 PM	12	39	0		51	38	55	24		117	16	76	43		135	32	92	77		201	504
5:30 PM	18	30	4		52	35	39	26		100	5	80	51		136	20	68	66		154	442
5:45 PM	17	32	2		51	41	42	19		102	2	57	45		104	12	55	49		116	373
6:00 PM					0					0					0					0	0
6:15 PM					0					0					0					0	0

GRAND TOTAL	184	628	148	0	960	519	701	246	0	1466	438	625	461	0	1524	155	803	522	0	1480	5430
APPR %	19.2	65.4	15.4			35.4	47.8	16.8			28.7	41.0	30.2			10.5	54.3	35.3			
TOTAL %	3.4	11.6	2.7			9.6	12.9	4.5			8.1	11.5	8.5			2.9	14.8	9.6			
AM PK HR	7:15 AM																				
TOTAL	54	258	91	0	403	161	284	27	0	472	300	83	87	0	470	6	165	52	0	223	1568
PHF					0.861					0.756					0.748					0.796	0.787
APPR %	13.4	64.0	22.6			34.1	60.2	5.7			63.8	17.7	18.5			2.7	74.0	23.3			
TOTAL %	3.4	16.5	5.8			10.3	18.1	1.7			19.1	5.3	5.5			0.4	10.5	3.3			
MID PK HR																					
TOTAL																					
PHF																					
APPR %																					
TOTAL %																					
PM PK HR	4:45 PM																				
TOTAL	43	131	15	0	189	137	175	105	0	417	47	287	179	0	513	98	368	353	0	819	1938
PHF					0.909					0.862					0.897					0.806	0.862
APPR %	22.8	69.3	7.9			32.9	42.0	25.2			9.2	55.9	34.9			12.0	44.9	43.1			
TOTAL %	2.2	6.8	0.8			7.1	9.0	5.4			2.4	14.8	9.2			5.1	19.0	18.2			

SITE CODE: 2012052401
LOCATION: Hillside & 37th
START DATE: 5/24/2012
WEATHER: Clear/Dry
COLLECTED BY: J. Templin

PEC
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

START	SOUTHBOUND					WESTBOUND					NORTHBOUND					EASTBOUND					INT
TIME	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	TOTAL
6:45 AM					0					0					0					0	0
7:00 AM	78	22	2		102	13	13	8		34	11	8	38		57	1	31	4		36	229
7:15 AM	87	44	5		136	14	13	5		32	8	7	43		58	4	38	16		58	284
7:30 AM	144	34	4		182	19	26	3		48	17	12	92		121	2	77	21		100	451
7:45 AM	125	46	1		172	17	31	3		51	19	16	146		181	1	82	14		97	501
8:00 AM	32	22	7		61	8	20	6		34	16	12	35		63	2	21	14		37	195
8:15 AM	16	24	8		48	13	13	2		28	16	11	11		38	0	23	7		30	144
8:30 AM	9	20	5		34	12	8	5		25	9	19	10		38	1	11	9		21	118
8:45 AM	13	37	8		58	12	12	3		27	19	10	7		36	4	12	11		27	148
9:00 AM					0					0					0					0	0
9:15 AM					0					0					0					0	0
9:30 AM					0					0					0					0	0
9:45 AM					0					0					0					0	0
10:00 AM					0					0					0					0	0
10:15 AM					0					0					0					0	0
10:30 AM					0					0					0					0	0
10:45 AM					0					0					0					0	0
11:00 AM					0					0					0					0	0
11:15 AM					0					0					0					0	0
11:30 AM					0					0					0					0	0
11:45 AM					0					0					0					0	0
12:00 PM					0					0					0					0	0
12:15 PM					0					0					0					0	0
12:30 PM					0					0					0					0	0
12:45 PM					0					0					0					0	0
1:00 PM					0					0					0					0	0
1:15 PM					0					0					0					0	0
1:30 PM					0					0					0					0	0
1:45 PM					0					0					0					0	0
2:00 PM					0					0					0					0	0
2:15 PM					0					0					0					0	0
2:30 PM					0					0					0					0	0
2:45 PM					0					0					0					0	0
3:00 PM					0					0					0					0	0
3:15 PM					0					0					0					0	0
3:30 PM					0					0					0					0	0
3:45 PM					0					0					0					0	0
4:00 PM	5	22	0		27	16	22	22		60	10	32	16		58	2	28	13		43	188
4:15 PM	7	19	0		26	19	18	25		62	5	21	17		43	5	27	10		42	173
4:30 PM	6	28	3		37	19	29	38		86	12	43	23		78	2	22	11		35	236
4:45 PM	9	14	0		23	63	43	92		198	11	32	22		65	2	20	10		32	318
5:00 PM	10	21	1		32	89	60	94		243	15	36	25		76	6	40	39		85	436
5:15 PM	7	30	3		40	55	57	64		176	13	32	36		81	3	48	15		66	363
5:30 PM	8	29	3		40	44	44	71		159	5	32	21		58	5	30	12		47	304
5:45 PM	18	21	1		40	27	24	42		93	3	23	16		42	5	19	8		32	207
6:00 PM					0					0					0					0	0
6:15 PM					0					0					0					0	0

GRAND TOTAL	574	433	51	0	1058	440	433	483	0	1356	189	346	558	0	1093	45	529	214	0	788	4295
APPR %	54.3	40.9	4.8			32.4	31.9	35.6			17.3	31.7	51.1			5.7	67.1	27.2			
TOTAL %	13.4	10.1	1.2			10.2	10.1	11.2			4.4	8.1	13.0			1.0	12.3	5.0			
AM PK HR	7:00 AM																				
TOTAL	434	146	12	0	592	63	83	19	0	165	55	43	319	0	417	8	228	55	0	291	1465
PHF					0.813					0.809					0.576					0.728	0.731
APPR %	73.3	24.7	2.0			38.2	50.3	11.5			13.2	10.3	76.5			2.7	78.4	18.9			
TOTAL %	29.6	10.0	0.8			4.3	5.7	1.3			3.8	2.9	21.8			0.5	15.6	3.8			
MID PK HR																					
TOTAL																					
PHF																					
APPR %																					
TOTAL %																					
PM PK HR	4:45 PM																				
TOTAL	34	94	7	0	135	251	204	321	0	776	44	132	104	0	280	16	138	76	0	230	1421
PHF					0.844					0.798					0.864					0.676	0.815
APPR %	25.2	69.6	5.2			32.3	26.3	41.4			15.7	47.1	37.1			7.0	60.0	33.0			
TOTAL %	2.4	6.6	0.5			17.7	14.4	22.6			3.1	9.3	7.3			1.1	9.7	5.3			

SITE CODE: 2012052402
LOCATION: Oliver & 37th
START DATE: 5/24/2012
WEATHER: Clear/Dry
COLLECTED BY: K. Raymond

PEC PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

START	SOUTHBOUND					WESTBOUND					NORTHBOUND					EASTBOUND					INT
TIME	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	TOTAL
6:45 AM					0					0					0					0	0
7:00 AM	4	38	9		51	21	33	2		56	35	14	11		60	1	30	10		41	208
7:15 AM	11	68	18		97	28	49	6		83	59	11	20		90	3	39	10		52	322
7:30 AM	17	77	23		117	50	99	7		156	118	17	20		155	2	54	14		70	498
7:45 AM	15	63	39		117	46	93	5		144	93	36	28		157	1	41	18		60	478
8:00 AM	11	50	11		72	37	43	9		89	30	19	19		68	0	31	10		41	270
8:15 AM	11	31	7		49	25	20	6		51	21	12	15		48	3	28	5		36	184
8:30 AM	14	27	8		49	19	25	2		46	8	10	12		30	2	18	7		27	152
8:45 AM	8	34	11		53	26	16	5		47	4	19	18		41	1	11	2		14	155
9:00 AM					0					0					0					0	0
9:15 AM					0					0					0					0	0
9:30 AM					0					0					0					0	0
9:45 AM					0					0					0					0	0
10:00 AM					0					0					0					0	0
10:15 AM					0					0					0					0	0
10:30 AM					0					0					0					0	0
10:45 AM					0					0					0					0	0
11:00 AM					0					0					0					0	0
11:15 AM					0					0					0					0	0
11:30 AM					0					0					0					0	0
11:45 AM					0					0					0					0	0
12:00 PM					0					0					0					0	0
12:15 PM					0					0					0					0	0
12:30 PM					0					0					0					0	0
12:45 PM					0					0					0					0	0
1:00 PM					0					0					0					0	0
1:15 PM					0					0					0					0	0
1:30 PM					0					0					0					0	0
1:45 PM					0					0					0					0	0
2:00 PM					0					0					0					0	0
2:15 PM					0					0					0					0	0
2:30 PM					0					0					0					0	0
2:45 PM					0					0					0					0	0
3:00 PM					0					0					0					0	0
3:15 PM					0					0					0					0	0
3:30 PM					0					0					0					0	0
3:45 PM					0					0					0					0	0
4:00 PM	10	29	2		41	26	37	15		78	7	43	34		84	10	41	12		63	266
4:15 PM	9	23	0		32	28	29	27		84	3	41	29		73	13	40	14		67	256
4:30 PM	14	25	3		42	35	40	38		113	11	59	31		101	9	47	18		74	330
4:45 PM	6	29	7		42	25	33	21		79	9	48	42		99	20	98	92		210	430
5:00 PM	7	33	4		44	39	48	34		121	17	83	43		143	26	110	118		254	562
5:15 PM	12	39	0		51	38	55	24		117	16	76	43		135	32	92	77		201	504
5:30 PM	18	30	4		52	35	39	26		100	5	80	51		136	20	68	66		154	442
5:45 PM	17	32	2		51	41	42	19		102	2	57	45		104	12	55	49		116	373
6:00 PM					0					0					0					0	0
6:15 PM					0					0					0					0	0

GRAND TOTAL	184	628	148	0	960	519	701	246	0	1466	438	625	461	0	1524	155	803	522	0	1480	5430
APPR %	19.2	65.4	15.4			35.4	47.8	16.8			28.7	41.0	30.2			10.5	54.3	35.3			
TOTAL %	3.4	11.6	2.7			9.6	12.9	4.5			8.1	11.5	8.5			2.9	14.8	9.6			
AM PK HR	7:15 AM																				
TOTAL	54	258	91	0	403	161	284	27	0	472	300	83	87	0	470	6	165	52	0	223	1568
PHF					0.861					0.756					0.748					0.796	0.787
APPR %	13.4	64.0	22.6			34.1	60.2	5.7			63.8	17.7	18.5			2.7	74.0	23.3			
TOTAL %	3.4	16.5	5.8			10.3	18.1	1.7			19.1	5.3	5.5			0.4	10.5	3.3			
MID PK HR																					
TOTAL																					
PHF																					
APPR %																					
TOTAL %																					
PM PK HR	4:45 PM																				
TOTAL	43	131	15	0	189	137	175	105	0	417	47	287	179	0	513	98	368	353	0	819	1938
PHF					0.909					0.862					0.897					0.806	0.862
APPR %	22.8	69.3	7.9			32.9	42.0	25.2			9.2	55.9	34.9			12.0	44.9	43.1			
TOTAL %	2.2	6.8	0.8			7.1	9.0	5.4			2.4	14.8	9.2			5.1	19.0	18.2			

SITE CODE: 2012060501
LOCATION: Hillside & K-96 (N)
START DATE: 6/5/2012
WEATHER: Clear/Dry
COLLECTED BY: J. Templin

PEC
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

START	SOUTHBOUND					WESTBOUND					NORTHBOUND					EASTBOUND					INT
TIME	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	TOTAL
6:45 AM					0					0					0					0	0
7:00 AM	0	40	15		55	20	0	8		28	11	50	0		61	0	0	0		0	144
7:15 AM	0	53	7		60	24	0	16		40	10	88	0		98	0	0	0		0	198
7:30 AM	0	91	5		96	37	1	33		71	11	124	0		135	0	0	0		0	302
7:45 AM	0	89	11		100	48	0	35		83	13	140	0		153	0	0	0		0	336
8:00 AM	0	59	9		68	32	1	13		46	12	45	0		57	0	0	0		0	171
8:15 AM	0	32	4		36	38	1	12		51	17	45	0		62	0	0	0		0	149
8:30 AM	0	34	8		42	37	0	14		51	7	29	0		36	0	0	0		0	129
8:45 AM	0	35	10		45	28	0	8		36	8	23	0		31	0	0	0		0	112
9:00 AM					0					0					0					0	0
9:15 AM					0					0					0					0	0
9:30 AM					0					0					0					0	0
9:45 AM					0					0					0					0	0
10:00 AM					0					0					0					0	0
10:15 AM					0					0					0					0	0
10:30 AM					0					0					0					0	0
10:45 AM					0					0					0					0	0
11:00 AM					0					0					0					0	0
11:15 AM					0					0					0					0	0
11:30 AM					0					0					0					0	0
11:45 AM					0					0					0					0	0
12:00 PM					0					0					0					0	0
12:15 PM					0					0					0					0	0
12:30 PM					0					0					0					0	0
12:45 PM					0					0					0					0	0
1:00 PM					0					0					0					0	0
1:15 PM					0					0					0					0	0
1:30 PM					0					0					0					0	0
1:45 PM					0					0					0					0	0
2:00 PM					0					0					0					0	0
2:15 PM					0					0					0					0	0
2:30 PM					0					0					0					0	0
2:45 PM					0					0					0					0	0
3:00 PM					0					0					0					0	0
3:15 PM					0					0					0					0	0
3:30 PM					0					0					0					0	0
3:45 PM					0					0					0					0	0
4:00 PM	0	53	28		81	22	1	18		41	21	51	0		72	0	0	0		0	194
4:15 PM	0	44	16		60	20	0	19		39	34	47	0		81	0	0	0		0	180
4:30 PM	0	67	18		85	20	0	19		39	39	77	0		116	0	0	0		0	240
4:45 PM	0	52	41		93	25	1	10		36	35	57	0		92	0	0	0		0	221
5:00 PM	0	73	87		160	29	1	9		39	34	87	0		121	0	0	0		0	320
5:15 PM	0	56	48		104	33	0	22		55	25	69	0		94	0	0	0		0	253
5:30 PM	0	58	45		103	17	0	14		31	26	55	0		81	0	0	0		0	215
5:45 PM	0	57	19		76	31	0	20		51	20	49	0		69	0	0	0		0	196
6:00 PM					0					0					0					0	0
6:15 PM					0					0					0					0	0

GRAND TOTAL	0	893	371	0	1264	461	6	270	0	737	323	1036	0	0	1359	0	0	0	0	0	3360
APPR %	0.0	70.6	29.4			62.6	0.8	36.6			23.8	76.2	0.0								
TOTAL %	0.0	26.6	11.0			13.7	0.2	8.0			9.6	30.8	0.0								
AM PK HR	7:15 AM																				
TOTAL	0	292	32	0	324	141	2	97	0	240	46	397	0	0	443	0	0	0	0	0	1007
PHF					0.810					0.723					0.724						0.749
APPR %	0.0	90.1	9.9			58.8	0.8	40.4			10.4	89.6	0.0								
TOTAL %	0.0	29.0	3.2			14.0	0.2	9.6			4.6	39.4	0.0								
MID PK HR																					
TOTAL																					
PHF																					
APPR %																					
TOTAL %																					
PM PK HR	4:30 PM																				
TOTAL	0	248	194	0	442	107	2	60	0	169	133	290	0	0	423	0	0	0	0	0	1034
PHF					0.691					0.768					0.874						0.808
APPR %	0.0	56.1	43.9			63.3	1.2	35.5			31.4	68.6	0.0								
TOTAL %	0.0	24.0	18.8			10.3	0.2	5.8			12.9	28.0	0.0								

SITE CODE: 2012060502
LOCATION: Hillside & K-96 (S)
START DATE: 6/5/2012
WEATHER: Clear/Dry
COLLECTED BY: C. O'Leary

PEC PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

START	SOUTHBOUND					WESTBOUND					NORTHBOUND					EASTBOUND					INT
TIME	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	TOTAL
6:45 AM					0					0					0					0	0
7:00 AM	13	49	0		62	0	0	0		0	0	21	9		30	34	0	17		51	143
7:15 AM	14	61	0		75	0	0	0		0	0	38	6		44	66	1	30		97	216
7:30 AM	32	102	0		134	0	0	0		0	0	55	15		70	75	0	55		130	334
7:45 AM	27	105	0		132	0	0	0		0	0	80	31		111	72	0	84		156	399
8:00 AM	17	75	0		92	0	0	0		0	0	27	19		46	21	0	34		55	193
8:15 AM	17	61	0		78	0	0	0		0	0	39	22		61	24	0	47		71	210
8:30 AM	10	55	0		65	0	0	0		0	0	21	16		37	12	0	35		47	149
8:45 AM	16	45	0		61	0	0	0		0	0	18	27		45	11	1	35		47	153
9:00 AM					0					0					0					0	0
9:15 AM					0					0					0					0	0
9:30 AM					0					0					0					0	0
9:45 AM					0					0					0					0	0
10:00 AM					0					0					0					0	0
10:15 AM					0					0					0					0	0
10:30 AM					0					0					0					0	0
10:45 AM					0					0					0					0	0
11:00 AM					0					0					0					0	0
11:15 AM					0					0					0					0	0
11:30 AM					0					0					0					0	0
11:45 AM					0					0					0					0	0
12:00 PM					0					0					0					0	0
12:15 PM					0					0					0					0	0
12:30 PM					0					0					0					0	0
12:45 PM					0					0					0					0	0
1:00 PM					0					0					0					0	0
1:15 PM					0					0					0					0	0
1:30 PM					0					0					0					0	0
1:45 PM					0					0					0					0	0
2:00 PM					0					0					0					0	0
2:15 PM					0					0					0					0	0
2:30 PM					0					0					0					0	0
2:45 PM					0					0					0					0	0
3:00 PM					0					0					0					0	0
3:15 PM					0					0					0					0	0
3:30 PM					0					0					0					0	0
3:45 PM					0					0					0					0	0
4:00 PM	18	54	0		72	0	0	0		0	0	62	26		88	14	0	26		40	200
4:15 PM	18	48	0		66	0	0	0		0	0	71	39		110	9	1	23		33	209
4:30 PM	21	63	0		84	0	0	0		0	0	96	38		134	15	0	27		42	260
4:45 PM	21	59	0		80	0	0	0		0	0	78	34		112	22	0	29		51	243
5:00 PM	31	74	0		105	0	0	0		0	0	102	45		147	15	1	29		45	297
5:15 PM	23	63	0		86	0	0	0		0	0	73	35		108	26	0	24		50	244
5:30 PM	21	55	0		76	0	0	0		0	0	61	22		83	14	0	33		47	206
5:45 PM	27	61	0		88	0	0	0		0	0	55	23		78	12	0	30		42	208
6:00 PM					0					0					0					0	0
6:15 PM					0					0					0					0	0

GRAND TOTAL	326	1030	0	0	1356	0	0	0	0	0	0	897	407	0	1304	442	4	558	0	1004	3664
APPR %	24.0	76.0	0.0								0.0	68.8	31.2			44.0	0.4	55.6			
TOTAL %	8.9	28.1	0.0								0.0	24.5	11.1			12.1	0.1	15.2			
AM PK HR	7:15 AM																				
TOTAL	90	343	0	0	433	0	0	0	0	0	0	200	71	0	271	234	1	203	0	438	1142
PHF					0.808										0.610					0.702	0.716
APPR %	20.8	79.2	0.0								0.0	73.8	26.2			53.4	0.2	46.3			
TOTAL %	7.9	30.0	0.0								0.0	17.5	6.2			20.5	0.1	17.8			
MID PK HR																					
TOTAL																					
PHF																					
APPR %																					
TOTAL %																					
PM PK HR	4:30 PM																				
TOTAL	96	259	0	0	355	0	0	0	0	0	0	349	152	0	501	78	1	109	0	188	1044
PHF					0.845										0.852					0.922	0.879
APPR %	27.0	73.0	0.0								0.0	69.7	30.3			41.5	0.5	58.0			
TOTAL %	9.2	24.8	0.0								0.0	33.4	14.6			7.5	0.1	10.4			

SITE CODE: 2012060601
LOCATION: Hillside & K-96 (N)
START DATE: 6/6/2012
WEATHER: Clear/Dry
COLLECTED BY: J. Templin

PEC PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

START	SOUTHBOUND					WESTBOUND					NORTHBOUND					EASTBOUND					INT
TIME	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	TOTAL
6:45 AM					0					0					0					0	0
7:00 AM	0	56	34		90	12	0	82		94	28	74	0		102	0	0	0		0	286
7:15 AM	0	71	46		117	18	0	96		114	33	104	0		137	0	0	0		0	368
7:30 AM	0	71	45		116	10	0	128		138	54	189	0		243	0	0	0		0	497
7:45 AM	0	99	44		143	18	0	120		138	58	234	0		292	0	0	0		0	573
8:00 AM	0	55	40		95	24	0	38		62	21	104	0		125	0	0	0		0	282
8:15 AM	0	66	32		98	24	0	20		44	31	76	0		107	0	0	0		0	249
8:30 AM	0	63	44		107	19	0	13		32	28	62	0		90	0	0	0		0	229
8:45 AM	0	52	20		72	24	0	19		43	22	59	0		81	0	0	0		0	196
9:00 AM					0					0					0					0	0
9:15 AM					0					0					0					0	0
9:30 AM					0					0					0					0	0
9:45 AM					0					0					0					0	0
10:00 AM					0					0					0					0	0
10:15 AM					0					0					0					0	0
10:30 AM					0					0					0					0	0
10:45 AM					0					0					0					0	0
11:00 AM					0					0					0					0	0
11:15 AM					0					0					0					0	0
11:30 AM					0					0					0					0	0
11:45 AM					0					0					0					0	0
12:00 PM					0					0					0					0	0
12:15 PM					0					0					0					0	0
12:30 PM					0					0					0					0	0
12:45 PM					0					0					0					0	0
1:00 PM					0					0					0					0	0
1:15 PM					0					0					0					0	0
1:30 PM					0					0					0					0	0
1:45 PM					0					0					0					0	0
2:00 PM					0					0					0					0	0
2:15 PM					0					0					0					0	0
2:30 PM					0					0					0					0	0
2:45 PM					0					0					0					0	0
3:00 PM					0					0					0					0	0
3:15 PM					0					0					0					0	0
3:30 PM					0					0					0					0	0
3:45 PM					0					0					0					0	0
4:00 PM	0	66	42		108	18	0	17		35	33	81	0		114	0	0	0		0	257
4:15 PM	0	93	40		133	23	0	9		32	42	85	0		127	0	0	0		0	292
4:30 PM	0	111	62		173	21	0	16		37	36	83	0		119	0	0	0		0	329
4:45 PM	0	209	49		258	9	2	24		35	34	86	0		120	0	0	0		0	413
5:00 PM	0	270	58		328	13	0	35		48	54	121	0		175	0	0	0		0	551
5:15 PM	0	196	41		237	24	0	27		51	34	119	0		153	0	0	0		0	441
5:30 PM	0	208	37		245	18	0	30		48	41	101	0		142	0	0	0		0	435
5:45 PM	0	123	33		156	22	0	21		43	28	89	0		117	0	0	0		0	316
6:00 PM					0					0					0					0	0
6:15 PM					0					0					0					0	0

GRAND TOTAL	0	1809	667	0	2476	297	2	695	0	994	577	1667	0	0	2244	0	0	0	0	0	5714
APPR %	0.0	73.1	26.9								25.7	74.3	0.0								
TOTAL %	0.0	31.7	11.7								10.1	29.2	0.0								
AM PK HR	7:15 AM																				
TOTAL	0	296	175	0	471	70	0	382	0	452	166	631	0	0	797	0	0	0	0	0	1720
PHF					0.823					0.819					0.682						0.750
APPR %	0.0	62.8	37.2			15.5	0.0	84.5			20.8	79.2	0.0								
TOTAL %	0.0	17.2	10.2			4.1	0.0	22.2			9.7	36.7	0.0								
MID PK HR																					
TOTAL																					
PHF																					
APPR %																					
TOTAL %																					
PM PK HR	4:45 PM																				
TOTAL	0	883	185	0	1068	64	2	116	0	182	163	427	0	0	590	0	0	0	0	0	1840
PHF					0.814					0.892					0.843						0.835
APPR %	0.0	82.7	17.3			35.2	1.1	63.7			27.6	72.4	0.0								
TOTAL %	0.0	48.0	10.1			3.5	0.1	6.3			8.9	23.2	0.0								

SITE CODE: 2012060602
LOCATION: Hillside & K-96 (S)
START DATE: 6/6/2012
WEATHER: Clear/Dry
COLLECTED BY: C. O'Leary

PEC PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

START	SOUTHBOUND					WESTBOUND					NORTHBOUND					EASTBOUND					INT
TIME	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	LT	TH	RT	PED	TOTAL	TOTAL
6:45 AM					0					0					0					0	0
7:00 AM	11	59	0		70	0	0	0		0	0	69	11		80	38	0	27		65	215
7:15 AM	21	65	0		86	0	0	0		0	0	100	10		110	42	0	28		70	266
7:30 AM	20	71	0		91	0	0	0		0	0	189	14		203	56	0	43		99	393
7:45 AM	28	84	0		112	0	0	0		0	0	223	21		244	61	0	60		121	477
8:00 AM	17	59	0		76	0	0	0		0	0	77	18		95	43	0	33		76	247
8:15 AM	10	81	0		91	0	0	0		0	0	71	18		89	38	0	29		67	247
8:30 AM	20	62	0		82	0	0	0		0	0	58	12		70	25	0	31		56	208
8:45 AM	15	62	0		77	0	0	0		0	0	56	16		72	25	0	35		60	209
9:00 AM					0					0					0					0	0
9:15 AM					0					0					0					0	0
9:30 AM					0					0					0					0	0
9:45 AM					0					0					0					0	0
10:00 AM					0					0					0					0	0
10:15 AM					0					0					0					0	0
10:30 AM					0					0					0					0	0
10:45 AM					0					0					0					0	0
11:00 AM					0					0					0					0	0
11:15 AM					0					0					0					0	0
11:30 AM					0					0					0					0	0
11:45 AM					0					0					0					0	0
12:00 PM					0					0					0					0	0
12:15 PM					0					0					0					0	0
12:30 PM					0					0					0					0	0
12:45 PM					0					0					0					0	0
1:00 PM					0					0					0					0	0
1:15 PM					0					0					0					0	0
1:30 PM					0					0					0					0	0
1:45 PM					0					0					0					0	0
2:00 PM					0					0					0					0	0
2:15 PM					0					0					0					0	0
2:30 PM					0					0					0					0	0
2:45 PM					0					0					0					0	0
3:00 PM					0					0					0					0	0
3:15 PM					0					0					0					0	0
3:30 PM					0					0					0					0	0
3:45 PM					0					0					0					0	0
4:00 PM	20	67	0		87	0	0	0		0	0	84	25		109	29	0	43		72	268
4:15 PM	31	84	0		115	0	0	0		0	0	103	14		117	22	0	32		54	286
4:30 PM	40	95	0		135	0	0	0		0	0	97	27		124	19	0	34		53	312
4:45 PM	99	123	0		222	0	0	0		0	0	117	22		139	18	0	54		72	433
5:00 PM	133	155	0		288	0	0	0		0	0	155	34		189	13	0	55		68	545
5:15 PM	108	111	0		219	0	0	0		0	0	125	32		157	19	0	58		77	453
5:30 PM	94	129	0		223	0	0	0		0	0	117	20		137	20	0	38		58	418
5:45 PM	60	81	0		141	0	0	0		0	0	81	19		100	30	0	42		72	313
6:00 PM					0					0					0					0	0
6:15 PM					0					0					0					0	0

GRAND TOTAL	727	1388	0	0	2115	0	0	0	0	0	0	1722	313	0	2035	498	0	642	0	1140	5290
APPR %	34.4	65.6	0.0								0.0	84.6	15.4			43.7	0.0	56.3			
TOTAL %	13.7	26.2	0.0								0.0	32.6	5.9			9.4	0.0	12.1			
AM PK HR	7:15 AM																				
TOTAL	86	279	0	0	365	0	0	0	0	0	0	589	63	0	652	202	0	164	0	366	1383
PHF					0.815										0.668					0.756	0.725
APPR %	23.6	76.4	0.0								0.0	90.3	9.7			55.2	0.0	44.8			
TOTAL %	6.2	20.2	0.0								0.0	42.6	4.6			14.6	0.0	11.9			
MID PK HR																					
TOTAL																					
PHF																					
APPR %																					
TOTAL %																					
PM PK HR	4:45 PM																				
TOTAL	434	518	0	0	952	0	0	0	0	0	0	514	108	0	622	70	0	205	0	275	1849
PHF					0.826										0.823					0.893	0.848
APPR %	45.6	54.4	0.0								0.0	82.6	17.4			25.5	0.0	74.5			
TOTAL %	23.5	28.0	0.0								0.0	27.8	5.8			3.8	0.0	11.1			

Lanes, Volumes, Timings
Hillside & 37th

7/25/2012
Existing AM Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	228	55	63	83	19	55	43	319	434	146	12
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt		0.971			0.972			0.868			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3437	0	1770	3440	0	1770	3072	0	1770	3500	0
Flt Permitted	0.663			0.395			0.617			0.206		
Satd. Flow (perm)	1235	3437	0	736	3440	0	1149	3072	0	384	3500	0
Satd. Flow (RTOR)		32			26			220			13	
Adj. Flow (vph)	11	312	75	86	114	26	75	59	437	595	200	16
Lane Group Flow (vph)	11	387	0	86	140	0	75	496	0	595	216	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	10.0	20.0		10.0	20.0		11.0	20.0		30.0	39.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	15.2	12.2		18.5	17.8		16.8	11.7		40.7	32.5	
Actuated g/C Ratio	0.21	0.17		0.25	0.24		0.23	0.16		0.56	0.45	
v/c Ratio	0.04	0.64		0.35	0.16		0.24	1.00dr		0.92	0.14	
Control Delay	20.4	32.5		25.7	19.9		14.7	23.7		39.3	13.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.4	32.5		25.7	19.9		14.7	23.7		39.3	13.6	
LOS	C	C		C	B		B	C		D	B	
Approach Delay		32.2			22.1			22.5			32.5	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	4	86		31	21		16	65		227	31	
Queue Length 95th (ft)	12	102		52	40		28	80		#262	42	
Internal Link Dist (ft)		1195			1369			2414			1596	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	288	709		246	940		310	787		687	1648	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.04	0.55		0.35	0.15		0.24	0.63		0.87	0.13	

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 72.7	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 28.4	Intersection LOS: C
Intersection Capacity Utilization 67.1%	ICU Level of Service C
Analysis Period (min) 15	
Description: Hillside / 37th	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Lanes, Volumes, Timings
Hillside & 37th

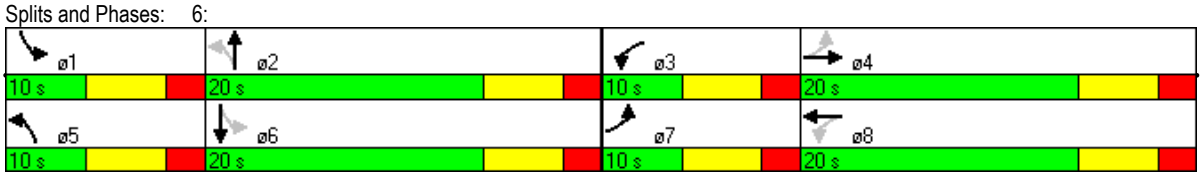
7/25/2012
Existing PM Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	138	76	251	204	321	44	132	104	34	94	7
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt		0.947			0.908			0.934			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3352	0	1770	3214	0	1770	3306	0	1770	3500	0
Flt Permitted	0.409			0.468			0.673			0.575		
Satd. Flow (perm)	762	3352	0	872	3214	0	1254	3306	0	1071	3500	0
Satd. Flow (RTOR)		93			391			127			9	
Adj. Flow (vph)	20	168	93	306	249	391	54	161	127	41	115	9
Lane Group Flow (vph)	20	261	0	306	640	0	54	288	0	41	124	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	10.0	20.0		10.0	20.0		10.0	20.0		10.0	20.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	12.5	8.3		17.9	17.3		9.0	7.8		9.0	7.8	
Actuated g/C Ratio	0.30	0.20		0.42	0.41		0.21	0.18		0.21	0.18	
v/c Ratio	0.06	0.36		0.67	0.41		0.17	0.41		0.14	0.19	
Control Delay	9.9	12.0		23.0	5.9		13.0	11.8		12.6	16.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	9.9	12.0		23.0	5.9		13.0	11.8		12.6	16.5	
LOS	A	B		C	A		B	B		B	B	
Approach Delay		11.8			11.4			12.0			15.5	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	2	15		34	13		9	14		7	10	
Queue Length 95th (ft)	13	43		#153	62		28	46		23	33	
Internal Link Dist (ft)		1195			1369			2414			1596	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	325	1222		458	1546		319	1228		298	1218	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.21		0.67	0.41		0.17	0.23		0.14	0.10	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 42.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 12.0 — Intersection LOS: B
Intersection Capacity Utilization 50.5% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6:



Lanes, Volumes, Timings
Oliver & 37th

7/25/2012
Existing AM Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	165	52	161	284	27	300	83	87	54	258	91
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt		0.964			0.987			0.923			0.961	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3412	0	1770	3493	0	1770	3267	0	1770	3401	0
Flt Permitted	0.520			0.473			0.328			0.617		
Satd. Flow (perm)	969	3412	0	881	3493	0	611	3267	0	1149	3401	0
Satd. Flow (RTOR)		59			14			110			69	
Adj. Flow (vph)	8	209	66	204	359	34	380	105	110	68	327	115
Lane Group Flow (vph)	8	275	0	204	393	0	380	215	0	68	442	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	10.0	20.0		10.0	20.0		15.0	25.0		10.0	20.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	13.5	9.5		18.4	17.6		28.5	23.2		18.0	14.0	
Actuated g/C Ratio	0.22	0.16		0.30	0.29		0.47	0.38		0.30	0.23	
v/c Ratio	0.03	0.47		0.63	0.38		0.83	0.16		0.18	0.53	
Control Delay	14.0	20.7		27.8	18.6		30.9	8.4		11.6	20.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.0	20.7		27.8	18.6		30.9	8.4		11.6	20.2	
LOS	B	C		C	B		C	A		B	C	
Approach Delay		20.5			21.7			22.8			19.0	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	2	37		56	54		85	14		12	61	
Queue Length 95th (ft)	8	57		#88	93		#155	31		30	93	
Internal Link Dist (ft)		757			983			584			2162	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	269	836		326	1026		460	1319		383	841	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.03	0.33		0.63	0.38		0.83	0.16		0.18	0.53	

Intersection Summary	
Cycle Length: 65	
Actuated Cycle Length: 60.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 21.2	Intersection LOS: C
Intersection Capacity Utilization 61.8%	ICU Level of Service B
Analysis Period (min) 15	
Description: Oliver / 37th	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
Oliver & 37th

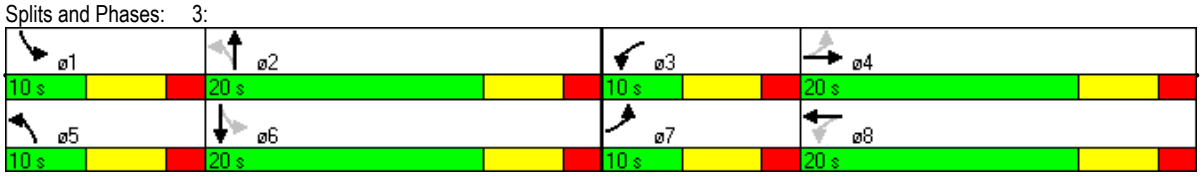
7/25/2012
Existing PM Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	368	353	137	175	105	47	287	179	43	131	15
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt		0.927			0.944			0.942			0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3281	0	1770	3341	0	1770	3334	0	1770	3486	0
Flt Permitted	0.555			0.308			0.645			0.390		
Satd. Flow (perm)	1034	3281	0	574	3341	0	1201	3334	0	726	3486	0
Satd. Flow (RTOR)		377			122			208			17	
Adj. Flow (vph)	114	428	410	159	203	122	55	334	208	50	152	17
Lane Group Flow (vph)	114	838	0	159	325	0	55	542	0	50	169	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	10.0	20.0		10.0	20.0		10.0	20.0		10.0	20.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	16.0	13.0		16.0	13.0		16.7	14.6		16.7	14.6	
Actuated g/C Ratio	0.30	0.25		0.30	0.25		0.32	0.28		0.32	0.28	
v/c Ratio	0.31	0.77		0.59	0.36		0.13	0.51		0.16	0.17	
Control Delay	14.3	16.9		24.6	12.8		12.5	13.4		12.9	16.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.3	16.9		24.6	12.8		12.5	13.4		12.9	16.7	
LOS	B	B		C	B		B	B		B	B	
Approach Delay		16.6			16.7			13.3			15.8	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	25	79		36	31		12	54		11	23	
Queue Length 95th (ft)	51	129		#77	58		29	90		27	43	
Internal Link Dist (ft)		757			983			584			2162	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	370	1180		268	1012		425	1072		312	976	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.31	0.71		0.59	0.32		0.13	0.51		0.16	0.17	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 52.9	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 15.7	Intersection LOS: B
Intersection Capacity Utilization 66.1%	ICU Level of Service C
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3:



Lanes, Volumes, Timings
Hillside & 37th

7/25/2012
Future AM Conditions (10-yr Growth)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	285	69	103	136	31	69	54	398	542	182	15
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt		0.971			0.972			0.868			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3437	0	1770	3440	0	1770	3072	0	1770	3497	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3437	0	1770	3440	0	1770	3072	0	1770	3497	0
Satd. Flow (RTOR)		22			21			145			11	
Adj. Flow (vph)	14	390	95	141	186	42	95	74	545	742	249	21
Lane Group Flow (vph)	14	485	0	141	228	0	95	619	0	742	270	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Total Split (s)	10.0	20.0		15.0	25.0		18.0	25.0		50.0	57.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	4.0	14.0		9.0	25.0		10.3	19.0		44.0	52.7	
Actuated g/C Ratio	0.04	0.13		0.08	0.23		0.09	0.17		0.40	0.48	
v/c Ratio	0.22	1.06		0.97	0.29		0.57	1.39dr		1.05	0.16	
Control Delay	59.6	103.6		119.4	34.2		61.2	60.1		80.4	16.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	59.6	103.6		119.4	34.2		61.2	60.1		80.4	16.1	
LOS	E	F		F	C		E	E		F	B	
Approach Delay		102.4			66.8			60.3			63.2	
Approach LOS		F			E			E			E	
Queue Length 50th (ft)	10	~191		101	60		65	180		~572	53	
Queue Length 95th (ft)	26	#207		#166	83		95	182		#552	63	
Internal Link Dist (ft)		1195			1369			2414			1596	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	64	457		145	798		193	651		708	1681	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.22	1.06		0.97	0.29		0.49	0.95		1.05	0.16	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.06	
Intersection Signal Delay: 70.4	Intersection LOS: E
Intersection Capacity Utilization 80.2%	ICU Level of Service D
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Lanes, Volumes, Timings
Hillside & 37th

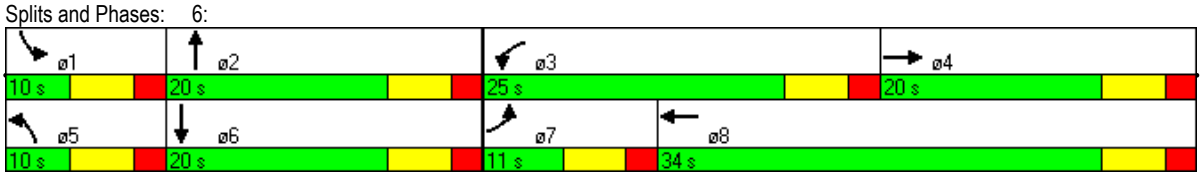
7/25/2012
Future PM Conditions (10-yr Growth)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	172	95	350	285	448	55	165	130	42	117	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt		0.947			0.908			0.934			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3352	0	1770	3214	0	1770	3306	0	1770	3500	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3352	0	1770	3214	0	1770	3306	0	1770	3500	0
Satd. Flow (RTOR)		116			503			159			9	
Adj. Flow (vph)	24	210	116	427	348	546	67	201	159	51	143	11
Lane Group Flow (vph)	24	326	0	427	894	0	67	360	0	51	154	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Total Split (s)	11.0	20.0		25.0	34.0		10.0	20.0		10.0	20.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	5.1	9.7		18.6	30.6		4.1	11.4		4.1	9.4	
Actuated g/C Ratio	0.08	0.15		0.29	0.48		0.06	0.18		0.06	0.15	
v/c Ratio	0.17	0.54		0.83	0.50		0.59	0.50		0.45	0.29	
Control Delay	34.3	20.3		39.8	7.2		56.2	16.7		46.7	25.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	34.3	20.3		39.8	7.2		56.2	16.7		46.7	25.7	
LOS	C	C		D	A		E	B		D	C	
Approach Delay		21.2			17.7			22.9			30.9	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	9	41		161	41		27	39		20	27	
Queue Length 95th (ft)	31	71		#316	95		#83	69		#60	50	
Internal Link Dist (ft)		1195			1369			2414			1596	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	143	848		544	1828		114	904		114	799	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.17	0.38		0.78	0.49		0.59	0.40		0.45	0.19	

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 63.7	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 59.3%	ICU Level of Service B
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6:



Lanes, Volumes, Timings
Oliver & 37th

7/25/2012
Future AM Conditions (10-yr Growth)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	235	74	240	404	38	427	118	124	77	380	130
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.987			0.923			0.962	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3493	0	1770	3267	0	1770	3405	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	1770	3493	0	1770	3267	0	1770	3405	0
Satd. Flow (RTOR)			94		9			157			41	
Adj. Flow (vph)	11	297	94	304	511	48	541	149	157	97	481	165
Lane Group Flow (vph)	11	297	94	304	559	0	541	306	0	97	646	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Total Split (s)	10.0	20.0	20.0	22.0	32.0		35.0	40.0		18.0	23.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	4.0	12.7	12.7	16.0	32.7		29.0	38.6		10.0	17.0	
Actuated g/C Ratio	0.04	0.13	0.13	0.16	0.33		0.29	0.39		0.10	0.17	
v/c Ratio	0.15	0.65	0.33	1.06	0.48		1.04	0.22		0.54	1.04	
Control Delay	51.2	48.3	11.8	111.1	28.1		86.0	11.3		53.4	85.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	51.2	48.3	11.8	111.1	28.1		86.0	11.3		53.4	85.6	
LOS	D	D	B	F	C		F	B		D	F	
Approach Delay		39.8			57.4			59.0			81.4	
Approach LOS		D			E			E			F	
Queue Length 50th (ft)	7	94	0	~215	138		~376	33		59	~224	
Queue Length 95th (ft)	22	120	32	#313	186		#470	52		95	#271	
Internal Link Dist (ft)		757			983			584			2162	
Turn Bay Length (ft)	200		250	200			200			200		
Base Capacity (vph)	72	502	305	287	1163		520	1373		215	621	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.15	0.59	0.31	1.06	0.48		1.04	0.22		0.45	1.04	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 98.7	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.06	
Intersection Signal Delay: 61.6	Intersection LOS: E
Intersection Capacity Utilization 78.1%	ICU Level of Service D
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
Oliver & 37th

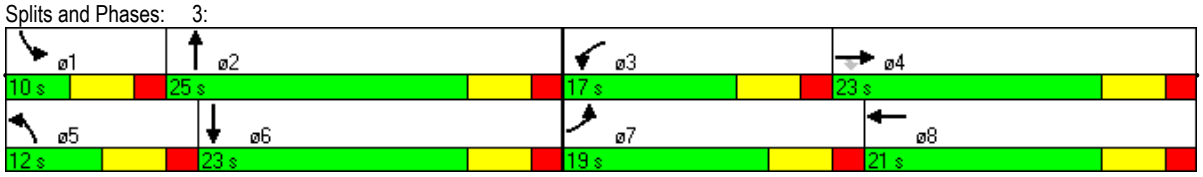
7/25/2012
Future PM Conditions (10-yr Growth)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	131	495	474	195	250	150	67	408	255	61	186	21
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.944			0.942			0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3341	0	1770	3334	0	1770	3486	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	1770	3341	0	1770	3334	0	1770	3486	0
Satd. Flow (RTOR)			354		147			175			15	
Adj. Flow (vph)	152	576	551	227	291	174	78	474	297	71	216	24
Lane Group Flow (vph)	152	576	551	227	465	0	78	771	0	71	240	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Total Split (s)	19.0	23.0	23.0	17.0	21.0		12.0	25.0		10.0	23.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	10.8	16.2	16.2	11.0	19.5		5.9	19.1		4.0	17.6	
Actuated g/C Ratio	0.15	0.22	0.22	0.15	0.27		0.08	0.26		0.06	0.24	
v/c Ratio	0.58	0.72	0.87	0.84	0.46		0.53	0.76		0.72	0.28	
Control Delay	38.1	32.3	27.2	60.2	18.9		48.0	25.4		75.8	23.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	38.1	32.3	27.2	60.2	18.9		48.0	25.4		75.8	23.0	
LOS	D	C	C	E	B		D	C		E	C	
Approach Delay		30.8			32.4			27.4			35.1	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	66	130	87	105	67		36	136		33	45	
Queue Length 95th (ft)	114	175	#242	#210	107		#82	187		#96	72	
Internal Link Dist (ft)		757			983			584			2162	
Turn Bay Length (ft)	200		250	200			200			200		
Base Capacity (vph)	321	840	646	272	1009		149	1013		99	862	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.47	0.69	0.85	0.83	0.46		0.52	0.76		0.72	0.28	

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 72.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 30.7 — Intersection LOS: C
Intersection Capacity Utilization 67.3% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3:



HCM Unsignalized Intersection Capacity Analysis 7/25/2012
37th & Gate A Future AM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	471	754	15	244	13	11
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	645	1033	21	334	18	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1678		853	323
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1678		853	323
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		94	98
cM capacity (veh/h)			378		282	673

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	323	323	1033	21	167	167	18	15
Volume Left	0	0	0	21	0	0	18	0
Volume Right	0	0	1033	0	0	0	0	15
cSH	1700	1700	1700	378	1700	1700	282	673
Volume to Capacity	0.19	0.19	0.61	0.05	0.10	0.10	0.06	0.02
Queue Length 95th (ft)	0	0	0	4	0	0	5	2
Control Delay (s)	0.0	0.0	0.0	15.1	0.0	0.0	18.6	10.5
Lane LOS				C			C	B
Approach Delay (s)	0.0			0.9			14.9	
Approach LOS							B	

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
37th & Gate A

7/25/2012
Future PM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	330	14	2	458	618	323
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	402	17	2	559	754	394
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			420		687	201
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			420		687	201
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	51
cM capacity (veh/h)			1136		380	806

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	201	201	17	2	279	279	754	394
Volume Left	0	0	0	2	0	0	754	0
Volume Right	0	0	17	0	0	0	0	394
cSH	1700	1700	1700	1136	1700	1700	380	806
Volume to Capacity	0.12	0.12	0.01	0.00	0.16	0.16	1.98	0.49
Queue Length 95th (ft)	0	0	0	0	0	0	1303	68
Control Delay (s)	0.0	0.0	0.0	8.2	0.0	0.0	475.0	13.7
Lane LOS				A			F	B
Approach Delay (s)	0.0			0.0			316.6	
Approach LOS							F	

Intersection Summary			
Average Delay	170.8		
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 7/25/2012
37th & Gate B Future AM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	352	130	176	252	8	11
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	482	178	241	345	11	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			660		1137	241
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			660		1137	241
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			74		92	98
cM capacity (veh/h)			924		144	760

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	241	241	178	241	173	173	11	15
Volume Left	0	0	0	241	0	0	11	0
Volume Right	0	0	178	0	0	0	0	15
cSH	1700	1700	1700	924	1700	1700	144	760
Volume to Capacity	0.14	0.14	0.10	0.26	0.10	0.10	0.08	0.02
Queue Length 95th (ft)	0	0	0	26	0	0	6	2
Control Delay (s)	0.0	0.0	0.0	10.3	0.0	0.0	32.0	9.8
Lane LOS				B			D	A
Approach Delay (s)	0.0			4.2			19.2	
Approach LOS							C	

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
37th & Gate B

7/25/2012
Future PM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	640	5	8	346	112	110
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	780	6	10	422	137	134
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			787		1011	390
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			787		1011	390
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		41	78
cM capacity (veh/h)			828		233	608

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	390	390	6	10	211	211	137	134
Volume Left	0	0	0	10	0	0	137	0
Volume Right	0	0	6	0	0	0	0	134
cSH	1700	1700	1700	828	1700	1700	233	608
Volume to Capacity	0.23	0.23	0.00	0.01	0.12	0.12	0.59	0.22
Queue Length 95th (ft)	0	0	0	1	0	0	83	21
Control Delay (s)	0.0	0.0	0.0	9.4	0.0	0.0	40.2	12.6
Lane LOS				A			E	B
Approach Delay (s)	0.0			0.2			26.5	
Approach LOS							D	

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	31.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 7/25/2012
37th & Gate C Future AM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	304	59	536	415	13	11
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	416	81	734	568	18	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				837		
pX, platoon unblocked						
vC, conflicting volume			497		2169	208
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			497		2169	208
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			31		0	98
cM capacity (veh/h)			1063		12	798

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NE 1	NE 2
Volume Total	208	208	81	734	284	284	18	15
Volume Left	0	0	0	734	0	0	18	0
Volume Right	0	0	81	0	0	0	0	15
cSH	1700	1700	1700	1063	1700	1700	12	798
Volume to Capacity	0.12	0.12	0.05	0.69	0.17	0.17	1.44	0.02
Queue Length 95th (ft)	0	0	0	147	0	0	74	1
Control Delay (s)	0.0	0.0	0.0	15.6	0.0	0.0	841.0	9.6
Lane LOS				C			F	A
Approach Delay (s)	0.0			8.8			459.9	
Approach LOS							F	

Intersection Summary			
Average Delay	14.5		
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
37th & Gate C

7/25/2012
Future PM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	745	4	17	321	33	338
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	909	5	21	391	40	412
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				837		
pX, platoon unblocked						
vC, conflicting volume			913		1146	454
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			913		1146	454
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		79	25
cM capacity (veh/h)			742		187	553

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NE 1	NE 2
Volume Total	454	454	5	21	196	196	40	412
Volume Left	0	0	0	21	0	0	40	0
Volume Right	0	0	5	0	0	0	0	412
cSH	1700	1700	1700	742	1700	1700	187	553
Volume to Capacity	0.27	0.27	0.00	0.03	0.12	0.12	0.21	0.75
Queue Length 95th (ft)	0	0	0	2	0	0	20	161
Control Delay (s)	0.0	0.0	0.0	10.0	0.0	0.0	29.4	28.2
Lane LOS				A			D	D
Approach Delay (s)	0.0			0.5			28.3	
Approach LOS							D	

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 7/25/2012
Oliver & Gate D Future AM Conditions (10-yr Growth)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	64	2	116	163	427	0	0	883	185
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	0	0	0	81	3	147	206	541	0	0	1118	234
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						14						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1919	2188	676	1512	2305	270	1352			541		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1919	2188	676	1512	2305	270	1352			541		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	0	89	80	59			100		
cM capacity (veh/h)	20	27	396	56	22	728	505			1024		

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	230	206	270	270	745	607
Volume Left	81	206	0	0	0	0
Volume Right	147	0	0	0	0	234
cSH	152	505	1700	1700	1700	1700
Volume to Capacity	1.51	0.41	0.16	0.16	0.44	0.36
Queue Length 95th (ft)	385	49	0	0	0	0
Control Delay (s)	161.7	17.0	0.0	0.0	0.0	0.0
Lane LOS	F	C				
Approach Delay (s)	161.7	4.7			0.0	
Approach LOS	F					

Intersection Summary				
Average Delay	17.5			
Intersection Capacity Utilization	55.6%	ICU Level of Service		B
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
Oliver & Gate D

7/25/2012
Future PM Conditions (10-yr Growth)

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	21	436	28	794	850	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	26	532	34	968	1037	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					664	
pX, platoon unblocked						
vC, conflicting volume	1592	521	1043			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1592	521	1043			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	72	0	95			
cM capacity (veh/h)	93	500	663			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	26	532	34	484	484	691	352
Volume Left	26	0	34	0	0	0	0
Volume Right	0	532	0	0	0	0	6
cSH	93	500	663	1700	1700	1700	1700
Volume to Capacity	0.28	1.06	0.05	0.28	0.28	0.41	0.21
Queue Length 95th (ft)	25	406	4	0	0	0	0
Control Delay (s)	57.9	86.9	10.7	0.0	0.0	0.0	0.0
Lane LOS	F	F	B				
Approach Delay (s)	85.6		0.4			0.0	
Approach LOS	F						

Intersection Summary				
Average Delay	18.5			
Intersection Capacity Utilization	57.3%	ICU Level of Service		B
Analysis Period (min)	15			

Lanes, Volumes, Timings
Hillside & 37th

7/25/2012
Future+Expansion AM Conditions (10-yr Growth)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	285	69	118	153	37	69	54	613	613	182	15
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt		0.971			0.971			0.862			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3437	0	1770	3437	0	1770	3051	0	1770	3497	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3437	0	1770	3437	0	1770	3051	0	1770	3497	0
Satd. Flow (RTOR)		16			17			125			9	
Adj. Flow (vph)	14	390	95	162	210	51	95	74	840	840	249	21
Lane Group Flow (vph)	14	485	0	162	261	0	95	914	0	840	270	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Total Split (s)	11.0	22.0		17.0	28.0		21.0	43.0		68.0	90.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	5.0	16.0		11.0	28.6		12.6	37.0		62.0	86.4	
Actuated g/C Ratio	0.03	0.11		0.07	0.19		0.08	0.25		0.41	0.58	
v/c Ratio	0.24	1.27		1.25	0.39		0.64	1.73dr		1.15	0.13	
Control Delay	80.4	191.5		213.1	52.7		85.4	99.6		121.9	14.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	80.4	191.5		213.1	52.7		85.4	99.6		121.9	14.6	
LOS	F	F		F	D		F	F		F	B	
Approach Delay		188.4			114.1			98.3			95.8	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	14	~307		~197	106		91	~473		~962	60	
Queue Length 95th (ft)	31	#305		#260	130		123	385		#848	67	
Internal Link Dist (ft)		1195			1369			2414			1596	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	59	381		130	669		177	847		732	2018	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.24	1.27		1.25	0.39		0.54	1.08		1.15	0.13	

Intersection Summary	
Cycle Length: 150	
Actuated Cycle Length: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.27	
Intersection Signal Delay: 114.4	Intersection LOS: F
Intersection Capacity Utilization 92.0%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Lanes, Volumes, Timings
Hillside & 37th

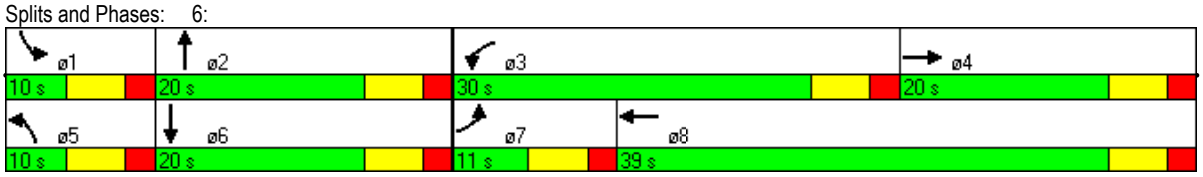
7/25/2012
Future+Expansion PM Conditions (10-yr Growth)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	172	95	430	340	545	55	165	145	57	117	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt		0.947			0.908			0.930			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3352	0	1770	3214	0	1770	3291	0	1770	3500	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3352	0	1770	3214	0	1770	3291	0	1770	3500	0
Satd. Flow (RTOR)		113			484			177			9	
Adj. Flow (vph)	24	210	116	524	415	665	67	201	177	70	143	11
Lane Group Flow (vph)	24	326	0	524	1080	0	67	378	0	70	154	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Total Split (s)	11.0	20.0		30.0	39.0		10.0	20.0		10.0	20.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	5.1	10.0		24.1	36.2		4.1	9.8		4.1	9.8	
Actuated g/C Ratio	0.07	0.14		0.35	0.52		0.06	0.14		0.06	0.14	
v/c Ratio	0.18	0.57		0.86	0.57		0.64	0.62		0.67	0.31	
Control Delay	37.6	22.9		40.4	8.9		66.2	20.1		69.4	28.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	37.6	22.9		40.4	8.9		66.2	20.1		69.4	28.2	
LOS	D	C		D	A		E	C		E	C	
Approach Delay		23.9			19.2			27.0			41.1	
Approach LOS		C			B			C			D	
Queue Length 50th (ft)	10	46		217	69		30	43		31	31	
Queue Length 95th (ft)	32	77		#392	149		#90	75		#94	54	
Internal Link Dist (ft)		1195			1369			2414			1596	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	130	776		621	1917		104	815		104	724	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.18	0.42		0.84	0.56		0.64	0.46		0.67	0.21	

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 69.8	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 23.0	Intersection LOS: C
Intersection Capacity Utilization 64.2%	ICU Level of Service C
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6:



Lanes, Volumes, Timings
Oliver & 37th

7/25/2012
Future+Expansion AM Conditions (10-yr Growth)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	265	83	240	524	38	554	118	124	77	380	169
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.990			0.923			0.954	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3504	0	1770	3267	0	1770	3376	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	1770	3504	0	1770	3267	0	1770	3376	0
Satd. Flow (RTOR)			105		5			157			48	
Adj. Flow (vph)	13	335	105	304	663	48	701	149	157	97	481	214
Lane Group Flow (vph)	13	335	105	304	711	0	701	306	0	97	695	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Total Split (s)	10.0	20.0	20.0	27.0	37.0		53.0	63.0		20.0	30.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	4.0	14.0	14.0	21.0	37.0		47.0	59.3		11.7	24.0	
Actuated g/C Ratio	0.03	0.11	0.11	0.16	0.28		0.36	0.46		0.09	0.18	
v/c Ratio	0.24	0.88	0.40	1.06	0.71		1.10	0.19		0.61	1.05	
Control Delay	72.2	81.1	14.4	122.3	46.9		103.8	10.6		72.6	95.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	72.2	81.1	14.4	122.3	46.9		103.8	10.6		72.6	95.9	
LOS	E	F	B	F	D		F	B		E	F	
Approach Delay		65.4			69.5			75.5			93.1	
Approach LOS		E			E			E			F	
Queue Length 50th (ft)	11	148	0	~282	268		~667	37		80	~316	
Queue Length 95th (ft)	30	#182	38	#378	318		#727	53		120	#348	
Internal Link Dist (ft)		757			983			584			2162	
Turn Bay Length (ft)	200		250	200			200			200		
Base Capacity (vph)	54	381	264	286	1001		640	1575		191	662	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.24	0.88	0.40	1.06	0.71		1.10	0.19		0.51	1.05	

Intersection Summary		
Cycle Length: 130		
Actuated Cycle Length: 130		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 1.10		
Intersection Signal Delay: 76.5	Intersection LOS: E	
Intersection Capacity Utilization 87.2%	ICU Level of Service E	
Analysis Period (min) 15		

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
Oliver & 37th

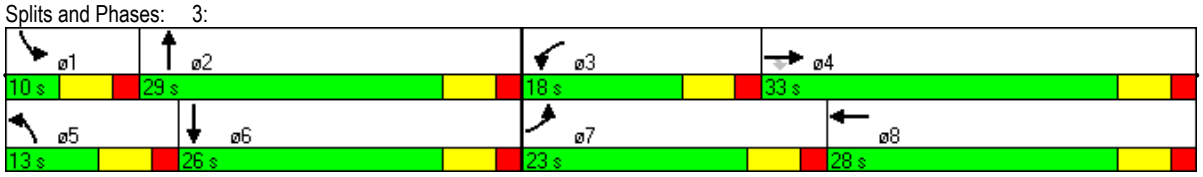
7/25/2012
Future+Expansion PM Conditions (10-yr Growth)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	600	582	195	250	150	82	408	255	61	186	36
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.944			0.942			0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3341	0	1770	3334	0	1770	3454	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	1770	3341	0	1770	3334	0	1770	3454	0
Satd. Flow (RTOR)			331		130			146			23	
Adj. Flow (vph)	187	698	677	227	291	174	95	474	297	71	216	42
Lane Group Flow (vph)	187	698	677	227	465	0	95	771	0	71	258	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Total Split (s)	23.0	33.0	33.0	18.0	28.0		13.0	29.0		10.0	26.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	14.0	26.7	26.7	12.0	24.7		6.9	23.0		4.0	22.6	
Actuated g/C Ratio	0.16	0.30	0.30	0.13	0.28		0.08	0.26		0.04	0.25	
v/c Ratio	0.68	0.66	0.96	0.96	0.46		0.69	0.80		0.90	0.29	
Control Delay	47.9	31.1	43.1	90.1	21.4		67.3	32.6		121.9	26.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	47.9	31.1	43.1	90.1	21.4		67.3	32.6		121.9	26.9	
LOS	D	C	D	F	C		E	C		F	C	
Approach Delay		38.3			43.9			36.4			47.4	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)	101	181	216	130	81		54	177		41	58	
Queue Length 95th (ft)	157	228	#410	#253	124		#120	230		#117	88	
Internal Link Dist (ft)		757			983			584			2162	
Turn Bay Length (ft)	200		250	200			200			200		
Base Capacity (vph)	335	1065	708	237	1014		138	963		79	888	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.56	0.66	0.96	0.96	0.46		0.69	0.80		0.90	0.29	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 89.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 39.8 — Intersection LOS: D
Intersection Capacity Utilization 70.2% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3:



HCM Unsignalized Intersection Capacity Analysis 7/25/2012
37th & Gate A Future+Expansion AM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	681	830	101	277	25	23
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	933	1137	138	379	34	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			2070		1399	466
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			2070		1399	466
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			48		46	94
cM capacity (veh/h)			266		63	543

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	466	466	1137	138	190	190	34	32
Volume Left	0	0	0	138	0	0	34	0
Volume Right	0	0	1137	0	0	0	0	32
cSH	1700	1700	1700	266	1700	1700	63	543
Volume to Capacity	0.27	0.27	0.67	0.52	0.11	0.11	0.54	0.06
Queue Length 95th (ft)	0	0	0	69	0	0	55	5
Control Delay (s)	0.0	0.0	0.0	32.4	0.0	0.0	116.1	12.0
Lane LOS				D			F	B
Approach Delay (s)	0.0			8.7			66.2	
Approach LOS							F	

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 7/25/2012
37th & Gate A Future+Expansion PM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	340	34	12	620	693	398
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	415	41	15	756	845	485
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			456		822	207
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			456		822	207
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		0	39
cM capacity (veh/h)			1101		308	799

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	207	207	41	15	378	378	845	485
Volume Left	0	0	0	15	0	0	845	0
Volume Right	0	0	41	0	0	0	0	485
cSH	1700	1700	1700	1101	1700	1700	308	799
Volume to Capacity	0.12	0.12	0.02	0.01	0.22	0.22	2.74	0.61
Queue Length 95th (ft)	0	0	0	1	0	0	1789	105
Control Delay (s)	0.0	0.0	0.0	8.3	0.0	0.0	819.3	16.2
Lane LOS				A			F	C
Approach Delay (s)	0.0			0.2			526.3	
Approach LOS							F	

Intersection Summary			
Average Delay	273.9		
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 7/25/2012
37th & Gate B Future+Expansion AM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	462	220	276	357	22	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	633	301	378	489	30	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			934		1634	316
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			934		1634	316
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			48		32	95
cM capacity (veh/h)			729		44	679

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	316	316	301	378	245	245	30	34
Volume Left	0	0	0	378	0	0	30	0
Volume Right	0	0	301	0	0	0	0	34
cSH	1700	1700	1700	729	1700	1700	44	679
Volume to Capacity	0.19	0.19	0.18	0.52	0.14	0.14	0.68	0.05
Queue Length 95th (ft)	0	0	0	76	0	0	65	4
Control Delay (s)	0.0	0.0	0.0	15.1	0.0	0.0	188.3	10.6
Lane LOS				C			F	B
Approach Delay (s)	0.0			6.6			93.7	
Approach LOS							F	

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 7/25/2012
37th & Gate B Future+Expansion PM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	725	10	18	435	200	198
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	884	12	22	530	244	241
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			896		1193	442
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			896		1193	442
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		0	57
cM capacity (veh/h)			753		174	563

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	442	442	12	22	265	265	244	241
Volume Left	0	0	0	22	0	0	244	0
Volume Right	0	0	12	0	0	0	0	241
cSH	1700	1700	1700	753	1700	1700	174	563
Volume to Capacity	0.26	0.26	0.01	0.03	0.16	0.16	1.40	0.43
Queue Length 95th (ft)	0	0	0	2	0	0	371	53
Control Delay (s)	0.0	0.0	0.0	9.9	0.0	0.0	260.7	16.1
Lane LOS				A			F	C
Approach Delay (s)	0.0			0.4			139.0	
Approach LOS							F	

Intersection Summary			
Average Delay	35.0		
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 7/25/2012
37th & Gate C Future+Expansion AM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	324	159	636	611	27	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	444	218	871	837	37	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				837		
pX, platoon unblocked						
vC, conflicting volume			662		2605	222
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			662		2605	222
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			6		0	96
cM capacity (veh/h)			923		1	782

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NE 1	NE 2
Volume Total	222	222	218	871	418	418	37	34
Volume Left	0	0	0	871	0	0	37	0
Volume Right	0	0	218	0	0	0	0	34
cSH	1700	1700	1700	923	1700	1700	1	782
Volume to Capacity	0.13	0.13	0.13	0.94	0.25	0.25	33.06	0.04
Queue Length 95th (ft)	0	0	0	378	0	0	Err	3
Control Delay (s)	0.0	0.0	0.0	38.9	0.0	0.0	Err	9.8
Lane LOS				E			F	A
Approach Delay (s)	0.0			19.9			5196.5	
Approach LOS							F	

Intersection Summary			
Average Delay	165.5		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 7/25/2012
37th & Gate C Future+Expansion PM Conditions (10-yr Growth)

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	910	10	37	331	121	426
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	1110	12	45	404	148	520
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				837		
pX, platoon unblocked						
vC, conflicting volume			1122		1402	555
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1122		1402	555
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		0	0
cM capacity (veh/h)			618		121	475

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NE 1	NE 2
Volume Total	555	555	12	45	202	202	148	520
Volume Left	0	0	0	45	0	0	148	0
Volume Right	0	0	12	0	0	0	0	520
cSH	1700	1700	1700	618	1700	1700	121	475
Volume to Capacity	0.33	0.33	0.01	0.07	0.12	0.12	1.22	1.09
Queue Length 95th (ft)	0	0	0	6	0	0	231	425
Control Delay (s)	0.0	0.0	0.0	11.3	0.0	0.0	219.3	98.0
Lane LOS				B			F	F
Approach Delay (s)	0.0			1.1			124.8	
Approach LOS							F	

Intersection Summary			
Average Delay	37.4		
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 7/25/2012
Oliver & Gate D Future+Expansion AM Conditions (10-yr Growth)

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	4	16	476	818	748	36
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	5	22	652	1121	1025	49
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					664	
pX, platoon unblocked	0.87	0.87	0.87			
vC, conflicting volume	2914	537	1074			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2900	155	775			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	97	10			
cM capacity (veh/h)	1	748	724			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	5	22	652	560	560	683	391
Volume Left	5	0	652	0	0	0	0
Volume Right	0	22	0	0	0	0	49
cSH	1	748	724	1700	1700	1700	1700
Volume to Capacity	5.10	0.03	0.90	0.33	0.33	0.40	0.23
Queue Length 95th (ft)	Err	2	294	0	0	0	0
Control Delay (s)	Err	10.0	37.7	0.0	0.0	0.0	0.0
Lane LOS	F	A	E				
Approach Delay (s)	2007.8		13.9			0.0	
Approach LOS	F						

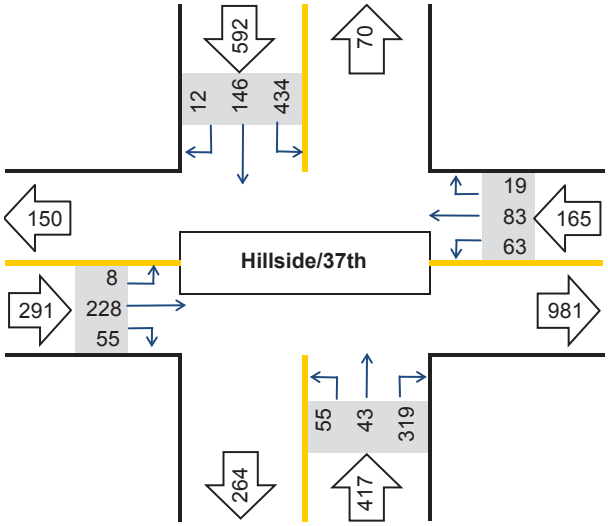
Intersection Summary			
Average Delay	27.7		
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

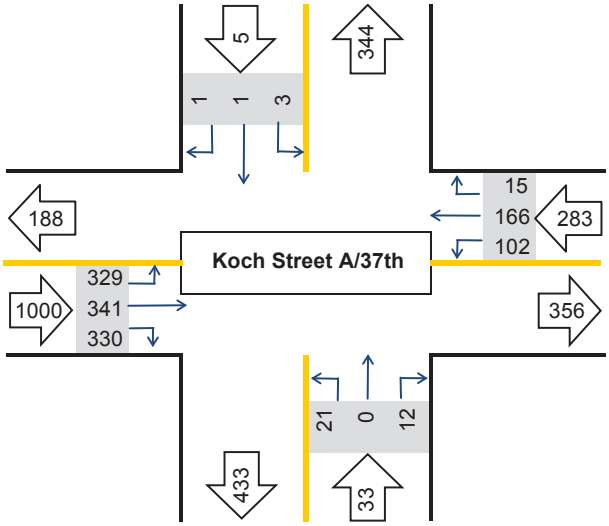
HCM Unsignalized Intersection Capacity Analysis 7/25/2012
Oliver & Gate D Future+Expansion PM Conditions (10-yr Growth)

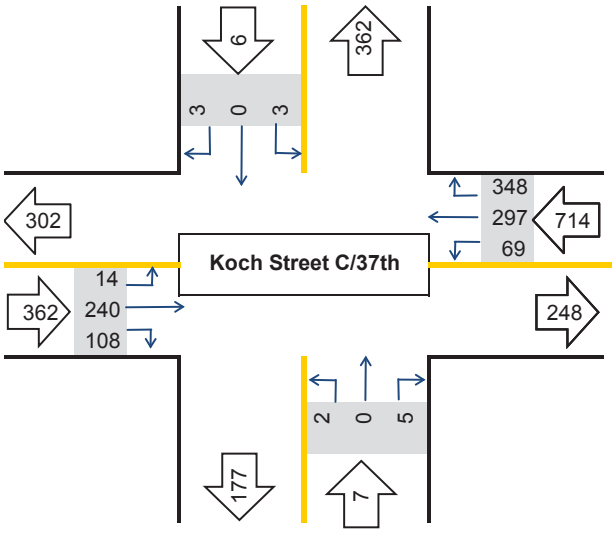
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	21	436	28	810	960	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	26	532	34	988	1171	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					664	
pX, platoon unblocked						
vC, conflicting volume	1736	588	1177			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1736	588	1177			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	65	0	94			
cM capacity (veh/h)	74	452	589			

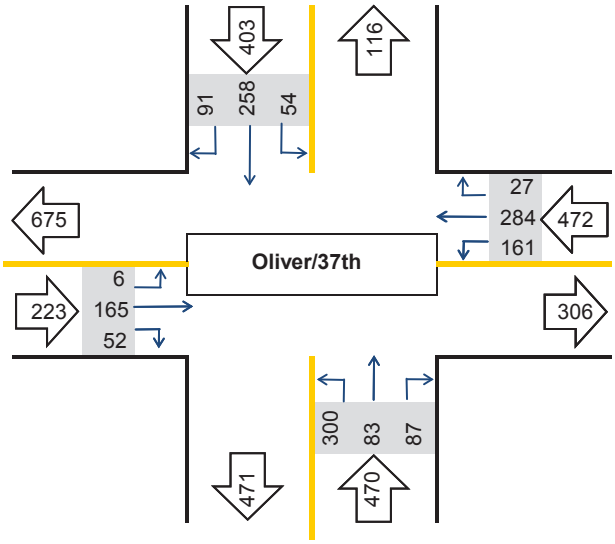
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	26	532	34	494	494	780	396
Volume Left	26	0	34	0	0	0	0
Volume Right	0	532	0	0	0	0	6
cSH	74	452	589	1700	1700	1700	1700
Volume to Capacity	0.35	1.18	0.06	0.29	0.29	0.46	0.23
Queue Length 95th (ft)	33	499	5	0	0	0	0
Control Delay (s)	77.5	128.8	11.5	0.0	0.0	0.0	0.0
Lane LOS	F	F	B				
Approach Delay (s)	126.5		0.4			0.0	
Approach LOS	F						

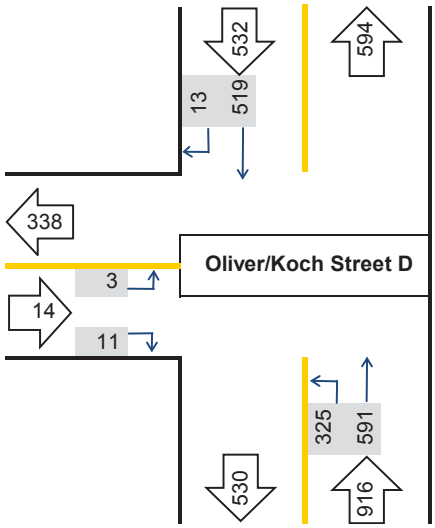
Intersection Summary			
Average Delay	25.7		
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		



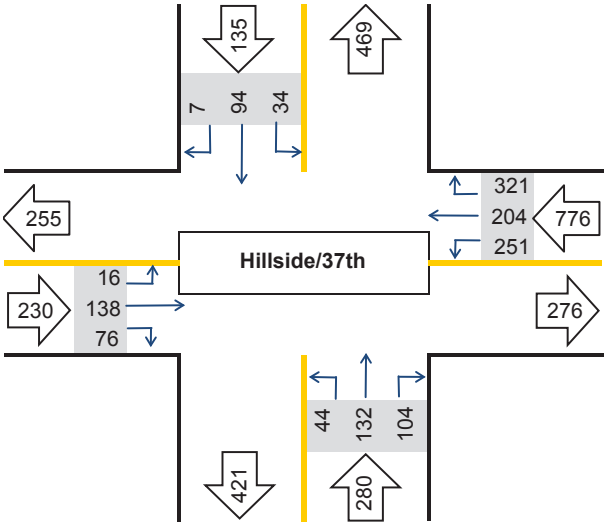


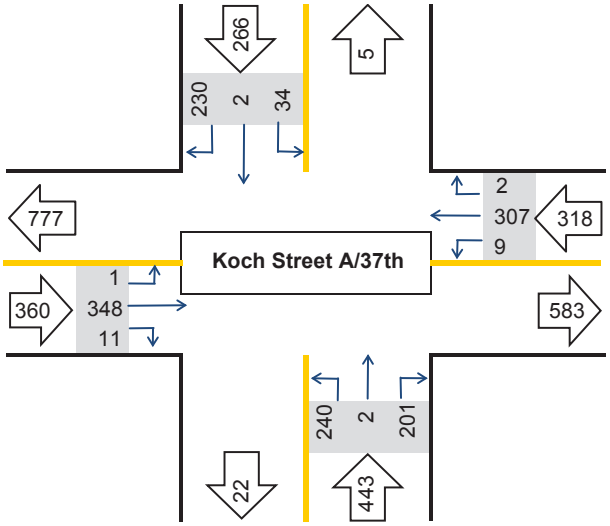


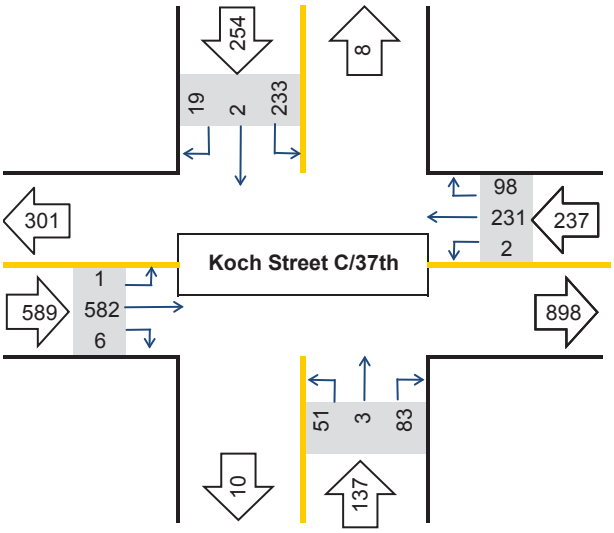


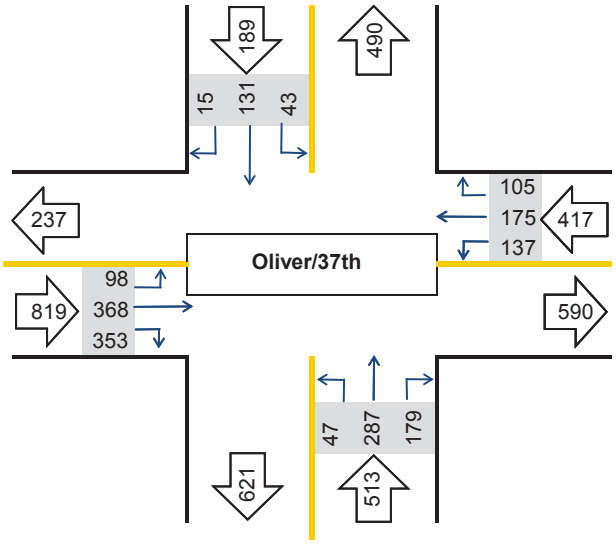


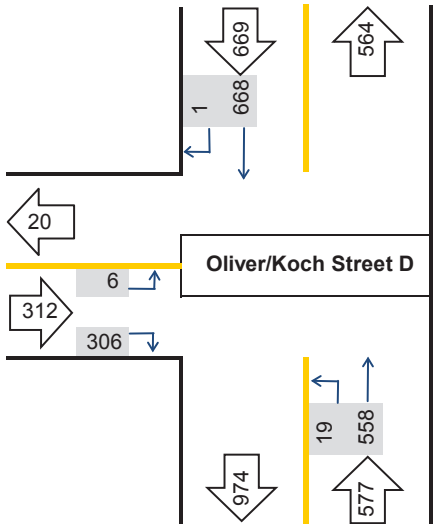
Project Name: KOCH IND - 37TH REALIGNMENT
Project Location: NORTHEAST WICHITA, KANSAS
Date: MAY 23/24, 2012
Conducted By: S. CANFIELD
General Peak Hour: EXISTING AM PEAK HOUR











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Date: MAY 23/24, 2012
Conducted By: S. CANFIELD
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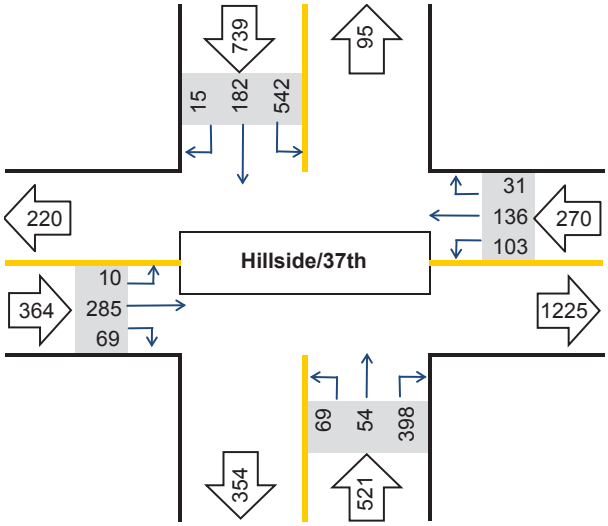
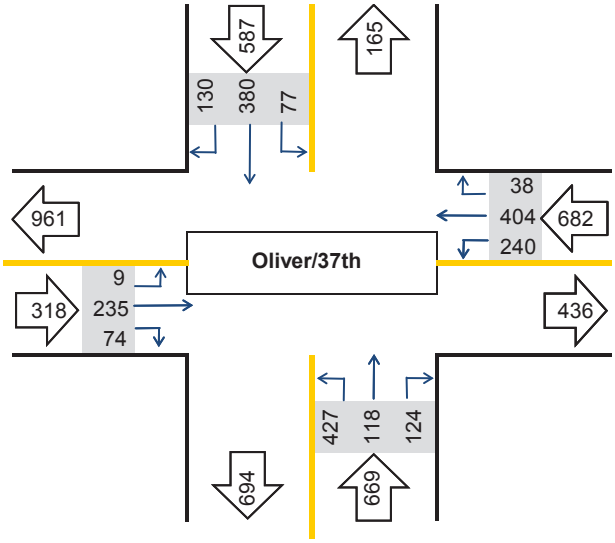
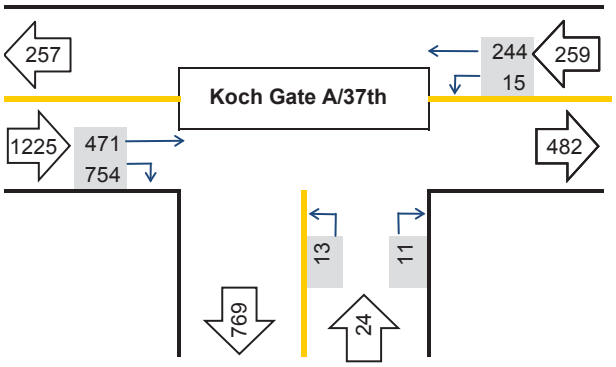
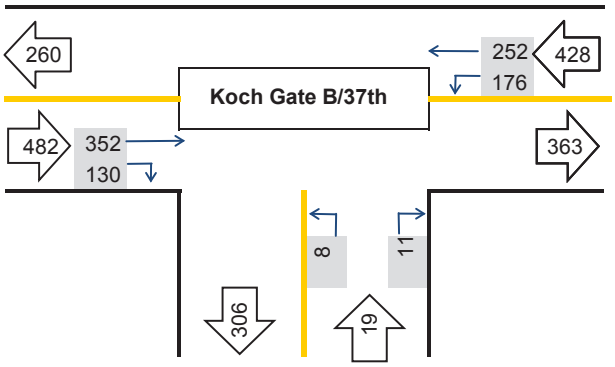
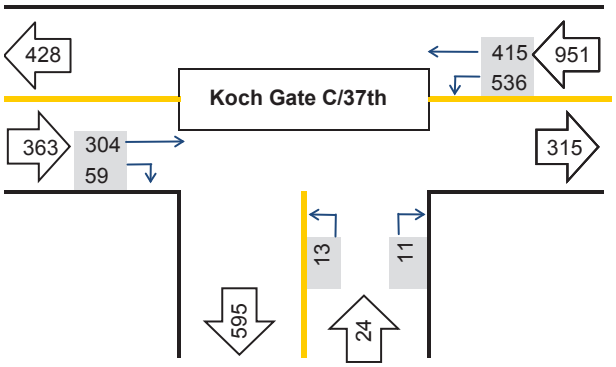
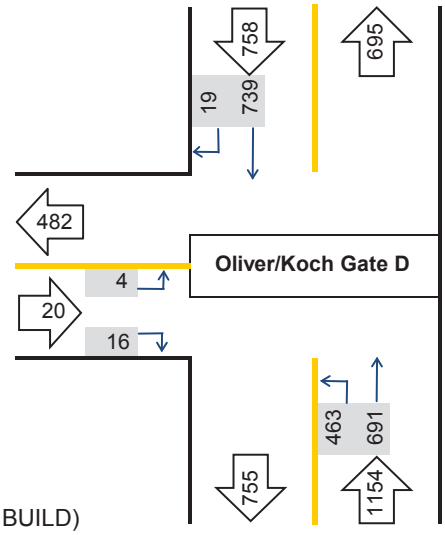




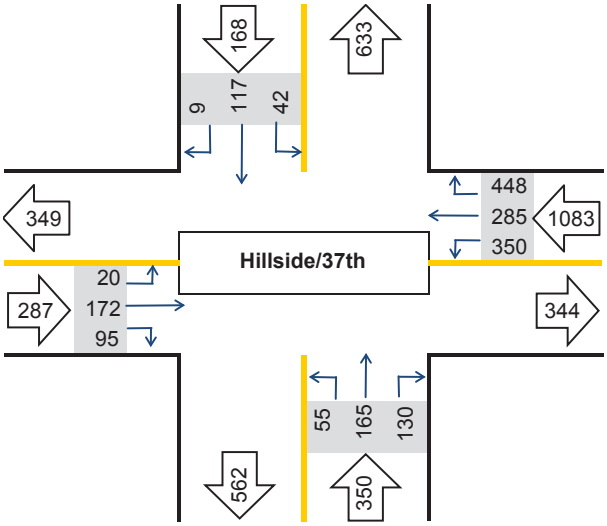


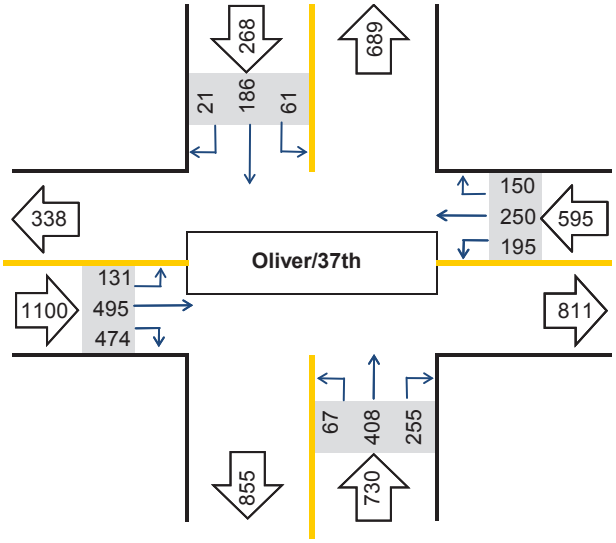


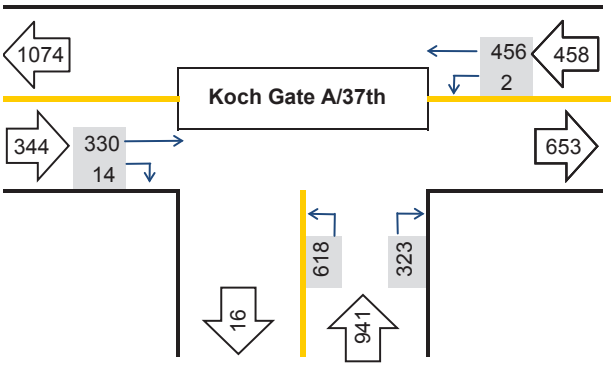


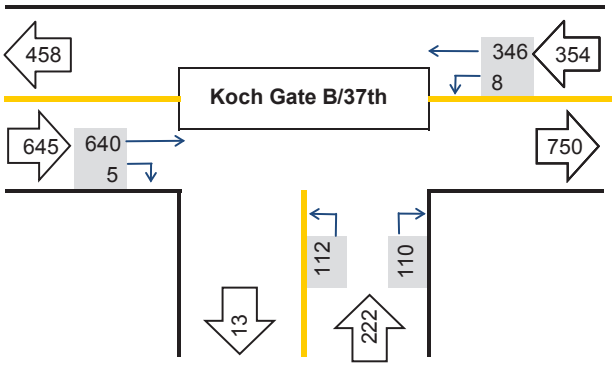


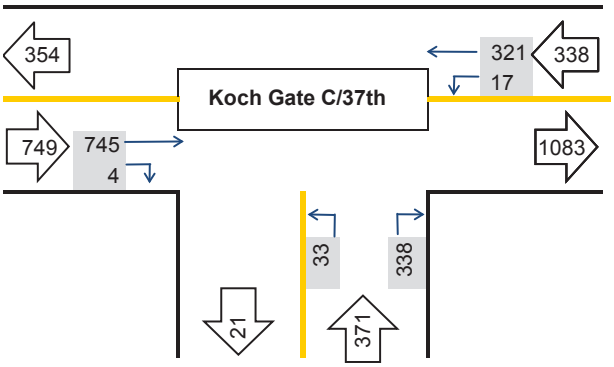
Project Name: KOCH IND - 37TH REALIGNMENT
Project Location: NORTHEAST WICHITA, KANSAS
Date: MAY 23/24, 2012
Conducted By: S. CANFIELD
General Peak Hour: AM PEAK HOUR - FUTURE (10-YR NO BUILD)

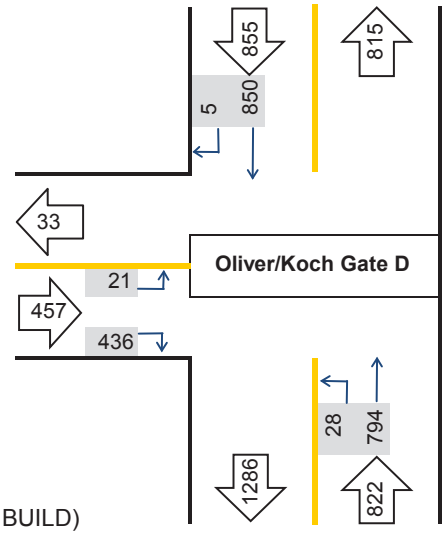












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Project Location: NORTHEAST WICHITA, KANSAS
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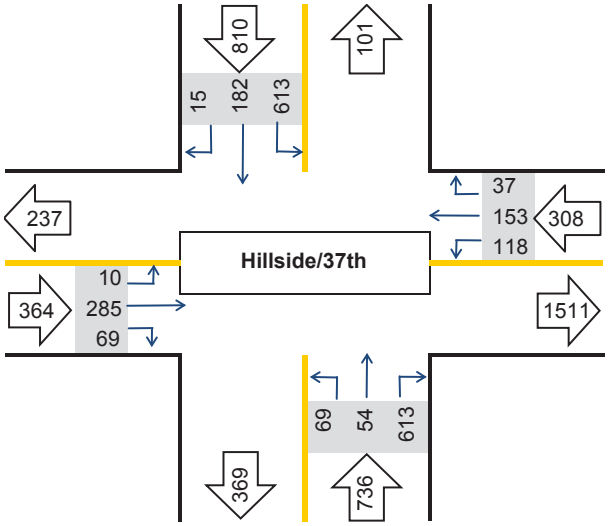
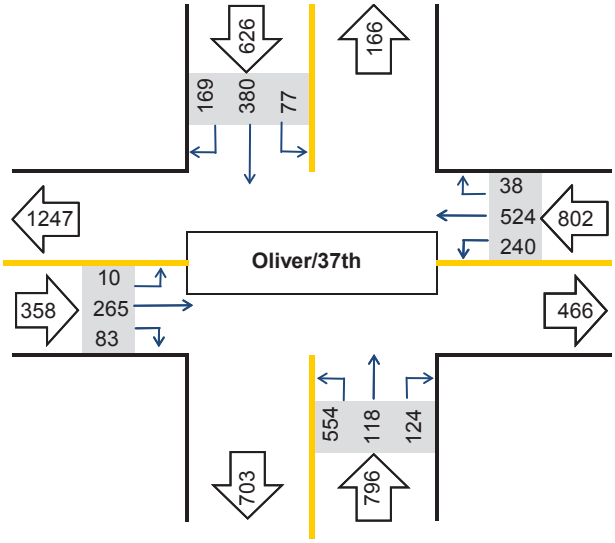
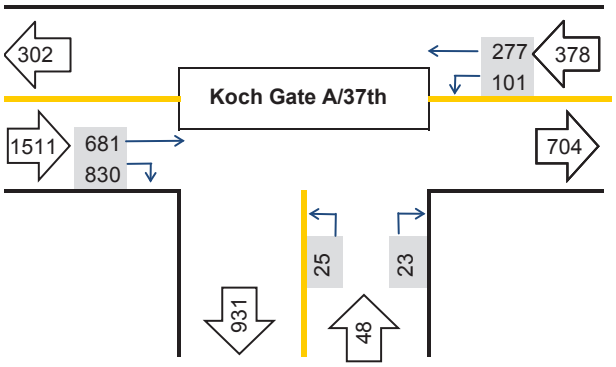
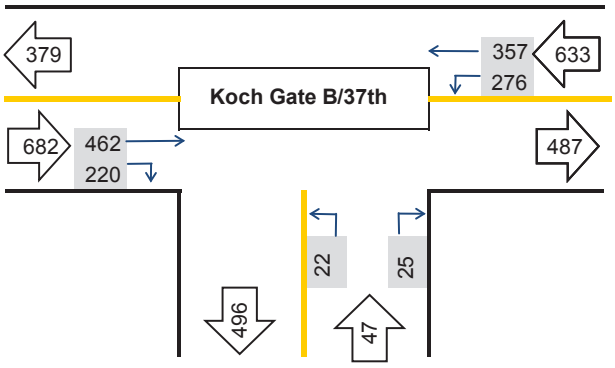
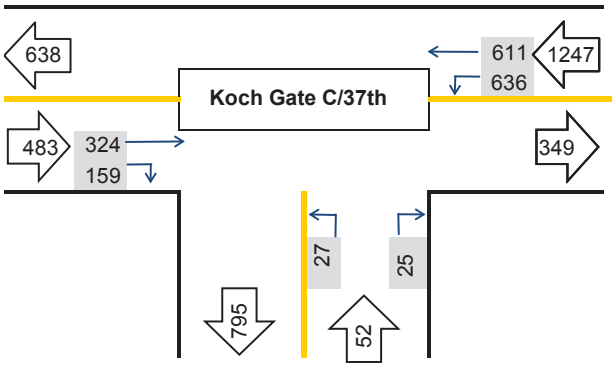
General Peak Hour: PM PEAK HOUR - FUTURE (10-YR NO BUILD)

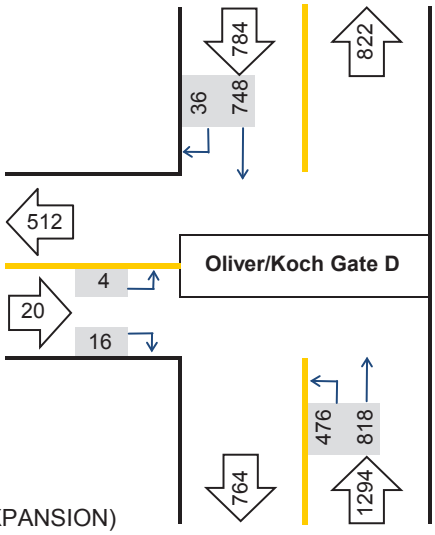




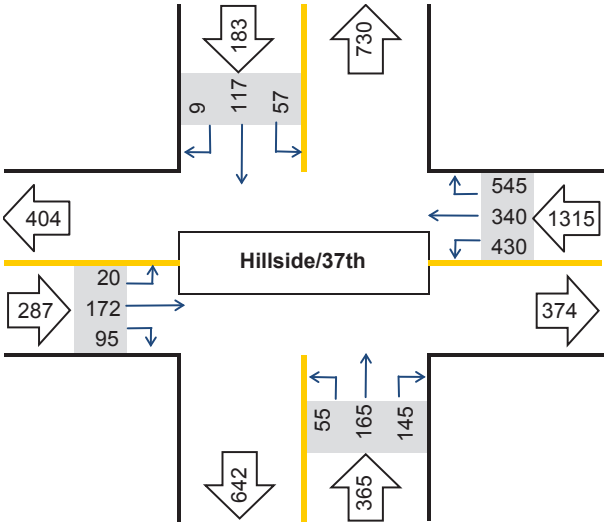


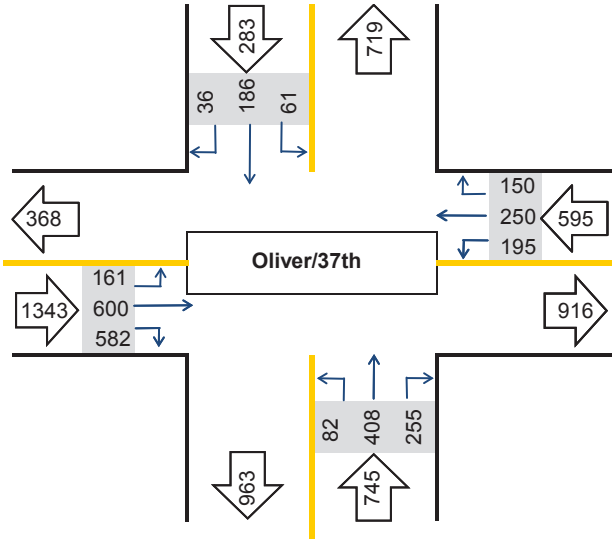


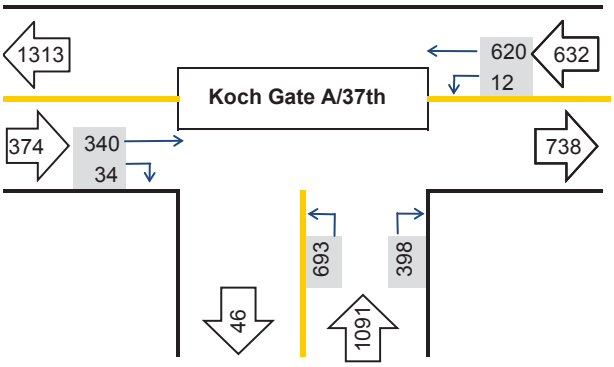


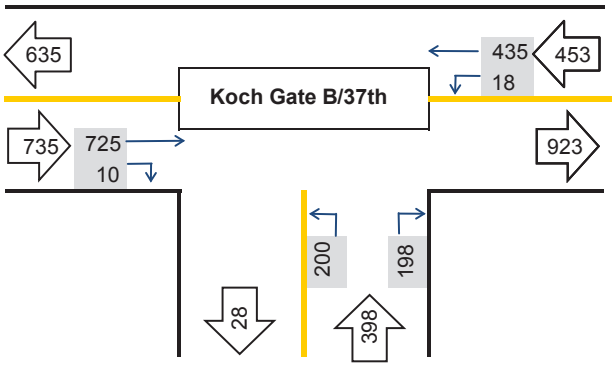


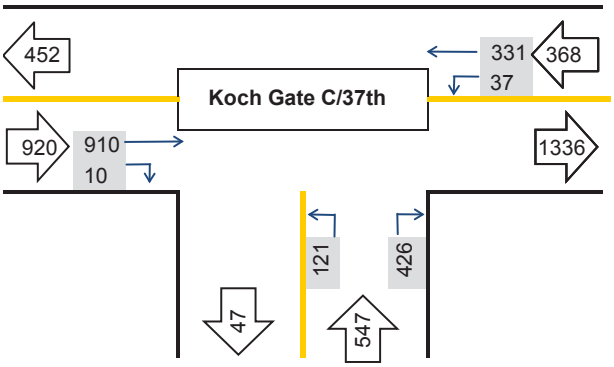
Project Name: KOCH IND - 37TH REALIGNMENT
Project Location: NORTHEAST WICHITA, KANSAS
Date: MAY 23/24, 2012
Conducted By: S. CANFIELD
General Peak Hour: AM PEAK HOUR - FUTURE (10-YR + EXPANSION)

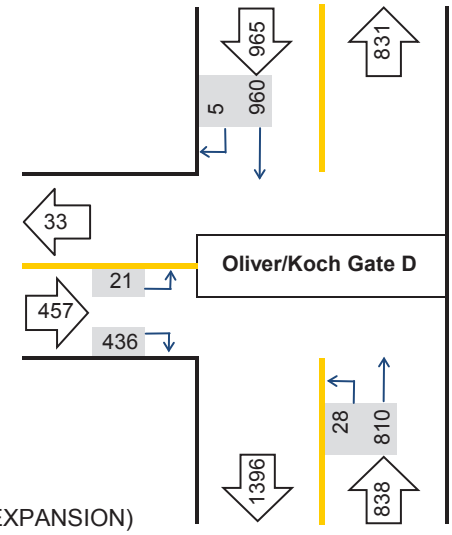












Project Name: KOCH IND - 37TH REALIGNMENT
Project Location: NORTHEAST WICHITA, KANSAS
Date: MAY 23/24, 2012
Conducted By: S. CANFIELD
General Peak Hour: PM PEAK HOUR - FUTURE (10-YR + EXPANSION)

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Professional Engineering Consultants, P.A.
303 S. Topeka
Wichita, Kansas 67202
Phone (316)262-2691

KOCH CAMPUS EXPANSION
CITY OF WICHITA, KS

PEC PROJECT NO. 32-12275-7208

Prepared by: JPS
Estimate Date: 9/7/2012

37TH STREET RELOCATION

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	COST
1	MOBILIZATION	1	LS	$ 175,000.00	$ 175,000.00
2	FIELD OFFICE & LAB	1	EA	$ 10,000.00	$ 10,000.00
3	SITE CLEARING	1	LS	$ 100,000.00	$ 100,000.00
4	PAVEMENT REMOVAL	5500	SY	$ 12.00	$ 66,000.00
5	EXCAVATION	20000	CY	$ 10.00	$ 200,000.00
6	COMPACTED FILL	15000	CY	$ 2.00	$ 30,000.00
7	CONCRETE DRIVEWAY 8" (REINF.)	10000	SF	$ 6.00	$ 60,000.00
8	7" AC PAVEMENT	41000	SY	$ 25.00	$ 1,025,000.00
9	8" REINFORCED CRUSHED ROCK BASE	46000	SY	$ 12.00	$ 552,000.00
10	CURB & GUTTER (TYPE 1)	13000	LF	$ 12.00	$ 156,000.00
11	CURB INLET (TYPE 1)	40	EA	$ 4,500.00	$ 180,000.00
12	15" RCP	3300	LF	$ 45.00	$ 148,500.00
13	18" RCP	1800	LF	$ 55.00	$ 99,000.00
14	24" RCP	900	LF	$ 62.00	$ 55,800.00
15	30" RCP	300	LF	$ 70.00	$ 21,000.00
16	10' X 5' RCB w/WINGWALLS & HANDRAILS	1	LS	$ 125,000.00	$ 125,000.00
17	6' X 3' RCB Extension w/WINGWALL	1	LS	$ 25,000.00	$ 25,000.00
18	SAND FILL (FLUSHED & VIBRATED)	6400	LF	$ 20.00	$ 128,000.00
19	SIGNING	1	LS	$ 15,000.00	$ 15,000.00
20	PAVEMENT MARKING	1	LS	$ 40,000.00	$ 40,000.00
21	TRAFFIC SIGNAL MODIFICATION (OLIVER)	1	LS	$ 80,000.00	$ 80,000.00
22	TRAFFIC SIGNAL MODIFICATION (HILLSIDE)	1	LS	$ 80,000.00	$ 80,000.00
23	TRAFFIC CONTROL	1	LS	$ 75,000.00	$ 75,000.00
24	CONCRETE SIDEWALK (4")	80000	SF	$ 6.00	$ 480,000.00
25	BRICK PAVERS (CROSSWALKS)	500	SY	$ 50.00	$ 25,000.00
26	FESCUE SOD	10000	SY	$ 5.00	$ 50,000.00
27	TREES - 2.5" CALIPER	300	EA	$ 300.00	$ 90,000.00
28	BMP, INLET PROTECTION	40	EA	$ 100.00	$ 4,000.00
29	BMP, SILT FENCE	15000	LF	$ 2.00	$ 30,000.00
30	BMP, CONSTRUCTION ENTRANCE	2	EA	$ 1,000.00	$ 2,000.00
				Total Construction Estimate	$ 4,127,300.00
			15%	Contingency Costs	$ 619,095.00
			8%	City Inspect/Test Fees	$ 379,711.60
			4%	City Staking Fees	$ 189,855.80
				Total Project Costs	**$ 5,315,962.40**

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Wichita, Kansas 67202
Phone (316)262-2691

KOCH CAMPUS EXPANSION
CITY OF WICHITA, KS

PEC PROJECT NO. 35-12275-001-7208

Prepared by: MDK
Estimate Date: 9/7/2012

20" WATER MAIN RELOCATION TO NEW 37TH ST

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE		COST
1	WL Pipe 20"	5700	lf	115.00	$	655,500.00
2	WL Pipe 12"	2100	lf	55.00	$	115,500.00
3	New meter vaults (8")	2	ea	18,500.00	$	37,000.00
4	Fire Hydrants	5	ea	2,800.00	$	14,000.00
5	20" Valve Assemblies	3	ea	3,400.00	$	10,200.00
6	Air Release Assembly (2")	1	ea	3,200.00	$	3,200.00
7	Reconnect Fire Line/Domestic S	1	LS	100,000.00	$	100,000.00
8	Abandon existing 20"	1	LS	20,000.00	$	20,000.00
9	Erosion Protection	1	LS	15,000.00	$	15,000.00
10	Site Clearing and Restoration	1	LS	30,000.00	$	30,000.00
				Total Construction Estimate	$	1,000,400.00
		25%		Project costs (see notes)	$	250,100.00
		15%		Contingency Costs	$	150,060.00
		8%		City Inspect/Test Fees	$	112,044.80
		4%		City Staking Fees	$	56,022.40
				Total Project Costs	**$**	**1,568,627.20**

NOTES and QUESTIONS:

1. Project costs may be impacted based on the following items.
2. Can the entire facility be metered with master meters at each end of the site?
3. Tower is currently metered separately, if relocation along 37th is needed, can we maintain the existing 20" as a private line and relocate around future buildings H and I to reduce the cost for extension of a separate fire and domestic line to the Tower?
4. Estimate assumes that domestic and fire protection will be extended off the relocated service line.

Professional Engineering Consultants, P.A.
303 S. Topeka
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Phone (316)262-2691

KOCH CAMPUS EXPANSION
CITY OF WICHITA, KS

PEC PROJECT NO. 35-12275-001-7208

Prepared by: JEH
Estimate Date: 9/7/2012

CAMPUS UTILITIES AND INFRASTRUCTURE

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	COST
1	OUTFALL STRUCTURE	1	LS	$ 20,000.00	$ 20,000.00
2	STREAM EXCAVATION	36000	CY	$ 10.00	$ 360,000.00
3	DIVERSION DITCH	12000	CY	$ 10.00	$ 120,000.00
4	8" SEWER	700	LF	$ 35.00	$ 24,500.00
5	SANI MANHOLES	3	EA	$ 3,500.00	$ 10,500.00
6	STORM MANHOLES	20	EA	$ 4,000.00	$ 80,000.00
7	54" RCP	1545	LF	$ 120.00	$ 185,400.00
8	48" RCP	1750	LF	$ 100.00	$ 175,000.00
9	42" RCP	450	LF	$ 85.00	$ 38,250.00
10	36" RCP	1120	LF	$ 75.00	$ 84,000.00
11	30" RCP	2125	LF	$ 70.00	$ 148,750.00
12	SITE EXCAVATION	36461	CY	$ 5.00	$ 182,306.67
13	ROCK RIPRAP	1	LS	$ 10,000.00	$ 10,000.00
14	PHONE RELOCATION	1	LS	$ 100,000.00	$ 100,000.00
15	GAS RELOCATION	1	LS	$ 500,000.00	$ 500,000.00
16	CABLE RELOCATION	1	LS	$ 100,000.00	$ 100,000.00
17	CAMPUS ROAD SYSTEM	1	LS	$ 3,000,000.00	$ 3,000,000.00
18	PARK LOT STORMSEWER	1	LS	$ 177,850.00	$ 177,850.00
19	PARKING LOTS	109384	SY	$ 22.35	$ 2,444,732.40
20	LAKE EXCAVATION (8' DEPTH)	150800	CY	$ 5.00	$ 754,000.00
21	ROAD DEMOLITION	42827	SY	$ 9.00	$ 385,440.00
22	SITE DEMOLITION	1	LS	$ 500,000.00	$ 500,000.00
23	MISC	1	LS	$ 100,000.00	$ 100,000.00
				Total Construction Estimate	$ 9,500,729.07
		15%		Contingency Costs	$ 1,425,109.36
				Total Project Costs	**$ 10,925,838.43**

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KOCH CAMPUS EXPANSION
CITY OF WICHITA, KS

PEC PROJECT NO. 35-12275-001-7208

Prepared by: IDK
Estimate Date: 9/5/2012

CAMPUS LANDSCAPE AND IRRIGATION

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	COST
1	EARTHWORK - 37TH BERM GRADING	64000	CY	$ 4.00	$ 256,000.00
2	NATIVE GRASS/ WILDFLOWER SEEDING	54	AC	$ 4,000.00	$ 216,000.00
3	FESCUE SOD	55500	SY	$ 5.00	$ 277,500.00
4	SHADE TREES (2" CAL. B&B)	1143	EA	$ 300.00	$ 342,900.00
5	ORNAMENTAL TREES (2" CAL. B&B)	132	EA	$ 300.00	$ 39,600.00
6	BUFFER TREES	500	EA	$ 100.00	$ 50,000.00
7	SHRUBS (5 GAL. CONT.)	1000	EA	$ 60.00	$ 60,000.00
8	PERENNIALS (1 GAL. CONT.)	2000	EA	$ 20.00	$ 40,000.00
9	CONCRETE SIDEWALK (4")	70000	SF	$ 6.00	$ 420,000.00
10	PERIMETER FENCE (EXCL. ENTRY GATES)	13500	LF	$ 60.00	$ 810,000.00
11	STONE EDGING	1400	LF	$ 10.00	$ 14,000.00
12	RETAINING WALLS	1200	SF	$ 50.00	$ 60,000.00
13	IRRIGATION	30	AC	$ 20,000.00	$ 600,000.00
14	IRRIGATION PUMP IN POND	1	LS	$ 50,000.00	$ 50,000.00
15	TRASH RECEPTACLES	3	EA	$ 1,500.00	$ 4,500.00
16	TOWER DRIVE - WATER FEATURE	1	LS	$ 50,000.00	$ 50,000.00
17	BOLLARDS	30	EA	$ 500.00	$ 15,000.00
				Total Construction Estimate	$ 3,305,500.00
		15%		Contingency Costs	$ 495,825.00
				Total Project Costs	**$ 3,801,325.00**

PEC
SCIENCE APPLIED

303 SOUTH TOPEKA WICHITA, KS 67202
316-262-2691 **www.pec1.com**