Town of Thompson's Station
Board of Mayor and Aldermen
Meeting Agenda
February 11, 2020

Meeting Called To Order

Pledge Of Allegiance

Consent Agenda

A. Consideration Of The Minutes Of The January 14, 2020 Regular Meeting.

Documents:

ITEM A - CONSENT AGENDA BOMA MINUTES 01_14_2020.PDF

Public Comments-

Crosslin Presentation Regarding The Town Of Thompson's Station Audit

Documents:

PUBLIC COMMENTS - FINAL AUDIT DIGITAL TOWN OF THOMPSON STATION FINSTMT JUNE 2019 (ID 71593).PDF
PUBLIC COMMENTS - FINAL DIGITAL AUDIT COMMUNICATIONS.PDF

Unfinished Business:

1. Public Hearing And Second Reading Of Ordinance 2020-001: An Ordinance Of The Board Of Mayor And Aldermen Of The Town Of Thompson's Station, Tennessee To Approve An Amended Specific Plan Concept Plan For Roderick Place.

Documents:

ITEM 1 - ORDINANCE 2020-001 RODERICK PLACE REVISED 1-14-20.PDF
ITEM 1 - RODERICK 24X36 CONCEPT PLAN.PDF
ITEM 1 - RODERICK PATTERN BOOK REDLINED 12.13.19.PDF
ITEM 1 - RODERICK PATTERN BOOK REVISED.PDF
ITEM 1 - RODERICK PLACE - TRAFFIC STUDY.PDF
ITEM 1 - RODERICK STAFF REPORT BOMA MEMO REVISED 1-14-20.PDF

2. Public Hearing And Second Reading Of Ordinance 2020-002: An Ordinance Of The Town Of Thompson's Station, Tennessee To Amend Title 8, Alcoholic Beverages Ordinance.

Documents:

ITEM 2 - ORDINANCE 2020-002 AMEND TITLEL 8 ALCOHOLIC BEVERAGES ORDINANCE.PDF
ITEM 2 - TITLE 8 ALCOHOLIC BEVERAGES - RED-LINED PROPOSED AMENDMENTS MILLS EDTS 12 31 2019 (2).PDF

3. Public Hearing And Second Reading Of Ordinance 2020-003: An Ordinance Of The Town Of Thompson's Station, Tennessee, To Amend Title 12, Chapter

4 Of The Municipal Code Regarding The Impact Assessment Fee (Adoption Of Road And Park Fees).

Documents:

ITEM 3 - 1 IMPACT FEE ORDINANCE 2020 - FINAL.PDF
ITEM 3 - 2 ORDINANCE 2020 - 003 IMPACT FEE - FEBRUARY DRAFT WITH EDITS (2).PDF
ITEM 3 - DUNCAN ASSOCIATES.PDF
ITEM 3 - BARGE MTP PRESENTATION 3.PDF
ITEM 3 - IMPACT FEE PRESENTATION 1-14-2020.PDF
ITEM 3 - MEMO ROADWAY IMPACT FEE STUDY.PDF
ITEM 3 - OLD ORDINANCE 2013-016 IMPACT FEES.PDF
ITEM 3 - OLD RESOLUTION 2019-005 DUNCAN AGREEMENT.PDF
ITEM 3 - OLD RESOLUTION 2019-006 BARGE MTP.PDF
ITEM 3 - THOMP STN ROAD PARK IMPACT FEE STUDY REV6.PDF

New Business:

4. First Reading On Ordinance 2020-004: An Ordinance Of The Town Of Thompson's Station, Tennessee To Amend Ordinance No. 10-007 Pursuant To Title 18, Chapter 1 Regarding Wastewater Reclamation And Reuse.

Documents:

ITEM 4 - ORDINANCE 2020-004 TO AMEND ORDINANCE 10-007.PDF
ITEM 4 - ORDINANCE NO 10-007 RED -LINED VERSION OF AMENDMENTS 1-31-20_VER2.PDF
ITEM 4 - ORDINANCE NO 14-001 - RED LINED VERSION.PDF
ITEM 4 - THOMPSONS STATION SDC PRESENTATION 2-11-2020.PDF
ITEM 4 - Z JACKSON THORNTON DOCUMENTS.PDF
ITEM 4 - ZZ BARGE WW MASTER PLAN UPDATE.PDF

Announcements/Agenda Requests

Adjourn

Information Only:

Finance Report

Documents:

JAN2020 BOMA FINANCE REPORT.PDF
LTR MAYOR ALDERMAN SECOND QUARTER REPORT 2020-01-23.PDF

This meeting will be held at 7:00 p.m. at Thompson's Station Community Center
1555 Thompson's Station Road West

Town of Thompson's Station
Board of Mayor and Aldermen
Meeting Minutes
January 14, 2020 7:00 p.m.

Call to Order:

The meeting of the Board of Mayor and Aldermen of the Town of Thompson's Station was called to order at 7:00 p.m. on January 14, 2020, at the Thompson's Station Community Center with the required quorum. Members and staff in attendance were: Mayor Corey Napier; Alderman Shaun Alexander; Alderman Brandon Bell; Alderman Ben Dilks; Town Administrator Ken McLawhon; Interim Town Planner Micah Wood; Finance Director Steve Banks; Town Recorder/Clerk Regina Fowler and Town Attorneys Andrew Mills and Kirk Vandivort. Alderman Brian Stover was absent.

Pledge of Allegiance:

Consent Agenda:

Alderman Dilks requested that item b. be pulled from the consent agenda since it is an appointment by the Mayor. Mayor Napier re-appointed Tara Rumpler and Bob Whitmer to the planning commission.

a. c. d. e. f & g. Approve the Consent Agenda with the deletion of item b.: A motion was made by Alderman Bell to approve the Consent Agenda as amended; consideration of the minutes of the November 12, 2019 regular meeting, approval of BOMA regular meetings/work session dates & times for 2020, approve lease agreement for TN Equine Hospital, PLLC, approval of resolution 2020-005; to accept the dedication of Public Infrastructure within Phase 6, Section 6B of Bridgemore Village and set a maintenance surety for a period of one year, approval of Resolution 2020-004; contracting with TN Partners for Health Program for health & vision benefits for town staff, approval of Resolution 2020-003 to approve a subdivision development agreement with the Littlebury Development Company for the Littlebury neighborhood/subdivision (Lots 1-91) and authorize the Mayor to execute said document. The motion was seconded and passed unanimously.

Public Comments:

A presentation of an iron railroad spike plaque was presented to David Coleman, to say thank you for his years of service, hard work, time and dedication to the Town of Thompson's Station.

Ben Hailey – 2732 Critz Lane Mr. Hailey noted that his property backs up to the Alexander property on the south side next to the drip field. After research he discovered that Rutherford and Williamson Counties require a 50' - 100' easement between property lines and a drip field. He would ask that BOMA consider this change to their ordinance. Mayor Napier said this would be brought before the Utility Board for their perusal.

Several residents from Baugh Road had questions regarding Littlebury. Town Administrator, Ken McLawhon advised the residents that he would speak with the Developer of Littlebury and hopefully have him meet with them to address their concerns.

BOMA members addressed the gargantuan size of the paper BOMA packets. A determination was made to purchase electronic devices for their use in the future thereby eliminating paper packets.

Unfinished Business:

1. **Public Hearing and Second Reading of Ordinance 2019-010: An Ordinance of the Town of Thompson's Station to adopt the 2015 edition of the International Property Maintenance Code.**

   A motion was made by Alderman Bell to approve second reading of Ordinance 2019-010. An ordinance of the Town of Thompson's Station to adopt the 2015 edition of the International Property Maintenance Code. The motion was seconded and passed unanimously.

2. **Motion to Approve Bidding Services Contract with Ragan Smith for Critz Lane.**

   A motion was made by Alderman Bell to approve Bidding Services Contract with Ragan Smith for Critz Lane. The motion was seconded and passed unanimously.

New Business:

3. **Approval of Resolution 2020-001: A Resolution of the Town of Thompson's Station, TN approving a contract with Civil War Trails, Inc. for the development and installation of six historic sign markers and to authorize the Mayor to sign a contract with Civil War Trails, Inc.**

   A motion was made by Alderman Alexander to approve a Resolution of the Town of Thompson's Station, TN approving a contract with Civil War Trails, Inc. for the development and installation of six historic sign markers and to authorize the Mayor to sign a contract with Civil War Trails Inc. The motion was seconded and passed unanimously.

4. **Approval of Resolution 2020-002: A Resolution of the Town of Thompson's Station, TN for the design and development of Phase 2 of the Town's Greenway and to authorize the Mayor to sign a contract with Kimley Horn for the consulting services.**

   A motion was made by Alderman Alexander to approve a resolution of the Town of Thompson's Station, TN for the design and development of Phase 2 of the Town's Greenway and to authorize the Mayor to sign a contract with Kimley

Horn for the consulting services. The motion was seconded and passed unanimously.

5. **First Reading of Ordinance 2020-003: An Ordinance to amend Title 12, Chapter 4 of the Municipal Code regarding the Impact Assessment Fees as presented by Clancy Mullen with Duncan Associates.**

A motion was made by Alderman Bell to approve an Ordinance to amend Title 12, Chapter 4 of the Municipal Code regarding the Impact Assessment Fees presented by Clancy Mulllen with Duncan Associates with said modifications. BOMA requested legal counsel present a couple of options for second reading whereby BOMA would review said fees based upon a set time frame possibly being linked to strategic indexes. The motion was seconded and passed unanimously.

6. **First Reading of Ordinance 2020-001: An Ordinance to approve an amended Specific Concept Plan for Roderick Place.**

A motion was made by Alderman Alexander to approve Ordinance 2020-001 to approve an amended Specific Concept plan for Roderick Place. The motion was seconded and passed 3 – 1, with Alderman Bell casting a no vote.

7. **First Reading of Ordinance 2020-002: An Ordinance to amend Title 8, Alcoholic Beverages Ordinance.**

A motion was made by Alderman Bell to approve an Ordinance to amend Title 8, Alcoholic Beverages Ordinance. The motion was seconded and passed unanimously.

8. **ELI - Energy & Infrastructure:** To approve a potential Contract with ELI – Energy & Infrastructure for the Town Scape for Thompson's Station.

Alderman Dilks insisted that nothing more than a contract result from the approval of this item.

A motion was made by Alderman Bell to approve a potential Contract with ELI - Energy & Infrastructure for the Town Scape for Thompson's Station**.** The motion was seconded and passed with a 3 – 1 vote with Mayor Napier recusing himself from this vote. The motion passed.

There being no further business, the meeting was adjourned at 9:12 p.m.

Corey Napier, Mayor

Regina Fowler Town Recorder/Clerk

TOWN OF THOMPSON'S STATION, TENNESSEE

AUDITED FINANCIAL STATEMENTS AND OTHER INFORMATION

JUNE 30, 2019

TOWN OF THOMPSON'S STATION, TENNESSEE

Table of Contents

TOWN OF THOMPSON'S STATION, TENNESSEE
DIRECTORY OF OFFICIALS
JUNE 30, 2019

Title	Name of Official
Mayor	Corey Napier
Alderman	Shaun Alexander
Alderman	Brandon Bell
Alderman	Ben Dilks
Alderman	Brian Stover
Finance Director	Steve Banks
Town Recorder	Regina Fowler
Town Administrator	Kenneth McLawhon

CROSSLIN
CERTIFIED PUBLIC ACCOUNTANTS

Independent Auditor's Report

Board of Mayor and Aldermen
Town of Thompson's Station, Tennessee
Thompson's Station, Tennessee

Report on the Financial Statements

We have audited the accompanying financial statements of the governmental activities, the business-type activities, and each major fund of the Town of Thompson's Station, Tennessee (the "Town") as of and for the year ended June 30, 2019, and the related notes to the financial statements, which collectively comprise the Town's basic financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express opinions on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Opinions

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of the governmental activities, the business-type activities, and each major fund of the Town of Thompson's Station, Tennessee as of June 30, 2019, and the respective changes in financial position and, where applicable, cash flows thereof and the budgetary comparisons for the General Fund and State Street Aid Fund for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis (pages 5 - 10) be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Other Information

Our audit was conducted for the purpose of forming opinions on the financial statements that collectively comprise the Town of Thompson's Station, Tennessee's basic financial statements. The accompanying schedule of expenditures of federal awards on page 38, the schedule of changes in long-term debt by individual issue on page 39, and the directory of officials on page 1, as required by the State of Tennessee are, presented for purposes of additional analysis and are not a required part of the basic financial statements.

The schedule of expenditures of federal awards and the schedule of changes in long-term debt by issue are the responsibility of management and were derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the schedule of expenditures of federal awards and the schedule of changes in long-term debt by issue are fairly stated, in all material respects, in relation to the basic financial statements as a whole.

The directory of officials information has not been subjected to the auditing procedures applied in the audit of the basic financial statements, and accordingly, we do not express an opinion or provide any assurance on it.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated January 3, 2020 on our consideration of the Town of Thompson's Station, Tennessee's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts and grant agreements and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the Town's internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the Town's internal control over financial reporting and compliance.

Crosslin, PLLC

Nashville, Tennessee
January 3, 2020

As management of the Town of Thompson's Station (the "Town"), we offer readers of the Town's financial statements this narrative overview and analysis of the financial activities of the Town for the fiscal year ended June 30, 2019. Readers are encouraged to consider information presented here in conjunction with the Town's financial statements.

FINANCIAL HIGHLIGHTS

1. The assets of the Town exceeded its liabilities and deferred inflows of resources at the close of the most recent fiscal year by $43,435,663 (net position). Of this amount, $9,594,230 is considered unrestricted funds and may be used to meet the government's ongoing obligations to citizens and creditors.

2. The government's total net position increased by $2,253,352 during fiscal year 2019.

3. As of the close of the current fiscal year, the Town's governmental funds reported an ending fund balance of $6,305,042, an increase of $1,207,615 for the year. Over 96% of this total amount, or $6,021,934 is available for spending at the government's discretion (unassigned fund balance).

4. At June 30, 2019, the unassigned fund balance for the General Fund was 247% of total general fund expenditures.

OVERVIEW OF THE FINANCIAL STATEMENTS

This discussion and analysis is intended to serve as an introduction to the Town's basic financial statements. The Town's basic financial statements comprise three components: (1) government-wide financial statements, (2) fund financial statements, and (3) notes to the financial statements. This report also contains other supplementary information in addition to the basic financial statements themselves.

Government-Wide Financial Statements. These financial statements are designed to provide readers with a broad overview of the Town's finances in a manner similar to a private-sector business.

The statement of net position presents information on all of the Town's assets, liabilities, and deferred inflows of resources, with the difference reported as net position. Over time, increases or decreases in net position may serve as a useful indicator of whether the financial position of the Town is improving or deteriorating.

The statement of activities presents information showing how the Town's net position changed during the most recent fiscal year. All changes in net position are reported as soon as the underlying event giving rise to the change occurs, regardless of the timing of related cash flows. Thus, revenues and expenses are reported in this statement for some items that will only result in cash flows in future fiscal periods.

Both of the government-wide financial statements distinguish functions of the Town that are principally supported by taxes, licenses, and permits, and intergovernmental revenues (governmental activities) from other functions that are intended to recover all or a significant portion of their costs through user fees and charges (business-type activities). The governmental activities of the Town include general government, parks, and highways and streets. The business-type activity of the Town includes wastewater services.

Fund Financial Statements. A fund is a grouping of related accounts that is used to maintain control over resources that have been segregated for specific activities or objectives. The Town of Thompson's Station, like other state and local governments, uses fund accounting to ensure and demonstrate compliance with finance-related legal requirements. All of the funds of the Town can be divided into two categories: governmental funds and a proprietary fund.

Governmental funds. Governmental funds are used to account for essentially the same functions reported as governmental activities in the government-wide financial statements. However, unlike the government-wide financial statements, governmental fund financial statements focus on near-term inflows and outflows of spendable resources, as well as on balances of spendable resources available at the end of the fiscal year. Such information may be useful in evaluating a Town's near-term financing requirements. Because the focus of governmental funds is narrower than that of the government-wide financial statements, it is useful to compare the information presented for governmental funds with similar information presented for governmental activities in the government-wide financial statements. By doing so, readers may better understand the long-term impact of the government's near-term financing decisions. Both the governmental fund balance sheet and the governmental fund statement of revenues, expenditures and changes in fund balances provide a reconciliation to facilitate this comparison between governmental funds and governmental activities.

The Town adopts an annual operating budget and capital improvement budget for its General Fund and the State Street Aid Special Revenue Fund.

Proprietary fund. The Town maintains a wastewater fund as an enterprise fund. Enterprise funds are used to report the same functions presented as business-type activities in the government-wide financial statements.

Proprietary funds provide the same type of information as the government-wide financial statements, only in more detail. The proprietary fund financial statements provide separate information of the wastewater activity, which is also considered a major fund of the Town.

The Town adopts an annual operating budget and capital improvement budget for its Proprietary Fund.

Notes to the financial statements. The notes provide additional information that is essential to a full understanding of the data provided in the government-wide and fund financial statements.

Other information. In addition to the basic financial statements and accompanying notes, this report also presents certain other required information. The original budgets and final budgets as well as comparison of final budgets to actual appear on pages 17 through 20.

GOVERNMENT-WIDE FINANCIAL ANALYSIS

Net position may serve over time as a useful indicator of the Town's financial position. In the case of the Town, assets exceeded liabilities and deferred inflows of resources by $43,435,663 at the end of the most recent fiscal year.

TOWN OF THOMPSON'S STATION'S NET POSITION

	Governmental Activities		Business-Type Activities		Total	
	2019	2018	2019	2018	2019	2018
Current and other assets	$ 7,022,272	$ 6,083,927	$ 4,753,621	$ 3,955,150	$ 11,775,893	$ 10,039,077
Capital assets	19,343,268	19,092,252	16,646,742	16,869,953	35,990,010	35,962,205
Total assets	26,365,540	25,176,179	21,400,363	20,825,103	47,765,903	46,001,282
Long-term liabilities outstanding	1,996,500	2,241,800	435,185	546,297	2,431,685	2,788,097
Other liabilities	426,939	520,546	68,360	132,324	495,299	652,870
Total liabilities	2,423,439	2,762,346	503,545	678,621	2,926,984	3,440,967
Deferred inflows of resources	287,256	262,004	1,116,000	1,116,000	1,403,256	1,378,004
Net position:						
Net investment in capital assets	17,346,768	16,850,452	16,211,557	16,323,656	33,558,325	33,174,108
Restricted for roads and streets	283,108	188,251	-	-	283,108	188,251
Unrestricted	6,024,969	5,113,126	3,569,261	2,706,826	9,594,230	7,819,952
Total net position	$ 23,654,845	$ 22,151,829	$ 19,780,818	$ 19,030,482	$ 43,435,663	$ 41,182,311

A significant portion of the Town's net position, $33,558,325 or (77%) reflects its investment in capital assets (for example - land, buildings, vehicles, equipment and infrastructure), less any related debt used to acquire those assets that is still outstanding. The Town uses these capital assets to provide services to citizens; therefore, these assets are not available for future spending. The Town's investment in capital assets is reported net of related debt. It should be noted that the resources needed to repay any future debt issues must be provided from other sources, since the capital assets themselves cannot be used to liquidate these liabilities.

At year-end, $283,108 of the Town's net position represents resources that are subject to external restrictions on how they may be used. For the Town, the restricted resources must be used for State Street Aid expenses. The remaining balance of unrestricted net position, $9,594,230 (22%), may be used to meet the government's ongoing obligations to citizens and creditors.

At the end of the current fiscal year, the Town reports positive balances in both categories of net position, both for the government as a whole, as well as for its separate governmental and business- type activities.

The following is a summary of financial activities for the Town during the fiscal years ended June 30, 2019 and 2018:

TOWN OF THOMPSON'S STATION'S CHANGE IN NET POSITION

	Governmental Activities		Business-Type Activities		Total	
	2019	2018	2019	2018	2019	2018
Program revenues:						
Charges for service	$ 39,131	$ 63,968	$ 1,140,000	$ 972,721	$ 1,179,131	$ 1,036,689
Operating grants and contributions	175,356	167,992	-	-	175,356	167,992
Capital grants and contributions	-	5,362,352	502,500	2,392,982	502,500	7,755,334
General revenues:						
Property taxes	288,090	267,438	-	-	288,090	267,438
Local option sales taxes	994,173	920,986	-	-	994,173	920,986
Intergovernmental revenues	657,413	633,955	-	-	657,413	633,955
Building permits / impact fees	1,130,012	1,043,405	-	-	1,130,012	1,043,405
Other	202,784	226,659	-	-	202,784	226,659
Unrestricted investment earnings	36,311	26,553	18,420	37,168	54,731	63,721
Total revenues	3,523,270	8,713,308	1,660,920	3,402,871	5,184,190	12,116,179
Expenses:						
General government	1,462,296	1,296,144	-	-	1,462,296	1,296,144
State Street Aid	80,499	-	-	-	80,499	-
Streets and roads	352,794	220,459	-	-	352,794	220,459
Parks	58,021	74,402	-	-	58,021	74,402
Debt service	66,644	21,350	-	-	66,644	21,350
Wastewater	-	-	910,584	1,003,205	910,584	1,003,205
Total expenses	2,020,254	1,612,355	910,584	1,003,205	2,930,838	2,615,560
Change in net position	1,503,016	7,100,953	750,336	2,399,666	2,253,352	9,500,619
Net position - beginning of year	22,151,829	15,050,876	19,030,482	16,630,816	41,182,311	31,681,692
Net position - end of year	$ 23,654,845	$ 22,151,829	$ 19,780,818	$ 19,030,482	$ 43,435,663	$ 41,182,311

Governmental Activities. Governmental activities increased the Town's net position by $1,503,016, which compares with an increase in net position of $7,100,953 for fiscal year 2018. During the fiscal year 2019, no infrastructure assets were contributed or accepted.

Business-Type Activities. Business-type activities increased the Town's net position by $750,336 compared with $2,399,666 for 2018. Revenues from charges to customers for wastewater treatment increased by $167,279 while capital grants and contributions decreased by $1,890,482. Wastewater expenses decreased by $92,621 compared to prior year primarily due to fewer professional fees expended in the current year.

FINANCIAL ANALYSIS OF THE TOWN'S FUNDS

As noted earlier, the Town uses fund accounting to ensure and demonstrate compliance with finance-related legal requirements.

Governmental funds. The focus of the Town's governmental funds is to provide information on near-term inflows, outflows, and balances of spendable resources. Such information is useful in assessing the Town's financing requirements. In particular, unassigned fund balance may serve as a useful measure of the Town's net resources available for spending at the end of the fiscal year. As of the end of the current fiscal year, the Town's governmental funds reported an ending fund balance of $6,305,042. Fund balances of the governmental funds increased $1,207,615 during fiscal year 2019 primarily due to reductions in overall capital expenditures.

The general fund is the chief operating fund of the Town. At the end of the current fiscal year, unassigned fund balance for the general fund was $6,021,934. As a measure of the general fund's liquidity, it may be useful to compare unassigned fund balance to total fund expenditures. Unassigned fund balance represents 246% of total general fund expenditures for this fiscal year.

Proprietary fund. The Town's proprietary fund provides the same type of information found in the government-wide financial statements, but in more detail.

Unrestricted net position of the Wastewater Fund at the end of the year amounted to $3,569,261. The Wastewater Fund had an increase in net position for the year of $750,336 during fiscal year 2019. Factors concerning the financial position of this fund have been addressed in the discussion of the Town's business-type activity above.

GENERAL FUND BUDGETARY HIGHLIGHTS

Highlights of the differences between the budget and actual are listed below:

1. Actual over budgeted total taxes by $ 97,302.
2. Actual over budgeted total licenses, permits and fees by $283,543.
3. Actual over budgeted intergovernmental revenue by $370,885.
4. Delay in capital projects of $1,851,670.

CAPITAL ASSETS AND DEBT ADMINISTRATION

Capital assets. The Town's investment in capital assets for its governmental and business- type activities as of June 30, 2019 amounted to $35,990,010 (net of accumulated depreciation). This investment includes land, buildings, improvements, machinery, equipment and infrastructure.

Additional information on the Town capital assets can be found in Note 5 to the financial statements. The following table compares capital assets at June 30, 2019 and 2018:

TOWN OF THOMPSON'S STATION'S CAPITAL ASSETS

	Governmental Activities		Business-Type Activities		Total	
	2019	2018	2019	2018	2019	2018
Land	$ 6,360,889	$ 6,360,889	$ 2,992,000	$ 2,992,000	$ 9,352,889	$ 9,352,889
Construction in progress	237,920	589,595	228,377	-	466,297	589,595
Infrastructure	12,832,326	11,874,936	-	-	12,832,326	11,874,936
Buildings	642,070	589,196	880,550	880,550	1,522,620	1,469,746
Equipment	242,516	242,516	519,982	519,982	762,498	762,498
Vehicles	192,343	192,343	48,361	48,361	240,704	240,704
Wastewater system	-	-	15,524,671	15,524,671	15,524,671	15,524,671
Total capital assets	20,508,064	19,849,475	20,193,941	19,965,564	40,702,005	39,815,039
Less: Accumulated depreciation	(1,164,796)	(757,223)	(3,547,199)	(3,095,611)	(4,711,995)	(3,852,834)
Capital assets, net	$ 19,343,268	$ 19,092,252	$ 16,646,742	$ 16,869,953	$ 35,990,010	$ 35,962,205

Long-term Debt. At the end of the fiscal year, the Town's total debt was $2,431,685 and is set forth in detail in Note 8. Payments made on debt obligations totaled $356,412.

ECONOMIC FACTORS AND NEXT YEAR'S BUDGETS AND RATES

Despite continued improving economic conditions, a conservative approach was used in preparing the Town of Thompson's Station's budget for the 2019 - 2020 fiscal year.

1. The continued significant economic development and growth of the Town makes the budget projection a challenging process. A conservative view of new development was made for the purpose of revenue projection.
2. The Town has been awarded a grant from the state of Tennessee Highway Department of Transportation (TDOT) for trail improvements in Preservation Park in the amount of $1,039,002. This should be completed within two years.
3. Critz Lane road is to be improved and cut down the dangerous portion of the hill. This project is to be completed within the next two years at an approximate cost of $2 million to the Town.
4. The regional wastewater services plant is undergoing repairs and a possible renovation. Drip fields are underway in the area of the Hill property (west of the Regional Plant). This will assist in meeting commitments previously made by the Town to existing developers. The regional plant renovation is being evaluated for improvements.
5. Expenditures were budgeted at a rate to maintain citizen services at approximately the same level as in prior years.

REQUESTS FOR INFORMATION

This financial report is designed to provide a general overview of the Town's finances for all those with an interest in the Town's finances. Questions concerning any of the information provided in this report or request for additional financial information should be addressed to the Town of Thompson's Station, Office of the Mayor, P.O. Box 100, Thompson's Station, Tennessee 37179.

Town of Thompson's Station, Tennessee
Statement of Net Position
June 30, 2019

	Governmental Activities	Business-Type Activities	Total Primary Government
Assets:			
Cash and cash equivalents	$ 6,716,153	$ 4,266,192	$ 10,982,345
Taxes receivable - property tax	290,291	-	290,291
Accounts and other receivables	67,305	168,504	235,809
Internal balances	(318,365)	318,365	-
Due from other governments	266,888	-	266,888
Prepaid expenses and other	-	560	560
Capital assets:			
Capital assets not being depreciated	6,598,809	3,220,377	9,819,186
Other capital assets, net of accumulated depreciation	12,744,459	13,426,365	26,170,824
Total assets	26,365,540	21,400,363	47,765,903
Liabilities:			
Accounts payable and accrued expenses	318,845	68,360	387,205
Deposits from developers	59,000	-	59,000
Accrued compensation and compensated absences	49,094	-	49,094
Long-term liabilities:			
Due within one year	245,300	111,111	356,411
Due in more than one year	1,751,200	324,074	2,075,274
Total liabilities	2,423,439	503,545	2,926,984
Deferred Inflows of Resources:			
Property taxes	287,256	-	287,256
Prepaid tap fees	-	1,116,000	1,116,000
Total deferred inflows of resources	287,256	1,116,000	1,403,256
Net Position:			
Net investment in capital assets	17,346,768	16,211,557	33,558,325
Restricted for State Street Aid	283,108	-	283,108
Unrestricted	6,024,969	3,569,261	9,594,230
Total net position	$ 23,654,845	$ 19,780,818	$ 43,435,663

The notes to the financial statements are an integral part of this statement.

Town of Thompson's Station, Tennessee
Statement of Activities
For the Year Ended June 30, 2019

Functions/Programs	Expenses	Program Revenues: Charges for Services	Program Revenues: Operating Grants and Contributions	Program Revenues: Capital Grants and Contributions	Net (Expense) Revenue and Changes in Net Position: Primary Government: Governmental Activities	Primary Government: Business-Type Activities	Primary Government: Total
Governmental Activities:							
General government	$ 1,462,296	$ 17,335	$ -	$ -	$ (1,444,961)	$ -	$ (1,444,961)
State Street Aid	80,499	-	175,356	-	94,857	-	94,857
Streets and roads	352,794	-	-	-	(352,794)	-	(352,794)
Parks and recreation	58,021	21,796	-	-	(36,225)	-	(36,225)
Interest on long-term debt	66,644	-	-	-	(66,644)	-	(66,644)
Total governmental activities	2,020,254	39,131	175,356	-	(1,805,767)	-	(1,805,767)
Business-Type Activities:							
Wastewater	910,584	1,140,000	-	502,500	-	731,916	731,916
Total primary government	$ 2,930,838	$ 1,179,131	$ 175,356	$ 502,500	(1,805,767)	731,916	(1,073,851)
General Revenues:							
Taxes:							
Property taxes					288,090	-	288,090
Local option sales taxes					994,173	-	994,173
Building permits/impact fees					1,130,012	-	1,130,012
Beer and liquor tax					114,997	-	114,997
Business and privilege taxes					51,105	-	51,105
Franchise tax					25,494	-	25,494
Unrestricted intergovernmental revenues:							
State income tax					59,137	-	59,137
Payment in lieu of taxes					55,965	-	55,965
State sales tax					419,157	-	419,157
Mixed drink and beer tax					27,958	-	27,958
Business tax					95,196	-	95,196
Unrestricted investment earnings					36,311	18,420	54,731
Other					11,188	-	11,188
Total general revenues					3,308,783	18,420	3,327,203
Change in net position					1,503,016	750,336	2,253,352
Net position - beginning					22,151,829	19,030,482	41,182,311
Net position - ending					$ 23,654,845	$ 19,780,818	$ 43,435,663

The notes to the financial statements are an integral part of this statement.

Town of Thompson's Station, Tennessee
Balance Sheet
Governmental Funds
June 30, 2019

	General Fund	State Street Aid Fund	Total Governmental Funds
Assets:			
Cash	$ 6,716,153	$ -	$ 6,716,153
Taxes receivable - property tax	290,291	-	290,291
Due from other governments	236,635	30,253	266,888
Due from other funds	-	252,855	252,855
Other receivables	67,305	-	67,305
Total assets	$ 7,310,384	$ 283,108	$ 7,593,492
Liabilities:			
Accounts payable and accrued expenditures	$ 318,845	$ -	$ 318,845
Deposits from developers	59,000	-	59,000
Due to other funds	571,220	-	571,220
Accrued compensation	49,094	-	49,094
Total liabilities	998,159	-	998,159
Deferred Inflows of Resources:			
Property taxes	290,291	-	290,291
Fund Balances:			
Restricted for State Street Aid	-	283,108	283,108
Unassigned	6,021,934	-	6,021,934
Total fund balances	6,021,934	283,108	6,305,042
Total liabilities, deferred inflows of resources, and fund balances	$ 7,310,384	$ 283,108	$ 7,593,492

The notes to the financial statements are an integral part of this statement.

Town of Thompson's Station, Tennessee
Reconciliation of the Balance Sheet of
Governmental Funds to the Statement of Net Position
June 30, 2019

Amounts reported for governmental activities in the statement of activities are different because:	
Total fund balances of governmental funds	$ 6,305,042
Capital assets used in governmental activities are not financial resources, and, therefore, are not reported in the funds, net of accumulated depreciation of $1,164,796	19,343,268
Receivables not available to pay for current expenditures are not current financial resources and therefore are not reported in the governmental funds	3,035
Long-term liabilities, including capital outlay notes payable, are not due and payable in the current period, and, therefore, are not reported in the governmental funds:	
General long-term debt	(1,996,500)
Net position of governmental activities	$ 23,654,845

The notes to the financial statements are an integral part of this statement.

Town of Thompson's Station, Tennessee
Statement of Revenues, Expenditures, and Changes in Fund Balances
Governmental Funds
For the Year Ended June 30, 2019

	General Fund	State Street Aid Fund	Total Governmental Funds
Revenues:			
Taxes	$ 1,472,302	$ -	$ 1,472,302
Licenses, permits and fees	1,169,143	-	1,169,143
Intergovernmental	859,885	175,356	1,035,241
Other	47,499	-	47,499
Total revenues	3,548,829	175,356	3,724,185
Expenditures:			
Current:			
General government	1,342,884	-	1,342,884
State Street Aid	-	80,499	80,499
Streets and roads	41,903	-	41,903
Parks	37,756	-	37,756
Capital outlay	701,584	-	701,584
Debt Service:			
Principal	245,300	-	245,300
Interest	66,644	-	66,644
Total expenditures	2,436,071	80,499	2,516,570
Excess of revenues over expenditures	1,112,758	94,857	1,207,615
Net change in fund balances	1,112,758	94,857	1,207,615
Fund balance - beginning	4,909,176	188,251	5,097,427
Fund balance - ending	$ 6,021,934	$ 283,108	$ 6,305,042

Town of Thompson's Station, Tennessee
Reconciliation of the Statement of Revenues, Expenditures, and Changes in Fund Balances of Governmental Funds to the Statement of Activities
For the Year Ended June 30, 2019

Net change in fund balances - total governmental funds	$	1,207,615
Amounts reported for the governmental activities in the statement of activities are different because:		
Governmental funds report capital outlays as expenditures. However, in the statement of activities, the cost of those assets is allocated over their estimated useful lives and reported as depreciation expense. Specifically these items are as follows:		
Acquisition and donations of capital assets		683,861
Net carrying value of capital assets disposed of		(25,272)
Depreciation expense		(407,573)
Revenue in the statement of revenues, expenditures, and changes in fund balance that provide current financial resources are not reported as resources in the statement of activities for:		
Grant revenues and reimbursements		(202,472)
Revenue in the statement of activities that do not provide current financial resources are not reported as resources in the governmental funds for:		
Property taxes		1,557
The issuance of long-term debt provides current financial resources to governmental funds, while the repayment of the principal of long-term debt consumes the current financial resources of governmental funds. Neither transaction, however, has any effect on net position. Specifically, these items are as follows:		
Debt payments		245,300
Change in net position of governmental activities	$	1,503,016

The notes to the financial statements are an integral part of this statement.

Town of Thompson's Station, Tennessee
Statement of Revenues, Expenditures, and Changes in Fund Balance
Budgetary Comparison Statement - General Fund
For the Year Ended June 30, 2019

	Budgeted Amounts			
	Original Budget	Final Budget	Actual Amounts	Variance with Final Budget
REVENUES:				
Taxes:				
Property	$ 270,000	$ 270,000	$ 286,533	$ 16,533
Franchise	25,000	25,000	25,494	494
Wholesale beer and wholesale liquor	110,000	110,000	114,997	4,997
Local sales tax - Trustee	900,000	900,000	994,173	94,173
Adequate schools facilities tax	70,000	70,000	51,105	(18,895)
Total taxes	1,375,000	1,375,000	1,472,302	97,302
Licenses, permits and fees:				
Beer permits	600	600	600	-
Building permits	300,000	300,000	479,812	179,812
Review fees	20,000	20,000	16,735	(3,265)
Impact fees	550,000	550,000	650,200	100,200
Miscellaneous	15,000	15,000	21,796	6,796
Total licenses, permits and fees	885,600	885,600	1,169,143	283,543
Intergovernmental:				
Payments in lieu of taxes	50,000	50,000	55,965	5,965
State of Tennessee - sales tax	350,000	350,000	419,157	69,157
State of Tennessee - mixed drink tax	12,000	12,000	25,770	13,770
State of Tennessee - beer tax	2,000	2,000	2,188	188
State of Tennessee - income tax	-	-	59,137	59,137
State of Tennessee - business tax	75,000	75,000	95,196	20,196
Federal grant revenue	-	-	202,472	202,472
Total intergovernmental revenue	489,000	489,000	859,885	370,885
Other income:				
Interest	20,000	20,000	36,311	16,311
Other	12,000	12,000	11,188	(812)
Transfer from reserves	5,812,000	1,972,156	-	(1,972,156)
Total other income	5,844,000	2,004,156	47,499	(1,956,657)
Total revenues	8,593,600	4,753,756	3,548,829	(1,204,927)

The notes to the financial statements are an integral part of this statement.

Town of Thompson's Station, Tennessee
Statement of Revenues, Expenditures, and Changes in Fund Balance
Budgetary Comparison Statement - General Fund
For the Year Ended June 30, 2019

	Budgeted Amounts			
	Original Budget	Final Budget	Actual Amounts	Variance with Final Budget
EXPENDITURES:				
General Government:				
Salaries and wages	600,000	600,000	468,022	131,978
Payroll taxes	48,300	48,300	42,038	6,262
Publication of legal notices	3,000	3,000	2,624	376
General expense	1,000	1,000	785	215
Utilities	16,500	16,500	13,659	2,841
Memberships and subscriptions	4,000	4,000	2,618	1,382
Insurance - employees	90,000	90,000	69,754	20,246
Insurance - other	35,000	35,000	50,099	(15,099)
Telephone expenses	5,000	5,000	4,488	512
Repairs and maintenance - building	20,000	20,000	22,308	(2,308)
Animal control services	7,500	7,500	7,355	145
Trustee commission	5,500	5,500	6	5,494
Other expenses	10,000	10,000	19,001	(9,001)
Travel	2,500	3,500	3,572	(72)
Economic development	7,500	7,500	6,796	704
Continuing education expenses	5,000	5,000	1,629	3,371
Office supplies	100,000	100,000	42,979	57,021
Postage, freight and express charges	1,000	1,000	426	574
Printing, forms and stationary	7,500	7,500	3,454	4,046
Professional fees - legal	100,000	130,000	141,780	(11,780)
Professional fees - other	106,000	315,000	292,555	22,445
Vehicle fuel	15,000	17,500	15,838	1,662
Vehicle repairs	5,000	10,000	8,896	1,104
Bank charges	2,000	2,000	1,050	950
Emergency services	145,000	145,000	100,000	45,000
Employee retirement expenses	30,000	30,000	21,152	8,848
Total general government	1,372,300	1,619,800	1,342,884	276,916

The notes to the financial statements are an integral part of this statement.

Town of Thompson's Station, Tennessee
Statement of Revenues, Expenditures, and Changes in Fund Balance
Budgetary Comparison Statement - General Fund
For the Year Ended June 30, 2019

	Budgeted Amounts			
	Original Budget	Final Budget	Actual Amounts	Variance with Final Budget
Streets and Roads:				
Resurfacing	819,300	200,702	41,903	158,799
Total streets and roads	819,300	200,702	41,903	158,799
Capital Projects:				
Capital projects	6,050,000	2,553,254	701,584	1,851,670
Total capital projects	6,050,000	2,553,254	701,584	1,851,670
Parks:				
Park improvements, repairs, and supplies	40,000	68,000	37,756	30,244
Total parks	40,000	68,000	37,756	30,244
Debt Service:				
Payments on capital outlay note	312,000	312,000	311,944	56
Total debt service	312,000	312,000	311,944	56
Total expenditures	8,593,600	4,753,756	2,436,071	2,317,685
NET CHANGE IN FUND BALANCE	$ -	$ -	1,112,758	$ 1,112,758
FUND BALANCE-BEGINNING OF YEAR			4,909,176	
FUND BALANCE-END OF YEAR			$ 6,021,934	

The notes to the financial statements are an integral part of this statement.

Town of Thompson's Station, Tennessee
Statement of Revenues, Expenditures, and Changes in Fund Balance
Budgetary Comparison Statement - State Street Aid Fund
For the Year Ended June 30, 2019

	Budgeted Amounts			
	Original Budget	Final Budget	Actual Amounts	Variance with Final Budget
REVENUES:				
Intergovernmental:				
State of Tennessee - gas tax 1989	$ 12,000	$ 12,000	$ 14,276	$ 2,276
State of Tennessee - gas tax $0.03 per gallon	20,000	20,000	26,452	6,452
State of Tennessee - gas and motor fuel tax	80,000	80,000	89,487	9,487
State of Tennessee - petroleum special	8,000	8,000	9,384	1,384
State of Tennessee - 2017 gas tax	20,000	20,000	35,757	15,757
Total intergovernmental revenue	140,000	140,000	175,356	35,356
Total revenues	140,000	140,000	175,356	35,356
EXPENDITURES:				
State Street Aid:				
Resurfacing	140,000	140,000	80,499	59,501
Total expenditures	140,000	140,000	80,499	59,501
NET CHANGE IN FUND BALANCE	$ -	$ -	94,857	$ 94,857
FUND BALANCE-BEGINNING OF YEAR			188,251	
FUND BALANCE-END OF YEAR			$ 283,108	

The notes to the financial statements are an integral part of this statement.

Town of Thompson's Station, Tennessee
Statement of Net Position
Proprietary Fund - Wastewater Fund
June 30, 2019

Assets:	
Current assets:	
Cash	$ 4,266,192
Accounts receivable	168,504
Prepaid expenses and other	560
Due from other funds	318,365
Total current assets	4,753,621
Capital assets:	
Wastewater system, net of accumulated depreciation	16,646,742
Total assets	21,400,363
Current Liabilities:	
Accounts payable and accrued expenses	68,360
Notes payable - current portion	111,111
Total current liabilities	179,471
Noncurrent Liabilities:	
Prepaid tap fees	1,116,000
Notes payable, less current portion	324,074
Total noncurrent liabilities	1,440,074
Total liabilities	1,619,545
Net Position:	
Net investment in capital assets	16,211,557
Unrestricted	3,569,261
Total net position	$ 19,780,818

The notes to the financial statements are an integral part of this statement.

Town of Thompson's Station, Tennessee
Statement of Revenues, Expenses, and Changes
in Fund Net Position
Proprietary Fund - Wastewater Fund
For the Year Ended June 30, 2019

Revenues:	
Charges to customers - wastewater	$ 1,104,491
Penalties	35,509
Total revenues	1,140,000
Operating Expenses:	
Supply and Operations:	
Salaries	123,502
Payroll taxes and benefits	15,013
Repairs and maintenance	62,413
Permits and licenses	4,828
Supplies	1,680
Testing	3,255
Utilities	79,315
Insurance	9,211
Professional and consulting fees	121,826
Other	25,643
Total supply and operations	446,686
Depreciation	451,588
Total operating expenses	898,274
Operating income	241,726
Non-Operating Income (Expense):	
Interest expense	(12,310)
Interest income	18,420
Total non-operating income	6,110
Capital contributions	-
Tap fees	502,500
Change in net position	750,336
Net position - beginning of year	19,030,482
Net position - end of year	$ 19,780,818

The notes to the financial statements are an integral part of this statement.

Town of Thompson's Station, Tennessee
Statement of Cash Flows
Proprietary Fund - Wastewater Fund
For the Year Ended June 30, 2019

Cash Flows from Operating Activities:	
Receipts from customers	$ 1,195,651
Payments to or on behalf of employees	(138,515)
Payments to suppliers	(802,362)
Net cash provided by operating activities	254,774
Cash Flows from Capital and Related Financing Activities:	
Proceeds from tap fees	502,500
Purchases of capital assets	(228,377)
Principal payments on notes	(111,112)
Interest paid on notes	(12,310)
Net cash provided by capital and related financing activities	150,701
Cash Flows from Investing Activities:	
Interest income from cash and cash equivalents	18,420
Net cash provided by investing activities	18,420
Net increase in cash and cash equivalents	423,895
Cash and Cash Equivalents - Beginning of Year	3,842,297
Cash and Cash Equivalents - End of Year	$ 4,266,192

Reconciliation of Operating Income to Net Cash Provided By Operating Activities

Operating income	$ 241,726
Adjustments to reconcile operating income to net cash provided by operating activities:	
Depreciation	451,588
Changes in assets and liabilities:	
Accounts receivable and due from other funds	(374,016)
Prepaid expenses and other	(560)
Accounts payable	(63,964)
Net cash provided by operating activities	$ 254,774

The notes to the financial statements are an integral part of this statement.

NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Reporting Entity

The Town of Thompson's Station, Tennessee (the "Town"), located in Williamson County, Tennessee, was incorporated August 15, 1990, under the provisions of Section 6-1-202, etc. seq., of the Tennessee Code Annotated. The Town operates under a Board of Mayor and Alderman form of government and is authorized to provide all services accorded to municipalities in the State of Tennessee.

The financial statements of the Town have been prepared in accordance with accounting principles generally accepted in the United States of America applicable to governmental units, as prescribed by the Governmental Accounting Standards Board ("GASB"). The following is a summary of the significant accounting policies of the Town of Thompson's Station:

The Town's accompanying financial statements present the governmental units relevant to the operations of the Town. The financial statements presented herein do not include agencies which have been formed under applicable state laws or separate and distinct units of government apart from the Town of Thompson's Station, Tennessee.

Based on criteria in GASB pronouncements, there are no component units to be included within the Town's financial reporting entity as of June 30, 2019.

Basis of Accounting and Basis of Presentation

Government-Wide Financial Statements

The government-wide financial statements, the statement of net position and the statement of activities, report information on all the nonfiduciary activities of the Town. The Statement of Net Position presents the Town's assets, liabilities, and deferred inflows of resources, with the difference reported as net position. Net position is reported in three categories:

> *Net investment in capital assets* consists of capital assets, net of accumulated depreciation and reduced by outstanding debt that is attributable to the acquisition, construction and improvement of those assets. Debt that was issued for capital purposes is not a part of the calculation of net investment in capital assets, until the proceeds have been used to acquire capital assets.
>
> *Restricted net position* results from restrictions placed on net position by external sources such as creditors, grantors and contributors, or imposed by law through constitutional provisions or enabling legislation.
>
> *Unrestricted net position* consists of net position which do not meet the definition of the two proceeding categories.

NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES - Continued

The statement of activities presents the amount of direct expenses of a given function that are offset by the related program revenues. The direct expenses are those that are clearly related to a specific function. Program revenues include charges to those who use, purchase and/or directly benefit from the services and/or goods provided by a given function. Taxes and other revenues not properly included in program revenues are reported as general revenues.

The government-wide and proprietary fund financial statements are reported using the economic resources measurement focus and the accrual basis of accounting. Revenues are reported when earned and expenses are recorded at the time liabilities are incurred, regardless of when the related cash flows take place. Nonexchange transactions, in which the Town gives (or receives) value without directly receiving (or giving) equal value in exchange, include property taxes, grants, entitlements and donations. On an accrual basis, revenue from property taxes is recognized in the fiscal year in which all eligibility requirements have been satisfied.

Generally, the effect of interfund activity has been eliminated from the government-wide financial statements. Exceptions to this general rule are utility payments between the Town's Wastewater Fund and the General Fund. Elimination of these charges would distort the direct costs and program revenues reported for the various functions concerned.

When both restricted and unrestricted resources are available for use, it is the Town's policy to use restricted resources first, then unrestricted resources as they are needed.

Fund Financial Statements

Governmental fund financial statements are reported using the current financial resources measurement focus and the modified accrual basis of accounting. Under this method, revenues are recognized when measurable and available. On this basis, the Town deems revenue to be available if the revenues are collectible within 60 days after the end of the close of the fiscal year, and up to one year for certain grant revenues.

Property taxes, sales taxes, licenses and interest associated with the current period are considered to be susceptible to accrual. Some expenditures (debt service, long-term compensated absences, and claims and judgments expenditures) are recorded only when payment is due. General capital asset acquisitions are reported as expenditures in governmental funds.

The Town presents the following governmental funds, which are considered to be major funds:

> The General Fund is the Town's primary operating fund. It includes all financial resources of the general government, except those required to be accounted for in other funds.
>
> The Town uses the State Street Aid Fund to account for the receipt and usage of the Town's share of State gasoline taxes. State law requires that these gasoline taxes be used to maintain streets.

NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES - Continued

Proprietary funds distinguish operating revenues and expenses from non-operating items. Operating revenues and expenses generally result from providing services and/or producing and delivering goods in connection with the proprietary fund's principal ongoing operations. The principal operating revenues are charges to customers for services. Operating expenses include the cost of services, administrative expenses and depreciation on capital assets. All revenues and expenses not meeting this definition are reported as non-operating revenues and expenses.

The Town presents the following proprietary enterprise fund, which is considered to be a major fund:

The Town's Wastewater Fund is used to account for wastewater revenues, expenses, and related assets and liabilities for services provided to customers of the system.

Governmental Fund Balances

In accordance with GASB Statement No. 54, the governmental funds report fund balances in classifications that comprise a hierarchy based primarily on the extent to which the Town is bound to honor constraints on the specific purposes for which amounts in those funds can be spent. The categories of fund balance are as follows:

Nonspendable - The nonspendable fund balance classification includes amounts that cannot be spent because they are either (a) not in spendable form or (b) legally or contractually required to be maintained intact.

Restricted - Fund balance is reported as restricted when constraints placed on the use of resources are either: (a) externally imposed by creditors (such as through debt covenants), grantors, contributors, or laws or regulations of other governments; or (b) imposed by law through constitutional provisions or enabling legislation.

Committed - Amounts that can only be used for specific purposes pursuant to constraints imposed by formal action, either ordinance or resolutions, of the Board of Mayor and Aldermen level of decision-making authority, are reported as committed fund balance. Committed fund balance also incorporates contractual obligations to the extent that existing resources in the fund have been specifically committed for use in satisfying those contractual requirements.

Assigned - Amounts that are constrained by the Town's intent to be used for specific purposes, but are neither restricted nor committed, are reported as assigned fund balance. The Board of Mayor and Aldermen have authorized the Town Administrator to assign fund balance up to certain amounts.

NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES - Continued

Unassigned - Unassigned fund balance is the residual classification for the General Fund. This classification represents fund balance that has not been assigned to other funds and that has not been restricted, committed, or assigned to specific purposes within the General Fund. In other governmental funds, if expenditures incurred for specific purposes have exceeded the amounts restricted, committed, or assigned to those purposes, those amounts are reported as a negative unassigned fund balance.

The Town does not have any committed or assigned fund balances at June 30, 2019. The Town's practice is to expend any available restricted, committed or assigned resources, in that order, prior to expending unassigned resources.

Budgetary Basis of Accounting

The Town adopts an annual budget for the General Fund and State Street Aid Fund. The Town's budgetary process accounts for transactions using the modified-accrual basis of accounting, which is consistent with the basis used in the governmental fund statements, in accordance with accounting principles generally accepted in the United States of America.

Cash and Cash Equivalents

Cash and cash equivalents are stated at cost and include amounts in demand deposits, interest bearing accounts and short-term investments maturing within three months or less. When applicable, investments consist of short-term investments, including certificates of deposits. These investments are reported at cost, which approximates fair value.

Receivables

Based on prior experience and estimates of current customer credit-worthiness, an allowance for uncollectible receivables has been provided in the amount of $11,195 for the Wastewater Fund.

Inventories

Inventories of materials and supplies of all funds of the Town were deemed to be immaterial and were not inventoried or reflected in the records. Inventory items are recorded as expenditures when purchased.

NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES - Continued

Capital Assets

Capital assets, which include land, buildings, and equipment, are reported in the applicable governmental activities in the government-wide financial statements. Wastewater capital assets are reported with business-type activities in the government-wide financial statements and in the proprietary fund statement of net position. Capital assets are defined by the Town as assets with an original and individual cost of $5,000 or more and have an estimated useful life of more than one year. Purchased or constructed assets are recorded at cost; capital assets that are donated are recorded at their estimated acquisition value at the date of the donation. The Town elected not to capitalize retroactively its major general infrastructure (roads, sidewalks, bridges and similar assets). Such assets will be reported as new items that are acquired and constructed in the future. Repairs and maintenance costs that do not significantly extend the useful life or increase the value of the asset are not capitalized.

Depreciation is recorded based on the straight-line method over the estimated useful life of the asset. The estimated useful lives of the assets range from 5 to 40 years.

Deferred Outflows/Inflows of Resources

In addition to assets, the statement of financial position may report a separate section for deferred outflows of resources. This separate financial statement element, deferred outflows of resources, represents a consumption of net position that applies to a future period(s) and so will not be recognized as an outflow of resources (expenses/expenditures) until then. The Town has no items that qualify for reporting in this category at June 30, 2019.

In addition to liabilities, the statement of financial position reports a separate section for deferred inflows of resources. This separate financial statement element, deferred inflows of resources, represents an increase to net position that applies to a future period and is not recognized as an inflow of resource (revenue) until that time. These items are amounts in the governmental funds that were measurable at year-end, but were not available to finance expenditures for the current year. This includes unavailable revenues from property taxes. Deferred inflows of resources reported in the statement of net position arise from imposed nonexchange revenues (property taxes) which are assessed prior to the end of the fiscal year, but levied in the subsequent year. These amounts are deferred and recognized as an inflow of resources in the period that the amounts become available. In the business-type activities and wastewater fund, deferred inflows of resources includes prepaid tap fees. These fees reserve capacity for taps within proposed parcels in a future year.

Estimates

Estimates and assumptions are used in preparing financial statements. These estimates and assumptions affect the reported amounts of assets, liabilities and deferred inflows of resources at the date of the financial statements and reported revenue and expenses during the period. Actual results could differ from those estimates.

NOTE 2 - PROPERTY TAXES

The Town's property tax is levied for the current year on October 1 each year on the assessed value as of the previous January 1 for all real and personal property within the boundaries of the Town. Property taxes are secured by a statutory lien as of the original assessment date of January 1 and are an enforceable legal claim. Taxes may be paid during the period of October 1 through February 28 and become delinquent on March 1. Delinquent taxes have been filed with the Williamson County Clerk and Master.

A schedule of tax rates, assessments, levies and collections for the last ten fiscal years are as follows:

Year of Levy	Tax Rate	Assessment	Levy	Balance June 30, 2018	Taxes Levied	Collections and Adjustments	Balance June 30, 2019
2010	.103	89,326,214	92,006	$ 84	-	-	$ 84
2011	.103	85,407,960	87,941	22	-	13	9
2012	.103	89,657,972	92,314	14	-	-	14
2013	.103	106,886,489	110,070	30	-	-	30
2014	.103	128,934,758	132,781	62	-	26	36
2015	.103	134,375,527	138,407	31	-	9	22
2016	.103	193,407,102	199,209	53	-	1	52
2017	.103	229,201,976	236,078	1,182	-	981	201
2018	.103	254,372,725	262,004	262,004	2,694	262,111	2,587
2019	.103	278,889,515	287,256	-	287,256	-	287,256
				$263,482	$289,950	$263,141	$290,291

NOTE 3 - CASH AND CASH EQUIVALENTS

Cash and cash equivalents consist of cash totaling $10,982,345 at June 30, 2019. State statutes authorize the Town to invest funds in the following: bonds, notes or treasury bills of the United States or any of its agencies; certificates of deposit at Tennessee state chartered banks and savings and loan associations and federally chartered banks and savings and loan associations; repurchase agreements utilizing obligations of the United States or its agencies as the underlying securities; and state pooled investment funds. Statutes also require that securities underlying repurchase agreements must have a market value at least equal to the amount of funds invested in the repurchase transaction.

NOTE 3 - CASH AND CASH EQUIVALENTS - Continued

At June 30, 2019, total demand deposits and certificates of deposit for the Town were insured and/or collateralized in one of the following ways. Deposits and certificates of deposits are insured, up to applicable limits, through the Federal Deposit Insurance Corporation ("FDIC"). All deposits and certificates were held in financial institutions, which are members of the Tennessee Bank Collateral Pool. The Tennessee Bank Collateral Pool (the pool) is a multiple financial institution collateral pool in which member financial institutions holding public funds pledge collateral securities. In the event any member financial institution fails, the entire collateral pool becomes available to satisfy the claims of the governmental entities. The pool also has the ability to make additional assessments on a pro rata basis to the pool if the value of the pool is not sufficient to cover a loss. The Town's deposits in financial institutions were entirely insured or collateralized at June 30, 2019.

NOTE 4 - WASTEWATER RATES AND CUSTOMERS

The active number of wastewater customers at June 30, 2019 was 1,787.

The following monthly service rates for residential and commercial customers were in effect at June 30, 2019:

Minimum bill	$17.20
Wastewater rates	$7.47 per thousand gallons for 0-8,000 gallons
	$9.46 per thousand gallons for 8,001-20,000 gallons
	$11.83 per thousand gallons for 20,001 gallons and greater

Residential accounts are limited to a maximum of $55.00 per month.
Non-residential accounts have no maximum limit.

NOTE 5 - CAPITAL ASSETS

Capital assets activity for the year ended June 30, 2019, was as follows:

Governmental Activities:

	Beginning Balance	Additions	Decreases and Transfers	Ending Balance
Capital assets not being depreciated				
Land	$ 6,360,889	$ -	$ -	$ 6,360,889
Construction in progress	589,595	182,897	(534,572)	237,920
Total capital assets not being depreciated	6,950,484	182,897	(534,572)	6,598,809
Capital assets being depreciated				
Infrastructure	11,874,936	448,090	509,300	12,832,326
Building and improvements	589,196	52,874	-	642,070
Furniture and equipment	242,516	-	-	242,516
Vehicles	192,343	-	-	192,343
Total capital assets being depreciated	12,898,991	500,964	509,300	13,909,255
Less: accumulated depreciation for				
Infrastructure	(301,415)	(331,156)	-	(632,571)
Building and improvements	(196,878)	(14,730)	-	(211,608)
Furniture and equipment	(120,205)	(36,377)	-	(156,582)
Vehicles	(138,725)	(25,310)	-	(164,035)
Total accumulated depreciation	(757,223)	(407,573)	-	(1,164,796)
Capital assets being depreciated, net	12,141,768	93,391	509,300	12,744,459
Governmental activities capital assets, net	$ 19,092,252	$ 276,288	$(25,272)	$ 19,343,268

NOTE 5 - CAPITAL ASSETS - Continued

Depreciation expense was charged to functions/programs at June 30, 2019, as follows:

General government	$ 76,417
Streets and roads	310,891
Parks	20,265
	$407,573

Construction in progress at June 30, 2019, is attributable to the following:

Town Hall design	$ 65,663
Critz Lane improvement	172,257
	$237,920

During fiscal year 2019, the following projects were substantially completed and were transferred to capital assets:

Clayton Arnold repairing	$ 16,600
Critz Lane redesign	492,700
	$509,300

Included in construction in progress at June 30, 2019 are various projects, as described above. Estimated costs to complete these projects were as follows at June 30, 2019:

Town Hall design	$1,200,000
Critz Lane improvement	2,000,000
	$3,200,000

NOTE 5 - CAPITAL ASSETS - Continued

Business-Type Activities - Wastewater:

	Beginning Balance	Additions	Decreases and Transfers	Ending Balance
Capital assets not being depreciated				
Land	$ 2,992,000	$ -	$ -	$ 2,992,000
Construction in progress	-	228,377	-	228,377
Total capital assets not being depreciated	2,992,000	228,377	-	3,220,377
Capital assets being depreciated				
Wastewater system	15,524,671	-	-	15,524,671
Building	880,550	-	-	880,550
Machinery and equipment	519,982	-	-	519,982
Vehicles	48,361	-	-	48,361
Total capital assets being depreciated	16,973,564	-	-	16,973,564
Less: accumulated depreciation for				
Wastewater system	(2,529,156)	(388,820)	-	(2,917,965)
Building	(237,934)	(21,848)	-	(259,782)
Machinery and equipment	(305,650)	(31,248)	-	(336,898)
Vehicles	(22,871)	(9,672)	-	(32,543)
Total accumulated depreciation	(3,095,611)	(451,588)	-	(3,547,199)
Capital assets being depreciated, net	13,877,953	(451,588)	-	13,426,365
Business-type activities capital assets, net	$ 16,869,953	$(223,211)	$ -	$ 16,646,742

Construction in progress at June 30, 2019, is attributable to the following:

Hall property drip fields	$228,377
Total construction in progress	$228,377

Included in construction in progress at June 30, 2019 is the Hill property drip fields, as described above. Estimated costs to complete this project is $3,101,500 as of June 30, 2019.

NOTE 6 - RISK MANAGEMENT

The Town is exposed to various risks of loss related to torts, damage to, destruction and/or theft of assets, errors and omissions, injuries to employees, and natural disasters. The Town maintains insurance coverage through the Tennessee Municipal League Risk Management Pool, covering each of those risks of loss. The TML Pool is a cooperative risk sharing arrangement between local government agencies that works in many ways like a traditional insurer. The Town pays a premium, receives coverage, and can make claims against the coverage. The Town meets the TML's guidelines and complies with its rules and regulations, including loss control requirements as well as its underwriting standards. Rates of the TML Pool are actuarially projected to provide adequate funding to cover loss reserves and expenses, as well as building contingency reserves. Management of the Town believes such coverage is sufficient to preclude any significant uninsured losses to the Town. Settled claims have not exceeded this commercial coverage in any of the past three years. See also Note 12.

NOTE 7 - INTERFUND BALANCES AND ACTIVITY

Balances due from/to other funds at June 30, 2019, consist of the following:

- $318,365 due from the General Fund to the Wastewater Fund representing utility services.
- $252,855 due from the General Fund to the State Street Aid Fund for cash held by the General Fund.

NOTE 8 - LONG-TERM LIABILITIES

The Town's long-term liabilities consist of the following at June 30, 2019:

General Obligation Liabilities	
$1,153,000 Land Purchase Capital Outlay Note, Series 2013, due in annual installments through September 26, 2023, with interest payable semi-annually at 2.85% per annum. The full faith and credit of the Town is pledged as collateral.	$ 576,500
$1,550,000 Land Purchase General Obligation (G.O.) Capital Outlay Note, Series 2018, due in annual installments through April 1, 2030, with Interest payable semi-annually at 2.90% per annum. The full faith and credit of the Town is pledged as collateral.	1,420,000
Business-Type Activities Liabilities	
$1,000,000 Wastewater Drip Field Project Capital Outlay Note, Series 2014, due in monthly installments of principal and interest at 2.45% through May 13, 2023. All revenue of the Wastewater Fund is Pledged as collateral.	435,185
	$2,431,685

NOTE 8 - LONG-TERM LIABILITIES - Continued

Changes in Long-Term Liabilities

The changes in long-term liabilities during the year ended June 30, 2019, were as follows:

	Balance July 1, 2018	Additions	Reductions	Balance June 30, 2019	Due Within One Year
Governmental Activities:					
Capital Outlay Note - Series 2013	$ 691,800	$ -	$115,300	$ 576,500	$115,300
G.O. Capital Outlay Note - Series 2018	1,550,000	-	130,000	1,420,000	130,000
	$2,241,800	$ -	$245,300	$1,996,500	$245,300
Business-Type Activities:					
Capital Outlay Note - Series 2014	$ 546,297	$ -	$111,112	$ 435,185	$111,111

Future principal and interest activities of long-term obligations are as follows at June 30, 2019:

	Governmental Activities Capital Outlay, Series 2013 and 2018			Business-Type Activities Capital Outlay, Series 2014			Totals		
	Principal	Interest	Total	Principal	Interest	Total	Principal	Interest	Total
2020	$ 245,300	$ 55,967	$ 301,267	$111,111	$ 9,415	$120,526	$ 356,411	$ 65,382	$ 421,793
2021	245,300	48,911	294,211	111,111	6,692	117,803	356,411	55,603	412,014
2022	245,300	41,855	287,155	111,111	3,970	115,081	356,411	45,825	402,236
2023	245,300	34,799	280,099	101,852	1,248	103,100	347,152	36,047	383,199
2024	245,300	27,743	273,043	-	-	-	245,300	27,743	273,043
2025 - 2029	650,000	73,950	723,950	-	-	-	650,000	73,950	723,950
2030	120,000	3,480	123,430	-	-	-	120,000	3,480	123,480
	$1,996,500	$286,705	$2,283,205	$435,185	$21,325	$456,510	$2,431,685	$308,030	$2,739,715

NOTE 9 - PREPAID TAP FEES

In 2018, the Town purchased two parcels of land for $480,000 (Hill property) and $2,625,000 (Alexander property), respectively. As part of the agreement the Town accepted $1,116,000 from the seller for system development and tap fees for 310 taps related to the Hill Property and one other development. The Town also financed $1,550,000 through a General Obligation Capital Outlay Note (See Note 8) for the Alexander property, approved for parks, open spaces, and general infrastructure purposes. The Town anticipates using the property for drip fields. The remaining $480,000 was paid through cash from the Wastewater Fund.

The Alexander property and related General Obligation Capital Outlay Note are recorded in the governmental activities due to the approved use of the property and related debt. The Hill property and related prepaid tap fees are recorded in capital assets and deferred inflows of resources in the Wastewater Fund. The residential units and drip fields planned for the property are not expected to begin development for another one to two years, at which time the Town will be able to recognize the prepaid tap fees as revenue.

NOTE 10 - DEFINED CONTRIBUTION BENEFIT PLAN

During fiscal year 2016, the Town began to offer its employees a deferred compensation defined contribution benefit plan through the Town of Thompson's Station 457 Retirement Readiness Plan (the "Plan"). The Plan is a prototype plan created in accordance with Internal Revenue Code section 457. The Plan is available to all employees working more than 30 hours per week and permits participants to defer a portion of their compensation until termination, retirement, disability, or other qualifying events under the Plan document. The Plan's investments are held by John Hancock. The Plan provides for a discretionary Town matching contribution of up to 5% of eligible compensation. The Town's match for fiscal year 2019 totaled $26,044. Effective July 1, 2016, the Plan was amended to provide cliff vesting for Town's matching contributions. Such contributions vest after 3-years of eligible employment. The amendment affects employees hired on and after July 1, 2016. Those hired before July 1, 2016 are immediately vested in the Town's matching contributions. There were no significant forfeitures during fiscal year 2019.

NOTE 11 - WASTEWATER TAP AGREEMENT

During fiscal year 2006, the Town entered into an agreement with a developer under which the developer would build a wastewater treatment facility and contribute it to the Town. The wastewater facility was completed and contributed to the Town during 2007, and a capital contribution was recorded. Also under the agreement, the Town agreed to provide to the developer the rights to 2,921 taps (i.e. access fees) to the wastewater system. The value of the wastewater facility approximates the amount of the taps given by the Town. The developer may utilize the taps at its discretion. The Town's guarantee to provide the taps expires in May 2021. The Town has no obligation other than to allow access to its wastewater system, which it has agreed to do whenever the developer determines. As of June 30, 2019, the developer has remaining rights to 1,392 taps.

NOTE 12 - COMMITMENTS AND CONTINGENCIES

The Town, from time to time, is involved in various lawsuits arising in the ordinary course of its business. The Town maintains insurance coverage to minimize the risk of loss from threatened or pending litigation. It is management's opinion that any pending or threatened litigation will not have a material effect on the Town's financial position or results of operations.

NOTE 13 - SUBSEQUENT EVENTS

Town management has evaluated subsequent events through January 3, 2020, the date the financial statements were available for issuance, and has determined that there was one subsequent event requiring disclosure.

During September 2019, the Town was awarded a grant from the State of Tennessee Highway Department of Transportation ("TDOT") for trail improvements in Preservation Park in the amount of $1,039,002.

OTHER INFORMATION

TOWN OF THOMPSON'S STATION, TENNESSEE

SCHEDULE OF EXPENDITURES OF FEDERAL AWARDS

FOR THE YEAR ENDED JUNE 30, 2019

Grantor	Federal CFDA Number	Grant Number / Pass-through Entity Identifying Number	Grant Receivables (Deferred) July 1, 2018	Federal Receipts	Expenditures	Grant Receivables (Deferred) June 30, 2019
U.S. DEPARTMENT OF THE INTERIOR						
National Park Service's American Battlefield Protection Program (ABPP)	15.928	P14AP00430	$ 202,472	$ 202,472	$ -	$ -
TOTAL US DEPARTMENT OF THE INTERIOR			202,472	202,472	-	-
TOTAL FEDERAL AWARDS			$ 202,472	$ 202,472	$ -	$ -

NOTE 1 - BASIS OF PRESENTATION

The Schedules of Expenditures of Federal Awards includes the federal grant activity of the Town of Thompson's Station, Tennessee. Because this Schedule presents only a selected portion of the operations of the Town, it is not intended to and does not present the financial position or changes in financial position of the Town.

NOTE 2 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The information reported in the Schedules is reported in accordance with accounting principles generally accepted in the United States of America, which is the same basis of accounting as the basic financial statements. The federal expenditures are recognized following cost principles, wherein certain types of expenditures are not allowable or are limited as to reimbursement.

NOTE 3 - DE MINIMUS INDIRECT COST RATE

The Town has elected to use the 10-percent de minimums indirect cost rate, when applicable.

See independent auditor's report.

TOWN OF THOMPSON'S STATION, TENNESSEE
SCHEDULE OF CHANGES IN LONG-TERM DEBT BY INDIVIDUAL ISSUE
JUNE 30, 2019

Description of Indebtedness	Original Amount of Issue	Interest Rate	Date of Issue	Last Maturity Date	Outstanding 7/1/2018	Issued During Period	Paid and/or Matured During Period	Refunded During Period	Outstanding 6/30/2018
Government Activities:									
Payable through General Fund									
Capital Outlay, Series 2013	$ 1,153,000	2.85%	9/26/2014	9/26/2023	$ 691,800	$ -	$ 115,300	$ -	$ 576,500
Capital Outlay, Series 2018	1,550,000	2.90%	3/2/2018	4/1/2030	1,550,000	-	130,000	-	1,420,000
Total					$ 2,241,800	$ -	$ 245,300	$ -	$ 1,996,500
Business-type Activities:									
Payable through Wastewater Fund									
Capital Outlay, Series 2014	$ 1,000,000	2.45%	6/13/2014	5/13/2023	$ 546,297	$ -	$ 111,112	$ -	$ 435,185
Total					$ 546,297	$ -	$ 111,112	$ -	$ 435,185

See independent auditor's report.

CROSSLIN
CERTIFIED PUBLIC ACCOUNTANTS

INDEPENDENT AUDITOR'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING AND ON COMPLIANCE AND OTHER MATTERS BASED ON AN AUDIT OF FINANCIAL STATEMENTS PERFORMED IN ACCORDANCE WITH *GOVERNMENT AUDITING STANDARDS*

Board of Mayor and Alderman
Town of Thompson's Station, Tennessee
Thompson's Station, Tennessee

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards,* issued by the Comptroller General of the United States, the financial statements of the governmental activities, the business-type activities, and each major fund of the Town of Thompson's Station, Tennessee (the "Town") as of and for the year ended June 30, 2019, and the related notes to the financial statements, which collectively comprise the Town's basic financial statements and have issued our report thereon dated January 3, 2020.

Internal Control Over Financial Reporting

In planning and performing our audit of the financial statements, we considered the Town's internal control over financial reporting (internal control) to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the Town's internal control. Accordingly, we do not express an opinion on the effectiveness of the Town's internal control.

A deficiency in internal control exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected, on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses may exist that have not been identified.

Compliance and Other Matters

As part of obtaining reasonable assurance about whether the Town's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards.*

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing and not to provide an opinion on the effectiveness of the entity's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the entity's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

Crosslin, PLLC

Nashville, Tennessee
January 3, 2020

TOWN OF THOMPSON'S STATION, TENNESSEE
SUMMARY SCHEDULE OF PRIOR YEAR FINDINGS
JUNE 30, 2019

The Town of Thompson's Station had no prior year findings reported.

Town of Thompson's Station, Tennessee

Report to the Board of Mayor and Alderman

Results of the 2019 Audit

January 3, 2020

CROSSLIN

CERTIFIED PUBLIC ACCOUNTANTS

CROSSLIN
CERTIFIED PUBLIC ACCOUNTANTS

January 3, 2020

To the Board of Mayor and Aldermen
Town of Thompson's Station, Tennessee

Thank you very much for the opportunity to continue to serve as independent auditors and business advisors for the Town of Thompson's Station, Tennessee (the "Town"). We are pleased to provide our report on the results of the June 30, 2019 audit of the Town's financial statements.

A direct line of communication between our Firm and those charged with governance is essential to the proper exercise of our respective responsibilities. Our appointment involves the responsibility on our part to call to your attention any significant matters which we believe require your consideration, either at a regularly scheduled meeting or on a more timely basis, if warranted.

The accompanying report is intended solely for the use of the Board of Mayor and Aldermen and management and presents information regarding the audit and certain other information which we believe will be of assistance to you. We appreciate this opportunity to communicate the contents of this report with you. If you have any questions, please call Erica Saeger, Audit Principal, or me at (615) 320-5500.

We would like to take this opportunity to express our appreciation for the assistance and courtesy extended to us by the Town's employees. We appreciate working with you, and we look forward to a continued relationship with the Town of Thompson's Station.

Very truly yours,

Erica D. Saeger

Erica D. Saeger
Principal

Report on Results of the June 30, 2019 Audit

Crosslin, PLLC has completed the audit of the financial statements of the Town of Thompson's Station, Tennessee (the "Town") as of and for the year ended June 30, 2019, and we have issued our unmodified report thereon.

The State of Tennessee has oversight responsibility and approved our audit engagement through the Comptroller of the Treasury's Standard Contract to Audit Accounts.

The following discussion contains information related to our audit that is required by professional standards, and certain other information which we hope will be of assistance to you.

Independence

Our professional standards require that we communicate at least annually with you regarding all relationships between Crosslin, PLLC ("Crosslin") and the Town that, in our professional judgment, may reasonably be thought to bear on our independence. We have prepared the following comments to facilitate our discussion with you regarding independence matters.

We are not aware of any relationships between Crosslin and the Town that, in our professional judgment, may reasonably be thought to bear on our independence that have occurred during the period from July 1, 2018 through the date of this letter.

We confirm that as of the date of this letter, we are independent accountants with respect to the Town, within the requirements of both the American Institute of Certified Public Accountants and *Government Auditing Standards*.

Engagement Personnel

The following is the engagement team:

Jennifer Manternach	Audit Principal
Erica Saeger	Audit Principal
Konnor Amis	Audit Senior
Jane Nutter	Audit Staff

Our Responsibility Under U.S. Generally Accepted Auditing Standards and Government Auditing Standards

Our responsibility, as described by professional standards, is to plan and perform our audit to obtain reasonable, but not absolute, assurance about whether the financial statements are free of material misstatement and are fairly presented in accordance with U.S. generally accepted accounting principles. Because an audit is designed to provide reasonable, but not absolute assurance and because we did not perform a detailed examination of all transactions, there is a risk that material misstatements may exist and not be detected by us.

In planning and performing our audit, we considered the Town's internal control over financial reporting in order to determine our auditing procedures for the purpose of expressing our opinions on the financial statements but not for the purpose of expressing an opinion on internal control. Accordingly, we do not provide assurance on the internal control.

As part of obtaining reasonable assurance about whether the Town's financial statements are free of material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts and grants, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit.

Management Judgments and Accounting Estimates

Accounting estimates are an integral part of the financial statements prepared by management and are based on management's current judgments. Those judgments are normally based on knowledge and experience about past and current events and assumptions about future events. Certain accounting estimates are particularly sensitive because of their significance to the financial statements and because of the possibility that future events affecting them may differ significantly from those expected. Significant judgments and accounting estimates reflected in the Town's 2019 financial statements include the following:

- Property taxes receivable and related deferred inflows of resources
- Allowance for doubtful receivables
- The useful lives and valuation of capital assets, including infrastructure
- Valuation of contributed capital assets
- Commitments and contingencies

The basis for our conclusions as to the reasonableness of the estimates when considered in the context of the financial statements taken as a whole, as expressed in our auditor's report, is our review and tests of the process used by management to develop the estimates. During the year ended June 30, 2019, we are not aware of any significant changes in the methodology surrounding accounting estimates or in management's judgments relating to such estimates.

Audit Adjustments

Our audit of the financial statements was designed to obtain reasonable, rather than absolute, assurance about whether the financial statements are free of material misstatement, whether caused by error or fraud. For purposes of this letter, professional standards define an audit adjustment as a proposed correction of the financial statements that, in our judgment, may not have been detected except through our auditing procedures. An audit adjustment may or may not indicate matters that could have a significant impact on an organization's financial reporting process.

During the audit, we proposed several adjusting entries related to capital assets, payroll accruals, and property and sales taxes, which are included as Appendix C.

Unrecorded adjustments are included in Appendix D and are not material.

Significant Accounting Policies

Management is responsible for the selection and use of appropriate accounting policies. The significant accounting policies used by the Town are described in Note 1 to the financial statements. We noted no matters that would require us, under professional standards, to inform you about (1) the methods used to account for significant unusual transactions and (2) the effect of significant accounting policies in controversial or emerging areas for which there is lack of authoritative guidance or consensus. The Town's significant accounting policies appear to be appropriate and comprehensive under U.S. generally accepted accounting principles.

See discussion of new accounting pronouncements starting on page 7.

Alternative Accounting Treatments

We had no discussions with management regarding alternative accounting treatments within accounting principles generally accepted in the United States of America for policies and practices related to material items including recognition, measurement, and disclosure considerations related to the accounting for specific transactions as well as general accounting policies related to the year ended June 30, 2019.

Management Consultations with Other Independent Accountants

In some cases, management may decide to consult with other accountants about auditing and accounting matters, similar to obtaining a "second opinion." If a consultation involves application of an accounting principle to the organization's financial statements or a determination of the type of auditor's opinion that may be expressed on those statements, our professional standards require the consulting accountant to check with us to determine that the consultant has all the relevant facts. To our knowledge, there were no such consultations with other accountants.

Disagreements with Management

For purposes of this letter, professional standards define a disagreement with management as a matter, whether or not resolved to our satisfaction, concerning a financial accounting, reporting, or auditing matter that could be significant to the financial statements or the auditor's report. No such disagreements arose during the course of our audit.

Issues Discussed Prior to Retention of Independent Auditors

We generally discuss a variety of matters, including the application of accounting principles and auditing standards, with management prior to our retention as the Town's auditor. However, these discussions occurred in the normal course of our professional relationship and our responses were not a condition of our retention.

Difficulties Encountered in Performing the Audit

We encountered no significant difficulties in performing our audit.

Fraud and Illegal Acts

There were no fraudulent or illegal acts disclosed to us by management or the Board.

Information in Documents Containing Audited Financial Statements

We are not aware of any other documents that will contain the audited financial statements. If such a need arises, we will review the other document to ensure that there are no material inconsistencies in the information.

Areas of Audit Emphasis

- Cash and cash equivalents
- Capital assets, including infrastructure, depreciation and significant capital additions
- Receivables, including property taxes, accounts and other
- Long-term debt
- Accounts payable and accrued expenses
- Classification of net position/fund balances
- Revenues, including taxes, state shared revenues, fees and other sources
- Salaries and benefits
- Other operating expenses
- Implementation of GASB Statements, when applicable (See below)
- Financial reporting

Upcoming Accounting Pronouncements

The government and standard-setting bodies are issuing guidance at an unprecedented pace. Crosslin, PLLC is constantly receiving, reviewing, and searching for the latest authoritative literature, in part through its involvement with the AICPA's Government Audit Quality Center and the Government Finance Officers Association ("GFOA"), including GFOA's Special Review Committee. We have had discussions with Town's management to ensure proper understanding and application of pronouncements, standards, interpretations, and addenda that arise and will continue to have these discussions with management to implement all new standards as they arise. We have included both new and upcoming accounting pronouncements on the subsequent pages for informational purposes.

We will analyze these Statements with Town management to ensure appropriate implementation, as applicable.

- **GASB Statement No. 84, Fiduciary Activities**
  Effective Date: The requirements of this Statement are effective for reporting periods beginning after December 15, 2018. Earlier application is encouraged.

- **GASB Statement No. 87, Leases**
  Effective Date: The requirements of this Statement are effective for reporting periods beginning after December 15, 2019. Earlier application is encouraged.

Recent Accounting Pronouncements *(continued)*

- **GASB Statement No. 89, Accounting for Interest Cost Incurred before the End of a Construction Period**
  Effective Date: The requirements of this Statement are effective for reporting periods beginning after December 15, 2019. Earlier application is encouraged.

- **GASB Statement No. 90, Majority Equity Interests—an amendment of GASB Statements No. 14 and No. 61**
  Effective Date: The requirements of this Statement are effective for reporting periods beginning after December 15, 2018. Earlier application is encouraged.

- **GASB Statement No. 91, Conduit Debt Obligations**
  Effective Date: The requirements of this Statement are effective for reporting periods beginning after December 15, 2020. Earlier application is encouraged.

Other Material Written Communications

Included in Appendix A is the management representation letter, which we requested from management for fiscal year 2019.

Included in Appendix B is the management letter for fiscal year 2019.

Included in Appendix C is the list of audit adjusting journal entries for fiscal year 2019.

Included in Appendix D is a listing of passed adjustments for fiscal year 2019.

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January 3, 2020

Crosslin, PLLC
The Astoria
3803 Bedford Avenue, Suite 103
Nashville, Tennessee 37215

This representation letter is provided in connection with your audit of the financial statements of the Town of Thompson's Station, Tennessee (the "Town"), which comprise the respective financial position of the governmental activities, the business-type activities, and each major fund as of June 30, 2019, and the respective changes in financial position and, where applicable, cash flows thereof and the budgetary comparison for the general fund and state street aid fund for the period then ended, and the related notes to the financial statements, for the purpose of expressing opinions as to whether the financial statements are presented fairly, in all material respects, in accordance with accounting principles generally accepted in the United States of America (U.S. GAAP).

Certain representations in this letter are described as being limited to matters that are material. Items are considered material, regardless of size, if they involve an omission or misstatement of accounting information that, in light of surrounding circumstances, makes it probable that the judgment of a reasonable person relying on the information would be changed or influenced by the omission or misstatement. An omission or misstatement that is monetarily small in amount could be considered material as a result of qualitative factors.
We confirm, to the best of our knowledge and belief, as of the date of this letter, the following representations made to you during your audit.

Financial Statements

1) We have fulfilled our responsibilities, as set out in the terms of the audit engagement letter dated June 30, 2015, including our responsibility for the preparation and fair presentation of the financial statements and for preparation of the supplementary information in accordance with the applicable criteria.

2) The financial statements referred to above are fairly presented in conformity with U.S. GAAP and include all properly classified funds and other financial information of the primary government required by generally accepted accounting principles to be included in the financial reporting entity. Based on our review and application of the applicable accounting guidance, the Town has no component units required to be included in the financial statements.

3) We acknowledge our responsibility for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

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4) We acknowledge our responsibility for the design, implementation, and maintenance of internal control to prevent and detect fraud.

5) Significant assumptions we used in making accounting estimates, including those measured at fair value, are reasonable.

6) Related party relationships and transactions, including revenues, expenditures/expenses, loans, transfers, leasing arrangements, and guarantees, and amounts receivable from or payable to related parties have been appropriately accounted for and disclosed in accordance with the requirements of U.S. GAAP.

7) All events subsequent to the date of the financial statements and for which U.S. GAAP requires adjustment or disclosure have been adjusted or disclosed. No events, including instances of noncompliance, have occurred subsequent to the balance sheet date and through the date of this letter that would require adjustment to or disclosure in the aforementioned financial statements or in the schedule of findings and questioned costs.

8) The effects of uncorrected misstatements are immaterial, both individually and in the aggregate, to the financial statements as a whole for each opinion unit. A list of the uncorrected misstatements is attached to the representation letter.

9) The effects of all known actual or possible litigation, claims, and assessments have been accounted for and disclosed in accordance with U.S. GAAP.

10) Guarantees, whether written or oral, under which the Town is contingently liable, if any, have been properly recorded or disclosed.

Information Provided

11) We have provided you with:

a) Access to all information, of which we are aware, that is relevant to the preparation and fair presentation of the financial statements, such as records, documentation, and all audit or relevant monitoring reports, if any, received from funding sources.

b) Additional information that you have requested from us for the purpose of the audit.

c) Unrestricted access to persons within the entity from whom you determined it necessary to obtain audit evidence.

d) Minutes of the meetings of the Board of Mayor and Alderman or summaries of actions of recent meetings for which minutes have not yet been prepared.

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12) All material transactions have been recorded in the accounting records and are reflected in the financial statements and the schedule of expenditures of federal awards.

13) We have disclosed to you the results of our assessment of the risk that the financial statements may be materially misstated as a result of fraud.

14) We have no knowledge of any fraud or suspected fraud that affects the entity and involves:

a) Management,

b) Employees who have significant roles in internal control, or

c) Others where the fraud could have a material effect on the financial statements.

15) We have no knowledge of any allegations of fraud or suspected fraud affecting the entity's financial statements communicated by employees, former employees, regulators, or others.

16) We have no knowledge of instances of noncompliance or suspected noncompliance with provisions of laws, regulations, contracts, or grant agreements, or abuse, whose effects should be considered when preparing financial statements.

17) We have disclosed to you all known actual or possible litigation, claims, and assessments whose effects should be considered when preparing the financial statements.

18) We have disclosed to you the identity of the entity's related parties and all the related party relationships and transactions of which we are aware.

Government—specific

19) There have been no communications from regulatory agencies concerning noncompliance with, or deficiencies in, financial reporting practices.

20) We have identified to you any previous audits, attestation engagements, and other studies related to the audit objectives and whether related recommendations have been implemented.

21) The Town has no plans or intentions that may materially affect the carrying value or classification of assets, liabilities, or equity.

22) We are responsible for compliance with the laws, regulations, and provisions of contracts and grant agreements applicable to us, including tax or debt limits and debt contracts; and we have identified and disclosed to you all laws, regulations and provisions of contracts and

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grant agreements that we believe have a direct and material effect on the determination of financial statement amounts or other financial data significant to the audit objectives, including legal and contractual provisions for reporting specific activities in separate funds.

23) There are no violations or possible violations of budget ordinances, laws and regulations (including those pertaining to adopting, approving, and amending budgets), provisions of contracts and grant agreements, tax or debt limits, and any related debt covenants whose effects should be considered for disclosure in the financial statements, or as a basis for recording a loss contingency, or for reporting on noncompliance.

24) As part of your audit, you assisted with preparation of the financial statements (including certain year end accrual adjustments and capital asset/depreciation expense adjustments) and related notes. We acknowledge our responsibility as it relates to those nonaudit services, including that we assume all management responsibilities; oversee the services by designating an individual, within senior management, who possesses suitable skill, knowledge, or experience; evaluate the adequacy and results of the services performed; and accept responsibility for the results of the services. We have reviewed, approved, and accepted responsibility for those financial statements and related notes.

25) The Town has satisfactory title to all owned assets, and there are no liens or encumbrances on such assets nor has any asset been pledged as collateral.

26) The Town has complied with all aspects of contractual agreements that would have a material effect on the financial statements in the event of noncompliance.

27) We have followed all applicable laws and regulations in adopting, approving, and amending budgets.

28) We have identified and disclosed to you all instances, which have occurred or are likely to have occurred, of noncompliance with provisions of contracts and grant agreements that we believe have a material effect on the determination of financial statement amounts or other financial data significant to the audit objectives.

29) We have identified and disclosed to you all instances that have occurred or are likely to have occurred, of abuse that could be quantitatively or qualitatively material to the financial statements or other financial data significant to the audit objectives.

30) We have identified and disclosed to you all instances that have occurred or are likely to have occurred, of fraud and noncompliance with provisions of laws and regulations that we believe have a material effect on the financial statements or other financial data significant to the audit objectives, and any other instances that warrant the attention of those charged with governance.

31) The financial statements properly classify all funds and activities, in accordance with GASB Statement No. 34.

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32) All funds that meet the quantitative criteria in GASBS Nos. 34 and 37 for presentation as major are identified and presented as such and all other funds that are presented as major are particularly important to financial statement users.

33) Components of net position (net investment in capital assets; restricted; and unrestricted) and equity amounts are properly classified and, if applicable, approved.

34) Land and other real estate held by endowments are properly valued.

35) Property tax receivables represent valid and enforceable claims to the taxable property.

36) The financial statements include all component units as well as joint ventures with an equity interest, and properly disclose all other joint ventures and other related organizations.

37) Provisions for uncollectible receivables have been properly identified and recorded.

38) Expenses have been appropriately classified in or allocated to functions and programs in the statement of activities, and allocations have been made on a reasonable basis.

39) Revenues are appropriately classified in the statement of activities within program revenues, general revenues, contributions to term or permanent endowments, or contributions to permanent fund principal.

40) Interfund, internal, and intra-entity activity and balances have been appropriately classified and reported.

41) Deposits are properly classified as to risk and are properly disclosed.

42) Capital assets, including infrastructure and intangible assets, are properly capitalized, reported, and, if applicable, depreciated.

43) There were no capital contributions to the Town for FY 19.

44) Based our assessment, the current wastewater facility is not impaired. We represent that there are repairs that are needed annually and those repairs are made in a timely manner. Based on the growth of the Town and the continued expected growth of the Town, we represent that the current wastewater facility would not be able to handle the continued expected growth; therefore, the Town is currently in the beginning stages of constructing a new wastewater facility. We will continue to use the current wastewater facility as well as the new wastewater facility once it is complete and placed into service. As of the report date, the Town has acquired 2 different parcels of land in order to accommodate the committed taps, which will be used as the site for the new wastewater facility.

45) We are following our established accounting policy regarding which resources (that is, restricted, committed, assigned, or unassigned) are considered to be spent first for

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expenditures for which more than one resource classification is available. That policy determines the fund balance classifications for financial reporting purposes.

46) We confirm that the Town did not have any pension or other post-employment benefits that would require recognition within the financial statements or disclosures thereto.

47) We have appropriately disclosed the Town's policy regarding whether to first apply restricted or unrestricted resources when an expense is incurred for purposes for which both restricted and unrestricted net position is available and have determined that net position is properly recognized under the policy.

48) We acknowledge our responsibility for the required supplementary information ("RSI"). The RSI is measured and presented within prescribed guidelines and the methods of measurement and presentation have not changed from those used in the prior period. We have disclosed to you any significant assumptions and interpretations underlying the measurement and presentation of the RSI.

49) With respect to federal programs, for fiscal year 2019, we confirm that expenditures of federal awards were below the $750,000 threshold, and we were not required to have an audit in accordance with OMB Uniform Guidance. Additionally, we confirm that there were no expenditures of federal or state program awards that would require a schedule of expenditures of federal awards or state financial assistance to be presented as supplementary information with the financial statements.

50) The Town had no asset forfeiture and/or seizures during fiscal year 2019 that should have been reported to the State of TN.

TOWN OF THOMPSON'S STATION, TENNESSEE

Corey Napier
Mayor

Kenneth McLawhon
Town Administrator

Steve Banks
Finance Director

CROSSLIN
CERTIFIED PUBLIC ACCOUNTANTS

To the Board of Mayor and Alderman of
the Town of Thompson's Station
Thompson's Station, Tennessee

In planning and performing our audit of the financial statements of the governmental activities, the business-type activities, and each major fund of the Town of Thompson's Station, Tennessee (the "Town") as of and for the year ended June 30, 2019, in accordance with auditing standards generally accepted in the United States of America, we considered the Town's internal control over financial reporting (internal control) as a basis for designing audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the Town's internal control. Accordingly, we do not express an opinion on the effectiveness of the Town's internal control.

A deficiency in internal control exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A material weakness is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected, on a timely basis.

Our consideration of internal control was for the limited purpose described in the first paragraph and was not designed to identify all deficiencies in internal control that might be material weaknesses. Given these limitations during our audit, we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses may exist that have not been identified.

As discussed below, we did identify certain matters involving the internal control and other operational matters that are presented for your consideration. We will review the status of these comments during our next audit engagement. Our comments and recommendations, which have been discussed with appropriate members of management, are intended to improve the internal control or result in other operating efficiencies. We will be pleased to discuss these comments in further detail at your convenience, perform any additional study of these matters, or assist you in implementing the recommendations. Our comments are summarized as follows:

STATE SHARED REVENUES AND LOCAL OPTION SALES TAXES

Observation

Currently, the Town is recording state shared revenues and local option sales taxes from Williamson County on a cash basis. We noted that payments of state shared revenues and local option sales taxes are received two months in arrears.

Recommendations and Benefit

State shared revenues and local option sales tax revenues should be recorded on an accrual basis. To properly record these revenues, the Town should record the receipts in the period to which it applies. For example, state shared revenues and local option sales taxes received in July 2019/August 2019 for the months of May 2019/June 2019, should be recorded in fiscal year 2019. This will ensure the financial statements are properly stated in accordance with U.S. Generally Accepted Accounting Principles.

ACCRUED EXPENSES

Observation

During the audit, we noted that the Town calculated and recorded entries to adjust accrued vacation and accrued payroll as of June 30, 2019; however, the accrual for fiscal year June 30, 2018 was not reversed, which overstated payroll expense.

Recommendations and Benefit

We recommend that the Town continue to track each employee's accrued vacation and accrued payroll and adjust the balances on a monthly basis. However, the Town should ensure that it is properly reversing any prior year accruals in order to ensure that such balances, as required by U.S. Generally Accepted Accounting Principles, are recorded properly in the interim and year-end financial statements.

CAPITALIZATION POLICY AND CAPITAL ASSET LISTING

Observation

The Town does not have a formal capitalization policy. Currently, management uses the Town's Capital Improvement Plan (dated July 2014) to define capital expenditures. Additionally, during our testing of property and equipment, we noted that the Town does not currently maintain a capital asset listing and does not record monthly depreciation expense.

Recommendations and Benefit

We recommend that the Town formally adopt a capitalization policy to include a dollar amount threshold as well as stating when it applies to individual purchases and items purchased as a group. The Town should follow this capitalization policy throughout the year to ensure that capital assets are capitalized at least on a monthly basis. Additionally, we suggest that the Town maintain a capital asset listing in order to properly track and account for capital assets throughout the year. Depreciation expense should be recorded on a monthly basis in the Wastewater fund to avoid a year-end adjustment and properly state interim financial statements.

PROPERTY TAX REVENUES

Observation

Currently, the Town is recording property taxes on a cash basis.

Recommendations and Benefit

Property tax revenues should be recorded when assessed under GASB Statement No. 33. At each year end, the Town should calculate the property tax levy and record a receivable with appropriate offsetting deferred inflows of resources.

* * * * *

This report is intended solely for the information and use of the Board of Mayor and Alderman and management and is not to be intended and should not be used by anyone other than these specified parties.

We would like to take this opportunity to express our appreciation for the courtesy extended to us by all of your employees. It has been a pleasure to work with the employees of the Town of Thompson's Station.

Very truly yours,

Crosslin, PLLC

CROSSLIN, PLLC
January 3, 2020

Town of Thompson's Station
Year End: June 30, 2019
Adjusting Journal Entries
Date: 7/1/2018 To 6/30/2019

Number	Date	Type	Name	Account No	Reference	Debit	Credit
1	6/30/2019	N	Land or other Non-Depreciated Assets	1610 GF	WW-1		(6,950,484.00)
1	6/30/2019	N	Other Capital Assets	1620 GF	WW-1		(12,141,768.00)
1	6/30/2019	N	Net Investment in Capital Assets	2610 GF	WW-1	18,924,260.00	
1	6/30/2019	N	Fund Balance for State Street Aid	2751 GF	WW-1	167,992.00	
			To reverse client AJE's booked in order to convert GF TB net position from fund basis to government-wide.				
2	6/30/2019	N	Deferred Revenue - Taxes	25000 GF		202,472.00	
2	6/30/2019	N	Federal Grant Revenue	CA0003 GF			(202,472.00)
			To properly recognize Battlefield Grant revenue in FY19.				
3	6/30/2019	N	Accrued Unpaid Compensation	22500 GF	HH LEAD	62,202.00	
3	6/30/2019	N	Payroll Expense	41110 GF	HH LEAD		(62,202.00)
			To eliminate prior year accrued payroll.				
4	6/30/2019	R	Other Current Liabilities	22000 GF	CC-4	41,944.00	
4	6/30/2019	R	Accrued Unpaid Compensation	22500 GF	CC-4		(41,944.00)
			To reclass accrued payroll.				
5	6/30/2019	N	Allowance for Uncoll. Accounts	1290 WF	C-3		(6,189.00)
5	6/30/2019	N	Bad Debt Expense	4901 WF	C-3	6,189.00	
			To increase the allowance for uncollectible accounts.				
6	6/30/2019	N	Taxes Receivable - Other	13200 GF		26,766.00	
6	6/30/2019	N	Business Tax Revenue	32260 GF			(9,558.00)
6	6/30/2019	N	TVA Payments in Lieu of Taxes	33320 GF			(13,991.00)
6	6/30/2019	N	Local Sales Tax - State	33510 GF		11,311.00	
6	6/30/2019	N	State Beer Tax	33530 GF			(2,188.00)
6	6/30/2019	N	Mixed Drink Tax	33535 GF			(11,497.00)
6	6/30/2019	N	State Streets & Trans. Revenue	33552 GF			(771.00)
6	6/30/2019	N	SSA - Motor Fuel Tax	33553 GF		1,221.00	
6	6/30/2019	N	SSA - 1989 Gas Tax	33554 GF		60.00	
6	6/30/2019	N	SSA - 3 Cent Gas Tax	33555 GF		112.00	
6	6/30/2019	N	SSA - 2017 Gas Tax	33556 GF			(1,465.00)
			To adjust State shared revenue taxes to accrual basis.				
7	6/30/2019	N	State Income Tax Repayment	23100 GF		59,137.00	
7	6/30/2019	N	State Income Tax	33520 GF			(59,137.00)
			To reduce repayment owed to the State based on information obtained from the July 2019 remittance advice.				
8	6/30/2019	N	Taxes Receivable - Other	13200 GF	C-1		(18,045.00)
8	6/30/2019	N	Other Expenses	41899 GF	C-1	18,045.00	
			To adjust taxes receivable to actual.				
9	6/30/2019	N	Taxes Receivable - Other	13200 GF	C-1	6,229.00	
9	6/30/2019	N	Local Sales Tax - Trustee	31610 GF	C-1		(6,229.00)
			To record FY19 local sales tax receivable.				
10	6/30/2019	N	Deferred Property Taxes Rec.	13101 GF	C-2		(262,004.00)
10	6/30/2019	N	Deferred Property Taxes Rec.	13101 GF	C-2	287,256.00	
10	6/30/2019	N	Deferred Revenue - Taxes	25000 GF	C-2	262,004.00	
10	6/30/2019	N	Deferred Revenue - Taxes	25000 GF	C-2		(287,256.00)
			To remove prior period property tax and adjust current year deferred property taxes to ac				

11	6/30/2019	N	Taxes Receivable - Property Tax	13100 GF	405	1,557.00	
11	6/30/2019	N	Deferred Revenue - Taxes	25000 GF	405		(1,557.00)
			To adjust delinquent property taxes to amounts confirmed per Williamson County.				
12	6/30/2019	N	GF Checking	11215 GF	A-1		(8,044.00)
12	6/30/2019	N	Payroll Expense	41110 GF	A-1	8,044.00	
			To adjust GF operating cash balance in order to agree with bank reconciliation completed by the client during fieldwork.				
13	6/30/2019	N	System in Operation	1562 WF		1,861,468.00	
13	6/30/2019	N	Retained Earnings	3900 WF			(1,861,468.00)
			FY18 audit AJE not booked by client - To record donated WF infrastructure.				
14	6/30/2019	N	Accumulated Depreciation	1590 WF	M-1		(91,588.00)
14	6/30/2019	N	Depreciation Expense	4990 WF	M-1	91,588.00	
			To adjust WWF accumulated depreciation to agree with fixed asset rollforward.				
15	6/30/2019	N	Construction in Progress	1566 WF	M-1	46,819.00	
15	6/30/2019	N	Capital Expenditures	4100 WF	M-1		(46,819.00)
			To capitalize WWF capital expenditures.				
16	6/30/2019	N	Fund Balance for State Street Aid	2751 GF	WW-2		(167,992.00)
16	6/30/2019	N	Opening Bal Equity	3000 GF	WW-2	168,789.00	
16	6/30/2019	N	Retained Earnings	3900 WF	WW-2	892.00	
16	6/30/2019	N	Other Expense	4900 WF	WW-2		(892.00)
16	6/30/2019	N	Other Expenses	41899 GF	WW-2		(797.00)
			To properly roll net position.				
17	6/30/2019	N	Construction in progress	1555 GF	M-2		(695,129.00)
17	6/30/2019	N	Capital Projects	41940 GF	M-2	695,129.00	
			To expense GF CIP in order to remain consistent with fund basis TB.				
18	6/30/2019	N	Interfund Rec/Pay Acct	26900 GF			(1,063.00)
18	6/30/2019	N	Other Expenses	41899 GF		1,063.00	
			To adjust the GF interfund payable balance in order to match the WF interfund receivable balance.				
19	6/30/2019	R	Prof. Fees-Consulting Engineers	41254 GF	M-2	24,750.00	
19	6/30/2019	R	Capital Projects	41940 GF	M-2		(24,750.00)
			To reclass engineering fees for Thoroughfare Plan project.				
20	6/30/2019	N	Accounts Payable	21120 GF	316. 1		(31,205.00)
20	6/30/2019	N	Capital Projects	41940 GF	316. 1	31,205.00	
			To accrue for Volunteer Paving settlement for work performed on Clayton Arnold road.				
21	6/30/2019	N	Prepaid Expenses	15100 GF	210. 1		(6,407.00)
21	6/30/2019	N	Accounts Payable	21120 GF	210. 1	10,517.00	
21	6/30/2019	N	Office Expense	41311 GF	210. 1		(882.00)
21	6/30/2019	N	Insurance - Employee Medical	41514 GF	210. 1	6,407.00	
21	6/30/2019	N	Insurance - Employee Medical	41514 GF	210. 1		(9,635.00)
			CRJE #1				
22	6/30/2019	N	Construction in Progress	1566 WF	M-1	165,089.00	
22	6/30/2019	N	Prof. Fees-Consulting Engineers	4400 WF	M-1		(165,089.00)
			To properly capitalize engineering fees related to Hill property drip fields.				
23	6/30/2019	N	Construction in Progress	1566 WF	210. 2	16,469.00	
23	6/30/2019	N	Accounts Payable	2000 WF	210. 2		(9,969.00)
23	6/30/2019	N	Prof. Fees - Other	4490 WF	210. 2		(6,500.00)
			CJRE #2 - To adjust WWF AP to agree to aging summary.				

PASSED ADJUSTMENTS

Entity: Town of Thompson's Station

Statement of Financial Position Date: 6/30/2019

Description (Nature) of Audit Difference (AD)	Known (K) or Likely (L)	Financial Statement Effect—Amount of Over (Under) Statement of:						
		Total Assets	Total Liabilities	Net Assets	Revenues	Expenses	Change in Net Assets	Working Capital
To recognize tap fee revenue for building permits that have been issued and not paid.	K	-$35,000			-$35,000		-$35,000	
							$0	
							$0	
							$0	
							$0	
							$0	
							$0	
							$0	
							$0	
							$0	
Total		-$35,000	$0	$0	-$35,000	$0	-$35,000	$0
Less Audit Adjustments Subsequently Booked							$0	
Unadjusted AD—Current Year (Iron Curtain Meth		-$35,000	$0	$0	-$35,000	$0	-$35,000	$0
Effect of Unadjusted AD—Prior Years		-$30,986	$0	$0	-$30,986	$0	-$30,986	
Combined Current and Prior Year AD (Rollover M		-$65,986	$0	$0	-$65,986	$0	-$65,986	$0
Financial Statement Caption Totals		$47,765,903	$4,330,240	$43,435,663	$5,184,190	$2,930,838	$2,253,352	
Current Year AD as % of FS Captions (Iron Curta		-0.07%	0.00%	0.00%	-0.68%	0.00%	-1.55%	0.00%
Current and Prior Year AD as % of FS Captions		-0.14%	0.00%	0.00%	-1.27%	0.00%	-2.93%	0.00%

ORDINANCE NO. 2020-001

AN ORDINANCE OF THE BOARD OF MAYOR AND ALDERMEN OF THE TOWN OF THOMPSON'S STATION, TENNESSEE TO APPROVE AN AMENDED SPECIFIC PLAN CONCEPT PLAN FOR RODERICK PLACE

WHEREAS, Roderick Place is a 79.9-acre site along Columbia Pike / U.S. 31 and is zoned Specific Plan in accordance with the zoning ordinance in effect at that time it was rezoned (Ord. 06-014); and

WHEREAS, the Town approved in 2007 a Specific Plan Concept Plan for Roderick Place; and

WHEREAS, the developer/owner of Roderick Place has submitted an Amended Specific Plan Concept Plan for Roderick Place; and

WHEREAS, the Town of Thompson's Station Planning Commission recommended approval of the Amended Specific Plan Concept Plan for Roderick Place at its November 19, 2019 regular meeting and has recommended the same to the Board of Mayor and Aldermen; and

WHEREAS, the Board of Mayor and Aldermen of the Town of Thompson's Station has determined that the Amended Specific Plan Concept Plan for Roderick Place is consistent with the General Plan and the newly adopted Major Thoroughfare Plan and will not have a deleterious effect on surrounding properties or the Town as a whole.

NOW, THEREFORE, BE IT ORDAINED by the Board of Mayor and Aldermen of the Town of Thompson's Station, Tennessee, as follows:

Section 1. That the previously approved Specific Concept Plan for Roderick Place within the Town of Thompson's Station, Tennessee is hereby amended and revised by repealing the previously approved plans and replacing the same with the Amended Specific Plan Concept Plan attached hereto and incorporated herein as Exhibit "A", subject to the conditions set forth in Section 2 below. The zoning for this territory shall remain Specific Plan (SP) and any further changes shall be subject to review by the Board of Mayor and Aldermen in accordance with the SP requirements.

Section 2. The following conditions, agreed to by the owner/developer of Roderick Place, shall apply to the Amended Specific Plan Concept Plan:

1. The project density shall be three (3) units per acre based on the total land area for the residential uses with 40% open space.
2. The project shall maintain 50% open space within the commercial designated area.
3. The project shall include the roadway cross sections and street lighting accordance with the Land Development Ordinance.
4. The mitigation and recommendations for traffic improvements shall be incorporated into the traffic study and shall be incorporated into the project.
5. A tree inventory and replacement plan shall be developed and considered during plat review before the Planning Commission.

6. All future plats and site plans shall conform to the general regulations set forth within the approved pattern book and all applicable standards with the Land Development Ordinance.

Section 2. This ordinance shall take effect immediately upon the publication of its caption in a newspaper of general circulation after final reading by the Board of Mayor and Aldermen, the public welfare requiring it.

Duly approved and adopted by the Board of Mayor and Aldermen of the Town of Thompson's Station, Tennessee, on the _____ day of _____, 2020.

_____
Corey Napier, Mayor

ATTEST:

_____
Regina Fowler, Town Recorder

Passed First Reading: _____

Passed Second Reading: _____

Submitted to Public Hearing on the ____ day of _____, 2020, at 7:00 p.m., after being advertised in the *Williamson AM* Newspaper on the ____ day of _____, 2020.

Recommended for approval by the Planning Commission on the ____ day of _____, 2018.

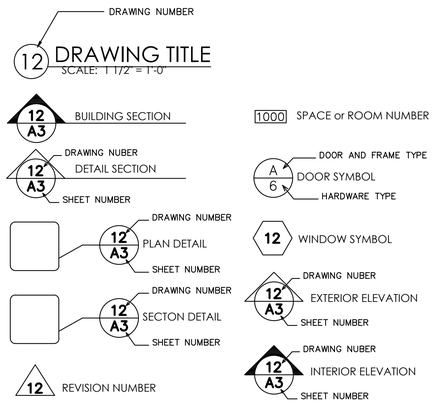
APPROVED AS TO FORM AND LEGALITY:

_____
Town Attorney

RODERICK PLACE
CONCEPTUAL SITE PLAN

4630 COLUMBIA PIKE
THOMPSON'S STATION, TENNESSEE

SYMBOLS LEGEND



DEVELOPER

Sampson J/V
144 Southeast Parkway, Suite 230
Franklin, TN. 37064
Jay Franks: 615.300.0001
E: jfranks130@gmail.com

OWNER

Leon C. Heron Jr.
Chief Manger / Sole Member
KMK Acres, LLC.
2655 Ranch Club Blvd.
Myakka City, FL. 34251
E: angus1600@comcast.net

PROGRAM MANAGEMENT:

BINKLEY DESIGNED, LLC.
144 Southeast Parkway, Suite 230
Turner Binkley: 407.459.9344
E: turner@binkleydesigned.com

ARCHITECT

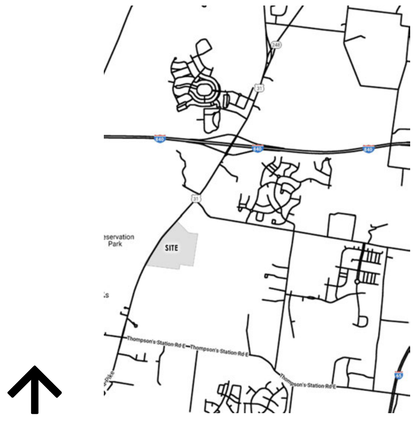
ED BINKLEY, AIA.
144 Southeast Parkway, Suite 230
Franklin, TN. 37064

I hereby certify that these plans and specifications have been prepared by me or under my supervision. I further certify that to the best of my knowledge these plans and specifications are as required by law and in compliance with applicable codes and the 2015 IBC.

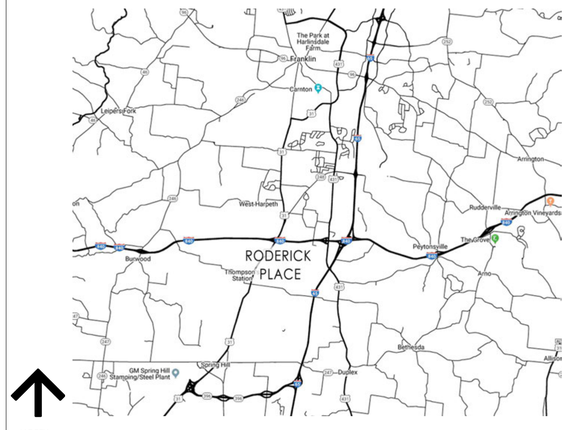
INDEX OF DRAWINGS

APPROVALS

LOCATION MAP:



VICINTY MAP:



BUILDING CODE LOCATION

Building Code information, Occupancy information and Life Safety Data is shown on Sheet BC1.0 are provide to completely delineate the component design of the buildings.

ARCHAEOLOGICAL

Glyn D. DuVall, M.A.
Archaeological Consultant
5371 leiper's Creek Road
Franklin, TN 37064

SOILS ENGINEER

Terra Nova Engineering
170D East Main Street #124
Hendersonville, TN 37075

CIVIL ENGINEER

Energy Land & Infrastructure
1420 Donelson Pike, Suite A12
Nashville, TN 37217

BINKLEY DESIGNED
144 SOUTHEAST PKWY.
SUITE 230
FRANKLIN TN.
37064

RODERICK PLACE
CONCEPTUAL SITE PLAN
THOMPSON'S STATION, TENNESSEE

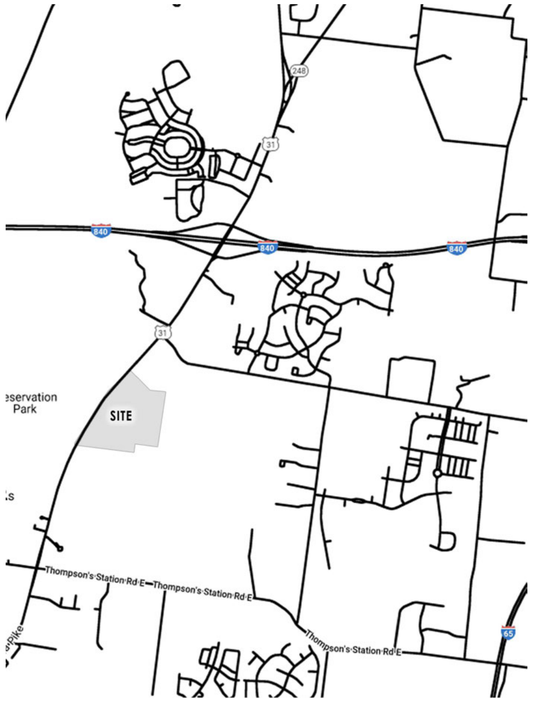
ISSUE 07.19.19
RE-ISSUE 11.26.19

PROJECT RODERICK PLACE

DEVELOPER
SAMSON J/V
144 SOUTHEAST PKWY. SUITE 230
FRANKLIN TN. 37064

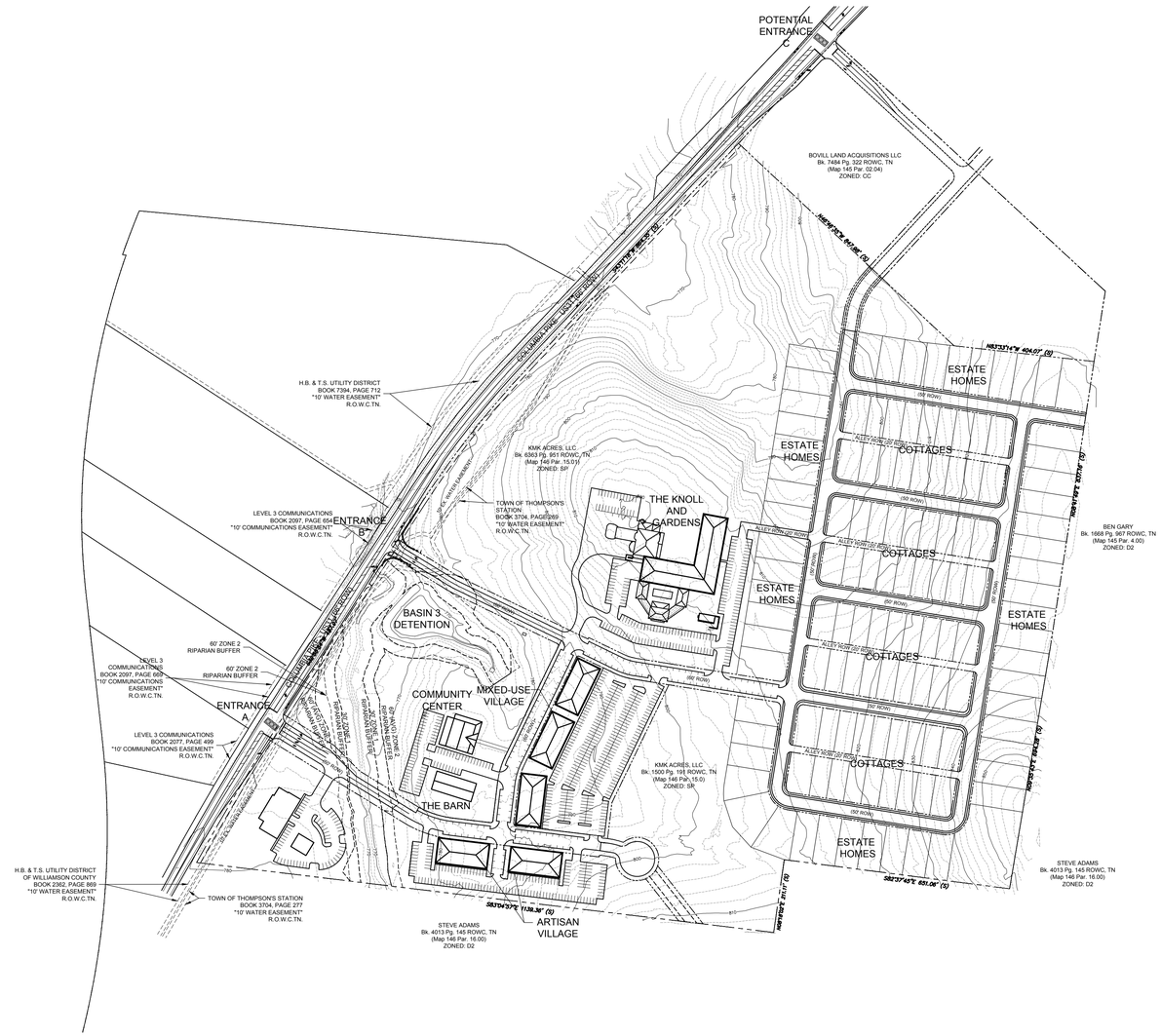
T

01



SITE LOCATION MAP

SCALE: 1"=2000'-0"



CONCEPT PLAN

0 200 400 600 feet

N

Master Plan Tabular Data

Existing Zoning: High Intensity District
Gross Site Area: 79.90 AC

Requirements of Proposed Zoning: Specific Plan, High Intensity District (Cluster Option)
- General Plan Requirements:
-Maximum Density: 3.00 DU/AC
-Maximum Height: 3 Stories
-Required Open Space: 40% Residential | 50% Commercial
-Minimum Site Area: 10 Acres
-Maximum Site Area: 100 Acres
-Area Permitted as Residential: 100%
-Area Permitted as Commercial: 100%

Density:

-Gross Permitted Density:	3.00 DU/AC
-Total Residential:	211 Units
-Estate Lots:	54 Units
-Cottage Lots:	72 Units
-Multistory dwellings/ live work:	85 Units
-Total Commercial:	129,367 S.F.
-Event Center & Historic Barn:	13,500 S.F.
-Hotel w/ Senior Residences:	92 Units
-Senior Living (IL,AL,ALZ):	100 Beds

Open Space:
-Total Land Area: 79.90 Acres
-Total Commercial Area: 9.26 Acres X 50% = 4.63 Acres
-Total Residential Area: 70.64 Acres X 40% = 28.25 Acres
-Total Required Open Space: 32.88 Acres
-Total Provided Open Space: 35.80 Acres

BINKLEY DESIGNED
144 SOUTHEAST PKWY.
SUITE 230
FRANKLIN TN.
37064

RODERICK PLACE
CONCEPTUAL SITE PLAN
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PROJECT RODERICK PLACE

DEVELOPER
SAMSON J/V
144 SOUTHEAST PKWY. SUITE 230
FRANKLIN TN. 37064

CP

01

PHASING PLAN

0 200 400 600 feet

N

NOTE: SUBJECT TO CHANGE

BINKLEY DESIGNED
144 SOUTHEAST PKWY.
SUITE 230
FRANKLIN TN.
37064

RODERICK PLACE
CONCEPTUAL SITE PLAN
THOMPSON'S STATION, TENNESSEE

ISSUE 07.19.19
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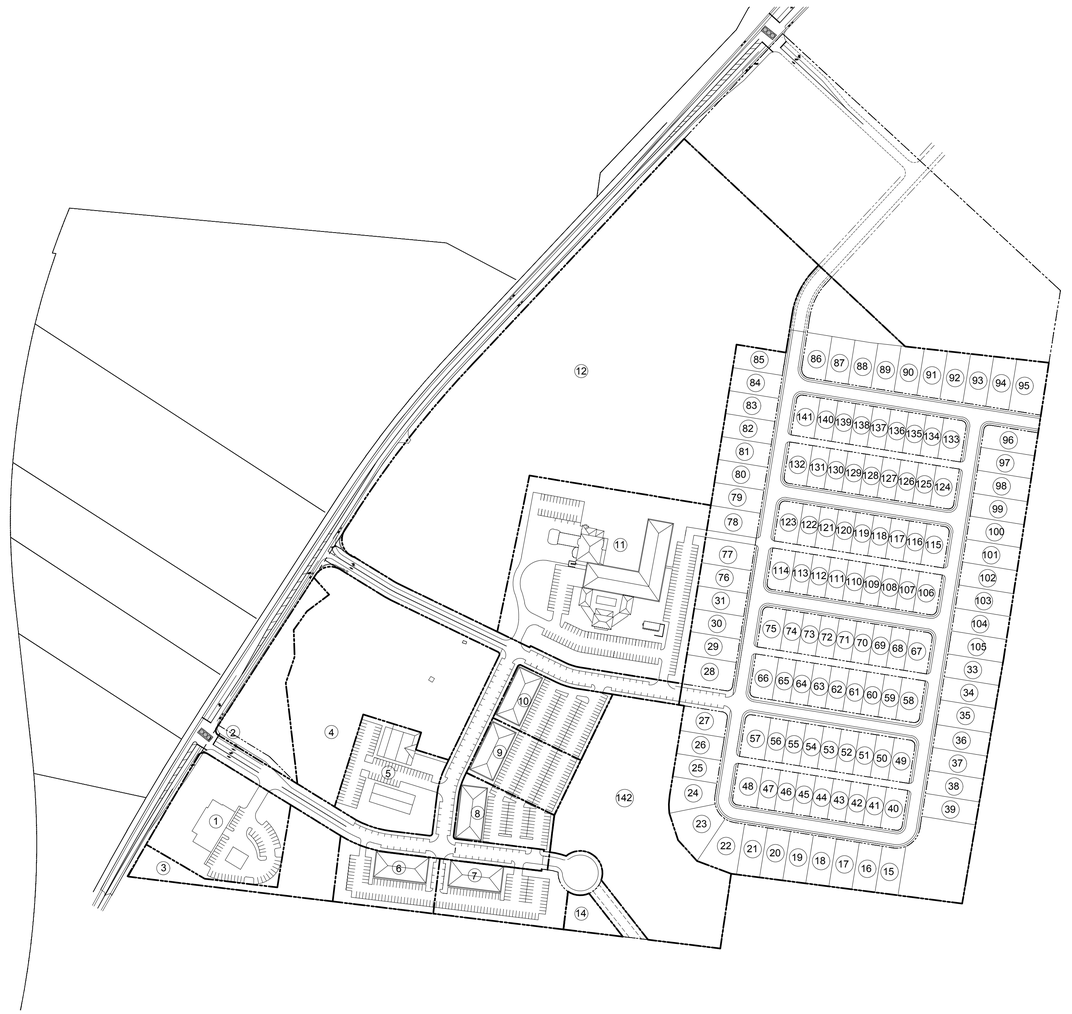
PROJECT RODERICK PLACE

DEVELOPER
SAMSON J/V
144 SOUTHEAST PKWY. SUITE 230
FRANKLIN TN. 37064

CP

02



CONCEPT LOT PLAN

0 200 400 600 feet

N

BINKLEY DESIGNED
144 SOUTHEAST PKWY.
SUITE 230
FRANKLIN TN.
37064

RODERICK PLACE
CONCEPTUAL SITE PLAN
THOMPSON'S STATION, TENNESSEE

ISSUE 07.19.19

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PROJECT RODERICK PLACE

DEVELOPER
SAMSON J/V
144 SOUTHEAST PKWY. SUITE 230
FRANKLIN TN. 37064

CP

CONCEPT NATURAL RESOURCES PLAN PLAN

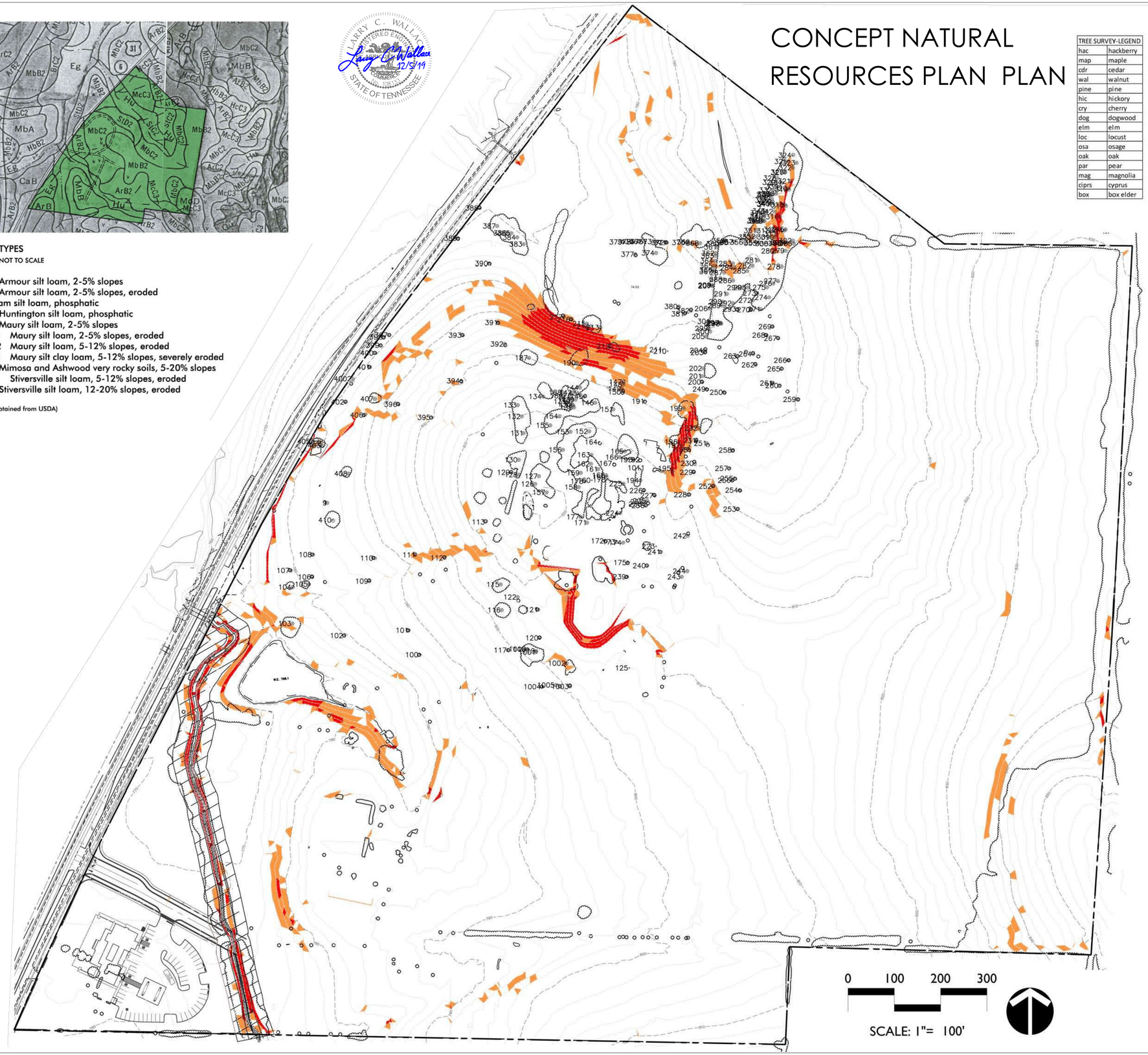
SOIL TYPES

IMAGE NOT TO SCALE

ArB Armour silt loam, 2-5% slopes
ArB2 Armour silt loam, 2-5% slopes, eroded
Eg Egam silt loam, phosphatic
Hu Huntington silt loam, phosphatic
MbB Maury silt loam, 2-5% slopes
MbB2 Maury silt loam, 2-5% slopes, eroded
MbC2 Maury silt loam, 5-12% slopes, eroded
McC3 Maury silt clay loam, 5-12% slopes, severely eroded
MoD Mimosa and Ashwood very rocky soils, 5-20% slopes
StC2 Stiversville silt loam, 5-12% slopes, eroded
StD2 Stiversville silt loam, 12-20% slopes, eroded

(Data obtained from USDA)

LARRY C. WALLACE
REGISTERED ENGINEER
12/5/19
STATE OF TENNESSEE



0 100 200 300

SCALE: 1"= 100'

TREE SURVEY-LEGEND	
hac	hackberry
map	maple
cdr	cedar
wal	walnut
pine	pine
hic	hickory
cry	cherry
dog	dogwood
elm	elm
loc	locust
osa	osage
oak	oak
par	pear
mag	magnolia
cipr s	cyprus
box	box elder

TREE SURVEY-POINT DESCRIPTION

Point #	Description	Point #	Description	Point #	Description	Point #	Description
100	51 hac	201	24 hac	302	14 elm	389	22 wal
101	60 tree	202	12 hac	303	28 wal	390	20 map
102	6 map	203	12 elm	304	16 wal	391	12 hic
103	36 cdr	204	22 hac	305	10 hac	392	18 oak
104	10 cipr s	205	20 wal	306	20 hac	393	6 par
105	10 cipr s	206	20 hac	307	10 hac	394	14 oak
106	12 hac	207	20 wal	308	14 hac	395	6 oak
107	15 map	208	16 hac	309	10 wal	396	10 map
108	17 oak	209	8 hac	310	6 hac	397	20 wal
109	10 red map	210	24 hac	311	20 wal	398	18 wal
110	60 hic	211	26 hac	312	30 map	399	6 dog clust
111	11 cry	212	10 map clust	313	12 wal	400	6 dog clust
112	16 cry	213	20 hac	314	8 hac tri	401	8 dog tri
113	25 tree	214	24 wal	315	12 elm	402	6 par
114	25 wall	215	18 hac	316	10 hac	403	28 hac
115	14 map	216	24 hac	317	10 hac	404	30 hac
116	16 map	217	28 hac	318	18 hac	405	12 dog
117	14 wal	226	20 wal	319	10 hac	406	12 cry
118	16 pine	227	18 wal	320	10 hac	407	8 mag
119	18 map	228	38 hac	321	24 hac	408	12 oak
120	16 wal	229	18 hac	322	24 cry	410	8 mag clust
121	21 hic	230	18 hac	323	32 hac		
122	12 map clust	231	12 wal	324	28 hac		
126	17 mag	232	24 elm	325	8 hac		
127	48 mag	235	16 wal	326	6 hac		
128	22 wal	236	22 wal	327	26 hac		
129	18 hac	237	8 wal	328	18 hac		
130	24 mag twn	238	14 wal	329	26 wal		
131	46 hic	239	16 wal	330	20 wal		
132	17 pine	240	8 map	331	12 hac		
133	50 hol clust	241	8 map	332	14 hac tri		
134	52 hic	242	20 wal	333	14 hac		
135	15 wal	243	22 wal	334	12 hac		
136	15 wal	244	20 wal	335	8 hac twn		
137	15 wal	249	24 wal	336	14 hac		
138	12	250	24 wal	337	6 hac		
139	16 wal	251	26 wal	338	8 hac		
140	7 wal	252	20 wal	339	20 hac		
141	7 wal	253	26 wal	340	12 hac twn		
142	14 wal	254	24 wal	341	20 hac		
143	14 wal	255	22 wal	342	10 elm		
144	36 wal	256	16 wal	343	8 hac		
145	36 wal twn	257	22 wal	344	12 hac		
146	24 map clust	258	28 wal	345	30 hac		
147	24 wal	259	28 wal	346	8 hac		
148	6 wal	260	18 wal	347	12 hac		
149	10 wal	261	22 wal	348	14 oak		
150	72 wal clust	262	18 wal	349	16 hac		
151	17 map	263	20 wal	350	6 hac twn		
152	10 map	264	24 wal	351	12 hac tri		
153	15 map	265	24 wal	352	16 hac twn		
154	15 map	266	24 wal	353	16 map		
155	15 hic	267	26 wal	354	12 wal		
156	25 elm	268	26 wal	355	10 hac		
157	60 hic	269	26 wal	356	12 hac		
158	10 box	270	28 wal	357	16 hac		
159	40 mag clust	271	15 wal	358	12 hac		
160	16 mag clust	272	32 hac	359	14 hac		
161	10 pine	273	16 hac	360	12 cry		
162	10 map	274	16 wal	361	18 wal		
163	8 wal	275	6 loc	362	14 hac		
164	20 dog clust	276	24 wal	363	20 hac		
165	24 wal	277	8 osa clust	364	14 hac		
166	24 wal	278	18 wal	365	14 hac twn		
167	18 wal	279	20 elm	366	16 hac		
168	16 wal	280	18 hac	367	14 hac		
169	8 wal	281	16 wal	368	34 hac		
170	24 wal	282	16 hac	369	26 hac		
171	8 dog	283	12 wal	370	14 hac		
172	30 hic	284	16 wal	371	26 hac		
173	14 map	285	28 hac	372	14 hac		
174	32 wal	286	12 wal	373	32 hac		
175	24 wal	287	8 wal	374	20 osa twn		
187	10 mag clust	288	12 wal	375	28 hac		
188	12 wal	289	16 wal	376	22 hac		
189	10 wal	290	18 wal	377	40 wal		
190	22 oak	291	14 wal	378	30 hac		
191	18 map	292	14 wal	379	26 hac		
192	20 wal	293	28 hac	380	12 hic		
193	18 wal	294	12 wal	381	24 hac		
194	20 mag	295	18 hac	382	26 elm		
195	30 wal	296	14 hac	383	20 pine		
196	18 map	297	12 hac	384	16 pine		
197	22 map	298	18 hac	385	16 pine		
198	24 hac	299	18 hac	386	16 pine		
199	30 map	300	24 hac	387	20 pine		
200	24 elm	301	14 hac twn	388	22 wal		

SLOPE ANALYSIS			
NUMBER	COLOR	RANGE BEG.	RANGE END
1		15.00%	24.99%
2		25.00%	100.00%

ENERGY LAND & INFRASTRUCTURE
1420 EXECUTIVE PARK DRIVE, SUITE 210
OFFICE 615-383-6300 • WWW.ELI-LLC.COM
ENGINEERS • SURVEYORS • INFRASTRUCTURE • ENVIRONMENTAL

RODERICK PLACE
CONCEPTUAL SITE PLAN
THOMPSON'S STATION, TENNESSEE

ISSUE 07.19.19
RE-ISSUE 08.07.19

PROJECT RODERICK PLACE

OWNER
SAMSON J/V
144 SOUTHEAST PKWY. SUITE 230
FRANKLIN TN. 37064

C

1.0

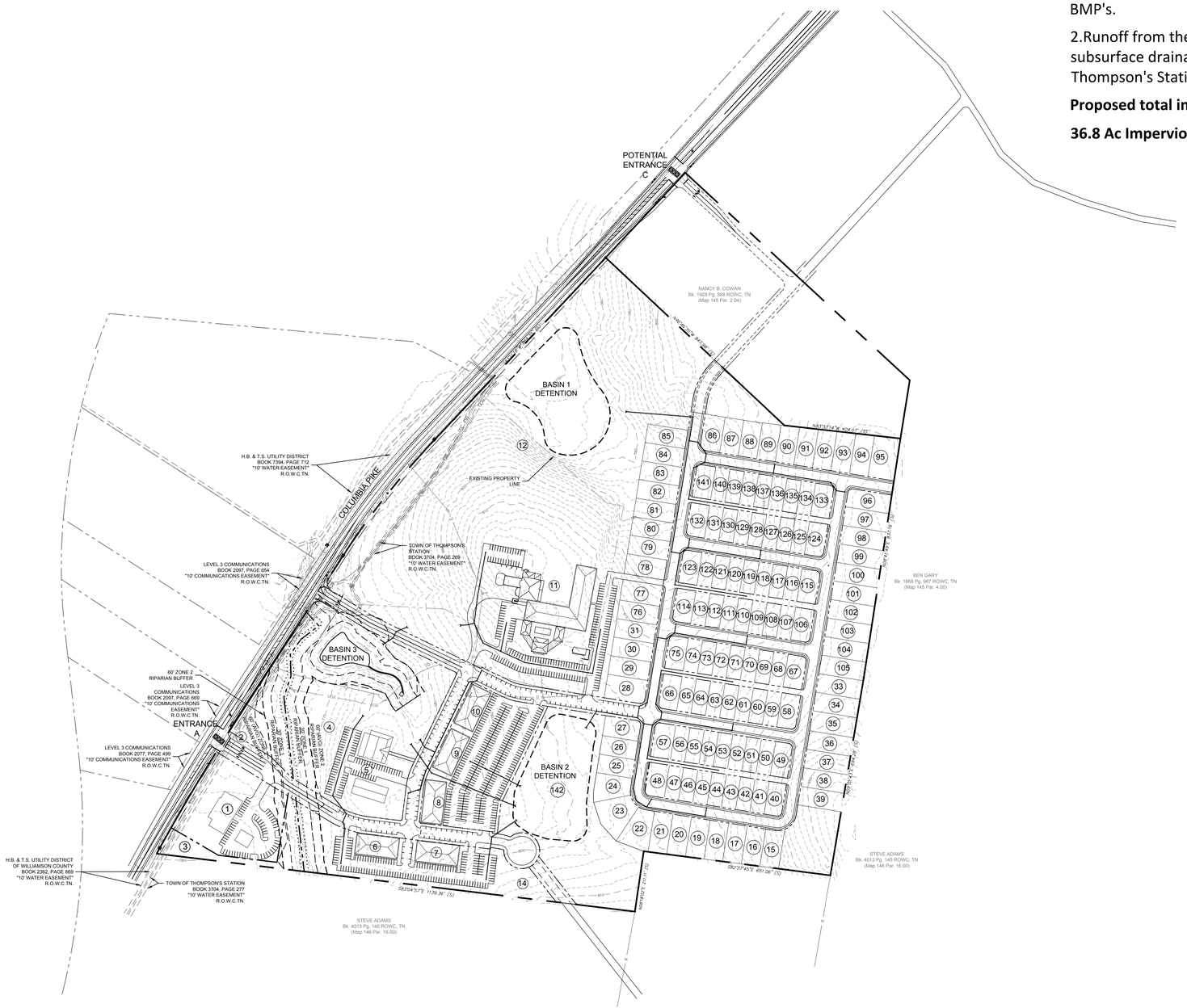
STORMWATER NARRATIVE

1.The additional impervious area to this site will be treated using approved BMP's.

2.Runoff from the impervious areas will either sheet flow or be collected in subsurface drainage networks. All discharges will meet or exceed the Town of Thompson's Stations stormwater requirements.

Proposed total impervious area = 36.8 Acres

36.8 Ac Impervious / 79.9 Ac Total = ±46%



ENERGY LAND & INFRASTRUCTURE
1420 DONELSON PIKE, SUITE A-12, NASHVILLE, TN 37217
OFFICE 615-383-6300 • WWW.ELI-LLC.COM
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RODERICK PLACE
CONCEPTUAL SITE PLAN
THOMPSON'S STATION, TENNESSEE

LARRY C. WALLACE
REGISTERED ENGINEER
12/5/19
No. 108133
STATE OF TENNESSEE

CONCEPT STORMWATER PLAN

0 200 300 400 feet

N

ISSUE 07.19.19
RE-ISSUE 08.07.19

PROJECT RODERICK PLACE

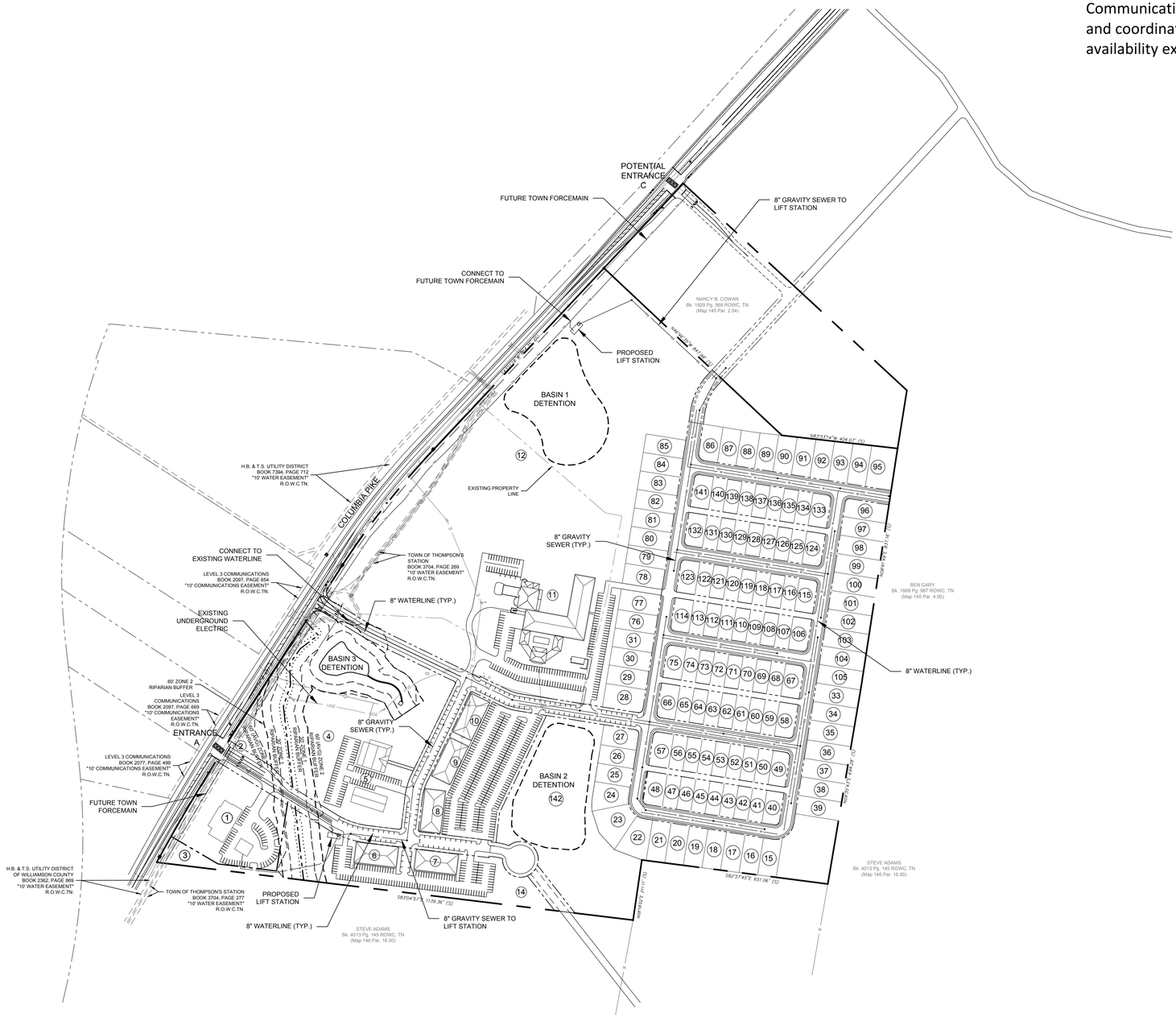
OWNER
SAMSON J/V
144 SOUTHEAST PKWY. SUITE 230
FRANKLIN TN. 37064

C

3.0

UTILITY NARRATIVE

Communications with outside utility providers (ATMOS, HB&TS, MTEMC) and coordination with Thompson's Station (Sewer) have indicated that availability existing to meet anticipated demands.



LARRY C. WALLACE
REGISTERED ENGINEER
12/9/19
STATE OF TENNESSEE

CONCEPT UTILITY PLAN

0 200 300 400 feet

N

ENERGY LAND & INFRASTRUCTURE
1420 CENTERPOINT BLVD. SUITE 1 KNOXVILLE, TN 37932
OFFICE 615-383-6300 • WWW.ELI-LLC.COM
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THOMPSON'S STATION, TENNESSEE

ISSUE 07.19.19
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PROJECT RODERICK PLACE

OWNER
SAMSON J/V
144 SOUTHEAST PKWY. SUITE 230
FRANKLIN TN, 37064

C

5.0

RODERICK PLACE

SPECIFIC PLAN AMENDMENT

CONCEPT PLAN AMENDMENT PROPOSAL
(HOW IT COMPARES TO THE ORIGINAL APPROVED 2007 CONCEPT PLAN)

R O D E R I C K P L A C E

SPECIFIC PLAN - ZONING REQUEST

October 2, 2007

Board of Mayor and Alderman,

This is a request to amend the 2007 Specific Zone Plan for Roderick Place. This will allow us to develop the property with a plan that is current in today's market. The existing approved plan does not provide for:

- Access dedication to all adjacent property owners.
- A collector road 60' right of way dedication consistent with the new major thoroughfare plan.
- Dedication of right of way for the widening of Columbia Pike / US 31.
- Dedication of a portion of right of way needed for the future sewer force main from the existing pump station in front of Thompson's Station Baptist Church to the existing TDOT stub out.
- Repairing, keeping or moving the existing historic rock wall along Columbia Pike / US 31.
- Preserving approximately 2 acres of old growth Trees, Including beautiful magnolias, maples and oaks.

This proposed amendment **does include the above items**, and allows us to additionally provide:

- A multi purpose, meeting hall, theater and event venue by keeping the existing appx 6,000 square foot event building.
- A longer and wider Vista along Columbia Pike by relocating approximately 2 acres of open space. It will provide for a larger active park with trails and hardscape .
- Less mass grading.
- Future space for a Williamson County Enrichment Center.

Thank you for your consideration.

Best regards,

Jay Franks

TABLE OF CONTENTS

~~C&L Development, LLC~~
~~P.O. Box 241~~
~~Thompsons Station, TN 37179~~
~~V:615.595.5877~~

LandDesign.
135 Second Avenue N.
Franklin TN, 37064
V:615.591.7164

SUTTLE MINDLIN
ARCHITECTURE + MASTER PLANNING + INTERIOR DESIGN
345 Marshall Avenue
Suite 102
St. Louis, Missouri 63119
V: 314.961.0102

Survey provided by:
LandDesign Survey
135 Second Avenue N.
Franklin TN, 37064
V:615.591.7164

Topographic information provided by:
Paul A Badr
Independent Mapping consultants, inc.
8037 Corporate Center Drive Suite 300
Charlotte NC 28226
V:704.540.0087

The envisioning book for the Roderick Place Specific Plan Zoning Request was originally submitted on August 23, 2006.

The plan and envisioning book were resubmitted on October 2, 2007 for consideration at the Planning Commission meeting on October 15, 2007.

Samson J/V
144 Southeast Parkway 230
Franklin, TN, 37064
Jay Franks: 615.300.0001

KCI Technologies Inc.
Traffic Engineer
1101 17th Ave S.
Nasvhille , TN, 37212
Robert Murphy:
Email: robert.murphy@kci.com

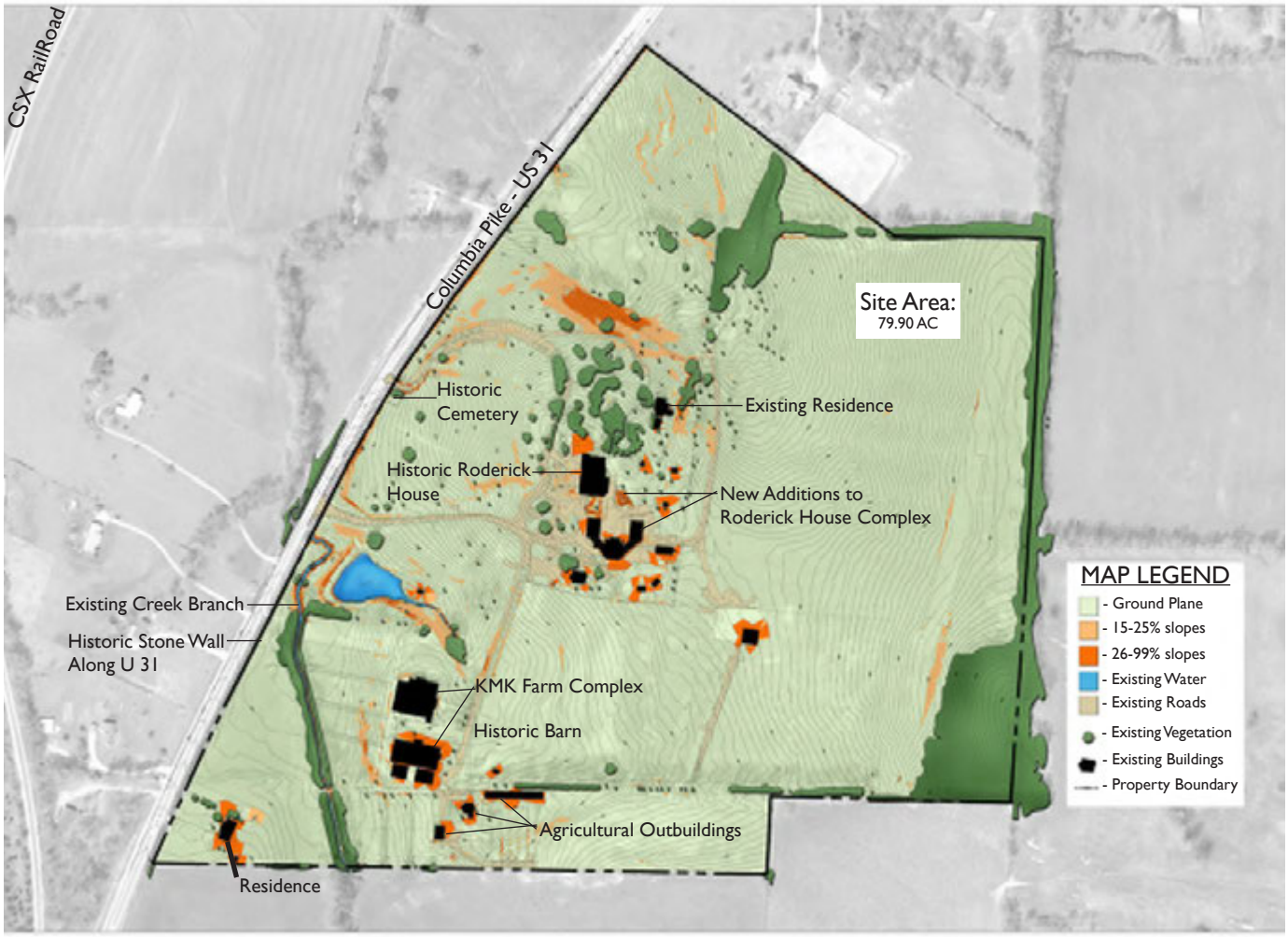
Energy Land & Infrastructure
Civil Engineer
1420 Donelson Pike Suite A12
Nasvhille , TN, 37217
Michael Ray: 615.440.7956
Email: micheal.ray@eli-llc.com

Binkley Designed, LLC.
4630 Columbia Pike
Thompson's Station, TN, 37179
Turner Binkley: 407.459.9344

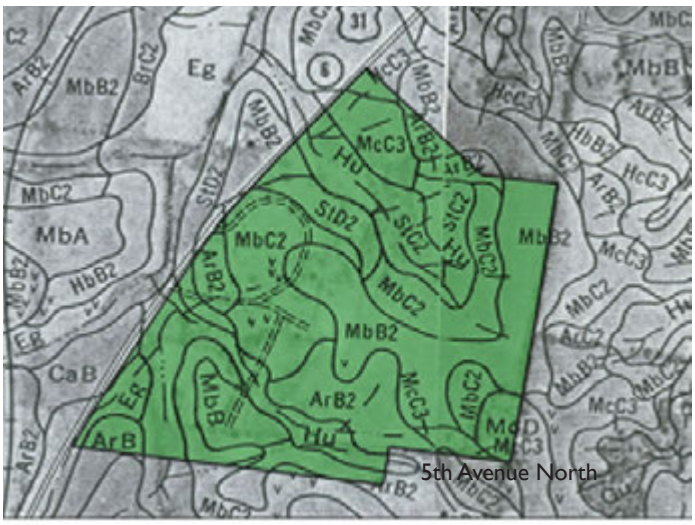
History of Roderick Farm

During the Civil War, at the Battle of Thompson's Station, noted General Nathan Bedford Forrest's horse, Roderick, was killed in effort to stand with the General. Roderick Farm is named for that horse. Roderick Place is located on a small portion of the original Roderick Farm Property which consisted of some three thousand acres belonging to Spencer Buford. A number of the site's historic elements will be retained as Roderick Place develops. Spencer Buford and his wife built the existing Federal Style home in 1801. This house is the focal point of the entire project. Existing stone walls, mature tree stands and a cemetery marking the burial places of historical figures of the community will all be preserved. A memorial to Roderick, who is buried in an unmarked grave at Roderick Farms, ~~will be created and placed on the site.~~

Since the civil War and the Battle of Thompson's Station, Roderick Farms has been used as an Aderdeen Cattle farm known as KMK Acres.



In the rural farmlands of Thompson's Station, historic Roderick Farm is situated on gently sloping land with existing creeks and dotted with mature trees. The 79.9 acre site is surrounded by farmland and beautiful existing vegetation and makes an ideal site for a project intending to preserve both cultural and natural features. Roderick Farm is located 7 miles south of Franklin, TN and just north of Spring Hill.



ArB	Armour silt loam, 2-5% slopes
ArB2	Armour silt loam, 2-5% slopes, eroded
Eg	Egam silt loam, phosphatic
Hu	Huntington silt loam, phosphatic
MbB	Maury silt loam, 2-5% slopes
MbB2	Maury silt loam, 2-5% slopes, eroded
MbC2	Maury silt loam, 5-12% slopes, eroded
McC3	Maury silt clay loam, 5-12% slopes, severely eroded
MoD	Mimosa and Ashwood very rocky soils, 5-20% slopes
StC2	Stiversville silt loam, 5-12% slopes, eroded
StD2	Stiversville silt loam, 12-20% slopes, eroded

View of the existing structure overlooking the pond.

View of the existing rock wall along Columbia Pike.

View of the existing stream on site.

View of existing cemetery along Columbia Pike.

View of existing tree line.

View of the preserved Roderick House.

View of existing barn.

Centered around the Civil War era Federal style Roderick House, Roderick Place responds to the importance of this historic land and historic home and enhances the story of this special place. This high quality mixed-use community is home to several distinct planned districts with a traditional Tennessee Federal house at its heart.

The Knoll is centered on the Roderick House and will feature a restaurant with a conference and reception center. Landscaped gardens surround and interconnect the house and new wellness facility with an adjoining day spa and an inn. An assortment of Neighborhoods radiate from the Knoll ranging from luxury condominium living and townhomes, to cottages and large estate lots. The Country Drive encircles the Knoll and connects the Village at the south entrance to the northern most Estate Lots. The Barn, Covered Bridge, and Village present the commercial face of Roderick Place by providing a location for recreational amenities and a cluster of small picturesque commercial buildings and alongside the highway at the south entrance.

Roderick Place weaves together diverse planning concepts in a complex and interesting way, maximizing the features of the landscape and history. Formal symmetry works with unexpected informality to create exciting experiences throughout the site. Each distinct neighborhood has unique characteristics and strives to create a sense of "belonging." Some neighborhoods are traditional and formal, while others are more relaxed and informal. However, everything is designed to be luxurious and inviting. Roderick Place also brings new residential forms and patterns, yet unseen in this region, which fit perfectly within the fabric of the overall development.

An extensive trail network meanders through Roderick Place, linking a compelling sequence of events as you move through the property. Trails and pathways interconnect all areas of the site providing both recreational opportunities and access to the Knoll. The development offers a complete range of landscape features including open hillside meadows existing boxwood gardens and formal floral gardens. Low stone walls, derived from the existing stone wall along Columbia Pike, are used throughout the site and are another important visual element within the development.

The Knoll - The centerpiece of the development is the Roderick mansion. It will be carefully expanded to include approximately 71 luxury age restricted apartments in a beautiful garden setting. Additionally the Roderick will provide terraces, porches and multiple open spaces for relaxing, dining and entertaining.

The original and future commercial uses have been relocated just to the south of the knoll and fronting the park. The majority of the parking is location in the rear of these mixed - use buildings.

This community will be designed to promote healthy lifestyles and create a sense of belonging where residents thrive .

MASTER PLAN TABULAR DATA

EXISTING ZONING: High Intensity District
GROSS SITE AREA: 79.90 AC

REQUIREMENTS OF PROPOSED ZONING: Specific Plan, High Intensity District (Cluster Option)- General Plan Requirements:
- Maximum Density: 3.00 DU/AC
- Permitted Gross Density (minus Commercial Area): 2.55 DU/AC
- Maximum Height: 3 Stories
- Required Open Space: 45%
- Minimum Site Area: 10 Acres
- Maximum Site Area: 100 Acres
- Area Permitted as Residential: 100%
- Area Permitted as Commercial: 100%

COMMERCIAL AREAS: (The Knoll & The Barn and Village)

Net Commercial Area:	13.90 AC
Total Square footage:	127,606 sf
Net FAR:	0.21

RESIDENTIAL AREAS:

Net Residential Area:	66.0 AC
Total Units:	174 Dwelling Units
Gross Density:	2.18 DU/AC

OPEN SPACE:

Required:	35.96 AC (45.0% of gross area)
Total provided:	36.70 AC (45.9% of gross area)

DISCRETIONARY DENSITY BONUSES:

Historic Preservation Bonus

- Historic Barn:	5% Increase in Gross Density
- Roderick House:	5% Increase in Gross Density

Increase to permitted density = .255 (10%)

Permitted density with Discretionary Density Bonuses: 2.80 DU/AC

Master Plan Tabular Data

Existing Zoning: High Intensity District
Gross Site Area: 79.90 AC

Requirements of Proposed Zoning: Specific Plan, High Intensity District (Cluster Option)
- General Plan Requirements:
-Maximum Density: 3.00 DU/AC
-Maximum Height: 3 Stories
-Required Open Space: 40% Residential | 50% Commercial
-Minimum Site Area: 10 Acres
-Maximum Site Area: 100 Acres
-Area Permitted as Residential: 100%
-Area Permitted as Commercial: 100%

Density:

-Gross Permitted Density:	3.00	DU/AC
-Total Residential:	211	Units
-Estate Lots:	54	Units
-Cottage Lots:	72	Units
-Multistory dwellings/ live work:	85	Units
-Total Commercial:	129,367	S.F.
-Event Center & Historic Barn:	13,500	S.F.
-Hotel w/ Senior Residences:	92	Units
-Senior Living (IL,AL,ALZ):	100	Beds

Open Space:
-Total Land Area: 79.90 Acres
-Total Commercial Area: 9.26 Acres X 50% = 4.63 Acres
-Total Residential Area: 70.64 Acres X 40% = 28.25 Acres
-Total Required Open Space: 32.88 Acres
-Total Provided Open Space: 35.80 Acres

The Knoll - The centerpiece of the development is the Roderick mansion. It will be carefully expanded to include approximately 71 luxury age restricted apartments in a beautiful garden setting. Additionally the Roderick will provide terraces, porches and multiple open spaces for relaxing, dining and entertaining.

~~**The Knoll** – Pedestrian oriented heart of the project features a restaurant, a conference and reception center, a country inn and a wellness facility and day spa.~~

The Barn, Mixed-Use and Artisan Village

~~**The Barn, Covered Bridge and Village**~~ – An existing barn, high quality commercial buildings and a small creek side park ~~with a covered bridge~~, all located at the south entrance.

Neighborhoods – Variety of housing types that expand upon the regional availability ~~through individual neighborhoods with distinct character.~~ — by utilizing an architectural palette that reinforces and compliments the character of Thompson's Station

Landscape Amenities – An integral part of celebrating each individual area of the development

History – Preservation of the existing barn, boxwood gardens, and the original house recall the Civil War period, while ~~the integration of a new equestrian pavilion~~ and an interpretive memorials pay tribute to the Roderick story.

Pedestrian Quality – Extensive network of paths, gardens and trails allow residents to enjoy the varied beauty of the natural and built landscape.

OPEN SPACE PLAN

The open space at Roderick Place is the projects driving force. The entire master plan concept evolved from the desire to celebrate the site's natural features while preserving a significant amount of open space. The master plan balances residential homes with exceptional and expansive natural scenery.

The Open Space Plan is intended to show some of the opportunities inherent in such an approach. Recreational amenities such as walking paths, nature trails and ~~an amphitheater~~ green houses and gardens will enhance the sites natural features. In addition, it is the intention of the plan to restore as much of the natural habitat to its original condition as is possible after years of degradation from grazing.

This natural habitat will be contrasted with a collection of formal greens, squares and neighborhood parks within the neighborhoods, that will create formal settings for outdoor enjoyment. All of these spaces will be linked by a network of sidewalks, pedestrian footpaths and bikeways, allowing non-motorized traffic to move freely throughout the site.

Scenery to be preserved

Conceptual open space images

COMMUNITY OPEN SPACE/LANDSCAPE GUIDELINES:

Community Buffers

1 Residential Lot /Columbia Pike Buffer - A landscape buffer with a minimum width of 60 feet shall be provided to buffer residences. One canopy tree shall be provided for every 25 feet of Columbia Pike frontage~~, and a continuous evergreen hedge row shall be provided along the residential property line with a minimum mature height of six feet and an installed height of at least 36 inches. Plants shall be a minimum of 48 inches on center.~~

2 ~~Property Boundary Buffer - A landscape buffer with a minimum width of 20 feet shall be provided at the exterior boundary of this development. Existing trees should be preserved where possible. Where existing trees do not exist or need to be supplemented, one canopy tree and 10 shrubs shall be planted for every 35 feet of adjacent boundary. Trees shall be a minimum of 2.5 inch caliper. One out of every three canopy trees installed shall be evergreen. Shrubs shall have a mature height of at least four feet.~~

3 Barn and Village Buffer - A minimum width of 15 feet informally planted canopy trees shall be provided with one tree for every 50 feet of adjacent Columbia Pike Right-of-Way. Canopy Trees shall be a minimum of 2.5 inch caliper.

4 Eastern Property Boundary - Minimum of 50 feet landscape buffer shall be provided and existing trees will be preserved where possible.

Street Trees

All street trees shall be provided per the street sections beginning on page 31.

Sidewalks

- All sidewalks to be provided per street sections beginning on page 31.
- Interconnecting (primary) sidewalks are encouraged and shall be a minimum of five feet wide, constructed with concrete, stone, asphalt, or brick materials. Gravel or garden (secondary) walks may be provided within residential clusters or community gardens or parks and shall be a minimum of four feet wide.

Parking Lot Landscape Requirements

- All off street parking should be hidden from view of the public street and located at the rear of all proposed buildings where possible.
- Where off-street parking abuts a public or private road it shall have a minimum 7' buffer.
- Parking should be designed to minimize site impact on existing natural features.
- For every 12 continuous parking spaces there shall be a planting island.

Dumpster Requirements

- Where dumpsters are required, an opaque screen wall / fence shall be provided surrounding its perimeter with a minimum height of 72 inches.
- Dumpster screen / wall shall consist of wood, brick masonry, stone or faux stone.
- Access gates shall be a minimum 72 inches in height, opaque and ornate in nature.
- Foundation planting shall be provided with an evergreen hedge with a minimum height of 30 inches at the time of installation.

COMMUNITY OPEN SPACE/LANDSCAPE GUIDELINES:

Community Buffers

1 Residential Lot /Columbia Pike Buffer - A landscape buffer with a minimum width of 60 feet shall be provided to buffer residences. One canopy tree shall be provided for every 25 feet of Columbia Pike frontage; ~~and a continuous evergreen hedge row shall be provided along the residential property line with a minimum mature height of six feet and an installed height of at least 36 inches. Plants shall be a minimum of 48 inches on center.~~

2 ~~Property Boundary Buffer - A landscape buffer with a minimum width of 20 feet shall be provided at the exterior boundary of this development. Existing trees should be preserved where possible. Where existing trees do not exist or need to be supplemented, one canopy tree and 10 shrubs shall be planted for every 35 feet of adjacent boundary. Trees shall be a minimum of 2.5 inch caliper. One out of every three canopy trees installed shall be evergreen. Shrubs shall have a mature height of at least four feet.~~

type 2 buffer

3 ~~Barn and Village Buffer - A minimum width of 15 feet informally planted canopy trees shall be provided with one tree for every 50 feet of adjacent Columbia Pike Right-of-Way. Canopy Trees shall be a minimum of 2.5 inch caliper.~~

4 ~~Eastern Property Boundary - Minimum of 50 feet landscape buffer shall be provided and existing trees will be preserved where possible.~~

Street Trees

All street trees shall be provided per the street sections beginning on page 31.

Sidewalks

- All sidewalks to be provided per street sections beginning on page 31.
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- Dumpster screen / wall shall consist of wood, brick masonry, stone or faux stone.
- Access gates shall be a minimum 72 inches in height, opaque and ornate in nature.
- Foundation planting shall be provided with an evergreen hedge with a minimum height of 30 inches at the time of installation.

Preserved Open Lawn - The sloping meadow along Columbia Pike is bordered by an existing stone wall and includes the historic cemetery. ~~The plan proposes a picturesque pond and a dramatic forest hedgerow flanking and framing views of the Roderick House.~~

The plan proposes a picturesque view shed from 31 by preserving the current landscape and sheltering the majority of the development to the east side of the property.

Neighborhood Park - "Creekside Park" - The park includes ~~an amphitheater, a stone bridge, waterfalls,~~ a memorial to Roderick the horse, the park and trail system and the wooded beauty of the existing creek. ~~A stone wall provides privacy and separates the park from the homes and alleys behind the Crescent on the Park.~~

The Gardens of The Knoll - These gardens include ~~the Wellness Garden,~~ Formal Garden, Revitalized Boxwood Garden, and both paved and grassed terraces. The gardens of the Knoll surround the ~~conservatory, overlook~~ the open lawn and form a strong visual connection to the Grand Lawn.

Wellness Fountain

preserved century old magnolia trees add a unique charm for the residents of the Knoll and pay tribute to the intent of retaining and enhancing the sites original landscape.

~~**The Grand Lawn** - The equestrian themed Grand Lawn is available for community functions and events. A park pavilion provides an architectural terminus to the axis from Roderick House. The space is formally defined by a stone privacy wall at the edge of the perimeter roadway. Four small gazebos define the entrance to this space and provide a beautiful arrival experience for the adjacent neighborhoods.~~

~~**The Center Garden in the Garden Courtyard Residences** - A charming Southern garden with academic and horticultural influences, this garden uses an existing stand of mature trees and sloping topography to create a unique focal point for the Garden Courtyard Neighborhood. This park could include water features and ornamental structures to compliment the serene nature of the garden.~~

REGULATING PLAN

The Regulating Plan for Roderick Place graphically articulates the different neighborhoods and specifies the building types permitted within each. This is intended to ensure a project that will, at full build out, meet or exceed the goals of both the developer and the Town of Thompson's Station, while creating an attractive, appealing and functionally sustainable community.

In general, the Roderick Place Regulating Plan defines the project's distinctive neighborhoods of varying densities and configurations and provides a range of housing types and prices. This plan is structured to encourage maximum compatibility with adjoining property uses and zoning. In addition, the Regulating Plan defines opportunities for commercial and civic uses within The Knoll and Barn & Village to reinforce the sense of place and to provide community services.

Building Typologies

A. The Knoll
B. The Barn, Covered Bridge, and Village
C. Estate Lots
D. (District Removed)
E. Live/ Work Units
F. Cottages on the Green or Garden Courtyard Residence
G. Residential Buildings or Row Houses
H. The Mews or Row Houses or Residential Buildings
I. The Mews or Cottages
J. Cottages on the Green
K. Row Houses or Cottages on the Green
L. Row Houses or Residential Buildings
M. Cottages on the Green or Row Houses or Residential Buildings
N. Cottages on the Green or Row Houses or Residential Buildings
O. Residential Buildings and Community Amenity

Notes

1. The regulatory plan is representitive of the intendended develoment. Actual plan may differ in product mix, location, density & size - not exceeding minimums or maximums established as part of this zoning document.
2. A variety of housing types will be built and may include: detached single family homes, attached single family homes, townhomes , live-work units, multi-family condos and resort residence.
3. For further information, see the following building typologies beginning on page 14.

Building Typologies

A. THE KNOLL
B. THE BARN AND MIXED USE ARTISAN VILLAGE
C. LIVE-WORK / MIXED-USE VILLAGE
D. ESTATE LOTS
E. COTTAGES

Notes

1. The regulatory plan is representitive of the intendended develoment. Actual plan may differ in product mix, location, density & size - not exceeding minimums or maximums established as part of this zoning document.
2. A variety of housing types will be built and may include: detached single family homes, attached single family homes, townhomes , live-work units, multi-family condos and resort residence.
3. For further information, see the following building typologies beginning on page 14.

THE KNOLL (District A)

The Knoll - The centerpiece of the development is the Roderick mansion. It will be carefully expanded to include approximately 71 luxury age restricted apartments in a beautiful garden setting. Additionally the Roderick will provide terraces, porches and multiple open spaces for relaxing, dining and entertaining.

The original and future commercial uses have been relocated just to the south of the knoll and fronting the park. The majority of the parking is location in the rear of these mixed - use buildings.

This community will be designed to promote healthy lifestyles and create a sense of belonging where residents thrive .

PERMITTED USES:

- Restaurant
- Retail Shop
- Boutique Shop
- ~~Country Inn~~ Hotel and Residences
- Guest Cottages
- Day Spa
- Community Club House / Pool
- General office
- Medical office
- Conference rooms
- Residential condominiums
- Residential townhomes

Assised Living and Memory Care

LOT STANDARDS

- Building Coverage: 75% maximum
- Primary Structure Front Setback: 0 feet minimum
- Primary Structure Side Setback: 0 feet minimum
- Primary Structure Rear Setback: 0 feet minimum
- Distance Between Buildings: 10 feet minimum
- Height: 3 stories maximum
- Parking: Permitted uses shall satisfy parking requirements per the Town of Thompson's Station Zoning Ordinance. On-street parking may count toward the required parking if directly adjacent the subject parcel.
- Signage: See page 28 for signage guidelines.

Mixed Use and Artisan Village

THE BARN, ~~COVERED BRIDGE, AND VILLAGE~~ (District B)

The Barn, ~~Covered Bridge~~, and Village present a unique "face" of Roderick Place and create a memorable entrance to the residential community. A large existing barn is retained and given new life as the focal point of the Village. A soaring second floor loft space provides an outstanding location for events, parties and receptions, and creates a unique experience for the residents of Roderick Place and Thompson's Station. The loft also provides an additional venue for conferences taking place at the Knoll or a stage for summer theater productions. The ground floor of the barn houses the services and amenities associated with the event space and could include a marketplace for antiques and collectibles. ~~The adjacent amphitheater, with its hillside park setting along the creek, creates a venue for a variety of musical and theatrical performances~~. A grassy open space next to the Barn ~~and Amphitheater~~ provides remote or overflow parking for events on the property and eliminates the need for large paved parking lots. ~~A covered bridge adds another landmark feature to Roderick Place and connects the many elements of Roderick Place. The historically inspired wooden bridge serves vehicular traffic and offers an attractive and safe pedestrian walkway overlooking the existing stream.~~ The Village itself provides the "necessities" of life including local retail shops for things like milk, and bread and a select group of professional and commercial office suites. It is also a casual place to go for coffee or ice cream after supper. ~~The Village will be built in the Countryside Vernacular architectural style.~~

Artisan

Farmers Market, Food Truck Events, etc...

The adjacent creekside park allows opportunities for movies on the lawn, along with creating a venue for other performacnes

PERMITTED USES:

- Restaurant
- Retail Shops
- Boutique Shops
- ~~Car Care services~~
- General office
- Professional office
- Deli
- Convenience Market
- Community Maintenance Facility
- Residential Apartments
- Farmers / Artisan Market
- Event and Community Center

LOT STANDARDS:

- Building Coverage: 75% maximum
- Primary Structure Front Setback: 0 feet minimum
- Primary Structure Side Setback: 0 feet minimum
- Primary Structure Rear Setback: 0 feet minimum
- Distance Between Buildings: 10 feet minimum
- Height: ~~2~~ 3 stories maximum
- Parking: Permitted uses shall satisfy parking requirements per the Town of Thompson's Station Zoning Ordinance. On-street parking may count toward the required parking if directly adjacent the subject parcel.
- Signage: See page 28 for signage guidelines

MIXED USE VILLAGE (District C)

The Mixed Use Village at Roderick Place will have a mix of residential, retail, restaurants, and offices that will serve the community and a village entrance into the neighborhood and The Knoll.

PERMITTED USES:

- Restaurant
- Retail Shops
- Boutique Shops
- ~~Car Care services~~
- General office
- Professional office
- Deli
- Convenience Market
- Community Maintenance Facility
- Residential Apartments
- Farmers / Artisan Market
- Hotel

LOT STANDARDS:

- Building Coverage: 75% maximum
- Primary Structure Front Setback: 0 feet minimum
- Primary Structure Side Setback: 0 feet minimum
- Primary Structure Rear Setback: 0 feet minimum
- Distance Between Buildings: 10 feet minimum
- Height: 2 stories maximum
- Parking: Permitted uses shall satisfy parking requirements per the Town of Thompson's Station Zoning Ordinance. On-street parking may count toward the required parking if directly adjacent the subject parcel.
- Signage: See page 28 for signage guidelines



ESTATE LOTS ~~ON THE COUNTRY DRIVE~~ (District ~~C~~) D

The Estate Lots are single family dwellings~~ along the outside edge of the Country Drive~~. Appropriately sized, the houses allow for generous front and rear yards. Architectural styles include ~~Tennessee Federal, Updated Neoclassical and Classic American~~ a mix of Historic Americana, Tennessee Farmhouse, and European Revival. Proportion, ornamentation, landscape treatments and soft exterior lighting are important to creating the luxurious and inviting character of this neighborhood. Side entry garages are located behind, to the side or even in front of the house,~~ but never facing the street. If the garage is in front of the house, a generous landscaped and walled auto courtyard provides a pleasant arrival to the front door and to the garage.~~ The lots are not designed for alley access.

INTERIOR LOTS

- Lot Area: ~~11,000~~ 8,000 square feet minimum
- Building Coverage: 55% maximum
- Lot Width ~~at Front Setback~~: ~~90~~ 65 feet minimum
- Lot Depth: 125 feet minimum (measured at the central axis of the lot)
- Primary Structure Front Setback: ~~30~~ 10 (reference D3 guidelines) feet minimum
- Primary Structure Side Setback: 7.5 feet minimum
- Primary Structure Rear Setback: ~~15~~ 20 (reference D3 guidelines) feet minimum
- ~~Porch Front Setback: 24 feet minimum~~
- Porch Side Setback: 5 feet minimum
- Height: 3 stories maximum
- Raised Foundation at Front Façade: 18 inches minimum
- Required Off-street Parking: Minimum 2 cars per unit within an enclosed garage. No garage may face the street.
- Porch Depth: 6 feet minimum
- Driveway Setback: ~~3~~ 1 feet minimum from the property line

Front Facing Garage Setback: 20' (in order to maintain min. driveway length of 20' and eliminate garages in front of the main body of the primary house)

CORNER LOTS (adjacent to a R.O.W.)

- Lot Area: 12,500 square feet minimum 8,750
- Building Coverage: 55% maximum
- Lot Width ~~at Front Setback~~: ~~102.5~~ 70 feet minimum
- Lot Depth: 125 feet minimum (measured at the central axis of the lot)
- Primary Structure Front: 30 feet 10 (reference D3 guidelines)
- Primary Structure Corner Side Setback: ~~20~~ 10 (reference D3 guidelines) feet minimum
- Primary Structure Side Setback: 7.5 feet minimum
- Primary Structure Rear Setback: ~~15~~ 20 (reference D3 guidelines) feet minimum
- ~~Porch Front/Corner Side Setback: 24 feet minimum~~
- Porch Side Setback: 5 feet minimum
- Height: 3 stories maximum
- Raised Foundation at Front Façade: 18 inches minimum
- Required Off-street Parking: Minimum 2 cars per unit within an enclosed garage. No garage may face the street. All access for garages shall be from the Primary Street.
- Porch Depth: 6 feet minimum
- Driveway Side Setback: ~~3~~ 1 feet minimum from the property line

Front Facing Garage Setback: 20' (in order to maintain min. driveway length of 20' and eliminate garages in front of the main body of the primary house)





COTTAGES ~~ON THE GREEN~~ (District E)

Cottages are single family dwellings ~~that front on internal neighborhood parks~~. Designed for smaller residential lots, the houses are appropriately scaled to create a traditional village street. ~~Neighborhood I may be in the Tennessee Federal style and expands upon the original architecture of the area. Neighborhood N could be Classic American, while M and J are Updated Neoclassical style. One neighborhood could emphasize large, inviting front porches, while others might emphasize a formal front stoop. Each street has significant variation within its architectural style; there should not be repeats.~~ Generous landscaping and soft landscape lighting are essential to creating the inviting character of the neighborhood. Garages are accessed from service alleys behind the homes.

located at the core of the neighborhood.

INTERIOR LOTS

- Lot Area: ~~6200~~ 5,750 square feet minimum
- Building Coverage: 75% of lot maximum
- Lot Width ~~at Front Setback~~: 50 feet minimum
- Lot Depth: ~~98~~ 115 feet minimum (measured at the central axis of the lot)
- Primary Structure Front Façade Zone: ~~10 to 15 feet from R.O.W. if Front Porch is provided; 8 to 10 feet from R.O.W. if no Front Porch is provided.~~ 10 (reference D3 guidelines) 7.5 (reference D3 guidelines)
- Primary Structure Side Setback: ~~5~~ feet
- Primary Structure Rear Setback: ~~5~~ feet minimum 20 to allow parking in driveway
- Garage Rear Zone: 4 to 6 feet from alley pavement edge (No driveway parking spaces are permitted. Guest parking shall be provided on-street.)
- Porch Front Setback: 4 feet minimum
- ~~Porch Side Setback: 5 feet minimum~~
- Height: 3 stories maximum
- Raised Foundation at Front Façade: 18 inches minimum
- Required Off-street Parking: Minimum 2 cars per unit within an enclosed garage. Garages shall be alley access only.
- Porch Depth: 6 feet minimum

CORNER LOTS (adjacent to a R.O.W.)

- Lot Area: ~~6500~~ 6,325 square feet minimum
- Building Coverage: 75% of lot maximum
- Lot Width ~~at Front Setback~~: 55 feet minimum
- Lot Depth: ~~98~~ 115 feet minimum (measured at the central axis of the lot)
- Primary Structure Front Façade Zone: ~~10 to 15 feet from R.O.W. if Front Porch is provided; 8 to 10 feet from R.O.W. if no Front Porch is provided.~~ 10 (reference D3 guidelines)
- Primary Structure Corner Street Setback: 10 feet minimum
- Primary Structure Side Setback: ~~5~~ 7.5 (reference D3 guidelines) feet minimum
- Primary Structure Rear Setback: ~~5~~ 20 to allow parking in driveway feet minimum
- Garage Rear Zone: 4 to 6 feet from Alley pavement edge (No driveway parking spaces are permitted. Guest parking shall be provided on-street.)
- Porch Front/Corner Side Setback: 4 feet minimum
- Porch Side Setback: 5 feet minimum
- Height: 3 stories maximum
- Raised Foundation at Front Façade: 18 inches minimum
- Required Off-street Parking: Minimum 2 cars per unit within an enclosed garage. Garages shall be alley access only.
- Porch Depth: 6 feet minimum



GARDEN COURTYARD RESIDENCES

Three layers of gardens organize the experience of this neighborhood. The first and most public garden will contain meandering paths and trees at the center of the neighborhood. A second and more private garden is provided as every residence has its own front garden creating a unique arrival to each home. A final exclusive and intimate courtyard garden is surrounded by the rooms and spaces of the house. The design of the garden courtyard residences focuses on the integration and openness of the gardens and interior spaces, placing emphasis on the landscaping and natural materials more than the formal style of the architecture. The house itself can be a modified version of any of the three residential architectural styles. Many windows help to create views and visual access to the courtyard, which is punctuated by fountains, trellises and other romantic garden elements. The garage and driveway, in a non-traditional arrangement, provide thematic and stylish design elements to the front garden. The zero-lot-lines and high courtyard walls create a desirable enclosure for this exclusive neighborhood.

INTERIOR LOTS

- Lot Area: 7000 square feet minimum
- Building Coverage: 55% maximum
- Lot Width at Front Setback: 50 feet minimum
- Lot Depth: 90 feet minimum (measured at the central axis of the lot)
- Primary Structure Front Façade Zone: 20 to 25 feet from R.O.W.
- Primary Structure Side Setback: 0 feet minimum
- Primary Structure Rear Setback: 0 feet minimum
- Garage Front Setback: 25 feet minimum
- Height: 3 stories maximum
- Raised Foundation at Front Façade: 8 inches minimum
- Required Off-street Parking: Minimum 2 cars per unit within an enclosed garage.




~~ROW HOUSES~~

~~Row Houses are buildings with three or more multi-story units situated side-by-side. The row houses in neighborhood L could be Neoclassical to complement the adjacent Cottages on the Green while The Crescent at Neighborhood K might be Updated Neoclassical, finished in natural and cut stone. Beautifully detailed front entrances provide rhythm and scale to the two or three story facades. Garages are accessed off service alleys at the rear, resulting in private yards located between the house and garage.~~

~~INTERIOR LOTS~~

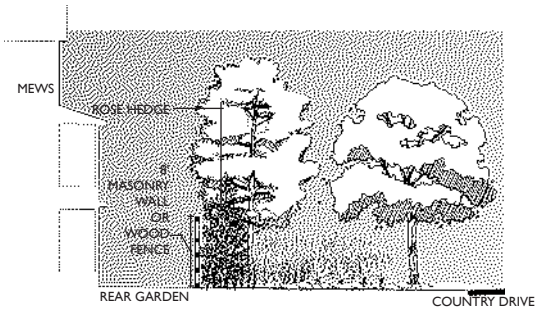
- ~~Lot Width at Front Setback: 20 feet minimum~~
- ~~Lot Depth: 90 feet minimum (measured at the midpoint of the lot)~~
- ~~Distance Between Buildings: 15 feet minimum~~
- ~~Number of Attached Units per Building: 8 Units maximum~~
- ~~Primary Structure Front Façade Zone: 10 to 15 feet from R.O.W.~~
- ~~Primary Structure Side Setback: 0 feet minimum~~
- ~~Primary Structure Rear Setback: 5 feet minimum~~
- ~~Building Side Setback: 10 feet minimum~~
- ~~Garage Rear Zone: 4 to 6 feet from alley pavement edge (No drive way parking spaces are permitted. Guest parking shall be provided on-street.)~~
- ~~Stoop Front Setback: 4 feet minimum~~
- ~~Height: 3 stories maximum~~
- ~~Raised Foundation at Front Façade: 18 inches minimum~~
- ~~Required Off-street Parking: Minimum 2 cars per unit within an enclosed garage. Garages shall be private drive/alley access only.~~

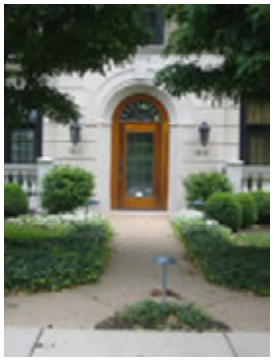

THE MEWS (District H)

The Mews District is a street/courtyard lined with multi-story dwellings, each with their formal front door and garage entrance on the street. Main living spaces are on the second and third floors, creating a picturesque streetscape and controlled views within the neighborhood. The Mews will be located in neighborhood H and will be situated directly adjacent to the Knoll. Architecture is expected to be in the Classic American style, with stone and stucco as the primary materials. The garages and doors are high quality stained wood for a clean, stylish look. The Mews feature balconies, bay windows, dormers, front stoops and carriage lanterns to add interest and rhythm to the facades. Formal landscaping includes street trees in grates, large potted shrubs and dramatic flower boxes. Behind the houses, balcony terraces on the main living level use decorative stairs to connect to enclosed gardens below. Except where the Mews overlook a 3-4 feet masonry wall and adjacent to the pond, a 6 foot wood fence encloses the back gardens.

INTERIOR LOTS

- Lot Width at Front Setback: 36 feet minimum
- Lot Depth: 65 feet minimum (measured at the midpoint of the lot)
- Distance Between Buildings: 18 feet minimum
- Number of Attached Units per Building: 4 Units maximum
- Primary Structure Front Façade: shall be set at 10 feet from private drive court.
- Primary Structure Side Setback: 0 feet minimum
- Primary Structure Rear Setback: 20 feet minimum
- Building Side Setback: 5 feet minimum at ends of street
- Height: 3 stories maximum
- Raised Foundation at Front Façade: 8 inches minimum
- Required Off-street Parking: Minimum 2 cars per unit within an enclosed garage. Garages are off the mews street/ courtyard
- Porch Depth Minimum: 6 feet minimum
- Rear balconies on upper level have a minimum 8' depth. This may extend into the rear setback.





~~THE RESORT RESIDENCE / RESIDENTIAL BUILDINGS (DISTRICTS G & O)~~

~~With their location and size, the Residential Buildings create a formal backdrop to the development of the Knoll. Updated~~ Neoclassical style ~~buildings~~ compliment the historic architecture of the Knoll, but do not ~~detract from~~ the importance of the main house. Large windows, generous ~~terraces and balconies~~ and quality ~~detailing~~ make the residential buildings a grand and beautiful place to live. The front entrances and ~~canopies are attractive features~~ within the arrival courtyards. Residents park in garages beneath the buildings, ~~while~~ guests may park near the entrance. The ~~Residential Buildings~~ offer the opportunity to provide assisted living amenities and services.

~~BUILDING LOTS~~

- Distance Between Buildings: 15 feet minimum
- Primary Structure Front Setback: 15 feet minimum
- Primary Structure Side Setback: 0 feet minimum
- Primary Structure Rear Setback: 35 feet minimum
- Accessory Structure Setback: 15 feet minimum
- Height: 3 stories maximum
- Raised Foundation at Front Façade: 18 inches minimum
- Required Off-street Parking: Minimum 2 cars per unit within an enclosed garage.
- Porch Depth Minimum: 6 feet minimum

LIVE/WORK UNITS (District E)

Situated along the entry loop road, the Live/Work units face the Knoll and the historic Roderick house. This group of buildings creates a dramatic setting with retail shops at ground-level and private residences above. The spaces between buildings contain lobbies and entrances to the private residences and connect to picturesque hillside gardens and the functional alley. The garages along the alley have exclusive elevator access to the residences above. The sidewalk in front of the units is a part of an elaborate step-down garden with decorative features that create a beautiful "front door" for the entire complex.

PERMITTED USES:

- Residential
- Retail Shops
- Boutique Shops
- General office
- Professional office
- Community Services

BUILDING LOTS

- Distance Between Buildings: 10 feet minimum
- Primary Structure Front Facade Zone: 10-20 feet minimum
- Primary Structure Side Setback: 0 feet minimum
- Primary Structure Rear Setback: 0 feet minimum
- Height: 3 stories maximum at front facade (4 stories rear)
- Raised Foundation at Front Façade: 8 inches minimum
- Parking: Permitted uses shall satisfy parking requirements per the Town of Thompson's Station Zoning Ordinance. On-street parking may count toward the required parking if directly adjacent the subject parcel.

A R C H I T E C T U R E
&
S I T E E L E M E N T S

ARCHITECTURAL PALETTE & STYLES

Tennessee Federal Style

- This is the most traditional and formal style in the palette. It is the basis for the proportions, materials and details of all other styles and should be the predominant style used within Roderick Place.
- The façade is orderly, with windows in symmetrical vertical rows around a central door.
- Brick or stone primary building material with cast stone or painted wood accents
- Windows are double-hung with sashes (upper and lower), typically with six panes per sash.
- Cornices are emphasized with tooth-like dentils or other decorative moldings.
- Uses a low hip roof with brick or stone chimneys and optional gable accents or a flat roof with a detailed parapet and cornice.
- A semicircular or elliptical fanlight over panelized front door is typical of this style.
- Palladian and arched windows are typical but restrained. These should only be used in a meaningful way.

Updated Neoclassical Style

- This style uses many of the principles of the Tennessee Federal style, but allows a greater range of less predictable details.
- The form of the house has more freedom and may include wings, terraces, bay windows, dormers and front porches to increase the architectural palette beyond the Tennessee Federal style.
- Brick, stone or stucco are the primary building materials with cast stone or painted wood accents.
- Material changes are acceptable throughout the house. For example, on multi-story houses and buildings, a first story of cast stone, can be used with upper stories of brick or stucco.
- Details like iron work, French doors and appropriately scaled columns are encouraged to add interest to the architecture

Classic American Style

- This style has roots in the country farmhouse, bungalow and shingle styles, and is the most informal of the architectural styles.
- It can retain the basic symmetry and simplicity of the Federal style, or it may introduce rambling floor plans of a looser nature.
- Roofs are more steeply pitched gable roofs with deep overhangs and are finished with wood shingles or standing seam metal.
- Copper roof details and accents may be introduced where appropriate.
- The primary building materials are wood, stucco, brick or stone with wood or cast stone detailing.
- Dormers, chimneys, large front and side porches and other details are highly encouraged and the asymmetrical placement of these will "loosen" the appearance of the house.
- Bay windows, columns and French doors are all encouraged to add interest to the house.

Countryside Vernacular (Not for use in residential architecture)

- This style is an elegant version of a picturesque village. Architecture references barns and stables as well as the charm of Main Street America; all in a park-like setting.
- Stone, brick, stucco and wood are the primary façade materials with simple high quality detailing.
- Roofs are hip or gable and should feature weathervanes, spires and cupolas of painted wood, copper or iron. These should be large-sized, with a strong presence and special attention to historic and creative detailing.
- The buildings should feature large windows and doors, generous front porches, gazebos and an inviting attitude with a sense of hospitality.

* If a design concept is presented and does not specifically fall into the approved styles, it could be reviewed and considered on its own merits.

Overview

These guidelines are not intended to skillfully educate the reader in academics of historic architecture or to prescribe dogmatic historical accuracy of outdated construction practices, but rather establish a platform for expressing the unique character and identity of the individual homeowner that upholds the cornerstone pricipals of Roderick Place.

Roderick Place is envisioned to be a neighborhood with a mix of traditional and modern architectural styles that work in concert to create harmonious streetscapes.

(As the development and character of Roderick Place is progressed through comments, feedback, and additional brainstorming, the development team of Roderick Place will develop a supplemental book. This book will include additional information and pictures that further define the theme and character of this project).

Architectural Styles

The design guidelines for residential architecture at Roderick Place are intended to assist home owners, architects and builders create truly livable homes through timeless design of authentic architecture. Architecture for roderick place is categorized into falling into one of four categories

Permitted Styles

- Refined Rustic
- Historic Americana
- Contemporary Farm
- European Revival

REFINED RUSTIC

HISTORIC AMERICANA

CONTEMPORARY FARM

EUROPEAN REVIVAL

General Building Requirements

- All buildings will use a high level of detail and articulation on all sides of the building to bring a complete architectural idea and a well-crafted feeling to each building.
- Avoid large monolithic massing.
- Use natural building materials and / or historically accurate materials where possible.
- Where two or more materials are combined on a façade, the visually heavier of the two materials shall be located below the lighter. Material composition will be in keeping with historical architectural precedents.
- Primary façade materials shall not change at outside corners. Material changes should happen at offsets in the wall. It is acceptable to change materials where used as trim or accents around windows, doors and cornices.
- Exterior colors shall be compatible and consistent with historical precedents. If bright colors are used, they shall be used in moderation and with respect to neighboring properties.
- The exterior building material of chimneys shall be masonry (stone or brick).
- ~~Windows shall be inset into walls to create shadow lines and a sense of quality.~~ wood or aluminum clad windows will be used on front facades to create a sense of quality
- Secondary structures and garages shall be constructed of the same materials as the primary building or house.
- Rooftop and ground-mounted utility units shall be architecturally screened from public views. A person standing on the property line of the site should not be able to see the equipment. Screening shall be constructed of materials similar to those used on the building.
- ~~Where required, all access to commercial building rooftops shall be by internal roof ladders not visible from the public way.~~
- All trash and service areas, meters, piping, transformers and other ground-installed equipment shall be concealed with architectural enclosures. Architectural screening shall be constructed of materials similar to those used on the building.

ARCHITECTURAL MATERIALS

General Descriptions

- Use natural building materials and / or historic materials where possible.
- Where two or more materials are combined on a façade, the visually heavier of the two materials shall be located below the lighter. Material composition will be in keeping with historical architectural precedents.
- Primary façade materials shall not change at outside corners. Material changes should follow form changes. It is acceptable to change materials where used as trim or accents around windows, doors and cornices.
- Exterior colors shall be compatible and consistent in keeping with historical precedents. If bright colors are used, they shall be used in moderation and with respect to neighboring properties.
- The exterior building material of chimneys shall be made of the primary façade material. Where the primary façade material is wood or stucco, the chimney shall either be made of stone or brick.
- Translucent or back-lit canopies and awnings are prohibited.
- Glass shall be clear and non-reflective

Permitted Building Façade Materials

- Brick (standard modular or matching a historical standard)
- Natural stone or cast stone
- Wood or composite wood
- Stucco

Soffits

- Hardiboard
- Smartboard

aluminum

Permitted Roof Materials

- 25-year composition shingle (or better)
- Standing seam metal
- Wood shingles
- Concrete roof tiles
- Slate
- Flat roofs (where surrounded by a decorative parapet and cornice, with or without a balustrade, or where consistent with the architectural style of the building.)
- Accents of copper (used in dormers, gutters, cupolas, spires, and other roof features)

Foundation Base Cladding

- Cast stone
- Brick
- Natural stone

Permitted Windows and Doors

- Wood windows
- Aluminum clad wood windows
- Steel or wood entry doors
- Clear or subtly tinted, insulated, high performance, lowe-E glazing
- High quality aluminum storefront for commercial use only
- Windows should have appropriate mullions, with true divided lights, or simulated divided lights which place mullion pieces on the inside and outside of the glass.
- Garage doors, especially those facing public roads or courtyards, shall be of high quality painted or stained wood or painted metal, well detailed, and in character with the style of the building. They should be a decorative feature of the elevation, accentuating the style of the building.

Shutters

- Painted or stained wood
- Shutters are to be installed with actual operating hardware or shall have the appearance of operable shutters.
- Shutters should be proportioned to be functional with relation to the size of the window it serves.

Architectural Trim

- Painted or stained wood
- Hardiboard
- Cast stone
- Azek or similar

Columns

- Painted or stained wood
- Brick
- Natural stone
- Cast stone
- Azek or similar

Trellises and Garden Structures

- Painted or stained, or naturally weathering wood
- Steel with decorative finish
- Wrought iron
- Cast stone
- Azek or similar

Awnings

- Commercial quality canvas awning
- Open sides
- Sturdy metal frames

bracketed wood awnings with shingle or standing steam roofs

Signage

A sign is any object, device, or structure, situated outdoors, which is used to advertise, identify, display, direct, or attract attention to any object, person, institution, organization, business, product, service, event or location by any means, including words, letters, figures, designs, symbols, fixtures, colors, illumination or projected images. Signs do not include flags or emblems of any nation, organization of nations, state, city or religious organization.

Categories of Signage

Directional Signage
- Traffic signs
- Street signs
- Parking regulations

Development Signage (at entrances)
- Iron letters mounted to the stone wall
- Soft illumination by discreet lighting placed in the landscape

Neighborhood Identification Signage at each gateway entrance
- Iron letters mounted to masonry walls or pillars
- Soft illumination by discreet lighting placed in the landscaping

Commercial Signage
- Individual letters on the buildings
    - Individual letter signs will be of white, black, gold, bronze or silver. High quality wood or metal letters individually pin-mounted a minimum of one inch from face of wall or background. No plastic letters.
    - Letters shall be prismatic face letterforms with full facets, round face forms, flat faces or layered letterforms with face and liner.
    - Wall signs shall be mounted through the wall material to the structure behind.
- Blade signs
- Awning signs
- Letters painted on storefront glass
- If illuminated, signs should use one of two lighting methods: decorative light source or concealed architectural light source.
- The use of distinctive type styles is encouraged for all commercial signs.

Historical Markers
- Discreet signage noting historical sites will be used as part of the park design.
- Historic markers will denote the preserved pasture, historic cemetery, Roderick memorial and other significant cultural features.

Prohibited Signs
- Signs located in Site Triangles at intersections.
- Signs obstructing view – Signs may not obstruct the view of pedestrians, bicyclists and / or motorists using any street or approaching any street intersection.
- Moving Signs – Signs, other than governmental signs, which contain oscillating, fluctuating, flashing or blinking lights, rotating disks, words or other devices.
- Flashing Signs – Signs with flashing or reflective disks, flashing lights or lights of changing degree of intensities or color or signs with electronically scrolled messages.
- Internally illuminated or halo illuminated signage.
- Billboards and off-premise non-directional signage.
- Post signs for interstate visibility
- Neon signage or decorations
- Box signs, exposed raceways, cabinet signs or signs on the roof of a building

Bridges

Spanning a small pond, a natural stone bridge sits lightly in the quiet country landscape. Large scale lanterns add ambiance and highlight the craftsmanship of the bridge.

Another bridge, the Covered Bridge serves as a landmark for the Village and helps to make Roderick Place a unique destination. See the Barn, Covered Bridge and Village section for more information about this area.

Fences and Walls

Low stone wall (at central loop road around Knoll and at Residential Building Arrival Courts) – 30-36" high

Wall at Barn & Crescent – stone screen wall and retaining wall – 48" on alley side, 48-72" total height on Barn side

Rose hedgerow (at inside edge of Country Drive) – 6' high and growing against a fence. The hedgerow provides a picturesque quality at a natural scale along the Country Drive and screens views of alleys and the sides of homes.

Equestrian fence (at outside edge of Country Drive) – 48" high, dark brown stained wood.

Courtyard Wall (at the rear yard of Mews Residences) – 8' high masonry wall or wood fence at perimeter, 6' high privacy fence between yards

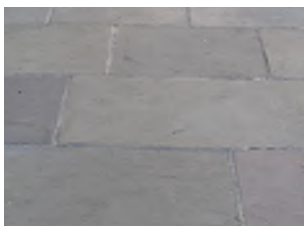
Privacy Walls (at Garden Courtyard Residences, front and courtyard gardens) – varying height, built of the primary building materials of the houses (brick, stone, wood or stucco) – 6-8' high

Walkway and steps (at Live / Work Units) – brick walls, steps, and walkway connecting from Roderick House, through the Live / Work Units, to the Garden Courtyards Residences down the hill.

Typical Residential Fence at alleys – There will be a standard fence between yards and at alleys, specific to each neighborhood. They will vary between 4' and 6' in height.

Sidewalk Requirements

1. All sidewalks to be provided per street sections.
2. Interconnecting (primary) sidewalks are encouraged and shall be a minimum of five feet wide, constructed with concrete, stone, asphalt, or brick materials. Gravel or garden (secondary) walks may be provided within residential clusters, community garden areas or parks and shall be a minimum of four feet wide.

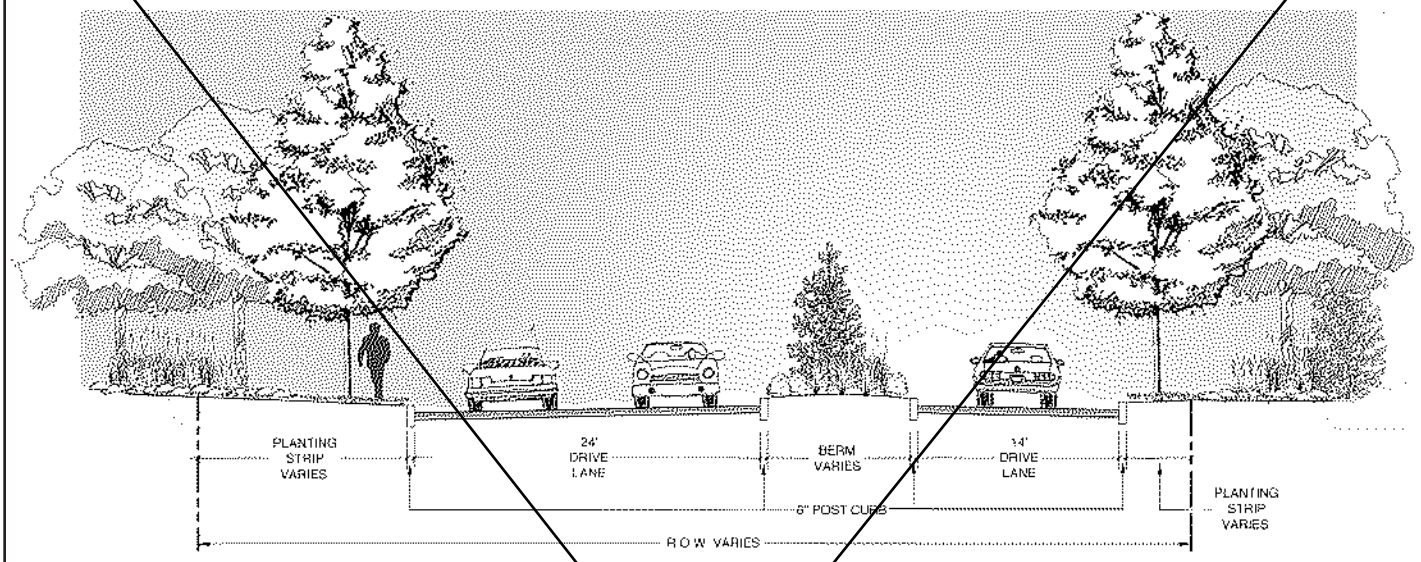


S T R E E T S & W A L K S

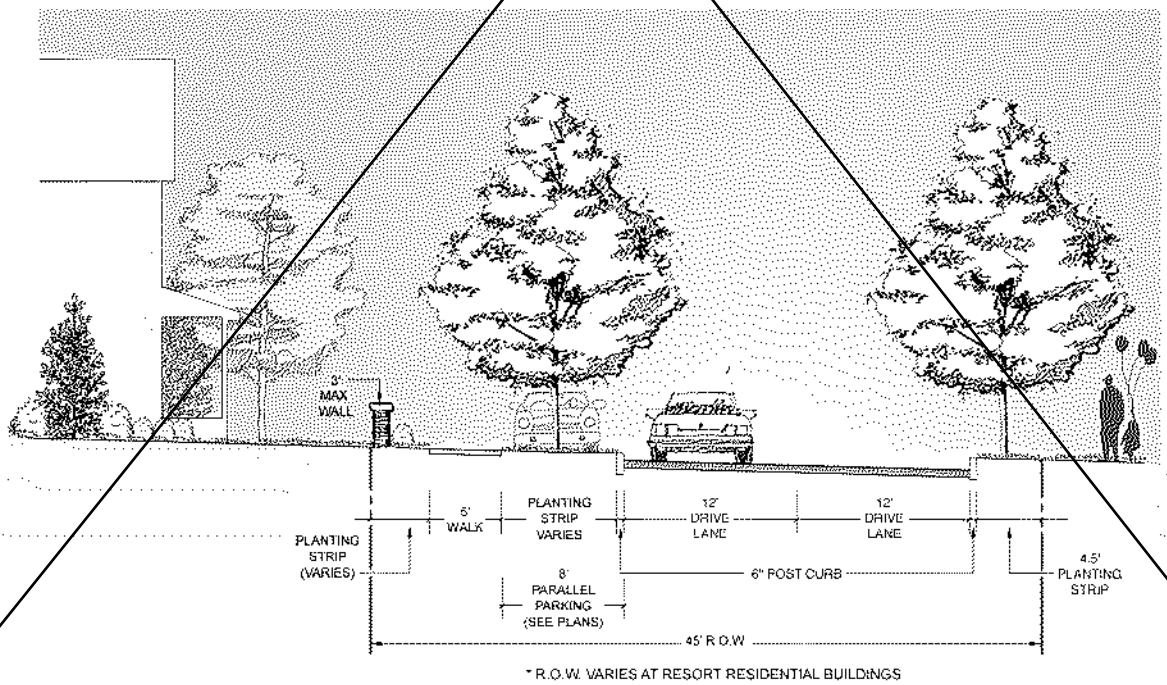
STREET NETWORK

STREET NETWORK

- Entry R.O.W.
- 60' R.O.W.
- 50' R.O.W.
- 20' Alley R.O.W.

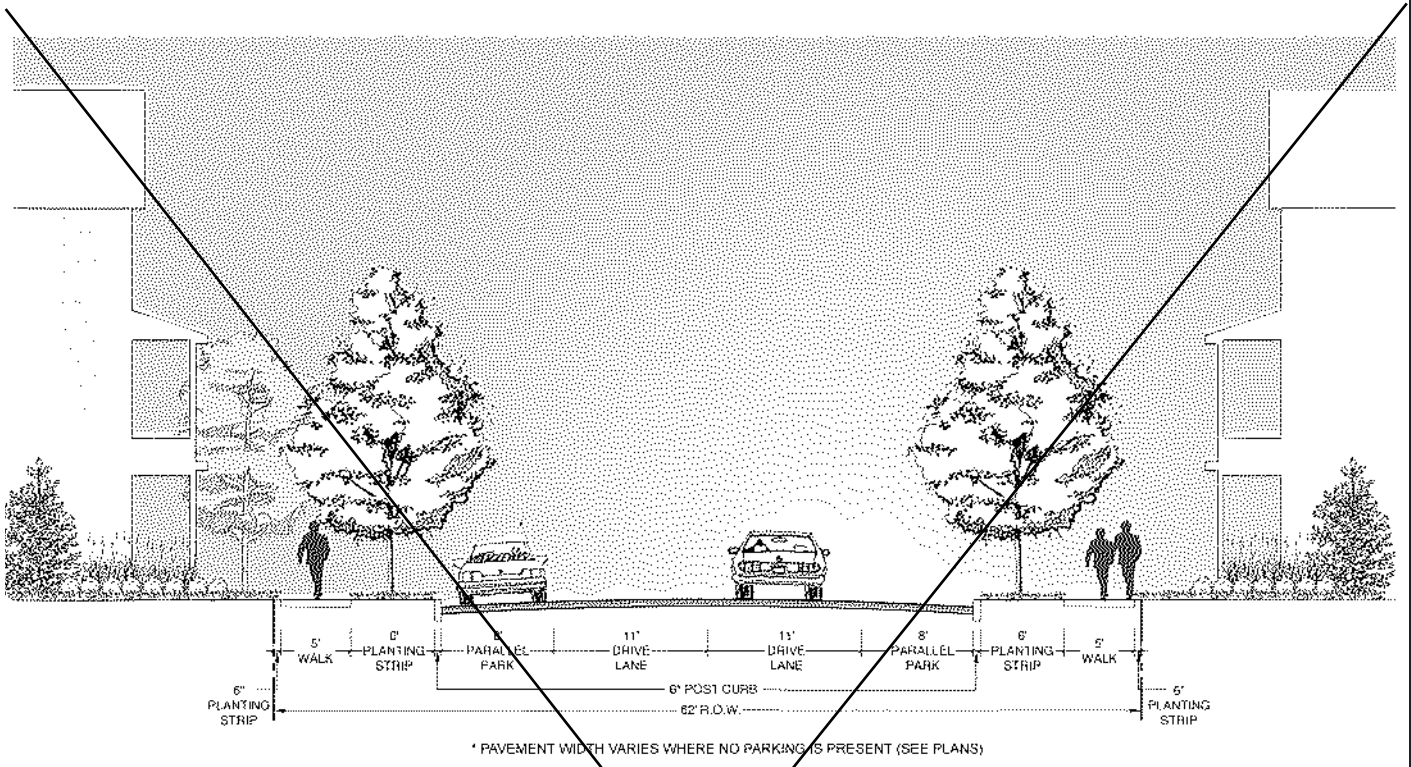


ENTRANCE - Private

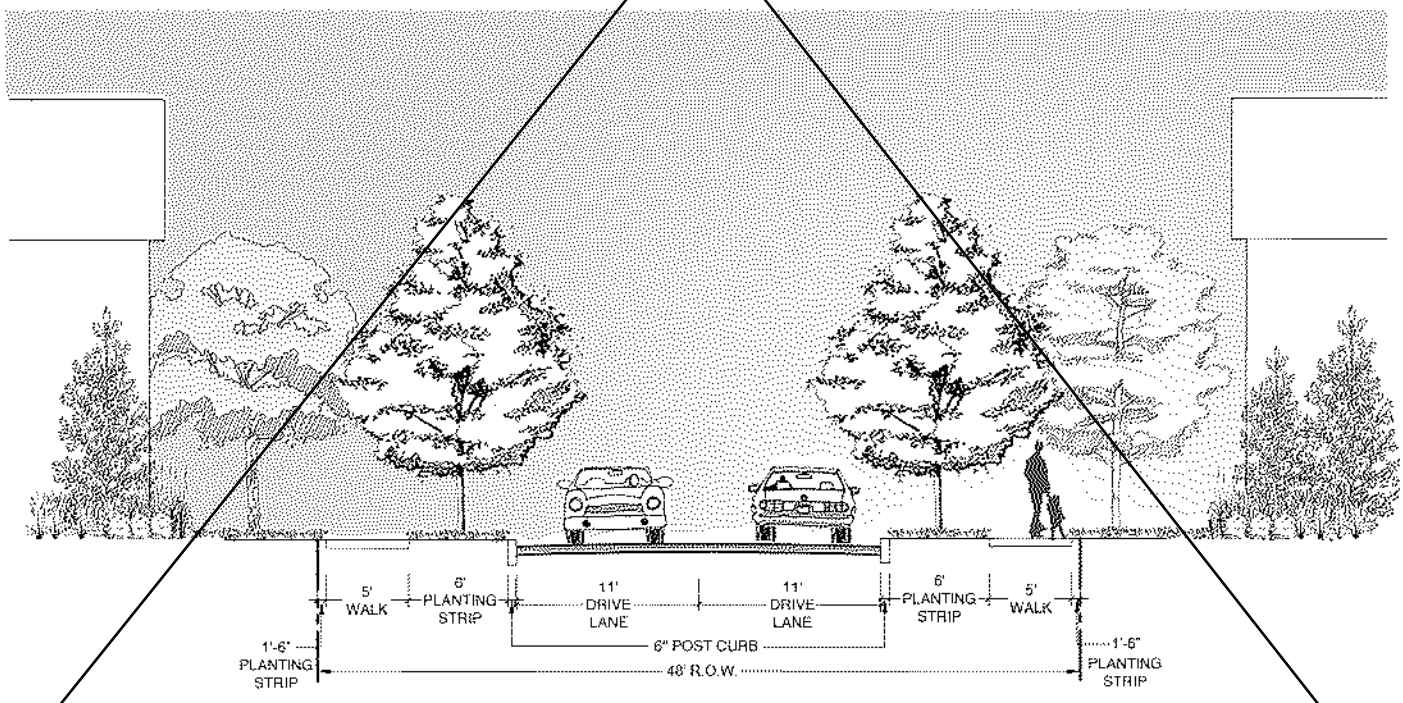


* R.O.W. VARIES AT RESORT RESIDENTIAL BUILDINGS

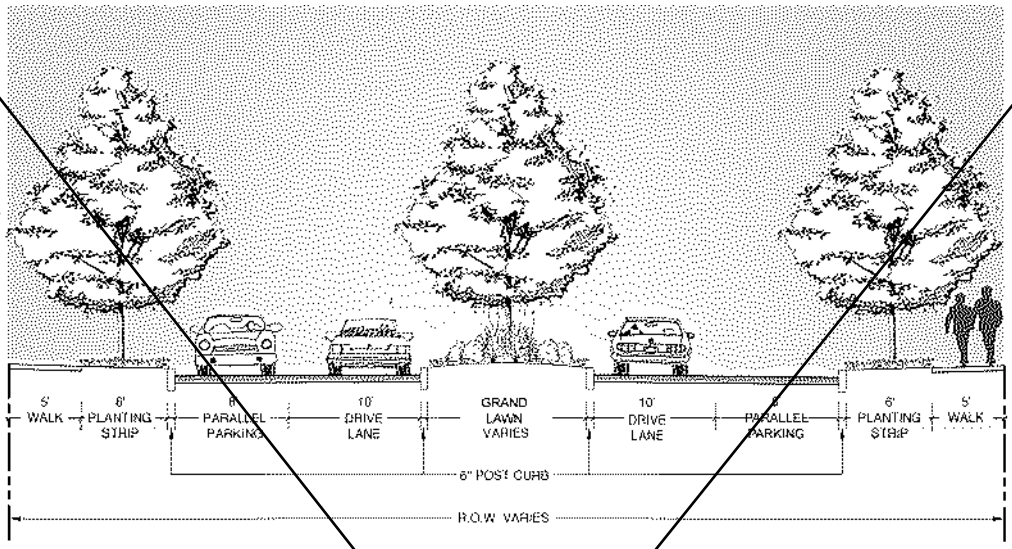
THE KNOLL LOOP - Private



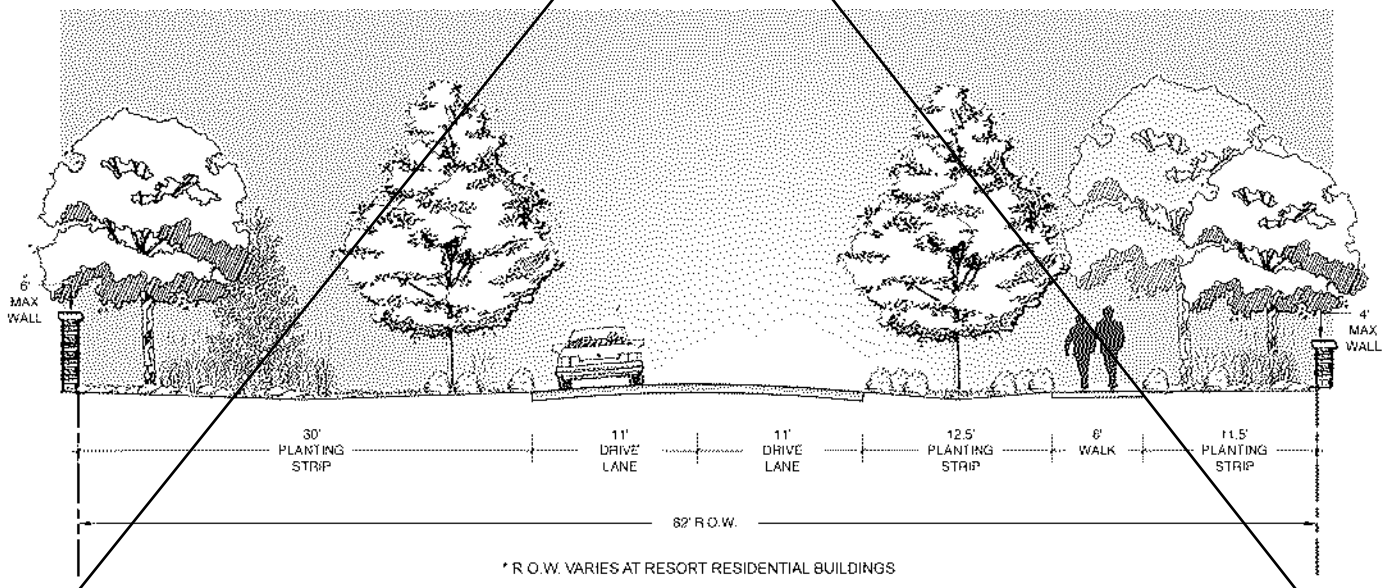
62’ ROW - Private



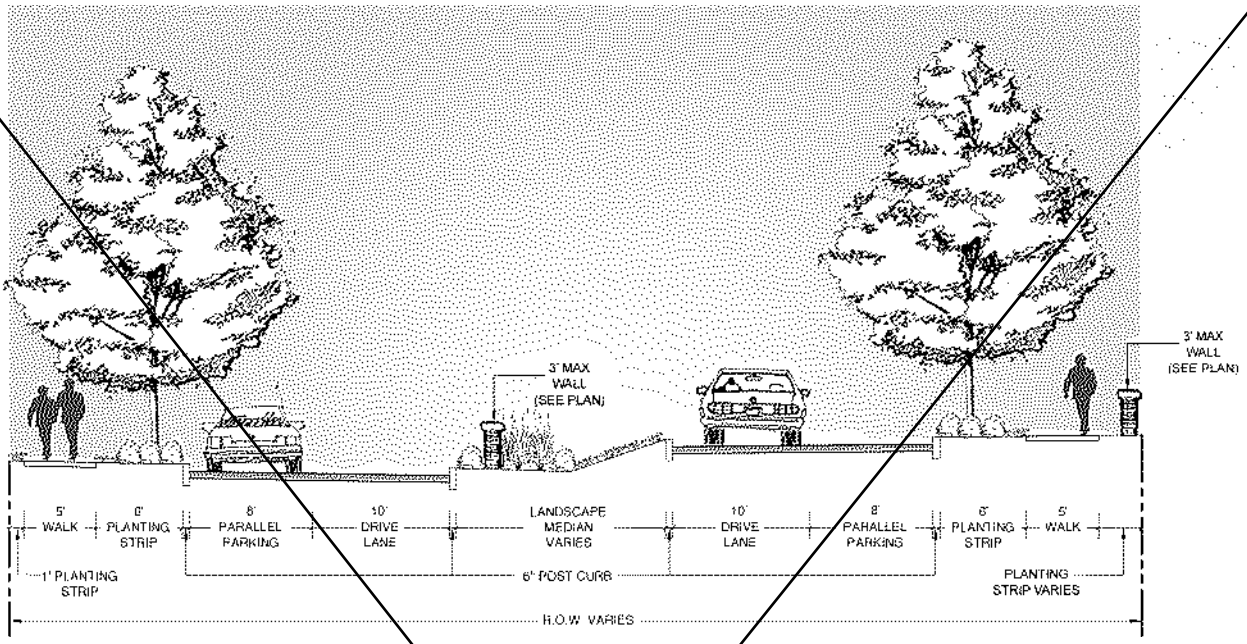
48’ ROW - Private



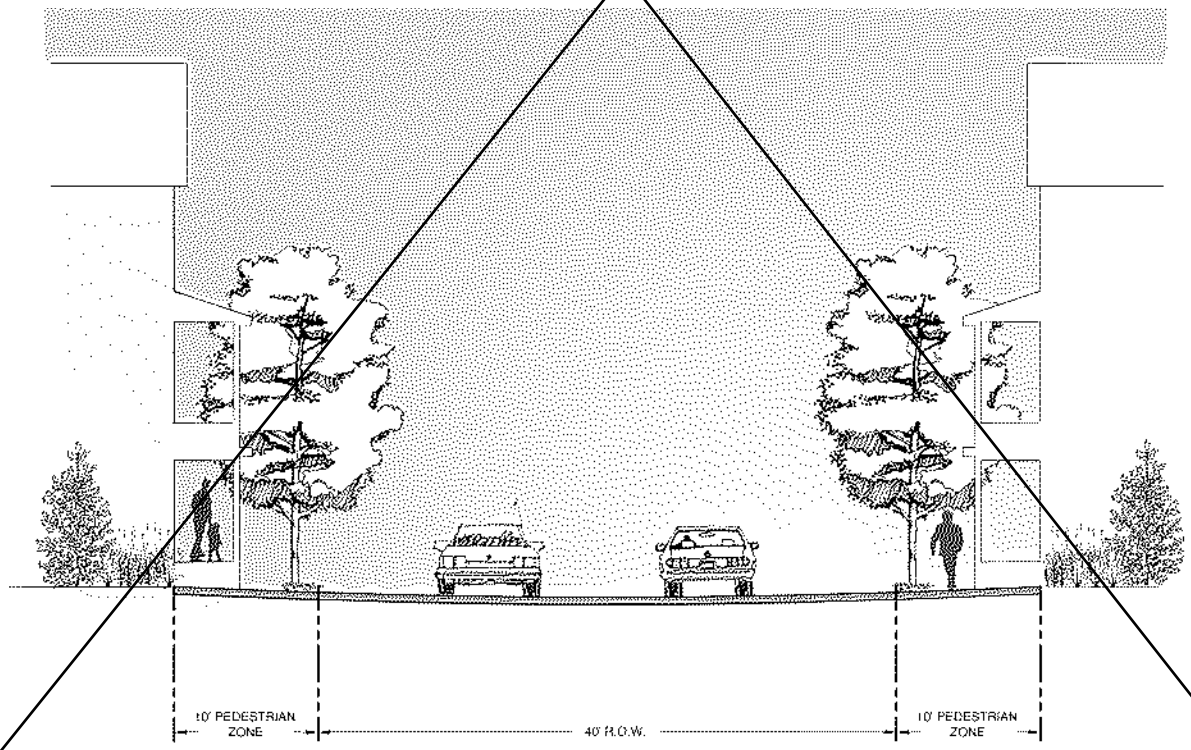
THE GRAND LAWN - Private



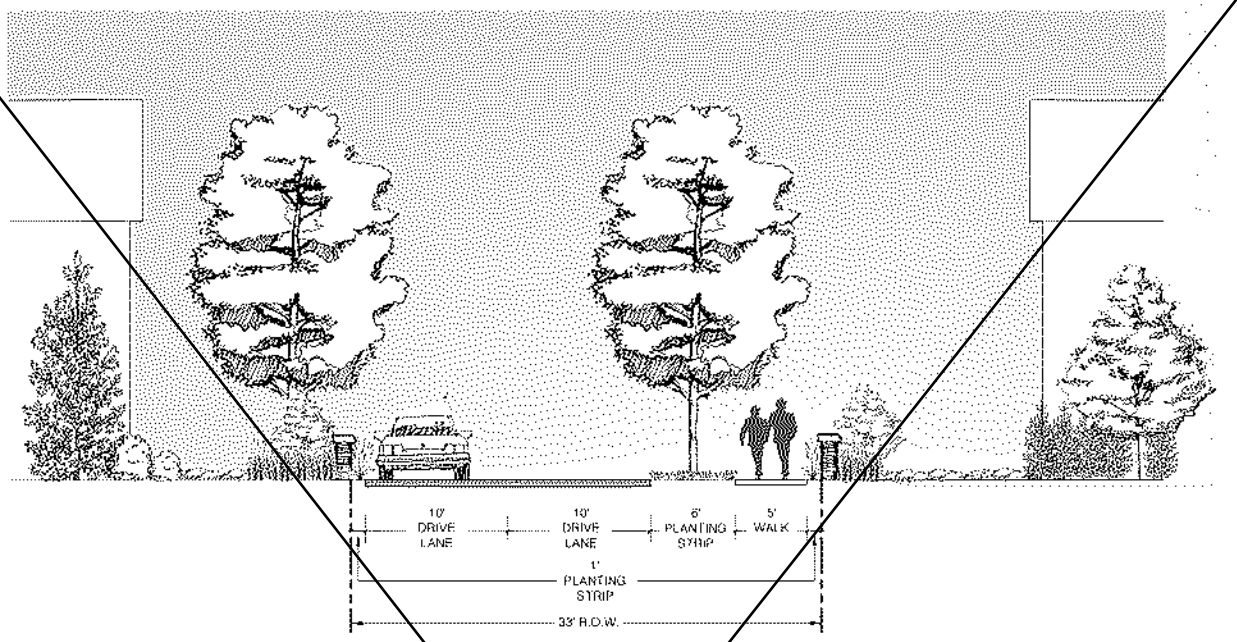
82' ROW COUNTRY DRIVE - Private



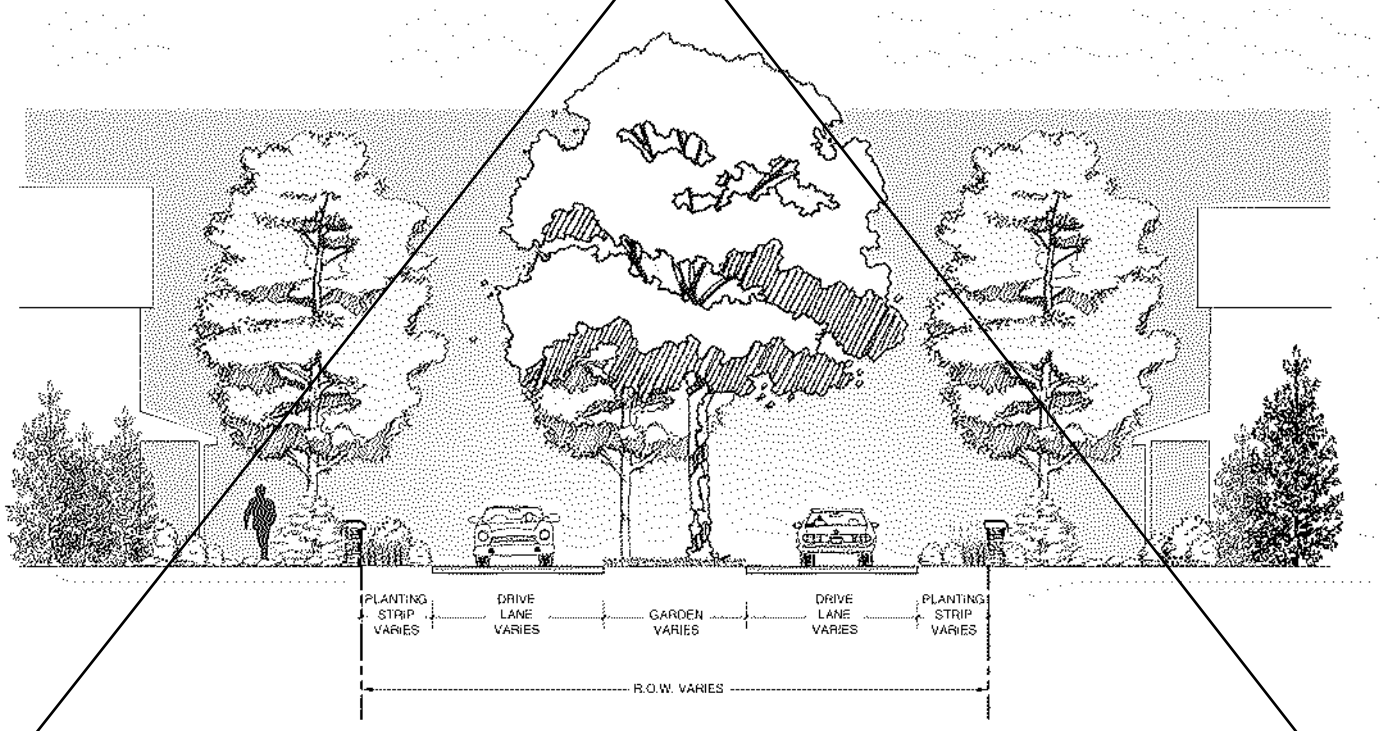
COTTAGES ON THE GREEN - Private



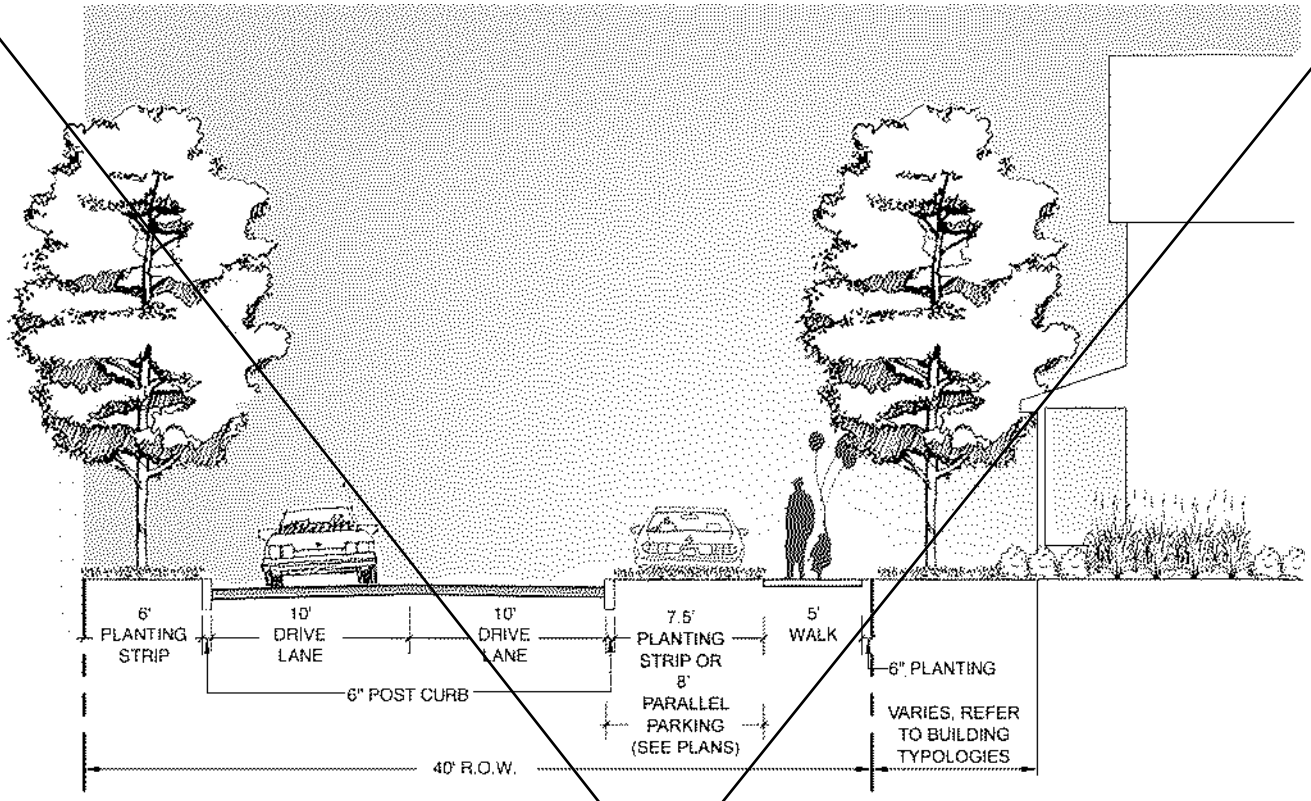
MEWS - Private



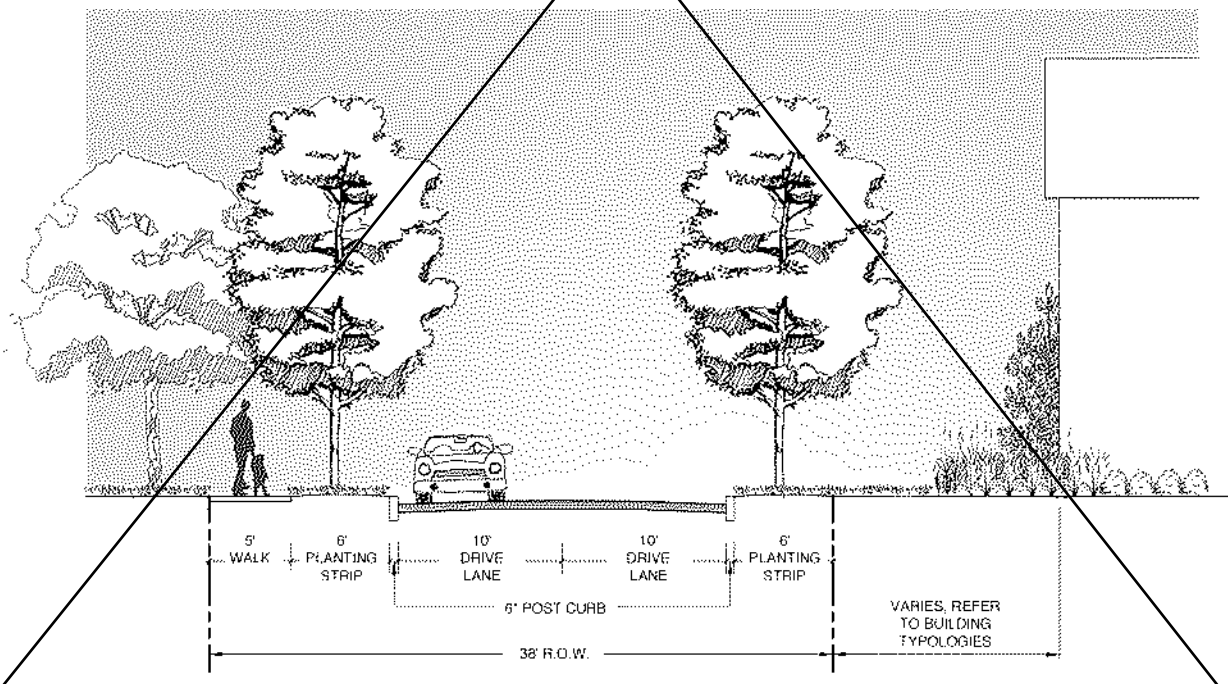
33’ GARDEN COURTYARD ENTRY - Private



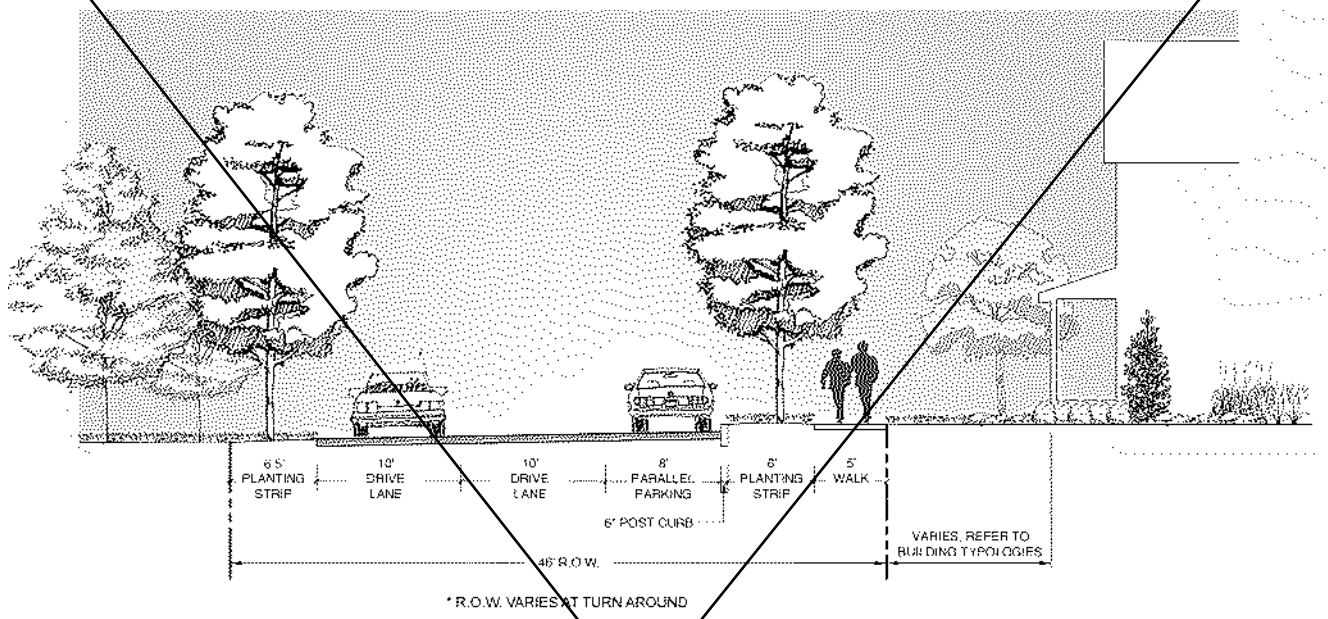
GARDEN COURTYARD - Private



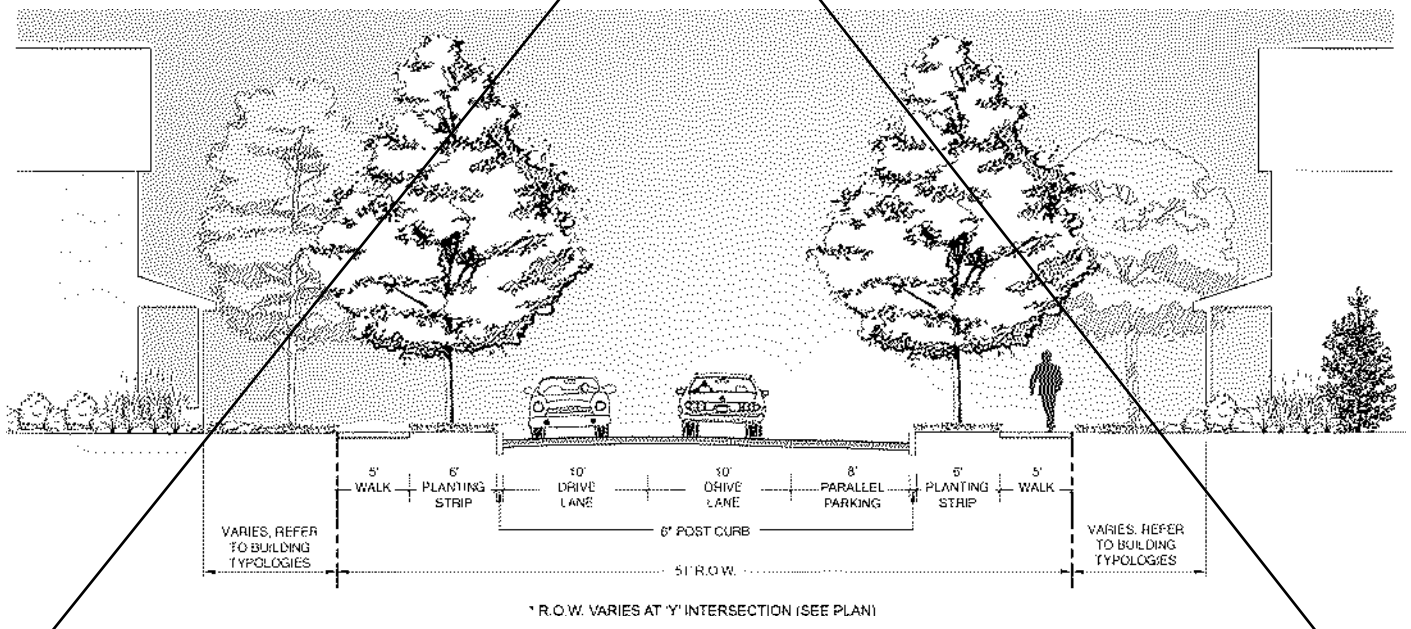
40' ROW - Private



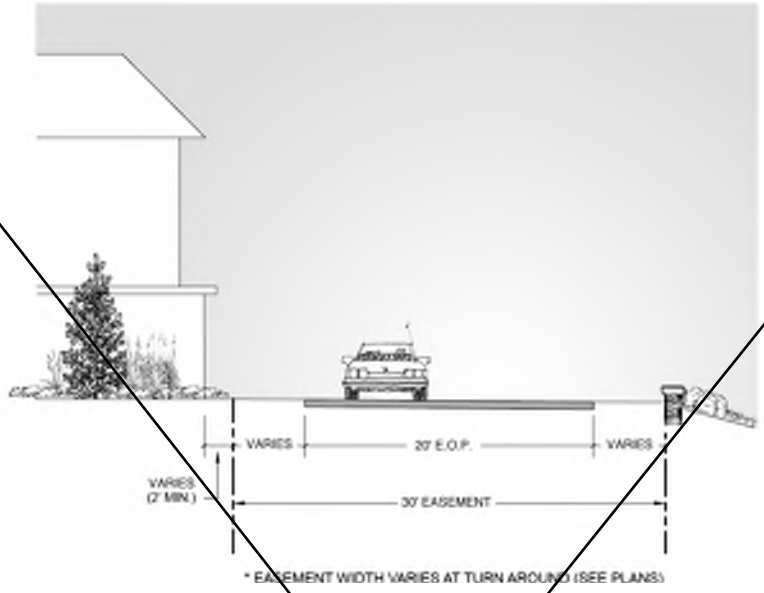
38' ROW - Private



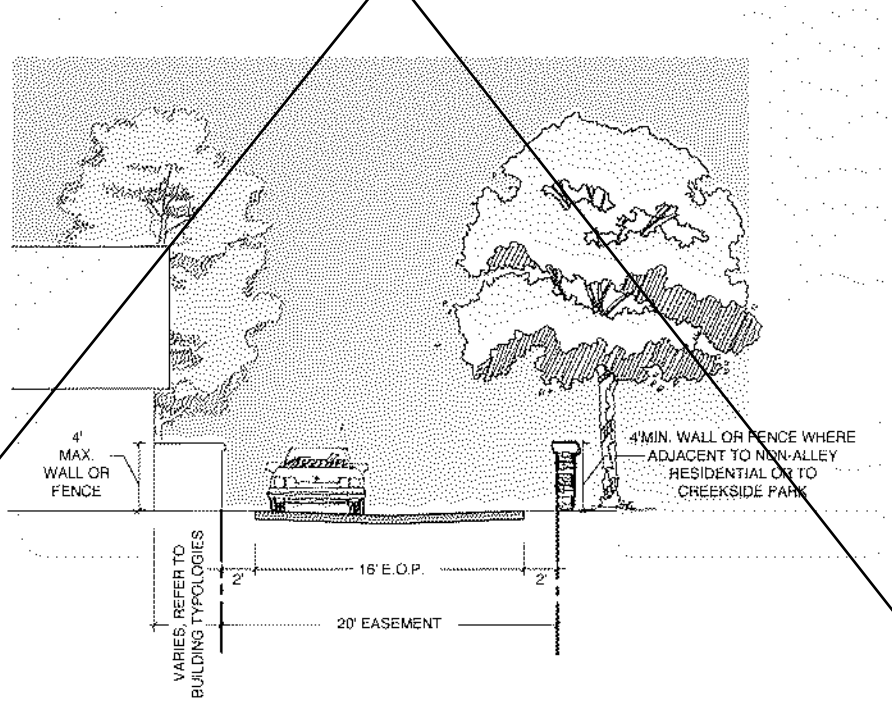
46’ ROW - Private



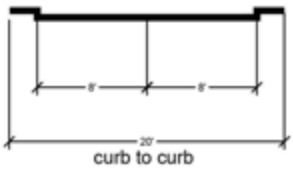
51’ ROW - Private



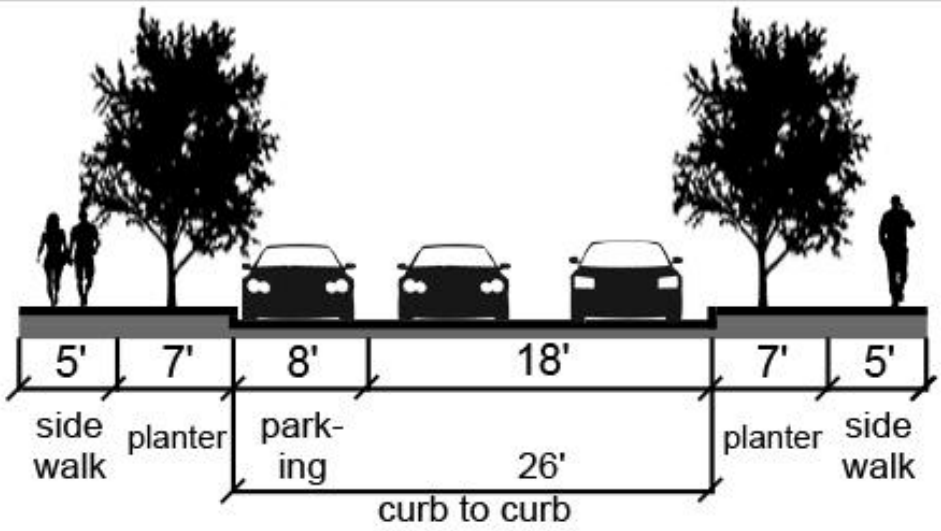
30' ALLEY (Access and Utility Easement - Private)



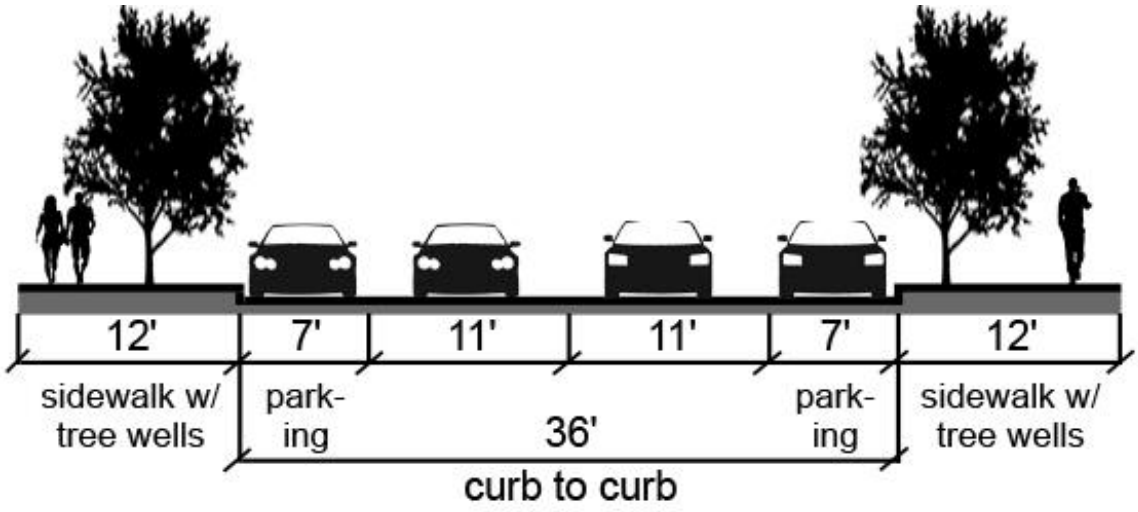
20' ALLEY (Access and Utility Easement - Private)



20' ALLEY ACCESS



50' R.O.W. (ST 50-26)



60' R.O.W. (ST 60-36)

RODERICK PLACE

CONCEPT PLAN VISION BOOK

Introduction

Development Guidelines

Architecture / Lot Standards

Project Description:

Roderick Place is 79.9 acres located in Thompson's Station Tennessee, 7 miles South of Franklin, TN and just North of Spring Hill. The proposed mixed-use community will provide a variety of Live, Shop, Work and Retirement options that will be serve the needs of many people. This amended plan carefully follows the GENERAL PLAN FOR THOMPSON'S STATION (see www.Thompsons-Station.com for the General Plan) Justification Statement: State why the application(s) should be approved, based on the required findings (if any). Attach additional pages if necessary.

This Specific Plan application which is to amend the Specific Plan Concept Plan Approved 2007. The intent of the Specific Plan zoning is to allow unique development to occur within the Town of Thompson's Station which does not fit within the Town's typical zoning classifications. The proposed development of Roderick Place acknowledges the historical past of the property while incorporating planning concepts in practical and interesting ways. A rural-chic coupled with unexpected informality create new and exciting experiences throughout the site. Each of the areas has a unique character and sense of place. While the styles are envisioned to be relaxed and informal, everything is designed to be luxurious and inviting.

Roderick Place is located on US-31 about mid-way between Critz Lane to the North and Thompson's Station Road to the South. With our approved entrance soon to be designed and permitted this will make an ideal point of beginning for the proposed East-West connection to Clayton Arnold Road. This connection opens up appx 500 acres for future development. This also enhances the feasibility of our proposed mixed use areas.

Statement as to how the concept plan is consistent with the General Plan:

Goal 1 – Preserve the rural characteristics of the community while accommodating for future growth in an orderly and sustainable manner. Roderick Place meets this goal by concentrating most of the proposed open space along the US-31 corridor.

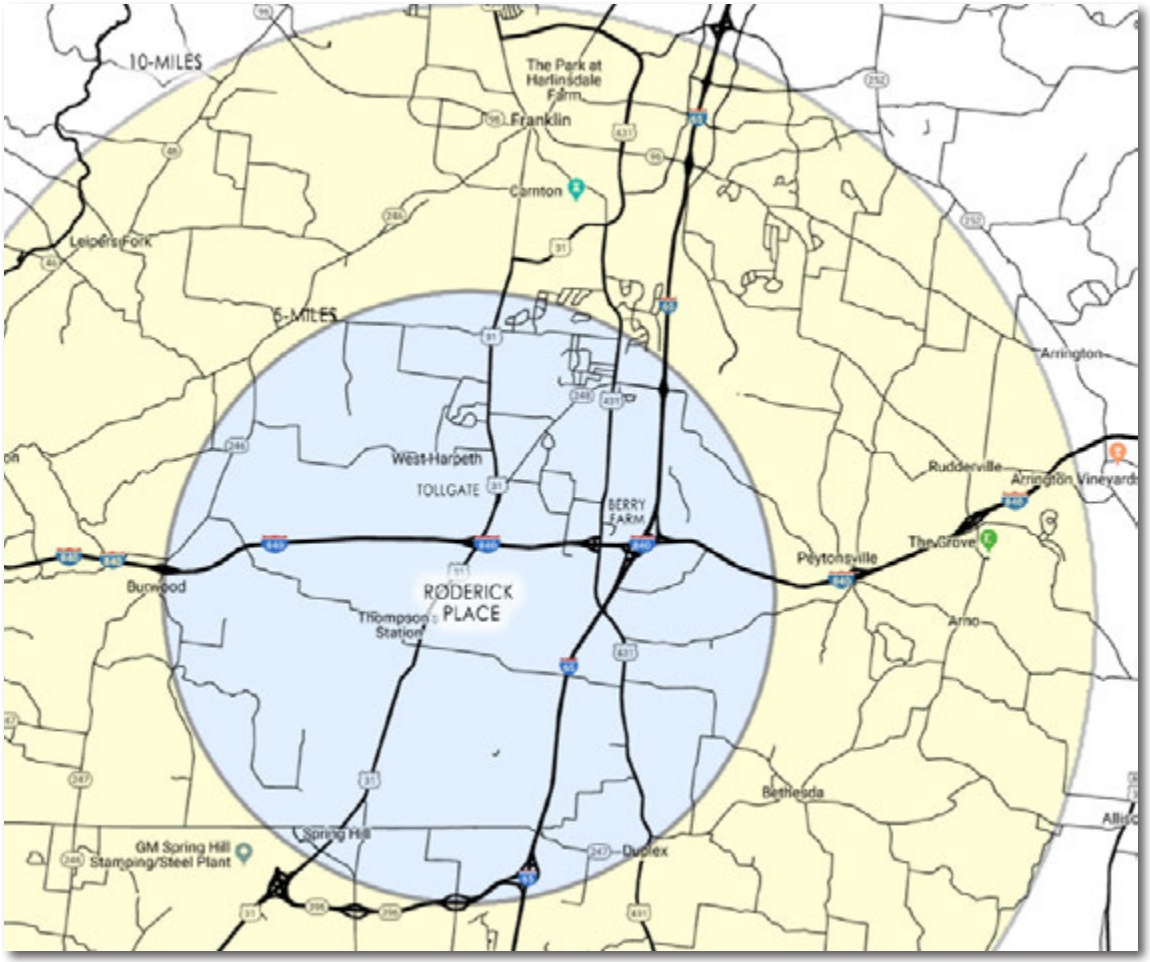
Goal 2 – Achieve a balanced mix of uses within the town. Roderick Place meets this goal. Please see our proposed plan.

Goal 3 – Achieve a balanced mix of non-residential uses within the town. Roderick Place meets this goal. Please see our proposed plan.

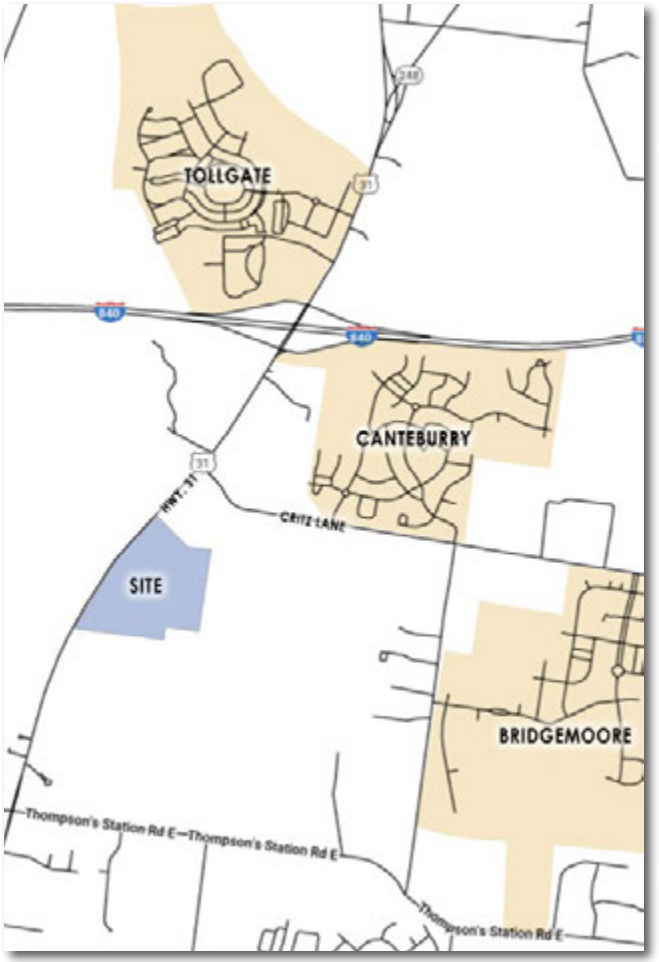
Goal 4 – Encourage design flexibility for future developments, in consideration of site grading, and increased impermeable surfaces. Roderick Place meets this goal. Please see our proposed plan.

Goal 5 – Encourage cluster development for preservation of natural and cultural resources where feasible and consistent with surrounding land uses. Roderick Place meets this goal. Please see our proposed plan.

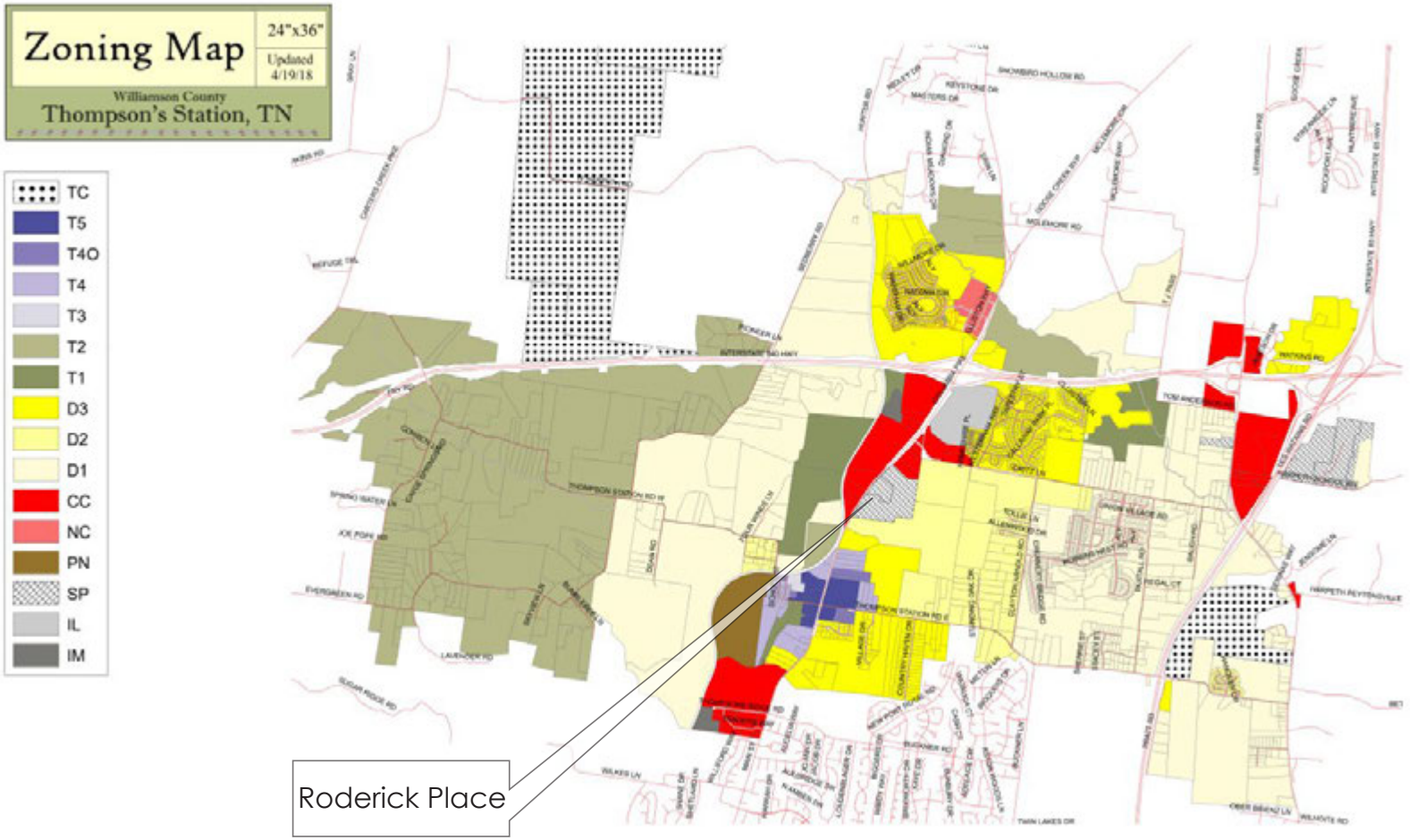
Goal 6 – Evaluate the jobs/housing balance and update plans as necessary to ensure that job opportunities are available through the possible development of land as economically feasible. Roderick Place meets this goal. Please see our proposed plan.z

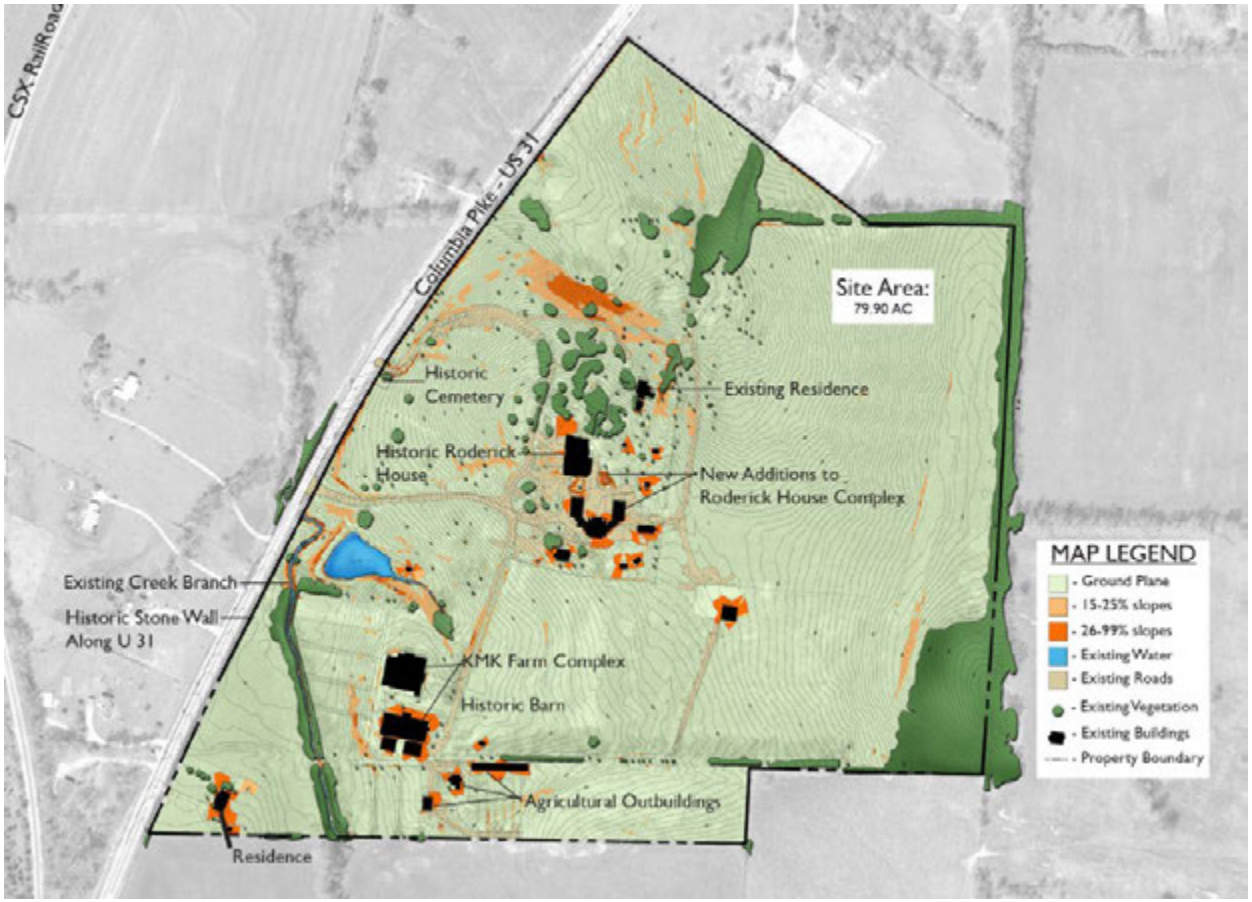


Vicinity Map



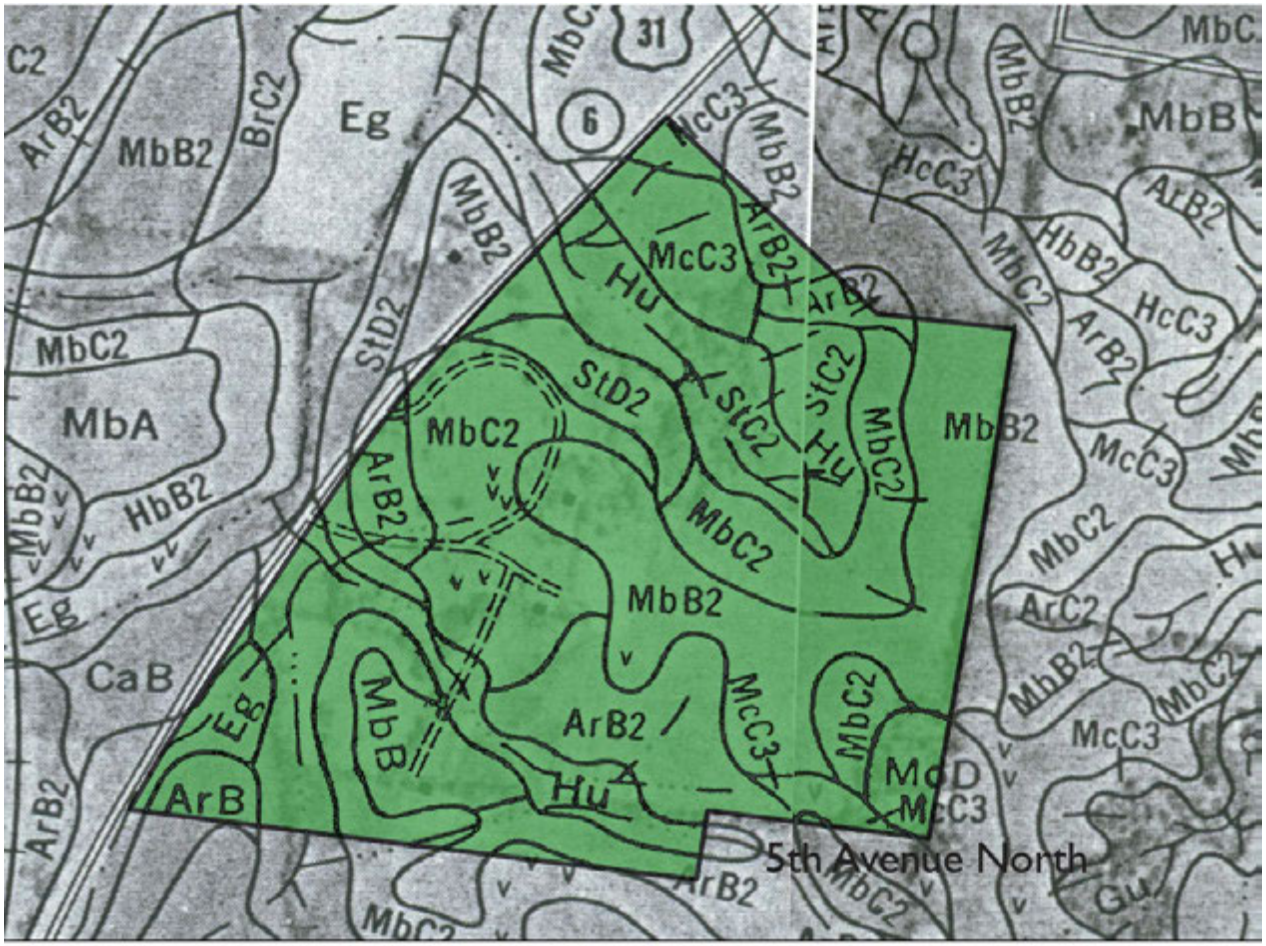
Location Map


Zoning Map
24"x36"
Updated 4/19/18
Williamson County
Thompson's Station, TN
TC
T5
T4O
T4
T3
T2
T1
D3
D2
D1
CC
NC
PN
SP
IL
IM
Roderick Place



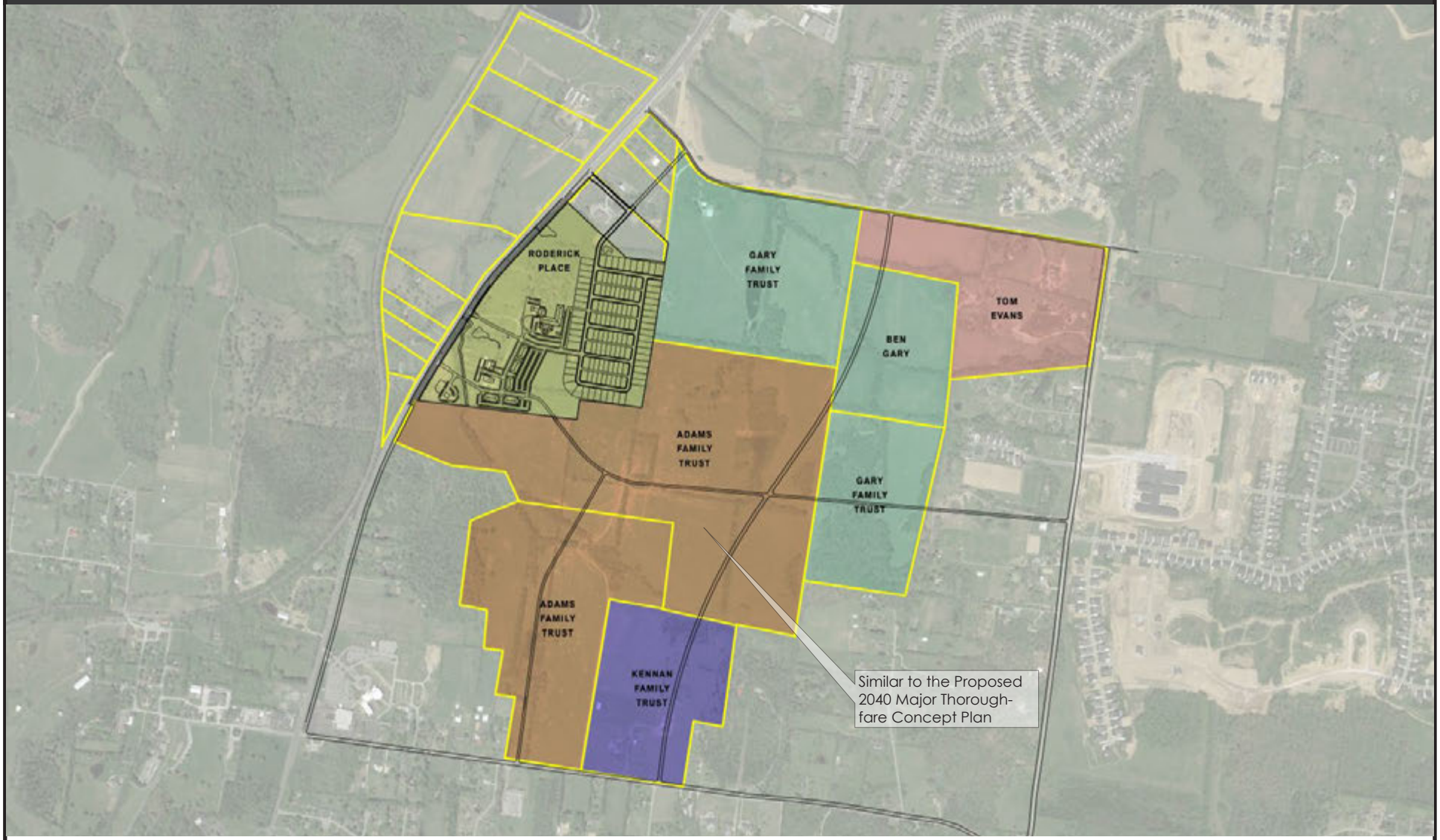

View of the existing structure overlooking the pond.
View of the existing rock wall along Columbia Pike.
View of the existing stream on site.
View of existing cemetery along Columbia Pike.
View of existing tree line.
View of the preserved Roderick House.
View of existing barn.

Existing Conditions



Existing Soils

ArB	Armour silt loam, 2-5% slopes
ArB2	Armour silt laom, 2-5% slopes, erod ed
Eg	Egam silt loam, phosphatic
Hu	Huntington silt laom, phospatic
MbB	Maury Silt loam, 2-5% slopes
MbB2	Maury Silt loam, 2-5% slopes, erod ed
MbC2	Maury Silt loam, 5-12% slopes, erod ed
MbC3	Maury Silt loam, 5-12% slopes, se verely eroded
MoD	Mimosa and Ashwood very rocky soils, 5-20% slopes
StC2	Stiversville silt loam, 5-12% slopes, eroded
StD2	Stiversville silt loam, 12-20% slopes, eroded

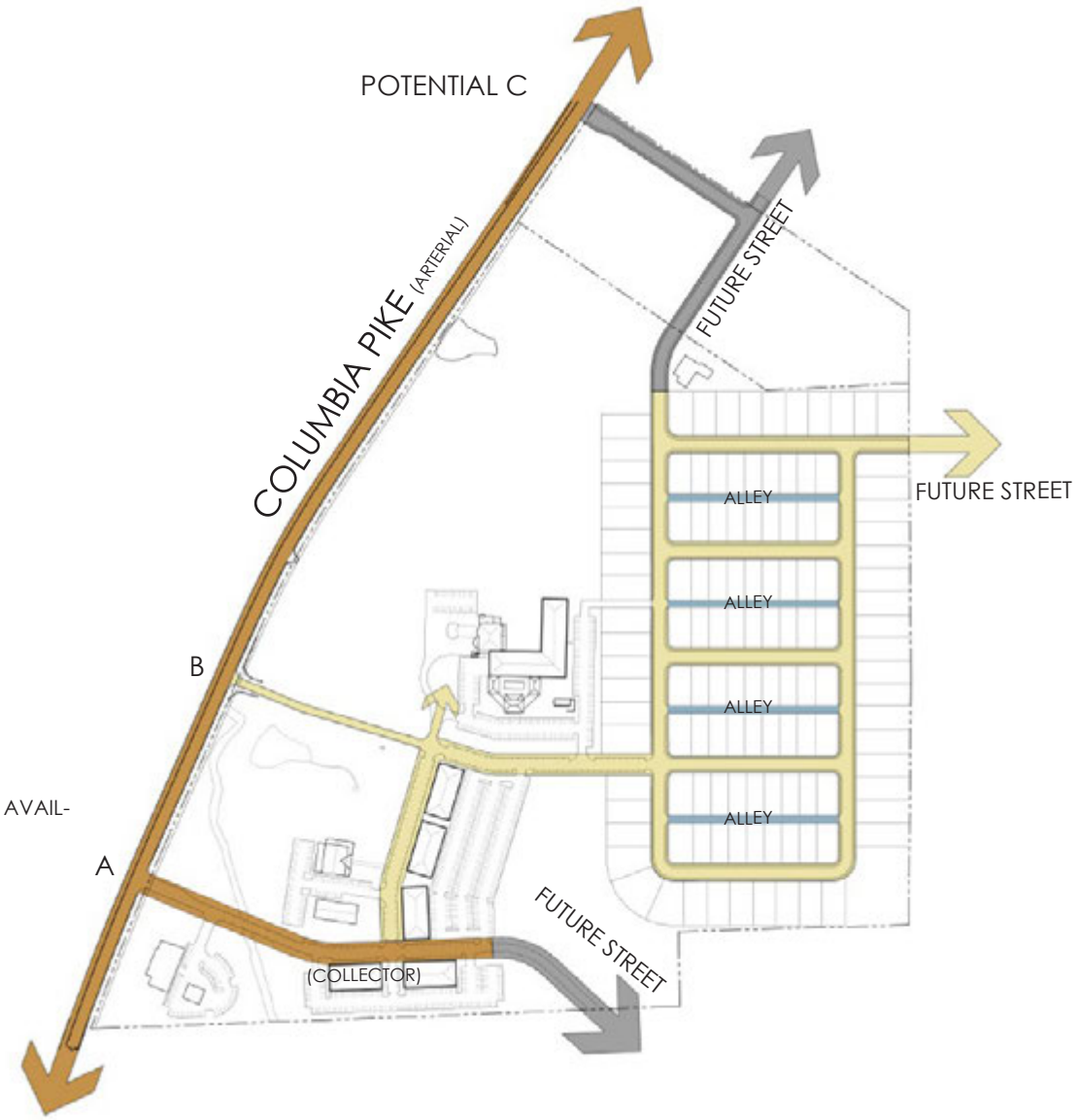


Adjacent Properties

LEGEND

- ARTERIAL, COLLECTOR
- LOCAL
- FUTURE STREETS
- ALLEY

NOTE: IF THE POTENTIAL ENTRANCE "C" IS AVAILABLE, ENTRANCE "B" WILL BE REMOVED



Street Network

Master Plan

RODERICK PLACE

THE VISION - AUGUST 2019 - REVISED NOVEMBER 2019

THOMPSON'S STATION, TN

Master Plan Tabular Data

Existing Zoning: High Intensity District
Gross Site Area: 79.90 AC

Requirements of Proposed Zoning: Specific Plan, High Intensity District (Cluster Option) - General Plan Requirements:
-Maximum Density: 3.00 DU/AC
-Maximum Height: 3 Stories
-Required Open Space: 40% Residential | 50% Commercial
-Minimum Site Area: 10 Acres
-Maximum Site Area: 100 Acres
-Area Permitted as Residential: 100%
-Area Permitted as Commercial: 100%

Density:

-Gross Permitted Density:	3.00 DU/AC
-Total Residential:	211 Units
-Estate Lots:	54 Units
-Cottage Lots:	72 Units
-Multistory dwellings/ live work:	85 Units
-Total Commercial:	129,367 S.F.
-Event Center & Historic Barn:	13,500 S.F.
-Hotel w/ Senior Residences:	92 Units
-Senior Living (IL,AL,ALZ):	100 Beds

Open Space:
-Total Land Area: 79.90 Acres
-Total Commercial Area: 9.26 Acres X 50% = 4.63 Acres
-Total Residential Area: 70.64 Acres X 40% = 28.25 Acres
-Total Required Open Space: 32.88 Acres
-Total Provided Open Space: 35.80 Acres

Open Space Plan

Regulating Plan

The Regulating Plan for Roderick Place graphically depicts the different neighborhoods and specific building types permitted within each. This is intended to ensure a project that will, at full build out, meet or exceed the goals of both the developer and the town of Thompson's Station, while creating an attractive, appealing and functionally sustainable community.

Building Types

A. The Knoll
B. The Barn and Artisan Village
C. Live/Work (Mixed-Use Village)
D. Estate Lots
E. Cottages

Notes

1. The regulatory plan is representative of the intended development. Actual plan may differ in product mix, location, density and size - not exceeding minimums or maximums established as part of this zoning document.
2. A variety of housing types will be built and may include: detached single family homes, attached single family homes, town-homes, Residential Buildings and Multistory Dwelling Units, senior living (IL,AL,ALZ), and Hotel.

The Knoll Main Entrance
Roderick Hotel & Residences

The Knoll

The centerpiece of the development is the Roderick mansion. It will be carefully expanded to include approximately 71 luxury age restricted apartments in a beautiful garden setting. Additionally the Roderick will provide terraces, porches and multiple open spaces for relaxing, dining and entertaining.

This community will be designed to promote healthy lifestyles, and create a sense of belonging where residents thrive.

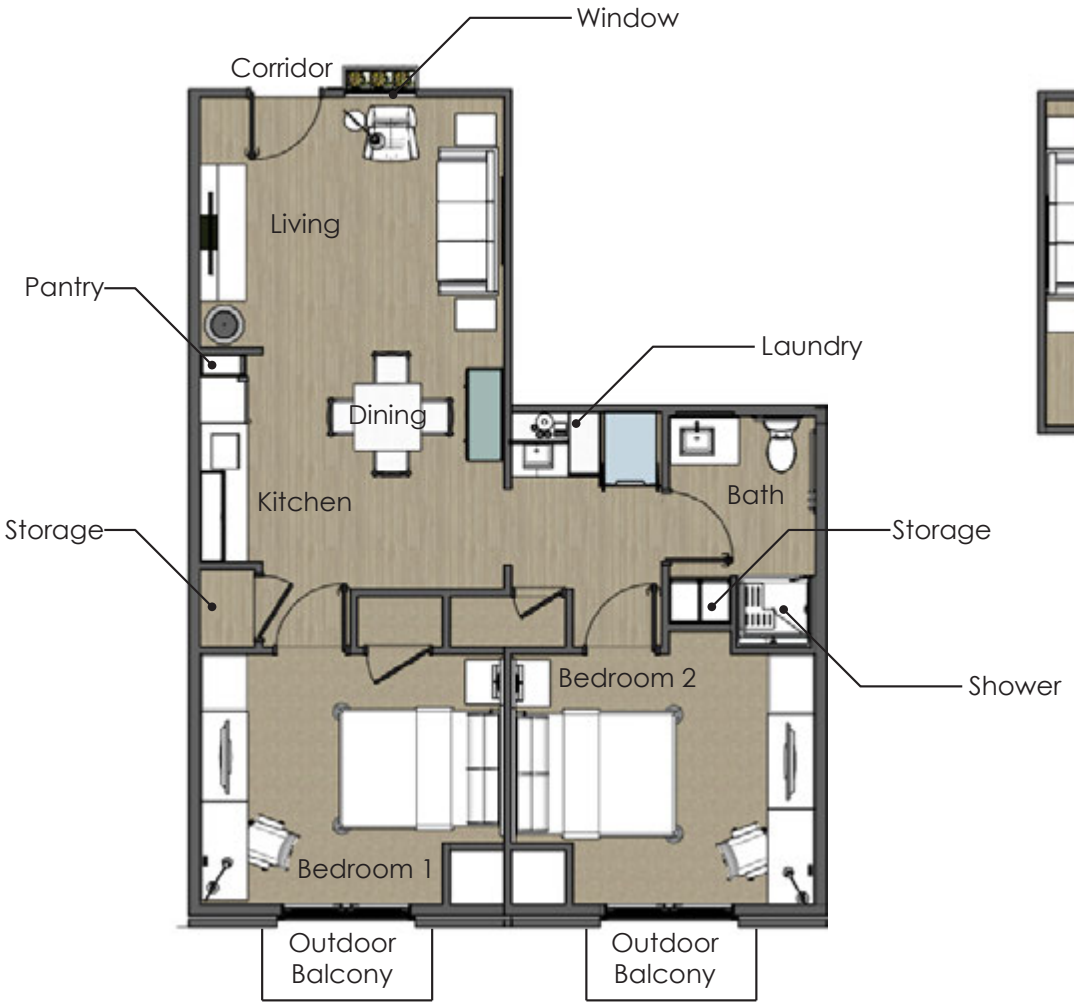
Permitted Uses

-Restaurant
-Retail Shop
-Boutique Shop
-Hotel and Residences
-Day Spa / Fitness
- Pool
-General Office
-Medical Office
-Conference Rooms
-Senior Living (IL,AL, ALZ)
-Residential Buildings and Multistory Dwelling Units

Lot Standards

-Building Coverage: 75% max.
-Primary Structure Front Setback: 0'
-Primary Structure Side Setback: 0'
-Primary Structure Rear Setback: 0'
-Distance Between Buildings: 10' min.
-Height 3 stories max.
-Parking: Permitted uses shall satisfy parking requirements of Thompson's Station Zoning Ordinance. On-street parking may count toward the required parking if directly adjacent the subject parcel

Garden View
Roderick Luxury Residences

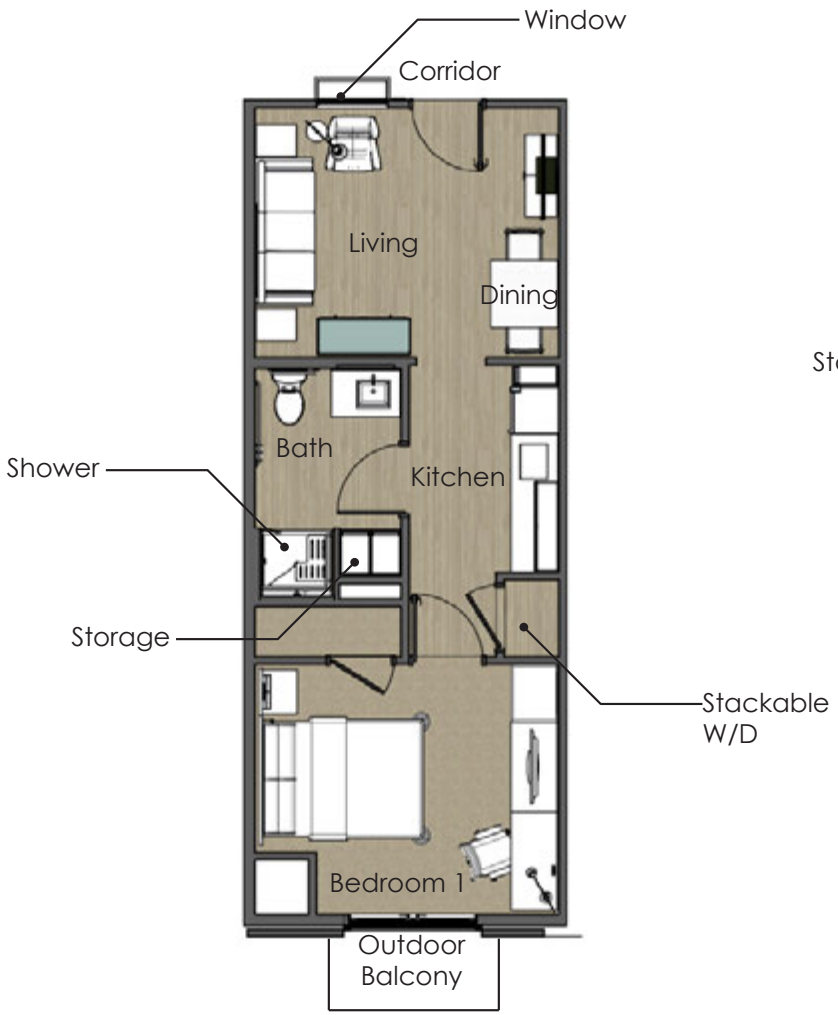


The Roderick 2 Bedroom Suite

775 SF

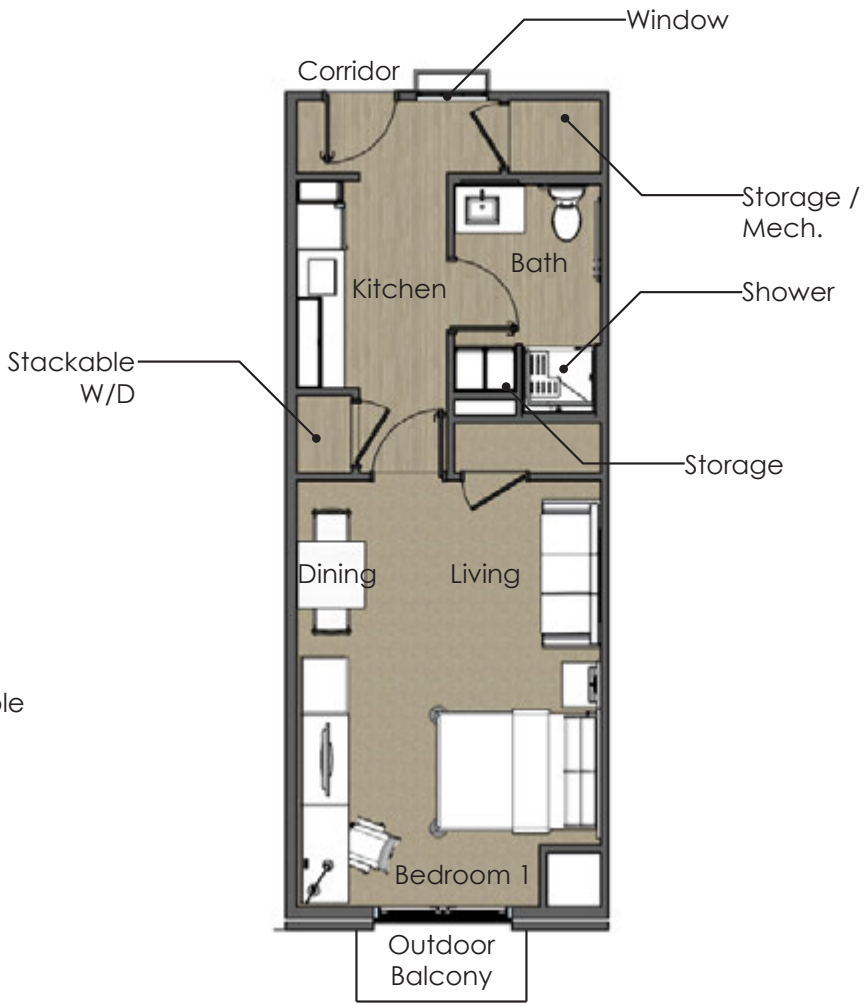
The Bedford 2 Bedroom Suite

680 SF



The 1 Bedroom

490 SF



The Spencer Studio Suite

475 SF

The Barn, Mixed-Use and Artisan Village

The Barn and Artisan Village present a unique "face" of Roderick Place and create a memorable entrance to the residential community. Two large existing barns are retained and given new life as the focal point of the Village. The Community Center will be renovated to include meeting and multi-use convention space for corporate clients, local music events, theatrical shows and church services. The Barn, the second venue has a soaring second floor loft space; providing an outstanding space for wedding events, parties and receptions, creating a unique experience for the residents of Roderick Place and Thompson's Station. The ground floor of the Barn will house the service and amenities associated with the event space and could include an artisan marketplace for locals. A grassy open space next to the Community Center provides outdoor space for family events and weddings. The Village itself provides the "necessities" of life including local retail shops, restaurants, a select group of professional offices, Country Inn, Daycare and Residential Buildings and Multistory Dwelling Units Designed to provide a destination place for work, living and cultural lifestyle of Thompson's Station, Tennessee.

Permitted Uses

-Restaurant
-Retail Shop
-Boutique Shop
-Hotel
-General Office
-Professional Office
-Deli / Butcher
-Convenience Market
-Residential Buildings and Multistory Dwelling Units
-Farmers / Artisan Market
-Medical Services
-Community Center
-Assisted Living / Memory Care
-Arts and Crafts, Ceramics, Metal and Wood Shops

Lot Standards

-Building Coverage: 75% max.
-Primary Structure Front Setback: 0'
-Primary Structure Side Setback: 0'
-Primary Structure Rear Setback: 0'
-Distance Between Buildings: 10' min.
-Height 3 stories max.
-Parking: Permitted uses shall satisfy parking requirements of Thompson's Station Zoning Ordinance. On-street parking may count toward the required parking if directly adjacent the subject parcel

RODERICK PLACE

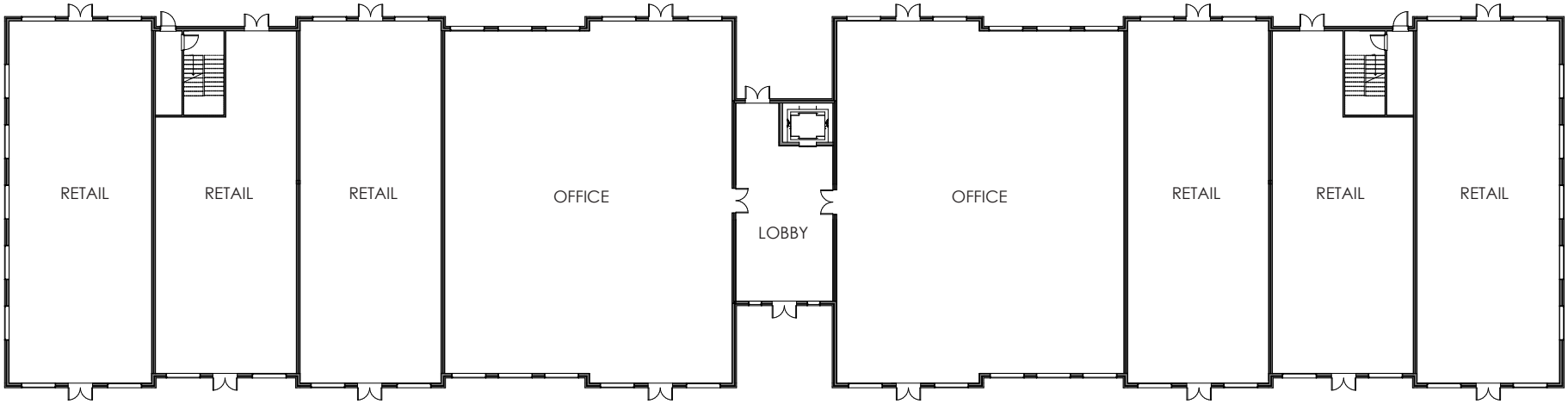
THE VISION - AUGUST 2019 - REVISED NOVEMBER 2019

THOMPSON'S STATION, TN

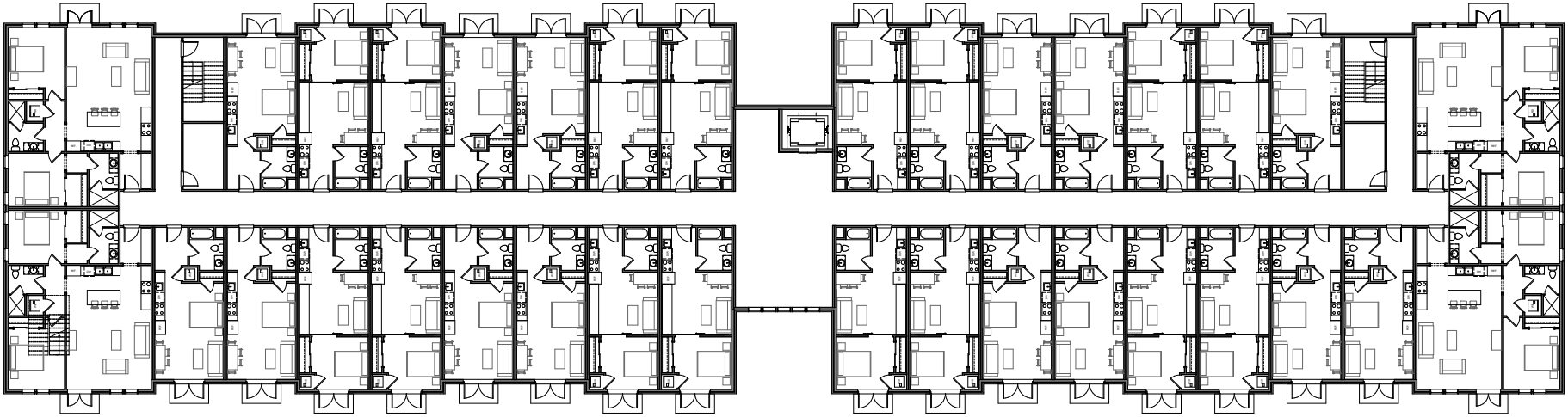




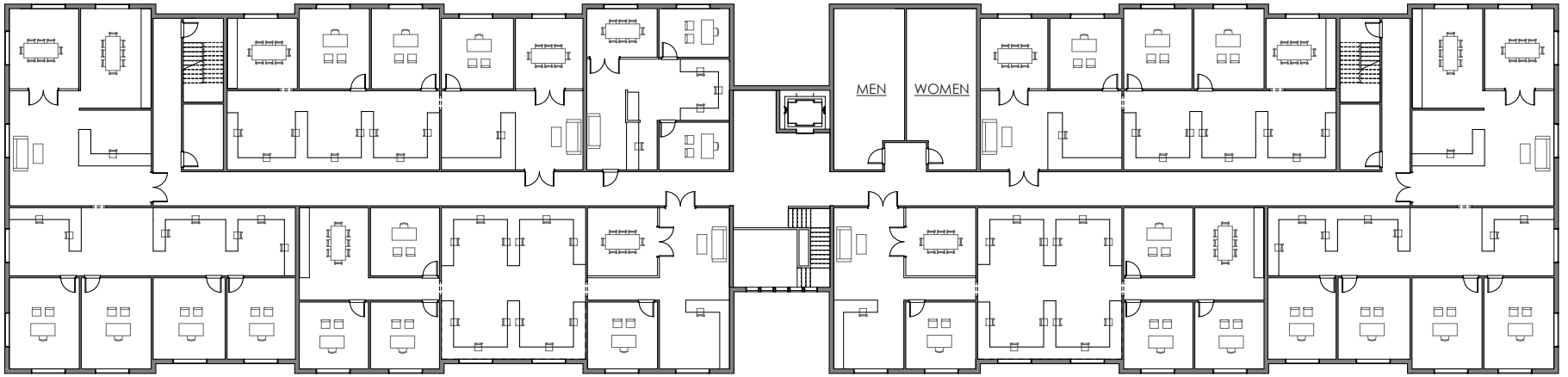

The Barn and Artisan Village Mixed-Use Building Images



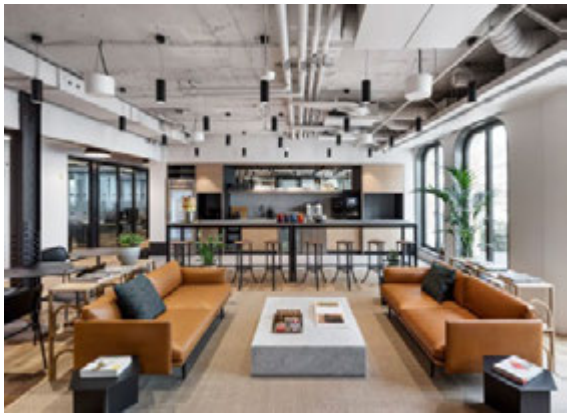
1st Floor Mixed Use



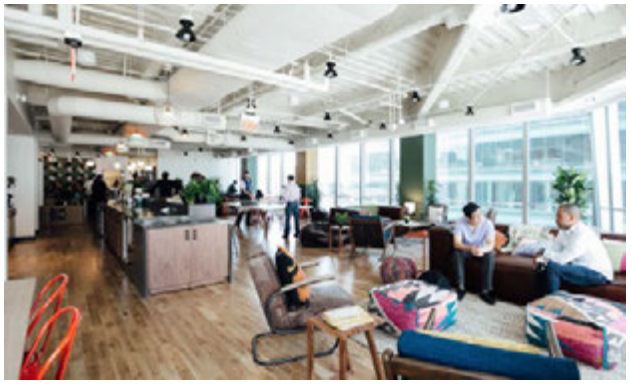
2nd & 3rd Floor Residential



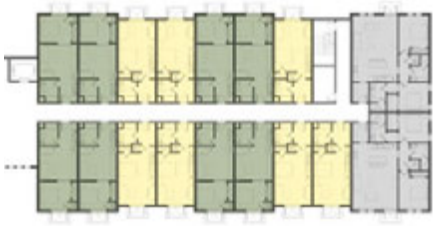
2nd & 3rd Floor Office








The Barn and Artisan Village Mixed-Use Office Interiors

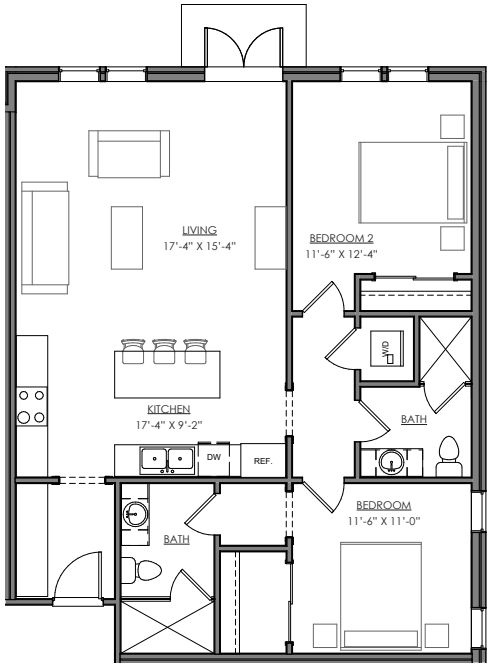


Legend

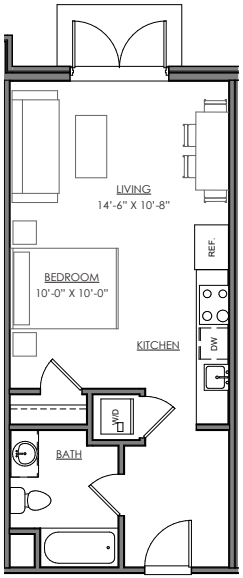
(2) 1,046 SF 2 Bedroom

(7) 474 SF Studio

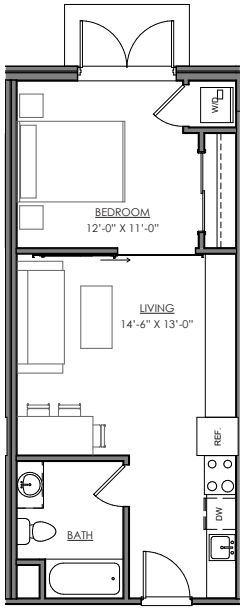
(8) 505 SF Studio Deluxe



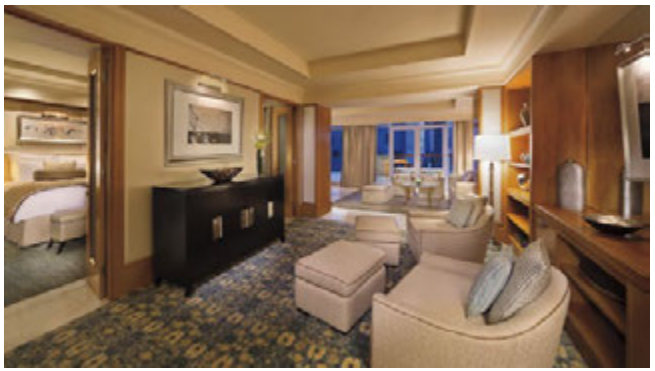
2 Bedroom - 1,046 SF



Studio - 474 SF



Studio Deluxe - 505 SF






The Barn and Artisan Village Mixed-Use Residential Interiors

Estate Lots

65x140 Lot Standards

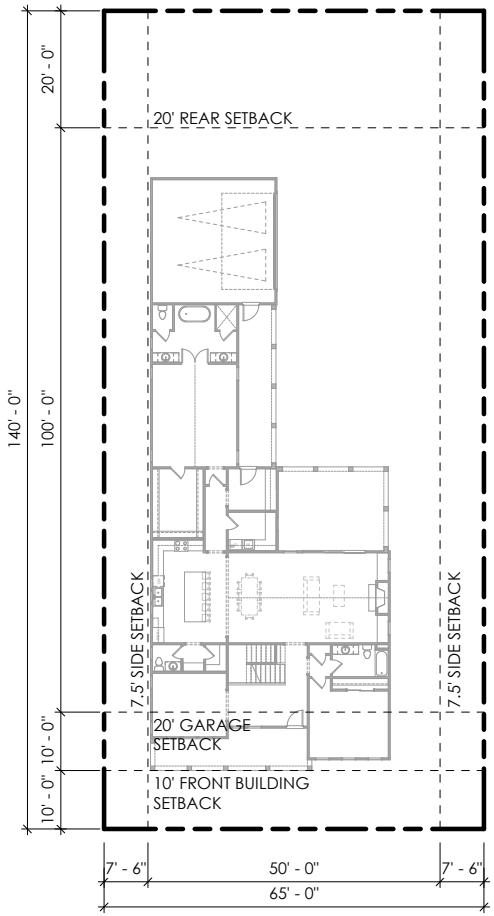
The single family dwellings located along the outside edge of the perimeter drive. Architectural styles follow an Americana influence and include variations of Federal, Classic American Farmhouse, European Cottage, Tudor, Folk Victorian, French Country, and Craftsman. Proportion, ornamentation, landscape treatments and soft exterior lightning are important to creating the luxurious and inviting character of this neighborhood. Side entry garages are located behind the house, and front entry garages are set back at a minimum 10' from the front facade of the home. The lots are not designed for alley access.

Interior Lots

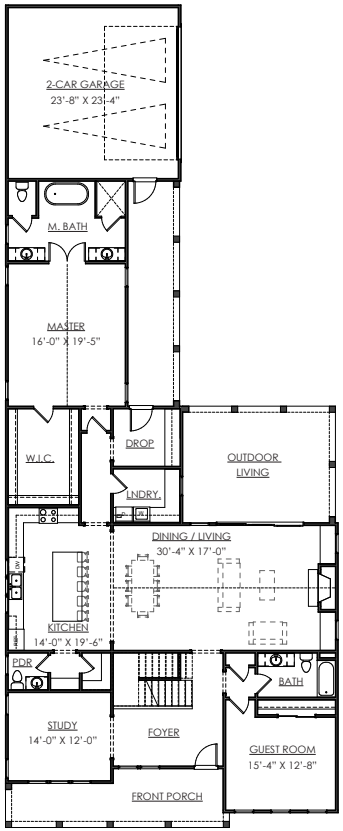
-Lot Area: 9,000 SF min.
-Building Coverage: 55% max.
-Lot Width: 65' min.
-Lot Depth: 140' min.
-Building Front Setback: 10'min.
-Garage Front Setback: 20' min.
-Building Side Setback: 7.5'min.
-Building Rear Setback: 20' min.
-Height: 3 stories max.
-Raised Foundation at Front Facade to be 18" min.
-Required Off-street parking: Min. 2 cars per unit within an enclosed garage.
-Porch Depth: 6' min.
-Driveway Setback: 1' min. from the property line

Corner Lots

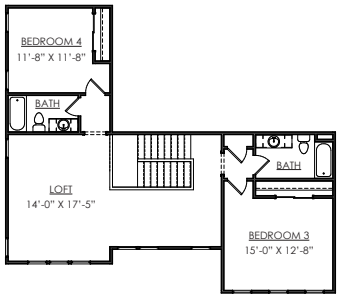
-Lot Area: 9,800 SF min.
-Building Coverage: 55% max.
-Lot Width: 70' min.
-Lot Depth: 140' min.
-Building Front Setback: 10'min.
-Garage Front Setback: 20' min.
-Building Corner Side Setback: 10' min.
-Building Side Setback: 7.5'min.
-Building Rear Setback: 20' min.
-Porch Side Setback: 5' min.
-Height: 3 stories max.
-Raised Foundation at Front Facade to be 18" min.
-Required Off-street parking: Min. 2 cars per unit within an enclosed garage.
-Porch Depth: 6' min.
-Driveway Setback: 1' min. from the property line



Typical Site Plan



First Floor



Second Floor

CONCEPT ELEVATION

CONCEPT ELEVATION

CONCEPT ELEVATION

Estate Lots

65x125 Lot Standards

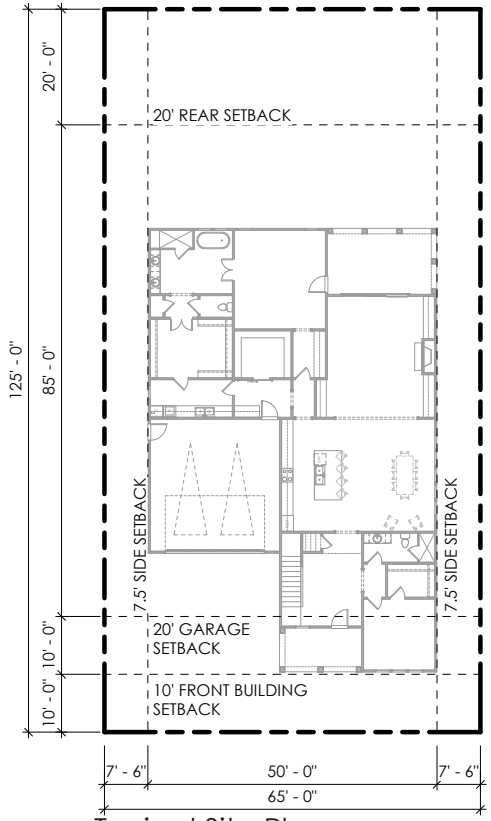
The single family dwellings located along the outside edge of the perimeter drive. Architectural styles follow an Americana influence and include variations of Federal, Classic American Farmhouse, European Cottage, Tudor, Folk Victorian, French Country, and Craftsman. Proportion, ornamentation, landscape treatments and soft exterior lightning are important to creating the luxurious and inviting character of this neighborhood. Side entry garages are located behind the house, and front entry garages are set back at a minimum 10' from the front facade of the home. The lots are not designed for alley access.

Interior Lots

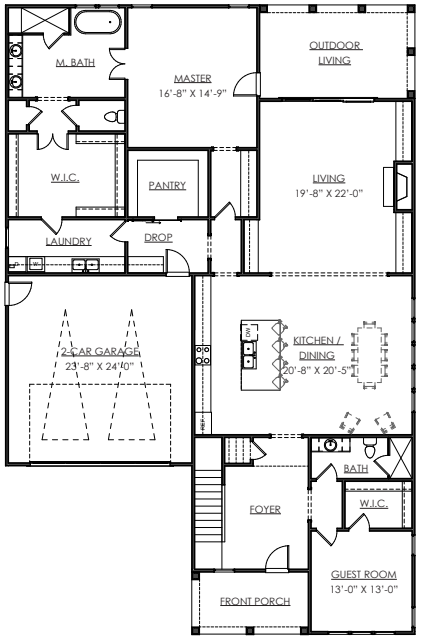
-Lot Area: 8,000 SF min.
-Building Coverage: 55% max.
-Lot Width: 65' min.
-Lot Depth: 125' min.
-Building Front Setback: 10'min.
-Garage Front Setback: 20' min.
-Building Side Setback: 7.5'min.
-Building Rear Setback: 20' min.
-Height: 3 stories max.
-Raised Foundation at Front Facade to be 18" min.
-Required Off-street parking: Min. 2 cars per unit within an enclosed garage.
-Porch Depth: 6' min.
-Driveway Setback: 1' min. from the property line

Corner Lots

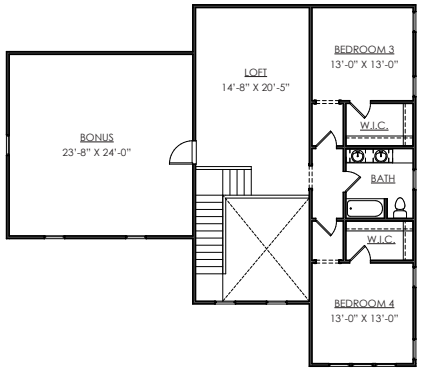
-Lot Area: 8,750 SF min.
-Building Coverage: 55% max.
-Lot Width: 70' min.
-Lot Depth: 125' min.
-Building Front Setback: 10'min.
-Garage Front Setback: 20' min.
-Building Corner Side Setback: 10' min.
-Building Side Setback: 7.5'min.
-Building Rear Setback: 20' min.
-Porch Side Setback: 5' min.
-Height: 3 stories max.
-Raised Foundation at Front Facade to be 18" min.
-Required Off-street parking: Min. 2 cars per unit within an enclosed garage.
-Porch Depth: 6' min.
-Driveway Setback: 1' min. from the property line



Typical Site Plan



First Floor



Second Floor

CONCEPT ELEVATION

CONCEPT ELEVATION

CONCEPT ELEVATION

Cottages

50X115 Lot Standards

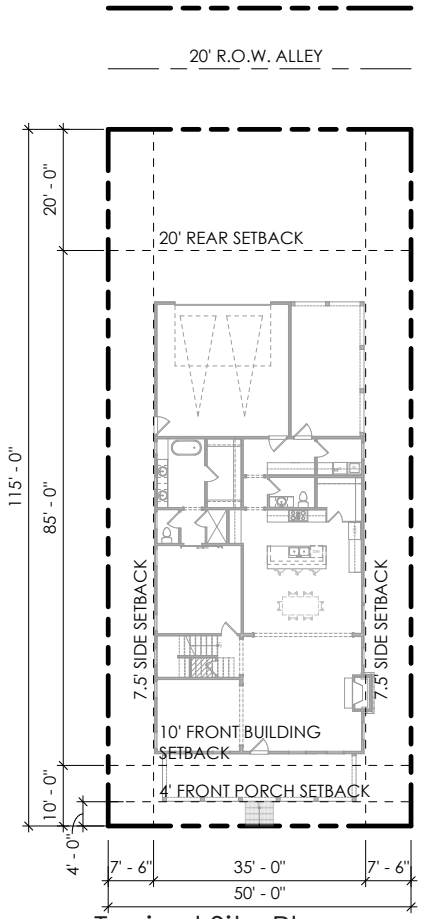
Cottages are single family dwellings located in the core of Roderick Place. Designed for smaller residential lots, the houses are appropriately scaled to create a traditional village street. These houses will emphasize front porch living, while offering inviting front facades. Generous landscaping and soft landscape lighting are essential to creating the inviting character of the neighborhood. Garages are accessed from service alleys behind the homes.

Interior Lots

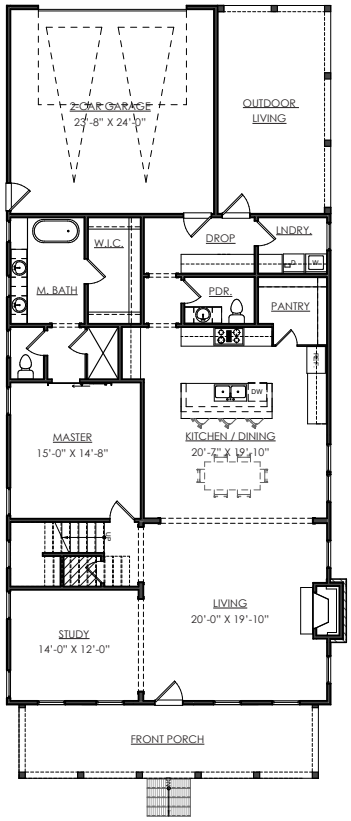
-Lot Area: 5,7 50 SF min.
-Building Coverage: 75% max.
-Lot Width: 50' min.
-Lot Depth: 115' min.
-Building Front Setback: 10'min.
-Building Side Setback: 7.5'min.
-Building Rear Setback: 20' min.
-Garage Rear Setback: 5' min.
-Porch Front Setback: 4' min.
-Height: 3 stories max.
-Raised Foundation at Front Facade to be 18" min.
-Required Off-street parking: Min. 2 cars per unit within an enclosed garage. Garages shall be alley access only.
-Porch Depth: 6' min.

Corner Lots

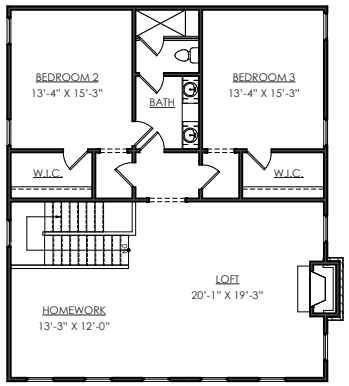
-Lot Area: 6,325 SF min.
-Building Coverage: 75% max.
-Lot Width: 55' min.
-Lot Depth: 115' min.
-Building Front Setback: 10'min.
-Building Side Setback: 7.5'min.
-Building Corner Side Setback: 10' min.
-Building Rear Setback: 20' min.
-Garage Rear Setback: 5' min.
-Porch Front Setback: 4' min.
-Porch Side Setback: 5' min.
-Height: 3 stories max.
-Raised Foundation at Front Facade to be 18" min.
-Required Off-street parking: Min. 2 cars per unit within an enclosed garage. Garages shall be alley access only.
-Porch Depth: 6' min.



Typical Site Plan



First Floor



Second Floor

CONCEPT ELEVATION

CONCEPT ELEVATION

CONCEPT ELEVATION

PROPOSED 2019 CONCEPT PLAN AMENDMENT AND 2007 APPROVED CONCEPT PLAN COMPARISON

COLUMBIA PIKE VIEWSHED AND OPEN SPACE COMPARISON

Samson J/V
144 Southeast Parkway #230
Franklin, TN, 37064

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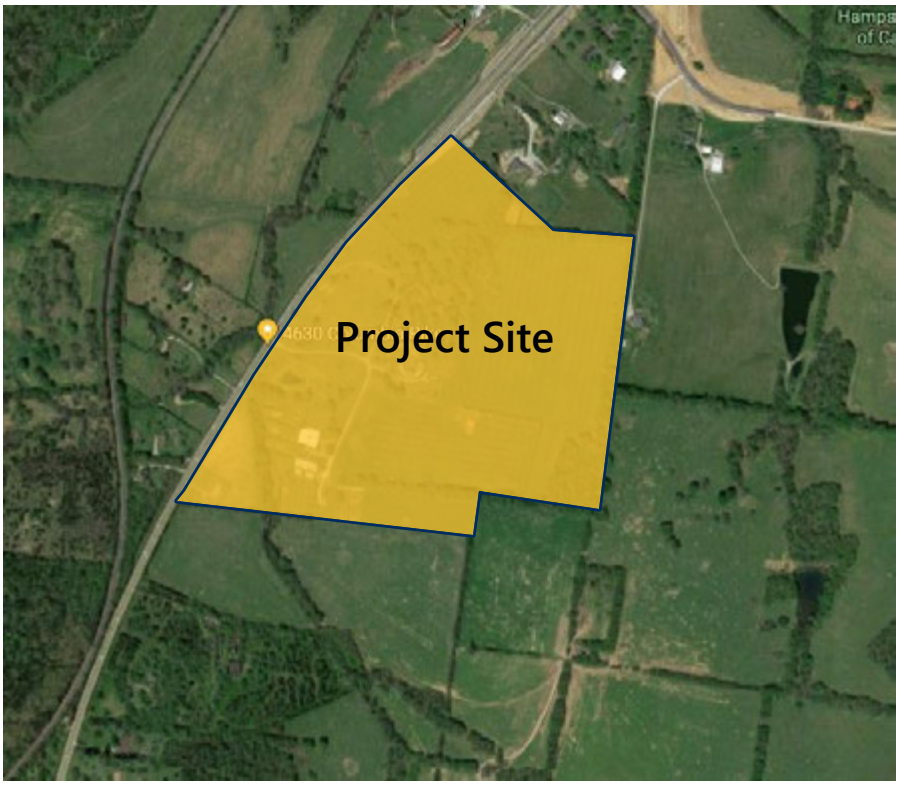
DECEMBER 2019

UPDATED TRAFFIC IMPACT STUDY

RODERICK PLACE

THOMPSON'S STATION, TENNESSEE



PREPARED FOR:

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UPDATED TRAFFIC IMPACT STUDY
RODERICK PLACE
THOMPSON'S STATION, TENNESSEE

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EXECUTIVE SUMMARY

Project Description

The proposed Roderick Place development is located along Columbia Pike (SR 6/US 31) in Thompson's Station, Tennessee. According to the developer, the proposed development includes approximately 92 hotel rooms, 75,606 square feet of office space, 20,000 square feet of commercial space, 19,768 square feet of restaurant space, 85 multi-family residential units, 100 assisted living units, 126 single-family homes, 13,000 square feet of private event space, 12,000 square feet of daycare, and a 4-fueling position convenience market with gasoline pumps. Access to the development is planned to be provided by two access drives on Columbia Pike (SR 6/US 31). The purpose of this study is to analyze the access plan and the traffic impacts associated with this proposed development.

Data Collection

In order to provide data for the traffic impact analysis, manual traffic counts were conducted at the following intersections:

1. Columbia Pike (SR 6/US 31) and Thompson's Station Road (signalized)
2. Columbia Pike (SR 6/US 31) and Critz Lane (signalized)
3. Columbia Pike (SR 6/US 31) and I-840 Eastbound Ramp (signalized)
4. Columbia Pike (SR 6/US 31) and I-840 Westbound Ramp (signalized)
5. Columbia Pike (SR 6/US 31) and Declaration Way

Specifically, KCI Technologies, Inc. conducted the traffic counts from 7:00 – 9:00 AM and 4:00 – 6:00 PM on a typical weekday in May 2019 and from 11:00 AM – 1:00 PM on a typical weekend in July 2019 for the intersections of Columbia Pike and Thompson's Station and Columbia Pike and Critz Lane. KCI Technologies, Inc conducted traffic counts for the remaining intersections on a typical weekday and weekend in August 2019. From the counts, it was determined that the peak hours of traffic flow for the majority of the study intersections occurred from 7:15 – 8:15 AM and 4:45 – 5:45 PM during weekdays and from 11:45 AM – 12:45 PM during weekends. Due to variations in peak hour associated with school and interstate traffic, individual peak hour traffic volumes were utilized at some intersections.

Projection of Future Traffic Volumes

In order to account for the traffic growth prior to the completion of the proposed project, background traffic volumes were established. These volumes include a background growth rate to account for general traffic growth within the study area based on the Tennessee Department of Transportation (TDOT) count station data. Then, the estimated total project-generated traffic volumes for the proposed Roderick Place development were added to the background peak hour traffic volumes in order to obtain the total projected peak hour traffic volumes for the study area intersections.

Conclusions and Recommendations

The analyses presented in this study indicate that the impacts of the proposed project on the existing street network will be manageable by providing the recommendations below. These specific recommendations will provide safe and efficient traffic operations within the study area following the completion of the proposed project. The recommendations are as follows:

Columbia Pike (SR 6/US 31) and Site Access A

- Provide a traffic signal at the intersection. A traffic signal should be installed at approximately 55% occupancy of the development.
- Until the 55% occupancy level is reached, the westbound approach of Site Access A should be stop-controlled and a stop bar and R1-1 'Stop' sign should be installed on the egress approach.
- Site Access A should be designed to include sufficient width for one entering lane and three exiting lanes. The exiting approach should include one left-turn lane and one right-turn lane with approximately 150 feet of storage length and a through lane to account for a future fourth leg of the intersection. This through lane should be striped out until needed.
- Provide a northbound right-turn lane on Columbia Pike (SR 6/US 31) with approximately 100 feet of storage length.
- Provide a southbound left-turn lane on Columbia Pike (SR 6/US 31) with approximately 150 feet of storage length.

Columbia Pike (SR 6/US 31) and Site Access B

- Site Access B should initially be utilized as the development construction entrance.
- Site Access B should be converted from a construction access to a site access at the time when approximately 50% occupancy of the development is reached.

- When Site Access B is converted to a site access, it should operate as right-in/right-out only and should be designed to include sufficient width for one entering lane and one exiting lanes.
- The westbound approach of Site Access B should be stop-controlled and a stop bar and R1-1 'Stop' sign should be installed on the egress approach.

Signal Timing Optimization and Coordination

- Signal timings at all the signalized study intersections should be optimized upon completion of the development. Furthermore, after providing a traffic signals at the intersection of Columbia Pike (SR 6/US 31) and Site Access A, signal timing coordination should be conducted between the three intersections of Columbia Pike (SR 6/US 31) and Thompson's Station Road, Columbia Pike (SR 6/US 31) and Site Access A, and Columbia Pike (SR 6/US 31) and Critz Lane.

Additional Recommendations

- As part of the construction of the project, all internal and external driveway connections should be designed such that the departure sight triangles, as specified by AASHTO, will be clear of all sight obstructions, including landscaping, existing vegetation, monument signs/walls, fences, etc.
- Parking should be developed per code.
- According to the Major Thorough Plan for the Town of Thompson's Station, the construction of a new east-west roadway connecting Columbia Pike to Clayton Arnold Road is planned through this project site. Site Access A is planned to provide the start of that connector roadway and the site plan shows the proposed collector road extending to the southern property line. This internal collector roadway should be designed to Town of Thompson's Station standards for a ST-60-36 collector road. The collector should terminate as a stub and right-of-way should be dedicated for its future extension to the south property line.
- In the event of a large function at the private event space, traffic control officers should be considered to direct traffic.
- Final design of internal roadways and parking should meet all Town of Thompson's Station standards and the latest version of "A Policy of Geometric Design of Highways and Streets" published by AASHTO. Any parking lots and streets associated with the development should ensure that passenger cars and emergency vehicles are capable of making all turning movements. Internal intersections should be two-way stop-controlled unless all-way stop control warrants are met.

- Per the TDOT *Manual for Constructing Driveway Entrances on State Highways*, this development meets the minimum requirements for distance between two site access points.
- The Major Thoroughfare Plan for the Town of Thompson's Station details the following roadway improvements occurring in the vicinity of the project site:
    - The widening of Columbia Pike (SR 6/US 31) to a 4-lane median-divided cross-section, and
    - The construction of an east-west roadway connecting Columbia Pike to Clayton Arnold Road at its intersection with Robbins Nest Road.

  As previously described, the Roderick Place developer shall design a ST-60-36 collector roadway with a 60-foot right-of-way from Columbia Pike to the southern property line approximately as shown on the revised concept plan and the MTP. Additionally, right-of-way shall be dedicated along the entire frontage of Roderick Place (approximately 2,600 linear feet). The width is to be determined by State of Tennessee (TDOT) construction drawings.

In summary, based on the analyses conducted, no further recommendations are presented for the proposed Roderick Place development.

1. INTRODUCTION AND PROJECT DESCRIPTION

The purpose of this study is to analyze the traffic impacts and access plan associated with the proposed Roderick Place mixed-use development located along Columbia Pike (SR 6/US 31) in Thompson's Station, Tennessee. According to the developer, the proposed development includes approximately 92 hotel rooms, 75,606 square feet of office space, 20,000 square feet of commercial space, 19,768 square feet of restaurant space, 85 multi-family residential units, 100 assisted living units, 126 single-family homes, 13,000 square feet of private event space, and 12,000 square feet of daycare, and a 4-fueling position convenience market with gasoline pumps.

As shown by Figure 1, the property is located along Columbia Pike (SR 6/US 31) north of the intersection of Columbia Pike (SR 6/US 31) and Thompson's Station Road. According to the Thompson's Station zoning map, the property is currently zoned SP (Specific Plan). The proposed development is within an area that is characterized by low-density land uses. The property is generally bounded on the west by Columbia Pike (SR 6/US 31) and on the north, south, and east by undeveloped land. Surface parking is planned to be provided for the proposed development.

The current site plan for the Roderick Place development is shown in Appendix A. Based on this site plan, proposed vehicular access for the development will be provided by two site accesses on Columbia Pike (SR 6/US 31), located on the west side of the project site. Site Access A will be intersecting Columbia Pike approximately 420 feet north of the southern property line of the site, and Site Access B will intersect Columbia Pike approximately 650 feet further to the north.

In this study, the current operating characteristics of the adjacent roadways and intersections in the vicinity of the project site are evaluated. The expected trips generated by the proposed development are determined and distributed to the roadway network. The adjacent roadways and intersections are then reevaluated to determine the anticipated traffic impacts of the project. Finally, recommendations are presented, including roadway improvements and/or traffic control improvements that are needed to accommodate the expected traffic.

FIGURE 1. LOCATION OF THE PROJECT SITE

N

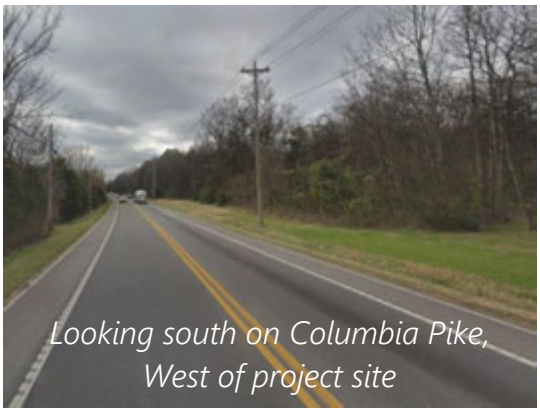
Location of the Project Site
(Not to Scale)

Figure 1.

2. EXISTING CONDITIONS

2.1 Existing Roadway Network

Local access to the site will be provided by Columbia Pike (SR 6/US 31), Thompson's Station Road, Critz Lane, I-840 Eastbound Ramp, I-840 Westbound Ramp, and Declaration Way. A description of these roadways within the project vicinity is as follows:



Looking south on Columbia Pike, West of project site

Columbia Pike (SR 6/US 31) is a two-way roadway that generally travels in a north-south direction. Columbia Pike (SR 6/US 31) includes one travel lane in each direction in the vicinity of the project site. TDOT currently has plans to widen the road to provide four travel lanes in the vicinity of the project site. Completion of the road widening should occur after completion of the proposed development. Near the project site, Columbia Pike provides connection between I-840 to the north and the Town of Thompson's Station to the south. According to the Town of Thompson's Station *Current Roadway Network,* Columbia Pike (SR 6/US 31) is categorized as an arterial roadway near the project site. The posted speed limit is 45 mph near the project site. A bicycle lane is provided in the northbound and southbound direction on Columbia Pike (SR 6/US 31). No pedestrian or transit services are provided near the project site.

Looking east on Thompson's Station Road,

Thompson's Station Road is a two-way roadway that generally travels in an east-west direction. Thompson's Station Road includes one travel lane in each direction. Thompson's Station Road provides connection between Columbia Pike (SR 6/US 31) to the west and Lewisburg Pike to the east. According to the Town of Thompson's Station *Current Roadway Network,* Thompson's Station Road is categorized as a major collector roadway near the project site. The posted speed limit is 45 mph near the project site. No pedestrian, bicycle, or transit services are provided near the project site.

Looking west on Critz Lane, North of the Project Site

Critz Lane is a two-way roadway that generally travels in an east-west direction. Critz Lane includes one travel lane in each direction near the project site. Critz Lane provides connection between Columbia Pike (SR 6/US 31) to the west and Lewisburg Pike to the east. According to the Town of Thompson's Station *Current Roadway Network,* Critz Lane is categorized as a minor collector roadway near the project site. The posted speed limit is 35 mph near the project site. No pedestrian, bicycle, or transit services are provided near the project site.

I-840 is an interstate that generally travels in an east-west direction near Thompson's Station. I-840 provides connection between I-40 and Fairview to the west and I-65, Murfreesboro, and Lebanon to the east. The posted speed limit is 70 mph near the project site. No pedestrian, bicycle, or transit services are provided.

Looking west on Declaration Way, North of the Project Site

Declaration Way is a two-way roadway that generally travels in an east-west direction. Declaration Way includes one travel lane in each direction near the project site. Declaration Way provides connection between Columbia Pike (SR 6/US 31) to the east and Independence High School to the west. According to the Town of Thompson's Station *Current Roadway Network,* Declaration Way is categorized as a local developer-maintained road (private road). The posted speed limit is 20 mph. No pedestrian, bicycle, or transit services are provided on Declaration Way.

The study area includes five existing intersections described as follows:

Thompson's Station Road Looking West at Columbia Pike (SR 6/US 31)

Columbia Pike (SR 6/US 31) and Thompson's Station Road is a signalized intersection with four approaches. The eastbound approach of Thompson's Station Road includes one shared through/right-turn lane and one left-turn lane with approximately 100 feet of storage. The westbound approach of Thompson's Station Road includes one shared through/right-turn lane and one left-turn lane with approximately 85 feet of storage. The northbound approach of Columbia Pike (SR 6/US 31) includes one shared through/right-turn lane and one left-turn lane with approximately 105 feet of storage. The southbound approach of Columbia Pike (SR 6/US 31) includes one shared through/right-turn lane and one left-turn lane with approximately 120 feet of storage. Protected/permissive left-turn signal phasing is provided for all approaches. No pedestrian signals or crosswalks are provided at this intersection. The northbound and southbound approaches of Columbia Pike (SR 6/US 31) include a right-sided bike lane through the intersection.

Columbia Pike (SR 6/US 31) Looking North at Critz Lane

Columbia Pike (SR 6/US 31) and Critz Lane is a signalized intersection with four approaches. The eastbound approach is a private driveway and includes one shared lane for all turning movements. The westbound approach of Critz Lane includes one shared through/right-lane and one left-turn lane with approximately 150 feet of storage. The northbound approach of Columbia Pike (SR 6/US 31) includes one shared through/right-turn lane, one through lane, and one exclusive left-turn lane with approximately 100 feet of storage. The southbound approach of Columbia Pike (SR 6/US 31) includes one shared through/right-turn lane, one through lane, and one exclusive left-turn lane with approximately 275 feet of storage. Protected/permissive left-turn signal phasing is provided for the southbound approach of Columbia Pike (SR 6/US 31) only. The eastbound and westbound approaches operate as split phase, with a westbound right-turn overlap. No pedestrian signals or crosswalks are provided at this intersection. The northbound and southbound approaches of Columbia Pike (SR 6/US 31) include a right-sided bike lane through the intersection.

Columbia Pike (SR 6/US 31) Looking North at I-840 Eastbound Ramp

Columbia Pike (SR 6/US 31) and I-840 Eastbound Ramp is a signalized intersection with three approaches. The eastbound approach of I-840 Eastbound Ramp includes two left-turn lanes and one channelized, right-turn lane with approximately 310 feet of storage length. The northbound approach of Columbia Pike (SR 6/US 31) includes two through lanes and one channelized, right-turn lane with approximately 600 feet of storage. The southbound approach of Columbia Pike (SR 6/US 31) includes two through lanes and one exclusive left-turn lane with approximately 150 feet of storage. Protected/permissive left-turn signal phasing is provided for the southbound approach of Columbia Pike (SR 6/US 31) only. No pedestrian signals or crosswalks, bicycle, or transit facilities are provided at this intersection.

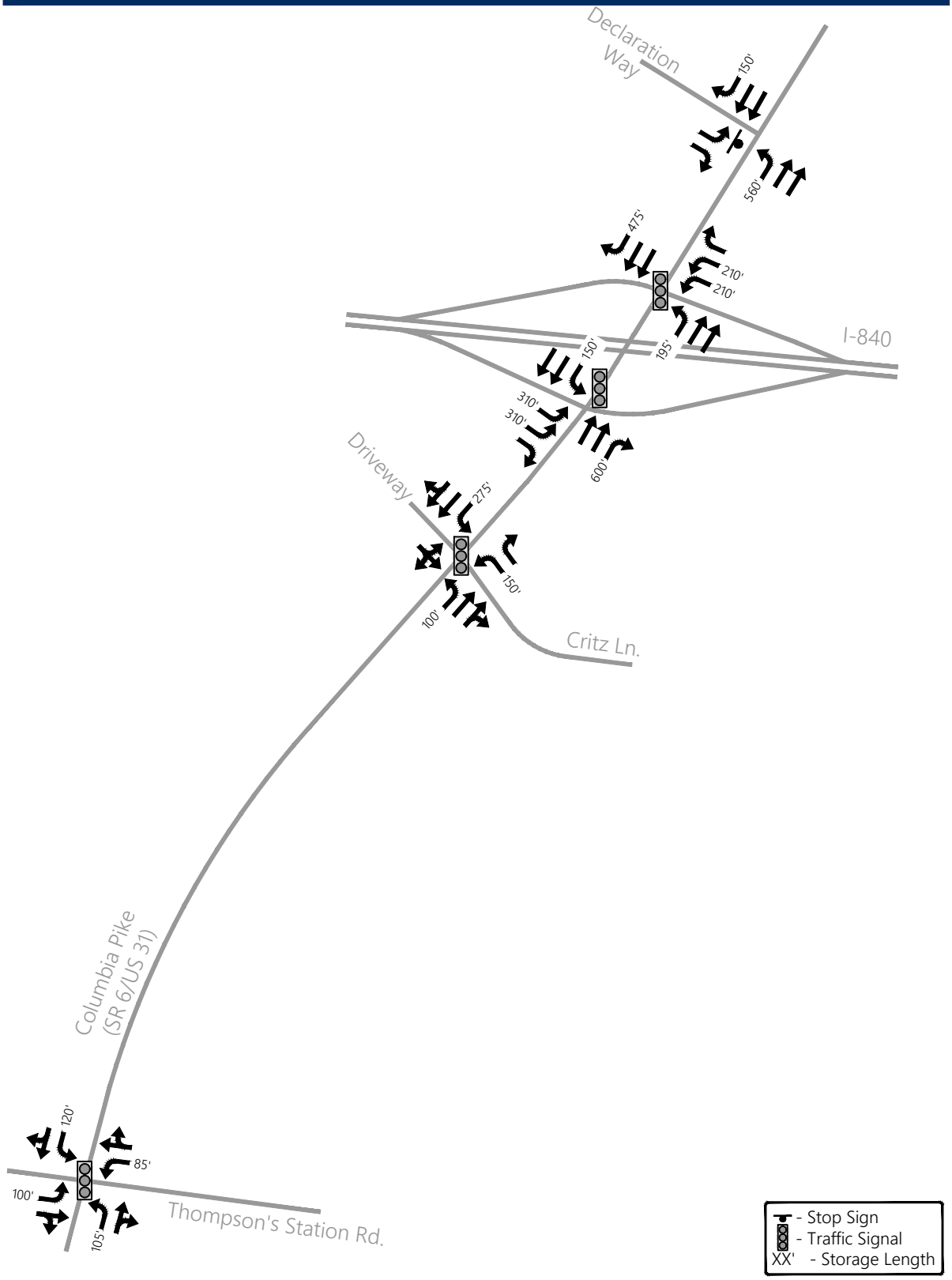
Columbia Pike (SR 6/US 31) Looking North at I-840 Westbound Ramp

Columbia Pike (SR 6/US 31) and I-840 Westbound Ramp is a signalized intersection with three approaches. The westbound approach of I-840 Westbound Ramp includes two left-turn lanes and one channelized, right-turn lane with approximately 225 feet of storage. The northbound approach of Columbia Pike (SR 6/US 31) includes one shared two through lanes and one exclusive left-turn lane with approximately 200 feet of storage. The southbound approach of Columbia Pike (SR 6/US 31) includes two through lanes and one channelized, right-turn lane with approximately 575 feet of storage. Protected-only left-turn signal phasing is provided for the northbound approach of Columbia Pike (SR 6/US 31). No pedestrian signals or crosswalks, bicycle, or transit facilities are provided at this intersection.

Columbia Pike (SR 6/US 31) Looking North at Declaration Way

Columbia Pike (SR 6/US 31) and Declaration Way is an unsignalized intersection with three approaches. The eastbound approach of Declaration Way is stop-controlled and includes one left-turn lane and one right-turn lane with approximately 210 feet of storage length. The northbound approach of Columbia Pike (SR 6/US 31) includes two through lanes and one exclusive left-turn lane with approximately 195 feet of storage. The southbound approach of Columbia Pike (SR 6/US 31) includes two through lanes and one exclusive right-turn lane with approximately 475 feet of storage. No pedestrian signals or crosswalks, bicycle, or transit facilities are provided at this intersection.

The existing laneage at the study intersections is illustrated in Figure 2.



Existing Laneage
(Not to Scale)

Figure 2.

2.2 Existing Traffic Volumes

In order to provide data for the traffic impact analysis, traffic counts were conducted at the following intersections:

1. Columbia Pike (SR 6/US 31) and Thompson's Station Road (signalized)
2. Columbia Pike (SR 6/US 31) and Critz Lane (signalized)
3. Columbia Pike (SR 6/US 31) and I-840 Eastbound Ramp (signalized)
4. Columbia Pike (SR 6/US 31) and I-840 Westbound Ramp (signalized)
5. Columbia Pike (SR 6/US 31) and Declaration Way

Specifically, KCI Technologies, Inc. conducted the traffic counts from 7:00 – 9:00 AM and 4:00 – 6:00 PM on a typical weekday in May 2019 and from 11:00 AM – 1:00 PM on a typical weekend in July 2019 for the intersections of Columbia Pike and Thompson's Station and Columbia Pike and Critz Lane. KCI Technologies, Inc conducted traffic counts for the remaining intersections on a typical weekday and weekend in August 2019. From the counts, it was determined that the peak hours of traffic flow for the majority of the study intersections occurred from 7:15 – 8:15 AM and 4:45 – 5:45 PM during weekdays and from 11:45 AM – 12:45 PM during weekends. Due to variations in peak hour associated with school and interstate traffic, individual peak hour traffic volumes were utilized at some intersections.

It is worth nothing that local schools were not in session when the weekday data for the intersections of Columbia Pike and Thompson's Station Road and Columbia Pike and Critz Lane was collected. KCI Technologies used 24-hour directional tube data collected in January 2019 to validate the existing traffic volumes. This comparison, presented in Appendix B, indicates that traffic volumes are higher when school is out of session. For that reason, no seasonal adjustment factor was applied to the existing turning movement counts.

The existing peak hour turning movement volumes are presented in Figures 3. A detailed summary of the turning movement counts is included in Appendix B.

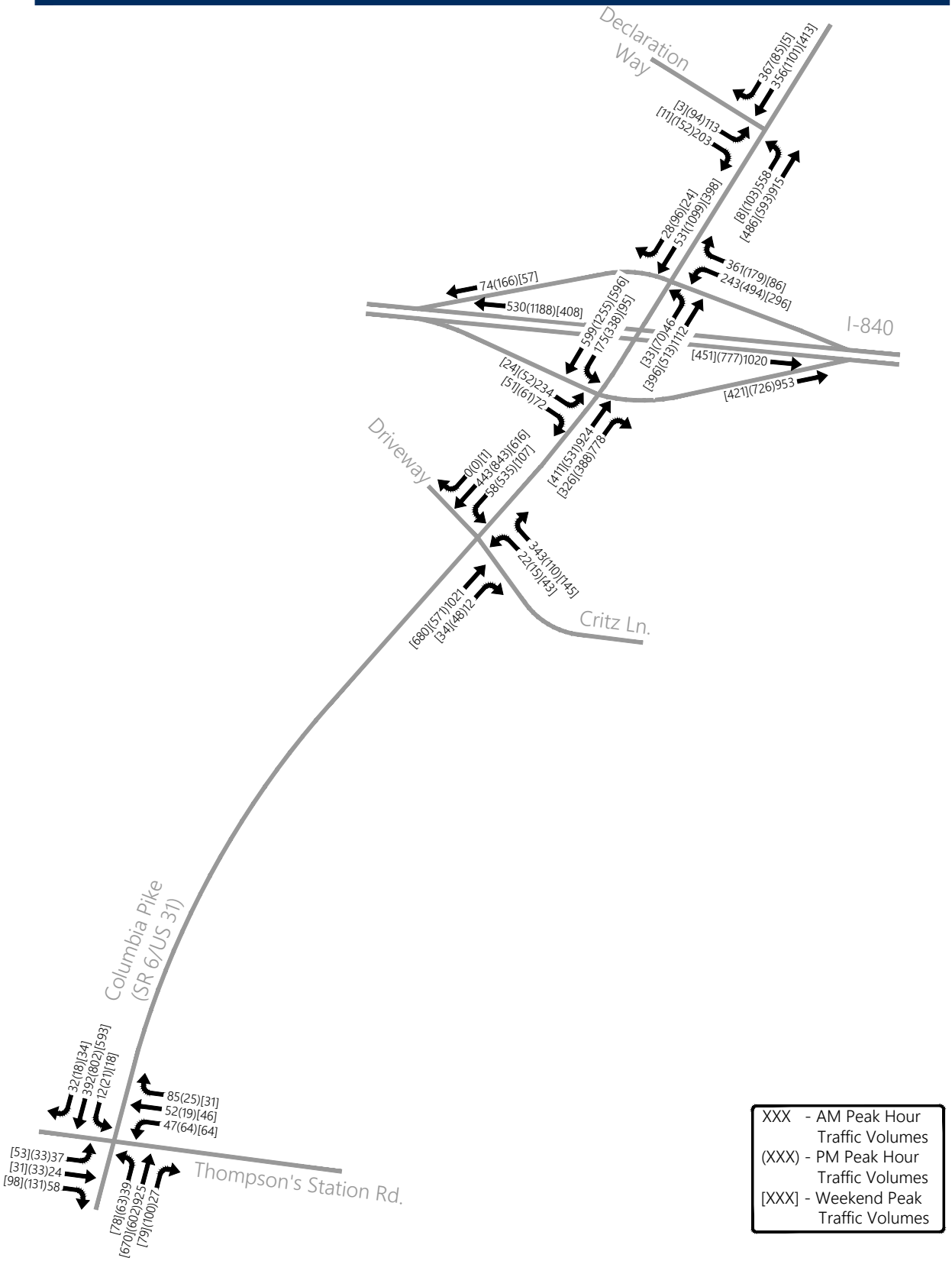
Peak hour factors were determined for each of the intersections. These factors generally range from 0.89 to 0.99. The exception to this was a peak hour factor of 0.82 for the intersection of Columbia Pike and Declaration Way in the AM peak hour. The overall peak hour factor of 0.92 was used for analysis due to the difficult nature of predicting the peak hour factors for future growth and projected traffic volumes generated by the project site, as well as the fact that as peak period traffic volumes increase, a corresponding increase in peak hour factor is typical.

Heavy vehicle percentages for the study network were determined for each of the study periods. For the PM and Weekend peak hours, the heavy vehicle percentage was determined to be at or below 2%. For these scenarios, a default heavy vehicle percentage of 2% was utilized for analysis. For the AM peak hour, the heavy vehicle percentage was determined to be 3%. For this scenario, the heavy vehicle percentage was adjusted to 3%.

In addition to the above information, average daily traffic volumes were obtained from the Tennessee Department of Transportation (TDOT). There are three TDOT count stations located in the vicinity of the project site. The count station locations and annual average daily traffic (AADT) in 2017 are shown in Table 1. Additional TDOT Count Station data is included in Appendix C.

TABLE 1: TDOT COUNT STATION DATA

LOCATION	2017 AADT (vpd)
Columbia Pike (SR 6/US 31)	20,369
Thompson's Station Road West	2,810
Thompson's Station Road East	2,824
I-840 – West of SR-6	23,754
I-840 – West of SR-106	20,398



Existing Peak Hour Traffic Volumes
(Not to Scale)

Figure 3.

2.3 Existing Traffic Operations

To determine the current operation of the study intersections, capacity analyses were performed for the AM and PM peak hours. The capacity calculations were performed according to the methods outlined in the *Highway Capacity Manual*, TRB 2010. The capacity analyses result in the determination of a Level of Service (LOS) for an intersection. The LOS is a concept used to describe how well an intersection or roadway operates. LOS A is the best, while LOS F is the worst. LOS D is typically considered as the minimum acceptable LOS for a signalized intersection in an urbanized area. Table 2 presents the descriptions of LOS for unsignalized intersections. Table 3 presents the descriptions of LOS for signalized intersections.

TABLE 2: DESCRIPTIONS OF LEVEL OF SERVICE FOR UNSIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	DESCRIPTION	CONTROL DELAY (sec/veh)
A	Little or no delay	≤ 10.0
B	Short traffic delay	>10 and ≤ 15
C	Average traffic delay	>15 and ≤ 25
D	Long traffic delay	>25 and ≤ 35
E	Very long traffic delay	>35 and ≤ 50
F	Extreme traffic delay	> 50.0

Source: *Highway Capacity Manual*, TRB 2010

TABLE 3: DESCRIPTIONS OF LEVEL OF SERVICE FOR SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	DESCRIPTION	CONTROL DELAY (sec/veh)
A	Operations with very low delay. This occurs when progression is extremely favorable. Most vehicles do not stop at all.	≤ 10
B	Operations with stable flows. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	>10 and ≤ 20
C	Operations with stable flow. Occurs with fair progression and/or longer cycle lengths. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	>20 and ≤ 35
D	Approaching unstable flow. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop.	>35 and ≤ 55
E	Unstable flow. This is considered to be the limit for acceptable delay. These high delays generally indicate poor progression, long cycle lengths, and high V/C ratios.	>55 and ≤ 80
F	Unacceptable delay. This condition often occurs with over saturation or with high V/C ratios. Poor progression and long cycle lengths may also cause such delay levels.	>80.0

Source: *Highway Capacity Manual*, TRB 2010

The signal timing and phasing plan for the signalized intersections in the study area were obtained from the Town of Thompson's Station and were utilized for the capacity analysis. Capacity analysis was completed using the traffic modeling software Synchro. HCM 2010 is not available in Synchro for the modeling of ramp merges. Therefore, the two ramp merge points were evaluated using HCS7 modeling software. Additionally, the HCM 2010 methodology was utilized for all study intersections. The signal timing data is included in Appendix G.

The results of the capacity analyses for the existing conditions at the study intersections are presented in Table 4. As shown, all intersections and critical movements operate at LOS D or better in the AM, PM, and weekend peak hours with two exceptions; the eastbound left-turn of Declaration Way at Columbia Pike operates at LOS F in both the AM and PM peak hours. Additionally, the eastbound and westbound I-840 ramp merge intersections are expected to operate at LOS B or better under all conditions. Capacity analyses worksheets are included in Appendix D.

TABLE 4: EXISTING PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE (Average Approach Delay in sec/veh)		
		AM Peak Hour	PM Peak Hour	Weekend Peak Hour
Columbia Pike (SR 6/US 31) and Thompson's Station Road	Overall Intersection	D (38.1)	C (31.7)	C (28.7)
Columbia Pike (SR 6/US 31) and Critz Lane	Overall Intersection	D (41.4)	B (10.5)	B (10.7)
Columbia Pike (SR 6/US 31) and I-840 EB Ramp	Overall Intersection	B (11.0)	A (2.1)	A (1.3)
Columbia Pike (SR 6/US 31) and I-840 WB Ramp	Overall Intersection	B (17.8)	C (23.6)	B (14.0)
Columbia Pike (SR 6/US 31) and Declaration Way	Northbound Left-Turn	C (20.6)	B (13.5)	A (8.3)
	Eastbound Left-Turn	F (>300.0)	F (66.3)	B (12.8)
	Eastbound Right-Turn	B (11.1)	C (17.8)	A (9.7)

Notes: For stop-controlled intersections, a LOS is presented for each critical turning movement. For signalized intersections, a LOS is presented for the overall intersection.

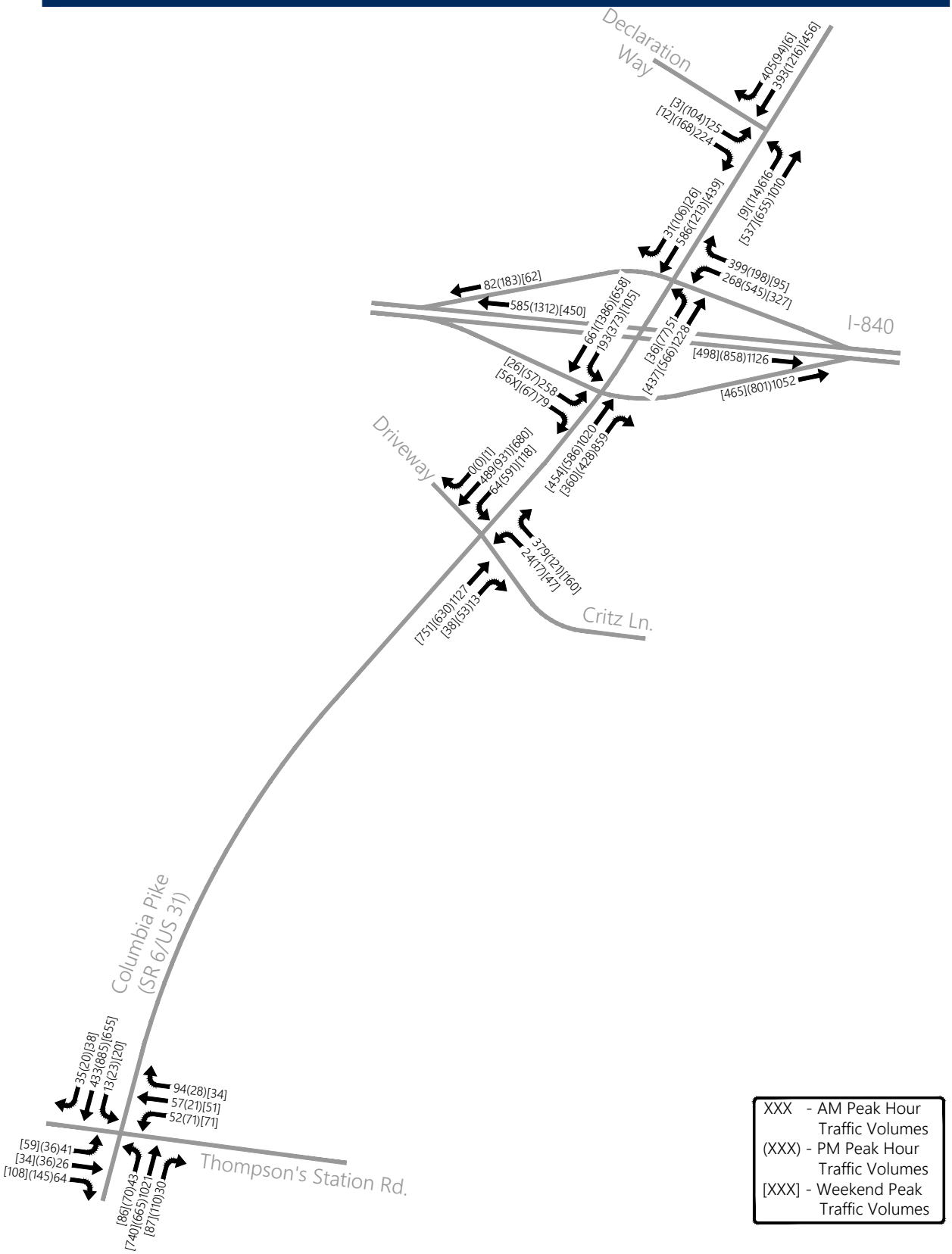
3. BACKGROUND TRAFFIC VOLUMES

3.1 Establishing Background Volumes

In order to account for the traffic growth prior to the completion of the proposed project, background traffic volumes were established. For the purposes of this traffic study, the proposed development was assumed to be completed by the year 2024, which is a 5-year horizon. Historical daily traffic volumes were obtained from the three TDOT count stations located in the vicinity of the project site. Over the past five years, the combined traffic at these three TDOT count stations has increased by an average of 2.0% per year. The TDOT count station data is included in Appendix C.

A growth factor was applied to the existing peak hour traffic volumes to account for background growth for the future conditions. The existing peak hour traffic volumes at the study intersections were increased by 2.0% per year for five years to account for anticipated background traffic growth within the study area.

The background peak hour traffic volumes for horizon year 2024 are presented in Figure 4. These volumes represent the peak hour traffic that is expected to be on the roadway in 2024 even if the proposed Roderick Place development is not completed.



Background Peak Hour Traffic Volumes
(Not to Scale)

Figure 4.

3.2 Background Traffic Operations

To determine the operation of the study area intersections under background conditions, capacity analyses were performed for the AM and PM peak hours. The analyses for the background conditions were based on the same lane configurations, peak hour factors, heavy vehicle percentages, and signal timings as the existing conditions.

As shown in Tables 5A, 5B, and 5C, under background conditions the capacity analyses indicate that all intersections and critical movements are expected to operate at LOS D or better in the AM, PM, and weekend peak hours, with the following exceptions:

- The overall intersection of Columbia Pike (SR 6/US 31) and Thompson's Station Road is expected to operate at LOS E in the AM peak hour.
- The eastbound left-turn of Declaration Way is expected to operate at LOS F in both the AM and PM Peak hours.

Additionally, the eastbound and westbound I-840 ramp merge intersections are expected to operate at LOS B or better under all conditions.

Capacity analyses worksheets are included in Appendix D.

TABLE 5A: BACKGROUND AM PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE (Average Approach Delay in sec/veh)	
		Existing AM	Background AM
Columbia Pike (SR 6/US 31) and Thompson's Station Road	Overall Intersection	D (38.1)	E (62.1)
Columbia Pike (SR 6/US 31) and Critz Lane	Overall Intersection	D (41.4)	D (51.9)
Columbia Pike (SR 6/US 31) and I-840 EB Ramp	Overall Intersection	B (11.0)	B (15.4)
Columbia Pike (SR 6/US 31) and I-840 WB Ramp	Overall Intersection	B (17.8)	B (18.6)
Columbia Pike (SR 6/US 31) and Declaration Way	Northbound Left-Turn	C (20.6)	D (32.9)
	Eastbound Left-Turn	F (>300.0)	F (>300.0)
	Eastbound Right-Turn	B (11.1)	B (11.6)

Notes: For stop-controlled intersections, a LOS is presented for each critical turning movement. For signalized intersections, a LOS is presented for the overall intersection.

TABLE 5B: BACKGROUND PM PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE (Average Approach Delay in sec/veh)	
		Existing PM	Background PM
Columbia Pike (SR 6/US 31) and Thompson's Station Road	Overall Intersection	C (31.7)	D (41.3)
Columbia Pike (SR 6/US 31) and Critz Lane	Overall Intersection	B (10.5)	B (13.0)
Columbia Pike (SR 6/US 31) and I-840 EB Ramp	Overall Intersection	A (2.1)	A (2.1)
Columbia Pike (SR 6/US 31) and I-840 WB Ramp	Overall Intersection	C (23.6)	C (26.7)
Columbia Pike (SR 6/US 31) and Declaration Way	Northbound Left-Turn	B (13.5)	C (15.3)
	Eastbound Left-Turn	F (66.3)	F (127.6)
	Eastbound Right-Turn	C (17.8)	C (21.0)

Notes: For stop-controlled intersections, a LOS is presented for each critical turning movement. For signalized intersections, a LOS is presented for the overall intersection.

TABLE 5C: BACKGROUND WEEKEND PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE (Average Approach Delay in sec/veh)	
		Existing Weekend	Background Weekend
Columbia Pike (SR 6/US 31) and Thompson's Station Road	Overall Intersection	C (28.7)	D (37.8)
Columbia Pike (SR 6/US 31) and Critz Lane	Overall Intersection	B (10.7)	B (11.4)
Columbia Pike (SR 6/US 31) and I-840 EB Ramp	Overall Intersection	A (1.3)	A (1.3)
Columbia Pike (SR 6/US 31) and I-840 WB Ramp	Overall Intersection	B (14.0)	B (14.3)
Columbia Pike (SR 6/US 31) and Declaration Way	Northbound Left-Turn	A (8.3)	A (8.4)
	Eastbound Left-Turn	B (12.8)	B (13.4)
	Eastbound Right-Turn	A (9.7)	A (9.9)

Notes: For stop-controlled intersections, a LOS is presented for each critical turning movement. For signalized intersections, a LOS is presented for the overall intersection.

4. IMPACTS

4.1 Trip Generation

A traffic generation process was used to estimate the amount of traffic expected to be generated by the proposed Roderick Place development. Factors for the trip generation were taken from ITE's *Trip Generation*, 10th Edition. According to ITE's *Trip Generation Handbook*, 2nd Edition, the weighted average rate equation should be used when the R^2 value falls below 0.75. Therefore, where the R^2 value of the fitted curve equation falls below 0.75, the weighted average rate equation was used.

According to the developer, the proposed development includes approximately 92 hotel rooms, 75,606 square feet of office space, 20,000 square feet of commercial space, 19,768 square feet of restaurant space, 85 multi-family residential units, 100 assisted living units, 126 single-family homes, 13,000 square feet of private event space, and 12,000 square feet of daycare, and a 4-fueling position convenience market with gasoline pumps.

It should be noted that the private event space was not included in the analysis since this land use is not anticipated to generate significant traffic volumes during the AM, PM, or Weekend peak periods. Additionally, the daycare was not included in the analysis for the Weekend peak period.

Data presented in the ITE publication, *Trip Generation Handbook*, show that developments containing multiple land uses will commonly have internal trips. A process was used to estimate the amount of internal trips that can be expected between land uses based on methodology presented in NCHRP Report 684, "Enhancing Internal Trip Capture Estimation for Mixed-Use Developments." The methodology contained in the NCHRP Report expands on ITE's methodology, including additional land uses and supporting data.

The internal trip reduction process resulted in the following internal capture rate estimates:

- 29% internal capture rate for the daily trip generation,
- 18.9% internal capture rate for entering trips in the AM peak hour,
- 21.1% internal capture rate for exiting trips in the AM peak hour,
- 37.3% internal capture rate for entering trips in the PM peak hour,
- 38.9% internal capture rate for exiting trips in the PM peak hour, and
- 30% internal capture rate for trips in the Weekend peak hour.

Studies have shown that some service/retail developments generate a reduced number of "new" trips. The traffic volumes entering and exiting these service/retail sites are usually either captured ("pass-by") trips from the adjacent street or diverted trips from street serving other destinations. This traffic is already existing on the roadway system and will be passing by the site even if the proposed development is not constructed.

Data presented in the *Trip Generation Handbook* indicate average pass-by percentages for typical peak periods based on the size and type of various land usage. ITE indicates the average daily pass-by percentage for a gas station is approximately 62% in the AM peak and 56% in the PM peak. To be conservative, 50% of the gas station trips were considered to be pass-by trips. Therefore, 34 of the total AM and PM peak hour external trips generated by the proposed development and 32 of the total Weekend peak hour external trips generated by the proposed development were assumed to be pass-by trips.

Table 6 presents the daily, AM, PM, and Weekend peak hour trip generation for the proposed development. As shown in Table 6, the proposed development can be expected to generate approximately 6,189 new vehicle trips per day. The AM, PM, and Weekend peak hour trip generations will equal approximately 472, 532, and 531 new trips, respectively. These trips represent the new traffic that will be generated by the proposed Roderick Place development.

TABLE 6: DEVELOPMENT TRIP GENERATION

LAND USE	SIZE	GENERATED TRAFFIC							
		DAILY TRAFFIC	AM PEAK		PM PEAK		WEEKEND	
			Enter	Exit	Enter	Exit	Enter	Exit
Hotel (LUC 310)	92 Rooms	612	24	17	22	21	38	30
General Office (LUC 710)	75,606 s.f.	809	84	14	14	73	22	18
Shopping Center (LUC 820)	20,000 s.f.	2,012	12	7	79	86	92	84
Quality Restaurant (LUC 931)	9,884 s.f.	829	3	4	52	25	63	43
High-Turnover (Sit-Down) Restaurant (LUC 932)	9,884 s.f.	1,109	54	44	60	37	57	54
Multi-Family Housing (Low-Rise) (LUC 220)	85 Units	602	9	32	32	19	32	27
Assisted Living (LUC 254)	100 Units	260	12	7	10	16	12	15
Single-Family Detached Housing (LUC 210)	126 Units	1,286	24	70	80	47	67	57
Day Care Center (LUC 565)	12,000 s.f.	571	70	62	63	70	--	--
Convenience Market with Gasoline Pumps (LUC 853)	4 fueling positions	1,290	41	42	46	46	46	46
SUBTOTAL		**9,380**	**333**	**299**	**458**	**440**	**429**	**374**
			632		**898**		**803**	
Internal Trips Reduction		*-2,722*	*-63*	*-63*	*-171*	*-171*	*-128*	*-112*
SUBTOTAL		6,658	270	236	287	269	301	262
			506		556		563	
Pass-By Trips		*-469*	*-17*	*-17*	*-12*	*-12*	*-16*	*-16*
NEW TRIPS		6,189	253	219	275	257	285	246
			472		532		531	

Source: *Trip Generation*, 10th Edition

The calculations for trip generation are included in Appendix E.

4.2 Trip Distribution and Traffic Assignment

A directional distribution of traffic generated by the proposed project was established based on the proposed access, the existing roadway network, and the existing travel patterns developed from the existing peak hour traffic counts. As previously discussed, access to the development will be provided by two access drives on Columbia Pike (SR 6/US 31). Access B was modeled to operate as right-in/right-out only.

Three directional distributions were established for the proposed development; Weekday non-pass-by trips, Weekend non-pass-by trips, and pass-by trips.

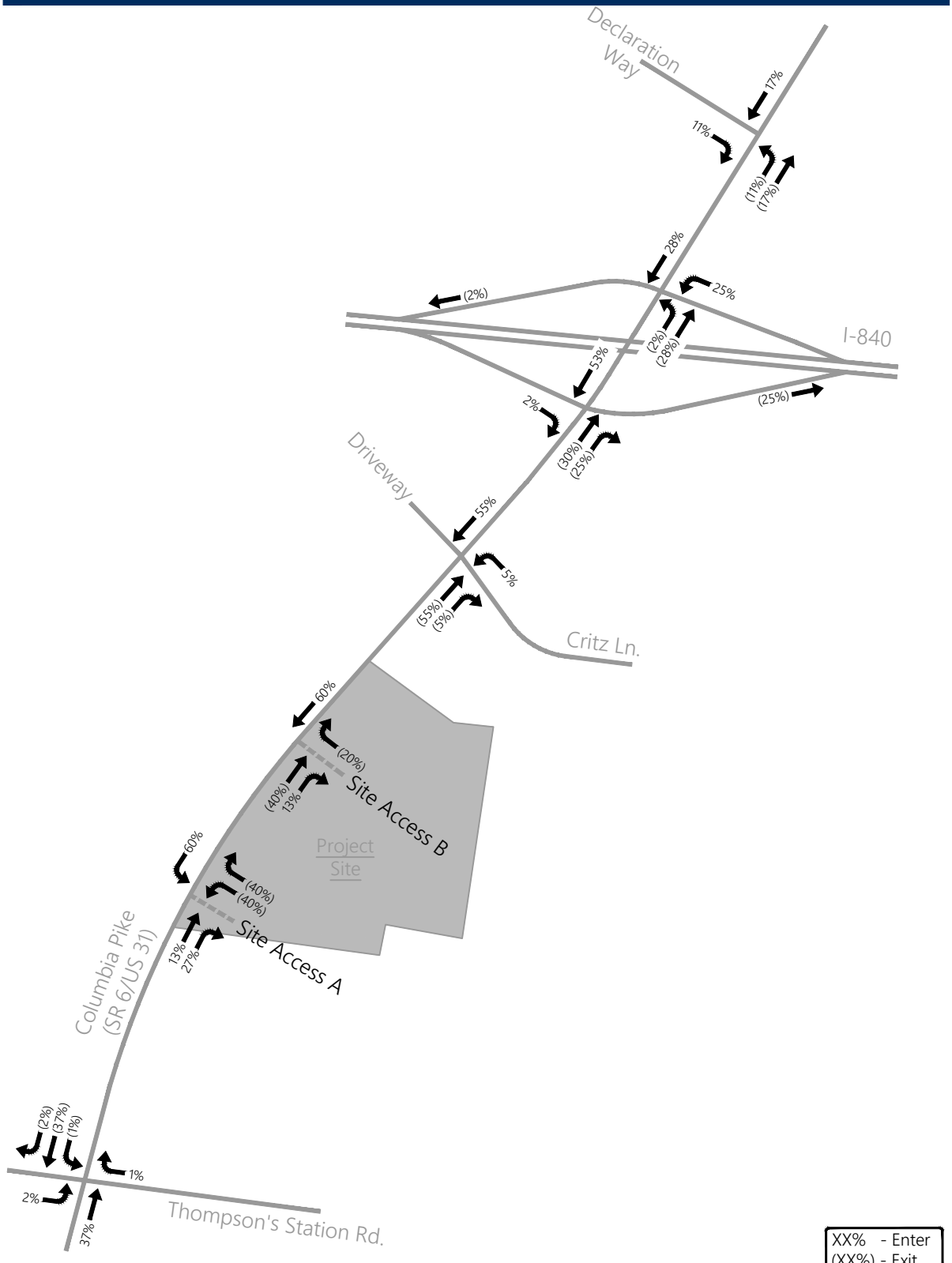
The directional distribution for the Weekday non-pass-by distribution is shown in Figure 5. As shown in the figure,

- approximately 17% of the traffic generated by the development will be oriented to the north on Columbia Parkway (SR 6/US 31),
- 11% to the west on Declaration Way,
- 2% to the west on I-840,
- 25% to the east on I-840,
- 5% to the east on Critz Lane,
- 37% to the south on Columbia Parkway (SR 6/US 31),
- 2% to the west on Thompson's Station Road, and
- 1% to the east on Thompson's Station Road.

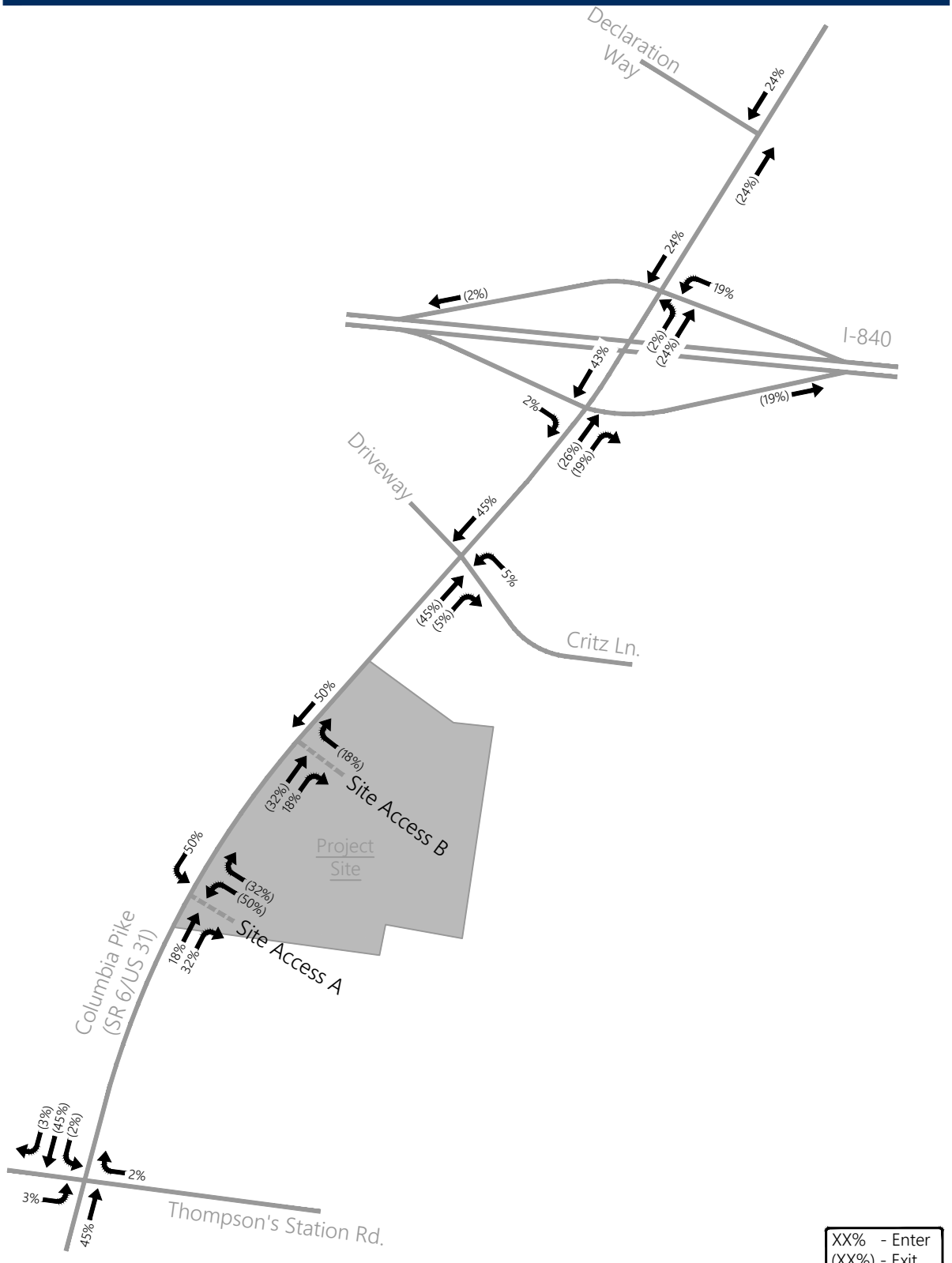
The directional distribution for the Weekend non-pass-by distribution is shown in Figure 6. As shown in the figure,

- approximately 24% of the traffic generated by the development will be oriented to the north on Columbia Parkway (SR 6/US 31),
- 2% west on I-840,
- 19% east on I-840,
- 5% to the east on Critz Lane,
- 45% to the south on Columbia Parkway (SR 6/US 31),
- 3% to the west on Thompson's Station Road, and
- 2% to the east on Thompson's Station Road.

The directional distribution and trip assignment for the pass-by trips are presented in Appendix I. Based on the directional distribution, the project-generated traffic for the AM, PM, and Weekend peak hour was assigned to the roadway network. The traffic assignment for the proposed development is shown in Figure 7.

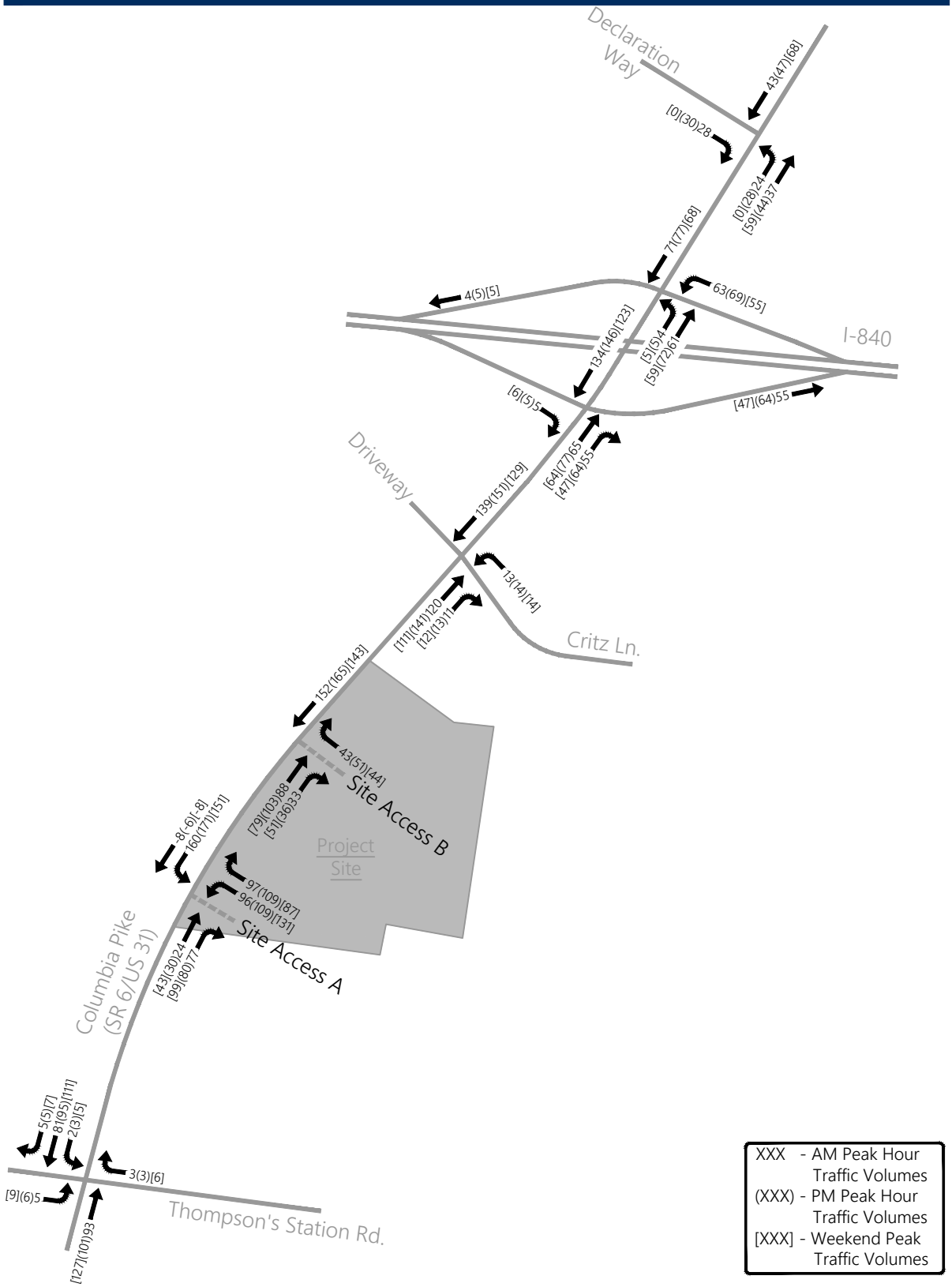


Distribution of Peak Hour Traffic Volumes
Generated by the Project Site (Weekday Non-Pass-By)
(Not to Scale) Figure 5.



Distribution of Peak Hour Traffic Volumes
Generated by the Project Site (Weekend Non-Pass-By)
(Not to Scale)

Figure 6.



Assignment of Peak Hour Traffic Volumes Generated by the Project Site
(Not to Scale)

Figure 7.

4.3 Capacity / Level of Service Analyses

The total site-generated traffic volumes were added to the background peak hour traffic volumes for the proposed Roderick Place development in order to obtain the total projected traffic volumes for the study intersections. Figure 8 presents the total projected AM, PM, and Weekend peak hour traffic volumes expected at the completion of the proposed development.

Capacity analyses were performed in order to determine the impact of the project on the study intersections. These capacity analyses were also used to evaluate the need for roadway and traffic control improvements at the intersections studied. The capacity calculations were performed according to the methods outlined in the *Highway Capacity Manual*, TRB 2010. The results of the capacity analyses for the projected conditions at the study area intersections are presented in Tables 7A, 7B, and 7C. For the analyses, the intersection configurations, peak hour factors, heavy vehicle percentages, and signal timings were the same as the existing and background conditions.

Capacity analyses for the proposed site accesses were also conducted under projected conditions with the following:

- Signalize the intersection of Columbia Pike (SR 6/US 31) and Site Access A. The northbound approach was modeled to include one through lane and one right-turn lane, the southbound approach was modeled to include one through lane and one left-turn lane, and the westbound approach was modeled to include one left-turn lane and one right-turn lane. The southbound left-turn was modeled to include protected-permissive phasing. Signal timing splits were optimized.
- The intersection of Columbia Pike (SR 6/US 31) and Site Access B was unsignalized with Columbia Pike (SR 6/US 31) operating freely and Site Access B operating as stop-controlled. Additionally, the westbound approach of Site Access B was modeled to operate as right-in/right-out only with one right-turn lane, the northbound approach was modeled to include one shared through/right-turn lane, and the southbound approach was modeled to include one through lane.

As shown in Tables 7A, 7B, and 7C, the capacity analyses indicate that the following intersection is expected to deteriorate to or continue to operate at LOS E or LOS F:

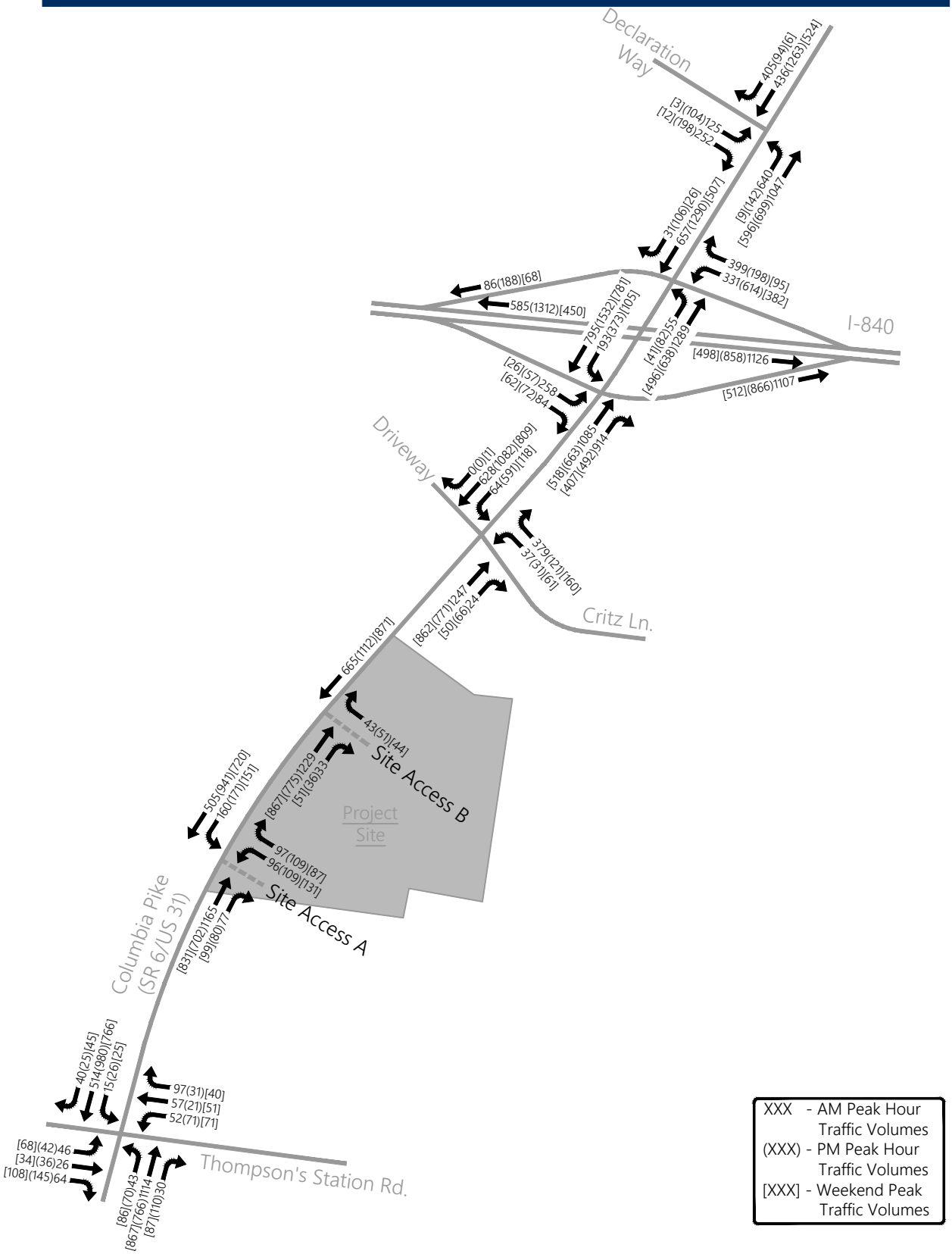
- The intersection of Columbia Pike (SR 6/US 31) and Thompson's Station Road is expected to deteriorate from LOS E to LOS F during the AM peak hour, from LOS D to LOS E during the PM peak hour, and from LOS D to LOS E in the Weekend peak hour.

Additionally, per the requirements set forth by the Town of Thompson's Station's scoping memorandum, the levels of service at each intersection approach and individual turning movements were compared between background and projected conditions. Below, turning movements and approaches that are expected to deteriorate to or continue to operate at LOS E or LOS F are discussed:

- Columbia Pike and Thompson's Station Road
    - The northbound right-turn movement is expected to deteriorate from LOS F with a lane group delay of 89.4 seconds per vehicle (s/veh) to LOS F with a lane group delay of 135.7 s/veh in the AM peak hour. Additionally, in the Weekend peak hour, the northbound right-turn movement is expected to deteriorate from LOS D with a lane group delay of 43.9 s/veh to LOS F with a lane group delay of 91.9 s/veh.
    - The overall northbound approach is expected to deteriorate from LOS F with an approach delay of 86.3 s/veh to LOS F with an approach delay of 131.2 s/veh in the AM peak hour. Additionally, in the Weekend peak hour, the overall northbound approach is expected to deteriorate from LOS D with an approach delay of 41.5 s/veh to LOS F with an approach delay of 86.2 s/veh.
    - The southbound right-turn movement is expected to deteriorate from LOS D with a lane group delay of 46.1 s/veh to LOS F with a lane group of 70.4 s/veh in the PM peak hour. Additionally, in the Weekend peak hour, the southbound right-turn movement is expected to deteriorate from LOS C with a lane group delay of 31.4 s/veh to LOS F with a lane group delay of 51.4 s/veh.
    - The overall southbound approach is expected to deteriorate from LOS D with an approach delay of 45.4 s/veh to LOS E with an approach delay of 69.2 s/veh in the PM peak hour.
- Columbia Pike and Critz Lane
    - Projected results were within the acceptable range.
- Columbia Pike and I-840 EB Ramp
    - Projected results were within the acceptable range.

- Columbia Pike and I-840 WB Ramp
    - Projected results were within the acceptable range.
- Columbia Pike and Declaration Way
    - The eastbound left-turn lane movement is expected to deteriorate from LOS F with a control delay of 1,208.1 seconds to LOS F with a control delay of 2,678.9 seconds in the AM peak hour. Additionally, in the PM peak hour, the eastbound left-turn lane movement is expected to deteriorate from LOS F with a control delay of 127.6 seconds to LOS F with a control delay of 195.1 seconds.
    - The overall eastbound approach is expected to deteriorate from LOS F with a control delay of 440.1 seconds to LOS F with a control delay of 896.5 seconds in the AM peak hour. Additionally, in the PM peak hour, the overall eastbound approach is expected to deteriorate from LOS F with a control delay of 61.8 seconds to LOS F with a control delay of 83.6 seconds in the PM peak hour.
- Columbia Pike and Site Access A
    - The northbound through movement is expected to operate at LOS F in the AM peak hour.
    - The westbound left-turn, right-turn, and overall approach are expected to operate at LOS E in the PM peak hour.
- Columbia Pike and Site Access B
    - The westbound left-turn movement is expected to operate at LOS D or better in the AM, PM, and Weekend peak hours.
- The eastbound and westbound I-840 ramp merge intersections are expected to operate at LOS B or better under all conditions.

Capacity analyses worksheets are included in Appendix D.



Total Projected Peak Hour Traffic Volumes

(Not to Scale)

Figure 8.

TABLE 7A: PROJECTED AM PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE (Average Approach Delay in sec/veh)		
		Existing	Background	Projected
Columbia Pike (SR 6/US 31) and Thompson's Station Road	Overall Intersection	D (38.1)	E (62.1)	F (87.2)
Columbia Pike (SR 6/US 31) and Critz Lane	Overall Intersection	D (41.4)	D (51.9)	D (48.0)
Columbia Pike (SR 6/US 31) and I-840 EB Ramp	Overall Intersection	B (11.0)	B (15.4)	B (15.0)
Columbia Pike (SR 6/US 31) and I-840 WB Ramp	Overall Intersection	B (17.8)	B (18.6)	B (19.4)
Columbia Pike (SR 6/US 31) and Declaration Way	Northbound Left-Turn	C (20.6)	D (32.9)	E (45.1)
	Eastbound Left-Turn	F (>300.0)	F (>300.0)	F (>300.0)
	Eastbound Right-Turn	B (11.1)	B (11.6)	B (12.4)
Columbia Pike (SR 6/US 31) and Site Access A	Overall Intersection	--	--	D (39.5)
Columbia Pike (SR 6/US 31) and Site Access B	Westbound Right-Turn	--	--	D (31.5)

Notes: For stop-controlled intersections, a LOS is presented for each critical turning movement. For signalized intersections, a LOS is presented for the overall intersection.

TABLE 7B: PROJECTED PM PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE (Average Approach Delay in sec/veh)		
		Existing	Background	Projected
Columbia Pike (SR 6/US 31) and Thompson's Station Road	Overall Intersection	C (31.7)	D (41.3)	E (55.4)
Columbia Pike (SR 6/US 31) and Critz Lane	Overall Intersection	B (10.5)	B (13.0)	B (15.5)
Columbia Pike (SR 6/US 31) and I-840 EB Ramp	Overall Intersection	A (2.1)	A (2.1)	A (2.0)
Columbia Pike (SR 6/US 31) and I-840 WB Ramp	Overall Intersection	C (23.6)	C (26.7)	C (25.0)
Columbia Pike (SR 6/US 31) and Declaration Way	Northbound Left-Turn	B (13.5)	C (15.3)	C (17.0)
	Eastbound Left-Turn	F (66.3)	F (127.6)	F (195.1)
	Eastbound Right-Turn	C (17.8)	C (21.0)	D (25.1)
Columbia Pike (SR 6/US 31) and Site Access A	Overall Intersection	--	--	B (14.3)
Columbia Pike (SR 6/US 31) and Site Access B	Westbound Right-Turn	--	--	C (17.0)

Notes: For stop-controlled intersections, a LOS is presented for each critical turning movement. For signalized intersections, a LOS is presented for the overall intersection.

TABLE 7C: PROJECTED WEEKEND PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE (Average Approach Delay in sec/veh)		
		Existing	Background	Projected
Columbia Pike (SR 6/US 31) and Thompson's Station Road	Overall Intersection	C (28.7)	D (37.8)	E (65.5)
Columbia Pike (SR 6/US 31) and Critz Lane	Overall Intersection	B (10.7)	B (11.4)	B (11.3)
Columbia Pike (SR 6/US 31) and I-840 EB Ramp	Overall Intersection	A (1.3)	A (1.3)	A (1.2)
Columbia Pike (SR 6/US 31) and I-840 WB Ramp	Overall Intersection	B (14.0)	B (14.3)	B (13.1)
Columbia Pike (SR 6/US 31) and Declaration Way	Northbound Left-Turn	A (8.3)	A (8.4)	A (8.7)
	Eastbound Left-Turn	B (12.8)	B (13.4)	B (14.3)
	Eastbound Right-Turn	A (9.7)	A (9.9)	B (10.2)
Columbia Pike (SR 6/US 31) and Site Access A	Overall Intersection	--	--	B (14.5)
Columbia Pike (SR 6/US 31) and Site Access B	Westbound Right-Turn	--	--	C (18.9)

Notes: For stop-controlled intersections, a LOS is presented for each critical turning movement. For signalized intersections, a LOS is presented for the overall intersection.

4.4 Signal Warrant Analysis

As noted in the capacity analysis, the intersection of Columbia Pike (SR 6/US 31) and Site Access A is expected to operate at poor LOS under unsignalized projected conditions in the AM, PM, and Weekend peak hours:

A traffic signal should normally be installed at an intersection only when specific warrants are satisfied. Therefore, traffic signal warrant analyses were performed with available data for the intersections based on the anticipated traffic conditions at completion of the development.

The *Manual on Uniform Traffic Control Devices* (MUTCD) sets forth nine different warrants that have been developed by the traffic engineering profession to facilitate the determination of whether a signal is warranted. These warrants include minimum conditions that normally indicate when a traffic signal is justified at a particular location.

Although the MUTCD provides nine different warrants, only three of these are potentially applicable at the intersection under study. These three warrants, described in the MUTCD, are the volume-related signal warrants, which are described as follows:

WARRANT 1A, MINIMUM VEHICULAR VOLUME

The Minimum Vehicular Volume warrant is intended for application where the volume of intersecting traffic is the principal reason for consideration of signal installation. The warrant is satisfied when, for each of any eight hours of an average day, the traffic volumes given below in Table 8 exist on the major street and on the higher volume minor street approach to the intersection.

TABLE 8. MINIMUM VEHICULAR VOLUMES FOR WARRANT 1A

Number of lanes for moving traffic on each approach		Vehicles per hour on major street	Vehicles per hour on higher volume minor approach
Major Street	Minor Street	Total of Both Approaches	One Direction Only
1 Lane	1 Lane	500	150
2 Lanes or more	1 Lane	600	150
2 Lanes or more	2 Lanes or more	600	200
1 Lane	2 Lanes or more	500	200

WARRANT 1B, INTERRUPTION OF CONTINUOUS TRAFFIC

The Interruption of Continuous Traffic warrant applies to operating conditions where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or hazard when entering or crossing the major street. The warrant is satisfied when, for each of any eight hours of an average day, the traffic volumes given below in Table 9 exist on the major street and on the higher volume minor street approach to an intersection. In addition, the signal installation shall not seriously disrupt progressive traffic flow.

TABLE 9. MINIMUM VEHICULAR VOLUMES FOR WARRANT 1B

Number of lanes for moving traffic on each approach		Vehicles per hour on major street	Vehicles per hour on higher volume minor approach
Major Street	Minor Street	Total of Both Approaches	One Direction Only
1 Lane	1 Lane	750	75
2 Lanes or more	1 Lane	900	75
2 Lanes or more	2 Lanes or more	900	100
1 Lane	2 Lanes or more	750	100

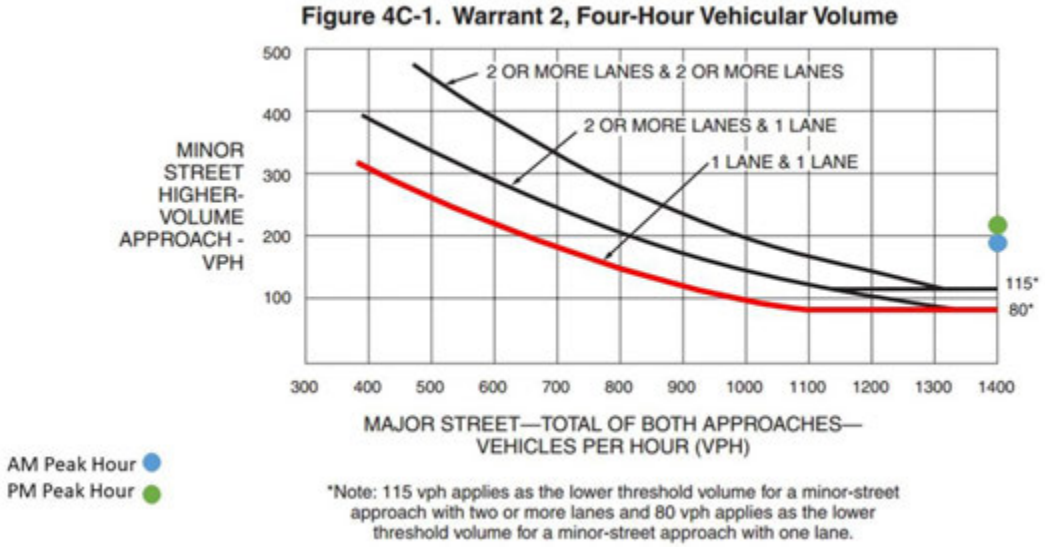
In exceptional cases, traffic signals occasionally may be justified where no single warrant is satisfied but where Warrants 1A and 1B are satisfied to the extent of 80 percent or more of the stated values. This warrant is referred to as Warrant 1C (Combination Warrant).

When only peak hour data is collected, preliminary traffic signal warrant analyses can be based on estimates of the eighth highest hour of a typical day, based off the highest peak hour. The method for this estimation is described in the Manual of Traffic Signal Design, by Iris Fullerton and James H. Kell. This estimation procedure is based on the assumption that the eight highest hours will each exceed 6.25% of the ADT and that the peak hour traffic volume is approximately 10% of the ADT.

WARRANT 2, FOUR HOUR VOLUME

The Four Hour Volume warrant is satisfied when for each of any four high hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher volume minor street approach (one direction only) all fall above the curve in Figure 9, for the appropriate combination of approach lanes. The colored dots below represent the results for each peak hour.

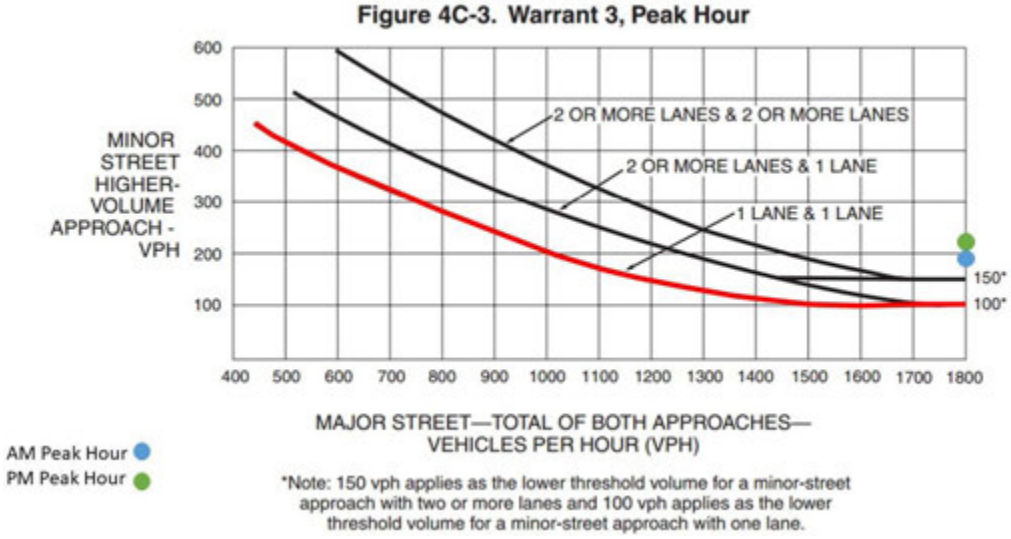
FIGURE 9. WARRANT 2, FOUR-HOUR VEHICULAR VOLUME



WARRANT 3, PEAK HOUR VOLUME

The Peak Hour Volume warrant is intended for application when traffic conditions are such that for one hour of the day, minor street traffic suffers undue traffic delay in entering or crossing the major street. The Peak Hour Volume warrant is satisfied when the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher volume minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) of an average day falls above the curve in Figure 10 for the appropriate combination of approach lanes. The colored dots below represent the results for each peak hour.

FIGURE 10. WARRANT 3, PEAK-HOUR VEHICULAR VOLUME



TRAFFIC SIGNAL WARRANT ANALYSIS RESULTS

Based on the geometry of the intersection, the analyses were performed based on one lane on the major street (Columbia Pike) and two lanes on the minor street (Site Access A). The results of the warrant analyses indicated that at the completion of the development, the projected traffic volumes at the intersection of Columbia Pike and Site Access A will warrant a traffic signal. Specifically, the intersection is expected to meet Warrant 1B for the eighth highest hour, Warrant 2 in the AM and PM peak hours, and Warrant 3 in the AM and PM peak hours. Based on the trip generation, a traffic signal for the intersection of Columbia Parkway (SR 6/US 31) and Site Access A is warranted when occupancy of the development reaches approximately 55%. Results of the warrant analyses are shown in Table 10.

TABLE 10: TRAFFIC SIGNAL WARRANT ANALYSIS – SITE ACCESS A

Hour	Main Street Both Directions	Minor Street Highest Approach	1A	1B	1C	2	3
8th Highest Hour	1186	123	No	Yes	n/a	n/a	n/a
AM Peak Hour	1904	135	n/a	n/a	n/a	Yes	Yes
PM Peak Hour	1898	196	n/a	n/a	n/a	Yes	Yes

4.5 Queue Length Analysis

95th percentile queue lengths for the critical movements of the study intersections that are expected to be impacted by the proposed development were also analyzed and evaluated under the projected conditions. Table 11 indicates the results of the queue length analyses for the study intersection.

As shown in Table 11, the 95th percentile queue lengths for the majority of critical movements of the study intersections are less than the available storage length with the following exceptions:

- The westbound left-turn lane at the intersection of Columbia Pike (SR 6/US 31) and Thompson's Station Road during the PM peak hour.
- The southbound left-turn lane at the intersection of Columbia Pike (SR 6/US 31) and Critz Lane during the PM peak hour.
- The westbound right-turn lane at the intersection of Columbia Pike (SR 6/US 31) and I-840 WB Ramp during the AM peak.

TABLE 11: STUDY INTERSECTIONS 95TH QUEUE LENGTH

INTERSECTION	TURNING MOVEMENT	AVAILABLE STORAGE (FEET)	95TH QUEUE LENGTH (FEET)		
			PROJECTED		
			AM Peak Hour	PM Peak Hour	Weekend Peak Hour
Columbia Pike (SR 6/US 31) and Thompson's Station Road	Eastbound Left-Turn	100	51	58	63
	Westbound Left-Turn	85	56	86	65
	Northbound Left-Turn	105	29	65	58
	Southbound Left-Turn	120	m12	m15	m11
Columbia Pike (SR 6/US 31) and Critz Lane	Westbound Left-Turn	150	55	59	74
	Southbound Left-Turn	275	12	496	37
Columbia Pike (SR 6/US 31) and I-840 EB Ramp	Eastbound Left-Turn	--	124	46	21
	Eastbound Right-Turn	350	26	31	2
	Northbound Right-Turn	700	499	272	244
	Southbound Left-Turn	150	120	m30	12
Columbia Pike (SR 6/US 31) and I-840 WB Ramp	Westbound Left-Turn	--	145	229	145
	Westbound Right-Turn	225	#470	84	38
	Northbound Left -Turn	200	m19	#193	3
	Southbound Right-Turn	575	10	34	7
Columbia Pike (SR 6/US 31) and Declaration Way	Northbound Left-Turn	550	348	38	0
	Eastbound Left-Turn	--	430	180	0
	Eastbound Right-Turn	225	40	80	3
Columbia Pike (SR 6/US 31) and Site Access A	Westbound Left-Turn	--	113	145	128
	Westbound Right-Turn	75	46	53	40
	Northbound Right-Turn	50	m43	m30	m32
	Southbound Left-Turn	150	147	58	111
Columbia Pike (SR 6/US 31) and Site Access B	Westbound Right-Turn	--	25	13	13

#: 95th percentile volume exceeds capacity, queue may be longer.
m: Volume for 95th percentile queue is metered by upstream signal.

5. ANALYSIS OF SITE PLAN

5.1 Site Access Review

Based on the current site plan, two proposed vehicular access points for the development will be provided on Columbia Pike (SR 6/US 31), located on the west side of the project site. Site Access A will be intersecting Columbia Pike approximately 420 feet north of the southern property line of the site. The intersection of Columbia Pike and Site Access A is expected to operate at LOS D or better under signalized conditions. It is recommended that when the development reaches approximately 55% occupancy, a signal should be installed at the intersection of Columbia Pike and Site Access A. Site Access B will intersect Columbia Pike approximately 650 feet further to the north. The westbound approach of Site Access B is planned to operate as right-in/right-out only. Additionally, Site Access B is expected to operate at LOS D or better in the AM, PM, and Weekend peak hours.

According to the Major Thorough Plan for the Town of Thompson's Station, the construction of a new east-west roadway connecting Columbia Pike to Clayton Arnold Road is planned through this project site. Specifically, Site Access A is planned to provide the start of that connector roadway. When this connection is established, the site distribution and existing roadway distribution is expected to change.

Based on the information presented above, it was determined that two site accesses should be sufficient to accommodate the peak period demand. The addition of a third access point only serves to increase the number of conflict points/potential crash locations along Columbia Pike and will not provide a significant improvement to the levels of service at the proposed site access points.

5.2 Pedestrian, Bicycle, and Transit Access

Bike lanes are provided on both sides of Columbia Pike (SR 6/US 31) in the vicinity of the project area. No pedestrian or transit services are provided near the project site.

5.3 TDOT Driveway Standards

TDOT permits access to state highways according to the standards outlined in their *Manual for Constructing Driveway Entrances on State Highways,* 2015 Edition. The site accesses for the Roderick Place development were evaluated according to these standards.

According to Section 4.2, one access is permitted for frontages less than 200 feet. Based on the need of additional access to provide better internal circulation and safety, an additional access may be permitted for frontages from 200 to 400 feet, and more than two accesses may be permitted for frontages greater than 400 feet. For frontages greater than 400 feet, additional access points are permitted every 200 feet of continuous frontage. The Roderick Place site plan proposes two accesses on Columbia Pike, and the distance between access points exceeds the recommended 200 feet.

5.4 Lane Warrant Analysis

The northbound approach of Columbia Pike (SR 6/US 31) at Site Access B was evaluated for the need to provide a right-turn lane based on the projected traffic volumes during the AM and PM peak hours. This analysis was based on the procedures outlined in the Intersection Channelization Design Guide (NCHRP 279). The results of the analysis indicate that a right-turn lane is not warranted in the AM or PM peak hour.

All warrant analyses are included in Appendix F.

5.5 Safety Analysis

Crash data was obtained from the Tennessee Department of Transportation. Since 2016, 107 crashes have occurred at the study intersections and along Columbia Pike (SR 6/US 31) on the frontage of the project site. Of the total crashes, 87 were property damage crashes, 18 were minor injury crashes, one involved a serious injury, and one was fatal. Table 12 and Table 13 present the intersection and segment crash analysis, respectively.

TABLE 12: INTERSECTION CRASH RATES

INTERSECTION	COLUMBIA PIKE AND					I-840 EB MERGE	I-840 WB MERGE
	THOMPSON'S STATION RD	CRITZ LANE	I-840 EB RAMP	I-840 WB RAMP	DECLARATION WAY		
Number of Crashes	32	5	23	29	10	4	4
Injuries	5	0	7	6	1	0	0
Fatal	0	0	0	0	0	1	0
Crash Rate	1.321	0.164	0.583	0.875	0.307	0.101	0.121

TABLE 13: SEGMENT CRASH RATES

CRASH TYPE	RESULT
Number of Crashes	9
Injuries	2
Fatal	0
Crash Rate	0.823

Based on the crash analysis, the highest reported intersection crash rate is at the intersection of Columbia Pike and Thompson's Station Road and was determined to be approximately 1.321 crashes per million entering vehicles. The segment crash rate for the property frontage was determined to be 0.823 crashes per million vehicle miles. According to TDOT's *Tennessee Traffic Crash Data*, Tennessee's average crash rate between 2016 and 2018 is 4.3 crashes per million vehicle miles. Additionally, Williamson County's average crash rate for 2018 is 2.988 crashes per million vehicle miles. Therefore, the crash rates along the project site frontage segments are lower than the state and county averages. Based on the fact that intersection and segment crash rates all fall below 2.000, and the segment crash rates fall below state and county average crash rates, no existing safety issues at the study intersections and along the property frontage are noted. Therefore, no safety improvements are recommended at this time.

Crash data calculations are included in Appendix H.

6. CONCLUSIONS

6.1 Capacity Analysis

According to the developer, the proposed development includes approximately 92 hotel rooms, 75,606 square feet of office space, 20,000 square feet of commercial space, 19,768 square feet of restaurant space, 85 multi-family residential units, 100 assisted living units, 126 single-family homes, 13,000 square feet of private event space, and 12,000 square feet of daycare, and a 4-fueling position convenience market with gasoline pumps.

The capacity analyses indicate that the following intersections are expected to deteriorate to or continue to operate at LOS E or LOS F:

- The intersection of Columbia Pike (SR 6/US 31) and Thompson's Station Road is expected to deteriorate from LOS E to LOS F during the AM peak hour, from LOS D to LOS E during the PM peak hour, and from LOS D to LOS E in the Weekend peak hour.
    - *This intersection was reevaluated with improvements to determine what is needed to maintain overall LOS D or better. It was determined the addition of a northbound and southbound through lane would be needed. Additionally, signal timing should be updated in the PM peak. These combined would mitigate any existing, background, or projected LOS E or LOS F. This developer does not own the property surrounding this intersection; however, and there is not currently right-of-way for these improvements. Therefore, the TIS does not present recommendations for this intersection.*

Additionally, per the requirements set forth by the Town of Thompson's Station's scoping memorandum, the levels of service at each intersection approach and individual turning movements were compared between background and projected conditions. Below, turning movements and approaches that are expected to deteriorate to or continue to operate at LOS E or LOS F are discussed:

- Columbia Pike and Thompson's Station Road
    - The northbound right-turn movement is expected to deteriorate from LOS F with a lane group delay of 89.4 seconds per vehicle (s/veh) to LOS F with a lane group delay of 135.7 s/veh in the AM peak hour. Additionally, in the Weekend peak hour, the northbound right-turn

movement is expected to deteriorate from LOS D with a lane group delay of 43.9 s/veh to LOS F with a lane group delay of 91.9 s/veh.
    - The overall northbound approach is expected to deteriorate from LOS F with an approach delay of 86.3 s/veh to LOS F with an approach delay of 131.2 s/veh in the AM peak hour. Additionally, in the Weekend peak hour, the overall northbound approach is expected to deteriorate from LOS D with an approach delay of 41.5 s/veh to LOS F with an approach delay of 86.2 s/veh.
    - The southbound right-turn movement is expected to deteriorate from LOS D with a lane group delay of 46.1 s/veh to LOS F with a lane group of 70.4 s/veh in the PM peak hour. Additionally, in the Weekend peak hour, the southbound right-turn movement is expected to deteriorate from LOS C with a lane group delay of 31.4 s/veh to LOS F with a lane group delay of 51.4 s/veh.
    - The overall southbound approach is expected to deteriorate from LOS D with an approach delay of 45.4 s/veh to LOS E with an approach delay of 69.2 s/veh in the PM peak hour.
    - *This intersection was reevaluated with improvements to determine what is needed to maintain overall LOS D or better. It was determined that the addition of a northbound and southbound through lane would be needed. Additionally, signal timing should be updated in the PM peak. These combined would mitigate any existing, background, or projected LOS E or LOS F. This developer does not own the property surrounding this intersection; however, and there is not currently right-of-way for these improvements. Therefore, the TIS does not present recommendations for this intersection.*
- Columbia Pike and Critz Lane
    - Projected results were within the acceptable range.
- Columbia Pike and I-840 EB Ramp
    - Projected results were within the acceptable range.
- Columbia Pike and I-840 WB Ramp
    - Projected results were within the acceptable range.
- Columbia Pike and Declaration Way
    - The eastbound left-turn lane movement is expected to deteriorate from LOS F with a control delay of 1,208.1 seconds to LOS F with a control delay of 2,678.9 seconds in the AM peak hour. Additionally, in the PM peak hour, the eastbound left-turn lane movement is expected to deteriorate from LOS F with a control delay of 127.6 seconds to LOS F with a control delay of 195.1 seconds.

  - The overall eastbound approach is expected to deteriorate from LOS F with a control delay of 440.1 seconds to LOS F with a control delay of 896.5 seconds in the AM peak hour. Additionally, in the PM peak hour, the overall eastbound approach is expected to deteriorate from LOS F with a control delay of 61.8 seconds to LOS F with a control delay of 83.6 seconds in the PM peak hour.
  - *These values do not depict the existing conditions at this intersection because the intersection is currently being controlled by a crossing guard in the AM and PM peak hours. The crossing guard mitigates the side street delay that would otherwise occur. Intersection should continue to be controlled via a crossing guard during school peaks.*
- Columbia Pike and Site Access A
  - The northbound through movement is expected to operate at LOS F in the AM peak hour.
    - *While the northbound through movement is expected to operate at LOS F in the AM peak hour, the overall intersection of Columbia Pike and Site Access A is expected to operate at good LOS for AM and PM peak hours. Therefore, no mitigation measures are recommended at this time.*
  - The overall westbound approach is expected to operate at LOS E in the PM peak hour.
    - *Signal splits at this intersection show preference to Columbia Pike northbound and southbound movements as these movements hold a higher priority. Signal splits could be set to show preference to Site Access A, however, this is not recommended because it would increase delays for the main street.*
- Columbia Pike and Site Access B
  - The westbound left-turn movement is expected to operate at LOS D or better in the AM, PM, and Weekend peak hours.
- The eastbound and westbound I-840 ramp merge intersections are expected to operate at LOS B or better under all conditions.

Capacity analysis is provided in Appendix D.

6.2 Site Access

Based on the current site plan, two proposed vehicular access points for the development will be provided on Columbia Pike (SR 6/US 31). Site Access A will be intersecting Columbia Pike approximately 420 feet north of the southern property line of the site. The intersection of Columbia Pike and Site Access A is expected to operate at LOS D or better under signalized conditions. It is recommended that when the development reaches approximately 55% occupancy, a signal should be installed at the intersection of Columbia Pike and Site Access A. Site Access B will intersect Columbia Pike approximately 650 feet further to the north. The westbound approach of Site Access B is planned to operate as right-in/right-out only and is expected to operate at LOS D or better in the AM, PM, and Weekend peak hours.

According to the Major Thorough Plan for the Town of Thompson's Station, the construction of a new east-west roadway connecting Columbia Pike to Clayton Arnold Road is planned through this project site. Site Access A is planned to provide the start of that connector roadway. When this connection is established, the site distribution and existing roadway distribution is expected to change so that some traffic from the Roderick development will travel to the east instead of using Columbia Pike for access.

Based on the information presented above, it was determined that two site accesses will be sufficient to accommodate the peak period demand. The addition of a third access point only serves to increase the number of conflict points/potential crash locations along Columbia Pike and will not provide a significant decrease to the levels of service at the proposed site access points.

6.3 Safety Analysis

Based on the crash analysis, the highest reported intersection crash rate is at the intersection of Columbia Pike and Thompson's Station Road and was determined to be approximately 1.321 crashes per million entering vehicles. The segment crash rate for the property frontage was determined to be 0.823 crashes per million vehicle miles. According to TDOT's *Tennessee Traffic Crash Data*, Tennessee's average crash rate between 2016 and 2018 is 4.3 crashes per million vehicle miles. Additionally, Williamson County's average crash rate for 2018 is 2.988 crashes per million vehicle miles. Therefore, the crash rates along the project site frontage segments are lower than the state and county averages. Intersection and segment crash rates all fall below 2.000, and the segment crash rates fall below state and county average crash rates. Therefore, no existing safety issues at the study intersections and along the property frontage are noted. Therefore, no safety improvements are recommended at this time.

7. RECOMMENDATIONS

The proposed Roderick Place development is located along Columbia Pike (SR 6/US 31) in Thompson's Station, Tennessee. According to the developer, the proposed development includes approximately 92 hotel rooms, 75,606 square feet of office space, 20,000 square feet of commercial space, 19,768 square feet of restaurant space, 85 multi-family residential units, 100 assisted living units, 126 single-family homes, 13,000 square feet of private event space, and 12,000 square feet of daycare, and a 4-fueling position convenience market with gasoline pumps. Access to the project site is planned to be provided by two site accesses along Columbia Pike. Site Access A will be intersecting Columbia Pike approximately 420 feet north of the southern property line of the site and Site Access B will intersect Columbia Pike approximately 650 feet further to the north. The analyses presented in this study indicate that the impacts of the proposed project on the existing street network will be manageable by providing the recommendations below. The recommendations are as follows:

Columbia Pike (SR 6/US 31) and Site Access A

- Provide a traffic signal at the intersection. A traffic signal should be installed at approximately 55% occupancy of the development.
- Until the 55% occupancy level is reached, the westbound approach of Site Access A should be stop-controlled and a stop bar and R1-1 'Stop' sign should be installed on the egress approach.
- Site Access A should be designed to include sufficient width for one entering lane and three exiting lanes. The exiting approach should include one left-turn lane and one right-turn lane with approximately 150 feet of storage length and a through lane to account for a future fourth leg of the intersection. This through lane should be striped out until needed.
- Provide a northbound right-turn lane on Columbia Pike (SR 6/US 31) with approximately 100 feet of storage length.
- Provide a southbound left-turn lane on Columbia Pike (SR 6/US 31) with approximately 150 feet of storage length.

Columbia Pike (SR 6/US 31) and Site Access B

- Site Access B should initially be utilized as the development construction entrance.
- Site Access B should be converted from a construction access to a site access at the time when approximately 50% occupancy of the development is reached.
- When Site Access B is converted to a site access, it should operate as right-in/right-out only and should be designed to include sufficient width for one entering lane and one exiting lanes.

- The westbound approach of Site Access B should be stop-controlled and a stop bar and R1-1 'Stop' sign should be installed on the egress approach.

Signal Timing Optimization and Coordination

- Signal timings at all the signalized study intersections should be optimized upon completion of the development. Furthermore, after providing a traffic signals at the intersection of Columbia Pike (SR 6/US 31) and Site Access A, signal timing coordination should be conducted between the three intersections of Columbia Pike (SR 6/US 31) and Thompson's Station Road, Columbia Pike (SR 6/US 31) and Site Access A, and Columbia Pike (SR 6/US 31) and Critz Lane.

Additional Recommendations

- As part of the construction of the project, all internal and external driveway connections should be designed such that the departure sight triangles, as specified by AASHTO, will be clear of all sight obstructions, including landscaping, existing vegetation, monument signs/walls, fences, etc.
- Parking should be developed per code.
- According to the Major Thorough Plan for the Town of Thompson's Station, the construction of a new east-west roadway connecting Columbia Pike to Clayton Arnold Road is planned through this project site. Site Access A is planned to provide the start of that connector roadway and the site plan shows the proposed collector road extending to the southern property line. This internal collector roadway should be designed to Town of Thompson's Station standards for a ST-60-36 collector road. The collector should terminate as a stub and right-of-way should be dedicated for its future extension to the south property line.
- In the event of a large function at the private event space, traffic control officers should be considered to direct traffic.
- Final design of internal roadways and parking should meet all Town of Thompson's Station standards and the latest version of "A Policy of Geometric Design of Highways and Streets" published by AASHTO. Any parking lots and streets associated with the development should ensure that passenger cars and emergency vehicles are capable of making all turning movements. Internal intersections should be two-way stop-controlled unless all-way stop control warrants are met.
- Per the TDOT *Manual for Constructing Driveway Entrances on State Highways*, this development meets the minimum requirements for distance between two site access points.

- The Major Thoroughfare Plan for the Town of Thompson's Station details the following roadway improvements occurring in the vicinity of the project site:
    - The widening of Columbia Pike (SR 6/US 31) to a 4-lane median-divided cross-section, and
    - The construction of an east-west roadway connecting Columbia Pike to Clayton Arnold Road at its intersection with Robbins Nest Road.

  As previously described, the Roderick Place developer shall design a ST-60-36 collector roadway with a 60-foot right-of-way from Columbia Pike to the southern property line approximately as shown on the revised concept plan and the MTP. Additionally, right-of-way shall be dedicated along the entire frontage of Roderick Place (approximately 2,600 linear feet). The width is to be determined by State of Tennessee (TDOT) construction drawings.

In summary, based on the analyses conducted, no further recommendations are presented for the proposed Roderick Place development.

APPENDICES

APPENDIX A
PRELIMINARY SITE PLAN

APPENDIX B
DETAILED TURNING MOVEMENT COUNTS

APPENDIX C
TDOT COUNT DATA

APPENDIX D
CAPACITY ANALYSES

APPENDIX E
TRIP GENERATION CALCULATIONS

APPENDIX F
WARRANT ANALYSIS

APPENDIX G
SIGNAL TIMING SHEETS

APPENDIX H
CRASH DATA

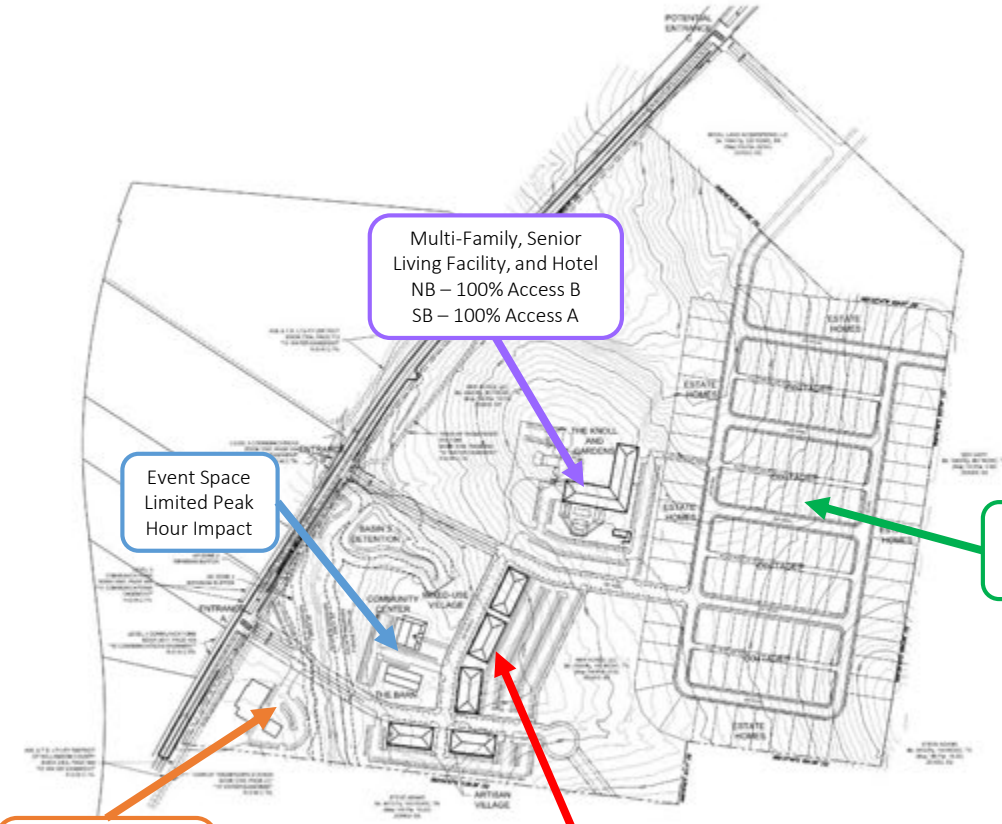
APPENDIX I
PASS-BY DISTRIBUTION AND ASSIGNMENT

APPENDIX A
PRELIMINARY SITE PLAN

Land Use Distributions

SITE LOCATION MAP

SCALE: 1"=2000'-0"



Master Plan Tabular Data

Existing Zoning: High Intensity District
Gross Site Area: 79.90 AC

Requirements of Proposed Zoning: Specific Plan, High Intensity District (Cluster Option)
- General Plan Requirements:
-Maximum Density: 3.00 DU/AC
-Maximum Height: 3 Stories
-Required Open Space: 40% Residential | 50% Commercial
-Minimum Site Area: 10 Acres
-Maximum Site Area: 100 Acres
-Area Permitted as Residential: 100%
-Area Permitted as Commercial: 100%

Density:

-Gross Permitted Density:	3.00 DU/AC
-Total Residential:	211 Units
-Estate Lots:	54 Units
-Cottage Lots:	72 Units
-Multistory dwellings/ live work:	85 Units
-Total Commercial:	129,367 S.F.
-Event Center & Historic Barn:	13,500 S.F.
-Hotel w/ Senior Residences:	92 Units
-Senior Living (IL,AL,ALZ):	100 Beds

Open Space:
-Total Land Area: 79.90 Acres
-Total Commercial Area: 9.26 Acres X 50% = 4.63 Acres
-Total Residential Area: 70.64 Acres X 40% = 28.25 Acres
-Total Required Open Space: 32.88 Acres
-Total Provided Open Space: 35.80 Acres

CONCEPT PLAN

0 200 400 600 feet

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144 SOUTHEAST PKWY.
SUITE 230
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37064

RODERICK PLACE
CONCEPTUAL SITE PLAN
THOMPSON'S STATION, TENNESSEE

ISSUE 07.19.19
RE-ISSUE 11.26.19

PROJECT
RODERICK PLACE

DEVELOPER
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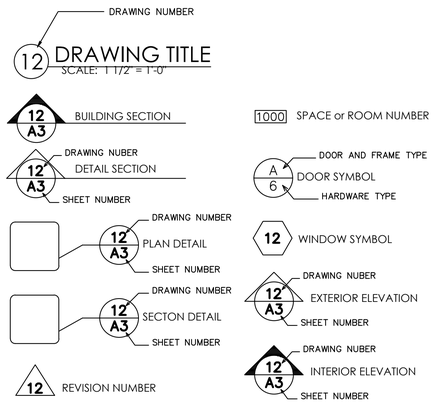
CP
01

RODERICK PLACE
CONCEPTUAL SITE PLAN

4630 COLUMBIA PIKE
THOMPSON'S STATION, TENNESSEE

SYMBOLS LEGEND



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Jay Franks: 615.300.0001
E: jfranks130@gmail.com

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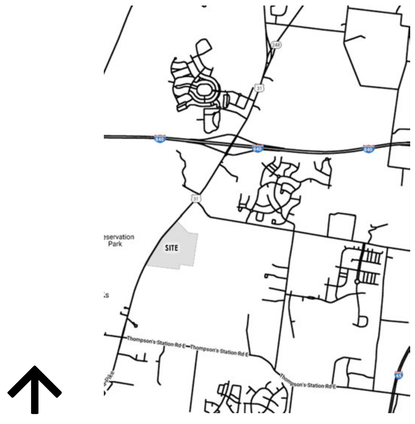
Franklin, TN. 37064

I hereby certify that these plans and specifications have been prepared by me or under my supervision. I further certify that to the best of my knowledge these plans and specifications are as required by law and in compliance with applicable codes and the 2015 IBC.

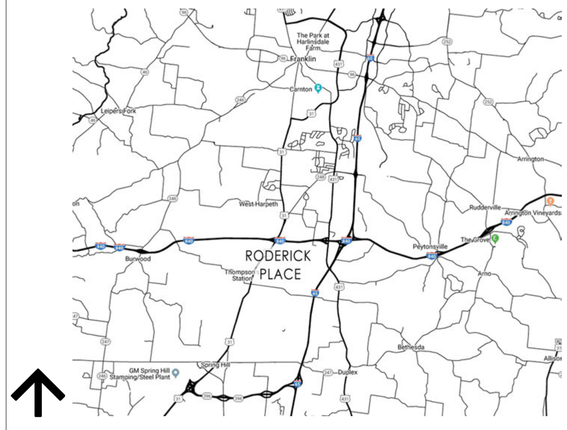
INDEX OF DRAWINGS

APPROVALS

LOCATION MAP:



VICINTY MAP:



BUILDING CODE LOCATION

Building Code information, Occupancy information and Life Safety Data is shown on Sheet BC1.0 are provide to completely delineate the component design of the buildings.

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Archaeological Consultant
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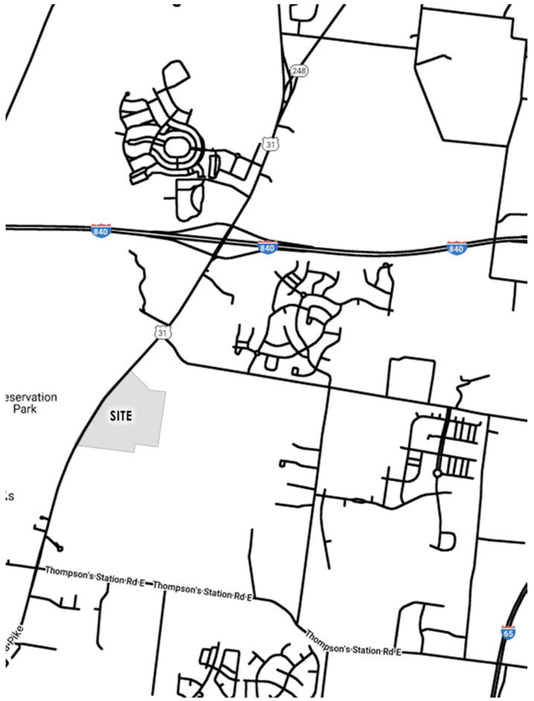

SITE LOCATION MAP

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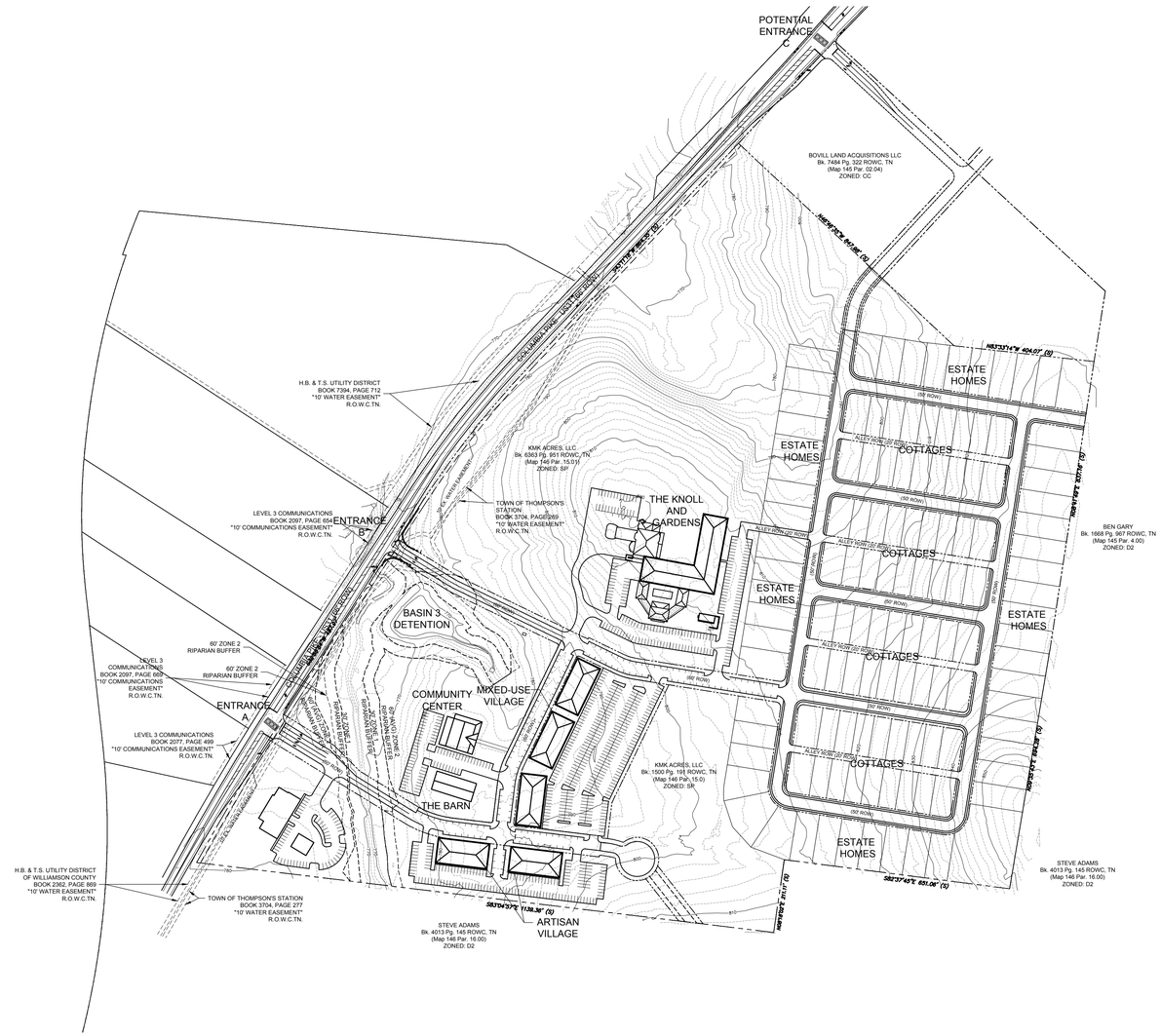

CONCEPT PLAN

0 200 400 600 feet

N

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PHASING PLAN

0 200 400 600 feet

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NOTE: SUBJECT TO CHANGE

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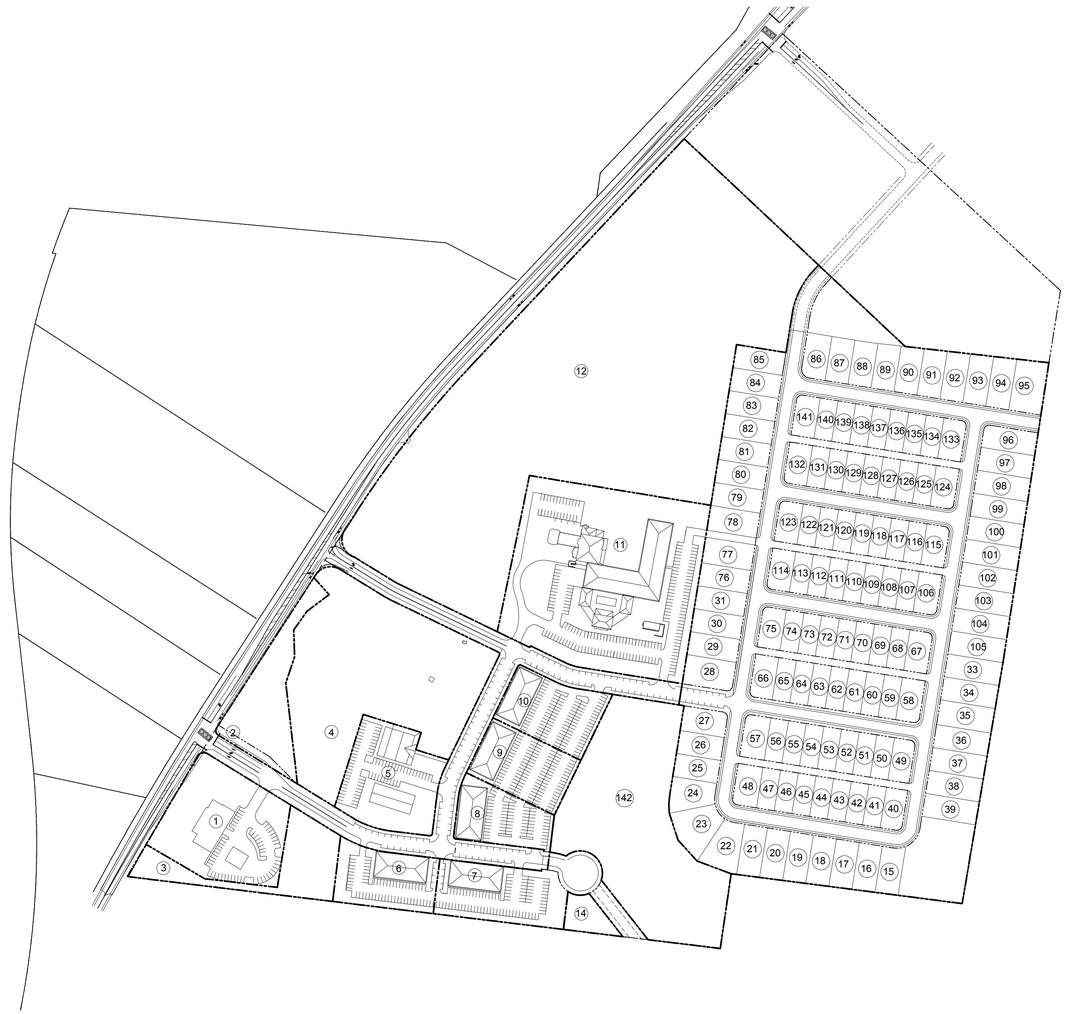

CONCEPT LOT PLAN

0 200 400 600 feet

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CONCEPT NATURAL RESOURCES PLAN PLAN

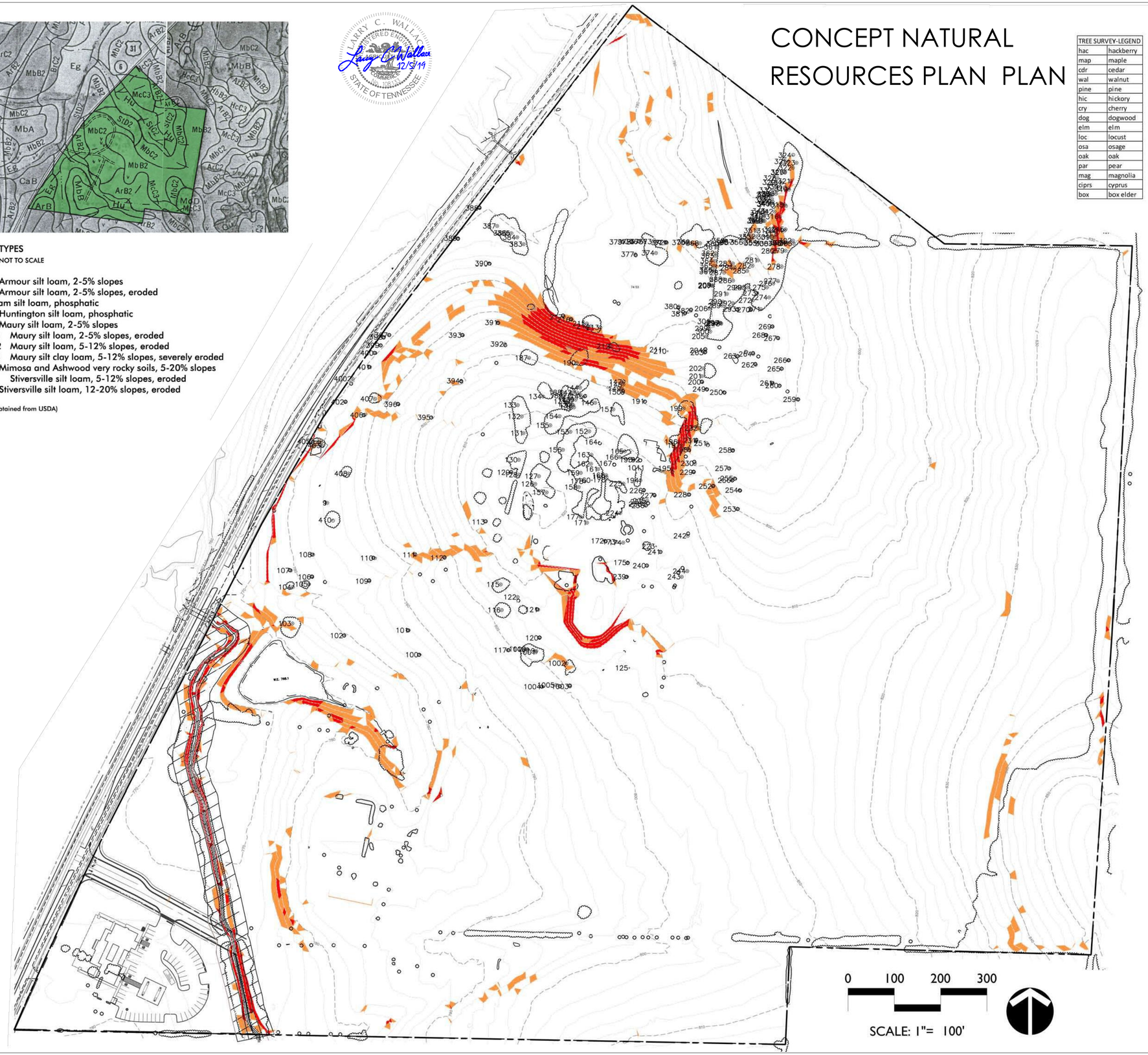
SOIL TYPES

IMAGE NOT TO SCALE

ArB Armour silt loam, 2-5% slopes
ArB2 Armour silt loam, 2-5% slopes, eroded
Eg Egam silt loam, phosphatic
Hu Huntington silt loam, phosphatic
MbB Maury silt loam, 2-5% slopes
MbB2 Maury silt loam, 2-5% slopes, eroded
MbC2 Maury silt loam, 5-12% slopes, eroded
McC3 Maury silt clay loam, 5-12% slopes, severely eroded
MoD Mimosa and Ashwood very rocky soils, 5-20% slopes
StC2 Stiversville silt loam, 5-12% slopes, eroded
StD2 Stiversville silt loam, 12-20% slopes, eroded

(Data obtained from USDA)

LARRY C. WALLACE
REGISTERED ENGINEER
12/5/19
STATE OF TENNESSEE



0 100 200 300

SCALE: 1"= 100'

TREE SURVEY-LEGEND	
hac	hackberry
map	maple
cdr	cedar
wal	walnut
pine	pine
hic	hickory
cry	cherry
dog	dogwood
elm	elm
loc	locust
osa	osage
oak	oak
par	pear
mag	magnolia
cipr s	cyprus
box	box elder

TREE SURVEY-POINT DESCRIPTION

Point #	Description	Point #	Description	Point #	Description	Point #	Description
100	51 hac	201	24 hac	302	14 elm	389	22 wal
101	60 tree	202	12 hac	303	28 wal	390	20 map
102	6 map	203	12 elm	304	16 wal	391	12 hic
103	36 cdr	204	22 hac	305	10 hac	392	18 oak
104	10 cipr s	205	20 wal	306	20 hac	393	6 par
105	10 cipr s	206	20 hac	307	10 hac	394	14 oak
106	12 hac	207	20 wal	308	14 hac	395	6 oak
107	15 map	208	16 hac	309	10 wal	396	10 map
108	17 oak	209	8 hac	310	6 hac	397	20 wal
109	10 red map	210	24 hac	311	20 wal	398	18 wal
110	60 hic	211	26 hac	312	30 map	399	6 dog clust
111	11 cry	212	10 map clust	313	12 wal	400	6 dog clust
112	16 cry	213	20 hac	314	8 hac tri	401	8 dog tri
113	25 tree	214	24 wal	315	12 elm	402	6 par
114	25 wall	215	18 hac	316	10 hac	403	28 hac
115	14 map	216	24 hac	317	10 hac	404	30 hac
116	16 map	217	28 hac	318	18 hac	405	12 dog
117	14 wal	226	20 wal	319	10 hac	406	12 cry
118	16 pine	227	18 wal	320	10 hac	407	8 mag
119	18 map	228	38 hac	321	24 hac	408	12 oak
120	16 wal	229	18 hac	322	24 cry	410	8 mag clust
121	21 hic	230	18 hac	323	32 hac		
122	12 map clust	231	12 wal	324	28 hac		
126	17 mag	232	24 elm	325	8 hac		
127	48 mag	235	16 wal	326	6 hac		
128	22 wal	236	22 wal	327	26 hac		
129	18 hac	237	8 wal	328	18 hac		
130	24 mag twn	238	14 wal	329	26 wal		
131	46 hic	239	16 wal	330	20 wal		
132	17 pine	240	8 map	331	12 hac		
133	50 hol clust	241	8 map	332	14 hac tri		
134	52 hic	242	20 wal	333	14 hac		
135	15 wal	243	22 wal	334	12 hac		
136	15 wal	244	20 wal	335	8 hac twn		
137	15 wal	249	24 wal	336	14 hac		
138	12	250	24 wal	337	6 hac		
139	16 wal	251	26 wal	338	8 hac		
140	7 wal	252	20 wal	339	20 hac		
141	7 wal	253	26 wal	340	12 hac twn		
142	14 wal	254	24 wal	341	20 hac		
143	14 wal	255	22 wal	342	10 elm		
144	36 wal	256	16 wal	343	8 hac		
145	36 wal twn	257	22 wal	344	12 hac		
146	24 map clust	258	28 wal	345	30 hac		
147	24 wal	259	28 wal	346	8 hac		
148	6 wal	260	18 wal	347	12 hac		
149	10 wal	261	22 wal	348	14 oak		
150	72 wal clust	262	18 wal	349	16 hac		
151	17 map	263	20 wal	350	6 hac twn		
152	10 map	264	24 wal	351	12 hac tri		
153	15 map	265	24 wal	352	16 hac twn		
154	15 map	266	24 wal	353	16 map		
155	15 hic	267	26 wal	354	12 wal		
156	25 elm	268	26 wal	355	10 hac		
157	60 hic	269	26 wal	356	12 hac		
158	10 box	270	28 wal	357	16 hac		
159	40 mag clust	271	15 wal	358	12 hac		
160	16 mag clust	272	32 hac	359	14 hac		
161	10 pine	273	16 hac	360	12 cry		
162	10 map	274	16 wal	361	18 wal		
163	8 wal	275	6 loc	362	14 hac		
164	20 dog clust	276	24 wal	363	20 hac		
165	24 wal	277	8 osa clust	364	14 hac		
166	24 wal	278	18 wal	365	14 hac twn		
167	18 wal	279	20 elm	366	16 hac		
168	16 wal	280	18 hac	367	14 hac		
169	8 wal	281	16 wal	368	34 hac		
170	24 wal	282	16 hac	369	26 hac		
171	8 dog	283	12 wal	370	14 hac		
172	30 hic	284	16 wal	371	26 hac		
173	14 map	285	28 hac	372	14 hac		
174	32 wal	286	12 wal	373	32 hac		
175	24 wal	287	8 wal	374	20 osa twn		
187	10 mag clust	288	12 wal	375	28 hac		
188	12 wal	289	16 wal	376	22 hac		
189	10 wal	290	18 wal	377	40 wal		
190	22 oak	291	14 wal	378	30 hac		
191	18 map	292	14 wal	379	26 hac		
192	20 wal	293	28 hac	380	12 hic		
193	18 wal	294	12 wal	381	24 hac		
194	20 mag	295	18 hac	382	26 elm		
195	30 wal	296	14 hac	383	20 pine		
196	18 map	297	12 hac	384	16 pine		
197	22 map	298	18 hac	385	16 pine		
198	24 hac	299	18 hac	386	16 pine		
199	30 map	300	24 hac	387	20 pine		
200	24 elm	301	14 hac twn	388	22 wal		

SLOPE ANALYSIS			
NUMBER	COLOR	RANGE BEG.	RANGE END
1		15.00%	24.99%
2		25.00%	100.00%

ENERGY LAND & INFRASTRUCTURE
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RODERICK PLACE
CONCEPTUAL SITE PLAN
THOMPSON'S STATION, TENNESSEE

ISSUE 07.19.19
RE-ISSUE 08.07.19

PROJECT RODERICK PLACE

OWNER
SAMSON J/V
144 SOUTHEAST PKWY. SUITE 230
FRANKLIN TN. 37064

C

1.0

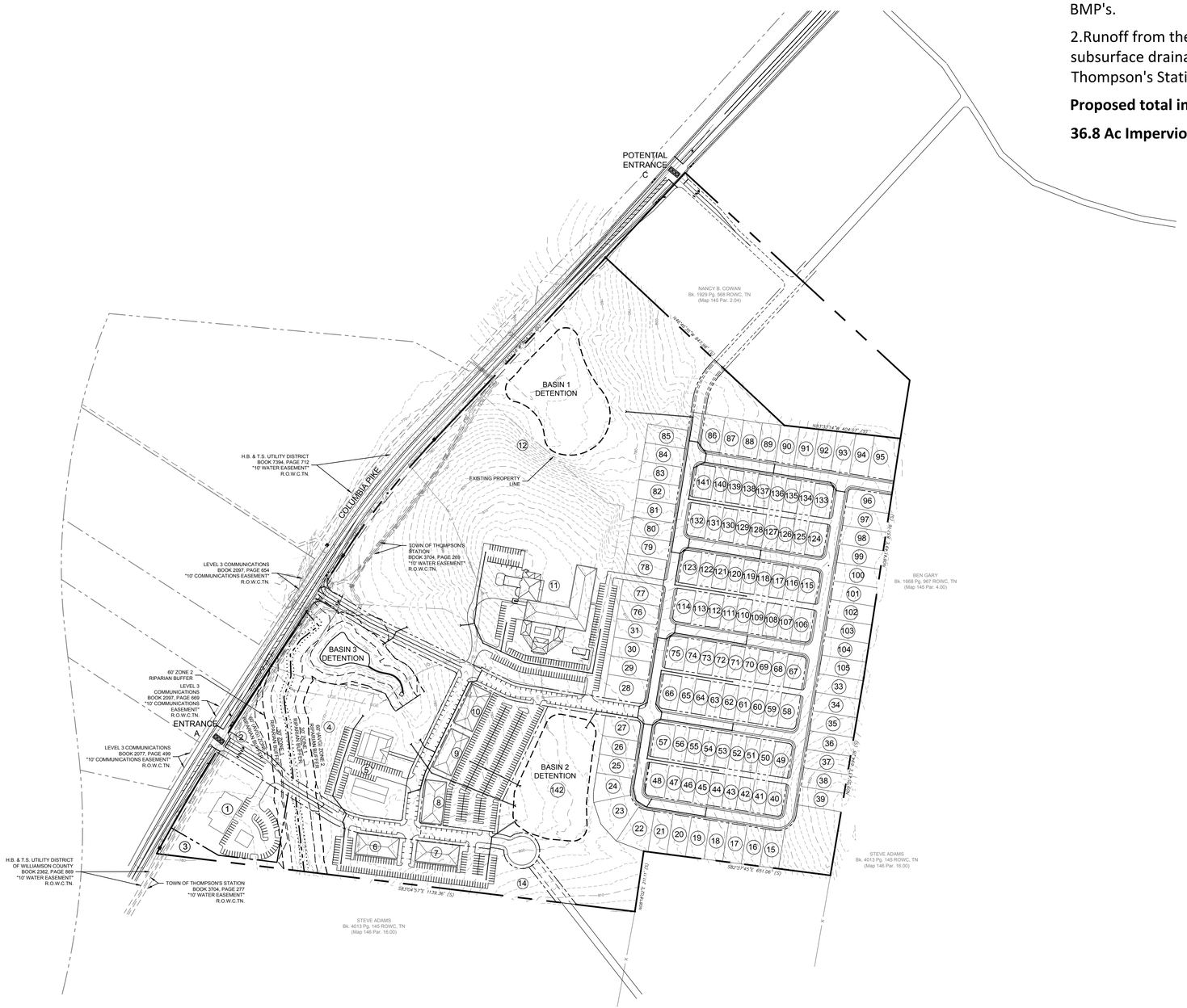
STORMWATER NARRATIVE

1.The additional impervious area to this site will be treated using approved BMP's.

2.Runoff from the impervious areas will either sheet flow or be collected in subsurface drainage networks. All discharges will meet or exceed the Town of Thompson's Stations stormwater requirements.

Proposed total impervious area = 36.8 Acres

36.8 Ac Impervious / 79.9 Ac Total = ±46%



ENERGY LAND & INFRASTRUCTURE
1420 DONELSON PIKE, SUITE A-12, NASHVILLE, TN 37217
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RODERICK PLACE
CONCEPTUAL SITE PLAN
THOMPSON'S STATION, TENNESSEE

LARRY C. WALLACE
REGISTERED ENGINEER
12/5/19
No. 108133
STATE OF TENNESSEE

CONCEPT STORMWATER PLAN

0 200 300 400 feet

N

ISSUE 07.19.19
RE-ISSUE 08.07.19

PROJECT RODERICK PLACE

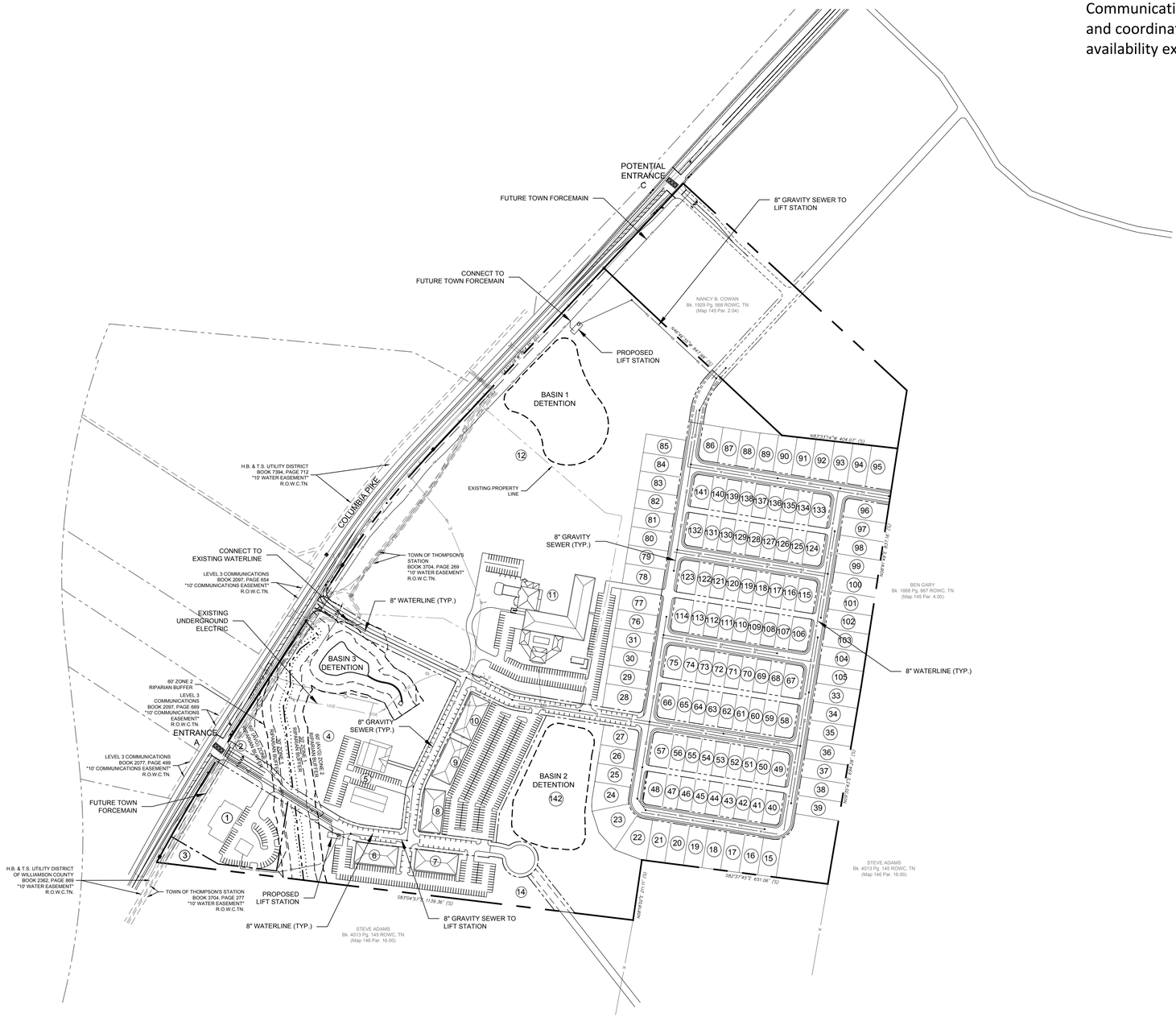
OWNER
SAMSON J/V
144 SOUTHEAST PKWY. SUITE 230
FRANKLIN TN. 37064

C

3.0

UTILITY NARRATIVE

Communications with outside utility providers (ATMOS, HB&TS, MTEMC) and coordination with Thompson's Station (Sewer) have indicated that availability existing to meet anticipated demands.



LARRY C. WALLACE
REGISTERED ENGINEER
12/9/19
STATE OF TENNESSEE

CONCEPT UTILITY PLAN

0 200 300 400 feet

N

ENERGY LAND & INFRASTRUCTURE
1420 CENTERPOINT BLVD. SUITE 1 KNOXVILLE, TN 37932
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RODERICK PLACE
CONCEPTUAL SITE PLAN
THOMPSON'S STATION, TENNESSEE

ISSUE 07.19.19
RE-ISSUE 08.07.19

PROJECT RODERICK PLACE

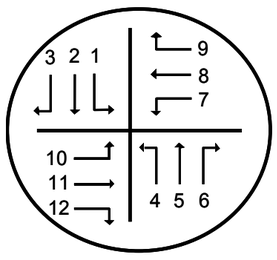
OWNER
SAMSON J/V
144 SOUTHEAST PKWY. SUITE 230
FRANKLIN TN, 37064

C

5.0

APPENDIX B
DETAILED TURNING MOVEMENT COUNTS

DETAILED TURNING MOVEMENT COUNTS
WEEKDAY COUNTS



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Thompson Station Rd & US 31
DATE: 5/29/2019
RECORDER: Zhiwar Rashid
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	**US 31**			**US 31**			**Thompson Station Rd**			**Thompson Station Rd**			
TIME	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	
6:00-6:15 AM													**793**
6:15-6:30													**1,179**
6:30-6:45	2	56	2	6	262	4	3	3	21	6	3	9	**1,604**
6:45-7:00	1	77	3	17	266	3	8	4	15	7	1	14	**1,666**
7:00-7:15		74	4	16	229	2	7	10	15	13	3	13	**1,700**
7:15-7:30	2	93	7	9	213	10	18	15	30	9	5	14	**1,730**
7:30-7:45	2	102	9	10	245	3	8	9	22	10	3	16	**1,701**
7:45-8:00	5	105	7	8	247	6	12	16	19	12	6	7	**1,667**
8:00-8:15	3	92	9	12	220	8	9	12	14	6	10	21	**1,632**
8:15-8:30	7	77	9	18	214	5	7	14	14	16	5	10	**1,216**
8:30-8:45	4	78	12	11	215	9	14	2	11	10	9	30	**820**
8:45-9:00	5	97	12	18	200	3	6	9	17	16	9	23	**415**
9:00-9:15													
9:15-9:30													
9:30-9:45													
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2:30-2:45													
2:45-3:00													
3:00-3:15													
3:15-3:30													**428**
3:30-3:45													**878**
3:45-4:00													**1,333**
4:00-4:15	9	182	2	17	116	17	20	5	6	16	11	27	**1,818**
4:15-4:30	7	183	9	10	133	20	19	9	10	11	10	29	**1,854**
4:30-4:45	6	174	8	17	137	26	15	6	4	13	16	33	**1,886**
4:45-5:00	4	192	8	17	160	28	13	6	5	7	7	38	**1,911**
5:00-5:15	5	187	6	15	133	25	28	4	4	14	13	30	**1,877**
5:15-5:30	6	206	3	11	159	24	12	5	6	8	7	35	**1,413**
5:30-5:45	6	217	1	20	150	23	11	4	10	4	6	28	**931**
5:45-6:00	6	180	7	19	136	17	16	8	6	6	9	41	**451**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
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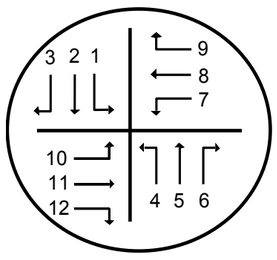
9:30-9:45													
9:45-10:00 PM													
TOTAL	80	2,372	118	251	3,435	233	226	141	229	184	133	418	
AM PK HR	12	392	32	39	925	27	47	52	85	37	24	58	7:15 AM - 8:15 AM
MID PK HR													
PM PK HR	21	802	18	63	602	100	64	19	25	33	33	131	4:45 PM - 5:45 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: THOMPSON STATION LN & CRITZ LN
DATE: 5/29/2019
RECORDER: ZHIWAR RASHID - AM 8-9a - Darryl Glascock 7-8a & 4-6p
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	US 31			US 31			CRITZ LN			DRIVEWAY			
TIME	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	
6:00-6:15 AM													
6:15-6:30													**409**
6:30-6:45													**862**
6:45-7:00													**1,368**
7:00-7:15	13	75			237	3	5		76				**1,873**
7:15-7:30	9	106			254	2	4		78				**1,899**
7:30-7:45	15	108			269	7	4		103				**1,889**
7:45-8:00	22	133			245		8		97				**1,800**
8:00-8:15	12	96			253	3	6		65				**1,731**
8:15-8:30	14	104			241	3	6		75				**1,296**
8:30-8:45	18	84		1	237	3	7		66			1	**853**
8:45-9:00	16	111			227	1	9		72				**436**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
10:00-10:15													
10:15-10:30													
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2:30-2:45													
2:45-3:00													
3:00-3:15													
3:15-3:30													**534**
3:30-3:45													**1,059**
3:45-4:00													**1,576**
4:00-4:15	108	238			127	23	7		31				**2,085**
4:15-4:30	142	185			153	9	2		34				**2,075**
4:30-4:45	125	187			162	14	3		26				**2,098**
4:45-5:00	129	192			149	12	2		25				**2,122**
5:00-5:15	118	247			121	9	3		26				**2,119**
5:15-5:30	148	186			157	16	9		32				**1,595**
5:30-5:45	140	218			144	11	1		27				**1,047**
5:45-6:00	108	207			141	14	6		30				**506**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
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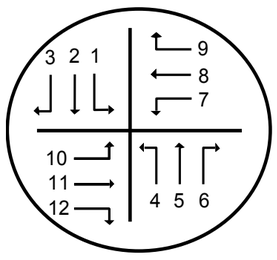
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	1,137	2,477		1	3,117	130	82		863			1	
AM PK HR	58	443			1,021	12	22		343				7:15 AM - 8:15 AM
MID PK HR													
PM PK HR	535	843			571	48	15		110				4:45 PM - 5:45 PM



North

TOTAL INTERSECTION TRAFFIC VOLUME COUNTS

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	Road A			Road B			Road C			Road D			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													**793**
6:15-6:30													**1,588**
6:30-6:45	2	56	2	6	262	4	3	3	21	6	3	9	**2,466**
6:45-7:00	1	77	3	17	266	3	8	4	15	7	1	14	**3,034**
7:00-7:15	13	149	4	16	466	5	12	10	91	13	3	13	**3,573**
7:15-7:30	11	199	7	9	467	12	22	15	108	9	5	14	**3,629**
7:30-7:45	17	210	9	10	514	10	12	9	125	10	3	16	**3,590**
7:45-8:00	27	238	7	8	492	6	20	16	116	12	6	7	**3,467**
8:00-8:15	15	188	9	12	473	11	15	12	79	6	10	21	**3,363**
8:15-8:30	21	181	9	18	455	8	13	14	89	16	5	10	**2,512**
8:30-8:45	22	162	12	12	452	12	21	2	77	10	9	31	**1,673**
8:45-9:00	21	208	12	18	427	4	15	9	89	16	9	23	**851**
9:00-9:15													
9:15-9:30													
9:30-9:45													
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2:30-2:45													
2:45-3:00													
3:00-3:15													
3:15-3:30													**962**
3:30-3:45													**1,937**
3:45-4:00													**2,909**
4:00-4:15	117	420	2	17	243	40	27	5	37	16	11	27	**3,903**
4:15-4:30	149	368	9	10	286	29	21	9	44	11	10	29	**3,929**
4:30-4:45	131	361	8	17	299	40	18	6	30	13	16	33	**3,984**
4:45-5:00	133	384	8	17	309	40	15	6	30	7	7	38	**4,033**
5:00-5:15	123	434	6	15	254	34	31	4	30	14	13	30	**3,996**
5:15-5:30	154	392	3	11	316	40	21	5	38	8	7	35	**3,008**
5:30-5:45	146	435	1	20	294	34	12	4	37	4	6	28	**1,978**
5:45-6:00	114	387	7	19	277	31	22	8	36	6	9	41	**957**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
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8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	1,217	4,849	118	252	6,552	363	308	141	1,092	184	133	419	
AM PK HR	70	835	32	39	1,946	39	69	52	428	37	24	58	7:15 AM - 8:15 AM
MID PK HR													
PM PK HR	556	1,645	18	63	1,173	148	79	19	135	33	33	131	4:45 PM - 5:45 PM

KC Technologies

1101 11th Ave South
Nashville, TN

Groups Printed- Unshifted

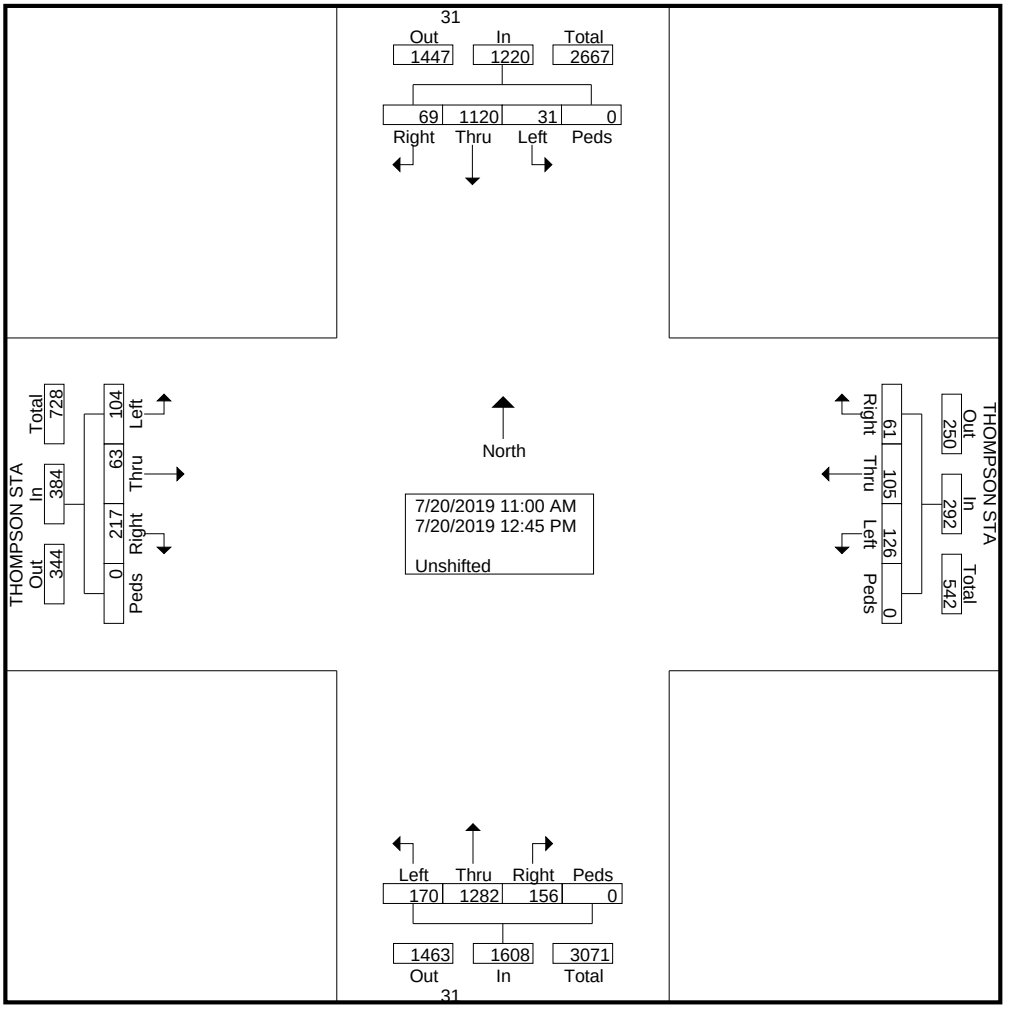
	31 Southbound					31 Northbound					THOMPSON STA Westbound					THOMPSON STA Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
11:00 AM	2	125	7	0	134	26	152	19	0	197	14	21	11	0	46	10	9	27	0	46	423
11:15 AM	4	120	6	0	130	25	166	18	0	209	18	20	4	0	42	11	8	36	0	55	436
11:30 AM	5	140	15	0	160	16	157	21	0	194	18	7	8	0	33	12	9	34	0	55	442
11:45 AM	4	130	7	0	141	25	153	13	0	191	13	11	7	0	31	11	9	25	0	45	408
Total	15	515	35	0	565	92	628	71	0	791	63	59	30	0	152	44	35	122	0	201	1709
12:00 PM	3	163	8	0	174	22	172	20	0	214	18	15	8	0	41	15	3	28	0	46	475
12:15 PM	8	140	8	0	156	18	161	17	0	196	19	12	9	0	40	18	13	23	0	54	446
12:30 PM	3	160	11	0	174	13	184	29	0	226	14	8	7	0	29	9	6	22	0	37	466
12:45 PM	2	142	7	0	151	25	137	19	0	181	12	11	7	0	30	18	6	22	0	46	408
Total	16	605	34	0	655	78	654	85	0	817	63	46	31	0	140	60	28	95	0	183	1795

KC Technologies

1101 11th Ave South
Nashville, TN

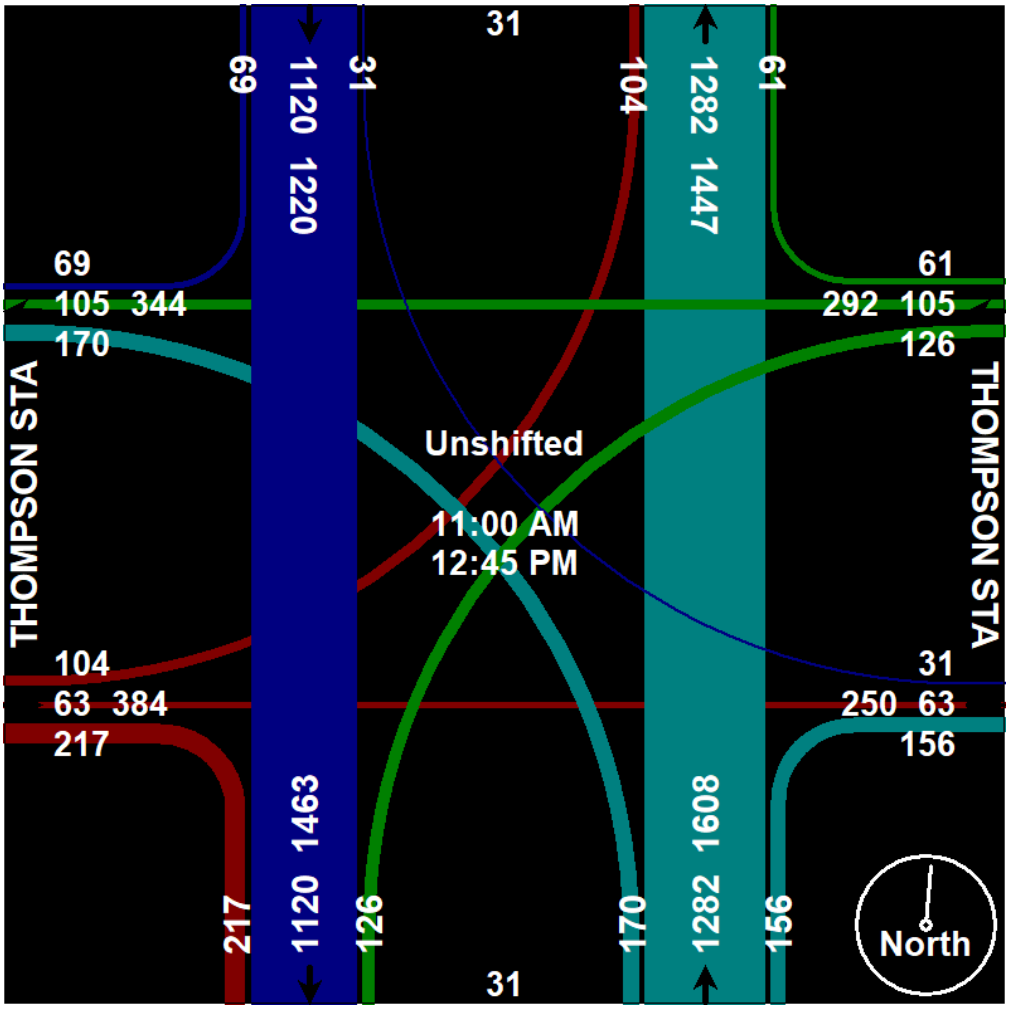
Groups Printed- Unshifted

	31 Southbound					31 Northbound					THOMPSON STA Westbound					THOMPSON STA Eastbound					
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	31	1120	69	0	1220	170	1282	156	0	1608	126	105	61	0	292	104	63	217	0	384	3504
Apprch %	2.5	91.8	5.7	0		10.6	79.7	9.7	0		43.2	36	20.9	0		27.1	16.4	56.5	0		
Total %	0.9	32	2	0	34.8	4.9	36.6	4.5	0	45.9	3.6	3	1.7	0	8.3	3	1.8	6.2	0	11	



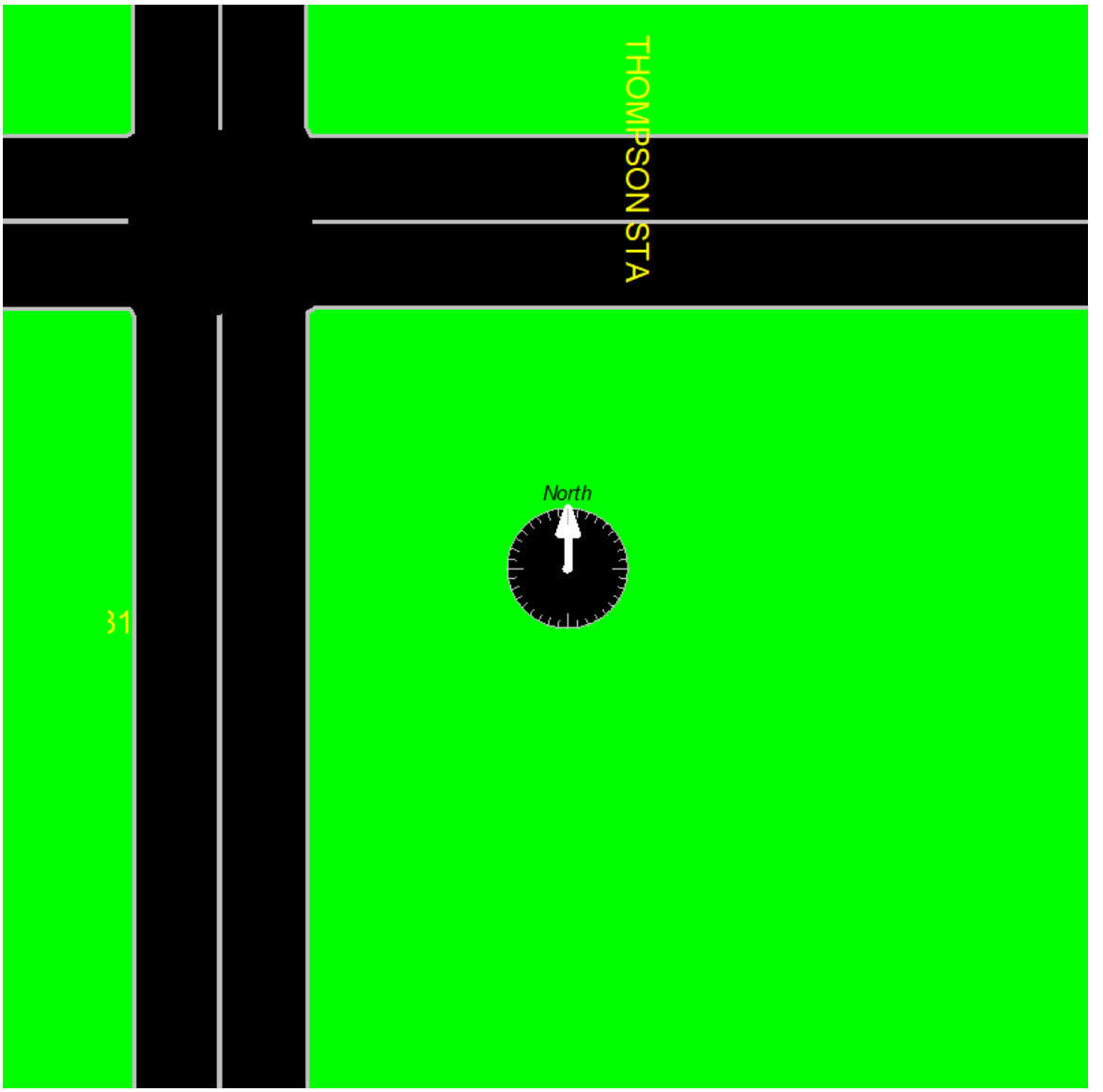
KC Technologies

1101 11th Ave South
Nashville, TN

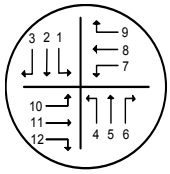


KC Technologies

1101 11th Ave South
Nashville, TN



DETAILED TURNING MOVEMENT COUNTS
WEEKEND COUNTS



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: US 31 & DECLERATION WAY
DATE: MID-DAY: 8/31/2019
RECORDER: ZHIWAR RASHID
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	Road A			Road B			Road C			Road D			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													
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9:45-10:00													
10:00-10:15													
10:15-10:30													**237**
10:30-10:45													**476**
10:45-11:00													**683**
11:00-11:15		118		1	116					1		1	**893**
11:15-11:30		121	3		113					1		1	**878**
11:30-11:45		113		1	93								**900**
11:45-12:00 PM		94		1	109					1		5	**908**
12:00-12:15		91		2	118					2		9	**926**
12:15-12:30		110	3	4	141					1		2	**704**
12:30-12:45		95		1	119								**443**
12:45-1:00		117	2	1	108								**228**
1:00-1:15													
1:15-1:30													
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8:45-9:00													
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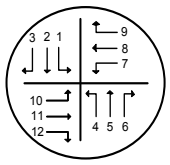
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL		859	8	11	917					6		18	
AM PK HR													
MID PK HR		413	5	8	486					3		11	12:00 PM - 1:00 PM
PM PK HR													



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: US 31 & 840 WB RAMPS
DATE: MID-DAY: 8/31/2019
RECORDER: ZHIWAR RASHID
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	**Road A**			**Road B**			**Road C**			**Road D**			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
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10:00-10:15													
10:15-10:30													**285**
10:30-10:45													**580**
10:45-11:00													**866**
11:00-11:15		104	4	10	93		50		24				**1,148**
11:15-11:30		113	6	10	89		57		20				**1,170**
11:30-11:45		118	6	8	73		59		22				**1,213**
11:45-12:00 PM		86	6	5	87		75		23				**1,225**
12:00-12:15		101	6	9	97		69		25				**1,233**
12:15-12:30		107	4	6	120		79		22				**926**
12:30-12:45		86	7	10	98		80		17				**588**
12:45-1:00		104	7	8	81		68		22				**290**
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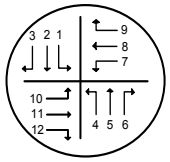
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL		819	46	66	738		537		175				
AM PK HR													
MID PK HR		398	24	33	396		296		86				12:00 PM - 1:00 PM
PM PK HR													



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: US 31 & EB 840 RAMP
DATE: MID-DAY: 8/31/2019
RECORDER: ZHIWAR RASHID
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	Road A			Road B			Road C			Road D			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
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9:45-10:00													
10:00-10:15													
10:15-10:30													**389**
10:30-10:45													**766**
10:45-11:00													**1,146**
11:00-11:15	25	127			100	120				8		9	**1,517**
11:15-11:30	29	145			91	98				7		7	**1,497**
11:30-11:45	19	151			75	113				8		14	**1,527**
11:45-12:00 PM	22	140			96	102				3		8	**1,527**
12:00-12:15	26	144			102	80				6		11	**1,504**
12:15-12:30	27	160			108	90				7		15	**1,135**
12:30-12:45	19	143			106	92				7		13	**728**
12:45-1:00	23	149			95	64				4	1	12	**348**
1:00-1:15													
1:15-1:30													
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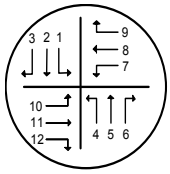
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	190	1,159			773	759				50	1	89	
AM PK HR													
MID PK HR	94	595			381	385				24		48	11:30 AM - 12:30 PM
PM PK HR													



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: US 31 & DECLERATION WAY
DATE: MID-DAY: 8/31/2019
RECORDER: ZHIWAR RASHID
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	Road A			Road B			Road C			Road D			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
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9:45-10:00													
10:00-10:15													
10:15-10:30													**237**
10:30-10:45													**476**
10:45-11:00													**683**
11:00-11:15		118		1	116					1		1	**893**
11:15-11:30		121	3		113					1		1	**878**
11:30-11:45		113		1	93								**900**
11:45-12:00 PM		94		1	109					1		5	**908**
12:00-12:15		91		2	118					2		9	**926**
12:15-12:30		110	3	4	141					1		2	**704**
12:30-12:45		95		1	119								**443**
12:45-1:00		117	2	1	108								**228**
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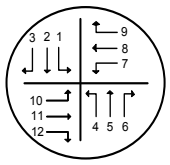
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL		859	8	11	917					6		18	
AM PK HR													
MID PK HR		413	5	8	486					3		11	12:00 PM - 1:00 PM
PM PK HR													



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: US 31 & 840 WB RAMPS
DATE: MID-DAY: 8/31/2019
RECORDER: ZHIWAR RASHID
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	**Road A**			**Road B**			**Road C**			**Road D**			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													
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10:15-10:30													**285**
10:30-10:45													**580**
10:45-11:00													**866**
11:00-11:15		104	4	10	93		50		24				**1,148**
11:15-11:30		113	6	10	89		57		20				**1,170**
11:30-11:45		118	6	8	73		59		22				**1,213**
11:45-12:00 PM		86	6	5	87		75		23				**1,225**
12:00-12:15		101	6	9	97		69		25				**1,233**
12:15-12:30		107	4	6	120		79		22				**926**
12:30-12:45		86	7	10	98		80		17				**588**
12:45-1:00		104	7	8	81		68		22				**290**
1:00-1:15													
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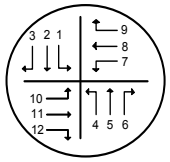
9:45-10:00 PM													
TOTAL		819	46	66	738		537		175				
AM PK HR													
MID PK HR		398	24	33	396		296		86				12:00 PM - 1:00 PM
PM PK HR													



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: US 31 & EB 840 RAMP
DATE: MID-DAY: 8/31/2019
RECORDER: ZHIWAR RASHID
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	Road A			Road B			Road C			Road D			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
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10:00-10:15													
10:15-10:30													**389**
10:30-10:45													**766**
10:45-11:00													**1,146**
11:00-11:15	25	127			100	120				8		9	**1,517**
11:15-11:30	29	145			91	98				7		7	**1,497**
11:30-11:45	19	151			75	113				8		14	**1,527**
11:45-12:00 PM	22	140			96	102				3		8	**1,527**
12:00-12:15	26	144			102	80				6		11	**1,504**
12:15-12:30	27	160			108	90				7		15	**1,135**
12:30-12:45	19	143			106	92				7		13	**728**
12:45-1:00	23	149			95	64				4	1	12	**348**
1:00-1:15													
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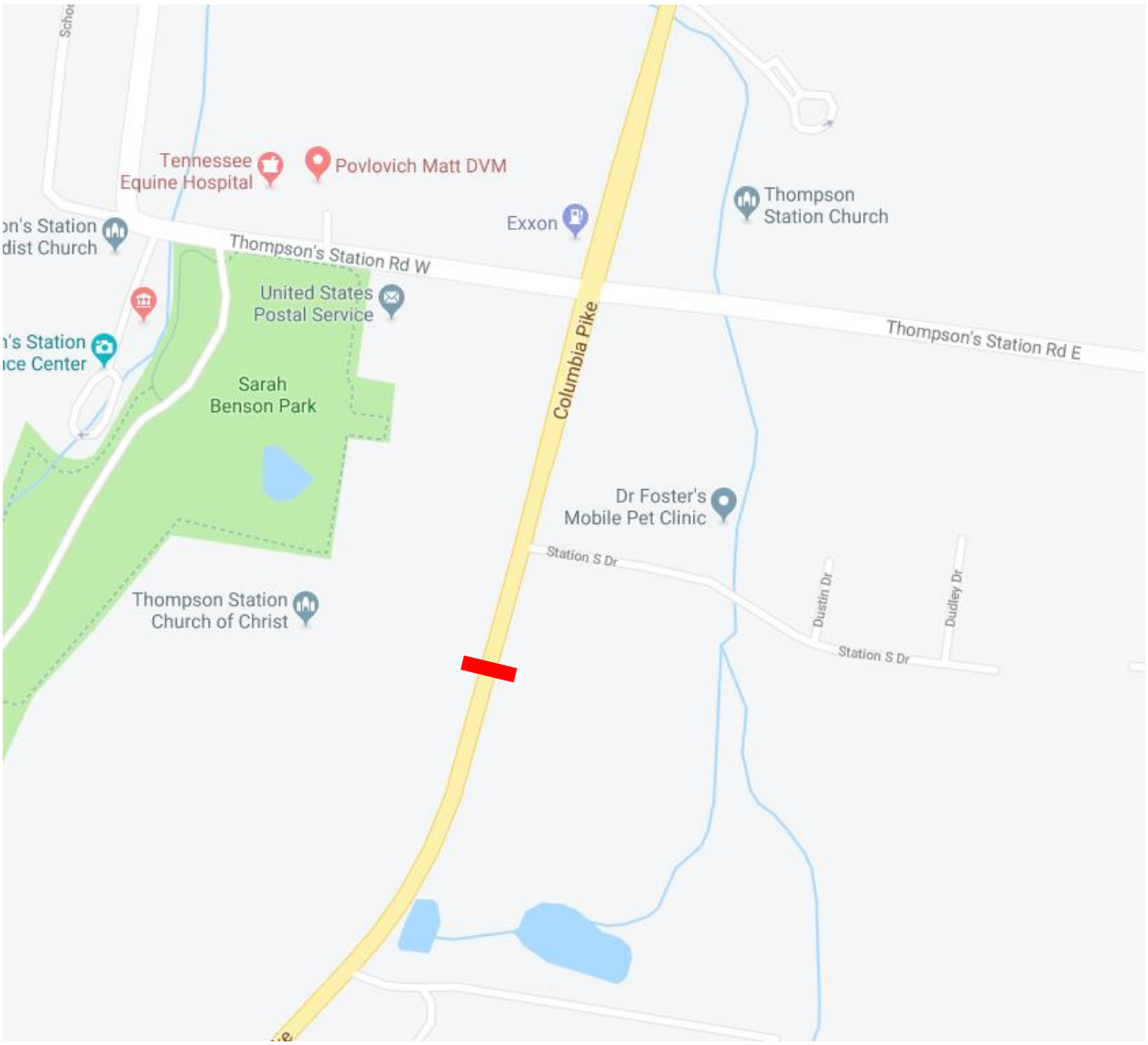
TOTAL	190	1,159			773	759				50	1	89	
AM PK HR													
MID PK HR	94	595			381	385				24		48	11:30 AM - 12:30 PM
PM PK HR													

DETAILED TURNING MOVEMENT COUNTS
SEASONAL GROWTH COMPARISON

Tube Count Comparison Data

KCI Technologies, Inc. collected 24-hour tube count data from January 10, 2019 to January 17, 2018 while local schools were in session. The location of the count station is presented in the figure below.



Data:

1/10/2019			
Time	NB	NB	Total
07:15 - 07:29	92	185	277
07:30 - 07:44	98	171	269
07:45 - 07:59	82	133	215
08:00 - 08:14	87	171	258
16:45 - 16:59	177	163	340
17:00 - 17:14	142	179	321
17:15 - 17:29	170	146	316
17:30 - 17:44	161	158	319

1/11/2019			
Time	NB	NB	Total
07:15 - 07:29	88	138	226
07:30 - 07:44	132	144	276
07:45 - 07:59	97	208	305
08:00 - 08:14	69	137	206
16:45 - 16:59	197	167	364
17:00 - 17:14	220	158	378
17:15 - 17:29	111	162	273
17:30 - 17:44	215	175	390

1/14/2019			
Time	NB	NB	Total
07:15 - 07:29	97	166	263
07:30 - 07:44	92	216	308
07:45 - 07:59	144	145	289
08:00 - 08:14	123	168	291
16:45 - 16:59	218	175	393
17:00 - 17:14	217	161	378
17:15 - 17:29	209	155	364
17:30 - 17:44	234	144	378

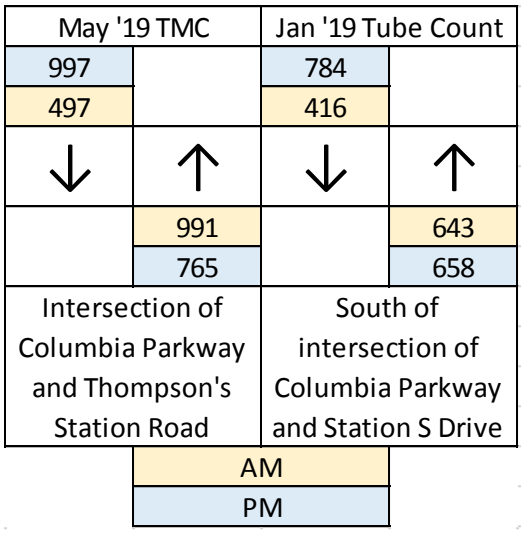
1/15/2019			
Time	NB	NB	Total
07:15 - 07:29	124	137	261
07:30 - 07:44	134	142	276
07:45 - 07:59	98	173	271
08:00 - 08:14	80	145	225
16:45 - 16:59	193	155	348
17:00 - 17:14	233	159	392
17:15 - 17:29	202	164	366
17:30 - 17:44	195	166	361

1/16/2019			
Time	NB	NB	Total
07:15 - 07:29	117	162	279
07:30 - 07:44	108	136	244
07:45 - 07:59	92	127	219
08:00 - 08:14	84	199	283
16:45 - 16:59	236	167	403
17:00 - 17:14	214	189	403
17:15 - 17:29	224	166	390
17:30 - 17:44	240	159	399

1/17/2019			
Time	NB	NB	Total
07:15 - 07:29	121	162	283
07:30 - 07:44	128	170	298
07:45 - 07:59	103	157	260
08:00 - 08:14	104	170	274
16:45 - 16:59	198	153	351
17:00 - 17:14	226	174	400
17:15 - 17:29	174	188	362
17:30 - 17:44	96	163	259

Average Weekday			
Time	SB	NB	Total
07:15 - 07:29	107	158	265
07:30 - 07:44	115	163	279
07:45 - 07:59	103	157	260
08:00 - 08:14	91	165	256
16:45 - 16:59	203	163	367
17:00 - 17:14	209	170	379
17:15 - 17:29	182	164	345
17:30 - 17:44	190	161	351

Average Weekday Peak Hour Movements			
Time	SB	NB	Total
07:15 - 08:14	416	643	1060
16:45 - 17:44	784	658	1442



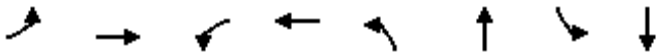
APPENDIX C
TDOT COUNT DATA

TDOT AADT DATA

Station	67	68	66
Route	SR006	1928	1928
Location	COLUMBIA PIKE NEAR THOMPSON'S STATION	THOMPSON'S STATION ROAD WEST	THOMPSON'S STATION ROAD EAST
County	Williamson	Williamson	Williamson
2017	20,369	2,810	2,824
2016	19,816	2,800	2,693
2015	19,620	2,617	2,666
2014	21,013	2,952	2,659
2013	19,666	2,723	2,404
2012	18,101	2,720	3,019
2011	18,685	2,585	2,634
2010	17,900	2,412	2,557
2009	18,342	2,916	2,590
2008	19,891	3,483	2,279
2007	20,488	3,449	3,720
2006	21,645	2,858	2,571
2005	15,488	2,513	2,599
2004	15,037	2,277	2,426
2003	14,599	2,264	2,127
2002	14,037	1,906	1,977
2001	15,108	1,847	1,891
2000	13,289	2,341	1,897
1999	10,915	1,943	2,019
1998	11,015	1,681	1,851
1997	9,499	1,510	1,400
1996	9,418	1,502	1,373
1995	9,079	1,400	1,404
1994	10,337	1,123	1,219
1993	8,121	955	1,036
1992	7,654	946	1,026
1991	7,117	1,231	751
1990	8,427	1,104	701
1989	7,490	1,088	653
1988	11,127	1159	799
1987	10,883	1288	780
1986	10,443	1,350	899
1985	9,342	971	792
1984	N/A	N/A	N/A
1983	N/A	N/A	N/A

APPENDIX D
CAPACITY ANALYSES

EXISTING CONDITIONS CAPACITY ANALYSES



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	40	89	51	149	42	1034	13	461
v/c Ratio	0.17	0.40	0.21	0.54	0.08	0.89	0.07	0.44
Control Delay	29.7	21.0	30.3	29.5	8.6	30.2	7.2	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	21.0	30.3	29.5	8.6	30.2	7.2	11.0
Queue Length 50th (ft)	20	15	26	48	9	510	2	188
Queue Length 95th (ft)	43	58	52	106	26	#1091	6	296
Internal Link Dist (ft)		737		561		511		6076
Turn Bay Length (ft)	100		85		105		120	
Base Capacity (vph)	240	324	247	343	559	1162	208	1054
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	0.27	0.21	0.43	0.08	0.89	0.06	0.44

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	24	58	47	52	85	39	925	27	12	392	32
Future Volume (veh/h)	37	24	58	47	52	85	39	925	27	12	392	32
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1900	1845	1845	1900	1845	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	40	26	63	51	57	92	42	1005	29	13	426	35
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	174	52	125	225	72	116	504	1015	29	111	918	75
Arrive On Green	0.04	0.11	0.11	0.05	0.11	0.11	0.04	0.57	0.57	0.02	0.55	0.55
Sat Flow, veh/h	1757	479	1161	1757	636	1027	1757	1784	51	1757	1682	138
Grp Volume(v), veh/h	40	0	89	51	0	149	42	0	1034	13	0	461
Grp Sat Flow(s),veh/h/ln	1757	0	1640	1757	0	1663	1757	0	1836	1757	0	1820
Q Serve(g_s), s	2.0	0.0	5.1	2.5	0.0	8.7	1.0	0.0	55.6	0.3	0.0	15.4
Cycle Q Clear(g_c), s	2.0	0.0	5.1	2.5	0.0	8.7	1.0	0.0	55.6	0.3	0.0	15.4
Prop In Lane	1.00		0.71	1.00		0.62	1.00		0.03	1.00		0.08
Lane Grp Cap(c), veh/h	174	0	177	225	0	188	504	0	1044	111	0	993
V/C Ratio(X)	0.23	0.00	0.50	0.23	0.00	0.79	0.08	0.00	0.99	0.12	0.00	0.46
Avail Cap(c_a), veh/h	235	0	271	277	0	274	598	0	1044	210	0	993
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.5	0.0	42.1	37.1	0.0	43.2	10.0	0.0	21.3	24.2	0.0	13.8
Incr Delay (d2), s/veh	0.7	0.0	2.2	0.5	0.0	9.5	0.1	0.0	25.7	0.5	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	2.4	1.3	0.0	4.5	0.5	0.0	35.3	0.2	0.0	8.1
LnGrp Delay(d),s/veh	38.2	0.0	44.3	37.6	0.0	52.7	10.1	0.0	47.0	24.6	0.0	15.4
LnGrp LOS	D		D	D		D	B		D	C		B
Approach Vol, veh/h		129			200			1076			474	
Approach Delay, s/veh		42.4			48.8			45.5			15.6	
Approach LOS		D			D			D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.3	63.4	11.0	17.3	10.6	61.1	10.5	17.8
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	7.5	42.5	7.5	16.5	9.5	40.5	7.5	16.5
Max Q Clear Time (g_c+I1), s	2.3	57.6	4.5	7.1	3.0	17.4	4.0	10.7
Green Ext Time (p_c), s	0.0	0.0	0.0	0.8	0.0	11.5	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	38.1
HCM 2010 LOS	D

Lane Group	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	24	373	1123	63	482
v/c Ratio	0.19	0.65	0.46	0.16	0.17
Control Delay	46.3	6.3	9.9	2.3	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	46.3	6.3	9.9	2.3	1.3
Queue Length 50th (ft)	15	0	131	2	14
Queue Length 95th (ft)	39	8	m259	9	23
Internal Link Dist (ft)		697	409		2564
Turn Bay Length (ft)	150			275	
Base Capacity (vph)	332	698	2443	539	2812
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.07	0.53	0.46	0.12	0.17

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	22	0	343	0	1021	12	58	443	0
Future Volume (veh/h)	0	0	0	22	0	343	0	1021	12	58	443	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1845	1900	1845	1845	1900	1845	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	0	0	0	24	0	373	0	1110	13	63	482	0
Adj No. of Lanes	0	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	0	2	0	334	0	298	72	2024	24	345	2401	0
Arrive On Green	0.00	0.00	0.00	0.19	0.00	0.19	0.00	0.57	0.57	0.10	1.00	0.00
Sat Flow, veh/h	0	1845	0	1757	0	1568	901	3548	42	1757	3597	0
Grp Volume(v), veh/h	0	0	0	24	0	373	0	548	575	63	482	0
Grp Sat Flow(s),veh/h/ln	0	1845	0	1757	0	1568	901	1752	1837	1757	1752	0
Q Serve(g_s), s	0.0	0.0	0.0	1.1	0.0	19.0	0.0	19.6	19.6	1.3	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.1	0.0	19.0	0.0	19.6	19.6	1.3	0.0	0.0
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.02	1.00		0.00
Lane Grp Cap(c), veh/h	0	2	0	334	0	298	72	1000	1048	345	2401	0
V/C Ratio(X)	0.00	0.00	0.00	0.07	0.00	1.25	0.00	0.55	0.55	0.18	0.20	0.00
Avail Cap(c_a), veh/h	0	138	0	334	0	298	72	1000	1048	565	2401	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.98	0.98	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	33.3	0.0	40.5	0.0	13.4	13.4	8.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.1	0.0	138.1	0.0	2.2	2.1	0.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.6	0.0	19.6	0.0	10.0	10.5	0.6	0.1	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	33.3	0.0	178.6	0.0	15.6	15.5	9.1	0.2	0.0
LnGrp LOS				C		F		B	B	A	A	
Approach Vol, veh/h		0			397			1123			545	
Approach Delay, s/veh		0.0			169.8			15.5			1.2	
Approach LOS					F			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	11.5	63.5		0.0		75.0		25.0
Change Period (Y+Rc), s	6.5	6.5		6.5		6.5		6.0
Max Green Setting (Gmax), s	17.5	30.5		7.5		54.5		19.0
Max Q Clear Time (g_c+I1), s	3.3	21.6		0.0		2.0		21.0
Green Ext Time (p_c), s	0.1	5.8		0.0		13.9		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	41.4
HCM 2010 LOS	D

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	254	78	1004	846	190	651
v/c Ratio	0.59	0.26	0.49	0.67	0.47	0.25
Control Delay	46.4	4.4	19.3	9.1	14.0	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.4	4.4	19.3	9.1	14.0	8.1
Queue Length 50th (ft)	79	0	238	48	51	83
Queue Length 95th (ft)	115	16	381	220	92	125
Internal Link Dist (ft)			2564			882
Turn Bay Length (ft)		350		700	150	
Base Capacity (vph)	816	467	2049	1268	418	2602
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.17	0.49	0.67	0.45	0.25

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	234	0	72	0	0	0	0	924	778	175	599	0
Future Volume (veh/h)	234	0	72	0	0	0	0	924	778	175	599	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	0	1845				0	1845	1845	1845	1845	0
Adj Flow Rate, veh/h	254	0	0				0	1004	0	190	651	0
Adj No. of Lanes	2	0	1				0	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	0	3				0	3	3	3	3	0
Cap, veh/h	338	0	156				0	2247	1005	452	2702	0
Arrive On Green	0.10	0.00	0.00				0.00	0.64	0.00	0.12	1.00	0.00
Sat Flow, veh/h	3408	0	1568				0	3597	1568	1757	3597	0
Grp Volume(v), veh/h	254	0	0				0	1004	0	190	651	0
Grp Sat Flow(s),veh/h/ln	1704	0	1568				0	1752	1568	1757	1752	0
Q Serve(g_s), s	7.3	0.0	0.0				0.0	14.4	0.0	3.6	0.0	0.0
Cycle Q Clear(g_c), s	7.3	0.0	0.0				0.0	14.4	0.0	3.6	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	338	0	156				0	2247	1005	452	2702	0
V/C Ratio(X)	0.75	0.00	0.00				0.00	0.45	0.00	0.42	0.24	0.00
Avail Cap(c_a), veh/h	818	0	376				0	2247	1005	505	2702	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.89	0.00	0.97	0.97	0.00
Uniform Delay (d), s/veh	43.8	0.0	0.0				0.0	9.0	0.0	6.0	0.0	0.0
Incr Delay (d2), s/veh	3.4	0.0	0.0				0.0	0.6	0.0	0.6	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	0.0	0.0				0.0	7.0	0.0	1.7	0.1	0.0
LnGrp Delay(d),s/veh	47.2	0.0	0.0				0.0	9.6	0.0	6.6	0.2	0.0
LnGrp LOS	D							A		A	A	
Approach Vol, veh/h		254						1004			841	
Approach Delay, s/veh		47.2						9.6			1.6	
Approach LOS		D						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.0	71.1		15.9		84.1		
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		
Max Green Setting (Gmax), s	9.0	47.0		24.0		63.0		
Max Q Clear Time (g_c+I1), s	5.6	16.4		9.3		2.0		
Green Ext Time (p_c), s	0.2	13.4		0.7		16.4		

Intersection Summary	
HCM 2010 Ctrl Delay	11.0
HCM 2010 LOS	B

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	264	392	50	1209	577	30
v/c Ratio	0.33	0.91	0.10	0.55	0.26	0.03
Control Delay	33.1	55.4	9.6	18.2	8.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.1	55.4	9.6	18.2	8.6	1.9
Queue Length 50th (ft)	72	196	22	311	77	0
Queue Length 95th (ft)	108	#373	m33	397	104	8
Internal Link Dist (ft)				882	859	
Turn Bay Length (ft)		225	200			575
Base Capacity (vph)	799	433	500	2208	2208	1001
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.91	0.10	0.55	0.26	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	243	0	361	46	1112	0	0	531	28
Future Volume (veh/h)	0	0	0	243	0	361	46	1112	0	0	531	28
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1845	0	1845	1845	1845	0	0	1845	1845
Adj Flow Rate, veh/h				264	0	0	50	1209	0	0	577	0
Adj No. of Lanes				2	0	1	1	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				3	0	3	3	3	0	0	3	3
Cap, veh/h				801	0	368	532	2208	0	0	2208	988
Arrive On Green				0.23	0.00	0.00	0.42	0.42	0.00	0.00	0.63	0.00
Sat Flow, veh/h				3408	0	1568	825	3597	0	0	3597	1568
Grp Volume(v), veh/h				264	0	0	50	1209	0	0	577	0
Grp Sat Flow(s),veh/h/ln				1704	0	1568	825	1752	0	0	1752	1568
Q Serve(g_s), s				6.4	0.0	0.0	4.0	25.9	0.0	0.0	7.3	0.0
Cycle Q Clear(g_c), s				6.4	0.0	0.0	11.3	25.9	0.0	0.0	7.3	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				801	0	368	532	2208	0	0	2208	988
V/C Ratio(X)				0.33	0.00	0.00	0.09	0.55	0.00	0.00	0.26	0.00
Avail Cap(c_a), veh/h				801	0	368	532	2208	0	0	2208	988
HCM Platoon Ratio				1.00	1.00	1.00	0.67	0.67	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.85	0.85	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				31.7	0.0	0.0	16.3	18.2	0.0	0.0	8.2	0.0
Incr Delay (d2), s/veh				1.1	0.0	0.0	0.3	0.8	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.1	0.0	0.0	0.9	12.8	0.0	0.0	3.6	0.0
LnGrp Delay(d),s/veh				32.8	0.0	0.0	16.6	19.0	0.0	0.0	8.5	0.0
LnGrp LOS				C			B	B			A	
Approach Vol, veh/h					264			1259			577	
Approach Delay, s/veh					32.8			18.9			8.5	
Approach LOS					C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		70.0				70.0		30.0
Change Period (Y+Rc), s		7.0				7.0		6.5
Max Green Setting (Gmax), s		63.0				63.0		23.5
Max Q Clear Time (g_c+I1), s		27.9				9.3		8.4
Green Ext Time (p_c), s		16.5				19.3		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	17.8
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	25.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	113	203	558	915	356	367
Future Vol, veh/h	113	203	558	915	356	367
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	225	550	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	123	221	607	995	387	399

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2099	194	786	0	-	0
Stage 1	387	-	-	-	-	-
Stage 2	1712	-	-	-	-	-
Critical Hdwy	6.86	6.96	4.16	-	-	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	~ 44	812	822	-	-	-
Stage 1	653	-	-	-	-	-
Stage 2	130	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 12	812	822	-	-	-
Mov Cap-2 Maneuver	~ 73	-	-	-	-	-
Stage 1	171	-	-	-	-	-
Stage 2	130	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	169.7	7.8	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	822	-	73	812	-	-
HCM Lane V/C Ratio	0.738	-	1.683	0.272	-	-
HCM Control Delay (s)	20.6	-	$ 454.7	11.1	-	-
HCM Lane LOS	C	-	F	B	-	-
HCM 95th %tile Q(veh)	6.8	-	10.6	1.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2019
Jurisdiction		Time Period Analyzed	AM Peak Hour
Project Description	Roderick Place TIS: I-840 Eastbound Ramp Existing		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	2.00		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 EB	5280	2
2	Merge	Merge	EB Ramp from Columbia Pike _I-840 EB	1500	2
3	Basic	Basic	I-840 EB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.943	1176	4646	0.25	73.5	8.0	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.943	0.943	2274	1098	4259	2033	0.53	0.54	66.3	66.3	17.1	13.4	B

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.943	2274	4646	0.49	73.2	15.5	B

Facility Time Period Results

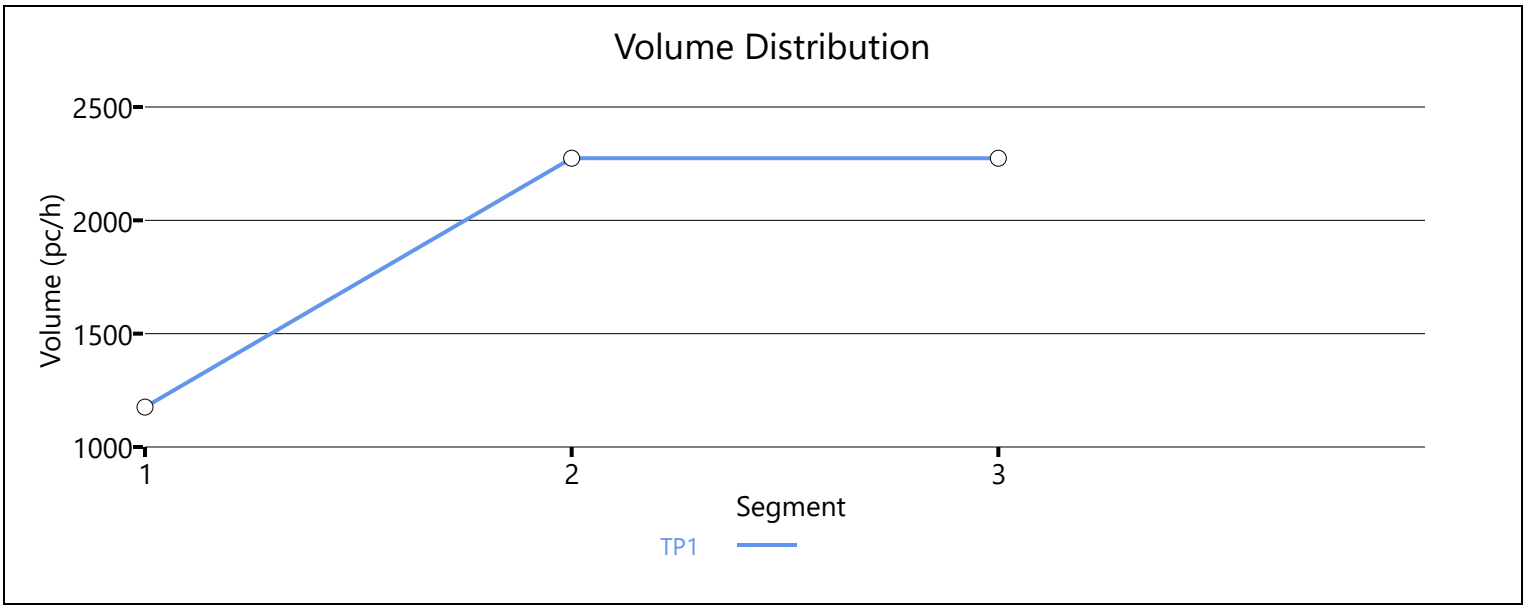
T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	71.9	12.0	11.3	1.70	B

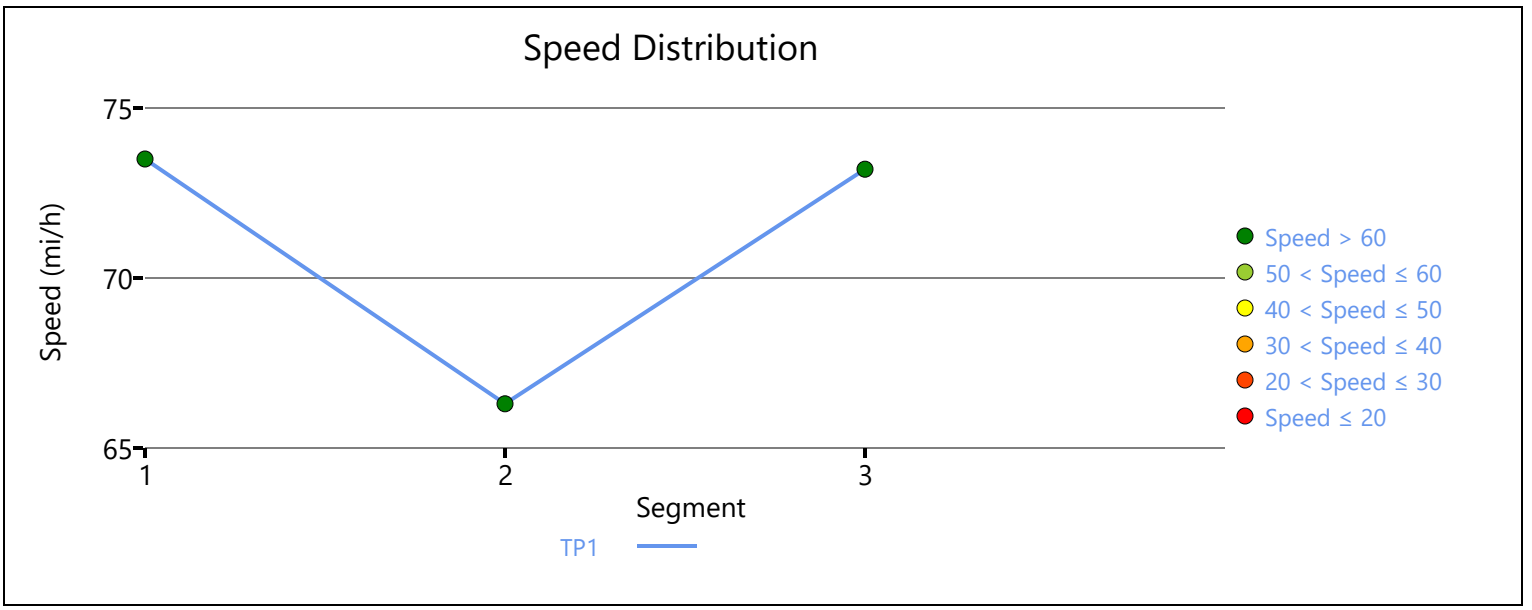
Facility Overall Results

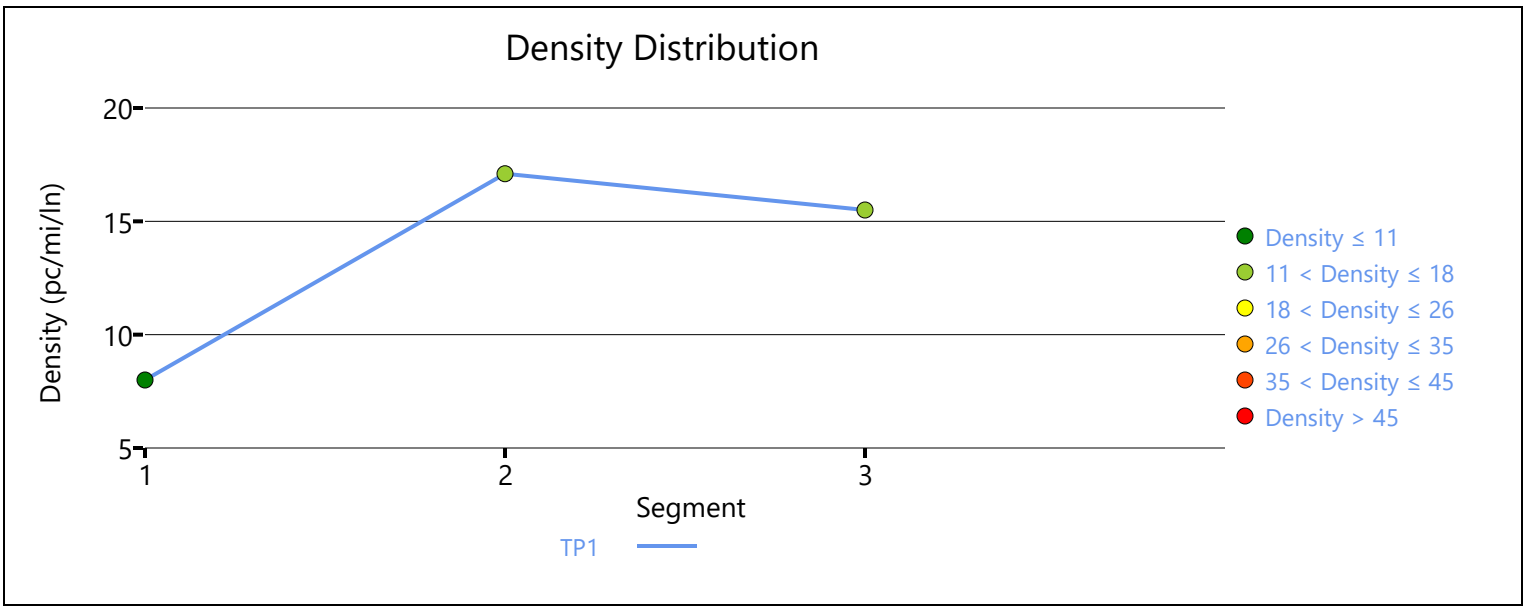
Space Mean Speed, mi/h	71.9	Density, veh/mi/ln	11.3
Average Travel Time, min	1.70	Density, pc/mi/ln	12.0

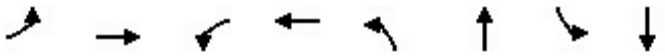
Messages

Comments









Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	46	197	77	57	76	953	28	1092
v/c Ratio	0.21	0.72	0.44	0.31	0.45	0.82	0.13	0.96
Control Delay	38.8	31.5	46.2	28.5	22.5	27.5	10.8	43.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	31.5	46.2	28.5	22.5	27.5	10.8	43.2
Queue Length 50th (ft)	29	41	50	17	18	608	9	~763
Queue Length 95th (ft)	58	114	86	56	65	#1038	m14	#1277
Internal Link Dist (ft)		737		561		511		4013
Turn Bay Length (ft)	100		85		105		120	
Base Capacity (vph)	229	360	180	276	187	1169	252	1133
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	0.20	0.55	0.43	0.21	0.41	0.82	0.11	0.96

Intersection Summary

~ 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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	36	145	71	21	31	70	766	110	26	980	25
Future Volume (veh/h)	42	36	145	71	21	31	70	766	110	26	980	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	46	39	158	77	23	34	76	833	120	28	1065	27
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	286	44	178	169	100	148	142	903	130	168	997	25
Arrive On Green	0.04	0.14	0.14	0.05	0.15	0.15	0.05	0.57	0.57	0.03	0.55	0.55
Sat Flow, veh/h	1774	323	1309	1774	680	1005	1774	1593	229	1774	1809	46
Grp Volume(v), veh/h	46	0	197	77	0	57	76	0	953	28	0	1092
Grp Sat Flow(s),veh/h/ln	1774	0	1632	1774	0	1685	1774	0	1822	1774	0	1855
Q Serve(g_s), s	2.6	0.0	14.2	4.4	0.0	3.6	2.2	0.0	57.0	0.8	0.0	66.2
Cycle Q Clear(g_c), s	2.6	0.0	14.2	4.4	0.0	3.6	2.2	0.0	57.0	0.8	0.0	66.2
Prop In Lane	1.00		0.80	1.00		0.60	1.00		0.13	1.00		0.02
Lane Grp Cap(c), veh/h	286	0	223	169	0	247	142	0	1033	168	0	1022
V/C Ratio(X)	0.16	0.00	0.89	0.46	0.00	0.23	0.54	0.00	0.92	0.17	0.00	1.07
Avail Cap(c_a), veh/h	342	0	238	207	0	247	186	0	1033	240	0	1022
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.66	0.00	0.66
Uniform Delay (d), s/veh	41.9	0.0	50.9	42.5	0.0	45.2	28.4	0.0	23.6	23.9	0.0	26.9
Incr Delay (d2), s/veh	0.3	0.0	29.1	1.9	0.0	0.5	3.1	0.0	14.6	0.3	0.0	43.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	8.2	2.2	0.0	1.7	1.5	0.0	32.5	0.5	0.0	45.9
LnGrp Delay(d),s/veh	42.2	0.0	80.0	44.4	0.0	45.7	31.5	0.0	38.2	24.3	0.0	70.4
LnGrp LOS	D		F	D		D	C		D	C		F
Approach Vol, veh/h		243			134			1029			1120	
Approach Delay, s/veh		72.9			44.9			37.7			69.2	
Approach LOS		E			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.1	74.5	12.5	22.9	12.0	72.7	11.2	24.1
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	8.5	59.5	8.5	17.5	8.5	59.5	8.5	17.5
Max Q Clear Time (g_c+I1), s	2.8	59.0	6.4	16.2	4.2	68.2	4.6	5.6
Green Ext Time (p_c), s	0.0	0.5	0.0	0.1	0.0	0.0	0.0	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	55.4
HCM 2010 LOS	E

Lane Group	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	34	132	910	642	1176
v/c Ratio	0.29	0.18	0.63	0.81	0.40
Control Delay	59.2	0.5	30.2	39.8	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	59.2	0.5	30.2	39.8	2.4
Queue Length 50th (ft)	26	0	379	399	53
Queue Length 95th (ft)	59	0	437	497	124
Internal Link Dist (ft)		697	409		2564
Turn Bay Length (ft)	150			275	
Base Capacity (vph)	280	836	1443	805	2937
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.16	0.63	0.80	0.40

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	31	0	121	0	771	66	591	1082	0
Future Volume (veh/h)	0	0	0	31	0	121	0	771	66	591	1082	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	0	0	0	34	0	132	0	838	72	642	1176	0
Adj No. of Lanes	0	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	2	0	180	0	161	60	1630	140	693	2812	0
Arrive On Green	0.00	0.00	0.00	0.10	0.00	0.10	0.00	0.49	0.49	0.49	1.00	0.00
Sat Flow, veh/h	0	1863	0	1774	0	1583	475	3299	283	1774	3632	0
Grp Volume(v), veh/h	0	0	0	34	0	132	0	449	461	642	1176	0
Grp Sat Flow(s),veh/h/ln	0	1863	0	1774	0	1583	475	1770	1813	1774	1770	0
Q Serve(g_s), s	0.0	0.0	0.0	2.1	0.0	9.8	0.0	20.7	20.7	25.7	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.1	0.0	9.8	0.0	20.7	20.7	25.7	0.0	0.0
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.16	1.00		0.00
Lane Grp Cap(c), veh/h	0	2	0	180	0	161	60	874	895	693	2812	0
V/C Ratio(X)	0.00	0.00	0.00	0.19	0.00	0.82	0.00	0.51	0.51	0.93	0.42	0.00
Avail Cap(c_a), veh/h	0	116	0	281	0	251	60	874	895	855	2812	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.81	0.81	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	49.4	0.0	52.9	0.0	20.6	20.6	9.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.5	0.0	11.6	0.0	2.2	2.1	11.8	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	1.1	0.0	4.8	0.0	10.6	10.9	13.7	0.1	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	49.9	0.0	64.5	0.0	22.8	22.7	20.9	0.4	0.0
LnGrp LOS				D		E		C	C	C	A	
Approach Vol, veh/h		0			166			910			1818	
Approach Delay, s/veh		0.0			61.5			22.7			7.6	
Approach LOS					E			C			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	36.1	65.8		0.0		101.8		18.2
Change Period (Y+Rc), s	6.5	6.5		6.5		6.5		6.0
Max Green Setting (Gmax), s	40.5	27.5		7.5		74.5		19.0
Max Q Clear Time (g_c+I1), s	27.7	22.7		0.0		2.0		11.8
Green Ext Time (p_c), s	1.8	4.1		0.0		24.3		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	15.5
HCM 2010 LOS	B

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	62	78	721	535	405	1665
v/c Ratio	0.28	0.40	0.30	0.43	0.65	0.57
Control Delay	56.5	11.9	18.8	11.1	6.7	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.5	11.9	18.8	11.1	6.7	1.2
Queue Length 50th (ft)	24	0	172	143	16	33
Queue Length 95th (ft)	46	31	283	272	m29	42
Internal Link Dist (ft)			2564			882
Turn Bay Length (ft)		350		700	150	
Base Capacity (vph)	400	273	2375	1238	732	2930
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.29	0.30	0.43	0.55	0.57

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	0	72	0	0	0	0	663	492	373	1532	0
Future Volume (veh/h)	57	0	72	0	0	0	0	663	492	373	1532	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	0	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	62	0	0				0	721	0	405	1665	0
Adj No. of Lanes	2	0	1				0	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	0	2				0	2	2	2	2	0
Cap, veh/h	150	0	69				0	2450	1096	737	3001	0
Arrive On Green	0.04	0.00	0.00				0.00	1.00	0.00	0.19	1.00	0.00
Sat Flow, veh/h	3442	0	1583				0	3632	1583	1774	3632	0
Grp Volume(v), veh/h	62	0	0				0	721	0	405	1665	0
Grp Sat Flow(s),veh/h/ln	1721	0	1583				0	1770	1583	1774	1770	0
Q Serve(g_s), s	2.1	0.0	0.0				0.0	0.0	0.0	8.7	0.0	0.0
Cycle Q Clear(g_c), s	2.1	0.0	0.0				0.0	0.0	0.0	8.7	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	150	0	69				0	2450	1096	737	3001	0
V/C Ratio(X)	0.41	0.00	0.00				0.00	0.29	0.00	0.55	0.55	0.00
Avail Cap(c_a), veh/h	402	0	185				0	2450	1096	904	3001	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.74	0.00	0.63	0.63	0.00
Uniform Delay (d), s/veh	55.9	0.0	0.0				0.0	0.0	0.0	2.8	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	0.0				0.0	0.2	0.0	0.4	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0				0.0	0.1	0.0	4.0	0.2	0.0
LnGrp Delay(d),s/veh	57.7	0.0	0.0				0.0	0.2	0.0	3.2	0.5	0.0
LnGrp LOS	E							A		A	A	
Approach Vol, veh/h		62						721			2070	
Approach Delay, s/veh		57.7						0.2			1.0	
Approach LOS		E						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	18.7	90.1		11.2		108.8		
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		
Max Green Setting (Gmax), s	23.0	63.0		14.0		93.0		
Max Q Clear Time (g_c+I1), s	10.7	2.0		4.1		2.0		
Green Ext Time (p_c), s	1.0	32.6		0.1		38.4		

Intersection Summary	
HCM 2010 Ctrl Delay	2.0
HCM 2010 LOS	A

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	667	215	89	693	1402	115
v/c Ratio	0.47	0.29	1.46	0.41	0.83	0.14
Control Delay	27.1	7.8	307.6	18.4	32.9	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.1	7.8	307.6	18.4	32.9	3.5
Queue Length 50th (ft)	191	26	~87	121	484	0
Queue Length 95th (ft)	244	77	#193	261	584	32
Internal Link Dist (ft)				882	859	
Turn Bay Length (ft)		225	200			575
Base Capacity (vph)	1416	746	61	1681	1681	812
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.29	1.46	0.41	0.83	0.14

Intersection Summary

~ 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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	614	0	198	82	638	0	0	1290	106
Future Volume (veh/h)	0	0	0	614	0	198	82	638	0	0	1290	106
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	0	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				667	0	0	89	693	0	0	1402	0
Adj No. of Lanes				2	0	1	1	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	2	2	0	0	2	2
Cap, veh/h				1420	0	653	110	1681	0	0	1681	752
Arrive On Green				0.41	0.00	0.00	0.95	0.95	0.00	0.00	0.47	0.00
Sat Flow, veh/h				3442	0	1583	383	3632	0	0	3632	1583
Grp Volume(v), veh/h				667	0	0	89	693	0	0	1402	0
Grp Sat Flow(s),veh/h/ln				1721	0	1583	383	1770	0	0	1770	1583
Q Serve(g_s), s				16.9	0.0	0.0	15.7	1.9	0.0	0.0	41.3	0.0
Cycle Q Clear(g_c), s				16.9	0.0	0.0	57.0	1.9	0.0	0.0	41.3	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				1420	0	653	110	1681	0	0	1681	752
V/C Ratio(X)				0.47	0.00	0.00	0.81	0.41	0.00	0.00	0.83	0.00
Avail Cap(c_a), veh/h				1420	0	653	110	1681	0	0	1681	752
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.96	0.96	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				25.7	0.0	0.0	27.1	1.6	0.0	0.0	27.4	0.0
Incr Delay (d2), s/veh				1.1	0.0	0.0	44.1	0.7	0.0	0.0	5.0	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				8.3	0.0	0.0	4.3	0.9	0.0	0.0	21.2	0.0
LnGrp Delay(d),s/veh				26.8	0.0	0.0	71.2	2.3	0.0	0.0	32.4	0.0
LnGrp LOS				C			E	A			C	
Approach Vol, veh/h					667			782			1402	
Approach Delay, s/veh					26.8			10.2			32.4	
Approach LOS					C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		64.0				64.0		56.0
Change Period (Y+Rc), s		7.0				7.0		6.5
Max Green Setting (Gmax), s		57.0				57.0		49.5
Max Q Clear Time (g_c+I1), s		59.0				43.3		18.9
Green Ext Time (p_c), s		0.0				10.9		2.4

Intersection Summary	
HCM 2010 Ctrl Delay	25.0
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	11.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	104	198	142	699	1263	94
Future Vol, veh/h	104	198	142	699	1263	94
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	225	550	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	113	215	154	760	1373	102

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2061	687	1475	0	-	0
Stage 1	1373	-	-	-	-	-
Stage 2	688	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 47	389	453	-	-	-
Stage 1	200	-	-	-	-	-
Stage 2	460	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 31	389	453	-	-	-
Mov Cap-2 Maneuver	~ 103	-	-	-	-	-
Stage 1	132	-	-	-	-	-
Stage 2	460	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	83.6	2.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	453	-	103	389	-	-
HCM Lane V/C Ratio	0.341	-	1.098	0.553	-	-
HCM Control Delay (s)	17	-	195.1	25.1	-	-
HCM Lane LOS	C	-	F	D	-	-
HCM 95th %tile Q(veh)	1.5	-	7.2	3.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	118	118	763	87	186	1023
v/c Ratio	0.60	0.42	0.63	0.08	0.42	0.70
Control Delay	63.1	12.9	20.6	6.3	5.2	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.1	12.9	20.6	6.3	5.2	8.1
Queue Length 50th (ft)	89	0	579	23	28	286
Queue Length 95th (ft)	145	53	731	m30	58	377
Internal Link Dist (ft)	381		4013			560
Turn Bay Length (ft)		75		50	150	
Base Capacity (vph)	346	404	1218	1043	449	1454
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.29	0.63	0.08	0.41	0.70

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	109	109	702	80	171	941
Future Volume (veh/h)	109	109	702	80	171	941
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	118	118	763	87	186	1023
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	167	149	1292	1098	459	1485
Arrive On Green	0.09	0.09	0.69	0.69	0.05	0.80
Sat Flow, veh/h	1774	1583	1863	1583	1774	1863
Grp Volume(v), veh/h	118	118	763	87	186	1023
Grp Sat Flow(s),veh/h/ln	1774	1583	1863	1583	1774	1863
Q Serve(g_s), s	7.7	8.8	25.5	2.1	3.4	29.6
Cycle Q Clear(g_c), s	7.7	8.8	25.5	2.1	3.4	29.6
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	167	149	1292	1098	459	1485
V/C Ratio(X)	0.71	0.79	0.59	0.08	0.41	0.69
Avail Cap(c_a), veh/h	347	310	1292	1098	481	1485
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.52	0.52	1.00	1.00
Uniform Delay (d), s/veh	52.7	53.2	9.6	6.0	8.3	5.5
Incr Delay (d2), s/veh	5.4	9.0	1.0	0.1	0.6	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	4.2	13.3	0.9	2.0	15.9
LnGrp Delay(d),s/veh	58.1	62.2	10.6	6.0	8.9	8.1
LnGrp LOS	E	E	B	A	A	A
Approach Vol, veh/h	236		850			1209
Approach Delay, s/veh	60.2		10.1			8.2
Approach LOS	E		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	12.5	89.7				102.2		17.8
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	7.5	69.5				83.5		23.5
Max Q Clear Time (g_c+I1), s	5.4	27.5				31.6		10.8
Green Ext Time (p_c), s	0.1	19.5				21.2		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.3
HCM 2010 LOS	B

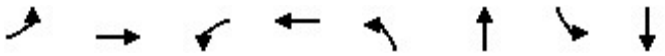
Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	51	775	36	0	1112
Future Vol, veh/h	0	51	775	36	0	1112
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	55	842	39	0	1209

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	862	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	355	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	355	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	355	-
HCM Lane V/C Ratio	-	-	0.156	-
HCM Control Delay (s)	-	-	17	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.5	-



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	46	197	77	57	76	953	28	1092
v/c Ratio	0.21	0.72	0.44	0.31	0.45	0.82	0.13	0.96
Control Delay	38.8	31.5	46.2	28.5	22.5	27.5	10.8	43.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	31.5	46.2	28.5	22.5	27.5	10.8	43.2
Queue Length 50th (ft)	29	41	50	17	18	608	9	~763
Queue Length 95th (ft)	58	114	86	56	65	#1038	m14	#1277
Internal Link Dist (ft)		737		561		511		4013
Turn Bay Length (ft)	100		85		105		120	
Base Capacity (vph)	229	360	180	276	187	1169	252	1133
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	0.20	0.55	0.43	0.21	0.41	0.82	0.11	0.96

Intersection Summary

~ 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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	36	145	71	21	31	70	766	110	26	980	25
Future Volume (veh/h)	42	36	145	71	21	31	70	766	110	26	980	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	46	39	158	77	23	34	76	833	120	28	1065	27
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	286	44	178	169	100	148	142	903	130	168	997	25
Arrive On Green	0.04	0.14	0.14	0.05	0.15	0.15	0.05	0.57	0.57	0.03	0.55	0.55
Sat Flow, veh/h	1774	323	1309	1774	680	1005	1774	1593	229	1774	1809	46
Grp Volume(v), veh/h	46	0	197	77	0	57	76	0	953	28	0	1092
Grp Sat Flow(s),veh/h/ln	1774	0	1632	1774	0	1685	1774	0	1822	1774	0	1855
Q Serve(g_s), s	2.6	0.0	14.2	4.4	0.0	3.6	2.2	0.0	57.0	0.8	0.0	66.2
Cycle Q Clear(g_c), s	2.6	0.0	14.2	4.4	0.0	3.6	2.2	0.0	57.0	0.8	0.0	66.2
Prop In Lane	1.00		0.80	1.00		0.60	1.00		0.13	1.00		0.02
Lane Grp Cap(c), veh/h	286	0	223	169	0	247	142	0	1033	168	0	1022
V/C Ratio(X)	0.16	0.00	0.89	0.46	0.00	0.23	0.54	0.00	0.92	0.17	0.00	1.07
Avail Cap(c_a), veh/h	342	0	238	207	0	247	186	0	1033	240	0	1022
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.66	0.00	0.66
Uniform Delay (d), s/veh	41.9	0.0	50.9	42.5	0.0	45.2	28.4	0.0	23.6	23.9	0.0	26.9
Incr Delay (d2), s/veh	0.3	0.0	29.1	1.9	0.0	0.5	3.1	0.0	14.6	0.3	0.0	43.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	8.2	2.2	0.0	1.7	1.5	0.0	32.5	0.5	0.0	45.9
LnGrp Delay(d),s/veh	42.2	0.0	80.0	44.4	0.0	45.7	31.5	0.0	38.2	24.3	0.0	70.4
LnGrp LOS	D		F	D		D	C		D	C		F
Approach Vol, veh/h		243			134			1029			1120	
Approach Delay, s/veh		72.9			44.9			37.7			69.2	
Approach LOS		E			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.1	74.5	12.5	22.9	12.0	72.7	11.2	24.1
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	8.5	59.5	8.5	17.5	8.5	59.5	8.5	17.5
Max Q Clear Time (g_c+I1), s	2.8	59.0	6.4	16.2	4.2	68.2	4.6	5.6
Green Ext Time (p_c), s	0.0	0.5	0.0	0.1	0.0	0.0	0.0	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	55.4
HCM 2010 LOS	E

Lane Group	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	34	132	910	642	1176
v/c Ratio	0.29	0.18	0.63	0.81	0.40
Control Delay	59.2	0.5	30.2	39.8	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	59.2	0.5	30.2	39.8	2.4
Queue Length 50th (ft)	26	0	379	399	53
Queue Length 95th (ft)	59	0	437	497	124
Internal Link Dist (ft)		697	409		2564
Turn Bay Length (ft)	150			275	
Base Capacity (vph)	280	836	1443	805	2937
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.16	0.63	0.80	0.40

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	31	0	121	0	771	66	591	1082	0
Future Volume (veh/h)	0	0	0	31	0	121	0	771	66	591	1082	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	0	0	0	34	0	132	0	838	72	642	1176	0
Adj No. of Lanes	0	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	2	0	180	0	161	60	1630	140	693	2812	0
Arrive On Green	0.00	0.00	0.00	0.10	0.00	0.10	0.00	0.49	0.49	0.49	1.00	0.00
Sat Flow, veh/h	0	1863	0	1774	0	1583	475	3299	283	1774	3632	0
Grp Volume(v), veh/h	0	0	0	34	0	132	0	449	461	642	1176	0
Grp Sat Flow(s),veh/h/ln	0	1863	0	1774	0	1583	475	1770	1813	1774	1770	0
Q Serve(g_s), s	0.0	0.0	0.0	2.1	0.0	9.8	0.0	20.7	20.7	25.7	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.1	0.0	9.8	0.0	20.7	20.7	25.7	0.0	0.0
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.16	1.00		0.00
Lane Grp Cap(c), veh/h	0	2	0	180	0	161	60	874	895	693	2812	0
V/C Ratio(X)	0.00	0.00	0.00	0.19	0.00	0.82	0.00	0.51	0.51	0.93	0.42	0.00
Avail Cap(c_a), veh/h	0	116	0	281	0	251	60	874	895	855	2812	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.81	0.81	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	49.4	0.0	52.9	0.0	20.6	20.6	9.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.5	0.0	11.6	0.0	2.2	2.1	11.8	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	1.1	0.0	4.8	0.0	10.6	10.9	13.7	0.1	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	49.9	0.0	64.5	0.0	22.8	22.7	20.9	0.4	0.0
LnGrp LOS				D		E		C	C	C	A	
Approach Vol, veh/h		0			166			910			1818	
Approach Delay, s/veh		0.0			61.5			22.7			7.6	
Approach LOS					E			C			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	36.1	65.8		0.0		101.8		18.2
Change Period (Y+Rc), s	6.5	6.5		6.5		6.5		6.0
Max Green Setting (Gmax), s	40.5	27.5		7.5		74.5		19.0
Max Q Clear Time (g_c+I1), s	27.7	22.7		0.0		2.0		11.8
Green Ext Time (p_c), s	1.8	4.1		0.0		24.3		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	15.5
HCM 2010 LOS	B

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	62	78	721	535	405	1665
v/c Ratio	0.28	0.40	0.30	0.43	0.65	0.57
Control Delay	56.5	11.9	18.8	11.1	6.7	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.5	11.9	18.8	11.1	6.7	1.2
Queue Length 50th (ft)	24	0	172	143	16	33
Queue Length 95th (ft)	46	31	283	272	m29	42
Internal Link Dist (ft)			2564			882
Turn Bay Length (ft)		350		700	150	
Base Capacity (vph)	400	273	2375	1238	732	2930
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.29	0.30	0.43	0.55	0.57

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	0	72	0	0	0	0	663	492	373	1532	0
Future Volume (veh/h)	57	0	72	0	0	0	0	663	492	373	1532	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	0	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	62	0	0				0	721	0	405	1665	0
Adj No. of Lanes	2	0	1				0	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	0	2				0	2	2	2	2	0
Cap, veh/h	150	0	69				0	2450	1096	737	3001	0
Arrive On Green	0.04	0.00	0.00				0.00	1.00	0.00	0.19	1.00	0.00
Sat Flow, veh/h	3442	0	1583				0	3632	1583	1774	3632	0
Grp Volume(v), veh/h	62	0	0				0	721	0	405	1665	0
Grp Sat Flow(s),veh/h/ln	1721	0	1583				0	1770	1583	1774	1770	0
Q Serve(g_s), s	2.1	0.0	0.0				0.0	0.0	0.0	8.7	0.0	0.0
Cycle Q Clear(g_c), s	2.1	0.0	0.0				0.0	0.0	0.0	8.7	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	150	0	69				0	2450	1096	737	3001	0
V/C Ratio(X)	0.41	0.00	0.00				0.00	0.29	0.00	0.55	0.55	0.00
Avail Cap(c_a), veh/h	402	0	185				0	2450	1096	904	3001	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.74	0.00	0.63	0.63	0.00
Uniform Delay (d), s/veh	55.9	0.0	0.0				0.0	0.0	0.0	2.8	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	0.0				0.0	0.2	0.0	0.4	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0				0.0	0.1	0.0	4.0	0.2	0.0
LnGrp Delay(d),s/veh	57.7	0.0	0.0				0.0	0.2	0.0	3.2	0.5	0.0
LnGrp LOS	E							A		A	A	
Approach Vol, veh/h		62						721			2070	
Approach Delay, s/veh		57.7						0.2			1.0	
Approach LOS		E						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	18.7	90.1		11.2		108.8		
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		
Max Green Setting (Gmax), s	23.0	63.0		14.0		93.0		
Max Q Clear Time (g_c+I1), s	10.7	2.0		4.1		2.0		
Green Ext Time (p_c), s	1.0	32.6		0.1		38.4		

Intersection Summary	
HCM 2010 Ctrl Delay	2.0
HCM 2010 LOS	A

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	667	215	89	693	1402	115
v/c Ratio	0.47	0.29	1.46	0.41	0.83	0.14
Control Delay	27.1	7.8	307.6	18.4	32.9	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.1	7.8	307.6	18.4	32.9	3.5
Queue Length 50th (ft)	191	26	~87	121	484	0
Queue Length 95th (ft)	244	77	#193	261	584	32
Internal Link Dist (ft)				882	859	
Turn Bay Length (ft)		225	200			575
Base Capacity (vph)	1416	746	61	1681	1681	812
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.29	1.46	0.41	0.83	0.14

Intersection Summary

~ 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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	614	0	198	82	638	0	0	1290	106
Future Volume (veh/h)	0	0	0	614	0	198	82	638	0	0	1290	106
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	0	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				667	0	0	89	693	0	0	1402	0
Adj No. of Lanes				2	0	1	1	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	2	2	0	0	2	2
Cap, veh/h				1420	0	653	110	1681	0	0	1681	752
Arrive On Green				0.41	0.00	0.00	0.95	0.95	0.00	0.00	0.47	0.00
Sat Flow, veh/h				3442	0	1583	383	3632	0	0	3632	1583
Grp Volume(v), veh/h				667	0	0	89	693	0	0	1402	0
Grp Sat Flow(s),veh/h/ln				1721	0	1583	383	1770	0	0	1770	1583
Q Serve(g_s), s				16.9	0.0	0.0	15.7	1.9	0.0	0.0	41.3	0.0
Cycle Q Clear(g_c), s				16.9	0.0	0.0	57.0	1.9	0.0	0.0	41.3	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				1420	0	653	110	1681	0	0	1681	752
V/C Ratio(X)				0.47	0.00	0.00	0.81	0.41	0.00	0.00	0.83	0.00
Avail Cap(c_a), veh/h				1420	0	653	110	1681	0	0	1681	752
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.96	0.96	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				25.7	0.0	0.0	27.1	1.6	0.0	0.0	27.4	0.0
Incr Delay (d2), s/veh				1.1	0.0	0.0	44.1	0.7	0.0	0.0	5.0	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				8.3	0.0	0.0	4.3	0.9	0.0	0.0	21.2	0.0
LnGrp Delay(d),s/veh				26.8	0.0	0.0	71.2	2.3	0.0	0.0	32.4	0.0
LnGrp LOS				C			E	A			C	
Approach Vol, veh/h					667			782			1402	
Approach Delay, s/veh					26.8			10.2			32.4	
Approach LOS					C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		64.0				64.0		56.0
Change Period (Y+Rc), s		7.0				7.0		6.5
Max Green Setting (Gmax), s		57.0				57.0		49.5
Max Q Clear Time (g_c+I1), s		59.0				43.3		18.9
Green Ext Time (p_c), s		0.0				10.9		2.4

Intersection Summary	
HCM 2010 Ctrl Delay	25.0
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	11.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	104	198	142	699	1263	94
Future Vol, veh/h	104	198	142	699	1263	94
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	225	550	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	113	215	154	760	1373	102

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2061	687	1475	0	-	0
Stage 1	1373	-	-	-	-	-
Stage 2	688	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 47	389	453	-	-	-
Stage 1	200	-	-	-	-	-
Stage 2	460	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 31	389	453	-	-	-
Mov Cap-2 Maneuver	~ 103	-	-	-	-	-
Stage 1	132	-	-	-	-	-
Stage 2	460	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	83.6	2.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	453	-	103	389	-	-
HCM Lane V/C Ratio	0.341	-	1.098	0.553	-	-
HCM Control Delay (s)	17	-	195.1	25.1	-	-
HCM Lane LOS	C	-	F	D	-	-
HCM 95th %tile Q(veh)	1.5	-	7.2	3.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	118	118	763	87	186	1023
v/c Ratio	0.60	0.42	0.63	0.08	0.42	0.70
Control Delay	63.1	12.9	20.6	6.3	5.2	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.1	12.9	20.6	6.3	5.2	8.1
Queue Length 50th (ft)	89	0	579	23	28	286
Queue Length 95th (ft)	145	53	731	m30	58	377
Internal Link Dist (ft)	381		4013			560
Turn Bay Length (ft)		75		50	150	
Base Capacity (vph)	346	404	1218	1043	449	1454
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.29	0.63	0.08	0.41	0.70

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	109	109	702	80	171	941
Future Volume (veh/h)	109	109	702	80	171	941
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	118	118	763	87	186	1023
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	167	149	1292	1098	459	1485
Arrive On Green	0.09	0.09	0.69	0.69	0.05	0.80
Sat Flow, veh/h	1774	1583	1863	1583	1774	1863
Grp Volume(v), veh/h	118	118	763	87	186	1023
Grp Sat Flow(s),veh/h/ln	1774	1583	1863	1583	1774	1863
Q Serve(g_s), s	7.7	8.8	25.5	2.1	3.4	29.6
Cycle Q Clear(g_c), s	7.7	8.8	25.5	2.1	3.4	29.6
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	167	149	1292	1098	459	1485
V/C Ratio(X)	0.71	0.79	0.59	0.08	0.41	0.69
Avail Cap(c_a), veh/h	347	310	1292	1098	481	1485
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.52	0.52	1.00	1.00
Uniform Delay (d), s/veh	52.7	53.2	9.6	6.0	8.3	5.5
Incr Delay (d2), s/veh	5.4	9.0	1.0	0.1	0.6	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	4.2	13.3	0.9	2.0	15.9
LnGrp Delay(d),s/veh	58.1	62.2	10.6	6.0	8.9	8.1
LnGrp LOS	E	E	B	A	A	A
Approach Vol, veh/h	236		850			1209
Approach Delay, s/veh	60.2		10.1			8.2
Approach LOS	E		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	12.5	89.7				102.2		17.8
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	7.5	69.5				83.5		23.5
Max Q Clear Time (g_c+I1), s	5.4	27.5				31.6		10.8
Green Ext Time (p_c), s	0.1	19.5				21.2		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.3
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	51	775	36	0	1112
Future Vol, veh/h	0	51	775	36	0	1112
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	55	842	39	0	1209

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	862	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	355	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	355	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	355	-
HCM Lane V/C Ratio	-	-	0.156	-
HCM Control Delay (s)	-	-	17	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.5	-

HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2019
Jurisdiction		Time Period Analyzed	PM Peak Hour
Project Description	Roderick Place TIS: I-840 Eastbound Ramp Existing		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	2.00		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 EB	5280	2
2	Merge	Merge	EB Ramp from Columbia Pike _I-840 EB	1500	2
3	Basic	Basic	I-840 EB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	878	4646	0.19	73.5	6.0	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	1698	820	4259	2033	0.40	0.40	66.9	66.9	12.7	9.0	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	1698	4646	0.37	73.4	11.6	B

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.1	9.0	8.6	1.70	A

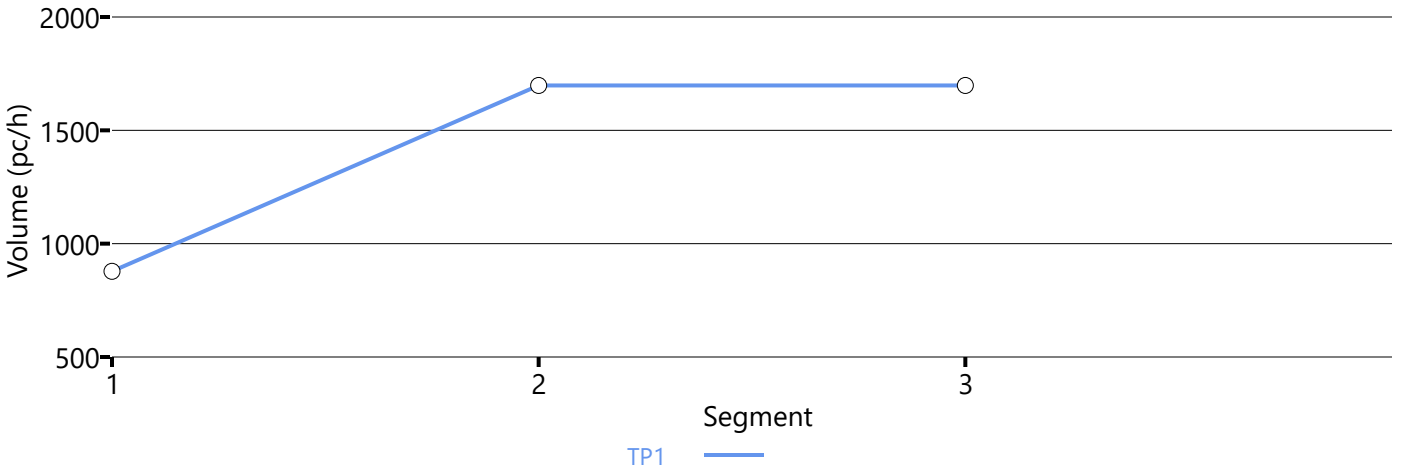
Facility Overall Results

Space Mean Speed, mi/h	72.1	Density, veh/mi/ln	8.6
Average Travel Time, min	1.70	Density, pc/mi/ln	9.0

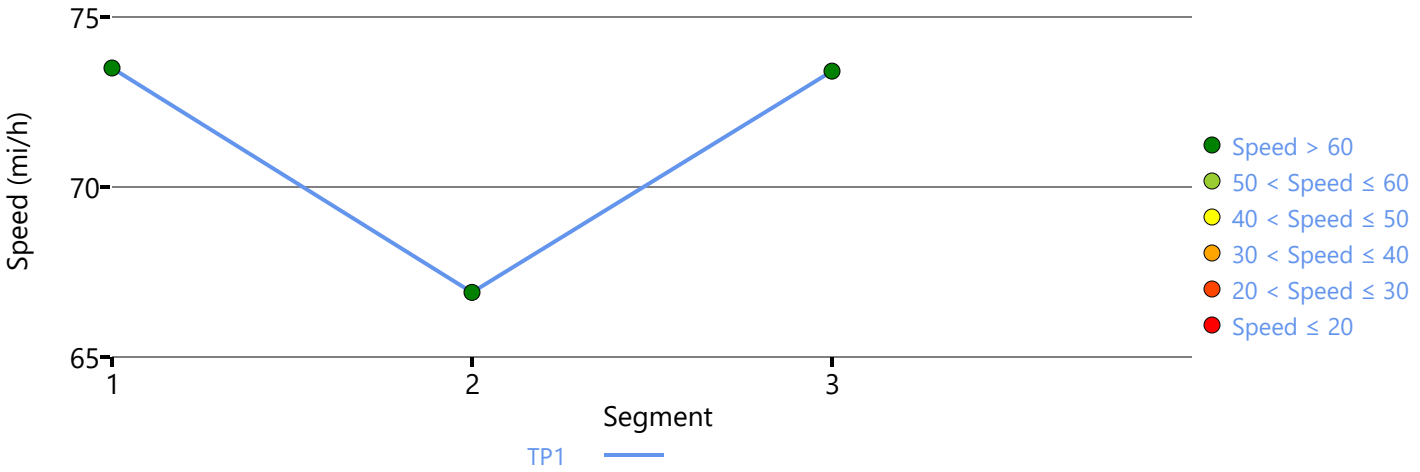
Messages

Comments

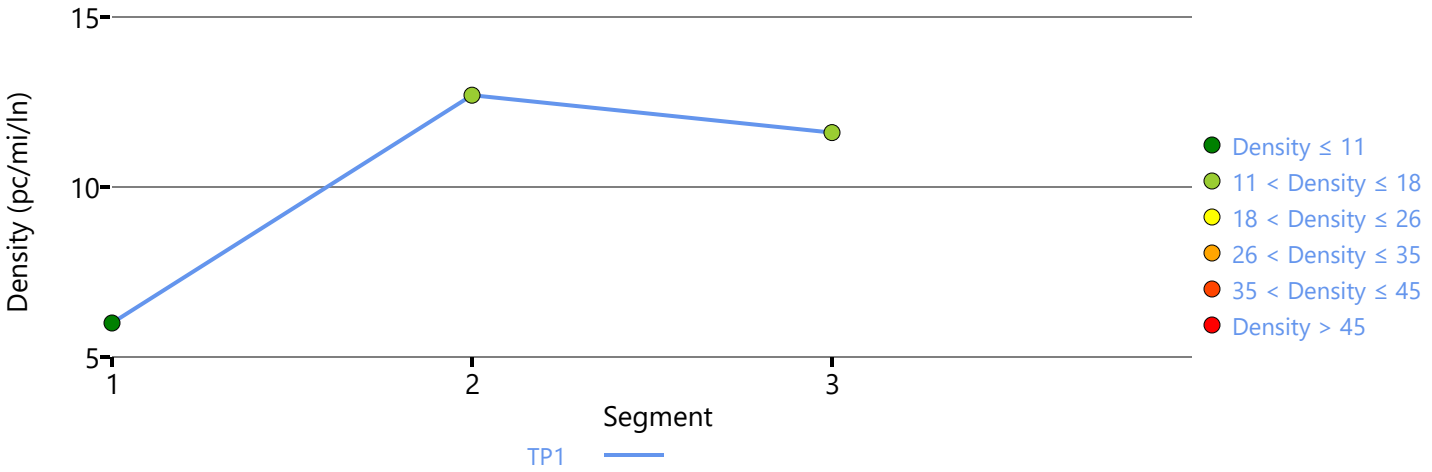
Volume Distribution



Speed Distribution



Density Distribution



HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2019
Jurisdiction		Time Period Analyzed	PM Peak Hour
Project Description	Roderick Place TIS: I-840 Westbound Ramp Existing		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	1.98		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 WB	5280	2
2	Merge	Merge	WB Ramp from Columbia Pike _I-840 EB	1400	2
3	Basic	Basic	I-840 WB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	1342	4646	0.29	73.5	9.1	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	1530	188	4259	2033	0.36	0.09	67.0	67.0	11.4	8.0	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	1530	4646	0.33	73.4	10.4	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.5	9.9	9.5	1.60	A

Facility Overall Results

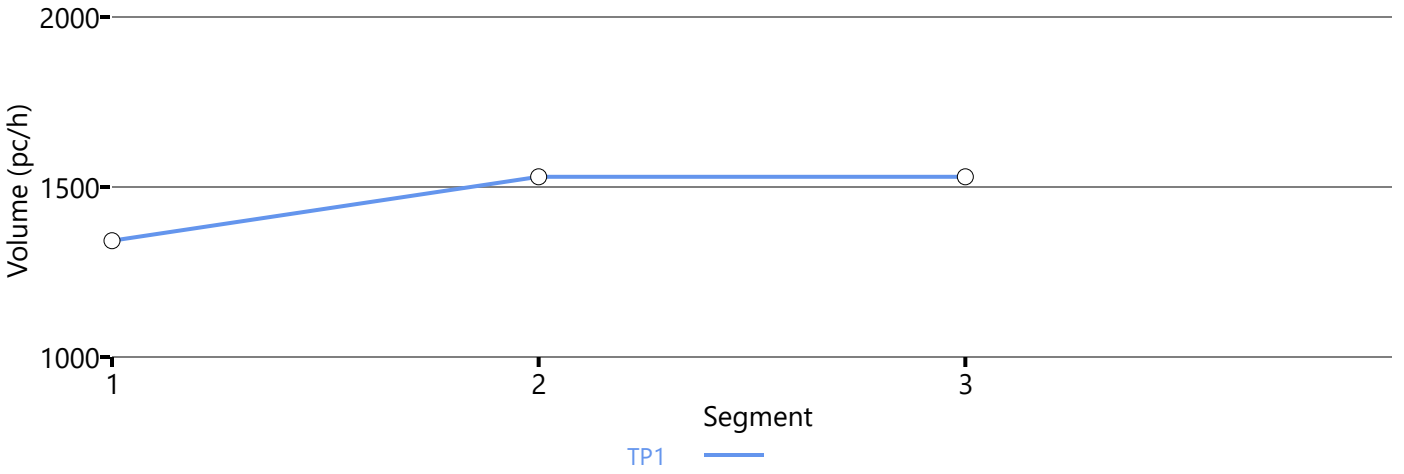
Space Mean Speed, mi/h	72.5	Density, veh/mi/ln	9.5
Average Travel Time, min	1.60	Density, pc/mi/ln	9.9

Messages

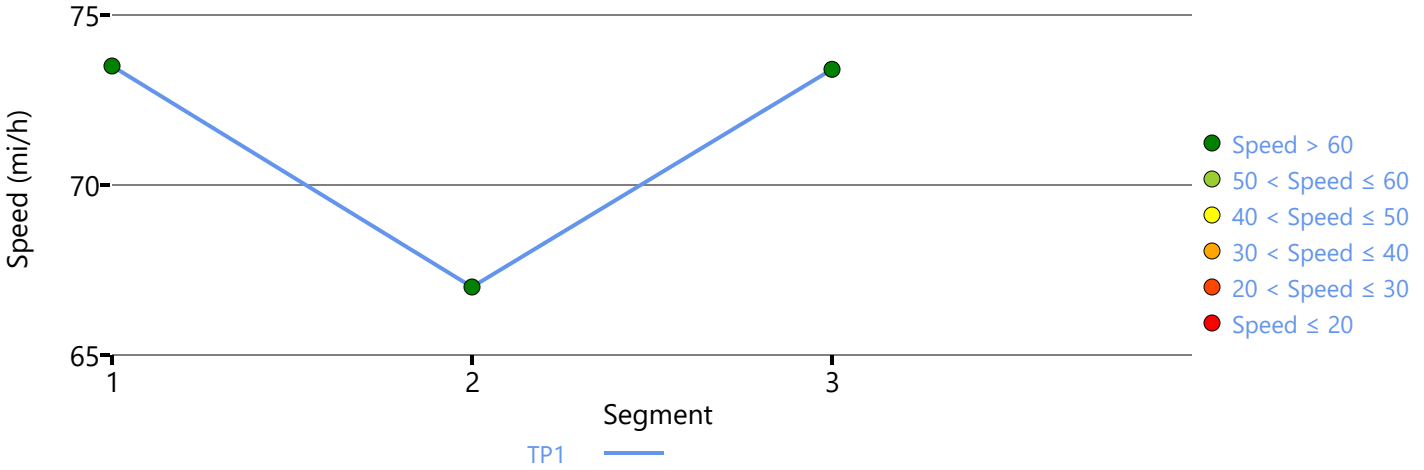
ERROR 1	Acceleration lane length is longer than the segment length for merge segment 2.

Comments

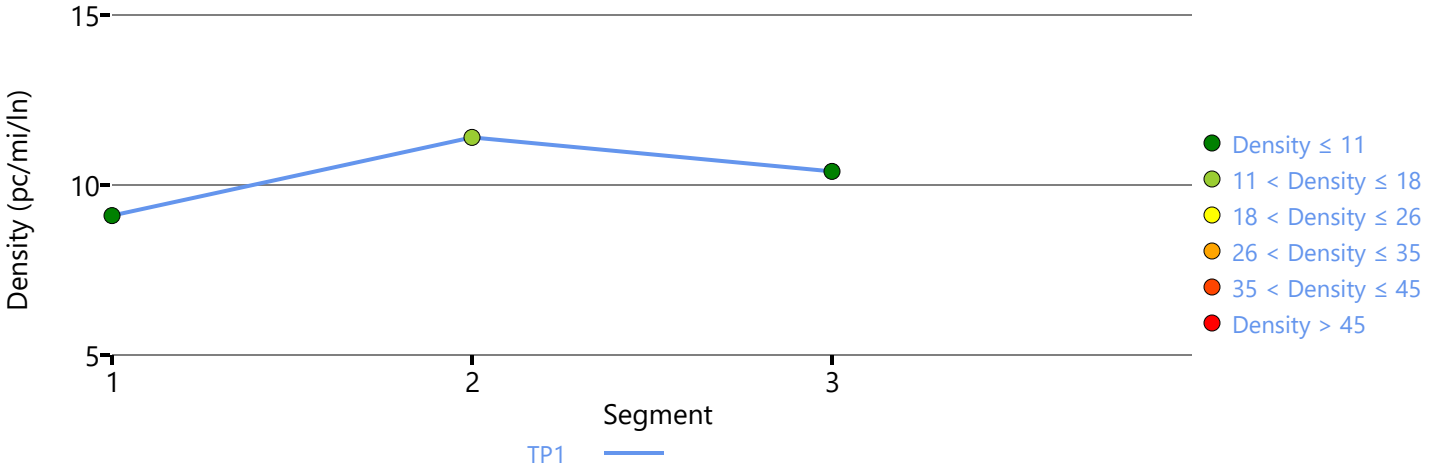
Volume Distribution

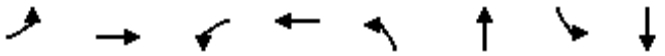


Speed Distribution



Density Distribution





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	141	70	84	85	814	20	682
v/c Ratio	0.24	0.56	0.30	0.43	0.26	0.77	0.08	0.72
Control Delay	27.8	21.0	29.0	31.6	10.2	25.0	9.2	27.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	21.0	29.0	31.6	10.2	25.0	9.2	27.7
Queue Length 50th (ft)	26	18	31	28	18	293	5	357
Queue Length 95th (ft)	53	71	61	69	42	#747	19	#603
Internal Link Dist (ft)		737		561		511		6096
Turn Bay Length (ft)	100		85		105		120	
Base Capacity (vph)	254	338	244	289	336	1064	283	949
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	0.23	0.42	0.29	0.29	0.25	0.77	0.07	0.72

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	31	98	64	46	31	78	670	79	18	593	34
Future Volume (veh/h)	53	31	98	64	46	31	78	670	79	18	593	34
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	58	34	107	70	50	34	85	728	86	20	645	37
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	261	44	137	211	118	80	325	850	100	216	850	49
Arrive On Green	0.05	0.11	0.11	0.06	0.11	0.11	0.06	0.52	0.52	0.03	0.49	0.49
Sat Flow, veh/h	1774	396	1247	1774	1035	704	1774	1635	193	1774	1745	100
Grp Volume(v), veh/h	58	0	141	70	0	84	85	0	814	20	0	682
Grp Sat Flow(s),veh/h/ln	1774	0	1643	1774	0	1739	1774	0	1829	1774	0	1845
Q Serve(g_s), s	2.6	0.0	7.5	3.1	0.0	4.0	2.1	0.0	34.7	0.5	0.0	27.1
Cycle Q Clear(g_c), s	2.6	0.0	7.5	3.1	0.0	4.0	2.1	0.0	34.7	0.5	0.0	27.1
Prop In Lane	1.00		0.76	1.00		0.40	1.00		0.11	1.00		0.05
Lane Grp Cap(c), veh/h	261	0	181	211	0	198	325	0	951	216	0	899
V/C Ratio(X)	0.22	0.00	0.78	0.33	0.00	0.42	0.26	0.00	0.86	0.09	0.00	0.76
Avail Cap(c_a), veh/h	318	0	246	261	0	261	369	0	951	318	0	899
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.8	0.0	39.0	33.0	0.0	37.1	14.3	0.0	18.7	16.5	0.0	18.8
Incr Delay (d2), s/veh	0.4	0.0	10.5	0.9	0.0	1.4	0.4	0.0	9.8	0.2	0.0	6.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	3.9	1.6	0.0	2.0	1.0	0.0	20.0	0.3	0.0	15.1
LnGrp Delay(d),s/veh	33.2	0.0	49.5	33.9	0.0	38.5	14.7	0.0	28.5	16.7	0.0	24.7
LnGrp LOS	C		D	C		D	B		C	B		C
Approach Vol, veh/h		199			154			899			702	
Approach Delay, s/veh		44.8			36.4			27.2			24.5	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.9	53.3	11.5	16.4	11.8	50.4	11.1	16.8
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	7.5	35.5	7.5	13.5	7.5	35.5	7.5	13.5
Max Q Clear Time (g_c+I1), s	2.5	36.7	5.1	9.5	4.1	29.1	4.6	6.0
Green Ext Time (p_c), s	0.0	0.0	0.0	0.4	0.0	4.5	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	28.7
HCM 2010 LOS	C

Lane Group	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	47	158	776	116	671
v/c Ratio	0.30	0.27	0.34	0.22	0.25
Control Delay	42.8	1.2	2.4	3.6	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	42.8	1.2	2.4	3.6	2.7
Queue Length 50th (ft)	26	0	41	9	28
Queue Length 95th (ft)	58	0	23	28	58
Internal Link Dist (ft)		697	409		2564
Turn Bay Length (ft)	150			275	
Base Capacity (vph)	275	655	2286	617	2734
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.17	0.24	0.34	0.19	0.25

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	43	0	145	0	680	34	107	616	1
Future Volume (veh/h)	0	0	0	43	0	145	0	680	34	107	616	1
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	0	0	0	47	0	158	0	739	37	116	670	1
Adj No. of Lanes	0	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	2	0	216	0	193	80	2072	104	535	2680	4
Arrive On Green	0.00	0.00	0.00	0.12	0.00	0.12	0.00	0.60	0.60	0.13	1.00	1.00
Sat Flow, veh/h	0	1863	0	1774	0	1583	763	3430	172	1774	3626	5
Grp Volume(v), veh/h	0	0	0	47	0	158	0	381	395	116	327	344
Grp Sat Flow(s),veh/h/ln	0	1863	0	1774	0	1583	763	1770	1832	1774	1770	1862
Q Serve(g_s), s	0.0	0.0	0.0	2.2	0.0	8.8	0.0	9.8	9.8	2.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.2	0.0	8.8	0.0	9.8	9.8	2.0	0.0	0.0
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.09	1.00		0.00
Lane Grp Cap(c), veh/h	0	2	0	216	0	193	80	1069	1107	535	1308	1376
V/C Ratio(X)	0.00	0.00	0.00	0.22	0.00	0.82	0.00	0.36	0.36	0.22	0.25	0.25
Avail Cap(c_a), veh/h	0	155	0	276	0	246	80	1069	1107	689	1308	1376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.98	0.98	0.98
Uniform Delay (d), s/veh	0.0	0.0	0.0	35.6	0.0	38.5	0.0	9.0	9.0	5.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.5	0.0	15.4	0.0	0.9	0.9	0.2	0.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	1.1	0.0	4.6	0.0	5.0	5.2	1.0	0.2	0.2
LnGrp Delay(d),s/veh	0.0	0.0	0.0	36.1	0.0	54.0	0.0	9.9	9.9	5.4	0.5	0.4
LnGrp LOS				D		D		A	A	A	A	A
Approach Vol, veh/h		0			205			776			787	
Approach Delay, s/veh		0.0			49.9			9.9			1.2	
Approach LOS					D			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	12.2	60.9		0.0		73.0		17.0
Change Period (Y+Rc), s	6.5	6.5		6.5		6.5		6.0
Max Green Setting (Gmax), s	13.5	29.5		7.5		49.5		14.0
Max Q Clear Time (g_c+I1), s	4.0	11.8		0.0		2.0		10.8
Green Ext Time (p_c), s	0.2	7.8		0.0		10.6		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	10.7
HCM 2010 LOS	B

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	26	55	447	354	103	648
v/c Ratio	0.11	0.23	0.18	0.29	0.14	0.22
Control Delay	40.0	2.3	10.0	5.9	1.6	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	2.3	10.0	5.9	1.6	1.4
Queue Length 50th (ft)	7	0	96	73	6	20
Queue Length 95th (ft)	20	0	110	110	11	28
Internal Link Dist (ft)			2564			882
Turn Bay Length (ft)		350		700	150	
Base Capacity (vph)	534	358	2489	1218	803	2927
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.15	0.18	0.29	0.13	0.22

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	0	51	0	0	0	0	411	326	95	596	0
Future Volume (veh/h)	24	0	51	0	0	0	0	411	326	95	596	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	0	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	26	0	0				0	447	0	103	648	0
Adj No. of Lanes	2	0	1				0	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	0	2				0	2	2	2	2	0
Cap, veh/h	110	0	50				0	2422	1084	832	2915	0
Arrive On Green	0.03	0.00	0.00				0.00	1.00	0.00	0.12	1.00	0.00
Sat Flow, veh/h	3442	0	1583				0	3632	1583	1774	3632	0
Grp Volume(v), veh/h	26	0	0				0	447	0	103	648	0
Grp Sat Flow(s),veh/h/ln	1721	0	1583				0	1770	1583	1774	1770	0
Q Serve(g_s), s	0.7	0.0	0.0				0.0	0.0	0.0	1.3	0.0	0.0
Cycle Q Clear(g_c), s	0.7	0.0	0.0				0.0	0.0	0.0	1.3	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	110	0	50				0	2422	1084	832	2915	0
V/C Ratio(X)	0.24	0.00	0.00				0.00	0.18	0.00	0.12	0.22	0.00
Avail Cap(c_a), veh/h	535	0	246				0	2422	1084	979	2915	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.95	0.00	0.97	0.97	0.00
Uniform Delay (d), s/veh	42.5	0.0	0.0				0.0	0.0	0.0	2.4	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0				0.0	0.2	0.0	0.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.0				0.0	0.1	0.0	0.6	0.1	0.0
LnGrp Delay(d),s/veh	43.6	0.0	0.0				0.0	0.2	0.0	2.5	0.2	0.0
LnGrp LOS	D							A		A	A	
Approach Vol, veh/h		26						447			751	
Approach Delay, s/veh		43.6						0.2			0.5	
Approach LOS		D						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	12.5	68.6		8.9		81.1		
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		
Max Green Setting (Gmax), s	13.0	43.0		14.0		63.0		
Max Q Clear Time (g_c+I1), s	3.3	2.0		2.7		2.0		
Green Ext Time (p_c), s	0.1	8.2		0.0		8.5		

Intersection Summary	
HCM 2010 Ctrl Delay	1.3
HCM 2010 LOS	A

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	322	93	36	430	433	26
v/c Ratio	0.36	0.19	0.07	0.21	0.21	0.03
Control Delay	28.5	7.0	2.8	5.2	9.0	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.5	7.0	2.8	5.2	9.0	1.5
Queue Length 50th (ft)	76	0	1	7	55	0
Queue Length 95th (ft)	114	36	3	10	79	6
Internal Link Dist (ft)				882	859	
Turn Bay Length (ft)		225	200			575
Base Capacity (vph)	896	482	548	2084	2084	949
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.19	0.07	0.21	0.21	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	296	0	86	33	396	0	0	398	24
Future Volume (veh/h)	0	0	0	296	0	86	33	396	0	0	398	24
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	0	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				322	0	0	36	430	0	0	433	0
Adj No. of Lanes				2	0	1	1	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	2	2	0	0	2	2
Cap, veh/h				899	0	413	586	2084	0	0	2084	932
Arrive On Green				0.26	0.00	0.00	0.59	0.59	0.00	0.00	0.59	0.00
Sat Flow, veh/h				3442	0	1583	951	3632	0	0	3632	1583
Grp Volume(v), veh/h				322	0	0	36	430	0	0	433	0
Grp Sat Flow(s),veh/h/ln				1721	0	1583	951	1770	0	0	1770	1583
Q Serve(g_s), s				6.9	0.0	0.0	1.7	5.1	0.0	0.0	5.2	0.0
Cycle Q Clear(g_c), s				6.9	0.0	0.0	6.8	5.1	0.0	0.0	5.2	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				899	0	413	586	2084	0	0	2084	932
V/C Ratio(X)				0.36	0.00	0.00	0.06	0.21	0.00	0.00	0.21	0.00
Avail Cap(c_a), veh/h				899	0	413	586	2084	0	0	2084	932
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.99	0.99	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				27.1	0.0	0.0	10.3	8.7	0.0	0.0	8.7	0.0
Incr Delay (d2), s/veh				1.1	0.0	0.0	0.2	0.2	0.0	0.0	0.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.4	0.0	0.0	0.5	2.5	0.0	0.0	2.6	0.0
LnGrp Delay(d),s/veh				28.2	0.0	0.0	10.5	8.9	0.0	0.0	8.9	0.0
LnGrp LOS				C			B	A			A	
Approach Vol, veh/h					322			466			433	
Approach Delay, s/veh					28.2			9.0			8.9	
Approach LOS					C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		60.0				60.0		30.0
Change Period (Y+Rc), s		7.0				7.0		6.5
Max Green Setting (Gmax), s		53.0				53.0		23.5
Max Q Clear Time (g_c+I1), s		8.8				7.2		8.9
Green Ext Time (p_c), s		6.3				6.3		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	14.0
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	11	8	486	413	5
Future Vol, veh/h	3	11	8	486	413	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	225	550	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	12	9	528	449	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	731	225	454	0	-	0
Stage 1	449	-	-	-	-	-
Stage 2	282	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	357	778	1103	-	-	-
Stage 1	610	-	-	-	-	-
Stage 2	741	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	354	778	1103	-	-	-
Mov Cap-2 Maneuver	462	-	-	-	-	-
Stage 1	605	-	-	-	-	-
Stage 2	741	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1103	-	462	778	-	-
HCM Lane V/C Ratio	0.008	-	0.007	0.015	-	-
HCM Control Delay (s)	8.3	-	12.8	9.7	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0	0	-	-

HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2019
Jurisdiction		Time Period Analyzed	Saturday
Project Description	Roderick Place TIS: I-840 Eastbound Ramp Existing		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	2.00		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 EB	5280	2
2	Merge	Merge	EB Ramp from Columbia Pike _I-840 EB	1500	2
3	Basic	Basic	I-840 EB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	510	4646	0.11	73.5	3.5	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	986	476	4259	2033	0.23	0.23	67.2	67.2	7.3	3.6	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	985	4646	0.21	73.4	6.7	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.2	5.2	5.0	1.70	A

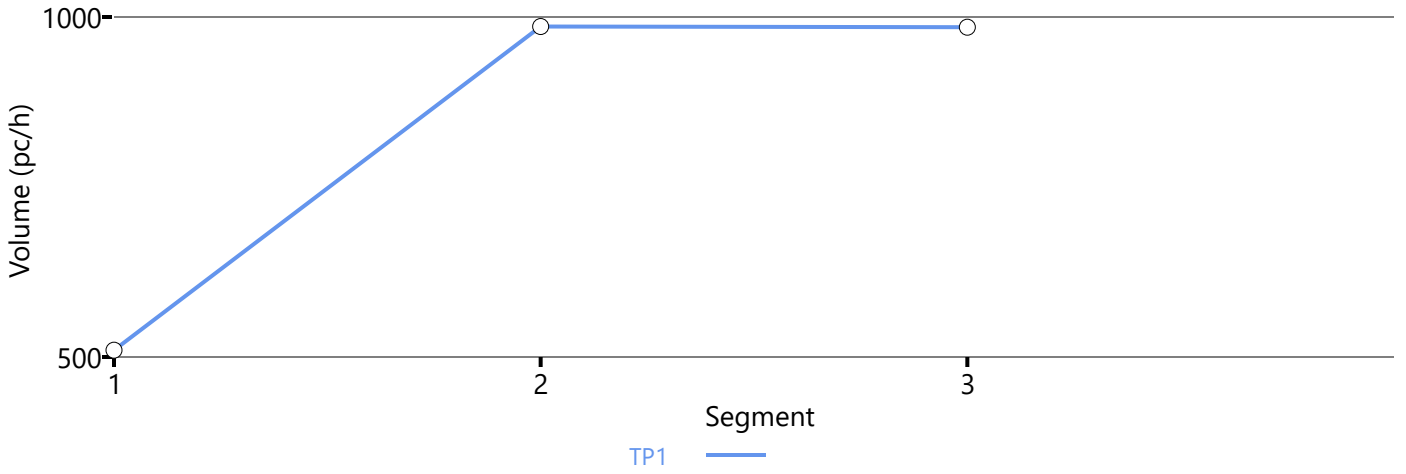
Facility Overall Results

Space Mean Speed, mi/h	72.2	Density, veh/mi/ln	5.0
Average Travel Time, min	1.70	Density, pc/mi/ln	5.2

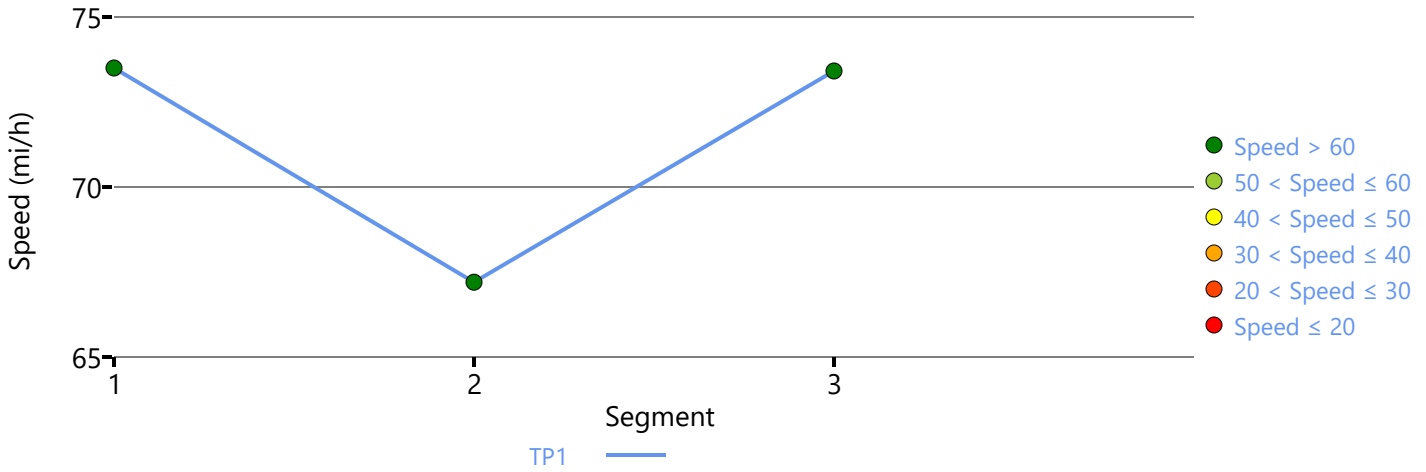
Messages

Comments

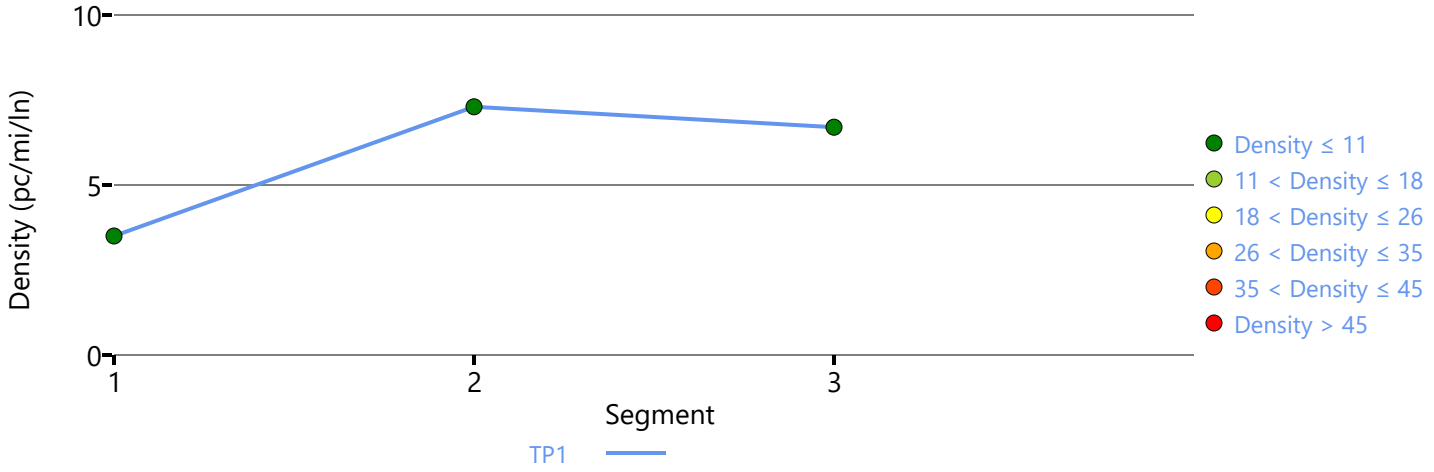
Volume Distribution



Speed Distribution



Density Distribution



HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2019
Jurisdiction		Time Period Analyzed	Saturday Peak Hour
Project Description	Roderick Place TIS: I-840 Westbound Ramp Existing		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	1.98		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 WB	5280	2
2	Merge	Merge	WB Ramp from Columbia Pike _I-840 EB	1400	2
3	Basic	Basic	I-840 WB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	461	4646	0.10	73.5	3.1	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	525	64	4259	2033	0.12	0.03	67.3	67.3	3.9	0.2	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	525	4646	0.11	73.4	3.6	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.5	3.4	3.3	1.60	A

Facility Overall Results

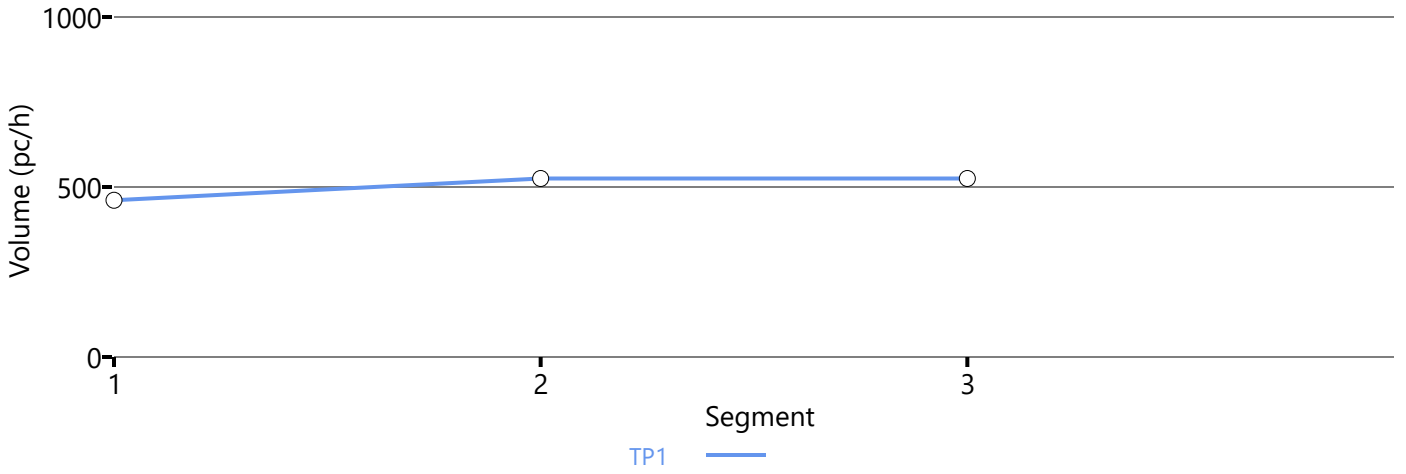
Space Mean Speed, mi/h	72.5	Density, veh/mi/ln	3.3
Average Travel Time, min	1.60	Density, pc/mi/ln	3.4

Messages

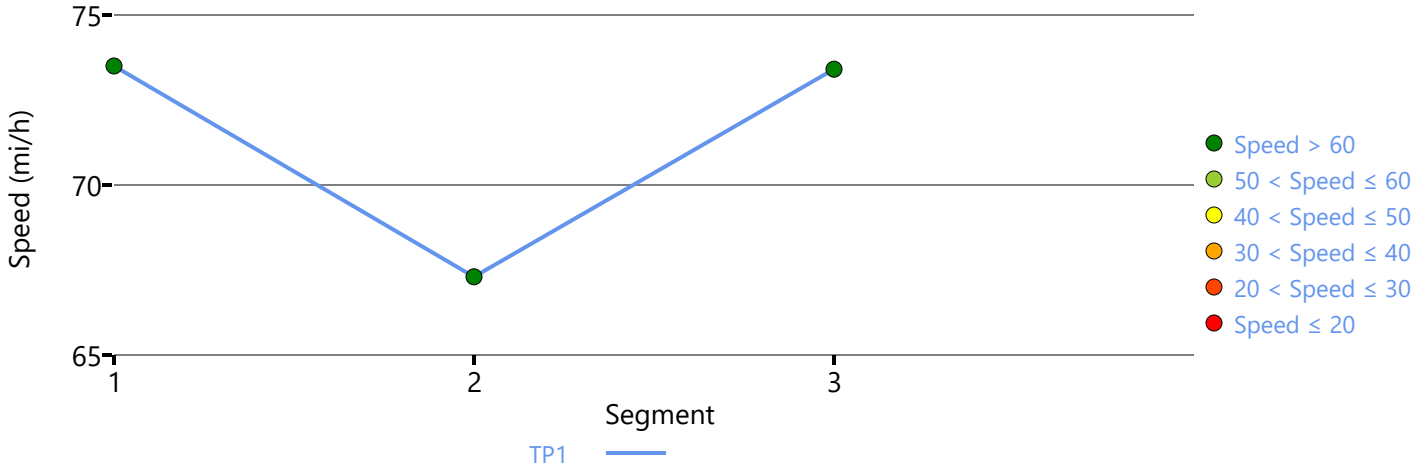
ERROR 1	Acceleration lane length is longer than the segment length for merge segment 2.

Comments

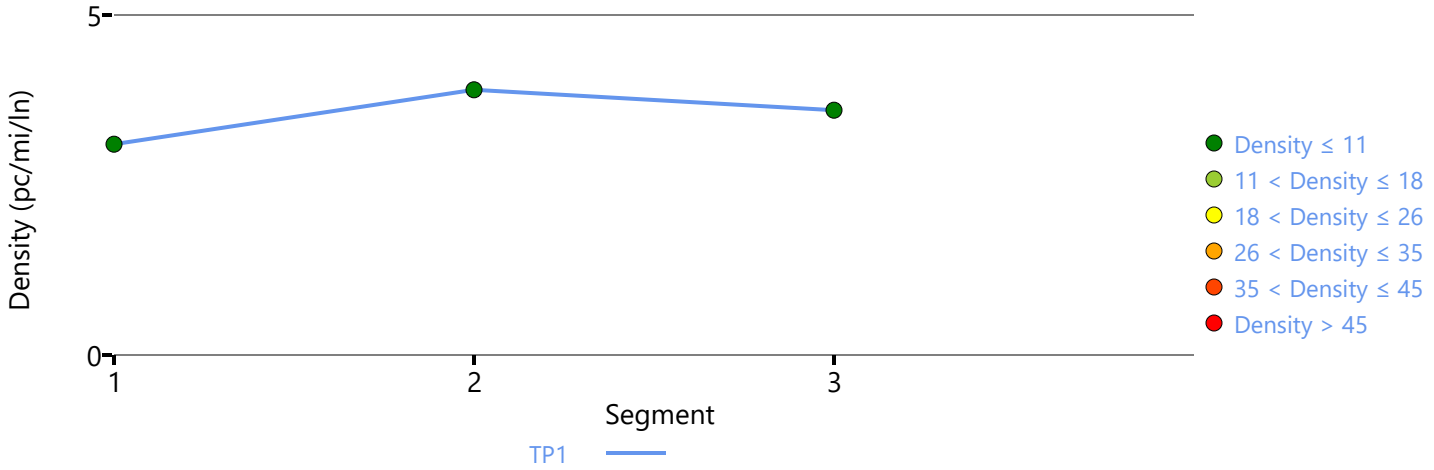
Volume Distribution



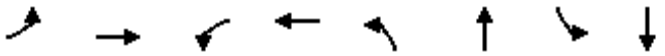
Speed Distribution



Density Distribution



BACKGROUND CONDITIONS CAPACITY ANALYSES

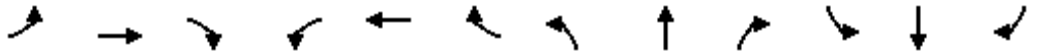


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	45	98	57	164	47	1143	14	509
v/c Ratio	0.20	0.41	0.23	0.58	0.10	0.99	0.08	0.49
Control Delay	29.6	20.1	30.2	31.1	9.1	47.1	6.8	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	20.1	30.2	31.1	9.1	47.1	6.8	11.5
Queue Length 50th (ft)	22	16	28	57	11	~683	2	216
Queue Length 95th (ft)	47	61	56	118	29	#1253	8	333
Internal Link Dist (ft)		737		561		511		6096
Turn Bay Length (ft)	100		85		105		120	
Base Capacity (vph)	237	330	253	345	513	1152	207	1042
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	0.19	0.30	0.23	0.48	0.09	0.99	0.07	0.49

Intersection Summary

~ 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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	41	26	64	52	57	94	43	1021	30	13	433	35
Future Volume (veh/h)	41	26	64	52	57	94	43	1021	30	13	433	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1900	1845	1845	1900	1845	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	45	28	70	57	62	102	47	1110	33	14	471	38
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	178	55	137	233	77	126	456	991	29	106	896	72
Arrive On Green	0.04	0.12	0.12	0.05	0.12	0.12	0.04	0.56	0.56	0.02	0.53	0.53
Sat Flow, veh/h	1757	468	1170	1757	628	1034	1757	1782	53	1757	1685	136
Grp Volume(v), veh/h	45	0	98	57	0	164	47	0	1143	14	0	509
Grp Sat Flow(s),veh/h/ln	1757	0	1638	1757	0	1662	1757	0	1835	1757	0	1821
Q Serve(g_s), s	2.2	0.0	5.6	2.8	0.0	9.6	1.2	0.0	55.6	0.4	0.0	18.2
Cycle Q Clear(g_c), s	2.2	0.0	5.6	2.8	0.0	9.6	1.2	0.0	55.6	0.4	0.0	18.2
Prop In Lane	1.00		0.71	1.00		0.62	1.00		0.03	1.00		0.07
Lane Grp Cap(c), veh/h	178	0	191	233	0	202	456	0	1021	106	0	968
V/C Ratio(X)	0.25	0.00	0.51	0.24	0.00	0.81	0.10	0.00	1.12	0.13	0.00	0.53
Avail Cap(c_a), veh/h	235	0	270	281	0	274	546	0	1021	204	0	968
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.7	0.0	41.5	36.2	0.0	42.8	11.0	0.0	22.2	24.3	0.0	15.2
Incr Delay (d2), s/veh	0.7	0.0	2.1	0.5	0.0	12.3	0.1	0.0	67.2	0.6	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	2.6	1.4	0.0	5.1	0.6	0.0	46.8	0.2	0.0	9.6
LnGrp Delay(d),s/veh	37.4	0.0	43.6	36.8	0.0	55.1	11.1	0.0	89.4	24.9	0.0	17.3
LnGrp LOS	D		D	D		E	B		F	C		B
Approach Vol, veh/h		143			221			1190			523	
Approach Delay, s/veh		41.6			50.3			86.3			17.5	
Approach LOS		D			D			F			B	

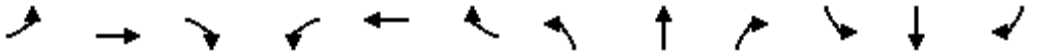
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.4	62.1	11.3	18.2	10.9	59.7	10.8	18.7
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	7.5	42.5	7.5	16.5	9.5	40.5	7.5	16.5
Max Q Clear Time (g_c+I1), s	2.4	57.6	4.8	7.6	3.2	20.2	4.2	11.6
Green Ext Time (p_c), s	0.0	0.0	0.0	0.9	0.0	12.4	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	62.1
HCM 2010 LOS	E

Lane Group	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	26	412	1239	70	532
v/c Ratio	0.18	0.71	0.51	0.21	0.19
Control Delay	44.2	8.6	11.4	3.3	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.2	8.6	11.4	3.3	1.4
Queue Length 50th (ft)	16	0	179	2	16
Queue Length 95th (ft)	40	33	m276	9	24
Internal Link Dist (ft)		697	409		2564
Turn Bay Length (ft)	150			275	
Base Capacity (vph)	332	698	2407	499	2780
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.08	0.59	0.51	0.14	0.19

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	24	0	379	0	1127	13	64	489	0
Future Volume (veh/h)	0	0	0	24	0	379	0	1127	13	64	489	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1845	1900	1845	1845	1900	1845	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	0	0	0	26	0	412	0	1225	14	70	532	0
Adj No. of Lanes	0	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	0	2	0	334	0	298	72	2018	23	313	2401	0
Arrive On Green	0.00	0.00	0.00	0.19	0.00	0.19	0.00	0.57	0.57	0.10	1.00	0.00
Sat Flow, veh/h	0	1845	0	1757	0	1568	860	3549	41	1757	3597	0
Grp Volume(v), veh/h	0	0	0	26	0	412	0	605	634	70	532	0
Grp Sat Flow(s),veh/h/ln	0	1845	0	1757	0	1568	860	1752	1838	1757	1752	0
Q Serve(g_s), s	0.0	0.0	0.0	1.2	0.0	19.0	0.0	22.7	22.7	1.5	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.2	0.0	19.0	0.0	22.7	22.7	1.5	0.0	0.0
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.02	1.00		0.00
Lane Grp Cap(c), veh/h	0	2	0	334	0	298	72	996	1045	313	2401	0
V/C Ratio(X)	0.00	0.00	0.00	0.08	0.00	1.38	0.00	0.61	0.61	0.22	0.22	0.00
Avail Cap(c_a), veh/h	0	138	0	334	0	298	72	996	1045	531	2401	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.97	0.97	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	33.3	0.0	40.5	0.0	14.2	14.2	9.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.1	0.0	191.9	0.0	2.7	2.6	0.3	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.6	0.0	24.1	0.0	11.7	12.2	0.7	0.1	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	33.4	0.0	232.4	0.0	17.0	16.8	10.1	0.2	0.0
LnGrp LOS				C		F		B	B	B	A	
Approach Vol, veh/h		0			438			1239			602	
Approach Delay, s/veh		0.0			220.6			16.9			1.4	
Approach LOS					F			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	11.6	63.4		0.0		75.0		25.0
Change Period (Y+Rc), s	6.5	6.5		6.5		6.5		6.0
Max Green Setting (Gmax), s	17.5	30.5		7.5		54.5		19.0
Max Q Clear Time (g_c+I1), s	3.5	24.7		0.0		2.0		21.0
Green Ext Time (p_c), s	0.1	4.3		0.0		16.6		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	51.9
HCM 2010 LOS	D

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	280	86	1109	934	210	718
v/c Ratio	0.61	0.27	0.56	0.74	0.55	0.28
Control Delay	46.2	5.1	22.7	12.7	17.6	8.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.2	5.1	22.7	12.7	17.6	8.8
Queue Length 50th (ft)	88	0	307	187	60	97
Queue Length 95th (ft)	124	22	437	496	108	143
Internal Link Dist (ft)			2564			882
Turn Bay Length (ft)		350		700	150	
Base Capacity (vph)	816	467	1970	1258	386	2574
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.18	0.56	0.74	0.54	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	258	0	79	0	0	0	0	1020	859	193	661	0
Future Volume (veh/h)	258	0	79	0	0	0	0	1020	859	193	661	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	0	1845				0	1845	1845	1845	1845	0
Adj Flow Rate, veh/h	280	0	0				0	1109	0	210	718	0
Adj No. of Lanes	2	0	1				0	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	0	3				0	3	3	3	3	0
Cap, veh/h	366	0	168				0	2206	987	382	2673	0
Arrive On Green	0.11	0.00	0.00				0.00	0.42	0.00	0.13	1.00	0.00
Sat Flow, veh/h	3408	0	1568				0	3597	1568	1757	3597	0
Grp Volume(v), veh/h	280	0	0				0	1109	0	210	718	0
Grp Sat Flow(s),veh/h/ln	1704	0	1568				0	1752	1568	1757	1752	0
Q Serve(g_s), s	8.0	0.0	0.0				0.0	23.2	0.0	4.2	0.0	0.0
Cycle Q Clear(g_c), s	8.0	0.0	0.0				0.0	23.2	0.0	4.2	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	366	0	168				0	2206	987	382	2673	0
V/C Ratio(X)	0.77	0.00	0.00				0.00	0.50	0.00	0.55	0.27	0.00
Avail Cap(c_a), veh/h	818	0	376				0	2206	987	429	2673	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	0.67	0.67	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.85	0.00	0.96	0.96	0.00
Uniform Delay (d), s/veh	43.4	0.0	0.0				0.0	17.4	0.0	9.3	0.0	0.0
Incr Delay (d2), s/veh	3.4	0.0	0.0				0.0	0.7	0.0	1.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	0.0	0.0				0.0	11.5	0.0	2.3	0.1	0.0
LnGrp Delay(d),s/veh	46.8	0.0	0.0				0.0	18.1	0.0	10.5	0.2	0.0
LnGrp LOS	D							B		B	A	
Approach Vol, veh/h		280						1109			928	
Approach Delay, s/veh		46.8						18.1			2.6	
Approach LOS		D						B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.3	69.9		16.7		83.3		
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		
Max Green Setting (Gmax), s	9.0	47.0		24.0		63.0		
Max Q Clear Time (g_c+I1), s	6.2	25.2		10.0		2.0		
Green Ext Time (p_c), s	0.1	12.7		0.7		19.5		

Intersection Summary	
HCM 2010 Ctrl Delay	15.4
HCM 2010 LOS	B

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	291	434	55	1335	637	34
v/c Ratio	0.36	1.04	0.12	0.60	0.29	0.03
Control Delay	33.6	88.4	7.4	17.2	8.8	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.6	88.4	7.4	17.2	8.8	2.2
Queue Length 50th (ft)	80	~267	23	353	88	0
Queue Length 95th (ft)	118	#460	m20	440	116	10
Internal Link Dist (ft)				882	859	
Turn Bay Length (ft)		225	200			575
Base Capacity (vph)	799	417	464	2208	2208	1001
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	1.04	0.12	0.60	0.29	0.03

Intersection Summary

~ 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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	268	0	399	51	1228	0	0	586	31
Future Volume (veh/h)	0	0	0	268	0	399	51	1228	0	0	586	31
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1845	0	1845	1845	1845	0	0	1845	1845
Adj Flow Rate, veh/h				291	0	0	55	1335	0	0	637	0
Adj No. of Lanes				2	0	1	1	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				3	0	3	3	3	0	0	3	3
Cap, veh/h				801	0	368	499	2208	0	0	2208	988
Arrive On Green				0.23	0.00	0.00	0.42	0.42	0.00	0.00	0.63	0.00
Sat Flow, veh/h				3408	0	1568	780	3597	0	0	3597	1568
Grp Volume(v), veh/h				291	0	0	55	1335	0	0	637	0
Grp Sat Flow(s),veh/h/ln				1704	0	1568	780	1752	0	0	1752	1568
Q Serve(g_s), s				7.1	0.0	0.0	4.7	29.6	0.0	0.0	8.2	0.0
Cycle Q Clear(g_c), s				7.1	0.0	0.0	12.9	29.6	0.0	0.0	8.2	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				801	0	368	499	2208	0	0	2208	988
V/C Ratio(X)				0.36	0.00	0.00	0.11	0.60	0.00	0.00	0.29	0.00
Avail Cap(c_a), veh/h				801	0	368	499	2208	0	0	2208	988
HCM Platoon Ratio				1.00	1.00	1.00	0.67	0.67	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.80	0.80	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				32.0	0.0	0.0	17.1	19.2	0.0	0.0	8.4	0.0
Incr Delay (d2), s/veh				1.3	0.0	0.0	0.4	1.0	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.5	0.0	0.0	1.1	14.6	0.0	0.0	4.0	0.0
LnGrp Delay(d),s/veh				33.3	0.0	0.0	17.5	20.2	0.0	0.0	8.7	0.0
LnGrp LOS				C			B	C			A	
Approach Vol, veh/h					291			1390			637	
Approach Delay, s/veh					33.3			20.1			8.7	
Approach LOS					C			C			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		70.0				70.0		30.0
Change Period (Y+Rc), s		7.0				7.0		6.5
Max Green Setting (Gmax), s		63.0				63.0		23.5
Max Q Clear Time (g_c+I1), s		31.6				10.2		9.1
Green Ext Time (p_c), s		17.9				22.8		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	18.6
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	62.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	125	224	616	1010	393	405
Future Vol, veh/h	125	224	616	1010	393	405
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	225	550	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	136	243	670	1098	427	440

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2316	214	867	0	-	0
Stage 1	427	-	-	-	-	-
Stage 2	1889	-	-	-	-	-
Critical Hdwy	6.86	6.96	4.16	-	-	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	~ 31	788	766	-	-	-
Stage 1	623	-	-	-	-	-
Stage 2	~ 104	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 4	788	766	-	-	-
Mov Cap-2 Maneuver	~ 42	-	-	-	-	-
Stage 1	~ 78	-	-	-	-	-
Stage 2	~ 104	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s$	440.1	12.4	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	766	-	42	788	-	-
HCM Lane V/C Ratio	0.874	-	3.235	0.309	-	-
HCM Control Delay (s)	32.9	-	$ 1208.1	11.6	-	-
HCM Lane LOS	D	-	F	B	-	-
HCM 95th %tile Q(veh)	10.9	-	15.1	1.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	AM Peak Hour
Project Description	Roderick Place TIS: I-840 Eastbound Ramp Background		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	2.00		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 EB	5280	2
2	Merge	Merge	EB Ramp from Columbia Pike _I-840 EB	1500	2
3	Basic	Basic	I-840 EB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.943	1298	4646	0.28	73.5	8.8	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.943	0.943	2511	1213	4259	2033	0.59	0.60	66.0	66.0	19.0	15.2	B

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.943	2510	4646	0.54	72.7	17.3	B

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	71.6	13.3	12.5	1.70	B

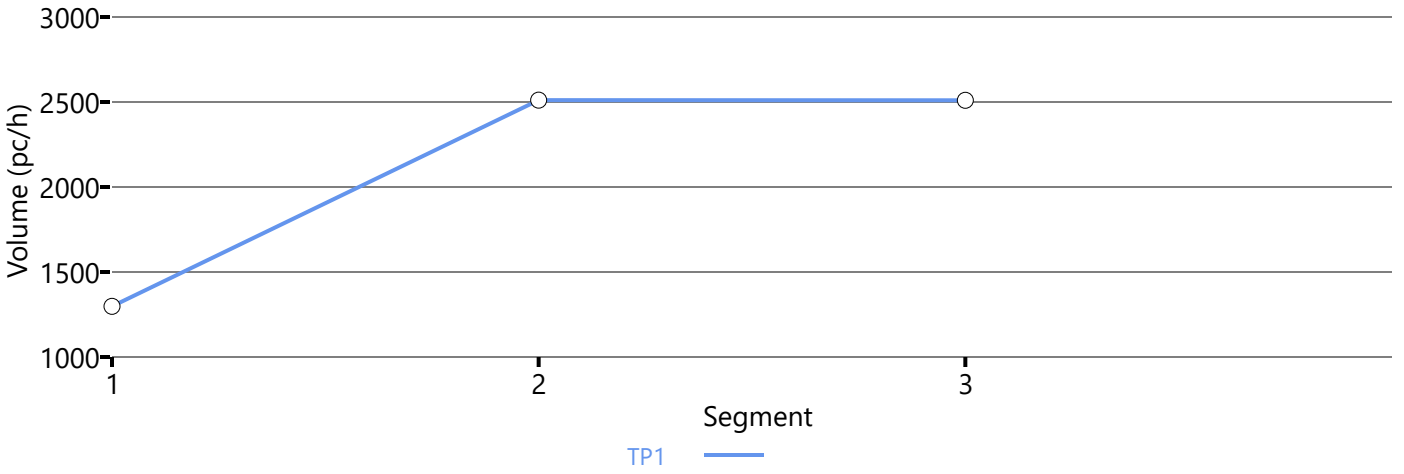
Facility Overall Results

Space Mean Speed, mi/h	71.6	Density, veh/mi/ln	12.5
Average Travel Time, min	1.70	Density, pc/mi/ln	13.3

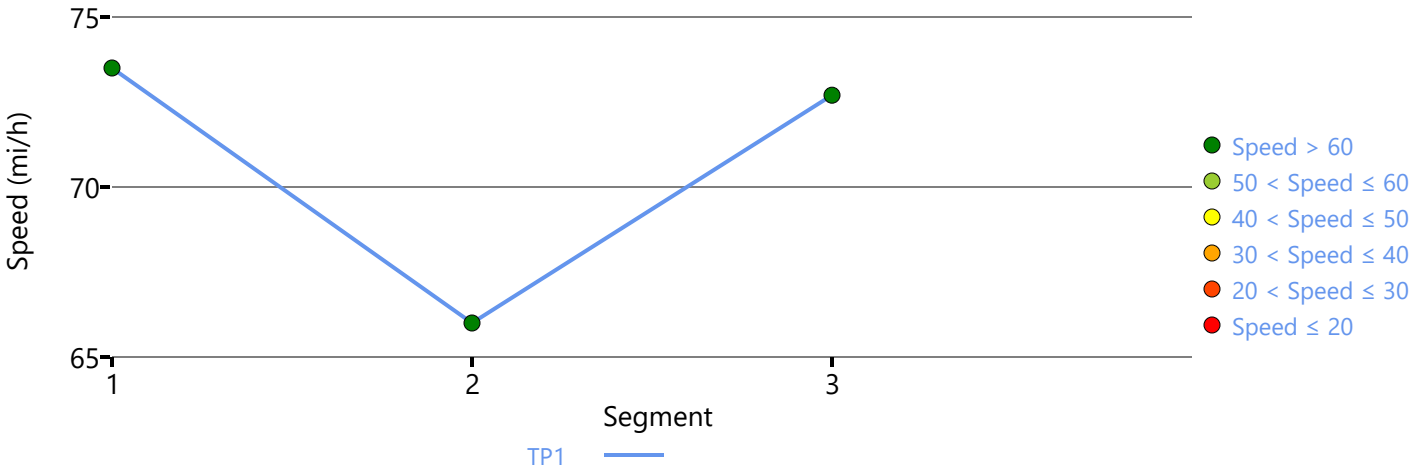
Messages

Comments

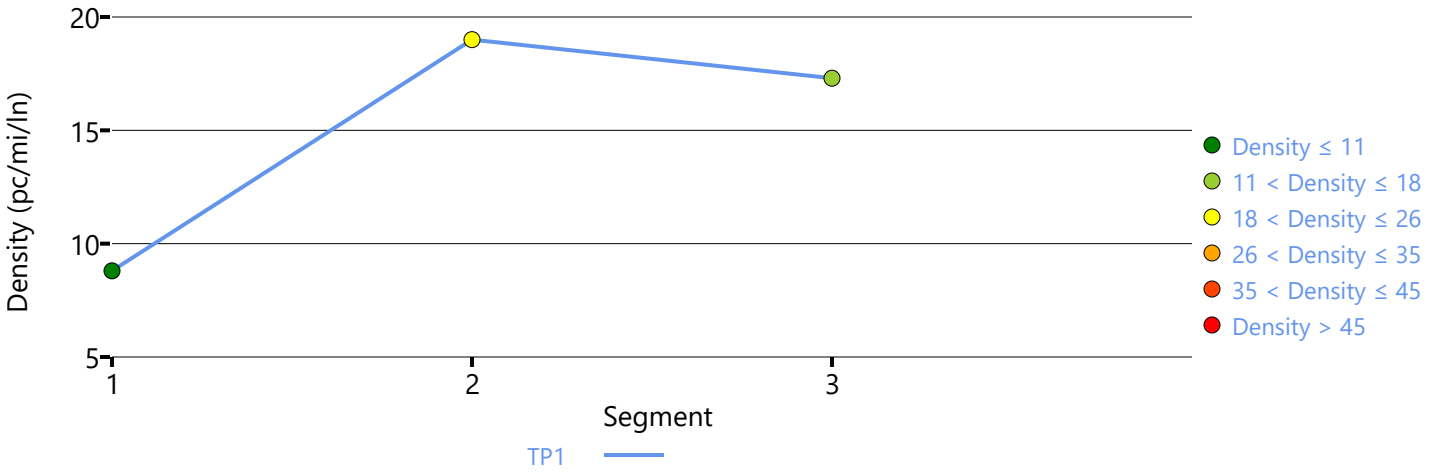
Volume Distribution



Speed Distribution



Density Distribution



HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	AM Peak Hour
Project Description	Roderick Place TIS: I-840 Westbound Ramp Background		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	1.98		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 WB	5280	2
2	Merge	Merge	WB Ramp from Columbia Pike _I-840 EB	1400	2
3	Basic	Basic	I-840 WB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.943	674	4646	0.15	73.5	4.6	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.943	0.943	769	95	4259	2033	0.18	0.05	67.3	67.3	5.7	2.1	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.943	769	4646	0.17	73.4	5.2	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.5	5.0	4.7	1.60	A

Facility Overall Results

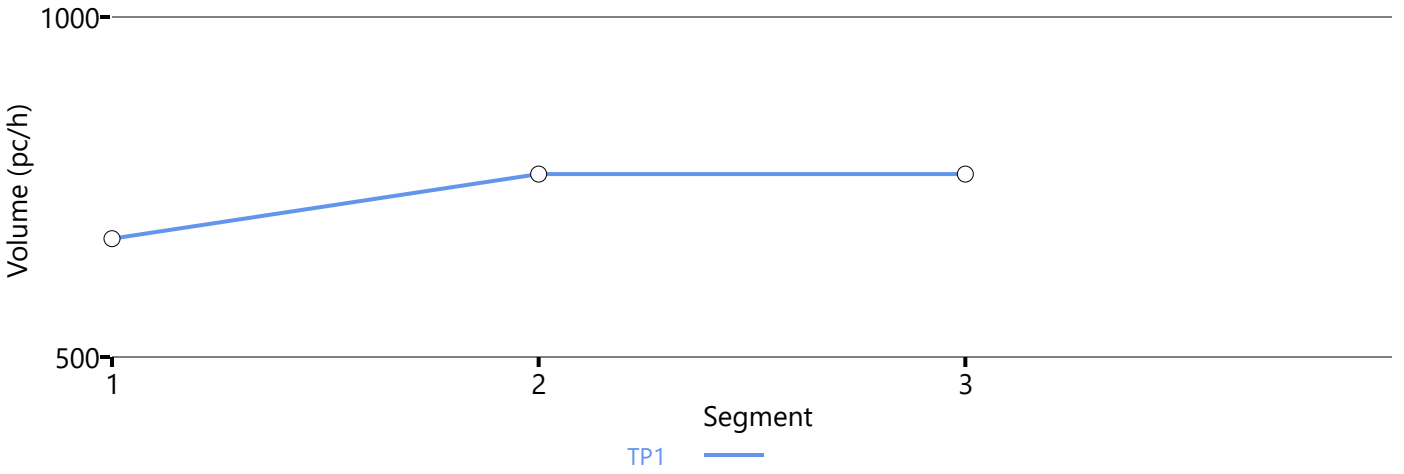
Space Mean Speed, mi/h	72.5	Density, veh/mi/ln	4.7
Average Travel Time, min	1.60	Density, pc/mi/ln	5.0

Messages

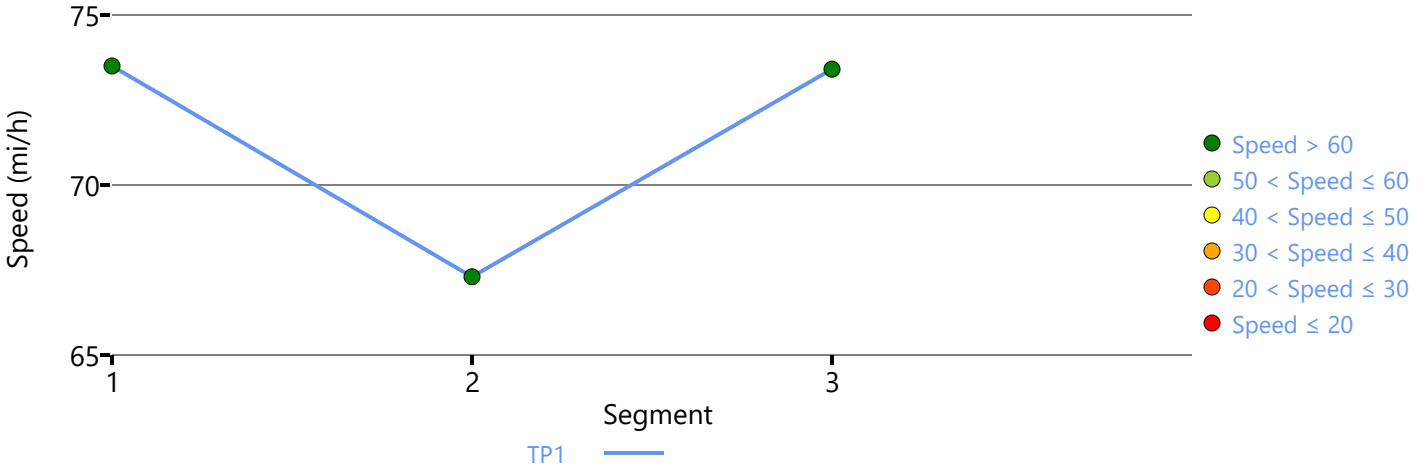
ERROR 1	Acceleration lane length is longer than the segment length for merge segment 2.

Comments

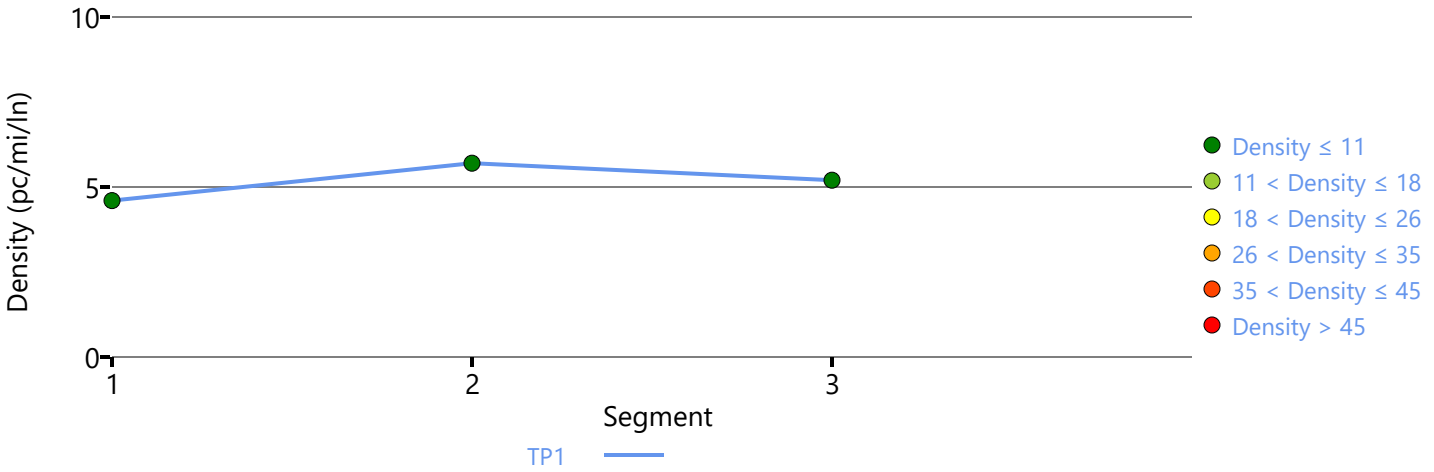
Volume Distribution

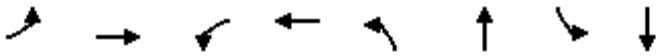


Speed Distribution



Density Distribution





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	39	197	77	53	76	843	25	984
v/c Ratio	0.18	0.72	0.46	0.24	0.42	0.72	0.09	0.87
Control Delay	38.2	31.5	47.1	28.2	18.4	22.9	12.3	39.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	31.5	47.1	28.2	18.4	22.9	12.3	39.9
Queue Length 50th (ft)	25	41	50	17	18	476	9	631
Queue Length 95th (ft)	51	114	86	54	57	#850	25	#1086
Internal Link Dist (ft)		737		561		511		6096
Turn Bay Length (ft)	100		85		105		120	
Base Capacity (vph)	230	360	174	285	198	1169	322	1134
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	0.55	0.44	0.19	0.38	0.72	0.08	0.87

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	36	145	71	21	28	70	665	110	23	885	20
Future Volume (veh/h)	36	36	145	71	21	28	70	665	110	23	885	20
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	39	39	158	77	23	30	76	723	120	25	962	22
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	289	44	178	169	110	143	167	887	147	238	1000	23
Arrive On Green	0.04	0.14	0.14	0.05	0.15	0.15	0.05	0.57	0.57	0.03	0.55	0.55
Sat Flow, veh/h	1774	323	1309	1774	735	959	1774	1558	259	1774	1814	41
Grp Volume(v), veh/h	39	0	197	77	0	53	76	0	843	25	0	984
Grp Sat Flow(s),veh/h/ln	1774	0	1632	1774	0	1694	1774	0	1817	1774	0	1855
Q Serve(g_s), s	2.2	0.0	14.2	4.4	0.0	3.3	2.2	0.0	44.8	0.7	0.0	60.8
Cycle Q Clear(g_c), s	2.2	0.0	14.2	4.4	0.0	3.3	2.2	0.0	44.8	0.7	0.0	60.8
Prop In Lane	1.00		0.80	1.00		0.57	1.00		0.14	1.00		0.02
Lane Grp Cap(c), veh/h	289	0	222	169	0	253	167	0	1034	238	0	1023
V/C Ratio(X)	0.13	0.00	0.89	0.46	0.00	0.21	0.45	0.00	0.82	0.11	0.00	0.96
Avail Cap(c_a), veh/h	350	0	238	207	0	253	211	0	1034	313	0	1023
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.0	0.0	50.9	42.5	0.0	44.8	27.5	0.0	20.8	18.6	0.0	25.7
Incr Delay (d2), s/veh	0.2	0.0	29.2	1.9	0.0	0.4	1.9	0.0	7.1	0.2	0.0	20.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	8.2	2.2	0.0	1.6	1.5	0.0	24.3	0.4	0.0	36.7
LnGrp Delay(d),s/veh	42.2	0.0	80.1	44.4	0.0	45.2	29.4	0.0	27.9	18.8	0.0	46.1
LnGrp LOS	D		F	D		D	C		C	B		D
Approach Vol, veh/h		236			130			919			1009	
Approach Delay, s/veh		73.8			44.7			28.0			45.4	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.9	74.8	12.5	22.9	12.0	72.7	10.9	24.5
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	8.5	59.5	8.5	17.5	8.5	59.5	8.5	17.5
Max Q Clear Time (g_c+I1), s	2.7	46.8	6.4	16.2	4.2	62.8	4.2	5.3
Green Ext Time (p_c), s	0.0	9.2	0.0	0.1	0.0	0.0	0.0	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	41.3
HCM 2010 LOS	D

Lane Group	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	18	132	743	642	1012
v/c Ratio	0.18	0.18	0.50	0.75	0.34
Control Delay	57.4	0.5	41.1	32.6	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	0.5	41.1	32.6	2.2
Queue Length 50th (ft)	14	0	314	347	59
Queue Length 95th (ft)	38	0	385	454	92
Internal Link Dist (ft)		697	409		2564
Turn Bay Length (ft)	150			275	
Base Capacity (vph)	280	839	1475	870	2966
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.06	0.16	0.50	0.74	0.34

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	17	0	121	0	630	53	591	931	0
Future Volume (veh/h)	0	0	0	17	0	121	0	630	53	591	931	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	0	0	0	18	0	132	0	685	58	642	1012	0
Adj No. of Lanes	0	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	2	0	179	0	160	60	1634	138	755	2813	0
Arrive On Green	0.00	0.00	0.00	0.10	0.00	0.10	0.00	0.49	0.49	0.49	1.00	0.00
Sat Flow, veh/h	0	1863	0	1774	0	1583	555	3304	279	1774	3632	0
Grp Volume(v), veh/h	0	0	0	18	0	132	0	367	376	642	1012	0
Grp Sat Flow(s),veh/h/ln	0	1863	0	1774	0	1583	555	1770	1813	1774	1770	0
Q Serve(g_s), s	0.0	0.0	0.0	1.1	0.0	9.8	0.0	15.8	15.9	25.7	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.1	0.0	9.8	0.0	15.8	15.9	25.7	0.0	0.0
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.15	1.00		0.00
Lane Grp Cap(c), veh/h	0	2	0	179	0	160	60	876	897	755	2813	0
V/C Ratio(X)	0.00	0.00	0.00	0.10	0.00	0.83	0.00	0.42	0.42	0.85	0.36	0.00
Avail Cap(c_a), veh/h	0	116	0	281	0	251	60	876	897	918	2813	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.87	0.87	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	49.0	0.0	52.9	0.0	19.3	19.3	6.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.2	0.0	12.0	0.0	1.5	1.4	5.7	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.6	0.0	4.8	0.0	8.1	8.3	12.6	0.1	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	49.2	0.0	64.9	0.0	20.8	20.8	12.5	0.3	0.0
LnGrp LOS				D		E		C	C	B	A	
Approach Vol, veh/h		0			150			743			1654	
Approach Delay, s/veh		0.0			63.0			20.8			5.0	
Approach LOS					E			C			A	

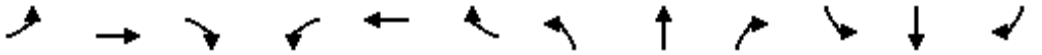
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	36.0	65.9		0.0		101.9		18.1
Change Period (Y+Rc), s	6.5	6.5		6.5		6.5		6.0
Max Green Setting (Gmax), s	40.5	27.5		7.5		74.5		19.0
Max Q Clear Time (g_c+I1), s	27.7	17.9		0.0		2.0		11.8
Green Ext Time (p_c), s	1.8	6.6		0.0		17.3		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	13.0
HCM 2010 LOS	B

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	62	73	637	465	405	1507
v/c Ratio	0.28	0.38	0.26	0.37	0.59	0.50
Control Delay	56.5	10.2	14.9	9.0	4.8	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.5	10.2	14.9	9.0	4.8	1.0
Queue Length 50th (ft)	24	0	122	95	14	28
Queue Length 95th (ft)	46	26	226	221	m22	36
Internal Link Dist (ft)			2564			882
Turn Bay Length (ft)		350		700	150	
Base Capacity (vph)	400	273	2458	1241	791	3042
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.27	0.26	0.37	0.51	0.50

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	0	67	0	0	0	0	586	428	373	1386	0
Future Volume (veh/h)	57	0	67	0	0	0	0	586	428	373	1386	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	0	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	62	0	0				0	637	0	405	1507	0
Adj No. of Lanes	2	0	1				0	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	0	2				0	2	2	2	2	0
Cap, veh/h	150	0	69				0	2450	1096	778	3001	0
Arrive On Green	0.04	0.00	0.00				0.00	1.00	0.00	0.19	1.00	0.00
Sat Flow, veh/h	3442	0	1583				0	3632	1583	1774	3632	0
Grp Volume(v), veh/h	62	0	0				0	637	0	405	1507	0
Grp Sat Flow(s),veh/h/ln	1721	0	1583				0	1770	1583	1774	1770	0
Q Serve(g_s), s	2.1	0.0	0.0				0.0	0.0	0.0	8.7	0.0	0.0
Cycle Q Clear(g_c), s	2.1	0.0	0.0				0.0	0.0	0.0	8.7	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	150	0	69				0	2450	1096	778	3001	0
V/C Ratio(X)	0.41	0.00	0.00				0.00	0.26	0.00	0.52	0.50	0.00
Avail Cap(c_a), veh/h	402	0	185				0	2450	1096	945	3001	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.86	0.00	0.65	0.65	0.00
Uniform Delay (d), s/veh	55.9	0.0	0.0				0.0	0.0	0.0	2.8	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	0.0				0.0	0.2	0.0	0.4	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0				0.0	0.1	0.0	4.0	0.2	0.0
LnGrp Delay(d),s/veh	57.7	0.0	0.0				0.0	0.2	0.0	3.1	0.4	0.0
LnGrp LOS	E							A		A	A	
Approach Vol, veh/h		62						637			1912	
Approach Delay, s/veh		57.7						0.2			1.0	
Approach LOS		E						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	18.7	90.1		11.2		108.8		
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		
Max Green Setting (Gmax), s	23.0	63.0		14.0		93.0		
Max Q Clear Time (g_c+I1), s	10.7	2.0		4.1		2.0		
Green Ext Time (p_c), s	1.0	27.0		0.1		30.3		

Intersection Summary	
HCM 2010 Ctrl Delay	2.1
HCM 2010 LOS	A

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	592	215	84	615	1318	115
v/c Ratio	0.39	0.27	1.38	0.39	0.84	0.15
Control Delay	23.2	5.7	278.0	21.7	36.0	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.2	5.7	278.0	21.7	36.0	4.0
Queue Length 50th (ft)	155	17	~78	132	468	0
Queue Length 95th (ft)	201	63	#180	268	567	34
Internal Link Dist (ft)				882	859	
Turn Bay Length (ft)		225	200			575
Base Capacity (vph)	1530	802	61	1563	1563	763
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.27	1.38	0.39	0.84	0.15

Intersection Summary

~ 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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	545	0	198	77	566	0	0	1213	106
Future Volume (veh/h)	0	0	0	545	0	198	77	566	0	0	1213	106
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	0	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				592	0	0	84	615	0	0	1318	0
Adj No. of Lanes				2	0	1	1	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	2	2	0	0	2	2
Cap, veh/h				1534	0	706	106	1563	0	0	1563	699
Arrive On Green				0.45	0.00	0.00	0.88	0.88	0.00	0.00	0.44	0.00
Sat Flow, veh/h				3442	0	1583	415	3632	0	0	3632	1583
Grp Volume(v), veh/h				592	0	0	84	615	0	0	1318	0
Grp Sat Flow(s),veh/h/ln				1721	0	1583	415	1770	0	0	1770	1583
Q Serve(g_s), s				13.8	0.0	0.0	13.2	3.7	0.0	0.0	39.8	0.0
Cycle Q Clear(g_c), s				13.8	0.0	0.0	53.0	3.7	0.0	0.0	39.8	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				1534	0	706	106	1563	0	0	1563	699
V/C Ratio(X)				0.39	0.00	0.00	0.79	0.39	0.00	0.00	0.84	0.00
Avail Cap(c_a), veh/h				1534	0	706	106	1563	0	0	1563	699
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.98	0.98	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				22.3	0.0	0.0	29.9	4.1	0.0	0.0	29.8	0.0
Incr Delay (d2), s/veh				0.7	0.0	0.0	43.5	0.7	0.0	0.0	5.7	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				6.7	0.0	0.0	4.0	1.9	0.0	0.0	20.6	0.0
LnGrp Delay(d),s/veh				23.0	0.0	0.0	73.4	4.9	0.0	0.0	35.5	0.0
LnGrp LOS				C			E	A			D	
Approach Vol, veh/h					592			699			1318	
Approach Delay, s/veh					23.0			13.1			35.5	
Approach LOS					C			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		60.0				60.0		60.0
Change Period (Y+Rc), s		7.0				7.0		6.5
Max Green Setting (Gmax), s		53.0				53.0		53.5
Max Q Clear Time (g_c+I1), s		55.0				41.8		15.8
Green Ext Time (p_c), s		0.0				8.8		2.1

Intersection Summary	
HCM 2010 Ctrl Delay	26.7
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	104	168	114	655	1216	94
Future Vol, veh/h	104	168	114	655	1216	94
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	225	550	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	113	183	124	712	1322	102

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1926	661	1424	0	-	0
Stage 1	1322	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 58	405	474	-	-	-
Stage 1	213	-	-	-	-	-
Stage 2	508	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 43	405	474	-	-	-
Mov Cap-2 Maneuver	123	-	-	-	-	-
Stage 1	157	-	-	-	-	-
Stage 2	508	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	61.8	2.3	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	474	-	123	405	-	-
HCM Lane V/C Ratio	0.261	-	0.919	0.451	-	-
HCM Control Delay (s)	15.3	-	127.6	21	-	-
HCM Lane LOS	C	-	F	C	-	-
HCM 95th %tile Q(veh)	1	-	5.9	2.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	PM Peak Hour
Project Description	Roderick Place TIS: I-840 Eastbound Ramp Background		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	2.00		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 EB	5280	2
2	Merge	Merge	EB Ramp from Columbia Pike _I-840 EB	1500	2
3	Basic	Basic	I-840 EB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	969	4646	0.21	73.5	6.6	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	1874	905	4259	2033	0.44	0.45	66.7	66.7	14.0	10.3	B

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	1874	4646	0.40	73.4	12.7	B

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.1	9.8	9.4	1.70	A

Facility Overall Results

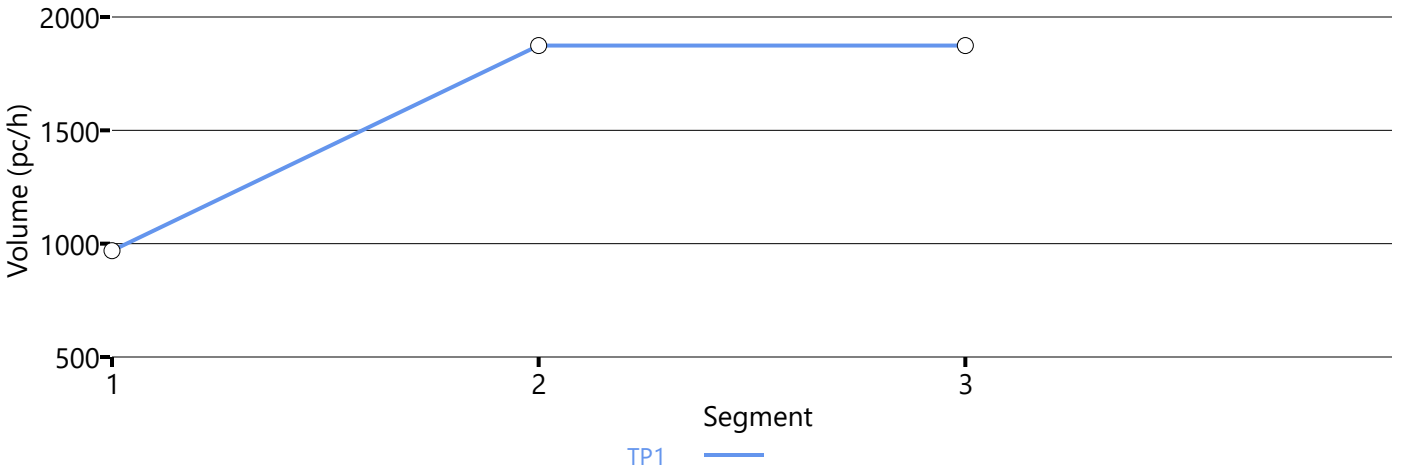
Space Mean Speed, mi/h	72.1	Density, veh/mi/ln	9.4
Average Travel Time, min	1.70	Density, pc/mi/ln	9.8

Messages

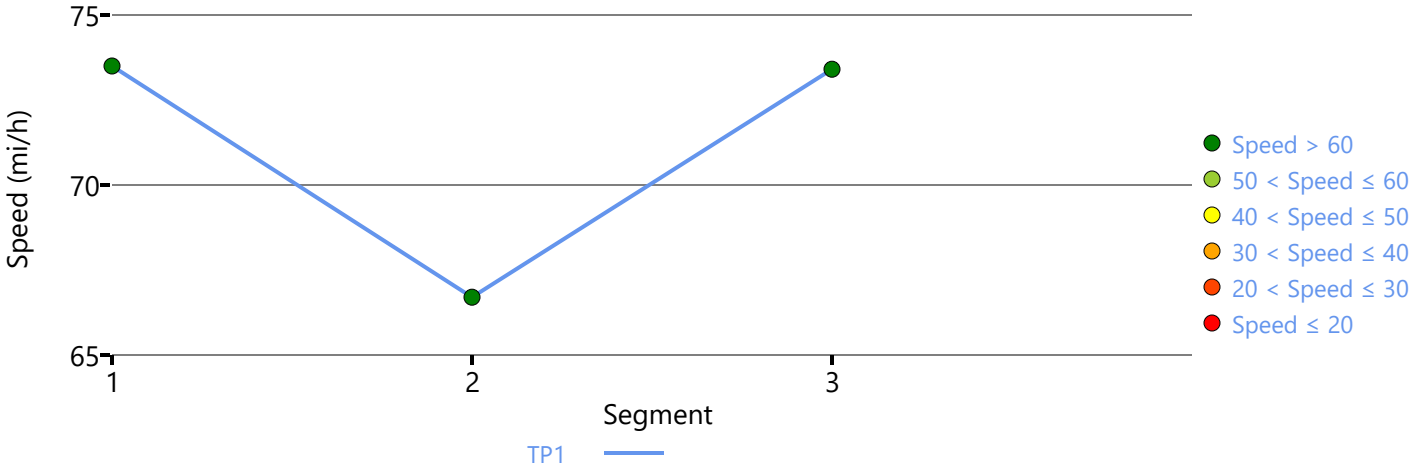
INFORMATION 1	Density for segment 2 in time period 1 is within 0.5 pc/mi/ln of LOS boundary. Be cautious when comparing LOS results.

Comments

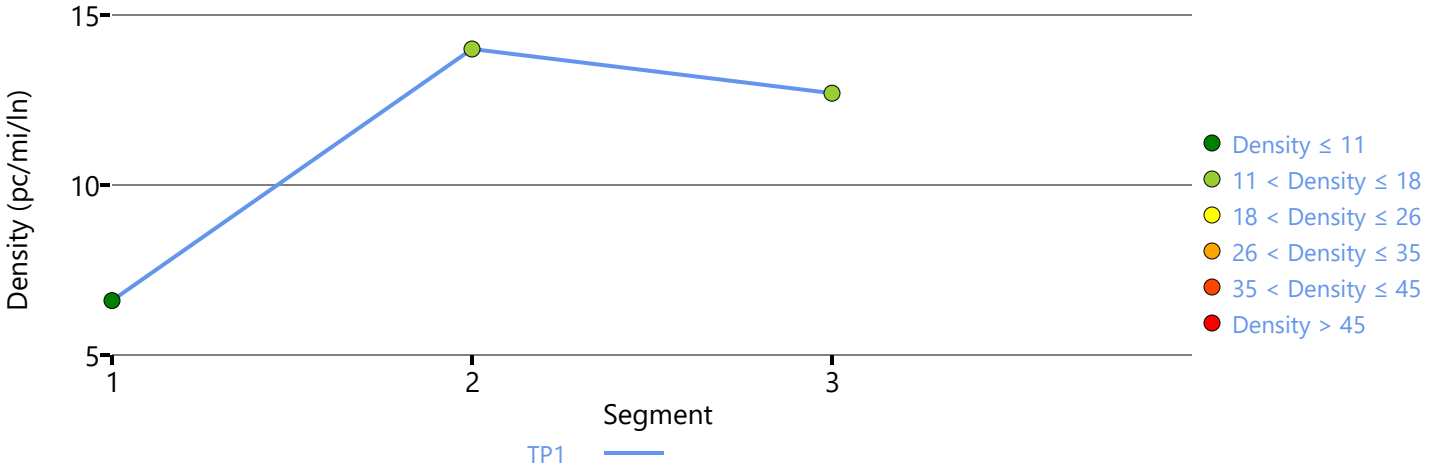
Volume Distribution



Speed Distribution



Density Distribution



HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	PM Peak Hour
Project Description	Roderick Place TIS: I-840 Westbound Ramp Background		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	1.98		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 WB	5280	2
2	Merge	Merge	WB Ramp from Columbia Pike _I-840 EB	1400	2
3	Basic	Basic	I-840 WB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	1482	4646	0.32	73.5	10.1	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	1689	207	4259	2033	0.40	0.10	66.9	66.9	12.6	9.2	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	1689	4646	0.36	73.4	11.5	B

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.4	10.9	10.5	1.60	A

Facility Overall Results

Space Mean Speed, mi/h	72.4	Density, veh/mi/ln	10.5
Average Travel Time, min	1.60	Density, pc/mi/ln	10.9

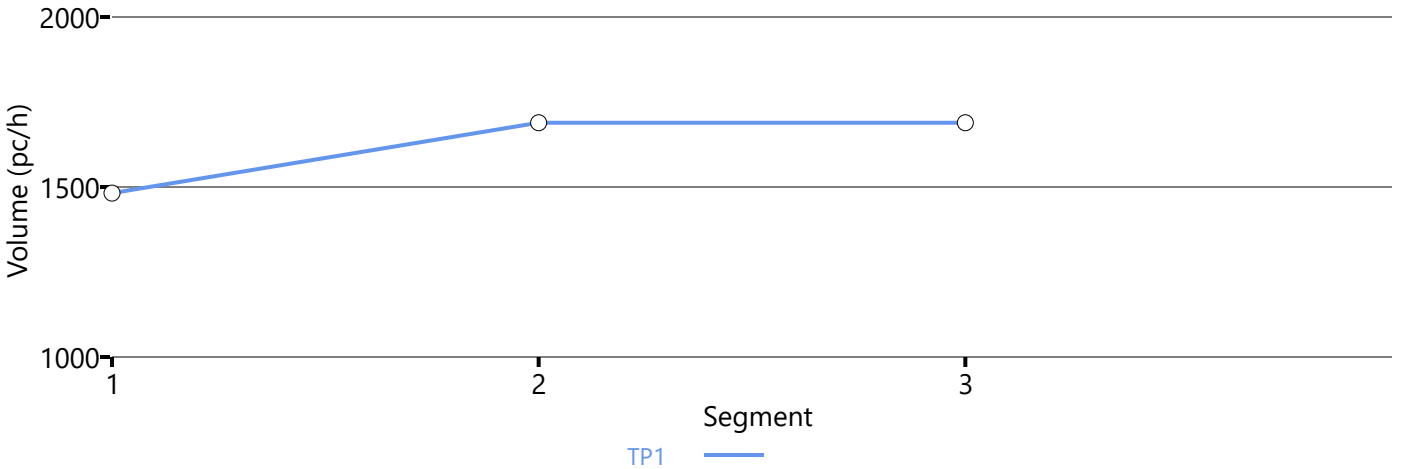
Messages

ERROR 1	Acceleration lane length is longer than the segment length for merge segment 2.

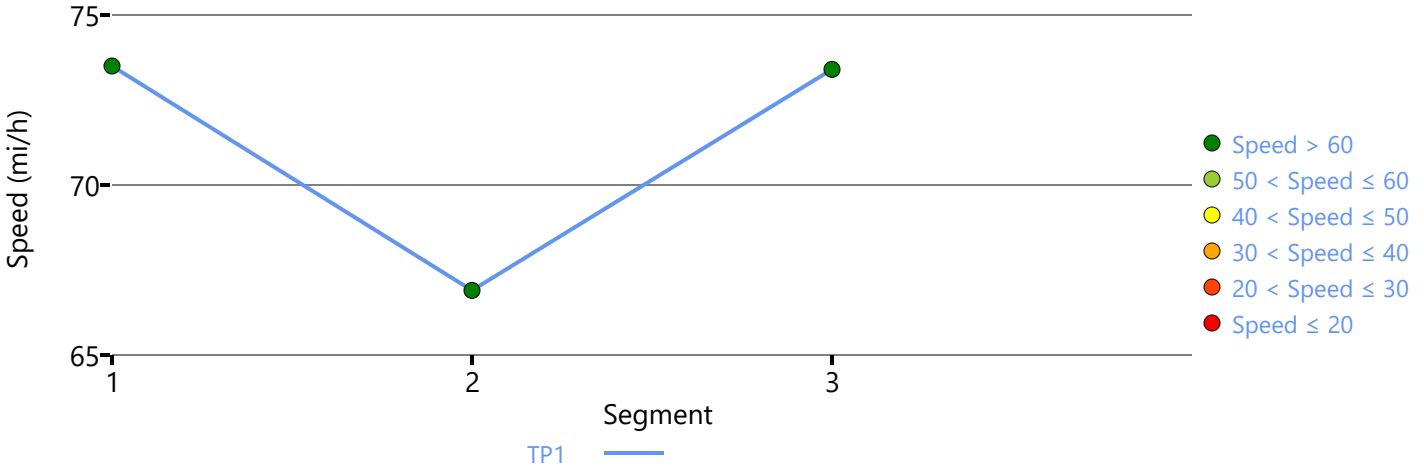
INFORMATION 1	Density for segment 3 in time period 1 is within 0.5 pc/mi/ln of LOS boundary. Be cautious when comparing LOS results.

Comments

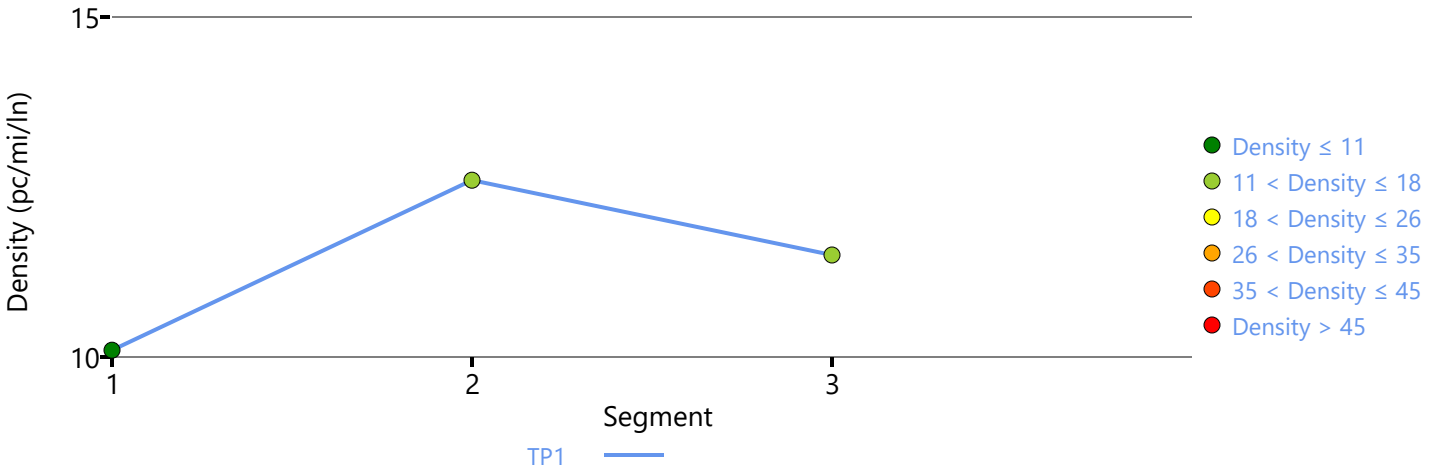
Volume Distribution

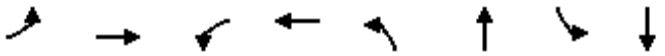


Speed Distribution



Density Distribution

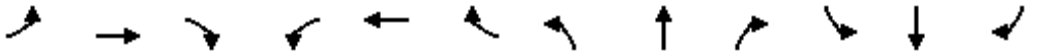




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	64	154	77	92	93	899	22	753
v/c Ratio	0.26	0.57	0.33	0.45	0.34	0.85	0.11	0.80
Control Delay	27.8	20.7	29.6	32.7	12.0	30.3	9.8	31.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	20.7	29.6	32.7	12.0	30.3	9.8	31.6
Queue Length 50th (ft)	28	20	34	33	20	358	6	388
Queue Length 95th (ft)	56	74	65	75	46	#865	20	#672
Internal Link Dist (ft)		737		561		511		6096
Turn Bay Length (ft)	100		85		105		120	
Base Capacity (vph)	258	346	239	289	278	1056	232	941
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	0.25	0.45	0.32	0.32	0.33	0.85	0.09	0.80

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	34	108	71	51	34	86	740	87	20	655	38
Future Volume (veh/h)	59	34	108	71	51	34	86	740	87	20	655	38
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	64	37	117	77	55	37	93	804	95	22	712	41
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	268	46	147	213	126	85	268	831	98	150	831	48
Arrive On Green	0.05	0.12	0.12	0.06	0.12	0.12	0.06	0.51	0.51	0.03	0.48	0.48
Sat Flow, veh/h	1774	395	1248	1774	1040	700	1774	1635	193	1774	1745	100
Grp Volume(v), veh/h	64	0	154	77	0	92	93	0	899	22	0	753
Grp Sat Flow(s),veh/h/ln	1774	0	1643	1774	0	1739	1774	0	1829	1774	0	1845
Q Serve(g_s), s	2.8	0.0	8.2	3.4	0.0	4.4	2.3	0.0	42.8	0.6	0.0	32.5
Cycle Q Clear(g_c), s	2.8	0.0	8.2	3.4	0.0	4.4	2.3	0.0	42.8	0.6	0.0	32.5
Prop In Lane	1.00		0.76	1.00		0.40	1.00		0.11	1.00		0.05
Lane Grp Cap(c), veh/h	268	0	193	213	0	211	268	0	930	150	0	879
V/C Ratio(X)	0.24	0.00	0.80	0.36	0.00	0.44	0.35	0.00	0.97	0.15	0.00	0.86
Avail Cap(c_a), veh/h	322	0	246	260	0	261	309	0	930	248	0	879
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.2	0.0	38.7	32.5	0.0	36.7	17.0	0.0	21.4	20.4	0.0	20.8
Incr Delay (d2), s/veh	0.5	0.0	13.2	1.0	0.0	1.4	0.8	0.0	22.5	0.4	0.0	10.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	4.4	1.7	0.0	2.2	1.2	0.0	27.3	0.3	0.0	19.1
LnGrp Delay(d),s/veh	32.7	0.0	51.9	33.5	0.0	38.1	17.7	0.0	43.9	20.8	0.0	31.4
LnGrp LOS	C		D	C		D	B		D	C		C
Approach Vol, veh/h		218			169			992			775	
Approach Delay, s/veh		46.2			36.0			41.5			31.1	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	52.3	11.6	17.1	11.9	49.4	11.3	17.4
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	7.5	35.5	7.5	13.5	7.5	35.5	7.5	13.5
Max Q Clear Time (g_c+I1), s	2.6	44.8	5.4	10.2	4.3	34.5	4.8	6.4
Green Ext Time (p_c), s	0.0	0.0	0.0	0.4	0.0	0.9	0.0	0.7

Intersection Summary	
HCM 2010 Ctrl Delay	37.8
HCM 2010 LOS	D

Lane Group	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	51	174	857	128	740
v/c Ratio	0.32	0.30	0.39	0.26	0.27
Control Delay	43.0	1.4	3.3	4.6	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	43.0	1.4	3.3	4.6	3.0
Queue Length 50th (ft)	28	0	43	11	38
Queue Length 95th (ft)	61	0	m25	34	67
Internal Link Dist (ft)		697	409		2564
Turn Bay Length (ft)	150			275	
Base Capacity (vph)	275	648	2175	576	2727
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.19	0.27	0.39	0.22	0.27

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	47	0	160	0	751	38	118	680	1
Future Volume (veh/h)	0	0	0	47	0	160	0	751	38	118	680	1
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	0	0	0	51	0	174	0	816	41	128	739	1
Adj No. of Lanes	0	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	2	0	234	0	208	80	2035	102	493	2645	4
Arrive On Green	0.00	0.00	0.00	0.13	0.00	0.13	0.00	0.59	0.59	0.13	1.00	1.00
Sat Flow, veh/h	0	1863	0	1774	0	1583	716	3430	172	1774	3627	5
Grp Volume(v), veh/h	0	0	0	51	0	174	0	421	436	128	361	379
Grp Sat Flow(s),veh/h/ln	0	1863	0	1774	0	1583	716	1770	1832	1774	1770	1862
Q Serve(g_s), s	0.0	0.0	0.0	2.3	0.0	9.6	0.0	11.4	11.4	2.3	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.3	0.0	9.6	0.0	11.4	11.4	2.3	0.0	0.0
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.09	1.00		0.00
Lane Grp Cap(c), veh/h	0	2	0	234	0	208	80	1050	1087	493	1291	1358
V/C Ratio(X)	0.00	0.00	0.00	0.22	0.00	0.83	0.00	0.40	0.40	0.26	0.28	0.28
Avail Cap(c_a), veh/h	0	155	0	276	0	246	80	1050	1087	645	1291	1358
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.98	0.98	0.98
Uniform Delay (d), s/veh	0.0	0.0	0.0	34.9	0.0	38.1	0.0	9.8	9.8	5.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.5	0.0	18.8	0.0	1.1	1.1	0.3	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	1.2	0.0	5.3	0.0	5.8	6.0	1.1	0.2	0.2
LnGrp Delay(d),s/veh	0.0	0.0	0.0	35.4	0.0	56.9	0.0	10.9	10.9	6.1	0.5	0.5
LnGrp LOS				D		E		B	B	A	A	A
Approach Vol, veh/h		0			225			857			868	
Approach Delay, s/veh		0.0			52.0			10.9			1.3	
Approach LOS					D			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	12.3	59.9		0.0		72.2		17.8
Change Period (Y+Rc), s	6.5	6.5		6.5		6.5		6.0
Max Green Setting (Gmax), s	13.5	29.5		7.5		49.5		14.0
Max Q Clear Time (g_c+I1), s	4.3	13.4		0.0		2.0		11.6
Green Ext Time (p_c), s	0.2	8.3		0.0		12.5		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	11.4
HCM 2010 LOS	B

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	28	61	493	391	114	715
v/c Ratio	0.11	0.26	0.20	0.32	0.16	0.24
Control Delay	40.0	2.6	10.2	6.0	1.7	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	2.6	10.2	6.0	1.7	1.4
Queue Length 50th (ft)	7	0	107	82	6	22
Queue Length 95th (ft)	21	0	126	138	12	31
Internal Link Dist (ft)			2564			882
Turn Bay Length (ft)		350		700	150	
Base Capacity (vph)	534	358	2480	1226	779	2924
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.17	0.20	0.32	0.15	0.24

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	0	56	0	0	0	0	454	360	105	658	0
Future Volume (veh/h)	26	0	56	0	0	0	0	454	360	105	658	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	0	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	28	0	0				0	493	0	114	715	0
Adj No. of Lanes	2	0	1				0	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	0	2				0	2	2	2	2	0
Cap, veh/h	116	0	53				0	2412	1079	805	2909	0
Arrive On Green	0.03	0.00	0.00				0.00	1.00	0.00	0.13	1.00	0.00
Sat Flow, veh/h	3442	0	1583				0	3632	1583	1774	3632	0
Grp Volume(v), veh/h	28	0	0				0	493	0	114	715	0
Grp Sat Flow(s),veh/h/ln	1721	0	1583				0	1770	1583	1774	1770	0
Q Serve(g_s), s	0.7	0.0	0.0				0.0	0.0	0.0	1.4	0.0	0.0
Cycle Q Clear(g_c), s	0.7	0.0	0.0				0.0	0.0	0.0	1.4	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	116	0	53				0	2412	1079	805	2909	0
V/C Ratio(X)	0.24	0.00	0.00				0.00	0.20	0.00	0.14	0.25	0.00
Avail Cap(c_a), veh/h	535	0	246				0	2412	1079	950	2909	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.93	0.00	0.96	0.96	0.00
Uniform Delay (d), s/veh	42.4	0.0	0.0				0.0	0.0	0.0	2.5	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0				0.0	0.2	0.0	0.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.0				0.0	0.1	0.0	0.7	0.1	0.0
LnGrp Delay(d),s/veh	43.4	0.0	0.0				0.0	0.2	0.0	2.5	0.2	0.0
LnGrp LOS	D							A		A	A	
Approach Vol, veh/h		28						493			829	
Approach Delay, s/veh		43.4						0.2			0.5	
Approach LOS		D						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	12.7	68.3		9.0		81.0		
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		
Max Green Setting (Gmax), s	13.0	43.0		14.0		63.0		
Max Q Clear Time (g_c+I1), s	3.4	2.0		2.7		2.0		
Green Ext Time (p_c), s	0.2	9.4		0.0		9.8		

Intersection Summary	
HCM 2010 Ctrl Delay	1.3
HCM 2010 LOS	A

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	355	103	39	475	477	28
v/c Ratio	0.40	0.21	0.07	0.23	0.23	0.03
Control Delay	29.0	6.8	2.6	6.4	9.1	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	6.8	2.6	6.4	9.1	1.7
Queue Length 50th (ft)	85	0	1	8	62	0
Queue Length 95th (ft)	125	38	3	11	87	7
Internal Link Dist (ft)				882	859	
Turn Bay Length (ft)		225	200			575
Base Capacity (vph)	896	489	525	2084	2084	949
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.21	0.07	0.23	0.23	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	327	0	95	36	437	0	0	439	26
Future Volume (veh/h)	0	0	0	327	0	95	36	437	0	0	439	26
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	0	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				355	0	0	39	475	0	0	477	0
Adj No. of Lanes				2	0	1	1	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	2	2	0	0	2	2
Cap, veh/h				899	0	413	560	2084	0	0	2084	932
Arrive On Green				0.26	0.00	0.00	0.59	0.59	0.00	0.00	0.59	0.00
Sat Flow, veh/h				3442	0	1583	914	3632	0	0	3632	1583
Grp Volume(v), veh/h				355	0	0	39	475	0	0	477	0
Grp Sat Flow(s),veh/h/ln				1721	0	1583	914	1770	0	0	1770	1583
Q Serve(g_s), s				7.6	0.0	0.0	1.9	5.7	0.0	0.0	5.8	0.0
Cycle Q Clear(g_c), s				7.6	0.0	0.0	7.7	5.7	0.0	0.0	5.8	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				899	0	413	560	2084	0	0	2084	932
V/C Ratio(X)				0.40	0.00	0.00	0.07	0.23	0.00	0.00	0.23	0.00
Avail Cap(c_a), veh/h				899	0	413	560	2084	0	0	2084	932
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.99	0.99	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				27.4	0.0	0.0	10.6	8.8	0.0	0.0	8.8	0.0
Incr Delay (d2), s/veh				1.3	0.0	0.0	0.2	0.3	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.8	0.0	0.0	0.5	2.8	0.0	0.0	2.9	0.0
LnGrp Delay(d),s/veh				28.7	0.0	0.0	10.9	9.0	0.0	0.0	9.0	0.0
LnGrp LOS				C			B	A			A	
Approach Vol, veh/h					355			514			477	
Approach Delay, s/veh					28.7			9.2			9.0	
Approach LOS					C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		60.0				60.0		30.0
Change Period (Y+Rc), s		7.0				7.0		6.5
Max Green Setting (Gmax), s		53.0				53.0		23.5
Max Q Clear Time (g_c+I1), s		9.7				7.8		9.6
Green Ext Time (p_c), s		7.1				7.2		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.3
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	12	9	537	456	6
Future Vol, veh/h	3	12	9	537	456	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	225	550	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	13	10	584	496	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	808	248	503	0	-	0
Stage 1	496	-	-	-	-	-
Stage 2	312	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	319	752	1058	-	-	-
Stage 1	577	-	-	-	-	-
Stage 2	715	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	316	752	1058	-	-	-
Mov Cap-2 Maneuver	431	-	-	-	-	-
Stage 1	572	-	-	-	-	-
Stage 2	715	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.6	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1058	-	431	752	-	-
HCM Lane V/C Ratio	0.009	-	0.008	0.017	-	-
HCM Control Delay (s)	8.4	-	13.4	9.9	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0	0.1	-	-

HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	Saturday
Project Description	Roderick Place TIS: I-840 Eastbound Ramp Background		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	2.00		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 EB	5280	2
2	Merge	Merge	EB Ramp from Columbia Pike _I-840 EB	1500	2
3	Basic	Basic	I-840 EB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	563	4646	0.12	73.5	3.8	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	1088	525	4259	2033	0.26	0.26	67.2	67.2	8.1	4.4	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	1088	4646	0.23	73.4	7.4	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.2	5.7	5.5	1.70	A

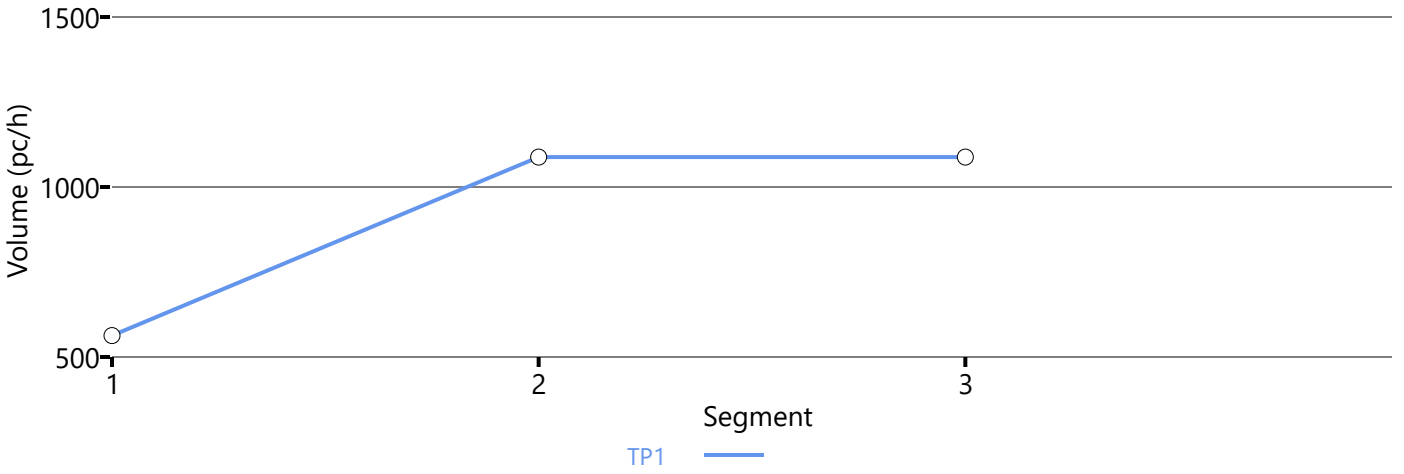
Facility Overall Results

Space Mean Speed, mi/h	72.2	Density, veh/mi/ln	5.5
Average Travel Time, min	1.70	Density, pc/mi/ln	5.7

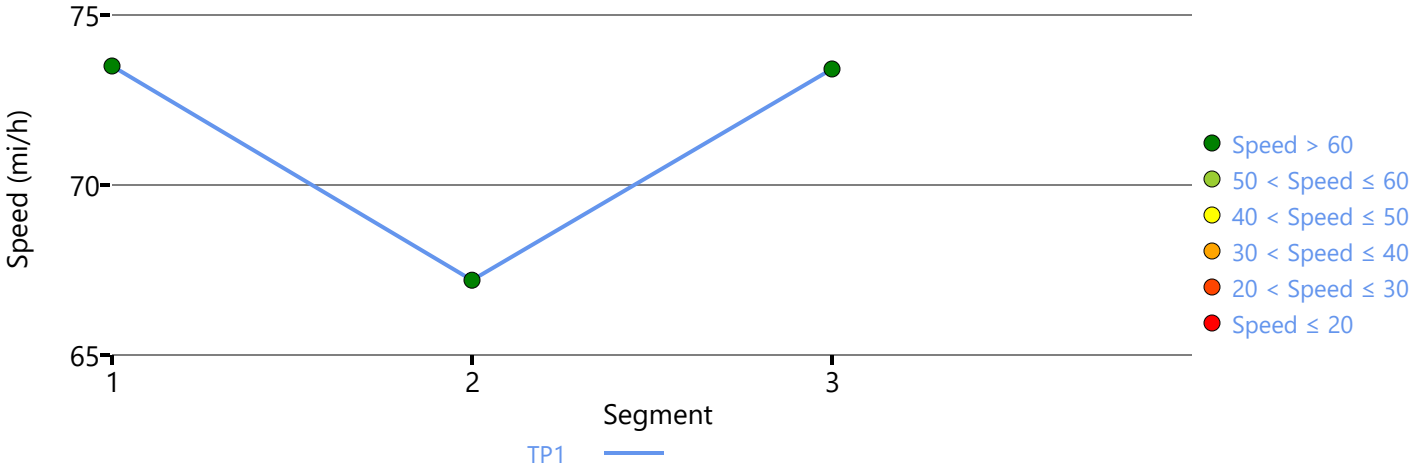
Messages

Comments

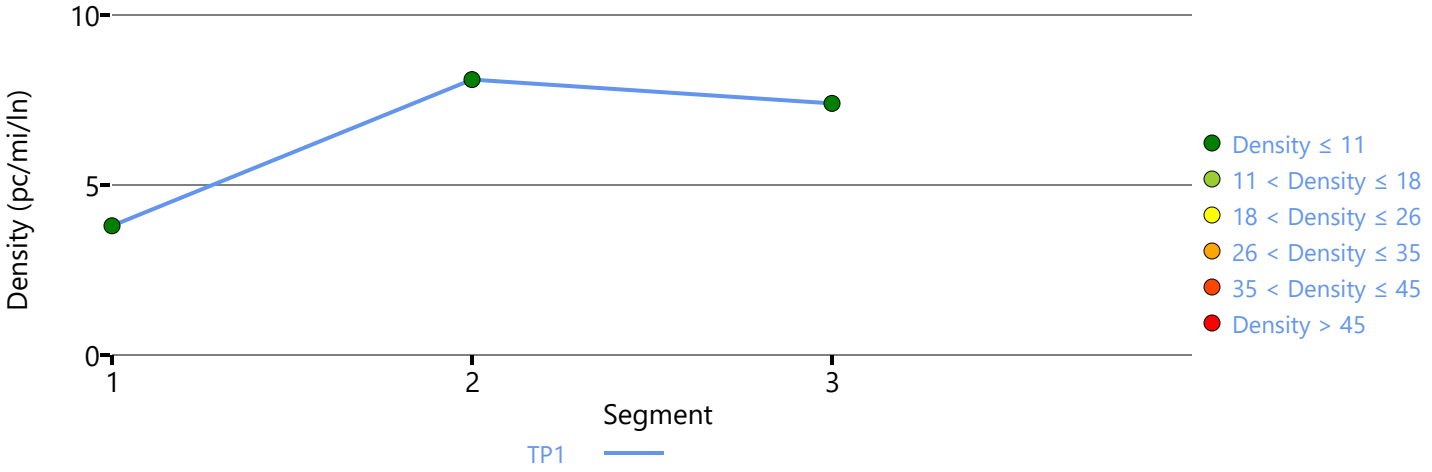
Volume Distribution



Speed Distribution



Density Distribution



HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	Saturday Peak Hour
Project Description	Roderick Place TIS: I-840 Westbound Ramp Background		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	1.98		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 WB	5280	2
2	Merge	Merge	WB Ramp from Columbia Pike _I-840 EB	1400	2
3	Basic	Basic	I-840 WB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	508	4646	0.11	73.5	3.5	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	578	70	4259	2033	0.14	0.03	67.3	67.3	4.3	0.6	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	579	4646	0.12	73.4	3.9	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.5	3.8	3.6	1.60	A

Facility Overall Results

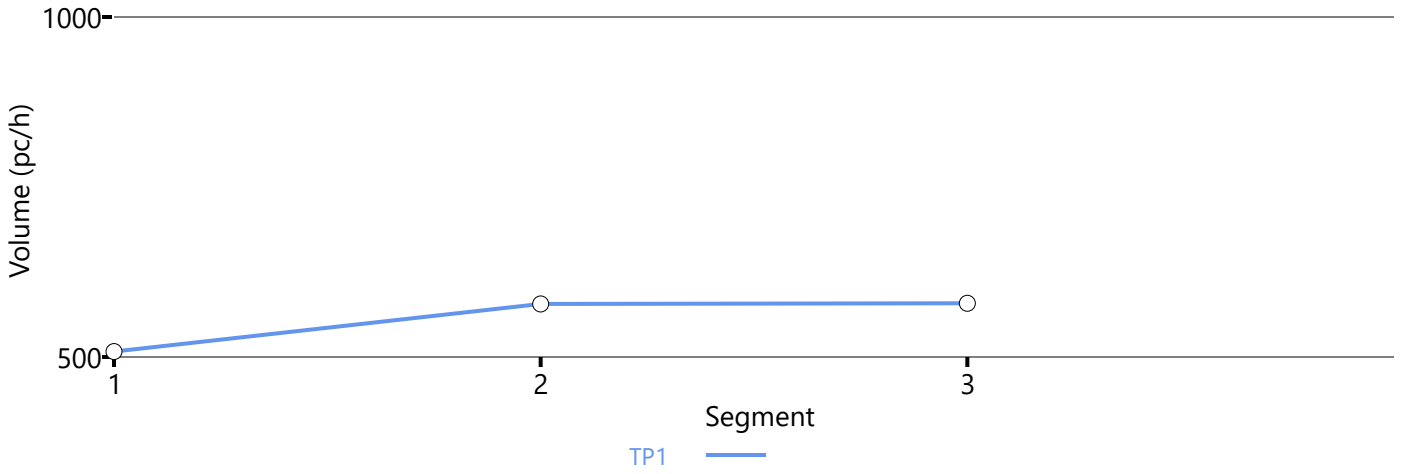
Space Mean Speed, mi/h	72.5	Density, veh/mi/ln	3.6
Average Travel Time, min	1.60	Density, pc/mi/ln	3.8

Messages

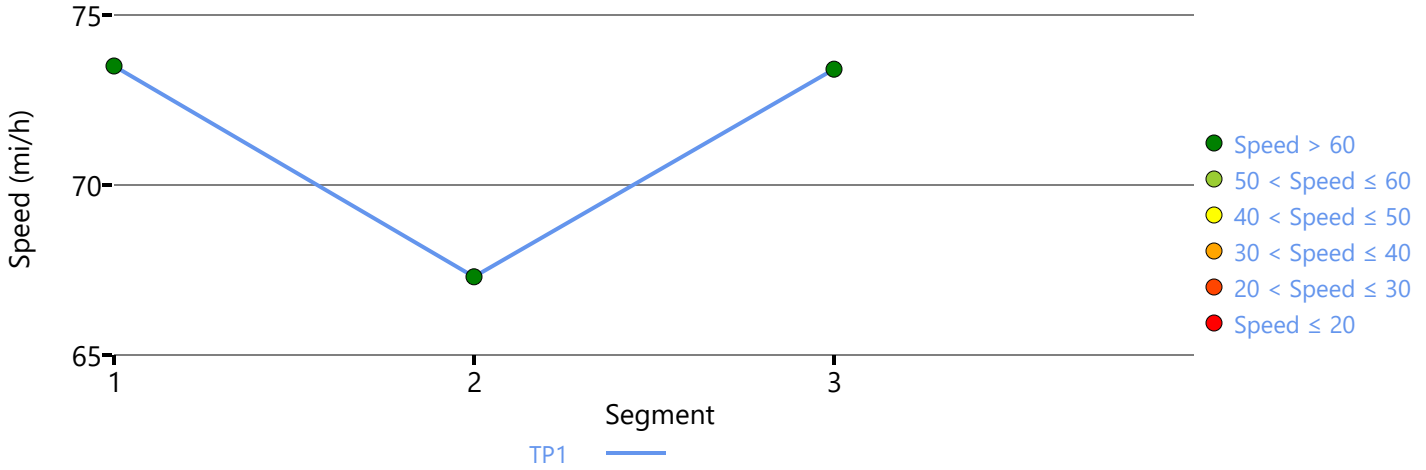
ERROR 1	Acceleration lane length is longer than the segment length for merge segment 2.

Comments

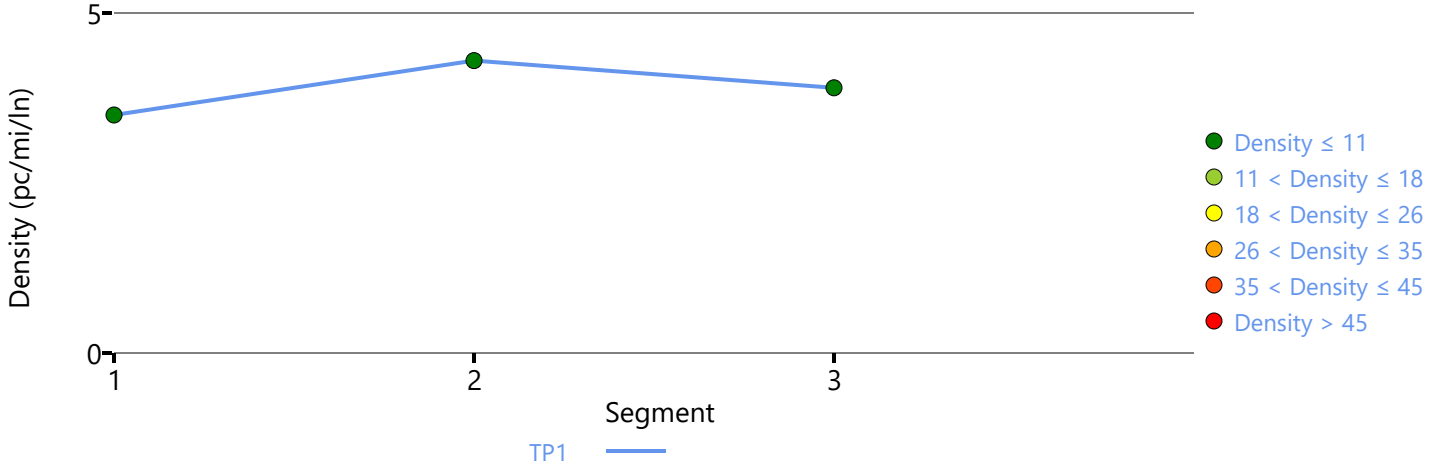
Volume Distribution



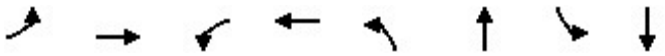
Speed Distribution



Density Distribution



PROJECTED CONDITIONS CAPACITY ANALYSES



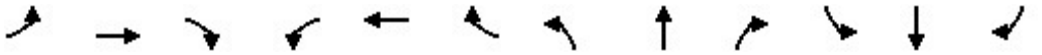
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	50	98	57	167	47	1244	16	602
v/c Ratio	0.23	0.40	0.23	0.66	0.11	1.14	0.09	0.58
Control Delay	30.0	19.6	29.8	36.2	9.4	96.6	10.2	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.0	19.6	29.8	36.2	9.4	96.6	10.2	15.6
Queue Length 50th (ft)	25	16	28	57	11	~904	2	211
Queue Length 95th (ft)	51	61	56	120	29	#1396	m11	432
Internal Link Dist (ft)		737		561		511		4013
Turn Bay Length (ft)	100		85		105		120	
Base Capacity (vph)	223	330	259	336	447	1095	206	1032
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	0.30	0.22	0.50	0.11	1.14	0.08	0.58

Intersection Summary

~ 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.

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	26	64	52	57	97	43	1114	30	15	514	40
Future Volume (veh/h)	46	26	64	52	57	97	43	1114	30	15	514	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1900	1845	1845	1900	1845	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	50	28	70	57	62	105	47	1211	33	16	559	43
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	182	57	141	239	76	129	386	983	27	110	893	69
Arrive On Green	0.05	0.12	0.12	0.05	0.12	0.12	0.04	0.55	0.55	0.02	0.53	0.53
Sat Flow, veh/h	1757	468	1170	1757	616	1044	1757	1787	49	1757	1692	130
Grp Volume(v), veh/h	50	0	98	57	0	167	47	0	1244	16	0	602
Grp Sat Flow(s),veh/h/ln	1757	0	1638	1757	0	1660	1757	0	1836	1757	0	1822
Q Serve(g_s), s	2.4	0.0	5.6	2.8	0.0	9.8	1.2	0.0	55.0	0.4	0.0	23.3
Cycle Q Clear(g_c), s	2.4	0.0	5.6	2.8	0.0	9.8	1.2	0.0	55.0	0.4	0.0	23.3
Prop In Lane	1.00		0.71	1.00		0.63	1.00		0.03	1.00		0.07
Lane Grp Cap(c), veh/h	182	0	198	239	0	205	386	0	1010	110	0	961
V/C Ratio(X)	0.28	0.00	0.49	0.24	0.00	0.81	0.12	0.00	1.23	0.15	0.00	0.63
Avail Cap(c_a), veh/h	234	0	270	287	0	274	476	0	1010	204	0	961
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.91	0.00	0.91
Uniform Delay (d), s/veh	36.3	0.0	41.1	35.9	0.0	42.7	12.3	0.0	22.5	24.2	0.0	16.7
Incr Delay (d2), s/veh	0.8	0.0	1.9	0.5	0.0	12.9	0.1	0.0	113.2	0.6	0.0	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	2.6	1.4	0.0	5.2	0.6	0.0	59.2	0.2	0.0	12.5
LnGrp Delay(d),s/veh	37.1	0.0	43.0	36.4	0.0	55.6	12.5	0.0	135.7	24.7	0.0	19.5
LnGrp LOS	D		D	D		E	B		F	C		B
Approach Vol, veh/h		148			224			1291			618	
Approach Delay, s/veh		41.0			50.7			131.2			19.6	
Approach LOS		D			D			F			B	

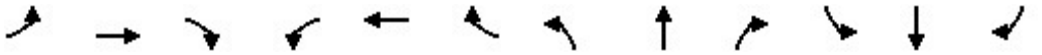
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.7	61.5	11.3	18.6	10.9	59.3	11.0	18.9
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	7.5	42.5	7.5	16.5	9.5	40.5	7.5	16.5
Max Q Clear Time (g_c+I1), s	2.4	57.0	4.8	7.6	3.2	25.3	4.4	11.8
Green Ext Time (p_c), s	0.0	0.0	0.0	0.9	0.0	11.3	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	87.2
HCM 2010 LOS	F

Lane Group	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	40	412	1381	70	683
v/c Ratio	0.26	0.70	0.58	0.24	0.25
Control Delay	45.8	8.4	17.7	4.4	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	45.8	8.4	17.7	4.4	1.4
Queue Length 50th (ft)	25	0	485	4	26
Queue Length 95th (ft)	55	34	m424	12	28
Internal Link Dist (ft)		697	409		2564
Turn Bay Length (ft)	150			275	
Base Capacity (vph)	332	697	2387	460	2763
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.59	0.58	0.15	0.25

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	37	0	379	0	1247	24	64	628	0
Future Volume (veh/h)	0	0	0	37	0	379	0	1247	24	64	628	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1845	1900	1845	1845	1900	1845	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	0	0	0	40	0	412	0	1355	26	70	683	0
Adj No. of Lanes	0	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	0	2	0	334	0	298	72	2000	38	278	2401	0
Arrive On Green	0.00	0.00	0.00	0.19	0.00	0.19	0.00	0.57	0.57	0.10	1.00	0.00
Sat Flow, veh/h	0	1845	0	1757	0	1568	748	3518	67	1757	3597	0
Grp Volume(v), veh/h	0	0	0	40	0	412	0	675	706	70	683	0
Grp Sat Flow(s),veh/h/ln	0	1845	0	1757	0	1568	748	1752	1833	1757	1752	0
Q Serve(g_s), s	0.0	0.0	0.0	1.9	0.0	19.0	0.0	27.0	27.1	1.5	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.9	0.0	19.0	0.0	27.0	27.1	1.5	0.0	0.0
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.04	1.00		0.00
Lane Grp Cap(c), veh/h	0	2	0	334	0	298	72	996	1042	278	2401	0
V/C Ratio(X)	0.00	0.00	0.00	0.12	0.00	1.38	0.00	0.68	0.68	0.25	0.28	0.00
Avail Cap(c_a), veh/h	0	138	0	334	0	298	72	996	1042	495	2401	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.95	0.95	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	33.6	0.0	40.5	0.0	15.1	15.1	11.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.2	0.0	191.9	0.0	3.7	3.5	0.4	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.9	0.0	24.1	0.0	14.0	14.6	0.7	0.1	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	33.7	0.0	232.4	0.0	18.8	18.7	11.6	0.3	0.0
LnGrp LOS				C		F		B	B	B	A	
Approach Vol, veh/h		0			452			1381			753	
Approach Delay, s/veh		0.0			214.8			18.8			1.3	
Approach LOS					F			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	11.6	63.4		0.0		75.0		25.0
Change Period (Y+Rc), s	6.5	6.5		6.5		6.5		6.0
Max Green Setting (Gmax), s	17.5	30.5		7.5		54.5		19.0
Max Q Clear Time (g_c+I1), s	3.5	29.1		0.0		2.0		21.0
Green Ext Time (p_c), s	0.1	1.3		0.0		21.8		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	48.0
HCM 2010 LOS	D

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	280	91	1179	993	210	864
v/c Ratio	0.61	0.29	0.61	0.79	0.58	0.34
Control Delay	46.2	5.8	29.5	20.8	19.3	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.2	5.8	29.5	20.8	19.3	9.1
Queue Length 50th (ft)	88	0	358	359	58	120
Queue Length 95th (ft)	124	26	471	498	120	171
Internal Link Dist (ft)			2564			882
Turn Bay Length (ft)		350		700	150	
Base Capacity (vph)	816	467	1944	1250	370	2574
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.19	0.61	0.79	0.57	0.34

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	258	0	84	0	0	0	0	1085	914	193	795	0
Future Volume (veh/h)	258	0	84	0	0	0	0	1085	914	193	795	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	0	1845				0	1845	1845	1845	1845	0
Adj Flow Rate, veh/h	280	0	0				0	1179	0	210	864	0
Adj No. of Lanes	2	0	1				0	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	0	3				0	3	3	3	3	0
Cap, veh/h	366	0	168				0	2206	987	361	2673	0
Arrive On Green	0.11	0.00	0.00				0.00	0.42	0.00	0.13	1.00	0.00
Sat Flow, veh/h	3408	0	1568				0	3597	1568	1757	3597	0
Grp Volume(v), veh/h	280	0	0				0	1179	0	210	864	0
Grp Sat Flow(s),veh/h/ln	1704	0	1568				0	1752	1568	1757	1752	0
Q Serve(g_s), s	8.0	0.0	0.0				0.0	25.1	0.0	4.2	0.0	0.0
Cycle Q Clear(g_c), s	8.0	0.0	0.0				0.0	25.1	0.0	4.2	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	366	0	168				0	2206	987	361	2673	0
V/C Ratio(X)	0.77	0.00	0.00				0.00	0.53	0.00	0.58	0.32	0.00
Avail Cap(c_a), veh/h	818	0	376				0	2206	987	407	2673	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	0.67	0.67	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.79	0.00	0.94	0.94	0.00
Uniform Delay (d), s/veh	43.4	0.0	0.0				0.0	18.0	0.0	10.3	0.0	0.0
Incr Delay (d2), s/veh	3.4	0.0	0.0				0.0	0.7	0.0	1.6	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	0.0	0.0				0.0	12.3	0.0	2.6	0.1	0.0
LnGrp Delay(d),s/veh	46.8	0.0	0.0				0.0	18.7	0.0	11.8	0.3	0.0
LnGrp LOS	D							B		B	A	
Approach Vol, veh/h		280						1179			1074	
Approach Delay, s/veh		46.8						18.7			2.6	
Approach LOS		D						B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.3	69.9		16.7		83.3		
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		
Max Green Setting (Gmax), s	9.0	47.0		24.0		63.0		
Max Q Clear Time (g_c+I1), s	6.2	27.1		10.0		2.0		
Green Ext Time (p_c), s	0.1	13.3		0.7		23.9		

Intersection Summary	
HCM 2010 Ctrl Delay	15.0
HCM 2010 LOS	B

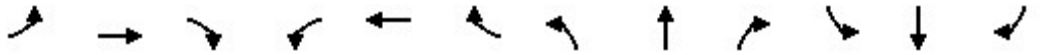
Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	360	434	60	1401	714	34
v/c Ratio	0.45	1.06	0.14	0.63	0.32	0.03
Control Delay	34.9	94.5	7.1	16.4	9.1	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	94.5	7.1	16.4	9.1	2.2
Queue Length 50th (ft)	101	~277	24	386	101	0
Queue Length 95th (ft)	145	#470	m19	468	133	10
Internal Link Dist (ft)				882	859	
Turn Bay Length (ft)		225	200			575
Base Capacity (vph)	799	410	422	2208	2208	1001
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.45	1.06	0.14	0.63	0.32	0.03

Intersection Summary

~ 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.

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	331	0	399	55	1289	0	0	657	31
Future Volume (veh/h)	0	0	0	331	0	399	55	1289	0	0	657	31
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1845	0	1845	1845	1845	0	0	1845	1845
Adj Flow Rate, veh/h				360	0	0	60	1401	0	0	714	0
Adj No. of Lanes				2	0	1	1	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				3	0	3	3	3	0	0	3	3
Cap, veh/h				801	0	368	461	2208	0	0	2208	988
Arrive On Green				0.23	0.00	0.00	0.42	0.42	0.00	0.00	0.63	0.00
Sat Flow, veh/h				3408	0	1568	726	3597	0	0	3597	1568
Grp Volume(v), veh/h				360	0	0	60	1401	0	0	714	0
Grp Sat Flow(s),veh/h/ln				1704	0	1568	726	1752	0	0	1752	1568
Q Serve(g_s), s				9.0	0.0	0.0	5.6	31.6	0.0	0.0	9.5	0.0
Cycle Q Clear(g_c), s				9.0	0.0	0.0	15.1	31.6	0.0	0.0	9.5	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				801	0	368	461	2208	0	0	2208	988
V/C Ratio(X)				0.45	0.00	0.00	0.13	0.63	0.00	0.00	0.32	0.00
Avail Cap(c_a), veh/h				801	0	368	461	2208	0	0	2208	988
HCM Platoon Ratio				1.00	1.00	1.00	0.67	0.67	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.76	0.76	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				32.7	0.0	0.0	18.3	19.8	0.0	0.0	8.6	0.0
Incr Delay (d2), s/veh				1.8	0.0	0.0	0.4	1.1	0.0	0.0	0.4	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				4.5	0.0	0.0	1.2	15.6	0.0	0.0	4.7	0.0
LnGrp Delay(d),s/veh				34.5	0.0	0.0	18.7	20.9	0.0	0.0	9.0	0.0
LnGrp LOS				C			B	C			A	
Approach Vol, veh/h					360			1461			714	
Approach Delay, s/veh					34.5			20.8			9.0	
Approach LOS					C			C			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		70.0				70.0		30.0
Change Period (Y+Rc), s		7.0				7.0		6.5
Max Green Setting (Gmax), s		63.0				63.0		23.5
Max Q Clear Time (g_c+I1), s		33.6				11.5		11.0
Green Ext Time (p_c), s		18.7				25.4		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	19.4
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	126.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	125	252	640	1047	436	405
Future Vol, veh/h	125	252	640	1047	436	405
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	225	550	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	136	274	696	1138	474	440

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2435	237	914	0	-	0
Stage 1	474	-	-	-	-	-
Stage 2	1961	-	-	-	-	-
Critical Hdwy	6.86	6.96	4.16	-	-	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	~ 26	761	735	-	-	-
Stage 1	589	-	-	-	-	-
Stage 2	~ 94	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 1	761	735	-	-	-
Mov Cap-2 Maneuver	~ 22	-	-	-	-	-
Stage 1	~ 31	-	-	-	-	-
Stage 2	~ 94	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 896.5	17.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	735	-	22	761	-	-
HCM Lane V/C Ratio	0.946	-	6.176	0.36	-	-
HCM Control Delay (s)	45.1	$	2678.9	12.4	-	-
HCM Lane LOS	E	-	F	B	-	-
HCM 95th %tile Q(veh)	13.9	-	17.2	1.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	104	105	1266	84	174	549
v/c Ratio	0.53	0.39	1.16	0.09	0.69	0.39
Control Delay	50.8	12.2	103.1	11.1	31.4	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	12.2	103.1	11.1	31.4	5.4
Queue Length 50th (ft)	63	0	~985	29	52	45
Queue Length 95th (ft)	113	46	m#968	m34	137	235
Internal Link Dist (ft)	381		4013			560
Turn Bay Length (ft)		75		50	150	
Base Capacity (vph)	411	448	1089	931	339	1396
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.23	1.16	0.09	0.51	0.39

Intersection Summary

~ 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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	96	97	1165	77	160	505
Future Volume (veh/h)	96	97	1165	77	160	505
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1845	1845	1845
Adj Flow Rate, veh/h	104	105	1266	84	174	549
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	158	141	1175	999	209	1438
Arrive On Green	0.09	0.09	0.64	0.64	0.08	0.78
Sat Flow, veh/h	1757	1568	1845	1568	1757	1845
Grp Volume(v), veh/h	104	105	1266	84	174	549
Grp Sat Flow(s),veh/h/ln	1757	1568	1845	1568	1757	1845
Q Serve(g_s), s	5.7	6.5	63.7	2.1	5.6	9.3
Cycle Q Clear(g_c), s	5.7	6.5	63.7	2.1	5.6	9.3
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	158	141	1175	999	209	1438
V/C Ratio(X)	0.66	0.74	1.08	0.08	0.83	0.38
Avail Cap(c_a), veh/h	413	368	1175	999	344	1438
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.09	0.09	1.00	1.00
Uniform Delay (d), s/veh	44.0	44.4	18.2	7.0	33.0	3.5
Incr Delay (d2), s/veh	4.6	7.5	36.7	0.0	8.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	3.1	44.0	0.9	5.2	5.0
LnGrp Delay(d),s/veh	48.5	51.8	54.8	7.0	41.7	4.2
LnGrp LOS	D	D	F	A	D	A
Approach Vol, veh/h	209		1350			723
Approach Delay, s/veh	50.2		51.8			13.2
Approach LOS	D		D			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	14.3	70.2				84.5		15.5
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	15.5	41.5				63.5		23.5
Max Q Clear Time (g_c+I1), s	7.6	65.7				11.3		8.5
Green Ext Time (p_c), s	0.3	0.0				25.4		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	39.5
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	43	1229	33	0	665
Future Vol, veh/h	0	43	1229	33	0	665
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	47	1336	36	0	723

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	1354	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.23	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.327	-	-	-	-
Pot Cap-1 Maneuver	0	182	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	182	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	31.5	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	182	-
HCM Lane V/C Ratio	-	-	0.257	-
HCM Control Delay (s)	-	-	31.5	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	1	-

HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	AM Peak Hour
Project Description	Roderick Place TIS: I-840 Westbound Ramp		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	1.98		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 WB	5280	2
2	Merge	Merge	WB Ramp from Columbia Pike _I-840 EB	1400	2
3	Basic	Basic	I-840 WB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.943	674	4646	0.15	73.5	4.6	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.943	0.943	773	99	4259	2033	0.18	0.05	67.3	67.3	5.7	2.1	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.943	773	4646	0.17	73.4	5.3	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.5	5.0	4.7	1.60	A

Facility Overall Results

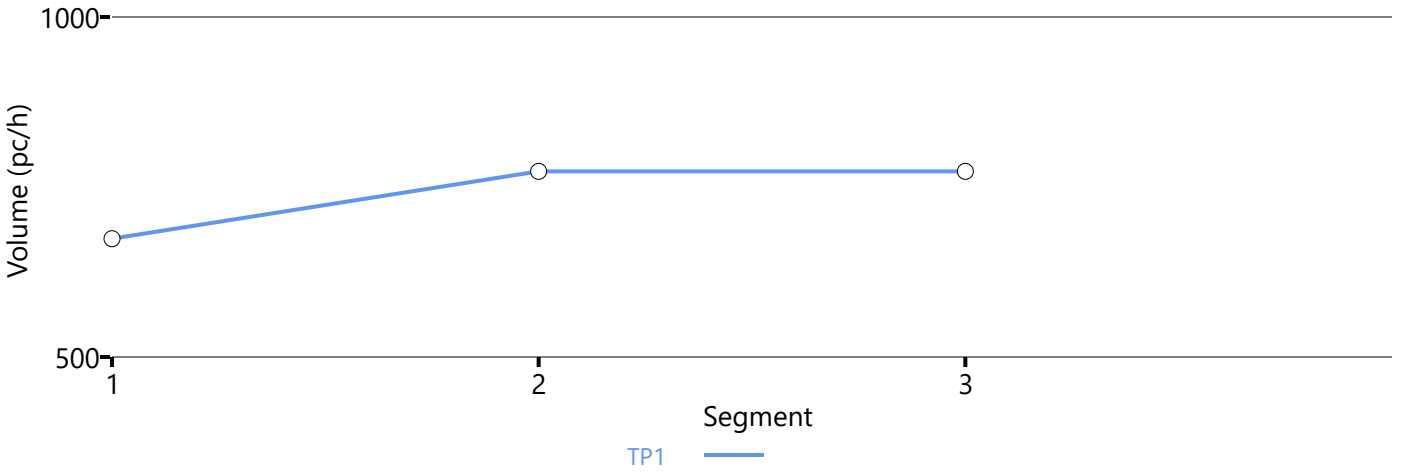
Space Mean Speed, mi/h	72.5	Density, veh/mi/ln	4.7
Average Travel Time, min	1.60	Density, pc/mi/ln	5.0

Messages

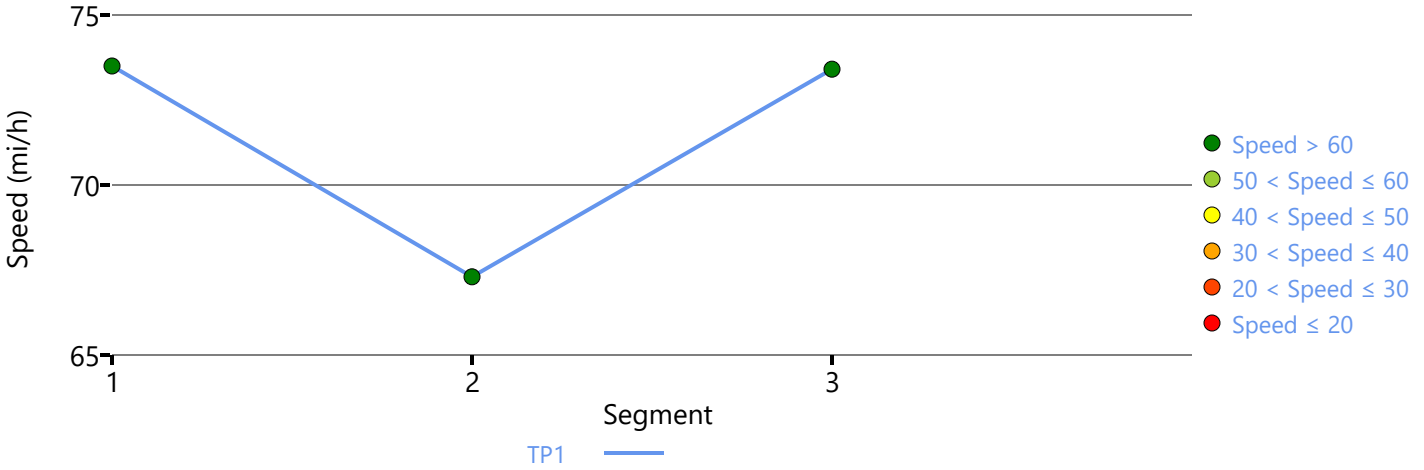
ERROR 1	Acceleration lane length is longer than the segment length for merge segment 2.

Comments

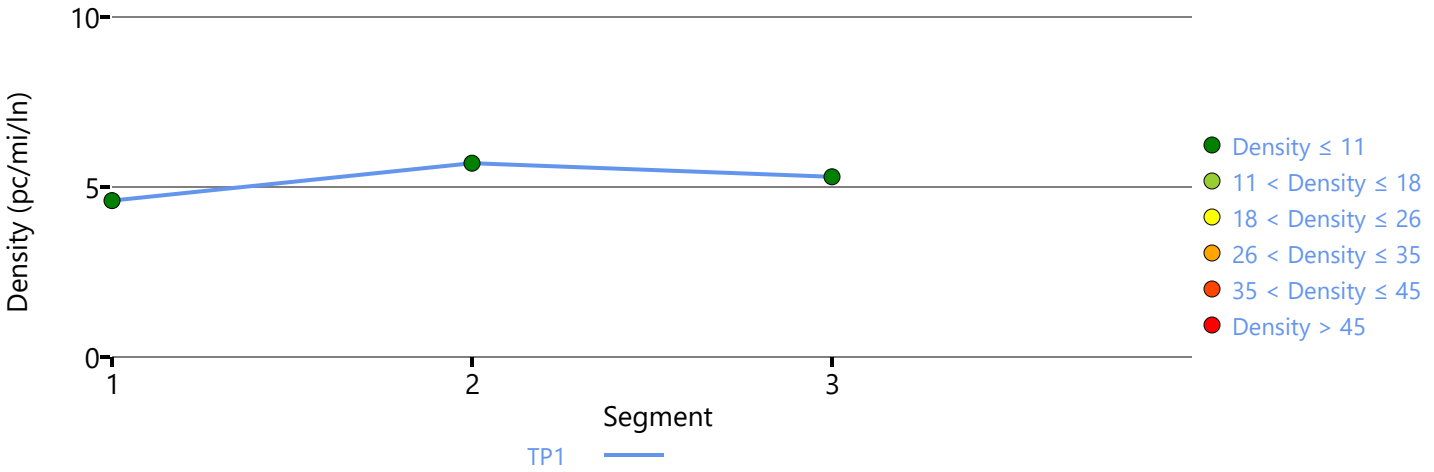
Volume Distribution



Speed Distribution



Density Distribution



HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	AM Peak Hour
Project Description	Roderick Place TIS: I-840 Eastbound Ramp		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	2.00		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 EB	5280	2
2	Merge	Merge	EB Ramp from Columbia Pike _I-840 EB	1500	2
3	Basic	Basic	I-840 EB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.943	1298	4646	0.28	73.5	8.8	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.943	0.943	2574	1276	4259	2033	0.60	0.63	65.9	65.9	19.5	15.6	B

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.943	2574	4646	0.55	72.4	17.8	B

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	71.4	13.5	12.8	1.70	B

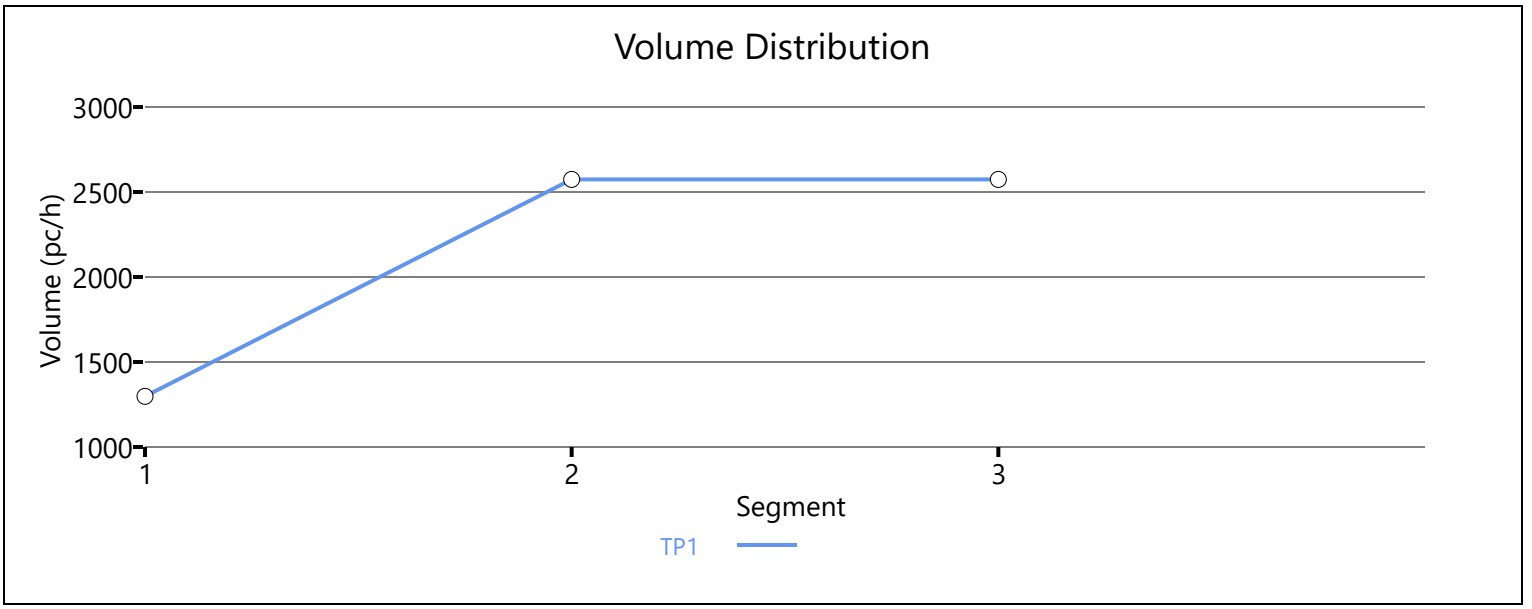
Facility Overall Results

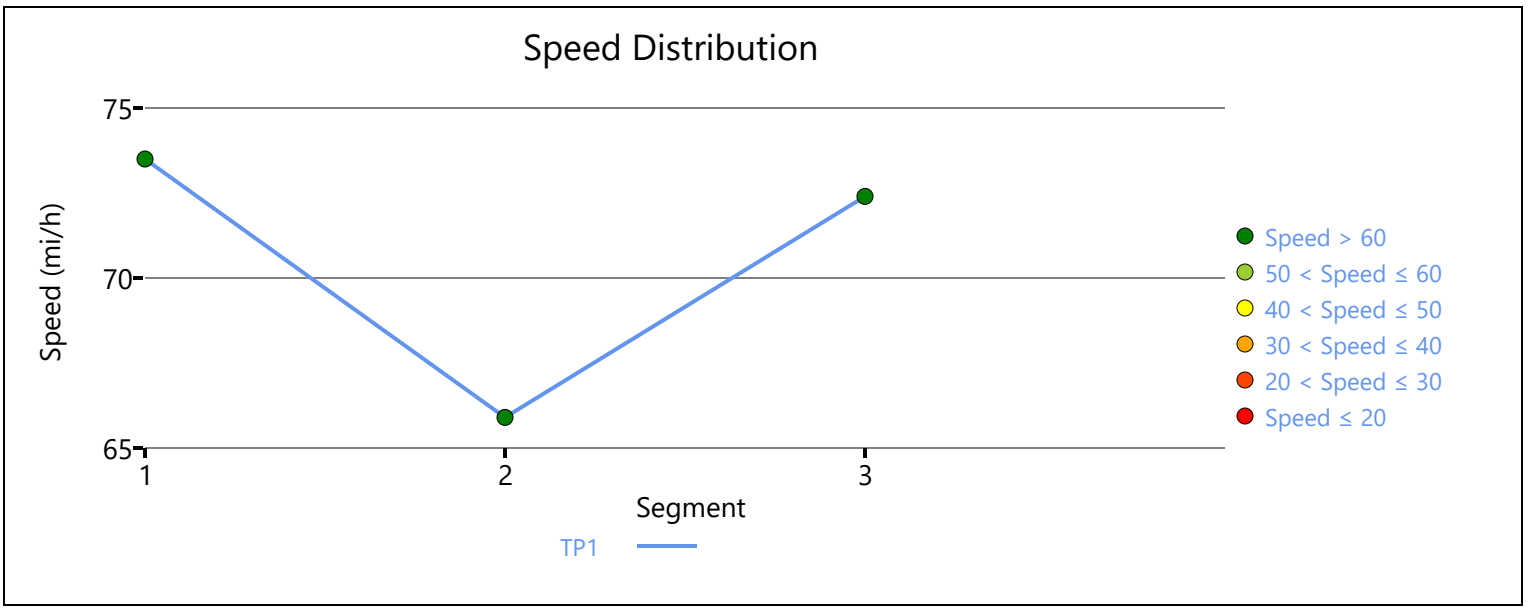
Space Mean Speed, mi/h	71.4	Density, veh/mi/ln	12.8
Average Travel Time, min	1.70	Density, pc/mi/ln	13.5

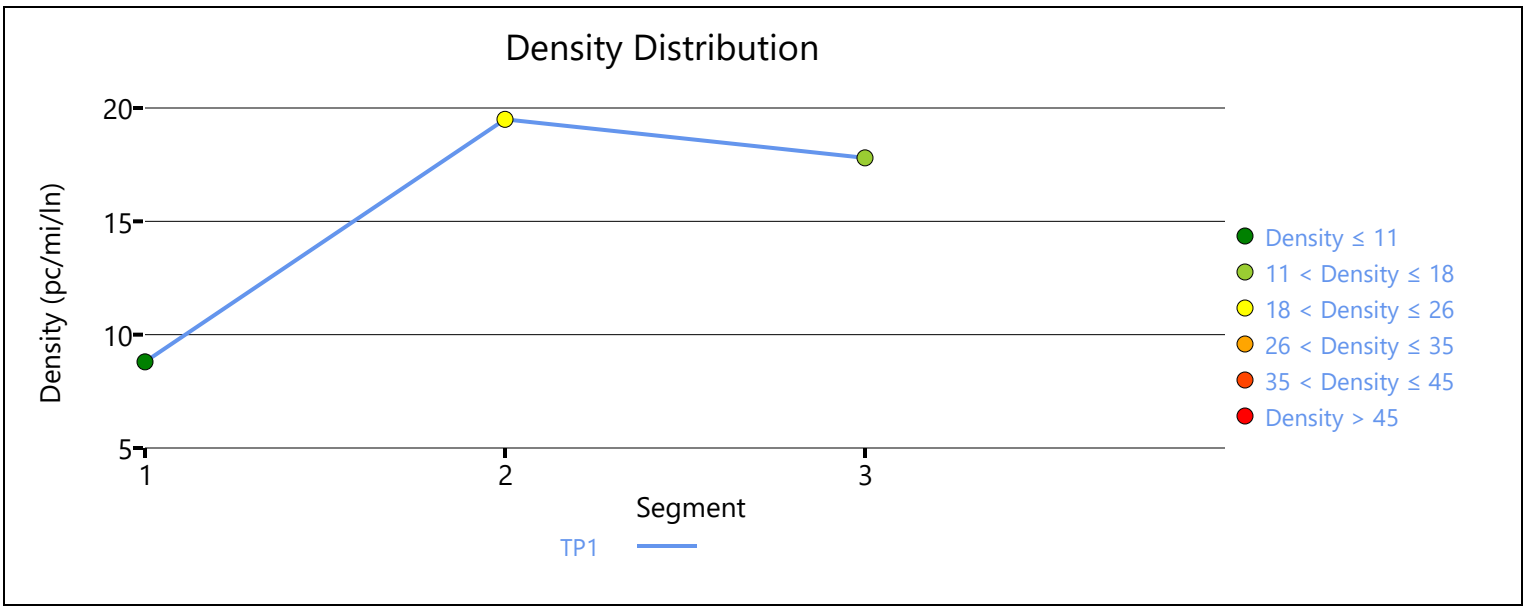
Messages

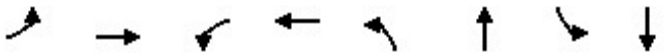
INFORMATION 1	Density for segment 3 in time period 1 is within 0.5 pc/mi/ln of LOS boundary. Be cautious when comparing LOS results.

Comments









Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	46	197	77	57	76	953	28	1092
v/c Ratio	0.21	0.72	0.44	0.31	0.45	0.82	0.13	0.96
Control Delay	38.8	31.5	46.2	28.5	22.5	27.5	10.8	43.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	31.5	46.2	28.5	22.5	27.5	10.8	43.2
Queue Length 50th (ft)	29	41	50	17	18	608	9	~763
Queue Length 95th (ft)	58	114	86	56	65	#1038	m14	#1277
Internal Link Dist (ft)		737		561		511		4013
Turn Bay Length (ft)	100		85		105		120	
Base Capacity (vph)	229	360	180	276	187	1169	252	1133
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	0.20	0.55	0.43	0.21	0.41	0.82	0.11	0.96

Intersection Summary

~ 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.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	36	145	71	21	31	70	766	110	26	980	25
Future Volume (veh/h)	42	36	145	71	21	31	70	766	110	26	980	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	46	39	158	77	23	34	76	833	120	28	1065	27
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	286	44	178	169	100	148	142	903	130	168	997	25
Arrive On Green	0.04	0.14	0.14	0.05	0.15	0.15	0.05	0.57	0.57	0.03	0.55	0.55
Sat Flow, veh/h	1774	323	1309	1774	680	1005	1774	1593	229	1774	1809	46
Grp Volume(v), veh/h	46	0	197	77	0	57	76	0	953	28	0	1092
Grp Sat Flow(s),veh/h/ln	1774	0	1632	1774	0	1685	1774	0	1822	1774	0	1855
Q Serve(g_s), s	2.6	0.0	14.2	4.4	0.0	3.6	2.2	0.0	57.0	0.8	0.0	66.2
Cycle Q Clear(g_c), s	2.6	0.0	14.2	4.4	0.0	3.6	2.2	0.0	57.0	0.8	0.0	66.2
Prop In Lane	1.00		0.80	1.00		0.60	1.00		0.13	1.00		0.02
Lane Grp Cap(c), veh/h	286	0	223	169	0	247	142	0	1033	168	0	1022
V/C Ratio(X)	0.16	0.00	0.89	0.46	0.00	0.23	0.54	0.00	0.92	0.17	0.00	1.07
Avail Cap(c_a), veh/h	342	0	238	207	0	247	186	0	1033	240	0	1022
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.66	0.00	0.66
Uniform Delay (d), s/veh	41.9	0.0	50.9	42.5	0.0	45.2	28.4	0.0	23.6	23.9	0.0	26.9
Incr Delay (d2), s/veh	0.3	0.0	29.1	1.9	0.0	0.5	3.1	0.0	14.6	0.3	0.0	43.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	8.2	2.2	0.0	1.7	1.5	0.0	32.5	0.5	0.0	45.9
LnGrp Delay(d),s/veh	42.2	0.0	80.0	44.4	0.0	45.7	31.5	0.0	38.2	24.3	0.0	70.4
LnGrp LOS	D		F	D		D	C		D	C		F
Approach Vol, veh/h		243			134			1029			1120	
Approach Delay, s/veh		72.9			44.9			37.7			69.2	
Approach LOS		E			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.1	74.5	12.5	22.9	12.0	72.7	11.2	24.1
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	8.5	59.5	8.5	17.5	8.5	59.5	8.5	17.5
Max Q Clear Time (g_c+I1), s	2.8	59.0	6.4	16.2	4.2	68.2	4.6	5.6
Green Ext Time (p_c), s	0.0	0.5	0.0	0.1	0.0	0.0	0.0	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	55.4
HCM 2010 LOS	E

Lane Group	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	34	132	910	642	1176
v/c Ratio	0.29	0.18	0.63	0.81	0.40
Control Delay	59.2	0.5	30.2	39.8	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	59.2	0.5	30.2	39.8	2.4
Queue Length 50th (ft)	26	0	379	399	53
Queue Length 95th (ft)	59	0	437	497	124
Internal Link Dist (ft)		697	409		2564
Turn Bay Length (ft)	150			275	
Base Capacity (vph)	280	836	1443	805	2937
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.16	0.63	0.80	0.40

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	31	0	121	0	771	66	591	1082	0
Future Volume (veh/h)	0	0	0	31	0	121	0	771	66	591	1082	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	0	0	0	34	0	132	0	838	72	642	1176	0
Adj No. of Lanes	0	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	2	0	180	0	161	60	1630	140	693	2812	0
Arrive On Green	0.00	0.00	0.00	0.10	0.00	0.10	0.00	0.49	0.49	0.49	1.00	0.00
Sat Flow, veh/h	0	1863	0	1774	0	1583	475	3299	283	1774	3632	0
Grp Volume(v), veh/h	0	0	0	34	0	132	0	449	461	642	1176	0
Grp Sat Flow(s),veh/h/ln	0	1863	0	1774	0	1583	475	1770	1813	1774	1770	0
Q Serve(g_s), s	0.0	0.0	0.0	2.1	0.0	9.8	0.0	20.7	20.7	25.7	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.1	0.0	9.8	0.0	20.7	20.7	25.7	0.0	0.0
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.16	1.00		0.00
Lane Grp Cap(c), veh/h	0	2	0	180	0	161	60	874	895	693	2812	0
V/C Ratio(X)	0.00	0.00	0.00	0.19	0.00	0.82	0.00	0.51	0.51	0.93	0.42	0.00
Avail Cap(c_a), veh/h	0	116	0	281	0	251	60	874	895	855	2812	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.81	0.81	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	49.4	0.0	52.9	0.0	20.6	20.6	9.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.5	0.0	11.6	0.0	2.2	2.1	11.8	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	1.1	0.0	4.8	0.0	10.6	10.9	13.7	0.1	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	49.9	0.0	64.5	0.0	22.8	22.7	20.9	0.4	0.0
LnGrp LOS				D		E		C	C	C	A	
Approach Vol, veh/h		0			166			910			1818	
Approach Delay, s/veh		0.0			61.5			22.7			7.6	
Approach LOS					E			C			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	36.1	65.8		0.0		101.8		18.2
Change Period (Y+Rc), s	6.5	6.5		6.5		6.5		6.0
Max Green Setting (Gmax), s	40.5	27.5		7.5		74.5		19.0
Max Q Clear Time (g_c+I1), s	27.7	22.7		0.0		2.0		11.8
Green Ext Time (p_c), s	1.8	4.1		0.0		24.3		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	15.5
HCM 2010 LOS	B

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	62	78	721	535	405	1665
v/c Ratio	0.28	0.40	0.30	0.43	0.65	0.57
Control Delay	56.5	11.9	18.8	11.1	6.7	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.5	11.9	18.8	11.1	6.7	1.2
Queue Length 50th (ft)	24	0	172	143	16	33
Queue Length 95th (ft)	46	31	283	272	m29	42
Internal Link Dist (ft)			2564			882
Turn Bay Length (ft)		350		700	150	
Base Capacity (vph)	400	273	2375	1238	732	2930
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.29	0.30	0.43	0.55	0.57

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	0	72	0	0	0	0	663	492	373	1532	0
Future Volume (veh/h)	57	0	72	0	0	0	0	663	492	373	1532	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	0	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	62	0	0				0	721	0	405	1665	0
Adj No. of Lanes	2	0	1				0	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	0	2				0	2	2	2	2	0
Cap, veh/h	150	0	69				0	2450	1096	737	3001	0
Arrive On Green	0.04	0.00	0.00				0.00	1.00	0.00	0.19	1.00	0.00
Sat Flow, veh/h	3442	0	1583				0	3632	1583	1774	3632	0
Grp Volume(v), veh/h	62	0	0				0	721	0	405	1665	0
Grp Sat Flow(s),veh/h/ln	1721	0	1583				0	1770	1583	1774	1770	0
Q Serve(g_s), s	2.1	0.0	0.0				0.0	0.0	0.0	8.7	0.0	0.0
Cycle Q Clear(g_c), s	2.1	0.0	0.0				0.0	0.0	0.0	8.7	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	150	0	69				0	2450	1096	737	3001	0
V/C Ratio(X)	0.41	0.00	0.00				0.00	0.29	0.00	0.55	0.55	0.00
Avail Cap(c_a), veh/h	402	0	185				0	2450	1096	904	3001	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.74	0.00	0.63	0.63	0.00
Uniform Delay (d), s/veh	55.9	0.0	0.0				0.0	0.0	0.0	2.8	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	0.0				0.0	0.2	0.0	0.4	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0				0.0	0.1	0.0	4.0	0.2	0.0
LnGrp Delay(d),s/veh	57.7	0.0	0.0				0.0	0.2	0.0	3.2	0.5	0.0
LnGrp LOS	E							A		A	A	
Approach Vol, veh/h		62						721			2070	
Approach Delay, s/veh		57.7						0.2			1.0	
Approach LOS		E						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	18.7	90.1		11.2		108.8		
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		
Max Green Setting (Gmax), s	23.0	63.0		14.0		93.0		
Max Q Clear Time (g_c+I1), s	10.7	2.0		4.1		2.0		
Green Ext Time (p_c), s	1.0	32.6		0.1		38.4		

Intersection Summary	
HCM 2010 Ctrl Delay	2.0
HCM 2010 LOS	A

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	667	215	89	693	1402	115
v/c Ratio	0.47	0.29	1.46	0.41	0.83	0.14
Control Delay	27.1	7.8	307.6	18.4	32.9	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.1	7.8	307.6	18.4	32.9	3.5
Queue Length 50th (ft)	191	26	~87	121	484	0
Queue Length 95th (ft)	244	77	#193	261	584	32
Internal Link Dist (ft)				882	859	
Turn Bay Length (ft)		225	200			575
Base Capacity (vph)	1416	746	61	1681	1681	812
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.29	1.46	0.41	0.83	0.14

Intersection Summary

~ 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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	614	0	198	82	638	0	0	1290	106
Future Volume (veh/h)	0	0	0	614	0	198	82	638	0	0	1290	106
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	0	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				667	0	0	89	693	0	0	1402	0
Adj No. of Lanes				2	0	1	1	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	2	2	0	0	2	2
Cap, veh/h				1420	0	653	110	1681	0	0	1681	752
Arrive On Green				0.41	0.00	0.00	0.95	0.95	0.00	0.00	0.47	0.00
Sat Flow, veh/h				3442	0	1583	383	3632	0	0	3632	1583
Grp Volume(v), veh/h				667	0	0	89	693	0	0	1402	0
Grp Sat Flow(s),veh/h/ln				1721	0	1583	383	1770	0	0	1770	1583
Q Serve(g_s), s				16.9	0.0	0.0	15.7	1.9	0.0	0.0	41.3	0.0
Cycle Q Clear(g_c), s				16.9	0.0	0.0	57.0	1.9	0.0	0.0	41.3	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				1420	0	653	110	1681	0	0	1681	752
V/C Ratio(X)				0.47	0.00	0.00	0.81	0.41	0.00	0.00	0.83	0.00
Avail Cap(c_a), veh/h				1420	0	653	110	1681	0	0	1681	752
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.96	0.96	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				25.7	0.0	0.0	27.1	1.6	0.0	0.0	27.4	0.0
Incr Delay (d2), s/veh				1.1	0.0	0.0	44.1	0.7	0.0	0.0	5.0	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				8.3	0.0	0.0	4.3	0.9	0.0	0.0	21.2	0.0
LnGrp Delay(d),s/veh				26.8	0.0	0.0	71.2	2.3	0.0	0.0	32.4	0.0
LnGrp LOS				C			E	A			C	
Approach Vol, veh/h					667			782			1402	
Approach Delay, s/veh					26.8			10.2			32.4	
Approach LOS					C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		64.0				64.0		56.0
Change Period (Y+Rc), s		7.0				7.0		6.5
Max Green Setting (Gmax), s		57.0				57.0		49.5
Max Q Clear Time (g_c+I1), s		59.0				43.3		18.9
Green Ext Time (p_c), s		0.0				10.9		2.4

Intersection Summary	
HCM 2010 Ctrl Delay	25.0
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	11.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	104	198	142	699	1263	94
Future Vol, veh/h	104	198	142	699	1263	94
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	225	550	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	113	215	154	760	1373	102

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2061	687	1475	0	-	0
Stage 1	1373	-	-	-	-	-
Stage 2	688	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 47	389	453	-	-	-
Stage 1	200	-	-	-	-	-
Stage 2	460	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 31	389	453	-	-	-
Mov Cap-2 Maneuver	~ 103	-	-	-	-	-
Stage 1	132	-	-	-	-	-
Stage 2	460	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	83.6	2.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	453	-	103	389	-	-
HCM Lane V/C Ratio	0.341	-	1.098	0.553	-	-
HCM Control Delay (s)	17	-	195.1	25.1	-	-
HCM Lane LOS	C	-	F	D	-	-
HCM 95th %tile Q(veh)	1.5	-	7.2	3.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	118	118	763	87	186	1023
v/c Ratio	0.60	0.42	0.63	0.08	0.42	0.70
Control Delay	63.1	12.9	20.6	6.3	5.2	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.1	12.9	20.6	6.3	5.2	8.1
Queue Length 50th (ft)	89	0	579	23	28	286
Queue Length 95th (ft)	145	53	731	m30	58	377
Internal Link Dist (ft)	381		4013			560
Turn Bay Length (ft)		75		50	150	
Base Capacity (vph)	346	404	1218	1043	449	1454
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.29	0.63	0.08	0.41	0.70

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	109	109	702	80	171	941
Future Volume (veh/h)	109	109	702	80	171	941
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	118	118	763	87	186	1023
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	167	149	1292	1098	459	1485
Arrive On Green	0.09	0.09	0.69	0.69	0.05	0.80
Sat Flow, veh/h	1774	1583	1863	1583	1774	1863
Grp Volume(v), veh/h	118	118	763	87	186	1023
Grp Sat Flow(s),veh/h/ln	1774	1583	1863	1583	1774	1863
Q Serve(g_s), s	7.7	8.8	25.5	2.1	3.4	29.6
Cycle Q Clear(g_c), s	7.7	8.8	25.5	2.1	3.4	29.6
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	167	149	1292	1098	459	1485
V/C Ratio(X)	0.71	0.79	0.59	0.08	0.41	0.69
Avail Cap(c_a), veh/h	347	310	1292	1098	481	1485
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.52	0.52	1.00	1.00
Uniform Delay (d), s/veh	52.7	53.2	9.6	6.0	8.3	5.5
Incr Delay (d2), s/veh	5.4	9.0	1.0	0.1	0.6	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	4.2	13.3	0.9	2.0	15.9
LnGrp Delay(d),s/veh	58.1	62.2	10.6	6.0	8.9	8.1
LnGrp LOS	E	E	B	A	A	A
Approach Vol, veh/h	236		850			1209
Approach Delay, s/veh	60.2		10.1			8.2
Approach LOS	E		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	12.5	89.7				102.2		17.8
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	7.5	69.5				83.5		23.5
Max Q Clear Time (g_c+I1), s	5.4	27.5				31.6		10.8
Green Ext Time (p_c), s	0.1	19.5				21.2		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.3
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	51	775	36	0	1112
Future Vol, veh/h	0	51	775	36	0	1112
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	55	842	39	0	1209

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	862	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	355	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	355	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	355	-
HCM Lane V/C Ratio	-	-	0.156	-
HCM Control Delay (s)	-	-	17	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.5	-

HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	PM Peak Hour
Project Description	Roderick Place TIS: I-840 Eastbound Ramp Scenario 1		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	2.00		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 EB	5280	2
2	Merge	Merge	EB Ramp from Columbia Pike _I-840 EB	1500	2
3	Basic	Basic	I-840 EB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	969	4646	0.21	73.5	6.6	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	1947	978	4259	2033	0.46	0.48	66.7	66.7	14.6	10.9	B

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	1948	4646	0.42	73.4	13.3	B

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.1	10.1	9.7	1.70	A

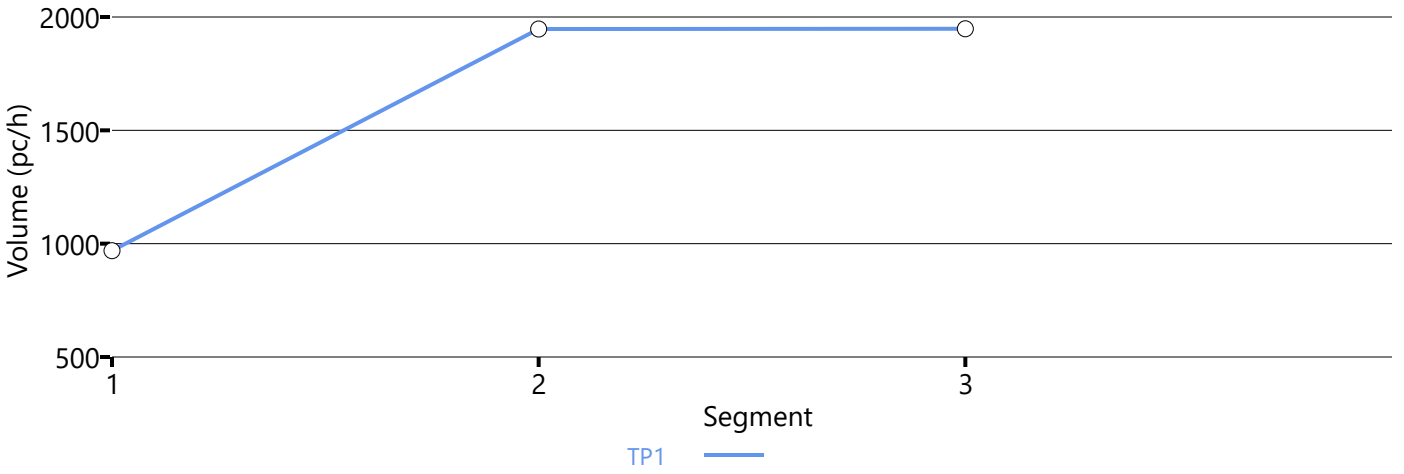
Facility Overall Results

Space Mean Speed, mi/h	72.1	Density, veh/mi/ln	9.7
Average Travel Time, min	1.70	Density, pc/mi/ln	10.1

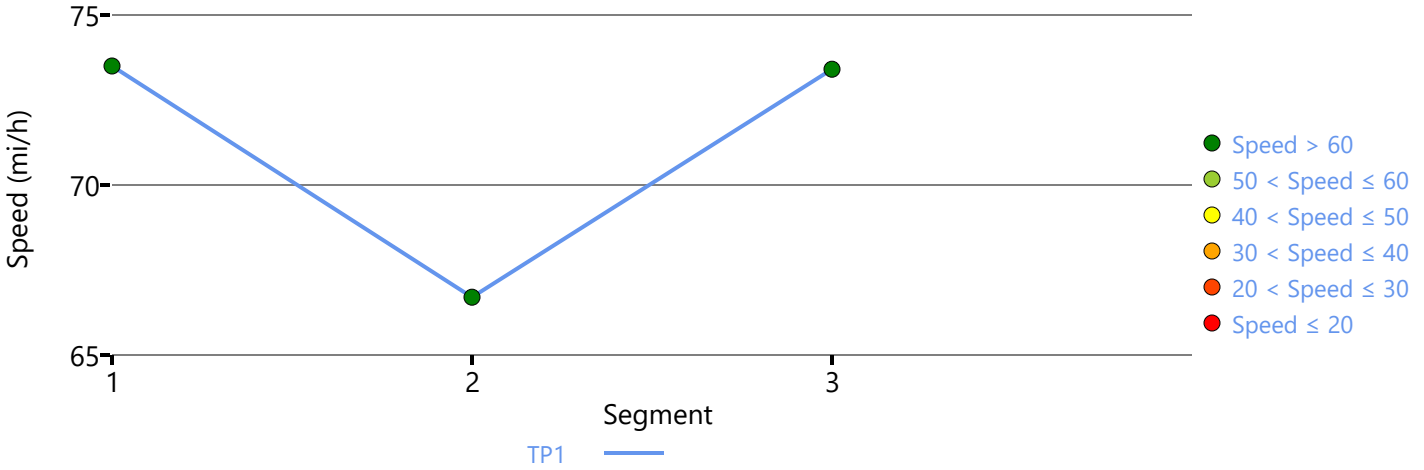
Messages

Comments

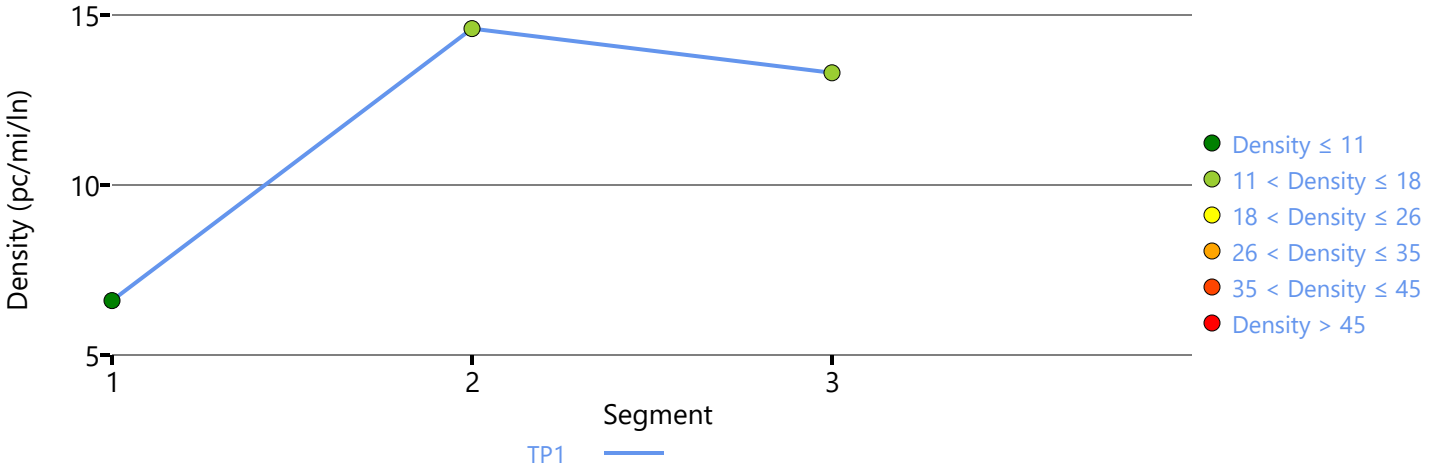
Volume Distribution



Speed Distribution



Density Distribution



HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	PM Peak Hour
Project Description	Roderick Place TIS: I-840 Westbound Ramp		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	1.98		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 WB	5280	2
2	Merge	Merge	WB Ramp from Columbia Pike _I-840 EB	1400	2
3	Basic	Basic	I-840 WB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	1482	4646	0.32	73.5	10.1	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	1694	212	4259	2033	0.40	0.10	66.9	66.9	12.7	9.3	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	1695	4646	0.36	73.4	11.5	B

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.4	11.0	10.5	1.60	A

Facility Overall Results

Space Mean Speed, mi/h	72.4	Density, veh/mi/ln	10.5
Average Travel Time, min	1.60	Density, pc/mi/ln	11.0

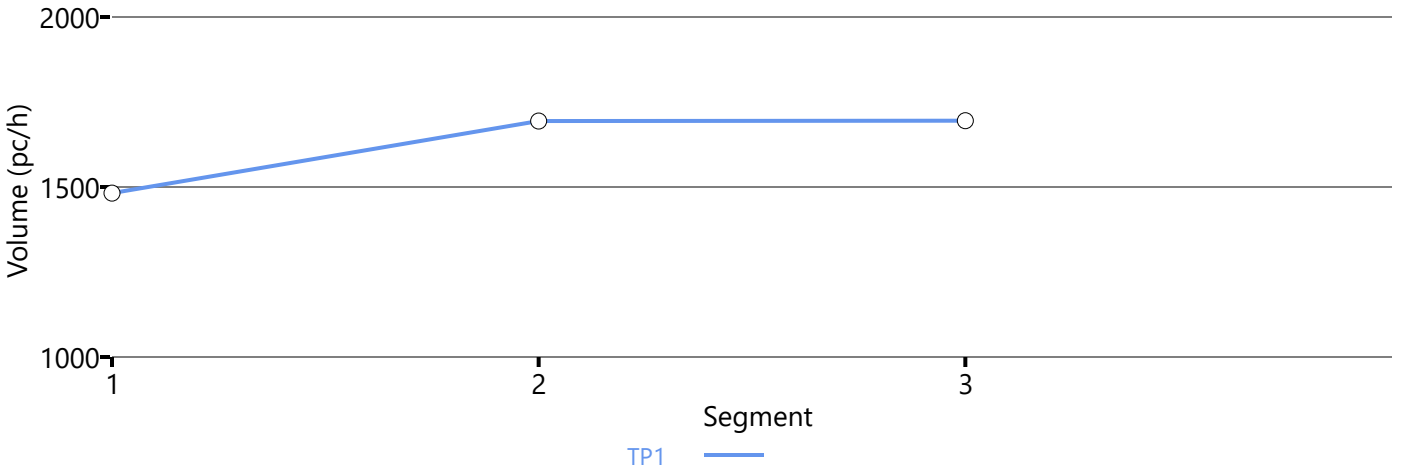
Messages

ERROR 1	Acceleration lane length is longer than the segment length for merge segment 2.

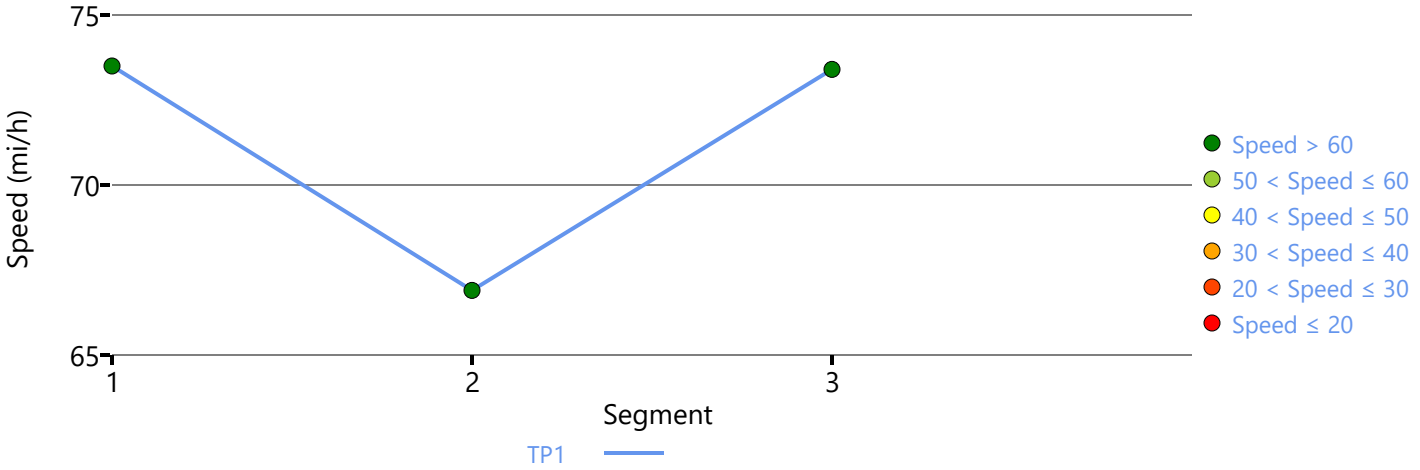
INFORMATION 1	Density for segment 3 in time period 1 is within 0.5 pc/mi/ln of LOS boundary. Be cautious when comparing LOS results.

Comments

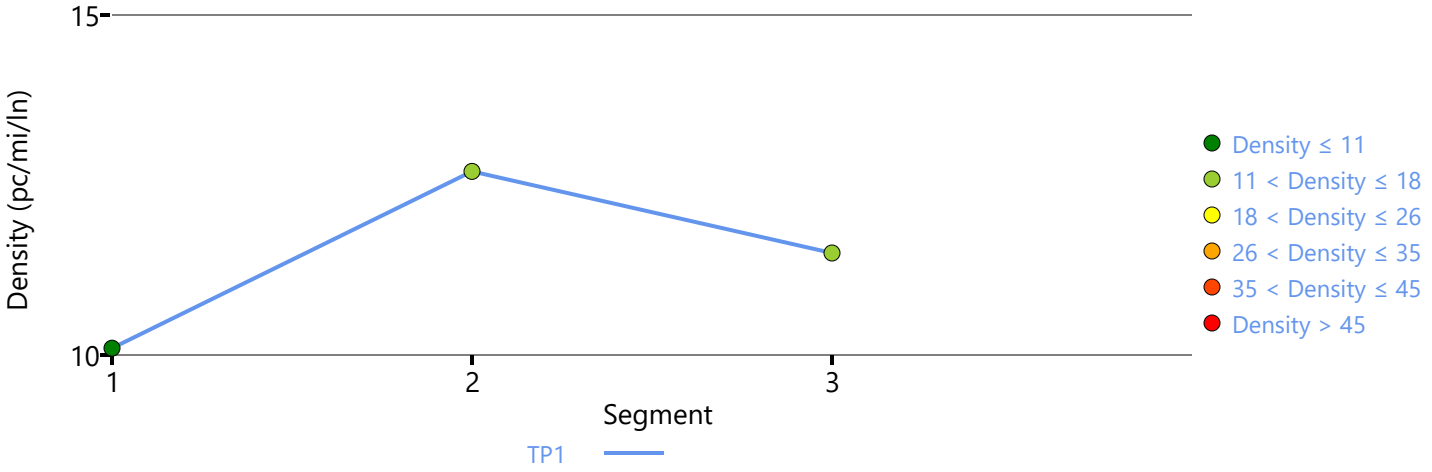
Volume Distribution

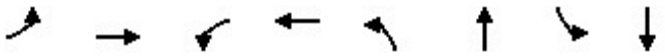


Speed Distribution



Density Distribution





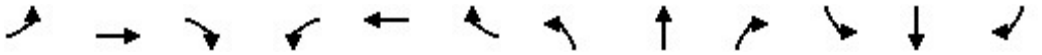
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	74	154	77	98	93	1037	27	882
v/c Ratio	0.29	0.57	0.33	0.47	0.41	0.98	0.13	0.94
Control Delay	28.5	20.5	29.4	32.0	16.5	48.0	9.5	40.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.5	20.5	29.4	32.0	16.5	48.0	9.5	40.4
Queue Length 50th (ft)	33	20	34	33	20	486	5	~458
Queue Length 95th (ft)	63	74	65	77	58	#1044	m11	#461
Internal Link Dist (ft)		737		561		511		4013
Turn Bay Length (ft)	100		85		105		120	
Base Capacity (vph)	259	346	241	292	234	1054	232	938
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	0.29	0.45	0.32	0.34	0.40	0.98	0.12	0.94

Intersection Summary

~ 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.

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	34	108	71	51	40	86	867	87	25	766	45
Future Volume (veh/h)	68	34	108	71	51	40	86	867	87	25	766	45
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	74	37	117	77	55	43	93	942	95	27	833	49
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	264	46	147	213	115	90	187	839	85	138	830	49
Arrive On Green	0.06	0.12	0.12	0.06	0.12	0.12	0.06	0.50	0.50	0.03	0.48	0.48
Sat Flow, veh/h	1774	395	1248	1774	970	759	1774	1665	168	1774	1742	102
Grp Volume(v), veh/h	74	0	154	77	0	98	93	0	1037	27	0	882
Grp Sat Flow(s),veh/h/ln	1774	0	1643	1774	0	1729	1774	0	1833	1774	0	1845
Q Serve(g_s), s	3.2	0.0	8.2	3.4	0.0	4.8	2.3	0.0	45.3	0.7	0.0	42.9
Cycle Q Clear(g_c), s	3.2	0.0	8.2	3.4	0.0	4.8	2.3	0.0	45.3	0.7	0.0	42.9
Prop In Lane	1.00		0.76	1.00		0.44	1.00		0.09	1.00		0.06
Lane Grp Cap(c), veh/h	264	0	193	213	0	205	187	0	923	138	0	879
V/C Ratio(X)	0.28	0.00	0.80	0.36	0.00	0.48	0.50	0.00	1.12	0.20	0.00	1.00
Avail Cap(c_a), veh/h	312	0	246	260	0	259	228	0	923	228	0	879
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.78	0.00	0.78
Uniform Delay (d), s/veh	32.2	0.0	38.7	32.4	0.0	37.1	20.4	0.0	22.3	21.2	0.0	23.6
Incr Delay (d2), s/veh	0.6	0.0	13.1	1.0	0.0	1.7	2.0	0.0	69.5	0.5	0.0	27.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	4.4	1.7	0.0	2.4	1.2	0.0	40.7	0.4	0.0	28.5
LnGrp Delay(d),s/veh	32.7	0.0	51.8	33.5	0.0	38.8	22.5	0.0	91.9	21.8	0.0	51.4
LnGrp LOS	C		D	C		D	C		F	C		F
Approach Vol, veh/h		228			175			1130			909	
Approach Delay, s/veh		45.6			36.5			86.2			50.5	
Approach LOS		D			D			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.4	51.8	11.6	17.1	11.9	49.4	11.6	17.2
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	7.5	35.5	7.5	13.5	7.5	35.5	7.5	13.5
Max Q Clear Time (g_c+I1), s	2.7	47.3	5.4	10.2	4.3	44.9	5.2	6.8
Green Ext Time (p_c), s	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.7

Intersection Summary		
HCM 2010 Ctrl Delay		65.5
HCM 2010 LOS		E

Lane Group	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	66	174	991	128	880
v/c Ratio	0.38	0.30	0.46	0.30	0.33
Control Delay	43.6	1.4	12.0	6.0	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	1.4	12.0	6.0	3.7
Queue Length 50th (ft)	36	0	224	14	55
Queue Length 95th (ft)	74	0	m331	37	85
Internal Link Dist (ft)		697	409		2564
Turn Bay Length (ft)	150			275	
Base Capacity (vph)	275	640	2133	518	2700
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.24	0.27	0.46	0.25	0.33

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	61	0	160	0	862	50	118	809	1
Future Volume (veh/h)	0	0	0	61	0	160	0	862	50	118	809	1
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	0	0	0	66	0	174	0	937	54	128	879	1
Adj No. of Lanes	0	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	2	0	234	0	209	80	2017	116	441	2645	3
Arrive On Green	0.00	0.00	0.00	0.13	0.00	0.13	0.00	0.59	0.59	0.13	1.00	1.00
Sat Flow, veh/h	0	1863	0	1774	0	1583	628	3402	196	1774	3627	4
Grp Volume(v), veh/h	0	0	0	66	0	174	0	487	504	128	429	451
Grp Sat Flow(s),veh/h/ln	0	1863	0	1774	0	1583	628	1770	1828	1774	1770	1862
Q Serve(g_s), s	0.0	0.0	0.0	3.0	0.0	9.6	0.0	13.9	13.9	2.3	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	3.0	0.0	9.6	0.0	13.9	13.9	2.3	0.0	0.0
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.11	1.00		0.00
Lane Grp Cap(c), veh/h	0	2	0	234	0	209	80	1049	1084	441	1290	1358
V/C Ratio(X)	0.00	0.00	0.00	0.28	0.00	0.83	0.00	0.46	0.46	0.29	0.33	0.33
Avail Cap(c_a), veh/h	0	155	0	276	0	246	80	1049	1084	594	1290	1358
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.97	0.97	0.97
Uniform Delay (d), s/veh	0.0	0.0	0.0	35.2	0.0	38.1	0.0	10.3	10.3	6.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.7	0.0	18.6	0.0	1.5	1.4	0.3	0.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	1.5	0.0	5.3	0.0	7.2	7.4	1.1	0.2	0.2
LnGrp Delay(d),s/veh	0.0	0.0	0.0	35.9	0.0	56.7	0.0	11.8	11.7	6.7	0.7	0.6
LnGrp LOS				D		E		B	B	A	A	A
Approach Vol, veh/h		0			240			991			1008	
Approach Delay, s/veh		0.0			51.0			11.7			1.4	
Approach LOS					D			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	12.3	59.9		0.0		72.1		17.9
Change Period (Y+Rc), s	6.5	6.5		6.5		6.5		6.0
Max Green Setting (Gmax), s	13.5	29.5		7.5		49.5		14.0
Max Q Clear Time (g_c+I1), s	4.3	15.9		0.0		2.0		11.6
Green Ext Time (p_c), s	0.2	8.7		0.0		16.3		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	11.3
HCM 2010 LOS	B

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	28	67	563	442	114	849
v/c Ratio	0.11	0.28	0.23	0.36	0.17	0.29
Control Delay	40.0	3.0	13.7	10.1	1.8	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	3.0	13.7	10.1	1.8	1.5
Queue Length 50th (ft)	7	0	153	143	6	27
Queue Length 95th (ft)	21	2	204	244	12	37
Internal Link Dist (ft)			2564			882
Turn Bay Length (ft)		350		700	150	
Base Capacity (vph)	534	358	2480	1241	744	2924
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.19	0.23	0.36	0.15	0.29

Intersection Summary

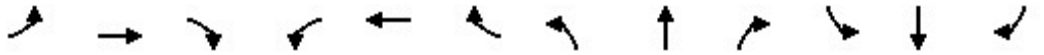
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	0	62	0	0	0	0	518	407	105	781	0
Future Volume (veh/h)	26	0	62	0	0	0	0	518	407	105	781	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	0	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	28	0	0				0	563	0	114	849	0
Adj No. of Lanes	2	0	1				0	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	0	2				0	2	2	2	2	0
Cap, veh/h	116	0	53				0	2412	1079	766	2909	0
Arrive On Green	0.03	0.00	0.00				0.00	1.00	0.00	0.13	1.00	0.00
Sat Flow, veh/h	3442	0	1583				0	3632	1583	1774	3632	0
Grp Volume(v), veh/h	28	0	0				0	563	0	114	849	0
Grp Sat Flow(s),veh/h/ln	1721	0	1583				0	1770	1583	1774	1770	0
Q Serve(g_s), s	0.7	0.0	0.0				0.0	0.0	0.0	1.4	0.0	0.0
Cycle Q Clear(g_c), s	0.7	0.0	0.0				0.0	0.0	0.0	1.4	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	116	0	53				0	2412	1079	766	2909	0
V/C Ratio(X)	0.24	0.00	0.00				0.00	0.23	0.00	0.15	0.29	0.00
Avail Cap(c_a), veh/h	535	0	246				0	2412	1079	911	2909	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.88	0.00	0.95	0.95	0.00
Uniform Delay (d), s/veh	42.4	0.0	0.0				0.0	0.0	0.0	2.5	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0				0.0	0.2	0.0	0.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.0				0.0	0.1	0.0	0.7	0.1	0.0
LnGrp Delay(d),s/veh	43.4	0.0	0.0				0.0	0.2	0.0	2.6	0.2	0.0
LnGrp LOS	D							A		A	A	
Approach Vol, veh/h		28						563			963	
Approach Delay, s/veh		43.4						0.2			0.5	
Approach LOS		D						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	12.7	68.3		9.0		81.0		
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		
Max Green Setting (Gmax), s	13.0	43.0		14.0		63.0		
Max Q Clear Time (g_c+I1), s	3.4	2.0		2.7		2.0		
Green Ext Time (p_c), s	0.2	11.8		0.0		12.5		

Intersection Summary	
HCM 2010 Ctrl Delay	1.2
HCM 2010 LOS	A

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	415	103	45	539	551	28
v/c Ratio	0.46	0.21	0.09	0.26	0.26	0.03
Control Delay	30.0	6.8	2.5	7.1	9.4	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.0	6.8	2.5	7.1	9.4	1.7
Queue Length 50th (ft)	102	0	1	8	74	0
Queue Length 95th (ft)	145	38	3	11	101	7
Internal Link Dist (ft)				882	859	
Turn Bay Length (ft)		225	200			575
Base Capacity (vph)	896	489	488	2084	2084	949
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.21	0.09	0.26	0.26	0.03

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	382	0	95	41	496	0	0	507	26
Future Volume (veh/h)	0	0	0	382	0	95	41	496	0	0	507	26
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	0	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				415	0	0	45	539	0	0	551	0
Adj No. of Lanes				2	0	1	1	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	2	2	0	0	2	2
Cap, veh/h				899	0	413	518	2084	0	0	2084	932
Arrive On Green				0.26	0.00	0.00	0.78	0.78	0.00	0.00	0.59	0.00
Sat Flow, veh/h				3442	0	1583	853	3632	0	0	3632	1583
Grp Volume(v), veh/h				415	0	0	45	539	0	0	551	0
Grp Sat Flow(s),veh/h/ln				1721	0	1583	853	1770	0	0	1770	1583
Q Serve(g_s), s				9.1	0.0	0.0	1.6	3.7	0.0	0.0	6.8	0.0
Cycle Q Clear(g_c), s				9.1	0.0	0.0	8.4	3.7	0.0	0.0	6.8	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				899	0	413	518	2084	0	0	2084	932
V/C Ratio(X)				0.46	0.00	0.00	0.09	0.26	0.00	0.00	0.26	0.00
Avail Cap(c_a), veh/h				899	0	413	518	2084	0	0	2084	932
HCM Platoon Ratio				1.00	1.00	1.00	1.33	1.33	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.98	0.98	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				27.9	0.0	0.0	6.1	4.4	0.0	0.0	9.0	0.0
Incr Delay (d2), s/veh				1.7	0.0	0.0	0.3	0.3	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				4.5	0.0	0.0	0.4	1.8	0.0	0.0	3.4	0.0
LnGrp Delay(d),s/veh				29.6	0.0	0.0	6.4	4.7	0.0	0.0	9.3	0.0
LnGrp LOS				C			A	A			A	
Approach Vol, veh/h					415			584			551	
Approach Delay, s/veh					29.6			4.8			9.3	
Approach LOS					C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		60.0				60.0		30.0
Change Period (Y+Rc), s		7.0				7.0		6.5
Max Green Setting (Gmax), s		53.0				53.0		23.5
Max Q Clear Time (g_c+I1), s		10.4				8.8		11.1
Green Ext Time (p_c), s		8.6				8.6		1.1

Intersection Summary	
HCM 2010 Ctrl Delay	13.1
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	12	9	596	524	6
Future Vol, veh/h	3	12	9	596	524	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	225	550	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	13	10	648	570	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	914	285	577	0	-	0
Stage 1	570	-	-	-	-	-
Stage 2	344	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	272	712	993	-	-	-
Stage 1	529	-	-	-	-	-
Stage 2	689	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	269	712	993	-	-	-
Mov Cap-2 Maneuver	390	-	-	-	-	-
Stage 1	524	-	-	-	-	-
Stage 2	689	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	993	-	390	712	-	-
HCM Lane V/C Ratio	0.01	-	0.008	0.018	-	-
HCM Control Delay (s)	8.7	-	14.3	10.2	-	-
HCM Lane LOS	A	-	B	B	-	-
HCM 95th %tile Q(veh)	0	-	0	0.1	-	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	142	95	903	108	164	783
v/c Ratio	0.58	0.32	0.90	0.13	0.59	0.59
Control Delay	45.0	10.0	25.5	12.8	23.9	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	10.0	25.5	12.8	23.9	11.0
Queue Length 50th (ft)	77	0	201	11	47	194
Queue Length 95th (ft)	128	40	m#605	m32	111	319
Internal Link Dist (ft)	381		4013			560
Turn Bay Length (ft)		75		50	150	
Base Capacity (vph)	462	483	1000	861	279	1334
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.20	0.90	0.13	0.59	0.59

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	131	87	831	99	151	720
Future Volume (veh/h)	131	87	831	99	151	720
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	142	95	903	108	164	783
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	188	168	1139	968	333	1396
Arrive On Green	0.11	0.11	0.61	0.61	0.07	0.75
Sat Flow, veh/h	1774	1583	1863	1583	1774	1863
Grp Volume(v), veh/h	142	95	903	108	164	783
Grp Sat Flow(s),veh/h/ln	1774	1583	1863	1583	1774	1863
Q Serve(g_s), s	7.0	5.1	32.9	2.6	2.8	16.4
Cycle Q Clear(g_c), s	7.0	5.1	32.9	2.6	2.8	16.4
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	188	168	1139	968	333	1396
V/C Ratio(X)	0.75	0.56	0.79	0.11	0.49	0.56
Avail Cap(c_a), veh/h	463	413	1139	968	364	1396
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.23	0.23	1.00	1.00
Uniform Delay (d), s/veh	39.1	38.2	13.2	7.3	14.1	4.9
Incr Delay (d2), s/veh	6.0	3.0	1.4	0.1	1.1	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	2.4	17.0	1.1	2.3	8.9
LnGrp Delay(d),s/veh	45.1	41.2	14.6	7.3	15.2	6.5
LnGrp LOS	D	D	B	A	B	A
Approach Vol, veh/h	237		1011			947
Approach Delay, s/veh	43.5		13.8			8.0
Approach LOS	D		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	12.4	61.5				73.9		16.1
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	7.5	39.5				53.5		23.5
Max Q Clear Time (g_c+I1), s	4.8	34.9				18.4		9.0
Green Ext Time (p_c), s	0.1	3.7				16.2		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.5
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	44	867	51	0	871
Future Vol, veh/h	0	44	867	51	0	871
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	48	942	55	0	947

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	970	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	307	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	307	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.9	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	307	-
HCM Lane V/C Ratio	-	-	0.156	-
HCM Control Delay (s)	-	-	18.9	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.5	-

HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	Weekend
Project Description	Roderick Place TIS: I-840 Eastbound Ramp Weekend		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	2.00		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 EB	5280	2
2	Merge	Merge	EB Ramp from Columbia Pike _I-840 EB	1500	2
3	Basic	Basic	I-840 EB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	563	4646	0.12	73.5	3.8	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	1142	579	4259	2033	0.27	0.28	67.1	67.1	8.5	4.8	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	1141	4646	0.25	73.4	7.8	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.2	5.9	5.7	1.70	A

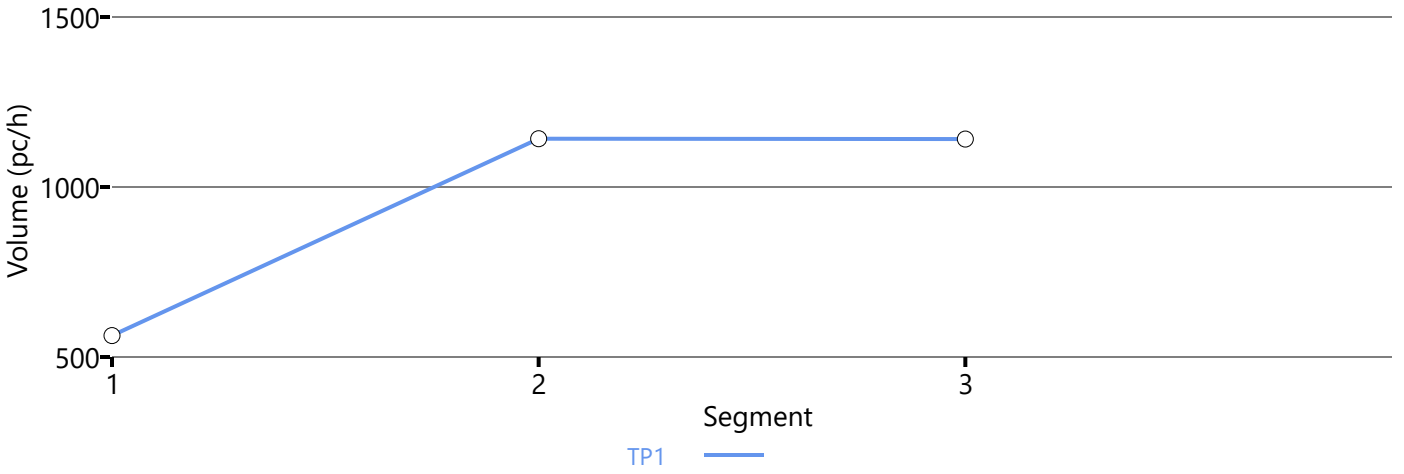
Facility Overall Results

Space Mean Speed, mi/h	72.2	Density, veh/mi/ln	5.7
Average Travel Time, min	1.70	Density, pc/mi/ln	5.9

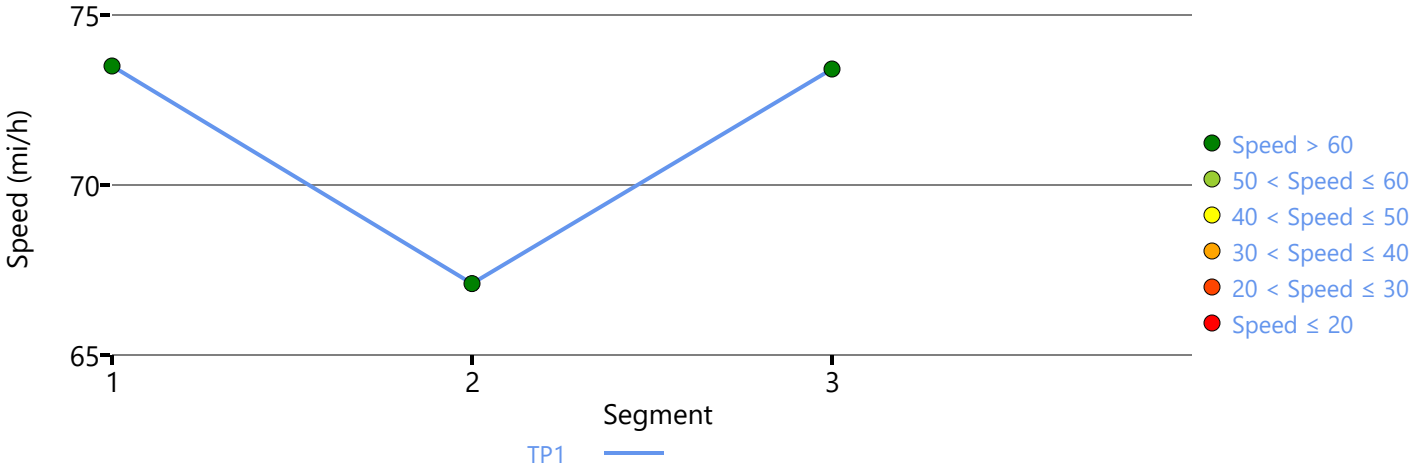
Messages

Comments

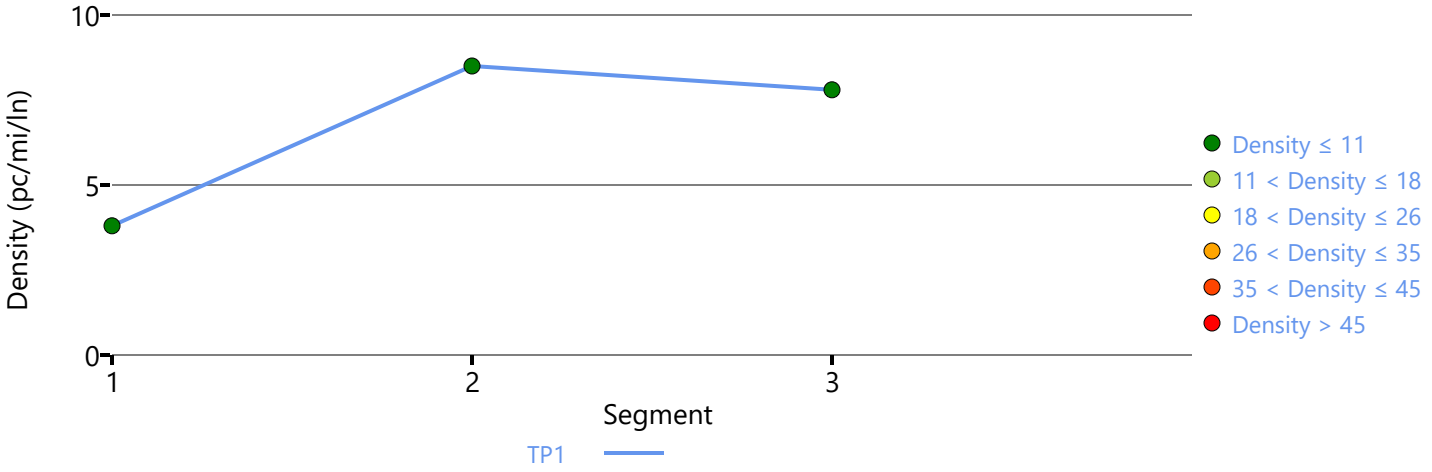
Volume Distribution



Speed Distribution



Density Distribution



HCS7 Freeway Facilities Report

Project Information

Analyst	KCI Technologies, Inc.	Date	9/13/2019
Agency		Analysis Year	2024
Jurisdiction		Time Period Analyzed	Weekend Peak Hour
Project Description	Roderick Place TIS: I-840 Westbound Ramp		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	3
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	1.98		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-840 WB	5280	2
2	Merge	Merge	WB Ramp from Columbia Pike _I-840 EB	1400	2
3	Basic	Basic	I-840 WB	3780	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	508	4646	0.11	73.5	3.5	A

Segment 2: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.962	0.962	585	77	4259	2033	0.14	0.04	67.3	67.3	4.3	0.7	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.962	585	4646	0.13	73.4	4.0	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	72.5	3.8	3.6	1.60	A

Facility Overall Results

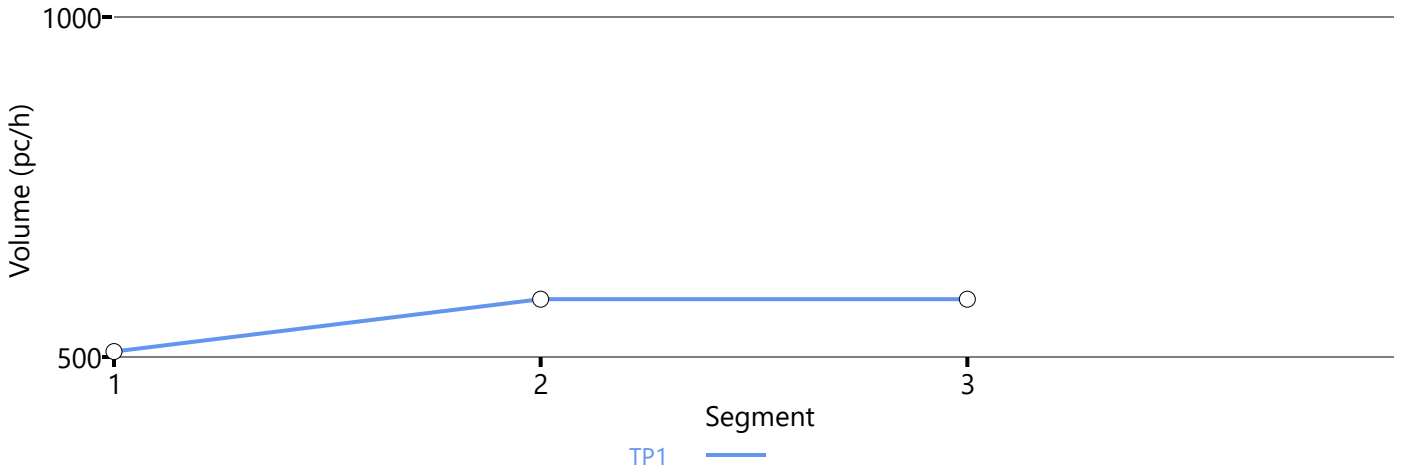
Space Mean Speed, mi/h	72.5	Density, veh/mi/ln	3.6
Average Travel Time, min	1.60	Density, pc/mi/ln	3.8

Messages

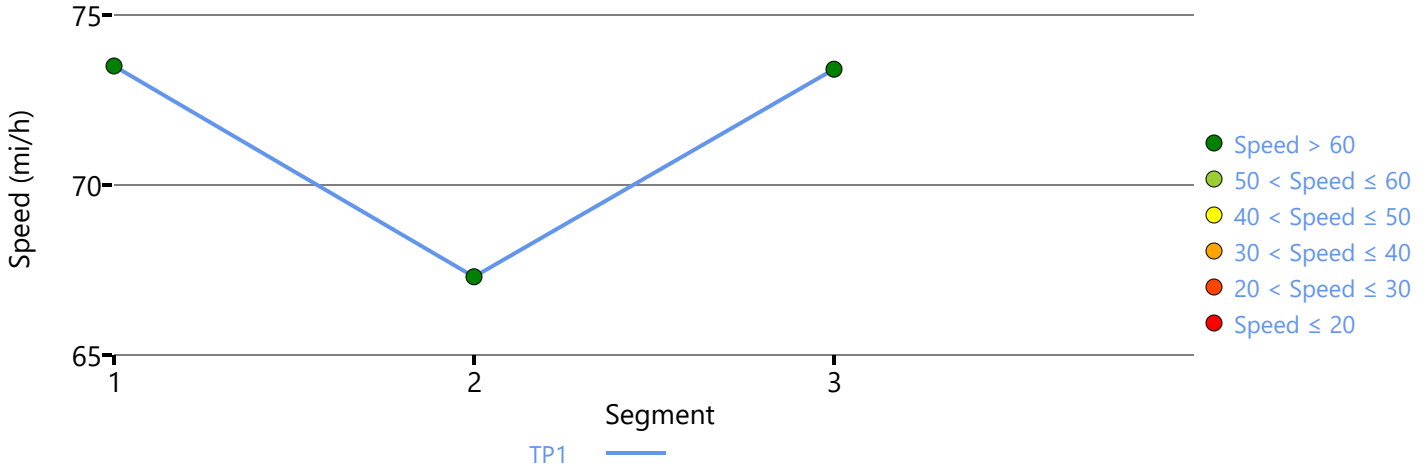
ERROR 1	Acceleration lane length is longer than the segment length for merge segment 2.

Comments

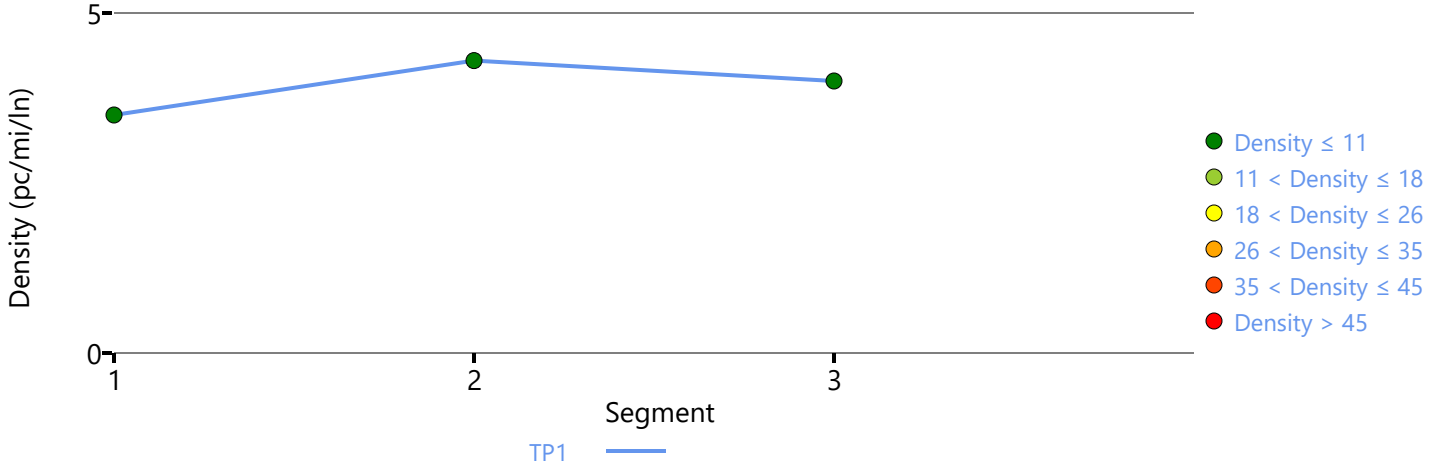
Volume Distribution



Speed Distribution



Density Distribution



APPENDIX E
TRIP GENERATION CALCULATIONS

TOTAL TRIP GENERATION

ITE CODE	LAND USE	# UNITS	UNIT TYPE	ADT	SAT			SUN		
					Enter	Exit	Total	Enter	Exit	Total
310	Hotel	92	Rooms	590	38	30	68			
710	Office	75.606	k.s.f.	167	22	18	40			
820	Shopping Center	20	k.s.f.	922	92	84	176			
931	Quality Restaurant	9.884	k.s.f.	890	63	43	106			
932	High-Turnover (Sit-Down) Restaurant	9.884	k.s.f.	1210	57	54	111			
220	Multi-Family Housing (Low-Rise)	85	units	669	32	27	59			
254	Assisted Living	100	Beds	293	12	15	27			
210	Single-Family Detached Housing	126	units	1219	67	57	124			
853	onvenience Market with Gasoline Pum	4	eling positic	1290	46	46	92			
TOTAL				**7250**	429	374	**803**			

TRIP GENERATION

Hotel

310 ITE Land Code

92 Rooms

Average Daily Traffic:

T = 9.62 * (X) - 294.56

T = 9.62 * (92) - 294.56

T = 590

SAT Peak Hour:

T = 0.69 * (X) + 4.32

T = 0.69 * (92) + 4.32

T = 68

Enter =	38	56%
Exit =	30	44%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Office

710 ITE Land Code

75.606 k.s.f.

Average Daily Traffic:

T = 2.21 * (X)

T = 2.21 * (75.606)

T = 167

SAT Peak Hour:

T = 0.53 * (X)

T = 40

Enter =	22	54%
Exit =	18	46%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Shopping Center

820 ITE Land Code

20 k.s.f.

Average Daily Traffic:

T = 46.12 * (X)

T = 46.12 * (20)

T = 922

SAT Peak Hour:

Ln(T) = (0.794 * Ln(X) + 2.79)

Ln(T) = (0.794 * Ln(20) + 2.79)

T = 176

Enter =	92	52%
Exit =	84	48%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Quality Restaurant

931 ITE Land Code

9.884 k.s.f.

Average Daily Traffic:

T = 90.04 * (X)

T = 90.04 * (9.884)

T = 890

SAT Peak Hour:

T = 10.68 * (X)

T = 10.68 * (9.884)

T = 106

Enter =	63	59%
Exit =	43	41%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

High-Turnover (Sit-Down) Restaurant

932 ITE Land Code

9.884 k.s.f.

Average Daily Traffic:

T = 122.40 * (X)

T = 122.40 * (9.884)

T = 1210

SAT Peak Hour:

T = 11.19 * (X)

T = 11.19 * (9.884)

T = 111

Enter =	57	51%
Exit =	54	49%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Multi-Family Housing (Low-Rise)

220 ITE Land Code

85 units

Average Daily Traffic:

T = 14.01 * (X) - 521.69

T = 14.01 * (85) - 521.69

T = 669

SAT Peak Hour:

T = 1.08 * (X) - 33.24

T = 1.08 * (85) - 33.24

T = 59

Enter =	32	54%
Exit =	27	46%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Assisted Living

254 ITE Land Code

100 Beds

Average Daily Traffic:

T = 2.93 * (X)

T = 2.93 * (100)

T = 293

SAT Peak Hour:

T = 0.27 * (X)

T = 0.27 * (100)

T = 27

Enter =	12	46%
Exit =	15	54%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Single-Family Detached Housing

210 ITE Land Code

126 units

Average Daily Traffic:

Ln(T) = (0.94 * Ln(X) + 2.56)

Ln(T) = (0.94 * Ln(126) + 2.56)

T = 1219

SAT Peak Hour:

T = 0.84 * (X) + 17.99

T = 0.84 * (126) + 17.99

T = 124

Enter =	67	54%
Exit =	57	46%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Convenience Market with Gasoline Pumps

853 ITE Land Code

4 fueling positions

Average Daily Traffic:

T = 322.50 * (X)

T = 322.50 * (4)

T = 1290

SAT Peak Hour:

T = 23.04 * (X)

T = 23.04 * (4)

T = 92

Enter =	46	50%
Exit =	46	50%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

Internal Trips Calculations

Project Name:	Roderick Place	Organization:	KCI Technologies, Inc.
Project Number:	891903440	Performed By:	MAS
Project Location:	Thompson's Station, Tennessee	Date:	12/3/2019
Count Year:	2019	Checked By:	0
Design Year:	2024	Date:	1/0/1900

SAT Peak Hour

Table 1-A: Entering Trips

LUC	% Internal Trips	Total Trips	Internal Trips	External Trips
Office	30%	22	7	**15**
Retail	30%	138	41	**97**
Restaurant	30%	120	36	**84**
Entertainment	30%	0	0	**0**
Residential	30%	111	33	**78**
Hotel	30%	38	11	**27**
Industrial	30%	0	0	**0**
Institutional	30%	0	0	**0**
Medical	30%	0	0	**0**

SUN Peak Hour

Table 1-P: Entering Trips

LUC	% Internal Trips	Total Trips	Internal Trips	External Trips
Office	30%	0	0	**0**
Retail	30%	0	0	**0**
Restaurant	30%	0	0	**0**
Entertainment	30%	0	0	**0**
Residential	30%	0	0	**0**
Hotel	30%	0	0	**0**
Industrial	30%	0	0	**0**
Institutional	30%	0	0	**0**
Medical	30%	0	0	**0**

Table 2-A: Exiting Trips

LUC	% Internal Trips	Total Trips	Internal Trips	External Trips
Office	30%	18	5	**13**
Retail	30%	130	39	**91**
Restaurant	30%	97	29	**68**
Entertainment	30%	0	0	**0**
Residential	30%	99	30	**69**
Hotel	30%	30	9	**21**
Industrial	30%	0	0	**0**
Institutional	30%	0	0	**0**
Medical	30%	0	0	**0**

Table 2-P: Exiting Trips

LUC	% Internal Trips	Total Trips	Internal Trips	External Trips
Office	30%	0	0	**0**
Retail	30%	0	0	**0**
Restaurant	30%	0	0	**0**
Entertainment	30%	0	0	**0**
Residential	30%	0	0	**0**
Hotel	30%	0	0	**0**
Industrial	30%	0	0	**0**
Institutional	30%	0	0	**0**
Medical	30%	0	0	**0**

LUC	Daily Trips	SAT PEAK HOUR		SUN PEAK HOUR	
		Enter	Exit	Enter	Exit
Office	117	15	13	0	0
Retail	1548	97	91	0	0
Restaurant	1470	84	68	0	0
Entertainment	0	0	0	0	0
Residential	1527	78	69	0	0
Hotel	413	27	21	0	0
Industrial	0	0	0	0	0
Institutional	0	0	0	0	0
Medical	0	0	0	0	0
TOTAL	**5075**	**301**	**262**	**0**	**0**

Pass-By Trip Calculations

Project Name:	Roderick Place	Organization:	KCI Technologies, Inc.
Project Number:	891903440	Performed By:	MAS
Project Location:	Thompson's Station, Tennessee	Date:	12/3/2019
Count Year:	2019	Checked By:	0
Design Year:	2024	Date:	1/0/1900

SAT Peak Hour

Table 1-A: Entering Trips

LUC	% Pass-By Trips	Vehicular Trips	Pass-By Trips	Non-Pass-By Trips
Office	0%	15	0	15
Retail	17%	97	16	81
Restaurant	0%	84	0	84
Entertainment	0%	0	0	0
Residential	0%	78	0	78
Hotel	0%	27	0	27
Industrial	0%	0	0	0
Institutional	0%	0	0	0
Medical	0%	0	0	0

SUN Peak Hour

Table 1-P: Entering Trips

LUC	% Pass-By Trips	Vehicular Trips	Pass-By Trips	Non-Pass-By Trips
Office	0%	0	0	0
Retail	0%	0	0	0
Restaurant	0%	0	0	0
Entertainment	0%	0	0	0
Residential	0%	0	0	0
Hotel	0%	0	0	0
Industrial	0%	0	0	0
Institutional	0%	0	0	0
Medical	0%	0	0	0

Table 2-A: Exiting Trips

LUC	% Pass-By Trips	Vehicular Trips	Pass-By Trips	Non-Pass-By Trips
Office	0%	13	0	13
Retail	17%	91	16	75
Restaurant	0%	68	0	68
Entertainment	0%	0	0	0
Residential	0%	69	0	69
Hotel	0%	21	0	21
Industrial	0%	0	0	0
Institutional	0%	0	0	0
Medical	0%	0	0	0

Table 2-P: Exiting Trips

LUC	% Pass-By Trips	Vehicular Trips	Pass-By Trips	Non-Pass-By Trips
Office	0%	0	0	0
Retail	0%	0	0	0
Restaurant	0%	0	0	0
Entertainment	0%	0	0	0
Residential	0%	0	0	0
Hotel	0%	0	0	0
Industrial	0%	0	0	0
Institutional	0%	0	0	0
Medical	0%	0	0	0

LUC	Pass-By Trips		Non-Pass-By Trips	
	Enter	Exit	Enter	Exit
Office	0	0	15	13
Retail	16	16	81	75
Restaurant	0	0	84	68
Entertainment	0	0	0	0
Residential	0	0	78	69
Hotel	0	0	27	21
Industrial	0	0	0	0
Institutional	0	0	0	0
Medical	0	0	0	0
TOTAL	16	16	285	246

LUC	Pass-By Trips		Non-Pass-By Trips	
	Enter	Exit	Enter	Exit
Office	0	0	0	0
Retail	0	0	0	0
Restaurant	0	0	0	0
Entertainment	0	0	0	0
Residential	0	0	0	0
Hotel	0	0	0	0
Industrial	0	0	0	0
Institutional	0	0	0	0
Medical	0	0	0	0
TOTAL	0	0	0	0

TOTAL TRIP GENERATION

ITE CODE	LAND USE	# UNITS	UNIT TYPE	ADT	SAT			SUN		
					Enter	Exit	Total	Enter	Exit	Total
310	Hotel	92	Rooms	590	38	30	68			
710	Office	75.606	k.s.f.	167	22	18	40			
820	Shopping Center	20	k.s.f.	922	92	84	176			
931	Quality Restaurant	9.884	k.s.f.	890	63	43	106			
932	High-Turnover (Sit-Down) Restaurant	9.884	k.s.f.	1210	57	54	111			
220	Multi-Family Housing (Low-Rise)	85	units	669	32	27	59			
254	Assisted Living	100	Beds	293	12	15	27			
210	Single-Family Detached Housing	126	units	1219	67	57	124			
853	onvenience Market with Gasoline Pum	4	eling positic	1290	46	46	92			
TOTAL				**7250**	429	374	**803**			

TRIP GENERATION

Hotel

310 ITE Land Code

92 Rooms

Average Daily Traffic:

T = 9.62 * (X) - 294.56

T = 9.62 * (92) - 294.56

T = 590

SAT Peak Hour:

T = 0.69 * (X) + 4.32

T = 0.69 * (92) + 4.32

T = 68

Enter =	38	56%
Exit =	30	44%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Office

710 ITE Land Code

75.606 k.s.f.

Average Daily Traffic:

T = 2.21 * (X)

T = 2.21 * (75.606)

T = 167

SAT Peak Hour:

T = 0.53 * (X)

T = 40

Enter =	22	54%
Exit =	18	46%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Shopping Center

820 ITE Land Code

20 k.s.f.

Average Daily Traffic:

T = 46.12 * (X)

T = 46.12 * (20)

T = 922

SAT Peak Hour:

Ln(T) = (0.794 * Ln(X) + 2.79)

Ln(T) = (0.794 * Ln(20) + 2.79)

T = 176

Enter =	92	52%
Exit =	84	48%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Quality Restaurant

931 ITE Land Code

9.884 k.s.f.

Average Daily Traffic:

T = 90.04 * (X)

T = 90.04 * (9.884)

T = 890

SAT Peak Hour:

T = 10.68 * (X)

T = 10.68 * (9.884)

T = 106

Enter =	63	59%
Exit =	43	41%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

High-Turnover (Sit-Down) Restaurant

932 ITE Land Code

9.884 k.s.f.

Average Daily Traffic:

T = 122.40 * (X)

T = 122.40 * (9.884)

T = 1210

SAT Peak Hour:

T = 11.19 * (X)

T = 11.19 * (9.884)

T = 111

Enter =	57	51%
Exit =	54	49%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Multi-Family Housing (Low-Rise)

220 ITE Land Code

85 units

Average Daily Traffic:

T = 14.01 * (X) - 521.69

T = 14.01 * (85) - 521.69

T = 669

SAT Peak Hour:

T = 1.08 * (X) - 33.24

T = 1.08 * (85) - 33.24

T = 59

Enter =	32	54%
Exit =	27	46%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Assisted Living

254 ITE Land Code

100 Beds

Average Daily Traffic:

T = 2.93 * (X)

T = 2.93 * (100)

T = 293

SAT Peak Hour:

T = 0.27 * (X)

T = 0.27 * (100)

T = 27

Enter =	12	46%
Exit =	15	54%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Single-Family Detached Housing

210 ITE Land Code

126 units

Average Daily Traffic:

Ln(T) = (0.94 * Ln(X) + 2.56)

Ln(T) = (0.94 * Ln(126) + 2.56)

T = 1219

SAT Peak Hour:

T = 0.84 * (X) + 17.99

T = 0.84 * (126) + 17.99

T = 124

Enter =	67	54%
Exit =	57	46%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

TRIP GENERATION

Convenience Market with Gasoline Pumps

853 ITE Land Code

4 fueling positions

Average Daily Traffic:

T = 322.50 * (X)

T = 322.50 * (4)

T = 1290

SAT Peak Hour:

T = 23.04 * (X)

T = 23.04 * (4)

T = 92

Enter =	46	50%
Exit =	46	50%

SUN Peak Hour:

0

0

T = 0

Enter =	0	0%
Exit =	0	0%

Internal Trips Calculations

Project Name:	Roderick Place	Organization:	KCI Technologies, Inc.
Project Number:	891903440	Performed By:	MAS
Project Location:	Thompson's Station, Tennessee	Date:	12/3/2019
Count Year:	2019	Checked By:	0
Design Year:	2024	Date:	1/0/1900

SAT Peak Hour

Table 1-A: Entering Trips

LUC	% Internal Trips	Total Trips	Internal Trips	External Trips
Office	30%	22	7	**15**
Retail	30%	138	41	**97**
Restaurant	30%	120	36	**84**
Entertainment	30%	0	0	**0**
Residential	30%	111	33	**78**
Hotel	30%	38	11	**27**
Industrial	30%	0	0	**0**
Institutional	30%	0	0	**0**
Medical	30%	0	0	**0**

SUN Peak Hour

Table 1-P: Entering Trips

LUC	% Internal Trips	Total Trips	Internal Trips	External Trips
Office	30%	0	0	**0**
Retail	30%	0	0	**0**
Restaurant	30%	0	0	**0**
Entertainment	30%	0	0	**0**
Residential	30%	0	0	**0**
Hotel	30%	0	0	**0**
Industrial	30%	0	0	**0**
Institutional	30%	0	0	**0**
Medical	30%	0	0	**0**

Table 2-A: Exiting Trips

LUC	% Internal Trips	Total Trips	Internal Trips	External Trips
Office	30%	18	5	**13**
Retail	30%	130	39	**91**
Restaurant	30%	97	29	**68**
Entertainment	30%	0	0	**0**
Residential	30%	99	30	**69**
Hotel	30%	30	9	**21**
Industrial	30%	0	0	**0**
Institutional	30%	0	0	**0**
Medical	30%	0	0	**0**

Table 2-P: Exiting Trips

LUC	% Internal Trips	Total Trips	Internal Trips	External Trips
Office	30%	0	0	**0**
Retail	30%	0	0	**0**
Restaurant	30%	0	0	**0**
Entertainment	30%	0	0	**0**
Residential	30%	0	0	**0**
Hotel	30%	0	0	**0**
Industrial	30%	0	0	**0**
Institutional	30%	0	0	**0**
Medical	30%	0	0	**0**

LUC	Daily Trips	SAT PEAK HOUR		SUN PEAK HOUR	
		Enter	Exit	Enter	Exit
Office	117	15	13	0	0
Retail	1548	97	91	0	0
Restaurant	1470	84	68	0	0
Entertainment	0	0	0	0	0
Residential	1527	78	69	0	0
Hotel	413	27	21	0	0
Industrial	0	0	0	0	0
Institutional	0	0	0	0	0
Medical	0	0	0	0	0
TOTAL	**5075**	**301**	**262**	**0**	**0**

Pass-By Trip Calculations

Project Name:	Roderick Place	Organization:	KCI Technologies, Inc.
Project Number:	891903440	Performed By:	MAS
Project Location:	Thompson's Station, Tennessee	Date:	12/3/2019
Count Year:	2019	Checked By:	0
Design Year:	2024	Date:	1/0/1900

SAT Peak Hour

Table 1-A: Entering Trips

LUC	% Pass-By Trips	Vehicular Trips	Pass-By Trips	Non-Pass-By Trips
Office	0%	15	0	15
Retail	17%	97	16	81
Restaurant	0%	84	0	84
Entertainment	0%	0	0	0
Residential	0%	78	0	78
Hotel	0%	27	0	27
Industrial	0%	0	0	0
Institutional	0%	0	0	0
Medical	0%	0	0	0

SUN Peak Hour

Table 1-P: Entering Trips

LUC	% Pass-By Trips	Vehicular Trips	Pass-By Trips	Non-Pass-By Trips
Office	0%	0	0	0
Retail	0%	0	0	0
Restaurant	0%	0	0	0
Entertainment	0%	0	0	0
Residential	0%	0	0	0
Hotel	0%	0	0	0
Industrial	0%	0	0	0
Institutional	0%	0	0	0
Medical	0%	0	0	0

Table 2-A: Exiting Trips

LUC	% Pass-By Trips	Vehicular Trips	Pass-By Trips	Non-Pass-By Trips
Office	0%	13	0	13
Retail	17%	91	16	75
Restaurant	0%	68	0	68
Entertainment	0%	0	0	0
Residential	0%	69	0	69
Hotel	0%	21	0	21
Industrial	0%	0	0	0
Institutional	0%	0	0	0
Medical	0%	0	0	0

Table 2-P: Exiting Trips

LUC	% Pass-By Trips	Vehicular Trips	Pass-By Trips	Non-Pass-By Trips
Office	0%	0	0	0
Retail	0%	0	0	0
Restaurant	0%	0	0	0
Entertainment	0%	0	0	0
Residential	0%	0	0	0
Hotel	0%	0	0	0
Industrial	0%	0	0	0
Institutional	0%	0	0	0
Medical	0%	0	0	0

LUC	Pass-By Trips		Non-Pass-By Trips	
	Enter	Exit	Enter	Exit
Office	0	0	15	13
Retail	16	16	81	75
Restaurant	0	0	84	68
Entertainment	0	0	0	0
Residential	0	0	78	69
Hotel	0	0	27	21
Industrial	0	0	0	0
Institutional	0	0	0	0
Medical	0	0	0	0
TOTAL	16	16	285	246

LUC	Pass-By Trips		Non-Pass-By Trips	
	Enter	Exit	Enter	Exit
Office	0	0	0	0
Retail	0	0	0	0
Restaurant	0	0	0	0
Entertainment	0	0	0	0
Residential	0	0	0	0
Hotel	0	0	0	0
Industrial	0	0	0	0
Institutional	0	0	0	0
Medical	0	0	0	0
TOTAL	0	0	0	0

APPENDIX F
WARRANT ANALYSIS

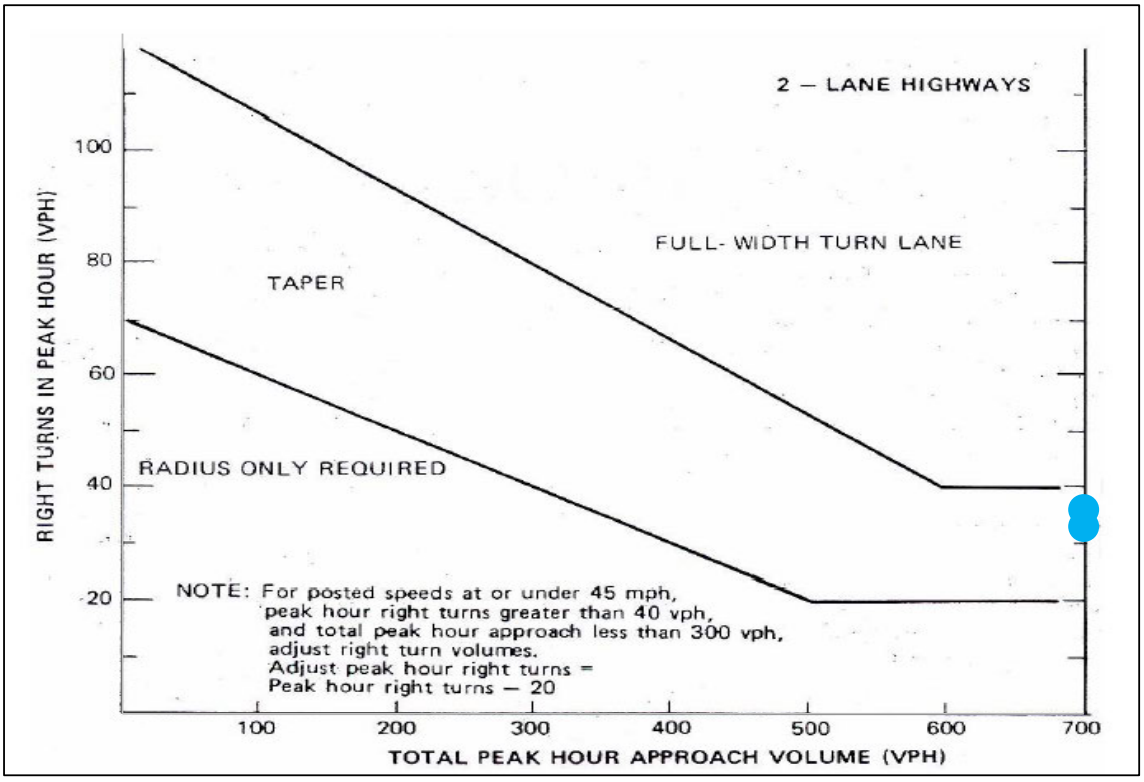
Projected Conditions (Peak Hours)

RIGHT-TURN LANE WARRANT ANALYSIS

(Based on Intersection Channelization Design Guide)

Intersection Approach	AM Peak Hour			PM Peak Hour		
	V_R*	V_A*	Warrant Met?	V_R*	V_A*	Warrant Met?
Columbia Pike and Site Access B	33	1262	No	36	811	No

V_R = Right Turn Volumes, V_A = Advancing Volumes



APPENDIX G
CRASH DATA

COUNTY	= WILLIAMSON	Date:	9/13/2019
Route	= COLUMBIA PIKE (SR 6/US 31)		
Location	= INTERSECTION OF COLUMBIA PIKE AND THOMPSON'S STATION ROAD		
Highway Type	= 2-Lane Undivided Urban Functionally Classified Road		
FUNCTIONAL CLASS=	COLLECTOR		
DATA YEARS	= SEPT. 2016 - SEPT. 2019		
ADT YEARS USED=	Data collected on September 9, 2019		
COMMENTS	=		
ANALYZED BY	= KCI TECHNOLOGIES, INC.		

SECTION = MORE THAN 0.10 MILE / SPOT = LESS THAN 0.10 MILE

BLM	ELM	Length	Average AADT	VMT
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
		0.00	0	0

INTERSECTION
Log Mile =

Leg		Traffic AADT
North	=	9,910
East	=	1,970
South	=	8,410
West	=	1,840
Entering AADT	=	22,130

Data Collected On September 9, 2019
2-Lane Undivided Urban Functionally Classified Road
Sept. 2016 - Sept. 2019

		Total	Fatal	Incap. Injury	*Severe Crashes	Other Injury
No. of Crashes	=	32	0	0	0	5
No. of Years	=	3				
SW avg. rate	=	4.178	0.021	N/A	0.021	0.962
14-16 S/W Rates						
Exposure (E)	=	24.2324				
Crash Rate (A)	=	1.321	0.000	0.000	0.000	0.206
Critical Rate (C)	=	5.165				
Severity Index (SI)	=	0.1563				
Actual Rate/SW Average	=	0.32	0.00	#DIV/0!	0.00	0.21
Ratio of A/C	=	0.26				

* Severe Crashes are the sum of fatal and incapacitating injury crashes

Revised 4/3/2007

COUNTY	= WILLIAMSON	Date:	9/13/2019
Route	= COLUMBIA PIKE (SR 6/US 31)		
Location	= INTERSECTION OF COLUMBIA PIKE AND CRITZ LANE		
Highway Type	= 2-Lane Undivided Urban Functionally Classified Road		
FUNCTIONAL CLASS=	COLLECTOR		
DATA YEARS	= SEPT. 2016 - SEPT. 2019		
ADT YEARS USED=	Data collected on September 9, 2019		
COMMENTS	=		
ANALYZED BY	= KCI TECHNOLOGIES, INC.		

SECTION = MORE THAN 0.10 MILE / SPOT = LESS THAN 0.10 MILE

BLM	ELM	Length	Average AADT	VMT
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
		0.00	0	0

INTERSECTION
Log Mile =

Leg		Traffic AADT
North	=	10,330
East	=	
South	=	13,780
West	=	3,650
Entering AADT	=	27,760

Data Collected On September 9, 2019

2-Lane Undivided Urban Functionally Classified Road

Sept. 2016 - Sept. 2019

		Total	Fatal	Incap. Injury	*Severe Crashes	Other Injury
No. of Crashes	=	5	0	0	0	0
No. of Years	=	3				
SW avg. rate	=	4.178	0.021	N/A	0.021	0.962
14-16 S/W Rates						
Exposure (E)	=	30.3972				
Crash Rate (A)	=	0.164	0.000	0.000	0.000	0.000
Critical Rate (C)	=	5.057				
Severity Index (SI)	=	0.0000				
Actual Rate/SW Average	=	0.04	0.00	#DIV/0!	0.00	0.00
Ratio of A/C	=	0.03				

* Severe Crashes are the sum of fatal and incapacitating injury crashes

Revised 4/3/2007

COUNTY	= WILLIAMSON	Date:	9/13/2019
Route	= COLUMBIA PIKE (SR 6/US 31)		
Location	= INTERSECTION OF COLUMBIA PIKE AND I-840 EASTBOUND RAMP		
Highway Type	= 4-Lane Undivided Urban Functionally Classified Road		
FUNCTIONAL CLASS=	COLLECTOR		
DATA YEARS	= SEPT. 2016 - SEPT. 2019		
ADT YEARS USED=	Data collected on September 9, 2019		
COMMENTS	=		
ANALYZED BY	= KCI TECHNOLOGIES, INC.		

SECTION = MORE THAN 0.10 MILE / SPOT = LESS THAN 0.10 MILE

BLM	ELM	Length	Average AADT	VMT
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
		0.00	0	0

INTERSECTION
Log Mile =

Leg		Traffic AADT
North	=	17,020
East	=	3,060
South	=	15,930
West	=	
Entering AADT	=	36,010

Data Collected On September 9, 2019

4-Lane Undivided Urban Functionally Classified Road

Sept. 2016 - Sept. 2019

		Total	Fatal	Incap. Injury	*Severe Crashes	Other Injury
No. of Crashes	=	23	0	0	0	7
No. of Years	=	3				
SW avg. rate	=	4.178	0.021	N/A	0.021	0.962
14-16 S/W Rates						
Exposure (E)	=	39.4310				
Crash Rate (A)	=	0.583	0.000	0.000	0.000	0.178
Critical Rate (C)	=	4.948				
Severity Index (SI)	=	0.3043				
Actual Rate/SW Average	=	0.14	0.00	#DIV/0!	0.00	0.18
Ratio of A/C	=	0.12				

* Severe Crashes are the sum of fatal and incapacitating injury crashes

Revised 4/3/2007

COUNTY	= WILLIAMSON	Date:	9/13/2019
Route	= COLUMBIA PIKE (SR 6/US 31)		
Location	= INTERSECTION OF I-840 EASTBOUND RAMP AND I-840 EASTBOUND		
Highway Type	= 4-Lane Undivided Urban Functionally Classified Road		
FUNCTIONAL CLASS=	ARTERIAL		
DATA YEARS	= SEPT. 2016 - SEPT. 2019		
ADT YEARS USED=	Data collected on September 9, 2019		
COMMENTS	=		
ANALYZED BY	= KCI TECHNOLOGIES, INC.		

SECTION = MORE THAN 0.10 MILE / SPOT = LESS THAN 0.10 MILE

BLM	ELM	Length	Average AADT	VMT
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
		0.00	0	0

INTERSECTION
Log Mile =

Leg		Traffic AADT
North	=	17,020
East	=	3,060
South	=	15,930
West	=	
Entering AADT	=	36,010

Data Collected On September 9, 2019

4-Lane Undivided Urban Functionally Classified Road

Sept. 2016 - Sept. 2019

		Total	Fatal	Incap. Injury	*Severe Crashes	Other Injury
No. of Crashes	=	4	1	0	1	0
No. of Years	=	3				
SW avg. rate	=	4.178	0.021	N/A	0.021	0.962
14-16 S/W Rates						
Exposure (E)	=	39.4310				
Crash Rate (A)	=	0.101	0.025	0.000	0.025	0.000
Critical Rate (C)	=	4.948				
Severity Index (SI)	=	1.0000				
Actual Rate/SW Average	=	0.02	1.20	#DIV/0!	1.20	0.00
Ratio of A/C	=	0.02				

* Severe Crashes are the sum of fatal and incapacitating injury crashes

Revised 4/3/2007

COUNTY	=	WILLIAMSON	Date: 9/13/2019
Route	=	COLUMBIA PIKE (SR 6/US 31)	
Location	=	INTERSECTION OF COLUMBIA PIKE AND I-840 WESTBOUND RAMP	
Highway Type	=	4-Lane Undivided Urban Functionally Classified Road	
FUNCTIONAL CLASS	=	COLLECTOR	
DATA YEARS	=	SEPT. 2016 - SEPT. 2019	
ADT YEARS USED	=	Data collected on September 9, 2019	
COMMENTS	=		
ANALYZED BY	=	KCI TECHNOLOGIES, INC.	

SECTION = MORE THAN 0.10 MILE / SPOT = LESS THAN 0.10 MILE

BLM	ELM	Length	Average AADT	VMT
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
		0.00	0	0

INTERSECTION Log Mile =

Leg		Traffic AADT
North	=	11,580
East	=	
South	=	11,950
West	=	6,730
Entering AADT	=	30,260

Data Collected On September 9, 2019

4-Lane Undivided Urban Functionally Classified Road

Sept. 2016 - Sept. 2019

		Total	Fatal	Incap. Injury	*Severe Crashes	Other Injury
No. of Crashes	=	29	0	0	0	6
No. of Years	=	3				
SW avg. rate	=	4.178	0.021	N/A	0.021	0.962
14-16 S/W Rates						
Exposure (E)	=	33.1347				
Crash Rate (A)	=	0.875	0.000	0.000	0.000	0.181
Critical Rate (C)	=	5.019				
Severity Index (SI)	=	0.2069				
Actual Rate/SW Average	=	0.21	0.00	#DIV/0!	0.00	0.19
Ratio of A/C	=	0.17				

* Severe Crashes are the sum of fatal and incapacitating injury crashes

Revised 4/3/2007

COUNTY	=	WILLIAMSON	Date: 9/13/2019
Route	=	COLUMBIA PIKE (SR 6/US 31)	
Location	=	INTERSECTION OF I-840 WESTBOUND RAMP AND I-840 WESTBOUND	
Highway Type	=	4-Lane Undivided Urban Functionally Classified Road	
FUNCTIONAL CLASS=		ARTERIAL	
DATA YEARS	=	SEPT. 2016 - SEPT. 2019	
ADT YEARS USED=		Data collected on September 9, 2019	
COMMENTS	=		
ANALYZED BY	=	KCI TECHNOLOGIES, INC.	

SECTION = MORE THAN 0.10 MILE / SPOT = LESS THAN 0.10 MILE

BLM	ELM	Length	Average AADT	VMT
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
		0.00	0	0

INTERSECTION Log Mile =

Leg		Traffic AADT
North	=	11,580
East	=	
South	=	11,950
West	=	6,730
Entering AADT	=	30,260

Data Collected On September 9, 2019

4-Lane Undivided Urban Functionally Classified Road

Sept. 2016 - Sept. 2019

		Total	Fatal	Incap. Injury	*Severe Crashes	Other Injury
No. of Crashes	=	4	0	0	0	0
No. of Years	=	3				
SW avg. rate	=	4.178	0.021	N/A	0.021	0.962
14-16 S/W Rates						
Exposure (E)	=	33.1347				
Crash Rate (A)	=	0.121	0.000	0.000	0.000	0.000
Critical Rate (C)	=	5.019				
Severity Index (SI)	=	0.0000				
Actual Rate/SW Average	=	0.03	0.00	#DIV/0!	0.00	0.00
Ratio of A/C	=	0.02				

* Severe Crashes are the sum of fatal and incapacitating injury crashes

Revised 4/3/2007

COUNTY	= WILLIAMSON	Date:	9/13/2019
Route	= COLUMBIA PIKE (SR 6/US 31)		
Location	= INTERSECTION OF COLUMBIA PIKE AND DECLARATION WAY		
Highway Type	= 4-Lane Undivided Urban Functionally Classified Road		
FUNCTIONAL CLASS=	COLLECTOR		
DATA YEARS	= SEPT. 2016 - SEPT. 2019		
ADT YEARS USED=	Data collected on September 9, 2019		
COMMENTS	=		
ANALYZED BY	= KCI TECHNOLOGIES, INC.		

SECTION = MORE THAN 0.10 MILE / SPOT = LESS THAN 0.10 MILE

BLM	ELM	Length	Average AADT	VMT
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
		0.00	0	0

INTERSECTION
Log Mile =

Leg		Traffic AADT
North	=	14,730
East	=	3,160
South	=	11,860
West	=	
Entering AADT	=	29,750

Data Collected On September 9, 2019

4-Lane Undivided Urban Functionally Classified Road

Sept. 2016 - Sept. 2019

		Total	Fatal	Incap. Injury	*Severe Crashes	Other Injury
No. of Crashes	=	10	0	1	1	1
No. of Years	=	3				
SW avg. rate	=	4.178	0.021	N/A	0.021	0.962
14-16 S/W Rates						
Exposure (E)	=	32.5763				
Crash Rate (A)	=	0.307	0.000	0.031	0.031	0.031
Critical Rate (C)	=	5.027				
Severity Index (SI)	=	0.3000				
Actual Rate/SW Average	=	0.07	0.00	#DIV/0!	1.45	0.03
Ratio of A/C	=	0.06				

* Severe Crashes are the sum of fatal and incapacitating injury crashes

Revised 4/3/2007

COUNTY	= WILLIAMSON	Date:	9/13/2019
Route	= COLUMBIA PIKE (SR 6/US 31)		
Location	= FRONTAGE ALONG PARCEL 1		
Highway Type	= 2-Lane Undivided Urban Functionally Classified Road		
FUNCTIONAL CLASS=	COLLECTOR		
DATA YEARS	= SEPT. 2016 - SEPT. 2019		
ADT YEARS USED=	Data collected on September 9, 2019		
COMMENTS	=		
ANALYZED BY	= KCI TECHNOLOGIES, INC.		

SECTION = MORE THAN 0.10 MILE / SPOT = LESS THAN 0.10 MILE

BLM	ELM	Length	Average AADT	VMT
0.00	0.49	0.49	20,369	9,981
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
		0.49	20,369	9,981

INTERSECTION
Log Mile =

Leg	Traffic AADT
North =	
East =	
South =	
West =	
Entering AADT =	0

Data Collected On September 9, 2019
2-Lane Undivided Urban Functionally Classified Road
Sept. 2016 - Sept. 2019

		Total	Fatal	Incap. Injury	*Severe Crashes	Other Injury
No. of Crashes	=	9			0	2
No. of Years	=	3				
SW avg. rate	=	4.178	0.021	N/A	0.021	0.962
14-16 S/W Rates						
Exposure (E)	=	10.9290				
Crash Rate (A)	=	0.823	0.000	0.000	0.000	0.183
Critical Rate (C)	=	5.663				
Severity Index (SI)	=	0.2222				
Actual Rate/SW Average	=	0.20	0.00	#DIV/0!	0.00	0.19
Ratio of A/C	=	0.15				

* Severe Crashes are the sum of fatal and incapacitating injury crashes

Revised 4/3/2007

COUNTY	= WILLIAMSON	Date:	9/13/2019
Route	= COLUMBIA PIKE (SR 6/US 31)		
Location	= FRONTAGE ALONG PARCEL 2		
Highway Type	= 2-Lane Undivided Urban Functionally Classified Road		
FUNCTIONAL CLASS=	COLLECTOR		
DATA YEARS	= SEPT. 2016 - SEPT. 2019		
ADT YEARS USED=	Data collected on September 9, 2019		
COMMENTS	=		
ANALYZED BY	= KCI TECHNOLOGIES, INC.		

SECTION = MORE THAN 0.10 MILE / SPOT = LESS THAN 0.10 MILE

BLM	ELM	Length	Average AADT	VMT
0.00	0.07	0.07	20,369	1,426
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
		0.07	20,369	1,426

INTERSECTION
Log Mile =

Leg	Traffic AADT
North =	
East =	
South =	
West =	
Entering AADT =	0

Data Collected On September 9, 2019
2-Lane Undivided Urban Functionally Classified Road
Sept. 2016 - Sept. 2019

		Total	Fatal	Incap. Injury	*Severe Crashes	Other Injury
No. of Crashes	=	5			0	2
No. of Years	=	3				
SW avg. rate	=	4.178	0.021	N/A	0.021	0.962
14-16 S/W Rates						
Exposure (E)	=	22.3041				
Crash Rate (A)	=	0.224	0.000	0.000	0.000	0.090
Critical Rate (C)	=	5.208				
Severity Index (SI)	=	0.4000				
Actual Rate/SW Average	=	0.05	0.00	#DIV/0!	0.00	0.09
Ratio of A/C	=	0.04				

* Severe Crashes are the sum of fatal and incapacitating injury crashes

Revised 4/3/2007

COUNTY	= WILLIAMSON	Date:	9/13/2019
Route	= COLUMBIA PIKE (SR 6/US 31)		
Location	= FRONTAGE ALONG PARCEL 1 & 2 Combined		
Highway Type	= 2-Lane Undivided Urban Functionally Classified Road		
FUNCTIONAL CLASS=	COLLECTOR		
DATA YEARS	= SEPT. 2016 - SEPT. 2019		
ADT YEARS USED=	Data collected on September 9, 2019		
COMMENTS	=		
ANALYZED BY	= KCI TECHNOLOGIES, INC.		

SECTION = MORE THAN 0.10 MILE / SPOT = LESS THAN 0.10 MILE

BLM	ELM	Length	Average AADT	VMT
0.00	0.56	0.56	20,369	11,407
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
0.00	0.00	0.00	0	0
		0.56	20,369	11,407

INTERSECTION
Log Mile =

Leg	Traffic AADT
North =	
East =	
South =	
West =	
Entering AADT =	0

Data Collected On September 9, 2019
2-Lane Undivided Urban Functionally Classified Road
Sept. 2016 - Sept. 2019

		Total	Fatal	Incap. Injury	*Severe Crashes	Other Injury
No. of Crashes	=	14			0	4
No. of Years	=	3				
SW avg. rate	=	4.178	0.021	N/A	0.021	0.962
14-16 S/W Rates						
Exposure (E)	=	12.4903				
Crash Rate (A)	=	1.121	0.000	0.000	0.000	0.320
Critical Rate (C)	=	5.564				
Severity Index (SI)	=	0.2857				
Actual Rate/SW Average	=	0.27	0.00	#DIV/0!	0.00	0.33
Ratio of A/C	=	0.20				

* Severe Crashes are the sum of fatal and incapacitating injury crashes

Revised 4/3/2007

APPENDIX H
SIGNAL TIMING PLANS

TOWN OF THOMPSON'S STATION - SIGNAL TIMING SUMMARY SHEET

INTERSECTION ID

LOCATION: US 31 & TOLLGATE BLVD

DATE: 1/11/2019

NOTES:

TIME BY PHASE (SEC) & FUNCTIONS

PHASE	1	2	3	4	5	6	7	8
INITIAL GREEN		10		6	6	10		
PASSAGE TIME								
YELLOW CHANGE INTERVAL		4.0		4.0	4.0	4.0		
RED CLEAR INTERVAL		2.0		3.0	3.0	2.0		
WALK INTERVAL		7		7		7		
PED CLEARANCE		12		12		12		
MAX 1		40		40	40	40		
MAX 2		0		0	0	0		
MAX 3 LIMIT		0		0	0	0		
MAX 3 ADJUST		0		0	0	0		
MAX OUTS TO ADJ MAX 3								
GAP OUTS TO ADJ MAX 3								
TIME BEFORE REDUCT.								
TIME TO REDUCE								
MIN. GAP								
ADDED INITIAL PER ACT.								
MAX. INITIAL								
MIN RECALL								
MAX RECALL		X				X		
PED RECALL								
SOFT RECALL								
NON-LOCK								
VEH OMIT								
PED OMIT					X			
CNA 1								
CNA 2								
WALK REST. MOD.								

PHASE ALLOCATIONS (SEC)

PHASE	1	2	3	4	5	6	7	8
CYCLE 1 / SPLIT 1		74		26	18	56		
CYCLE 1 / SPLIT 2								
CYCLE 2 / SPLIT 1		66		24	18	48		
CYCLE 2 / SPLIT 2								
CYCLE 3 / SPLIT 1		95		25	20	75		
CYCLE 3 / SPLIT 2								
CYCLE 4 / SPLIT 1								
CYCLE 4 / SPLIT 2								
CYCLE 5 / SPLIT 1								
CYCLE 5 / SPLIT 2								
CYCLE 6 / SPLIT 1								
CYCLE 6 / SPLIT 2								

CYCLE / OFFSETS	1	2	3	4	5	6
CYCLE LENGTH	100	90	120			
OFFSET 1	0	0	0			
OFFSET 2						

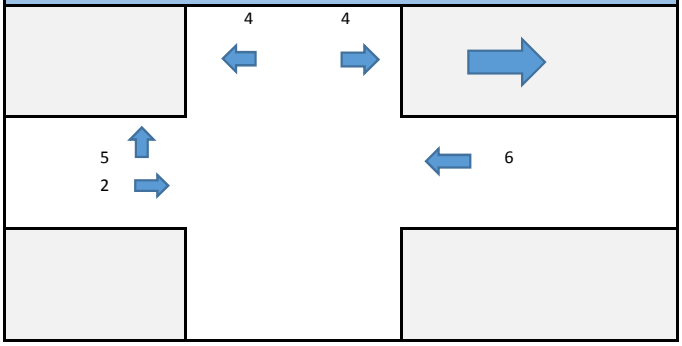
PHASE REVERSAL				COORD. PHASES			CIRCUIT OVERRIDES		
PTRN.	MODE	PHASES LEAD	PHASES LAG	CYCLE	PHASES TO COORD.		CKT.	SYM.	ON/OFF/ TOD
				1	2	6			
				2	2	6			
				3	2	6			
				4					
				5					
				6					

DAY PLAN EVENTS

PLAN	HH:MM	CKT PLN	C/O/S	CKT	ON/OFF
Free	0:00				ON
Free	6:30				OFF
AM	6:30		1/1/1		
MD	9:00		2/1/1		
PM	14:00		3/1/1		
Free	18:30				ON
Free	0:00				ON
Free	8:00				OFF
MD	8:00		2/1/1		
Free	17:00				ON

WEEKLY PROGRAM PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0							
1		X	X	X	X	X	
2	X						X

PHASE ORIENTATION



TOWN OF THOMPSON'S STATION - SIGNAL TIMING SUMMARY SHEET

INTERSECTION ID

LOCATION: US 31 & 840 WB

DATE: 1/11/2019

NOTES:

TIME BY PHASE (SEC) & FUNCTIONS

PHASE	1	2	3	4	5	6	7	8
INITIAL GREEN		10	6			10		6
PASSAGE TIME								
YELLOW CHANGE INTERVAL		5.0	4.0			5.0		4.0
RED CLEAR INTERVAL		2.0	2.5			2.0		2.5
WALK INTERVAL								
PED CLEARANCE								
MAX 1		40	40			40		40
MAX 2		0	0			0		0
MAX 3 LIMIT								
MAX 3 ADJUST								
MAX OUTS TO ADJ MAX 3								
GAP OUTS TO ADJ MAX 3								
TIME BEFORE REDUCT.								
TIME TO REDUCE								
MIN. GAP								
ADDED INITIAL PER ACT.								
MAX. INITIAL								
MIN RECALL								
MAX RECALL			X			X		X
PED RECALL								
SOFT RECALL								
NON-LOCK								
VEH OMIT								
PED OMIT		X	X			X		X
CNA 1								
CNA 2								
WALK REST. MOD.								

PHASE ALLOCATIONS (SEC)

PHASE	1	2	3	4	5	6	7	8
CYCLE 1 / SPLIT 1		70	30			70		30
CYCLE 1 / SPLIT 2								
CYCLE 2 / SPLIT 1		60	30			60		30
CYCLE 2 / SPLIT 2								
CYCLE 3 / SPLIT 1		60	60			60		60
CYCLE 3 / SPLIT 2								
CYCLE 4 / SPLIT 1								
CYCLE 4 / SPLIT 2								
CYCLE 5 / SPLIT 1								
CYCLE 5 / SPLIT 2								
CYCLE 6 / SPLIT 1								
CYCLE 6 / SPLIT 2								

CYCLE / OFFSETS	1	2	3	4	5	6
CYCLE LENGTH	100	90	120			
OFFSET 1	89	60	29			
OFFSET 2						

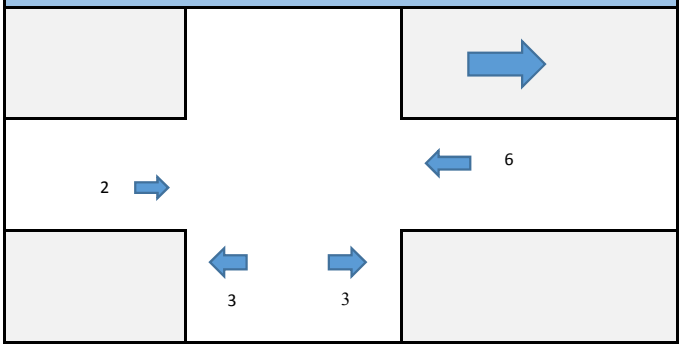
PHASE REVERSAL				COORD. PHASES			CIRCUIT OVERRIDES		
PTRN.	MODE	PHASES LEAD	PHASES LAG	CYCLE	PHASES TO COORD.		CKT.	SYM.	ON/OFF/ TOD
				1	2	6			
				2	2	6			
				3	2	6			
				4					
				5					
				6					

DAY PLAN EVENTS

PLAN	HH:MM	CKT PLN	C/O/S	CKT	ON/OFF
Free	0:00				ON
Free	6:30				OFF
AM	6:30		1/1/1		
MD	9:00		2/1/1		
PM	14:00		3/1/1		
Free	18:30				ON
Free	0:00				ON
Free	8:00				OFF
MD	8:00		2/1/1		
Free	17:00				ON

WEEKLY PROGRAM PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0							
1		X	X	X	X	X	
2	X						X

PHASE ORIENTATION



TOWN OF THOMPSON'S STATION - SIGNAL TIMING SUMMARY SHEET

INTERSECTION ID

LOCATION: US 31 & 840 EB

DATE: 1/11/2019

NOTES:

TIME BY PHASE (SEC) & FUNCTIONS

PHASE	1	2	3	4	5	6	7	8
INITIAL GREEN	6	10	6			10	6	
PASSAGE TIME								
YELLOW CHANGE INTERVAL	4.5	4.5	4.0			4.5	4.0	
RED CLEAR INTERVAL	2.5	2.5	2.0			2.5	2.0	
WALK INTERVAL								
PED CLEARANCE								
MAX 1	40	40	40			40	40	
MAX 2								
MAX 3 LIMIT								
MAX 3 ADJUST								
MAX OUTS TO ADJ MAX 3								
GAP OUTS TO ADJ MAX 3								
TIME BEFORE REDUCT.								
TIME TO REDUCE								
MIN. GAP								
ADDED INITIAL PER ACT.								
MAX. INITIAL								
MIN RECALL								
MAX RECALL		X				X		
PED RECALL								
SOFT RECALL								
NON-LOCK								
VEH OMIT								
PED OMIT								
CNA 1								
CNA 2								
WALK REST. MOD.								

PHASE ALLOCATIONS (SEC)

PHASE	1	2	3	4	5	6	7	8
CYCLE 1 / SPLIT 1	16	54	30			70	30	
CYCLE 1 / SPLIT 2								
CYCLE 2 / SPLIT 1	20	50	20			70	20	
CYCLE 2 / SPLIT 2								
CYCLE 3 / SPLIT 1	30	70	20			100	20	
CYCLE 3 / SPLIT 2								
CYCLE 4 / SPLIT 1								
CYCLE 4 / SPLIT 2								
CYCLE 5 / SPLIT 1								
CYCLE 5 / SPLIT 2								
CYCLE 6 / SPLIT 1								
CYCLE 6 / SPLIT 2								

CYCLE / OFFSETS	1	2	3	4	5	6
CYCLE LENGTH	100	90	120			
OFFSET 1	59	55	74			
OFFSET 2						

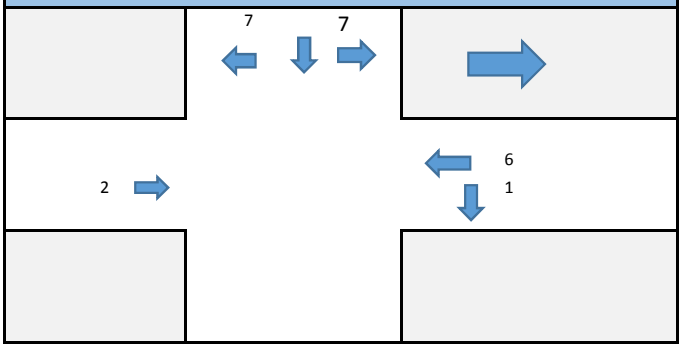
PHASE REVERSAL				COORD. PHASES			CIRCUIT OVERRIDES		
PTRN.	MODE	PHASES LEAD	PHASES LAG	CYCLE	PHASES TO COORD.		CKT.	SYM.	ON/OFF/ TOD
				1	2	6			
				2	2	6			
				3	2	6			
				4					
				5					
				6					

DAY PLAN EVENTS

PLAN	HH:MM	CKT PLN	C/O/S	CKT	ON/OFF
Free	0:00				ON
Free	6:30				OFF
AM	6:30		1/1/1		
MD	9:00		2/1/1		
PM	14:00		3/1/1		
Free	18:30				ON
Free	0:00				ON
Free	8:00				OFF
MD	8:00		2/1/1		
Free	17:00				ON

WEEKLY PROGRAM PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0							
1		X	X	X	X	X	
2	X						X

PHASE ORIENTATION



TOWN OF THOMPSON'S STATION - SIGNAL TIMING SUMMARY SHEET

INTERSECTION ID

LOCATION: US 31 & CRITZ LANE

DATE: 1/11/2019

NOTES:

TIME BY PHASE (SEC) & FUNCTIONS

PHASE	1	2	3	4	5	6	7	8
INITIAL GREEN	6	10	6	6		10		
PASSAGE TIME								
YELLOW CHANGE INTERVAL	4.5	4.5	4.5	4.0		4.5		
RED CLEAR INTERVAL	2.0	2.0	2.0	2.0		2.0		
WALK INTERVAL								
PED CLEARANCE								
MAX 1	40	40	40	40		40		
MAX 2								
MAX 3 LIMIT								
MAX 3 ADJUST								
MAX OUTS TO ADJ MAX 3								
GAP OUTS TO ADJ MAX 3								
TIME BEFORE REDUCT.								
TIME TO REDUCE								
MIN. GAP								
ADDED INITIAL PER ACT.								
MAX. INITIAL								
MIN RECALL								
MAX RECALL								
PED RECALL								
SOFT RECALL								
NON-LOCK								
VEH OMIT								
PED OMIT	X	X	X	X		X		
CNA 1								
CNA 2								
WALK REST. MOD.								

PHASE ALLOCATIONS (SEC)

PHASE	1	2	3	4	5	6	7	8
CYCLE 1 / SPLIT 1	24	37	14	25		61		
CYCLE 1 / SPLIT 2								
CYCLE 2 / SPLIT 1	20	36	14	20		56		
CYCLE 2 / SPLIT 2								
CYCLE 3 / SPLIT 1	47	34	14	25		81		
CYCLE 3 / SPLIT 2								
CYCLE 4 / SPLIT 1								
CYCLE 4 / SPLIT 2								
CYCLE 5 / SPLIT 1								
CYCLE 5 / SPLIT 2								
CYCLE 6 / SPLIT 1								
CYCLE 6 / SPLIT 2								

CYCLE / OFFSETS	1	2	3	4	5	6
CYCLE LENGTH	100	90	120			
OFFSET 1	0	0	106			
OFFSET 2						

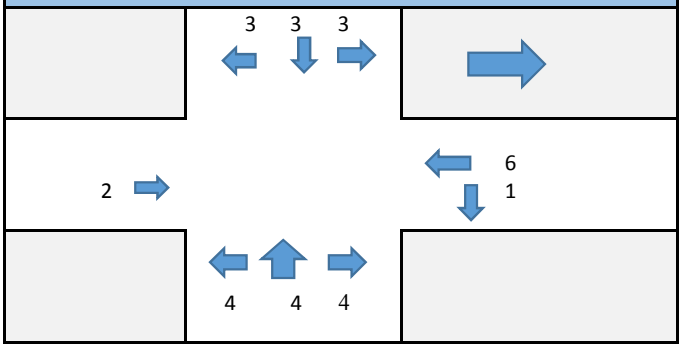
PHASE REVERSAL				COORD. PHASES			CIRCUIT OVERRIDES		
PTRN.	MODE	PHASES LEAD	PHASES LAG	CYCLE	PHASES TO COORD.		CKT.	SYM.	ON/OFF/ TOD
				1	2	6			
				2	2	6			
				3	2	6			
				4					
				5					
				6					

DAY PLAN EVENTS

PLAN	HH:MM	CKT PLN	C/O/S	CKT	ON/OFF
Free	0:00				ON
Free	6:30				OFF
AM	6:30		1/1/1		
MD	9:00		2/1/1		
PM	14:00		3/1/1		
Free	18:30				ON
Free	0:00				ON
Free	8:00				OFF
MD	8:00		2/1/1		
Free	17:00				ON

WEEKLY PROGRAM PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0							
1		X	X	X	X	X	
2	X						X

PHASE ORIENTATION



TOWN OF THOMPSON'S STATION - SIGNAL TIMING SUMMARY SHEET

INTERSECTION ID

LOCATION: US 31 & THOMPSON'S STATION ROAD

DATE: 1/11/2019

NOTES:

TIME BY PHASE (SEC) & FUNCTIONS

PHASE	1	2	3	4	5	6	7	8
INITIAL GREEN	6	10	6	6	6	10	6	6
PASSAGE TIME								
YELLOW CHANGE INTERVAL	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
RED CLEAR INTERVAL	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
WALK INTERVAL								
PED CLEARANCE								
MAX 1	20	40	20	40	20	40	20	40
MAX 2								
MAX 3 LIMIT								
MAX 3 ADJUST								
MAX OUTS TO ADJ MAX 3								
GAP OUTS TO ADJ MAX 3								
TIME BEFORE REDUCT.								
TIME TO REDUCE								
MIN. GAP								
ADDED INITIAL PER ACT.								
MAX. INITIAL								
MIN RECALL								
MAX RECALL		X				X		
PED RECALL								
SOFT RECALL								
NON-LOCK	X		X		X		X	
VEH OMIT								
PED OMIT	X	X	X	X	X	X	X	X
CNA 1								
CNA 2								
WALK REST. MOD.								

PHASE ALLOCATIONS (SEC)

PHASE	1	2	3	4	5	6	7	8
CYCLE 1 / SPLIT 1	14	49	14	23	16	47	14	23
CYCLE 1 / SPLIT 2								
CYCLE 2 / SPLIT 1	14	42	14	20	14	42	14	20
CYCLE 2 / SPLIT 2								
CYCLE 3 / SPLIT 1	15	66	15	24	15	66	15	24
CYCLE 3 / SPLIT 2								
CYCLE 4 / SPLIT 1								
CYCLE 4 / SPLIT 2								
CYCLE 5 / SPLIT 1								
CYCLE 5 / SPLIT 2								
CYCLE 6 / SPLIT 1								
CYCLE 6 / SPLIT 2								

CYCLE / OFFSETS	1	2	3	4	5	6
CYCLE LENGTH	100	90	120			
OFFSET 1	0	50	30			
OFFSET 2						

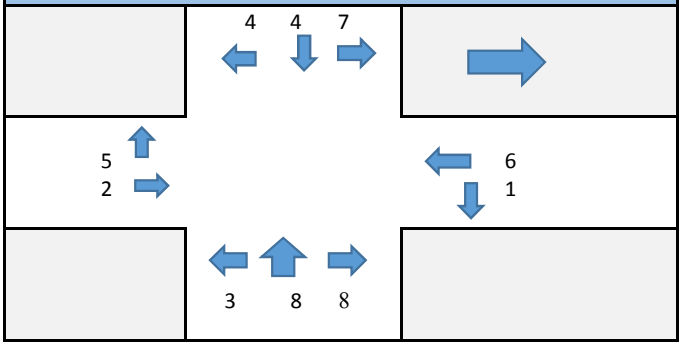
PHASE REVERSAL				COORD. PHASES			CIRCUIT OVERRIDES		
PTRN.	MODE	PHASES LEAD	PHASES LAG	CYCLE	PHASES TO COORD.		CKT.	SYM.	ON/OFF/ TOD
				1	2	6			
				2	2	6			
				3	2	6			
				4					
				5					
				6					

DAY PLAN EVENTS

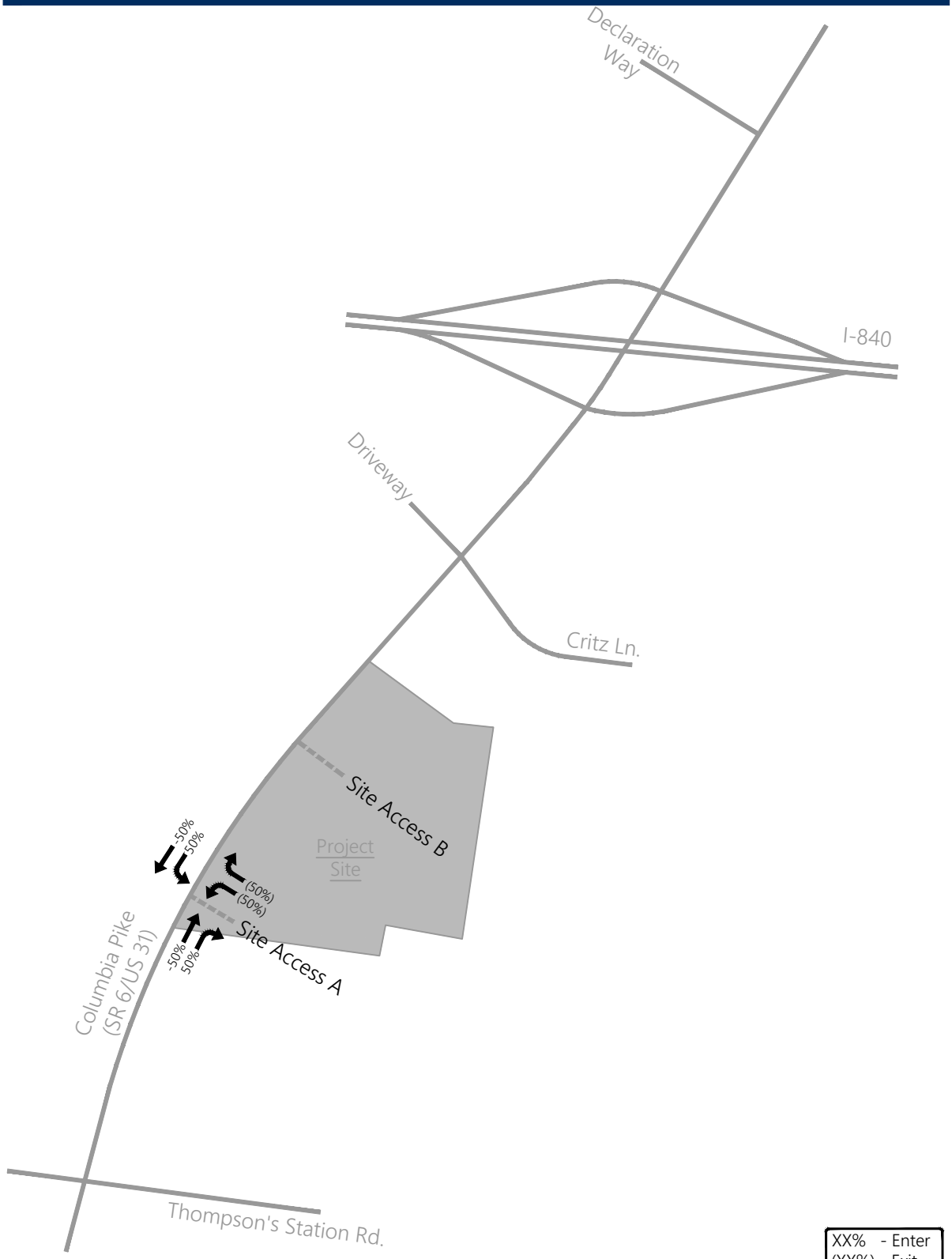
PLAN	HH:MM	CKT PLN	C/O/S	CKT	ON/OFF
Free	0:00				ON
Free	6:30				OFF
AM	6:30		1/1/1		
MD	9:00		2/2/1		
PM	14:00		3/3/1		
Free	18:30				ON
Free	0:00				ON
Free	8:00				OFF
MD	8:00		2/2/1		
Free	17:00				ON

WEEKLY PROGRAM PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0							
1		X	X	X	X	X	
2	X						X

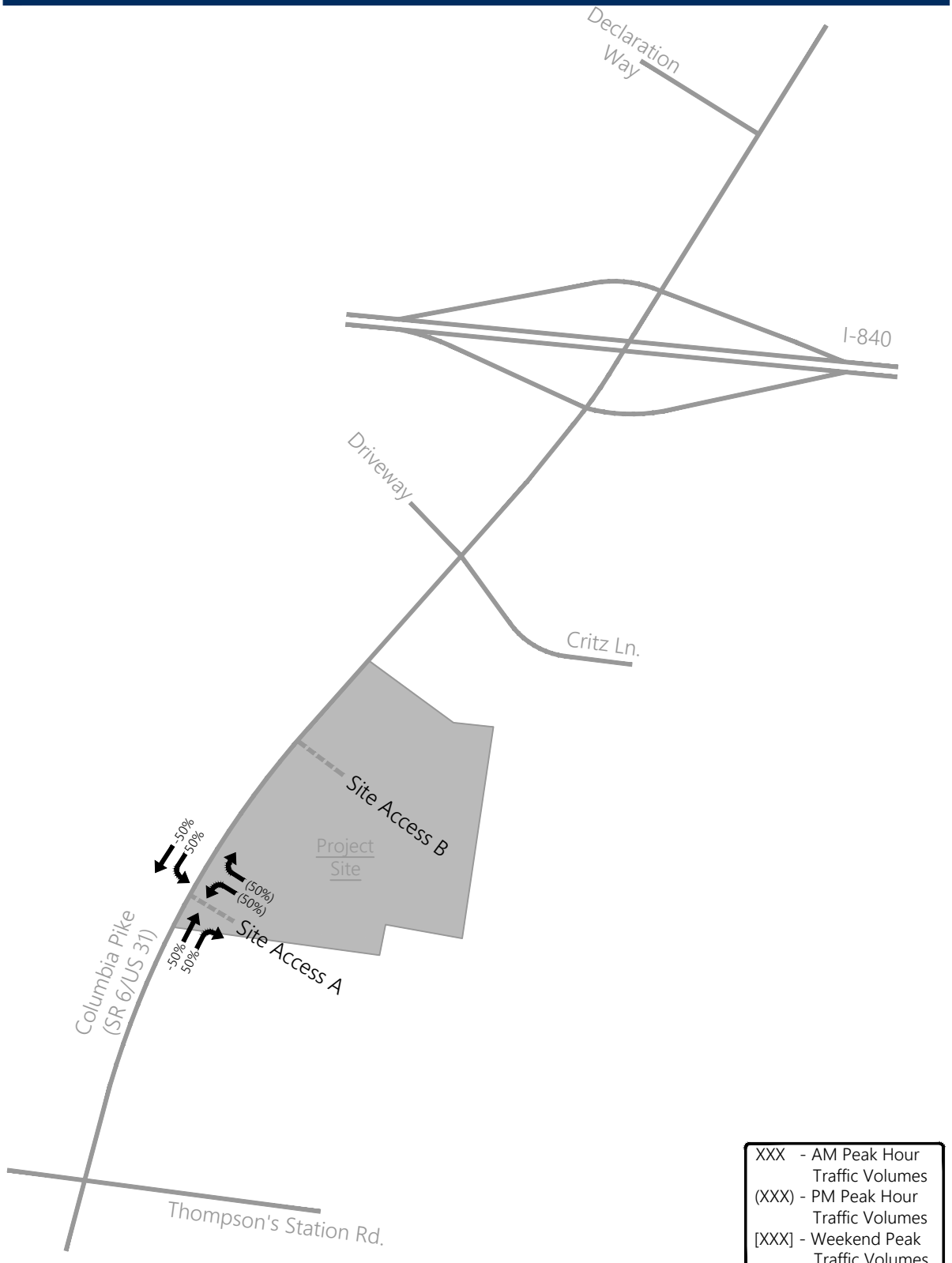
PHASE ORIENTATION



APPENDIX I
PASS-BY DISTRIBUTION AND ASSIGNMENT



Distribution of Peak Hour Traffic Volumes
Generated by the Project Site (Pass-By for Convenience Market)
(Not to Scale) Figure I1.



Assignment of Peak Hour Traffic Volumes
Generated by the Project Site (Pass-By for Convenience Market)
(Not to Scale) Figure I2.

Phone: (615) 794-4333
Fax: (615) 794-3313
www.thompsons-station.com

1550 Thompson's Station Road W.
P.O. Box 100
Thompson's Station, TN 37179

DATE: January 14, 2020

TO: Board of Mayor and Aldermen

FROM: Wendy Deats, Town Planner/Micah Wood Interim Town Planner

SUBJECT: **Roderick Place Amendment to Approved Plan (CP 2019-002) Revised**

On October 22, 2019, the Planning Commission reviewed the proposal and had concerns regarding mitigation for the impacts of the project. In addition, corrections to the density were required.

On October 29, 2019, the applicant, their traffic engineer, town staff including the town traffic engineer met to discuss the issues brought up at the Planning Commission.

On November 5, 2019, the applicant provided the following information via email:

1. *"Residential Density is 3 Units Per Acre based on the actual areas delineated residential on the future to be approved Preliminary plat.*
2. *Right of way will be dedicated along our entire frontage of Columbia Pike approximately 2600 lineal feet. The width to be determined by the state of Tennessee's construction drawings (when they become available).*
3. *A 60 foot right of way will be dedicated from Columbia Pike to the southeastern property line approximately as shown on the revised concept plan and the Major Thoroughfare plan.*
4. *See the attached Traffic Study recommendations and sketches.*
5. *Once the right of way is determined we will have the historic rock wall relocated.*
6. *See the attached projection of Permit and Road Impact fees that we will pay."*

The Town's traffic engineer has reviewed the information submitted from the developer and recommends that the planning documents be modified to show only one full movement access point on Columbia Pike (US 31) and that any other site driveways be shown as right in/right out movement driveways.

On November 13, 2019, the applicant also provided the following additional information for further clarification on their project via email:

"We can build the 2007 existing plan because it is vested, in addition the Planning Commission reapproved the Site plan for lots 1 - 4 of our approved partial preliminary plat.

It does not provide for:
1. *Access dedication to all adjacent property owners.*
2. *A collector road 60' ROW dedication consistent with the new major thoroughfare plan.*
3. *Dedication of right away for the widening of Columbia Pike / US 31.*
4. *Repairing, keeping or moving the existing historic rock wall along Columbia Pike / US 31.*
5. *Keeping approximately 2 acres of old growth Trees, Including beautiful magnolias, maples and oaks.*

Phone: (615) 794-4333
Fax: (615) 794-3313
www.thompsons-station.com

1550 Thompson's Station Road W.
P.O. Box 100
Thompson's Station, TN 37179

Our proposed amendment does, it additional allows us to provide:

1. *A multi-purpose, meeting hall, theater and event venue by keeping the existing appx 6,000 square foot event building.*
2. *A longer and wider Vista along Columbia Pike by relocating approximately 2 acres of open space. It will provide for a larger active park with trails and hardscape.*
3. *Less mass grading.*
4. *Future space for a Williamson County Enrichment Center."*

Staff did request the developer consider and plan for additional connections, including a future "collector" in order to provide better connectivity and improve the transportation system in accordance with the major thoroughfare plan. Staff does agree that preserving additional trees and keeping the scenic vista, including the repair of the historic rock wall is advantageous and will improve the aesthetics and protect history.

On November 19, 2019, the Planning Commission reviewed the additional information and is recommending the project with the following contingencies:

1. The project density shall be three (3) units per acre based on the total land area for the residential uses with 40% open space.
2. The project shall maintain 50% open space within the commercial designated area.
3. The project shall include the ST 50-26 for the local roadway and ST 60 -36 for the collector roadway and street lighting accordance with the Land Development Ordinance.
4. The mitigation/recommendations for traffic improvements shall be incorporated into the traffic study and shall be incorporated into the project.
5. A tree inventory and replacement plan shall be developed and considered during plat review before the Planning Commission.
6. All future plats and site plans shall conform to the general regulations set forth within the approved pattern book and all applicable standards with the Land Development Ordinance.

Attachments
Roderick Concept Plan dated 11-26-19
Roderick Traffic Study dated December 2019
Roderick Redlined Pattern Book & Revised Pattern Book dated November 2019

ORDINANCE NO. 2020-002

AN ORDINANCE OF THE TOWN OF THOMPSON'S STATION, TENNESSEE TO AMEND TITLE 8, ALCOHOLIC BEVERAGES ORDINANCE

WHEREAS, Town Staff and the Beer Board is recommending changes to certain provisions of the Town's Ordinance, under Title 8, Alcoholic Beverages to improve and clarify as to the process and procedures for the notice, payment and collection of the privilege tax.

WHEREAS, the Beer Board has reviewed these proposed changes and has recommended that the Board of Mayor and Aldermen adopt the amendments to the Ordinance under Title 8 as proposed herein; and

WHEREAS, the Board of Mayor and Aldermen has reviewed the Ordinance under Title 8, Alcoholic Beverages, and has determined, based upon the recommendations of Town Staff, the Beer Board, and the record as a whole, that the proposed amendments are consistent and appropriate to improve the process and procedures for the collection of the privilege tax, and does overall make improvements to the Ordinance, and is in the best interest of the Town.

NOW, THEREFORE, BE IT ORDAINED by the Board of Mayor and Aldermen of the Town of Thompson's Station, Tennessee, as follows:

Section 1. That the Town of Thompson's Station's Ordinance, under Title 8, Alcoholic Beverages is hereby amended by adopting the changes as set out in Exhibit A attached hereto and incorporated herein by reference. After final passage, Town Staff is directed to incorporate these changes into an updated ordinance document and said document shall constitute the Alcoholic Beverages ordinances of the Town.

Section 2. If any section or part of the Ordinance, including any amendments thereto, is determined to be invalid for any reason, such section or part shall be deemed to be a separate and independent provision. All other sections or parts shall remain in full force and effect. If any section or part of the Ordinance is invalid in one or more of its applications, that section or part shall remain in effect for all other valid applications.

Section 3. This ordinance shall take effect immediately upon the publication of its caption in a newspaper of general circulation after final reading by the Board of Mayor and Aldermen, the public welfare requiring it.

Duly approved and adopted by the Board of Mayor and Aldermen of the Town of Thompson's Station, Tennessee, on the _____ day of _____, 2020.

_____

Corey Napier, Mayor

ATTEST:

_____
Regina Fowler, Town Recorder

Passed First Reading: _____

Passed Second Reading: _____

Submitted to Public Hearing on the ____ day of _____, 2020, at 7:00 p.m., after being advertised in the *Williamson AM* Newspaper on the ____ day of _____, 2020.

Recommended for approval by the Beer Board on the _____day of _____, 2020.

APPROVED AS TO FORM AND LEGALITY:

_____
Town Attorney

EXHIBIT A
TITLE 8
ALCOHOLIC BEVERAGES[1]

CHAPTER
1. BEER.

CHAPTER 1
BEER[2]

SECTION

8-101. Beer board established. There is herby established a beer board to be composed of the board of mayor and aldermen. The mayor shall be chairman of the beer board. (Ord. #96-001, April 1996)

8-102. Meeting of the beer board. All meeting of the beer board shall be open to the public. The board shall hold regular meetings in the town hall at such times as it shall prescribe. When there is business to come before

[1]State law reference
Tennessee Code Annotated, title 57.

[2]State law reference
For a leading case on a municipality's authority to regulate beer, see the Tennessee Supreme Court decision in Watkins v. Naifeh, 635 S.W. 2d 104 (1982).

the beer board, a special meeting may be called b y the chairman, provided he gives a reasonable notice thereof to each member. The board may adjourn a meeting at any time to another tie and place. (Ord. #96-001, April 1996)

8-103. Record of beer board proceedings to be kept. The town recorder shall make a record of the proceedings of all meeting of the beer board. The record shall be a public record

and shall contain at least the following; the date of each meeting; the names of the board members present and absent; the names of the members introducing and recording motions and resolutions, etc., before the board; a copy of each such motion or resolution presented; the vote of each member thereon; and the provisions of each beer permit issued by the board. (Ord. #96-001, April 1996)

8-104. Requirements for beer board quorum and action. The attendance of at least a majority of the members of the beer board shall be required to constitute a quorum for the purpose of transacting business. Matters before the board shall be decided by a majority of the members present if a quorum is constituted. Any member present but not voting shall be deemed to have cast a "nay" vote. (Ord. #96-001, April 1996)

8-105. Powers and duties of the beer board. The beer board shall have the power and it is hereby directed to regulate the selling, storing for sale, distributing for sale, and manufacturing of beer within this town in accordance with the provisions of this chapter. (Ord. #96-001, April 1996)

8-106. "Beer" defined. The term "beer" as used in this Chapter shall mean and include all beers, ales, and other malt liquors having an alcoholic content of not more than five percent (5%) by weight. (Ord. #96-001, April 1996).

8-107 Permit required for engaging in beer business; privilege tax; Notice and Collection (1) It shall be unlawful for any person to sell, store for sale, distribute for sale, or manufacture beer without first making applications to and obtaining a permit from the beer board. The application shall be made on such form as the board shall pre scribe and/or furnish, and pursuant to Tennessee Code Annotated, § 57-5-101(b), and shall be accompanied by a non-refundable application fee of two hundred and fifty dollars ($250.00). Said fee shall be in the form of a cashier's check payable to the Town of Thompson's Station, Tennessee. Each applicant must be a person of good moral character and certify that he has read and is familiar with the provisions of this chapter.

(2) Privilege tax. There is hereby imposed on the business of selling, distribution, storing or manufacturing beer, an annual privilege tax of one hundred dollars ($100.00). Any person, firm, corporation, joint stock company, syndicated or association engaged in the sale, distribution, storage or manufacture of beer shall remit the tax on January 1, 1994, and on or before each successive January 1, to the Town of Thompson's Station, Tennessee. At the time a new permit is issued to any business subject to this tax, the permit holder shall be required to pay the privilege tax on a prorated basis for each month or portion thereof remaining until the next tax payment date. (Ord. #96-001, April 2006)

(3) Notice and collection of the privilege tax. Pursuant to Tenn. Code Ann. §57-5-104 (a)(3), the Town shall mail written notice to each permit holder of the payment date of the

annual tax at least thirty (30) days prior to January 1. Notice shall be mailed to the address specified by the permit holder on its permit application, or at such other address as provided by the permit holder to the Town. If a permit holder does not pay the tax by January 31st or within thirty (30) days after written notice of the tax was mailed by the Town, whichever is later, then the Town shall notify the permit holder by certified mail, return receipt requested, that the tax payment is past due. If a permit holder does not pay the tax within ten (10) days after receiving notice of its delinquency by certified mail, then the Town may suspend or revoke the permit or impose a civil penalty pursuant to Tenn. Code Ann. § 57-5-108.

8-108. Beer permits shall be restrictive. (1) All beer permits shall be restrictive as to the type of beer a business is authorized to sell under the permit. Separate permits shall be required for selling at retail, storing, distributing, and manufacturing. It shall be unlawful for any beer permit holder to engage in any type or phase of the beer business not expressly authorized by his permit. It shall likewise be unlawful for him not to comply with any and all express restrictions or conditions which may be written into his permit authorized by the beer board.

(2) A beer permit issued hereunder shall be issued only in the name of the individual, manager or employee applicant. A permit, except as authorized stated in this chapter, shall continue to be valid so long as that individual, manager or employee is engaged in business at the location authorized in the permit. The individual, manager or employee is charged with compliance of this chapter at the permit location. A permit does not run with the land or business. (Ord. #96-001, April 2006)

8-109. Types of permits. Permits issued by the beer board shall consist of three (3) types:

(1) An "on-premises permit" shall be used for the consumption of beer only on the premises. To qualify for an on-premises permit, an establishment, in addition to meeting the other regulations and restrictions in this chapter, must:

(a) Be a restaurant or eating place; and

(b) Be able to seat a minimum of thirty (30) people, including children, in booths and at tables, in addition to any other seating it may have; and

(c) Have all seating in the interior of the building or under a permanent roof.

(2) An "off-premises permit" shall be issued for the consumption of beer only off of the premises. To qualify for an off-premises permit, an establishment, in addition to meeting the other regulations herein, must;

(a) Be a grocery store or convenience type market; and

(b) In either case, be primarily engaged in the sale of grocery and personal and home care and cleaning articles, but may also sell gasoline.

(3) A "special event permit" may be issued by the beer board for the sale of beer for consumption on the premises of a special event upon an application describing the location and type of event. The beer board may waive the permit fee and tax for special events sponsored by

a bona fide charitable or non-profit organization or a governmental entity. The duration of a special event beer permit shall not exceed seventy-two (72) hours and shall not be issued to the same person or entity more than once within any thirty (30) day period. (Ord. #96-0001, April 1996, as amended by Ord. #08-012, June 2008)

8-110. Interference with public health, safety, and morals prohibited. No permit authorizing the sale of beer will be issued when such business(es) would cause congestion of traffic or would interfere with public health, safety and morals. In no event will a permit be issued authorizing the storage, sale or manufacture of beer by the permit holder within three hundred fee (300') of any school or church as measured in a straight line from the nearest corner of the school or church to the nearest corner of the structure where the beer is to be stored, sold or manufactured. (Ord. #05-004, March 20018)

8-111. Issuance of permits to persons convicted of certain crimes prohibited. No beer permit shall be issued to any person who has been convicted for the possession, sale, manufacture or transportation of intoxicating liquor or any crime involving moral turpitude, within the past ten (10) years. No person, firm, corporation, joint-stock company, syndicate or association having at least a five percent (5%) ownership interest in the applicant shall have been convicted of any violation of the laws against possession, sale, manufacture, or transportation of beer or other alcoholic beverages or any crime involving moral turpitude within the past ten (10) years. (Ord. #96-001, April 1996)

8-112. Prohibited conduct or activities by beer permit holders. It shall be unlawful for any beer permit holder to:

(1) Make or allow sale of beer between the hours of 12:00 midnight and 6:00am.;
(2) Allow any loud, unusual or obnoxious noises to emanate from the premises;
(3) Make or allow any sale of beer to a person under twenty-one (21) years of age;
(4) Allow any person under twenty-one (21) years of age to loiter in or about his place of business;
(5) Make or allow any sale of beer to any intoxicated person or to any feeble-minded, insane or otherwise mentally incapacitated person;
(6) Allow durn persons to loiter about the premises;
(7) Serve, sell or allow the consumption on his premises of any alcoholic beverage with an alcoholic content of more than five percent (5%) by weight; and
(8) "Off-premises" permit holders hall not allow the consumption of alcohol in or about their premises whatsoever;
(9) Allow gambling on his premises;
(10) "On-premises" permit holders shall not fail to provide and maintain sanitary toilet facilities;
(11) Allow an employee of the permit holder who is under the age of eighteen (18) years of to sell beer. (Ord. #96-001, April 1996, as amended by Ord. #07-009, Sept. 2007)

8-113. Suspension and revocation of beer permits. (1) The beer board shall have the power to suspend or revoke any beer permit issued under the provisions of this chapter when the holder thereof is guilty of making a false statement or misrepresentation in his application or of violation any of the provisions of this chapter. However, no beer permit shall be suspended or revoked until a public hearing is held by the board after reasonable notice to all the known parties in interest. Suspension or revocation proceedings may be initiated by any member of the beer board upon said member's written request to the chairman of the beer board. Said request shall be in writing, and a notice to the beer permit holder of the initiation of such proceedings shall be sent by certified mail. The notice shall include the basis of such initiation, and the date, time and location of any such public hearing for consideration of such suspension or revocation.

(2) Pursuant to Tennessee Code Annotated, § 57-5-608, the beer board shall not revoke or suspend the permit of a "responsible vendor" qualified under the requirements of Tennessee Code Annotated, § 57-5-606 for a clerk's illegal sale of beer to a minor if the clerk is properly certified and has attended annual meetings since the clerk's original certification, unless the vendor's status as a certified responsible vendor has been revoked by the alcoholic beverage commission. If the responsible vendor's certification has been revoked, the vendor shall be punished by the beer board as if the vendor were not certified as a responsible vendor. "Clerk" means any person working in a capacity to sell beer directly to consumers for off-premises consumption. Under Tennessee Code Annotated, § 57-5-608, the alcoholic beverage commission shall revoke a vendor's status as a responsible vendor upon notification by the beer board that the board has made a final determination that the vendor has sold beer to a minor for the second time in a consecutive twelve (12) month period. The revocation shall be for three (3) years. (Ord. #96-001, April 1996, as amended by Ord. #07-009, Sept. 2007)

8-114. Civil penalty in lieu of revocation or suspension.

(1) Definition. "Responsible vendor" means a person, corporation or other entity that has been issued a permit to sell beer for off-premises consumption and has received certification by the Tennessee Alcoholic Beverage Commission under the "Tennessee Responsible Vendor Act of 2006," Tennessee Code Annotated, § 57-5-601, et seq.

(2) Penalty, revocation or suspension. The beer board may, at the time it imposes a revocation or suspension, offer a permit holder that is not a responsible vendor the alternative of paying a civil penalty not to exceed two thousand five hundred dollars ($2,500.00) for each offense of making or permitting to be made any sales to minors, or a civil penalty not to exceed one thousand dollars ($1,000.00) for any other offense.

The beer board may impose on a responsible vendor a civil penalty not to exceed one thousand dollars ($1,000.00) for each offense of making or permitting to be made any sales to minors or for any other offense.

If a civil penalty is offered as an alternative to revocation or suspension, the holder shall have seven (7) days within which to pay the civil penalty before the revocation or suspension

shall be imposed. If the civil penalty is paid within that time, the revocation or suspension shall be deemed withdrawn.

Payment of the civil penalty in lieu of revocation or suspension by a permit holder shall be an admission by the holder of the violation so charged and shall be paid to the exclusion of any other penalty that the town may impose. (Ord. #07-009, Sept. 2007)

8-115. Revocation of clerk's certification for sale to minor. If the beer board determines that a clerk of an off-premises beer permit holder certified under Tennessee Code Annotated, § 57-5-606, sold beer to a minor, the beer board shall report the name of the clerk to the alcoholic beverage commission within fifteen (15) days of the determination of the sale. The certification of the clerk shall be invalid and the clerk may not reapply for a new certificate for a period of one (1) year from the date of the beer board's determination. (Ord. #07-009, Sept. 2007)

EXHIBIT A

TITLE 8

ALCOHOLIC BEVERAGES[1]

CHAPTER

CHAPTER 1

BEER[2]

SECTION

8-101. Beer board established. There is herby established a beer board to be composed of the board of mayor and aldermen. The mayor shall be chairman of the beer board. (Ord. #96-001, April 1996)

8-102. Meeting of the beer board. All meeting of the beer board shall be open to the public. The board shall hold regular meetings in the town hall at such times as it shall prescribe. When there is business to come before

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[1]State law reference
Tennessee Code Annotated, title 57.

[2]State law reference

For a leading case on a municipality's authority to regulate beer, see the Tennessee Supreme Court decision in Watkins v. Naifeh, 635 S.W. 2d 104 (1982).

the beer board, a special meeting may be called b y the chairman, provided he gives a reasonable notice thereof to each member. The board may adjourn a meeting at any time to another tie and place. (Ord. #96-001, April 1996)

8-103. Record of beer board proceedings to be kept. The town recorder shall make a record of the proceedings of all meeting of the beer board. The record shall be a public record and shall contain at least the following; the date of each meeting; the names of the board members present and absent; the names of the members introducing and recording motions and resolutions, etc., before the board; a copy of each such motion or resolution presented; the vote of each member thereon; and the provisions of each beer permit issued by the board. (Ord. #96-001, April 1996)

8-104. Requirements for beer board quorum and action. The attendance of at least a majority of the members of the beer board shall be required to constitute a quorum for the purpose of transacting business. Matters before the board shall be decided by a majority of the members present if a quorum is constituted. Any member present but not voting shall be deemed to have cast a "nay" vote. (Ord. #96-001, April 1996)

8-105. Powers and duties of the beer board. The beer board shall have the power and it is hereby directed to regulate the selling, storing for sale, distributing for sale, and manufacturing of beer within this town in accordance with the provisions of this chapter. (Ord. #96-001, April 1996)

8-106. "Beer" defined. The term "beer" as used in this Chapter shall mean and include all beers, ales, and other malt liquors having an alcoholic content of not more than five percent (5%) by weight. (Ord. #96-001, April 1996).

8-107 Permit required for engaging in beer business; privilege tax; Notice and Collection (1) It shall be unlawful for any person to sell, store for sale, distribute for sale, or manufacture beer without first making applications to and obtaining a permit from the beer board. The application shall be made on such form as the board shall pre scribe and/or furnish, and pursuant to Tennessee Code Annotated, § 57-5-101(b), and shall be accompanied by a non-refundable application fee of two hundred and fifty dollars ($250.00). Said fee shall be in the form of a cashier's check payable to the Town of Thompson's Station, Tennessee. Each applicant must be a person of good moral character and certify that he has read and is familiar with the provisions of this chapter.

(2) Privilege tax. There is hereby imposed on the business of selling, distribution, storing or manufacturing beer, an annual privilege tax of one hundred dollars ($100.00). Any person, firm, corporation, joint stock company, syndicated or association engaged in the sale,

distribution, storage or manufacture of beer shall remit the tax on January 1, 1994, and on or before each successive January 1, to the Town of Thompson's Station, Tennessee. At the time a new permit is issued to any business subject to this tax, the permit holder shall be required to pay the privilege tax on a prorated basis for each month or portion thereof remaining until the next tax payment date. (Ord. #96-001, April 2006)

(3) Notice and collection of the privilege tax. Pursuant to ~~TENN. CODE ANN~~Tenn. Code Ann. §57-5-104 (a)(3), the Town shall mail written notice to each permit holder of the payment date of the annual tax at least thirty (30) days prior to January 1. Notice shall be mailed to the address specified by the permit holder on its permit application, or at such other address as provided by the permit holder to the Town. If a permit holder does not pay the tax by January 31st or within thirty (30) days after written notice of the tax was mailed by the Town, whichever is later, then the Town shall notify the permit holder by certified mail, return receipt requested, that the tax payment is past due. If a permit holder does not pay the tax within ten (10) days after receiving notice of its delinquency by certified mail, then the Town may suspend or revoke the permit or impose a civil penalty pursuant to Tenn. Code Ann. § 57-5-108.

Formatted: Superscript

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(2) A beer permit issued hereunder shall be issued only in the name of the individual, manager or employee applicant. A permit, except as authorized stated in this chapter, shall continue to be valid so long as that individual, manager or employee is engaged in business at the location authorized in the permit. The individual, manager or employee is charged with compliance of this chapter at the permit location. A permit does not run with the land or business. (Ord. #96-001, April 2006)

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(1) An "on-premises permit" shall be used for the consumption of beer only on the premises. To qualify for an on-premises permit, an establishment, in addition to meeting the other regulations and restrictions in this chapter, must:

(a) Be a restaurant or eating place; and
(b) Be able to seat a minimum of thirty (30) people, including children, in booths and at tables, in addition to any other seating it may have; and

(c) Have all seating in the interior of the building or under a permanent roof.

(2) An "off-premises permit" shall be issued for the consumption of beer only off of the premises. To qualify for an off-premises permit, an establishment, in addition to meeting the other regulations herein, must;

(a) Be a grocery store or convenience type market; and

(b) In either case, be primarily engaged in the sale of grocery and personal and home care and cleaning articles, but may also sell gasoline.

(3) A "special event permit" may be issued by the beer board for the sale of beer for consumption on the premises of a special event upon an application describing the location and type of event. The beer board may waive the permit fee and tax for special events sponsored by a bona fide charitable or non-profit organization or a governmental entity. The duration of a special event beer permit shall not exceed seventy-two (72~~1~~) hours and shall not be issued to the same person or entity more than once within any thirty (30) day period. (Ord. #96-0001, April 1996, as amended by Ord. #08-012, June 2008)

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8-111. Issuance of permits to persons convicted of certain crimes prohibited. No beer permit shall be issued to any person who has been convicted for the possession, sale, manufacture or transportation of intoxicating liquor or any crime involving moral turpitude, within the past ten (10) years. No person, firm, corporation, joint-stock company, syndicate or association having at least a five percent (5%) ownership interest in the applicant shall have been convicted of any violation of the laws against possession, sale, manufacture, or transportation of beer or other alcoholic beverages or any crime involving moral turpitude within the past ten (10) years. (Ord. #96-001, April 1996)

8-112. Prohibited conduct or activi~~a~~ties by beer permit holders. It shall be unlawful for any beer permit holder to:

(1) Make or allow sale of beer between the hours of 12:00 midnight and 6:00am.;

(2) Allow any loud, unusual or obnoxious noises to emanate from the premises;

(3) Make or allow any sale of beer to a person under twenty-one (21) years of age;

(4) Allow any person under twenty-one (21) years of age to loiter in or about his place of business;

(5) Make or allow any sale of beer to any intoxicated person or to any feeble-minded, insane or otherwise mentally incapacitated person;
(6) Allow durn persons to loiter about the premises;
(7) Serve, sell or allow the consumption on his premises of any alcoholic beverage with an alcoholic content of more than five percent (5%) by weight; and
(8) "Off-premises" permit holders hall not allow the consumption of alcohol in or about their premises whatsoever;
(9) Allow gambling on his premises;
(10) "On-premises" permit holders shall not fail to provide and maintain sanitary toilet facilities;
(11) Allow an employee of the permit holder who is under the age of eighteen (18) years of to sell beer. (Ord. #96-001, April 1996, as amended by Ord. #07-009, Sept. 2007)

8-113. Suspension and revocation of beer permits. (1) The beer board shall have the power to suspend or revoke any beer permit issued under the provisions of this chapter when the holder thereof is guilty of making a false statement or misrepresentation in his application or of violation any of the provisions of this chapter. However, no beer permit shall be suspended or revoked until a public hearing is held by the board after reasonable notice to all the known parties in interest. ~~Suspension or revocation proceedings may be initiated by any member of the beer board.~~ Suspension or revocation proceedings may be initiated by any member of the beer board upon said member's written request to the chairman of the beer board. Said request~~, to occur~~shall be in writing, and ~~with~~ a notice to the beer permit holder of the initiation of such proceedings shall be sent by certified mail. The n~~N~~otice shall include the basis of such initiation, and the date, time and location of any such public hearing for consideration of such suspension or revocation.

(2) Pursuant to Tennessee Code Annotated, § 57-5-608, the beer board shall not revoke or suspend the permit of a "responsible vendor" qualified under the requirements of Tennessee Code Annotated, § 57-5-606 for a clerk's illegal sale of beer to a minor if the clerk is properly certified and has attended annual meetings since the clerk's original certification, unless the vendor's status as a certified responsible vendor has been revoked by the alcoholic beverage commission. If the responsible vendor's certification has been revoked, the vendor shall be punished by the beer board as if the vendor were not certified as a responsible vendor. "Clerk" means any person working in a capacity to sell beer directly to consumers for off-premises consumption. Under Tennessee Code Annotated, § 57-5-608, the alcoholic beverage commission shall revoke a vendor's status as a responsible vendor upon notification by the beer board that the board has made a final determination that the vendor has sold beer to a minor for the second time in a consecutive twelve (12) month period. The revocation shall be for three (3) years. (Ord. #96-001, April 1996, as amended by Ord. #07-009, Sept. 2007)

8-114. Civil penalty in lieu of revocation or suspension.

(1) Definition. "Responsible vendor" means a person, corporation or other entity that has been issued a permit to sell beer for off-premises consumption and has received certification by the Tennessee Alcoholic Beverage Commission under the "Tennessee Responsible Vendor Act of 2006," Tennessee Code Annotated, § 57-5-601, et seq.

(2) Penalty, revocation or suspension. The beer board may, at the time it imposes a revocation or suspension, offer a permit holder that is not a responsible vendor the alternative of paying a civil penalty not to exceed two thousand five hundred dollars ($2,500.00) for each offense of making or permitting to be made any sales to minors, or a civil penalty not to exceed one thousand dollars ($1,000.00) for any other offense.

The beer board may impose on a responsible vendor a civil penalty not to exceed one thousand dollars ($1,000.00) for each offense of making or permitting to be made any sales to minors or for any other offense.

If a civil penalty is offered as an alternative to revocation or suspension, the holder shall have seven (7) days within which to pay the civil penalty before the revocation or suspension shall be imposed. If the civil penalty is paid within that time, the revocation or suspension shall be deemed withdrawn.

Payment of the civil penalty in lieu of revocation or suspension by a permit holder shall be an admission by the holder of the violation so charged and shall be paid to the exclusion of any other penalty that the town may impose. (Ord. #07-009, Sept. 2007)

8-115. Revocation of clerk's certification for sale to minor. If the beer board determines that a clerk of an off-premises beer permit holder certified under Tennessee Code Annotated, § 57-5-606, sold beer to a minor, the beer board shall report the name of the clerk to the alcoholic beverage commission within fifteen (15) days of the determination of the sale. The certification of the clerk shall be invalid and the clerk may not reapply for a new certificate for a period of one (1) year from the date of the beer board's determination. (Ord. #07-009, Sept. 2007)

ORDINANCE NO. 2020-003

AN ORDINANCE OF THE TOWN OF THOMPSON'S STATION, TENNESSEE, TO AMEND TITLE 12, CHAPTER 4 OF THE MUNICIPAL CODE REGARDING THE IMPACT ASSESSMENT FEE.

WHEREAS, the Town is authorized pursuant to Tennessee Code Annotated § 6-2-201(15) and other applicable law to assess fees for use of or impact upon certain public infrastructure, including roadways, public parks, and recreation facilities; and

WHEREAS, the Town is experiencing and anticipating both rapid growth and an increase in commercial development which requires public facilities and infrastructure improvements to meet the demand created by such growth and development;

WHEREAS, the Board of Mayor and Aldermen has determined that it is in the best interest of the Town to amend the current code provisions related to its Impact Assessment Fees.

NOW, THEREFORE, BE IT ORDAINED by the Town of Thompson's Station as follows:

Section 1. That Title 12, Chapter 4 of the Municipal Code, *Impact Fees*, be deleted in its entirety upon the effective date of this ordinance and shall be amended by adding a new Chapter 4, *Impact Fees*, as set forth below:

CHAPTER 4

IMPACT FEES

SECTION

12-401. Title, authority, applicability (a) This article shall be known and may be cited as the "Impact Fee Ordinance."

(b) Authority to implement this article is granted under the General Law Mayor-Aldermanic Charter, and such other additional powers granted to municipalities by the state legislature. The enumeration of particular powers in this article is not exclusive of others, not restrictive of general words or phrases granting powers and all powers shall be construed so as to permit the town to exercise freely any one or more such powers.

(c) Except as provided herein, this article shall be applicable to all new buildings constructed or additions to existing buildings constructed after the effective date of this Ordinance.

(d) This chapter is intended to impose an impact fee at the time of building permit or certificate of occupancy issuance, in an amount based upon the demand generated by new development. The Town will meet, to the extent finances permit through the use of general revenues, all capital improvement needs associated with existing development. This chapter shall be uniformly applicable to development that occurs within the Town limits and the urban growth boundary.

12-402. Definitions. The following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

For the purpose of this chapter, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

Board or BOMA. The duly constituted governing body of the Town, or the Board of Mayor and Aldermen.

Building Permit. The permit required for new construction and additions pursuant to the International Building Code heretofore adopted. The term *Building Permit*, as used herein, shall not be deemed to include permits required for remodeling, rehabilitation or other improvements to an existing structure or rebuilding a damaged or destroyed structure; provided, there is no increase in gross floor area or number of dwelling units resulting therefrom.

Building. Any permanent structure having a roof and used or built for the enclosure or shelter of persons, animals, vehicles, goods, merchandise, equipment, materials or property of any kind.

Capital Improvements.

(1) Public facilities that are treated as capitalized expenses according to generally accepted accounting principles and does not include costs associated with the operation, administration, maintenance or replacement of capital improvements.

(2) Any and/or all of the following, and including acquisition of land, construction, improvements, equipping and installing of same and which facilities are identified in the capital improvements plan to be financed by the imposition of an impact fee:
(a) Parks and recreational facilities;
(b) Road systems;
(c) Other facilities the costs of which may be substantially attributed to new development.

Development. Any human-made change to improved or unimproved real property, the use of any principal structure or land or any other activity that requires issuance of a building permit.

Gross Floor Area. The total square feet of enclosed space on the floor or floors comprising the structure. The total of the gross horizontal area of all floors that will be heated or cooled, including usable basements, cellars and attics, below the roof and within the outer surface of the main walls of principal or accessory buildings or the centerlines of a party wall separating such buildings or portions thereof, or within lines drawn parallel to and two feet within the roof line of any building or portions thereof without walls, but excluding enclosed parking areas, farm buildings, and arcades, porticoes and similar open areas that are accessible to the general public and are not designed or used as sales, display, storage, service or production areas.

Impact Fee. Any construction privilege tax charge, fee or assessment levied as a condition of issuance of a building permit or development approval for the purpose of funding any portion of the costs of capital improvements or any public facilities attributable to accommodating the additional demands created by new development.

Site. The land on which development takes place.

Town. The Town of Thompson's Station, a duly constituted political subdivision of the State of Tennessee.

12-403. Intent and Purposes. (a) The board of mayor and aldermen has determined that the rapid growth rate which the town has experienced and is expected to experience in the foreseeable future necessitates capital improvements and makes it necessary to regulate land development and building activity that generates increased traffic and other impacts within the Town. It is the intent of the Town that the capacity of the road network in the community should handle the traffic demands generated by new development, thus maintaining a satisfactory quality of life in Thompson's Station. Additionally, the demands on the public parks and recreational facilities caused by new development must be addressed to maintain a satisfactory quality of life in Thompson's Station.

(b) In order to finance the necessary capital improvements required to meet the traffic demands, park demands, and recreational facility demands, as well as other capital improvement projects, created by growth in population and business activity, a variety of financial sources shall be used to fund the planning, engineering, and construction of future capital improvement projects.

(c) It shall be the purpose of this chapter to establish a regulatory system and method by which the Town calculates, collects, and obligates a regulatory fee hereinafter referred to as the impact fee. Except as otherwise provided for in this chapter, this fee shall be assessed on each new building or addition to an existing structure constructed within the Town. The fee shall provide a portion of the revenues required to complete infrastructure and public works projects necessary to service this new development.

(d) The public health, safety, and general welfare is protected when adequate financial resources are available to fund the public works projects needed to handle traffic demand generated from land development activities and the construction of new buildings in the Town.

(e) The intent of this chapter is to allow for continued land development and new building construction in accordance with orderly fulfillment of appropriate capital improvement projects.

(f) The impact fee shall be assessed to each new land development and building based on a reasonably estimated proportionate share of the anticipated cost of future public works projects attributable to new development.

12-404. Basis for fees. The impact fee schedule shall be based upon use of available land use planning data related to the Town, other transportation studies in the vicinity and other available transportation related studies and traffic general analysis and basic assumptions as updated by the Institute of Transportation Engineers (ITE), as well as any other information relevant to traffic, roadways, public parks, and recreational facilities, including census data and other reliable metrics.

12-405. Use of fees. The impact fees generated by this ordinance shall be used to pay for the public infrastructure required by new development, to include roadways, public parks, and recreational facilities. Upon the recommendation of the Town Administrator, the Board shall approve all impact fee fund expenditures as related to the costs of capital improvements. The impact fees shall be segregated into trust funds for each type of impact fee. Road impact fee funds shall be used only for capacity-expanding improvements to arterial and collector roads. Park impact fee funds shall be used only for new or expanded parks and recreational facilities.

12-406. Fee calculations. (a) A schedule of impact fees, based on the method of calculation promulgated by this chapter, shall be adopted herewith.

(b) For each land use, a demand factor shall be determined for use in calculating the appropriate impact fee. Such demand factors shall be based on the average travel demand generated by new development, with regard to roads, and based on the applicable service unit or equivalent dwelling unit used at the time by the Town, with regard to public parks and recreation facilitates.

(c) The impact fee schedule shall be based upon a written analysis that demonstrates that the adopted fees do not exceed the proportionate share of the costs required to accommodate the increased demands on public facilities likely to be generated by new development.

(d) The following fees are the maximum amounts calculated in the Road and Park Impact Fee Study prepared by Duncan Associates in 2019. These fees are hereby adopted at 100% of the maximum amounts.

		Impact Fee per Development Unit		
Land Use	Unit	Roads	Parks	Total
Single-Family Detached	Dwelling	$3,593	$488	$4,081
Multi-Family	Dwelling	$2,786	$327	$3,113
Mobile Home Park	Pad	$1,903	$488	$2,391
Senior Adult Housing, Detached	Dwelling	$1,621	$488	$2,109
Senior Adult Housing, Attached	Dwelling	$1,408	$327	$1,735

Golf Course	Acre	$1,028	$0	$1,028
Hotel/Motel	Room	$2,230	$0	$2,230
Retail/Commercial/Shopping Center	1,000 sf	$5,601	$0	$5,601
Restaurant, Standard	1,000 sf	$10,744	$0	$10,744
Restaurant, Drive-Through	1,000 sf	$23,904	$0	$23,904
Gas Station w/Convenience Mkt.	Pump	$9,274	$0	$9,274
Office/Institutional	1,000 sf	$4,238	$0	$4,238
Elementary/Secondary School	1,000 sf	$1,312	$0	$1,312
Community College	1,000 sf	$2,963	$0	$2,963
Day Care Center	1,000 sf	$3,487	$0	$3,487
Hospital	1,000 sf	$3,275	$0	$3,275
Nursing Home	1,000 sf	$1,997	$0	$1,997
Place of Worship	1,000 sf	$2,119	$0	$2,119
Industrial	1,000 sf	$1,590	$0	$1,590
Warehouse	1,000 sf	$823	$0	$823
Mini-Warehouse	1,000 sf	$711	$0	$711

Note: square feet based on gross floor area; definitions of land uses are provided in the impact fee study, which is attached hereto and incorporated herein as Exhibit "A".

(e) The fee schedule shown above in subsection (d) shall be adjusted on January 1st of each year by the percentage change in the *Engineering News-Record* Construction Cost Index for the most recent available twelve (12) month period, provided that updated fees have not been adopted based upon a new impact fee study within the preceding eight (8) months. If the aforementioned index becomes unavailable, an alternative and reasonably comparable cost index shall be used as determined by the BOMA by resolution. The Town Recorder shall ensure that (1) a notice of the adjusted impact fee schedule is posted on the Town's website at least two weeks prior to the January 1st effective date of the adjusted fees, and (2) the current fees are at all times available to the public on the Town's website and by request.

(f) Within sixty (60) days of January 1st in odd-numbered years, beginning in 2023, the BOMA shall review the then effective impact fee schedule under this Chapter and determine if said schedule should be adjusted in the best interests of the Town.

(g) In the event of redevelopment or change of use, each type of fee shall be assessed based on the net impact of the proposed development compared to the previously-existing development. This will be determined as the total potential road or park fee for the proposed development less the total fee under the current fee schedule for the previous development. No road fee will be due and no refund will be provided if the net impact on roads is negative. Similarly, no park fee will be due and no refund will be provided if the net impact on parks is negative.

12-407. Payment of fee; appeals. (a) Payment of the impact fee shall be made at the time that a building permit is issued by the town. No building permit shall be issued for a development unless the impact fee is imposed and calculated pursuant to this chapter.

(b) Appeals. (1) A person may challenge the calculation or application of a fee imposed pursuant to this chapter by filing with the Town Administrator a written notice of appeal with a full statement of the grounds and an appeal fee of two hundred and fifty dollars ($250.00) or such other amount as may be fixed from time to time by resolution of the Board. Notwithstanding the appeal, the building permit for the land use may be issued if the notice of appeal is accompanied by a bond, cashier's check or other security acceptable to the Town

Administrator in an amount equal to the fee. Appeals filed pursuant to this section must be submitted prior to issuance of the building permit or within ten (10) days thereafter.

(2) The appellant bears the burden of demonstrating that the amount of the fee was not calculated or applied according to the procedures established in this chapter.

(3) The board of zoning appeals shall hear the appeal at a regularly scheduled meeting or special called meeting which falls within thirty (30) days following receipt of the notice of appeal by the Town Administrator. The determination of the board of zoning appeals shall be announced at the conclusion of the hearing or at the next regular meeting of the board of zoning appeals. The determination of the board of zoning appeals shall be final.

12-408. Credits. (a) A property owner may elect, with written permission of the Board, to construct an eligible capital improvement listed in the capital improvements plan. If the property owner elects to make such improvement, the property owner must enter into an agreement with the Town prior to issuance of any building permit. The agreement must establish the estimated cost of the improvement, the schedule for initiation and completion of the improvement, a requirement that the improvement be completed to Town standards, and such other terms and conditions as deemed necessary by the Town. The Town must review the improvement plan, verify costs and time schedules, determine if the improvement is an eligible improvement, and determine the amount of the applicable credit for such improvement to be applied to the otherwise applicable impact fee prior to issuance of any building permit. In no event may the Town provide a refund for a credit that is greater than the applicable impact fee. If, however, the amount of the credit is calculated to be greater than the amount of the impact fee due, the property owner may utilize such excess credit toward the impact fees imposed on other building permits for development on the same site and in the same ownership. Credits shall only be applied against the type of impact fee (e.g., roads, parks) that is the same as the type of the improvement.

(b) No credits shall be given for the construction of local on-site facilities required by zoning, subdivision or other Town regulations.

Section 5. All Prior Conflicting Ordinances Repealed; Interpretation. That upon the effective date of this ordinance, all prior ordinances and resolutions in conflict herewith be repealed.

Section 6. Severability. If any section, sentence, clause or phrase of this ordinance should be held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause, or phrase of this ordinance.

Section 7. Effective date. This ordinance shall take effect upon its passage on final reading, provided that it shall not take effect until July 1, 2020, the public welfare requiring it.

Duly approved and adopted by the Board of Mayor and Aldermen of the Town of Thompson's Station, Tennessee.

_____
Mayor Corey Napier

ATTEST:

_____
Town Recorder

Passed First Reading: _____

Passed Second Reading: _____

Submitted to Public Hearing on the ____ day of _____ 2020, at 7:00 p.m., after being advertised in the *Williamson AM* Newspaper on the ____ day of _____, 2020.

APPROVED AS TO FORM AND LEGALITY:

_____
Town Attorney

ORDINANCE NO. 2020-003

AN ORDINANCE OF THE TOWN OF THOMPSON'S STATION, TENNESSEE, TO AMEND TITLE 12, CHAPTER 4 OF THE MUNICIPAL CODE REGARDING THE IMPACT ASSESSMENT FEE.

WHEREAS, the Town is authorized pursuant to Tennessee Code Annotated § 6-2-201(15) and other applicable law to assess fees for use of or impact upon certain public infrastructure, including roadways, public parks, and recreation facilities; and

WHEREAS, the Town is experiencing and anticipating both rapid growth and an increase in commercial development which requires public facilities and infrastructure improvements to meet the demand created by such growth and development;

WHEREAS, the Board of Mayor and Aldermen has determined that it is in the best interest of the Town to amend the current code provisions related to its Impact Assessment Fees.

NOW, THEREFORE, BE IT ORDAINED by the Town of Thompson's Station as follows:

Section 1. That Title 12, Chapter 4 of the Municipal Code, *Impact Fees*, be deleted in its entirety upon the effective date of this ordinance and shall be amended by adding a new Chapter 4, *Impact Fees*, as set forth below:

CHAPTER 4

IMPACT FEES

SECTION

12-401. Title, authority, applicability (a) This article shall be known and may be cited as the "Impact Fee Ordinance."

(b) Authority to implement this article is granted under the General Law Mayor-Aldermanic Charter, and such other additional powers granted to municipalities by the state legislature. The enumeration of particular powers in this article is not exclusive of others, not restrictive of general words or phrases granting powers and all powers shall be construed so as to permit the town to exercise freely any one or more such powers.

(c) Except as provided herein, this article shall be applicable to all new buildings constructed or additions to existing buildings constructed after the effective date of this Ordinance.

(d) This chapter is intended to impose an impact fee at the time of building permit or certificate of occupancy issuance, in an amount based upon the demand generated by new development. The Town will meet, to the extent finances permit through the use of general revenues, all capital improvement needs associated with existing development. This chapter shall be uniformly applicable to development that occurs within the Town limits and the urban growth boundary.

12-402. Definitions. The following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

For the purpose of this chapter, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

Board or BOMA. The duly constituted governing body of the Town, or the Board of Mayor and Aldermen.

Building Permit. The permit required for new construction and additions pursuant to the International Building Code heretofore adopted. The term *Building Permit*, as used herein, shall not be deemed to include permits required for remodeling, rehabilitation or other improvements to an existing structure or rebuilding a damaged or destroyed structure; provided, there is no increase in gross floor area or number of dwelling units resulting therefrom.

Building. Any permanent structure having a roof and used or built for the enclosure or shelter of persons, animals, vehicles, goods, merchandise, equipment, materials or property of any kind.

Capital Improvements.

(1) Public facilities that are treated as capitalized expenses according to generally accepted accounting principles and does not include costs associated with the operation, administration, maintenance or replacement of capital improvements.

(2) Any and/or all of the following, and including acquisition of land, construction, improvements, equipping and installing of same and which facilities are identified in the capital improvements plan to be financed by the imposition of an impact fee:
(a) Parks and recreational facilities;
(b) Road systems;
(c) Other facilities the costs of which may be substantially attributed to new development.

Development. Any human-made change to improved or unimproved real property, the use of

any principal structure or land or any other activity that requires issuance of a building permit.

Gross Floor Area. The total square feet of enclosed space on the floor or floors comprising the structure. The total of the gross horizontal area of all floors that will be heated or cooled, including usable basements, cellars and attics, below the roof and within the outer surface of the main walls of principal or accessory buildings or the centerlines of a party wall separating such buildings or portions thereof, or within lines drawn parallel to and two feet within the roof line of any building or portions thereof without walls, but excluding enclosed parking areas, farm buildings, and arcades, porticoes and similar open areas that are accessible to the general public and are not designed or used as sales, display, storage, service or production areas.

Impact Fee. Any construction privilege tax charge, fee or assessment levied as a condition of issuance of a building permit or development approval for the purpose of funding any portion of the costs of capital improvements or any public facilities attributable to accommodating the additional demands created by new development.

Site. The land on which development takes place.

Town. The Town of Thompson's Station, a duly constituted political subdivision of the State of Tennessee.

12-403. Intent and Purposes. (a) The board of mayor and aldermen has determined that the rapid growth rate which the town has experienced and is expected to experience in the foreseeable future necessitates capital improvements and makes it necessary to regulate land development and building activity that generates increased traffic and other impacts within the Town. It is the intent of the Town that the capacity of the road network in the community should handle the traffic demands generated by new development, thus maintaining a satisfactory quality of life in Thompson's Station. Additionally, the demands on the public parks and recreational facilities caused by new development must be addressed to maintain a satisfactory quality of life in Thompson's Station.

(b) In order to finance the necessary capital improvements required to meet the traffic demands, park demands, and recreational facility demands, as well as other capital improvement projects, created by growth in population and business activity, a variety of financial sources shall be used to fund the planning, engineering, and construction of future capital improvement projects.

(c) It shall be the purpose of this chapter to establish a regulatory system and method by which the Town calculates, collects, and obligates a regulatory fee hereinafter referred to as the impact fee. Except as otherwise provided for in this chapter, this fee shall be assessed on each new building or addition to an existing structure constructed within the Town. The fee shall provide a portion of the revenues required to complete infrastructure and public works projects necessary to service this new development.

(d) The public health, safety, and general welfare is protected when adequate financial resources are available to fund the public works projects needed to handle traffic demand generated from land development activities and the construction of new buildings in the Town.

(e) The intent of this chapter is to allow for continued land development and new building construction in accordance with orderly fulfillment of appropriate capital improvement projects.

(f) The impact fee shall be assessed to each new land development and building based on a reasonably estimated proportionate share of the anticipated cost of future public works projects attributable to new development.

12-404. Basis for fees. The impact fee schedule shall be based upon use of available land use planning data related to the Town, other transportation studies in the vicinity and other available transportation related studies and traffic general analysis and basic assumptions as updated by the Institute of Transportation Engineers (ITE), as well as any other information relevant to traffic, roadways, public parks, and recreational facilities, including census data and other reliable metrics.

12-405. Use of fees. The impact fees generated by this ordinance shall be used to pay for the public infrastructure required by new development, to include roadways, public parks, and recreational facilities. Upon the recommendation of the Town Administrator, the Board shall approve all impact fee fund expenditures as related to the costs of capital improvements. The impact fees shall be segregated into trust funds for each type of impact fee. Road impact fee funds shall be used only for capacity-expanding improvements to arterial and collector roads. Park impact fee funds shall be used only for new or expanded parks and recreational facilities.

12-406. Fee calculations. (a) A schedule of impact fees, based on the method of calculation promulgated by this chapter, shall be adopted herewith.

(b) For each land use, a demand factor shall be determined for use in calculating the appropriate impact fee. Such demand factors shall be based on the average travel demand generated by new development, with regard to roads, and based on the applicable service unit or equivalent dwelling unit used at the time by the Town, with regard to public parks and recreation facilitates.

(c) The impact fee schedule shall be based upon a written analysis that demonstrates that the adopted fees do not exceed the proportionate share of the costs required to accommodate the increased demands on public facilities likely to be generated by new development.

(d) The following fees are the maximum amounts calculated in the Road and Park Impact Fee Study prepared by Duncan Associates in 2019. These fees are hereby adopted at 100% of the maximum amounts.

		Impact Fee per Development Unit		
Land Use	Unit	Roads	Parks	Total
Single-Family Detached	Dwelling	$3,593	$488	$4,081
Multi-Family	Dwelling	$2,786	$327	$3,113
Mobile Home Park	Pad	$1,903	$488	$2,391
Senior Adult Housing, Detached	Dwelling	$1,621	$488	$2,109
Senior Adult Housing, Attached	Dwelling	$1,408	$327	$1,735

Golf Course	Acre	$1,028	$0	$1,028
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Retail/Commercial/Shopping Center	1,000 sf	$5,601	$0	$5,601
Restaurant, Standard	1,000 sf	$10,744	$0	$10,744
Restaurant, Drive-Through	1,000 sf	$23,904	$0	$23,904
Gas Station w/Convenience Mkt.	Pump	$9,274	$0	$9,274
Office/Institutional	1,000 sf	$4,238	$0	$4,238
Elementary/Secondary School	1,000 sf	$1,312	$0	$1,312
Community College	1,000 sf	$2,963	$0	$2,963
Day Care Center	1,000 sf	$3,487	$0	$3,487
Hospital	1,000 sf	$3,275	$0	$3,275
Nursing Home	1,000 sf	$1,997	$0	$1,997
Place of Worship	1,000 sf	$2,119	$0	$2,119
Industrial	1,000 sf	$1,590	$0	$1,590
Warehouse	1,000 sf	$823	$0	$823
Mini-Warehouse	1,000 sf	$711	$0	$711

Note: square feet based on gross floor area; definitions of land uses are provided in the impact fee study, which is attached hereto and incorporated herein as Exhibit "A".

(e) The fee schedule shown above in subsection (d) shall be adjusted on January 1st of each year by the percentage change in the *Engineering News-Record* Construction Cost Index for the most recent available twelve (12) month period, provided that updated fees have not been adopted based upon a new impact fee study within the preceding eight (8) months. If the aforementioned index becomes unavailable, an alternative and reasonably comparable cost index shall be used as determined by the BOMA by resolution. The Town Recorder shall ensure that (1) a notice of the adjusted impact fee schedule is posted on the Town's website at least two weeks prior to the January 1st effective date of the adjusted fees, and (2) the current fees are at all times available to the public on the Town's website and by request.

(f) Within sixty (60) days of January 1st in odd-numbered years, beginning in 2023, the BOMA shall review the then effective impact fee schedule under this Chapter and determine if said schedule should be adjusted in the best interests of the Town.

(g) In the event of redevelopment or change of use, each type of fee shall be assessed based on the net impact of the proposed development compared to the previously-existing development. This will be determined as the total potential road or park fee for the proposed development less the total fee under the current fee schedule for the previous development. No road fee will be due and no refund will be provided if the net impact on roads is negative. Similarly, no park fee will be due and no refund will be provided if the net impact on parks is negative.

12-407. Payment of fee; appeals. (a) Payment of the impact fee shall be made at the time that a building permit is issued by the town. No building permit shall be issued for a development unless the impact fee is imposed and calculated pursuant to this chapter.

(b) Appeals. (1) A person may challenge the calculation or application of a fee imposed pursuant to this chapter by filing with the Town Administrator a written notice of appeal with a full statement of the grounds and an appeal fee of two hundred and fifty dollars ($250.00) or such other amount as may be fixed from time to time by resolution of the Board. Notwithstanding the appeal, the building permit for the land use may be issued if the notice of appeal is accompanied by a bond, cashier's check or other security acceptable to the Town

Administrator in an amount equal to the fee. Appeals filed pursuant to this section must be submitted prior to issuance of the building permit or within ten (10) days thereafter.

(2) The appellant bears the burden of demonstrating that the amount of the fee was not calculated or applied according to the procedures established in this chapter.

(3) The board of zoning appeals shall hear the appeal at a regularly scheduled meeting or special called meeting which falls within thirty (30) days following receipt of the notice of appeal by the Town Administrator. The determination of the board of zoning appeals shall be announced at the conclusion of the hearing or at the next regular meeting of the board of zoning appeals. The determination of the board of zoning appeals shall be final.

12-408. Credits. (a) A property owner may elect, with written permission of the Board, to construct an eligible capital improvement listed in the capital improvements plan. If the property owner elects to make such improvement, the property owner must enter into an agreement with the Town prior to issuance of any building permit. The agreement must establish the estimated cost of the improvement, the schedule for initiation and completion of the improvement, a requirement that the improvement be completed to Town standards, and such other terms and conditions as deemed necessary by the Town. The Town must review the improvement plan, verify costs and time schedules, determine if the improvement is an eligible improvement, and determine the amount of the applicable credit for such improvement to be applied to the otherwise applicable impact fee prior to issuance of any building permit. In no event may the Town provide a refund for a credit that is greater than the applicable impact fee. If, however, the amount of the credit is calculated to be greater than the amount of the impact fee due, the property owner may utilize such excess credit toward the impact fees imposed on other building permits for development on the same site and in the same ownership. Credits shall only be applied against the type of impact fee (e.g., roads, parks) that is the same as the type of the improvement.

(b) No credits shall be given for the construction of local on-site facilities required by zoning, subdivision or other Town regulations.

Section 5. All Prior Conflicting Ordinances Repealed; Interpretation. That upon the effective date of this ordinance, all prior ordinances and resolutions in conflict herewith be repealed.

Section 6. Severability. If any section, sentence, clause or phrase of this ordinance should be held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause, or phrase of this ordinance.

Section 7. Effective date. This ordinance shall take effect upon its passage on final reading, provided that it shall not take effect until July 1, 2020, the public welfare requiring it.

Duly approved and adopted by the Board of Mayor and Aldermen of the Town of Thompson's Station, Tennessee.

_____
Mayor Corey Napier

ATTEST:

_____
Town Recorder

Passed First Reading: _____

Passed Second Reading: _____

Submitted to Public Hearing on the ____ day of _____ 2020, at 7:00 p.m., after being advertised in the *Williamson AM* Newspaper on the ____ day of _____, 2020.

APPROVED AS TO FORM AND LEGALITY:

_____
Town Attorney

RESOLUTION NO. 2019-007

A RESOLUTION OF THE TOWN OF THOMPSON'S STATION, TENNESSEE TO APPROVE AN AGREEMENT WITH DUNCAN & ASSOCIATES TO CONDUCT AN IMPACT FEE STUDY

WHEREAS, the Town advertised and received responses to its Request for Qualifications ("RFQ") for a contractor to conduct an impact fee study (the "Project"); and.

WHEREAS, the Board of Mayor and Aldermen previously authorized the Mayor and Town Administrator to enter into negotiations for an agreement for the Project with Duncan & Associates for the Project.

NOW, THEREFORE, BE IT RESOLVED by the Board of Mayor and Aldermen of the Town of Thompson's Station as follows:

That the agreement with Duncan & Associates for the Project attached hereto as Exhibit A is approved and the Mayor is authorized to sign it on behalf of the Town.

RESOLVED AND ADOPTED this 12 day of February 2019.

Corey Napier, Mayor

ATTEST:

Jennifer Jones, Town Recorder

APPROVED AS TO LEGALITY AND FORM:

Todd Moore, Town Attorney

PROFESSIONAL SERVICES AGREEMENT
BETWEEN TOWN OF THOMPSON'S STATION AND JAMES DUNCAN AND ASSOCIATES, INC.

THIS PROFESSIONAL SERVICES AGREEMENT ("Agreement") is entered into by and between the Town of Thompson's Station, a Tennessee municipal corporation ("Town"), and James Duncan and Associates, Inc., a Texas Corporation doing business as Duncan Associates ("Consultant").

WHEREAS, Town has determined that it requires professional services to prepare an impact fee study; and

WHEREAS, Town advertised and received responses to its Request for Qualifications ("RFQ") for a Consultant to perform these services.

WHEREAS, Consultant is qualified to perform such professional services by virtue of its experience and the training, education and expertise of its principals and employees;

WHEREAS, Consultant is willing to perform such services in accordance with the terms and conditions set forth in this Agreement.

NOW, THEREFORE, for and in consideration of the mutual covenants and conditions herein contained, Town and Consultant agree as follows:

1. DEFINITIONS

"Scope of Services": Such professional services as are set forth in Exhibit A attached hereto and incorporated herein by reference.

"Commencement Date": The date notice to proceed is provided by Town to Consultant following execution of this agreement.

2. TERM

The term of this Agreement shall commence at 12:00 a.m. on the Commencement Date and shall expire upon completion of the Scope of Services unless extended by written agreement of the parties or terminated earlier in accordance with Section 14 ("Termination") below. Consultant understands and agrees that the timely completion of these tasks is an important and material condition of this Agreement.

3. CONSULTANT'S SERVICES

Consultant shall perform the services identified in the Scope of Services. Town shall have the right to request, in writing, changes in the Scope of Services. Any such changes mutually agreed upon by the parties, and any corresponding increase or decrease in compensation, shall be incorporated by written amendment to this Agreement.

Consultant shall perform all work to the highest professional standards of Consultant's profession. Consultant shall comply with all applicable federal, state and local laws and regulations, including the conflict of interest provisions of the Town Municipal Code.

During the term of this Agreement, Consultant shall not perform any work for another person or entity for whom Consultant was not working at the Commencement Date if *both* (i) such work would require Consultant to abstain from a decision under this Agreement pursuant to a conflict of interest statute and (ii) Town has not consented in writing to Consultant's performance of such work.

Consultant represents that it has, or will secure at its own expense, all personnel required to perform the services identified in the Scope of Services. All such services shall be performed by Consultant or under its supervision, and all personnel engaged in the work shall be qualified to perform such services.

Clancy Mullen shall be Consultant's project administrator and shall have direct responsibility for management of Consultant's performance under this Agreement. No change shall be made in Consultant's project administrator without Town's prior written consent.

4. COMPENSATION

Town agrees to compensate Consultant for the services provided under this Agreement, and Consultant agrees to accept in full satisfaction for such services, payments pursuant to Exhibit B for a [road impact fees study] [road and park impact fee study]

In no event shall the total compensation and costs payable to Consultant under this Agreement exceed the sum of **Thirty-Six Thousand Dollars ($36,000.00)** unless specifically approved in advance and in writing by Town.

5. OWNERSHIP OF WRITTEN PRODUCTS

All reports, documents or other written material ("written products" herein) developed by Consultant in the performance of this Agreement shall be and remain the property of Town without restriction or limitation upon its use or dissemination by Town. Consultant may take and retain copies of such written products as desired, but no such written products shall be the subject of a copyright application by Consultant.

6. RELATIONSHIP OF PARTIES

Consultant is, and shall at all times remain as to Town, a wholly independent contractor. Consultant shall have no power to incur any debt, obligation, or liability on behalf of Town or otherwise to act on behalf of Town as an agent. Neither Town nor any of its agents shall have control over the conduct of Consultant or any of Consultant's employees, except as set forth in this Agreement. Consultant shall not represent that it is, or that any of its agents or employees are, in any manner employees of Town.

7. CONFIDENTIALITY

All data, documents, discussion, or other information developed or received by Consultant or provided for performance of this Agreement are deemed confidential and shall not be disclosed by Consultant without prior written consent by Town. Town shall grant such consent if disclosure is legally required. Upon request, all Town data shall be returned to Town upon the termination or expiration of this Agreement.

8. INDEMNIFICATION

The parties agree that Town, its officers, agents, employees and volunteers should, to the fullest extent permitted by law, be protected from any and all loss, injury, damage, claim, lawsuit, cost, expense, attorneys' fees, litigation costs, or any other cost arising out of or in any way related to the performance of this Agreement. Accordingly, the provisions of this indemnity provision are intended by the parties to be interpreted and construed to provide the Town with the fullest protection possible under the law. Consultant acknowledges that Town would not enter into this Agreement in the absence of Consultant's commitment to indemnify and protect Town as set forth herein.

To the fullest extent permitted by law, Consultant shall indemnify, hold harmless and defend Town, its officers, agents, employees and volunteers from and against any and all claims and losses, costs or expenses for any damage due to death or injury to any person and injury to any property resulting from any alleged intentional, reckless, negligent, or otherwise wrongful acts, errors or omissions of Consultant or any of its officers, employees, servants, agents, or subcontractors in the performance of this Agreement. Such costs and expenses shall include reasonable attorneys' fees incurred by counsel of Town's choice.

Town does not waive any immunities, defenses or tort liability limits that it may possess under the Tennessee Governmental Tort Liability Act or other law.

9. INSURANCE

During the term of this Agreement, Consultant shall carry, maintain, and keep in full force and effect insurance against claims for death or injuries to persons or damages to property that may arise from or in connection with Consultant's performance of this Agreement. Such insurance shall be of the types and in the amounts as set forth below:

Comprehensive General Liability Insurance with coverage limits of not less than One Million Dollars ($1,000,000) including products and operations hazard, contractual insurance, broad form property damage, independent consultants, personal injury, underground hazard, and explosion and collapse hazard where applicable.

Automobile Liability Insurance for vehicles used in connection with the performance of this Agreement with minimum limits of One Million Dollars ($1,000,000) per claimant and One Million dollars ($1,000,000) per incident.

Worker's Compensation Insurance as required by the laws of the State of Tennessee.

Professional Errors and Omissions Insurance with coverage limits of not less than One Million Dollars ($1,000,000).

Consultant shall require each of its subcontractors to maintain insurance coverage that meets all of the requirements of this Agreement. The policy or policies required by this Agreement shall be issued by an insurer admitted in the State of Tennessee and with a rating of at least A:VII in the latest edition of Best's Insurance Guide.

Consultant agrees that if it does not keep the aforesaid insurance in full force and effect, Town may either (i) immediately terminate this Agreement; or (ii) take out the necessary insurance and pay, at Consultant's expense, the premium thereon.

At all times during the term of this Agreement, Consultant shall maintain on file with the Town a certificate or certificates of insurance showing that the aforesaid policies are in effect in the required amounts and naming the Town and its officers, employees, agents and volunteers as additional insureds. Consultant shall, prior to commencement of work under this Agreement, file with the Town such certificate(s).

Consultant shall provide proof that policies of insurance required herein expiring during the term of this Agreement have been renewed or replaced with other policies providing at least the same coverage. Such proof will be furnished at least two weeks prior to the expiration of the coverages.

The General Liability Policy of insurance required by this Agreement shall contain an endorsement naming Town and its officers, employees, agents and volunteers as additional insureds. The General Liability Policy required under this Agreement shall contain an endorsement providing that the policies cannot be canceled or reduced except on thirty days' prior written notice to Town. Consultant agrees to require its insurer to modify the certificates of insurance to delete any exculpatory wording stating that failure of the insurer to mail written notice of cancellation imposes no obligation, and to delete the word "endeavor" with regard to any notice provisions.

The insurance provided by Consultant shall be primary to any coverage available to Town. Any insurance or self-insurance maintained by Town and/or its officers, employees, agents or volunteers, shall be in excess of Consultant's insurance and shall not contribute with it.

All insurance coverage provided pursuant to this Agreement shall not prohibit Consultant, and Consultant's employees, agents or subcontractors, from waiving the right of subrogation prior to a loss. Consultant hereby waives all rights of subrogation against the Town.

Any deductibles or self-insured retentions must be declared to and approved by the Town. At the option of Town, Consultant shall either reduce or eliminate the deductibles or self-insured retentions with respect to Town, or Consultant shall procure a bond or other security guaranteeing payment of losses and expenses.

Procurement of insurance by Consultant shall not be construed as a limitation of Consultant's liability or as full performance of Consultant's duties to indemnify, hold harmless and defend under Section 10 of this Agreement.

10. MUTUAL COOPERATION

Town shall provide Consultant with all pertinent data, documents and other requested information as is reasonably available for the proper performance of Consultant's services under this Agreement.

In the event any claim or action is brought against Town relating to Consultant's performance in connection with this Agreement, Consultant shall render any reasonable assistance that Town may require.

It is agreed that all claims, disputes, or other matters in question arising out of or related to this Agreement shall be submitted to nonbinding mediation before any legal proceeding is commenced. The parties shall equally bear the fees and expenses charged by the mediator.

11. RECORDS AND INSPECTIONS

Consultant shall maintain full and accurate records with respect to all matters covered under this Agreement for a period of three years after the expiration or termination of this Agreement. Town shall have the right to access and examine such records during normal business hours, without charge, or to request copies of such records at its expense.

12. PERMITS AND APPROVALS

Consultant shall obtain, at its sole cost and expense, all permits and regulatory approvals necessary in the performance of this Agreement. This includes, but shall not be limited to, encroachment permits and building and safety permits and inspections.

13. NOTICES

Any notices, bills, invoices, or reports required by this Agreement shall be deemed received on: (i) the day of delivery if delivered by hand, email or overnight courier service during Consultant's and Town's regular business hours; or (ii) on the third business day following deposit in the United States mail if delivered by mail, postage prepaid, to the addresses listed below (or to such other addresses as the parties may, from time to time, designate in writing).

If to the Town:

Town of Thompson's Station, Tennessee
Attn: Town Administrator
P.O. Box 100
Thompson's Station, Tennessee 37179

If to the Consultant:

Clancy Mullen, President
17409 Rush Pea Circle
Austin, TX 78738
clancy@duncanassociates.com

14. TERMINATION

Town shall have the right to terminate this Agreement for any reason on five calendar days' written notice to Consultant. Consultant shall have the right to terminate this Agreement for any reason on sixty calendar days' written notice to Town. Consultant agrees to cease all work under this Agreement on or before the effective date of any notice of termination. All Town data, documents, objects, materials or other tangible things shall be returned to Town upon the termination or expiration of this Agreement.

If Town terminates this Agreement due to no fault or failure of performance by Consultant, then Consultant shall be paid based on the work satisfactorily performed at the time of termination. In no event shall Consultant be entitled to receive more than the amount that would be paid to Consultant for the full performance of the services required by this Agreement.

15. GENERAL PROVISIONS

15.1 Consultant shall not delegate, transfer, subcontract or assign its duties or rights hereunder, either in whole or in part, without Town's prior written consent, and any attempt to do so shall be void and of no effect. Town shall not be obligated or liable under this Agreement to any party other than Consultant.

15.2 In the performance of this Agreement, Consultant shall not discriminate against any employee, subcontractor, or applicant for employment because of race, color, creed, religion, sex, marital status, sexual orientation, national origin, ancestry, age, physical or mental disability or medical condition.

15.3 The captions appearing at the commencement of the sections hereof, and in any paragraph thereof, are descriptive only and for convenience in reference to this Agreement. Should there be any conflict between such heading, and the section or paragraph thereof at the head of which it appears, the section or paragraph thereof, as the case may be, and not such heading, shall control and govern in the construction of this Agreement. Masculine or feminine pronouns shall be substituted for the neutral form and vice versa, and the plural shall be substituted for the singular form and vice versa, in any place or places herein in which the context requires such substitution(s).

15.4 The waiver by Town or Consultant of any breach of any term, covenant or condition herein contained shall not be deemed to be a waiver of such term, covenant or condition or of any subsequent breach of the same or any other term, covenant or condition herein contained. No term, covenant or condition of this Agreement shall be deemed to have been waived by Town or Consultant unless in writing.

15.5 Consultant shall not be liable for any failure to perform if Consultant presents acceptable evidence, that such failure was due to causes beyond the control and without the fault or negligence of Consultant.

15.6 Each right, power and remedy provided for herein or now or hereafter existing at law, in equity, by statute, or otherwise shall be cumulative and shall be in addition to every other right, power, or remedy provided for herein or now or hereafter existing at law, in equity, by statute, or otherwise. The exercise, the commencement of the exercise, or the forbearance of the exercise by any party of any one or more of such rights, powers or remedies shall not preclude the simultaneous or later exercise by such party of any of all of such other rights, powers or remedies. In the event legal action shall be necessary to enforce any term, covenant or condition herein contained, the party prevailing in such action, whether reduced to judgment or not, shall be entitled to its reasonable court costs, including accountants' fees, if any, and attorneys' fees expended in such action. The venue for any litigation shall be Williamson County, Tennessee.

15.7 If any term or provision of this Agreement or the application thereof to any person or circumstance shall, to any extent, be invalid or unenforceable, then such term or provision shall be amended to, and solely to, the extent necessary to cure such invalidity or unenforceability, and in its amended form shall be enforceable. In such event, the remainder of this Agreement, or the application of such term or provision to persons or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected thereby, and each term and provision of this Agreement shall be valid and be enforced to the fullest extent permitted by law.

15.8 This Agreement shall be governed and construed in accordance with the laws of the State of Tennessee.

15.9 All documents referenced as exhibits in this Agreement are hereby incorporated into this Agreement. In the event of any material discrepancy between the express provisions of this Agreement and the provisions of any document incorporated herein by reference, the provisions of this Agreement shall prevail. This instrument contains the entire Agreement between Town and Consultant with respect to the transactions contemplated herein. No other prior oral or written agreements are binding upon the parties. Amendments hereto or deviations herefrom shall be effective and binding only if made in writing and executed by Town and Consultant.

TO EFFECTUATE THIS AGREEMENT, the parties have caused their duly authorized representatives to execute this Agreement on the dates set forth below.

"Town"
Town of Thompson's Station

By: _____

Corey Napier, Mayor
Date: 2/12/19

"Consultant"
James Duncan and Associates, Inc.

By: _____

Clancy Mullen, President
Date: 2/21/19

Approved as to form:

By: _____
Town Attorney
Date: 3/18/19

EXHIBIT A
SCOPE OF SERVICES

Task 1: Project Organization/Data Collection

This task will involve data collection and project organization for the road (or road and park) impact fee study. Upon notice to proceed, the consultant will work with the Town's project manager to schedule a conference call or in-person meeting with key members of Town staff (an in-person meeting would involve additional costs that would be billed under Task 4). During the conference call or meeting, the consultant will gather available information related to the project, identify major policy issues involved in updating the road impact fee program, coordinate staff and consultant responsibilities and establish the project schedule. The Town should provide the consultant team, without charge, copies of all relevant plans, studies and documents needed to perform the scope of work. At the conclusion of the task, the consultant will prepare a memorandum summarizing the organizational framework for the project and listing additional data to be provided by the Town.

Deliverables: Project Organization Meetings
Project Organization Memorandum

Task 2: Staff Review Draft

This task entails the preparation of an initial draft of the road (or road and park) impact fee study for staff review. The study will be based on review of levels of service, land use trends and policies, facility master plans, planned capital improvements, and growth projections. It will include all the elements mandated by impact fee case law, including compliance with the dual rational nexus test. These elements include an inventory of existing capital facilities; the cost of improvements required to remedy any existing service deficiencies; the proportionate share of the cost of improvements re-quired to accommodate increased service demands; and appropriate revenue credits to ensure that new development is not charged more than its proportionate share of the cost of new facilities. The analysis will include a table that establishes the number of service units and amount of facility demand associated with different land use types. The study will include a net unit cost schedule that represents the maximum impact fees that could be charged.

Deliverable: Staff Review Draft Study

Task 3: Public Review Draft/Ordinance

Following receipt of Town staff comments on the staff review draft, the consultant will make appropriate modifications to the grrroad (or road and park) impact fee study. Concurrently with the public review draft of the study, the consultant will provide a draft ordinance amendment to implement the updated road (or road and park) impact fees and comply with all the requirements

of impact fee case law. Based on input from public meetings, the consultant will make appropriate modifications to the impact fee study, if necessary, and provide final report documents.

Deliverables: Public Review Draft Impact Fee Study and Spreadsheets
Draft Impact Fee Ordinance Amendment
Final Impact Fee Study and Spreadsheets (if required)

Task 4: Meetings and Presentations

Throughout the project, key members of the consulting team shall be available to attend and participate in local meetings with staff, stakeholders, Board of Mayor and Aldermen and/or the public as desired by the Town. Multiple meetings held on the same day will count as one meeting.

Deliverables: Meetings/Presentations

EXHIBIT B
TIME SCHEDULE AND BUDGET

Time Schedule

The proposed scope of services is anticipated to take approximately two and one-half months from project organization to delivery of the staff review draft. The timing of the rest of the project is dependent on staff review time, the extent of the desired public participation, and meeting scheduling.

Budget

The consultant cost for the scope of services outlined above, excluding meeting attendance, is a fixed-fee price of $25,000 for a road impact fee study or $30,000 for a road and park impact fee study, whichever is chosen by the Town, as broken down by task below. Consultant attendance at local meetings will be provided for a fixed fee, including preparation and travel time and expenses, of $3,000 per trip. The client will be billed monthly, based on the partial (as demonstrated by hours spent times the Consultant's hourly rate) or full completion of each task, or for meetings attended.

Task	Roads Only	Roads & Parks
1. Project Organization/Data Collection	$1,500	$2,000
2. Staff Review Draft	$18,000	$21,000
3. Public Review Draft/Ordinance	$5,500	$7,000
Study Total	$25,000	$30,000
4. In-Person Meetings (per trip)	$30,000	$3,000

Additional services related to this project shall be provided on a time-and-expense basis or for a fixed-fee as may be negotiated with the client. Duncan Associates' standard billing rate is $175 per hour, inclusive of all overhead and office expenses, but excluding travel expenses.

Town of Thompson's Station, TN

Major Thoroughfare Plan

Findings and Recommendations

January 14, 2020

Tonight's Agenda

Brief overview of the MTP process

Findings and recommendations

What is a Major Thoroughfare Plan?

Long-Range Vision for the Town

Guidance Document for Future Growth

Regulatory Plan/Policy for Future Improvements

Implementation of the General Plan

Project history

April 18th Open House

- Met with citizens and received feedback

June 18th Public Meeting

- Presented preliminary findings and received more feedback

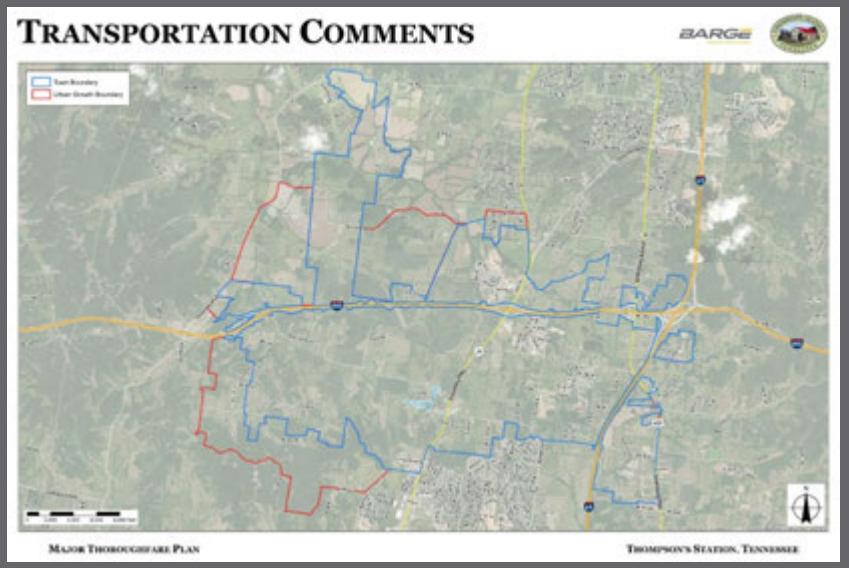
July 23rd PC meeting

- Presented draft plan and document

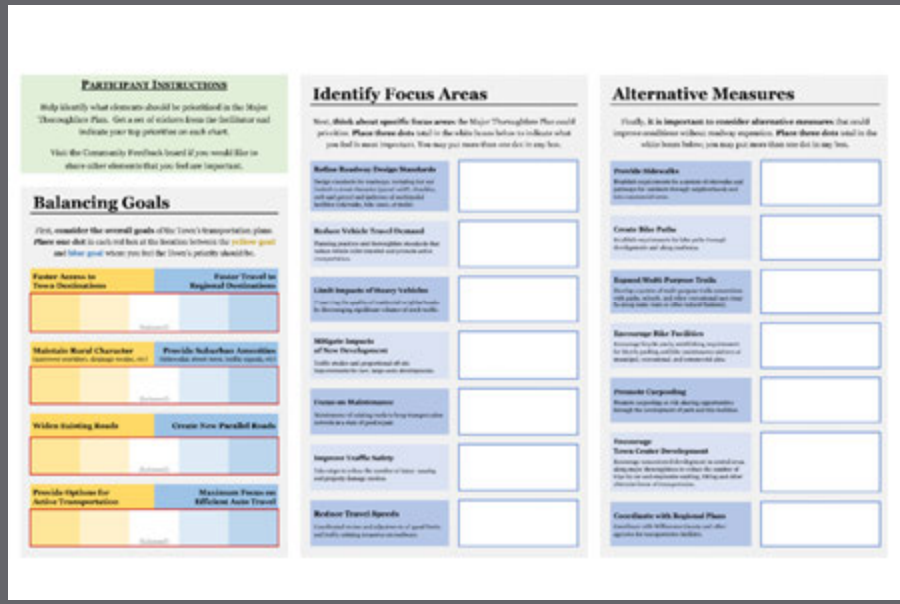
August 27th PC Meeting

- MTP Adoption

January 14th BOMA Meeting

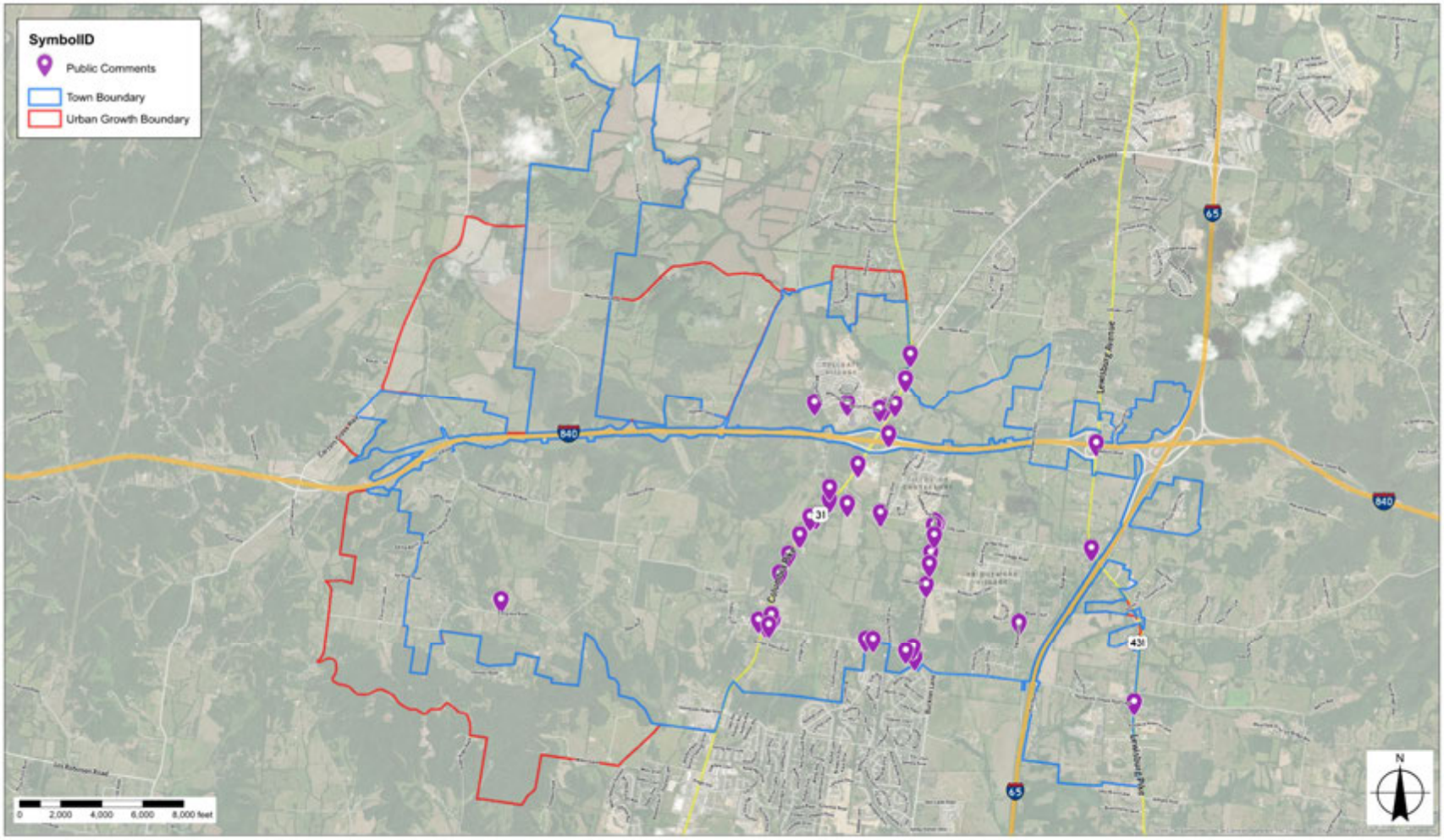


Mark Comments on Map



Choose Future Priorities

Write Feedback


SymbolID
Public Comments
Town Boundary
Urban Growth Boundary
840
65
31
431
N
0 2,000 4,000 6,000 8,000 feet

COMMUNITY PRIORITIES

BARGE

PARTICIPANT INSTRUCTIONS

Help identify what elements should be prioritized in the Major Thoroughfare Plan.

Get a set of stickers from the facilitator and mark your top priorities on each chart.

Visit the Community Feedback board if you would like to share other elements that you feel are important.

Note: Response totals from Open House on Tuesday, April 16, 2019 are noted in purple.

1. Balance Goals

First, **consider the overall goals** of the Town's transportation plans. **Place one dot** in each red box at the location between the yellow goal and blue goal where you feel the Town's priority should be.

Faster Access to Town Destinations				Faster Travel to Regional Destinations
3	8	9.5 responses	7.5	2

Maintain Rural Character (narrower corridors, drainage swales, etc)				Provide Suburban Amenities (sidewalks, street trees, traffic signals, etc)
5	7	8 responses	6	3

Widen Existing Roads				Create New Roads
20	5	4 responses	2	1

Choices for Alternative Transportation				Maximum Focus on Efficient Auto Travel
0	3	8 responses	9	6

2. Identify Focus Areas

Next, **think about specific focus areas** the Major Thoroughfare Plan could prioritize. **Place three dots** total in the white boxes below to indicate what you feel is most important. You may put more than one dot in any box.

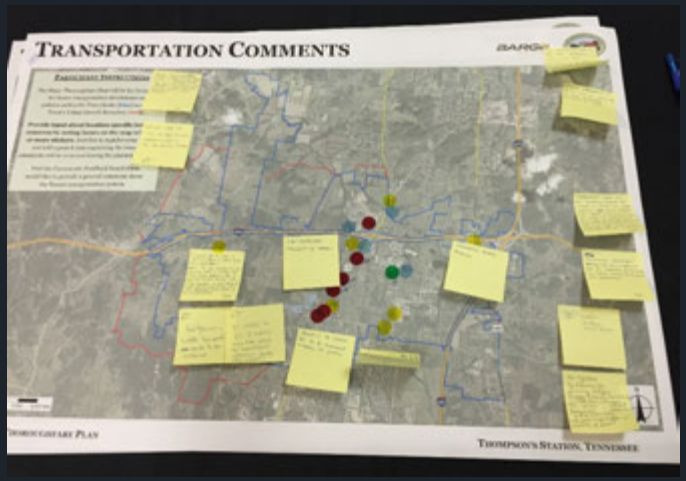
Refine Roadway Design Design standards for roadways, such as street character (paved width, shoulder, curb and gutter) and inclusion of multimodal facilities (sidewalks, bike lanes, or trails).	25 responses
Reduce Vehicle Travel Demand Planning practices and thoroughfare standards that reduce vehicle miles traveled and promote active transportation.	7 responses
Limit Impacts of Heavy Vehicles Preserving the quality of residential neighborhoods by discouraging significant volumes of truck traffic.	10 responses
Address Impacts of New Development Traffic studies and proportional off-site improvements for new, large-scale developments.	25 responses
Better Road Maintenance Maintenance of existing roads to keep transportation network in a state of good repair.	10 responses
Improve Traffic Safety Take steps to reduce the number of injury-causing and property damage crashes.	9 responses
Reduce Travel Speeds Coordinated review and adjustments of speed limits and traffic calming measures on roadways.	4 responses

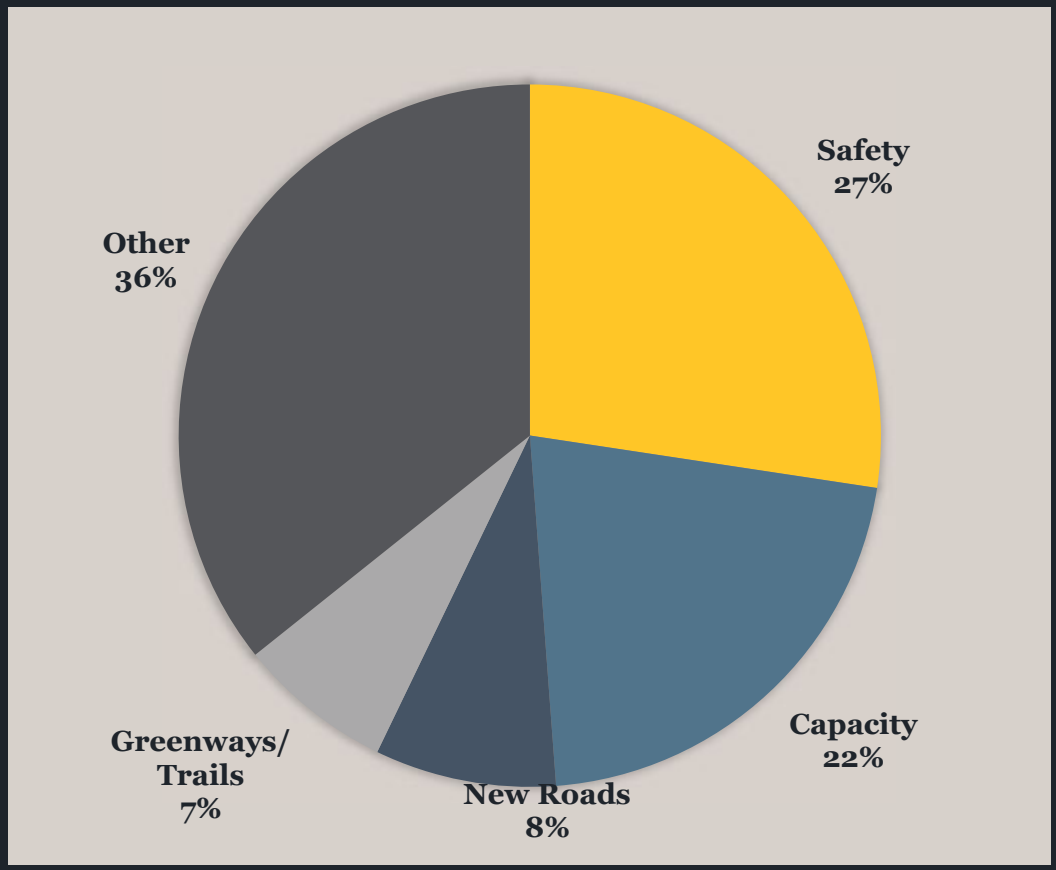
3. Alternative Measures

Finally, **it is important to consider alternative measures** that could improve conditions without roadway expansion. **Place three dots** total in the white boxes below. You may put more than one dot in any box.

Provide Sidewalks Establish requirements for a system of sidewalks and pathways for residents through neighborhoods and into commercial areas.	8 responses
Create Bike Paths Establish requirements for bike paths through developments and along roadways. Encourage bicycle use by installing additional bike parking and maintenance stations at parks and commercial sites.	8 responses
Expand Multi-Purpose Trails Develop a system of multi-purpose trails connections with parks, schools, and other recreational uses (may be along water ways or other natural features).	25 responses
Consider Public Transit Opportunities Explore possibility of expanding commuter, regional, or paratransit bus service to town center areas.	3 responses
Promote Carpooling Promote carpooling or ride sharing opportunities through the development of park and ride facilities.	1 response
Encourage Town Center Development Encourage concentrated development in central areas along major thoroughfares to reduce the number of trips by car and emphasize walking, biking and other alternate forms of transportation.	39 responses
Coordinate with Regional Plans Coordinate with Williamson County and other agencies for transportation facilities.	13 responses

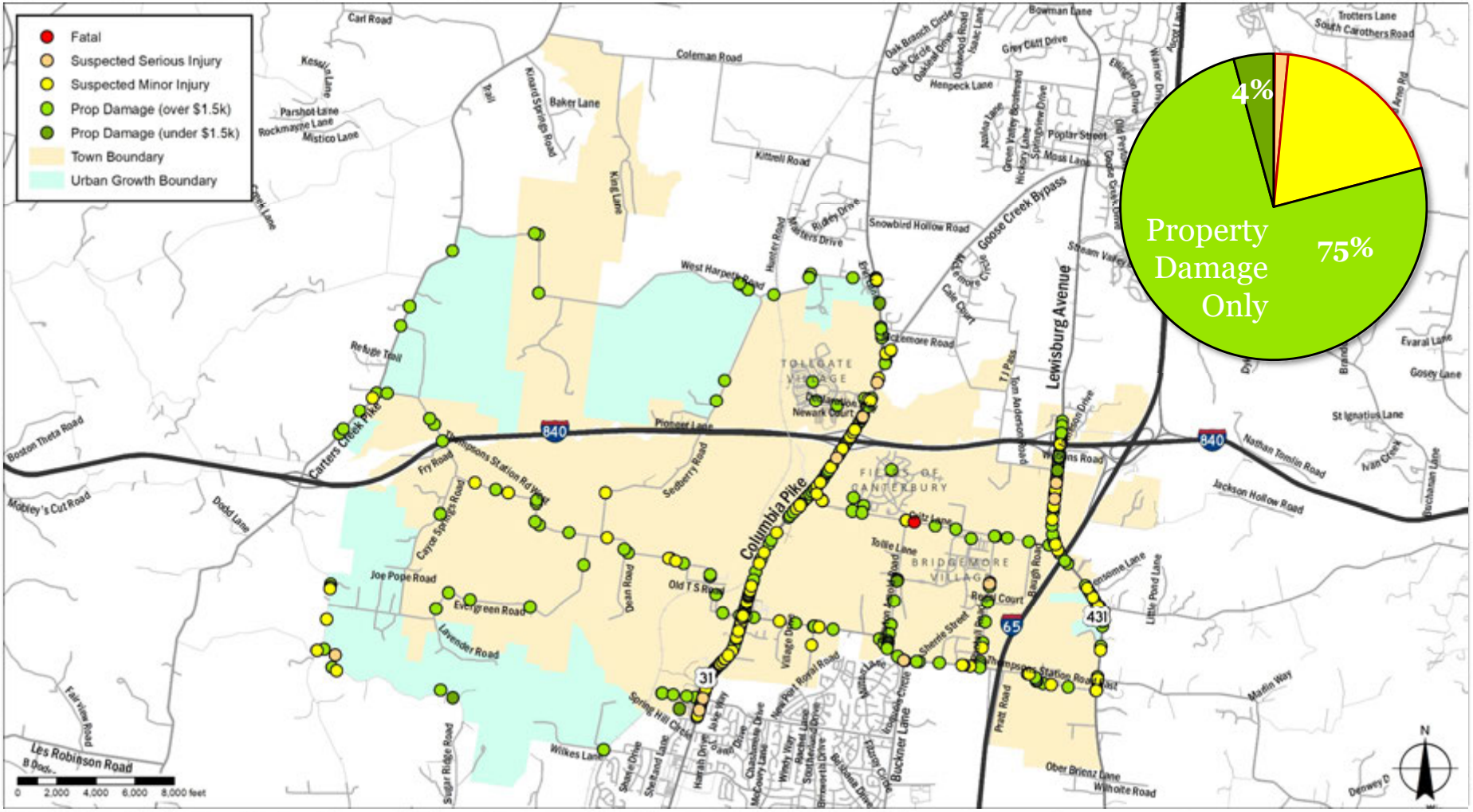
Concerns


TRANSPORTATION COMMENTS


Safety
27%
Capacity
22%
New Roads
8%
Greenways/
Trails
7%
Other
36%

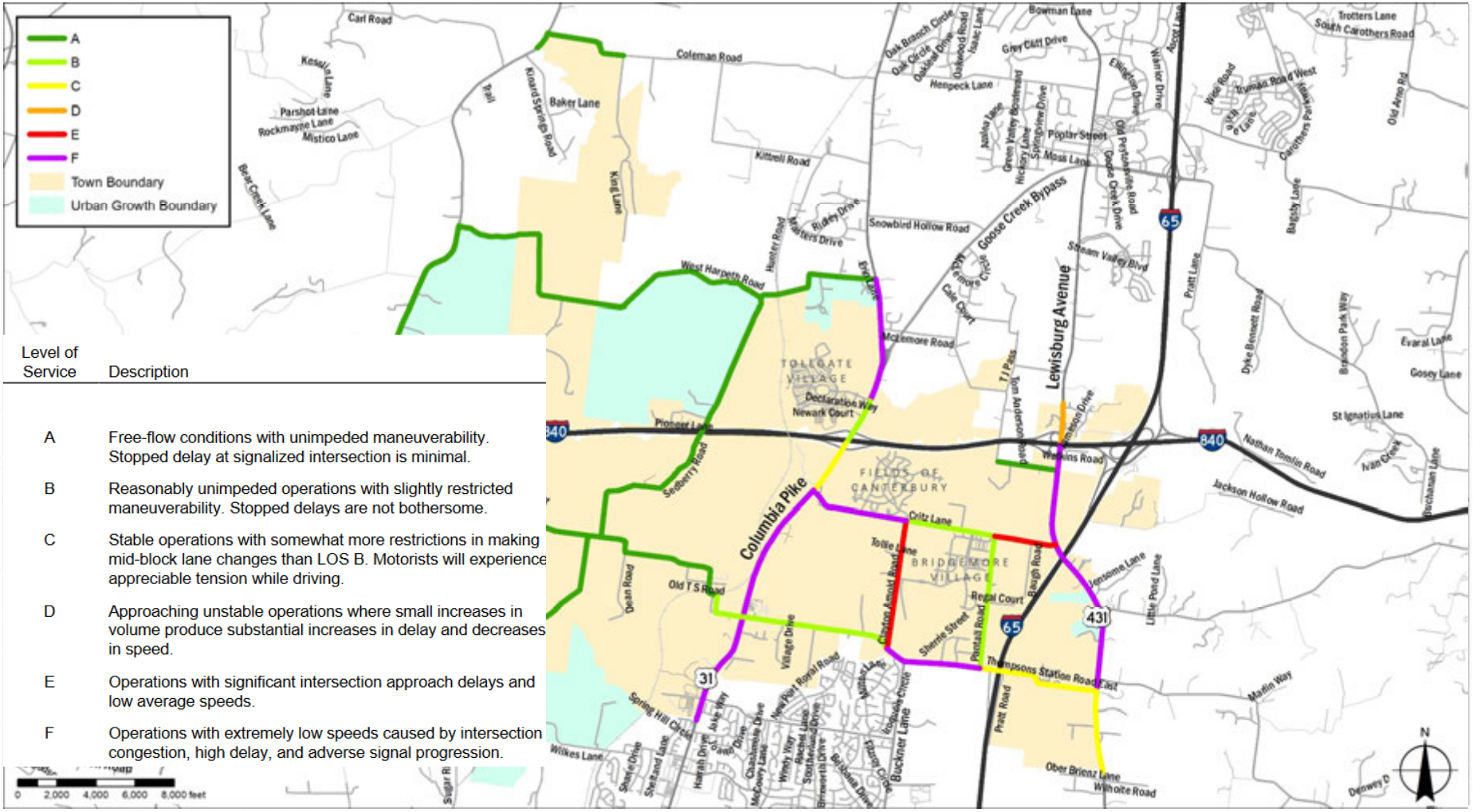
Existing Conditions

2016 - 2018 Crashes



Thompson's Station Major Thoroughfare Plan

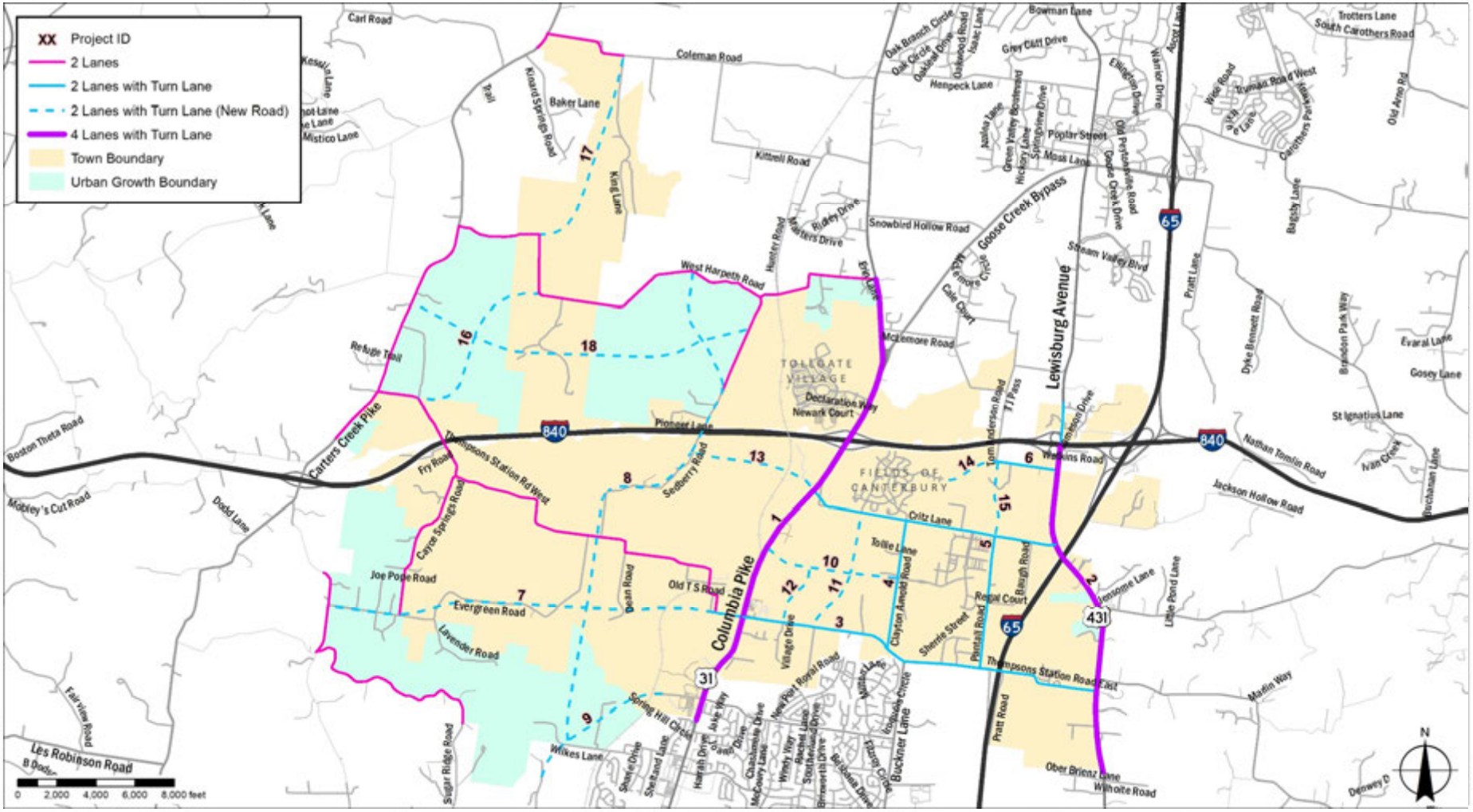
2018 Existing LOS



Level of Service	Description
A	Free-flow conditions with unimpeded maneuverability. Stopped delay at signalized intersection is minimal.
B	Reasonably unimpeded operations with slightly restricted maneuverability. Stopped delays are not bothersome.
C	Stable operations with somewhat more restrictions in making mid-block lane changes than LOS B. Motorists will experience appreciable tension while driving.
D	Approaching unstable operations where small increases in volume produce substantial increases in delay and decreases in speed.
E	Operations with significant intersection approach delays and low average speeds.
F	Operations with extremely low speeds caused by intersection congestion, high delay, and adverse signal progression.

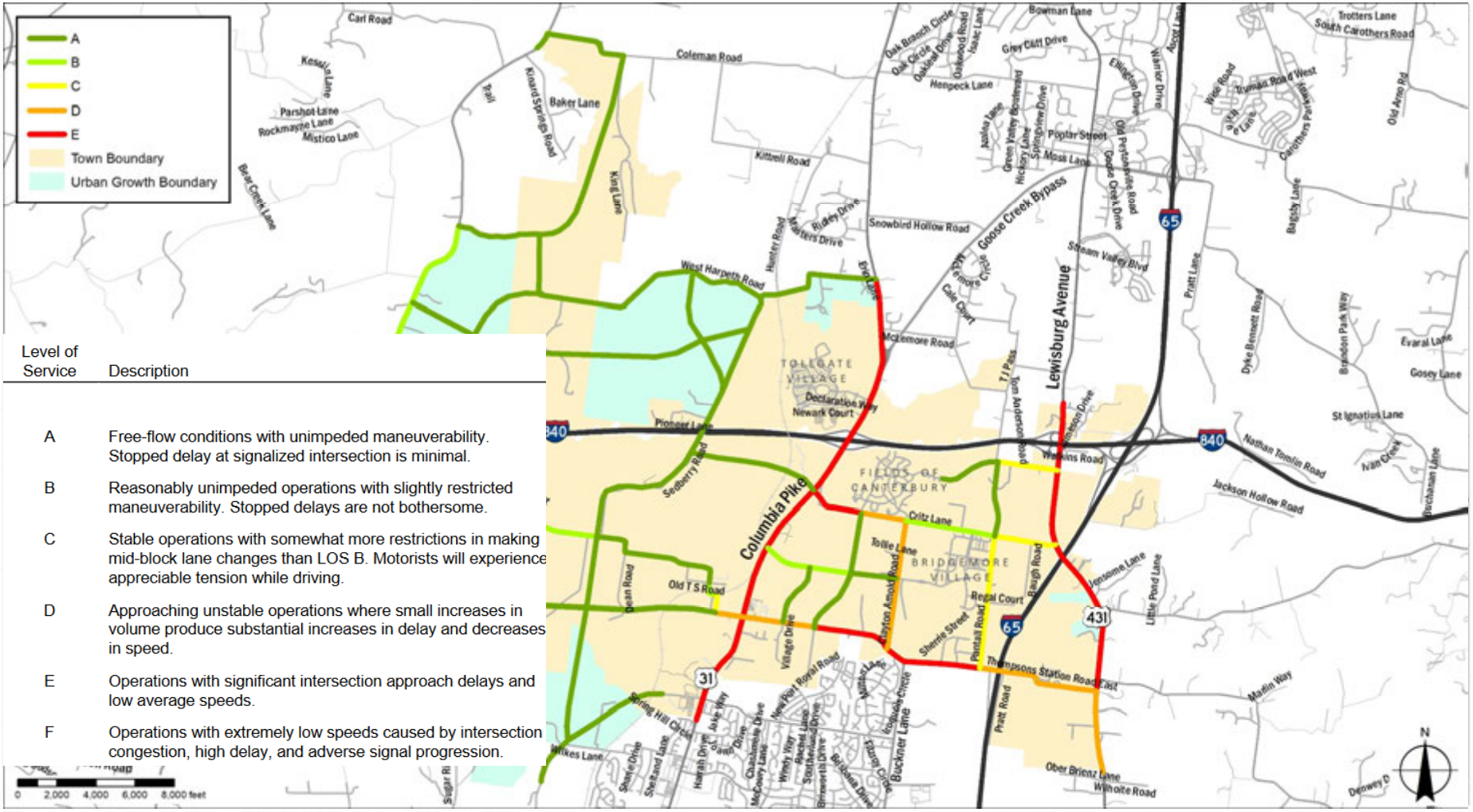
Future Conditions (2040)

2040 Proposed Laneage



Thompson's Station Major Thoroughfare Plan

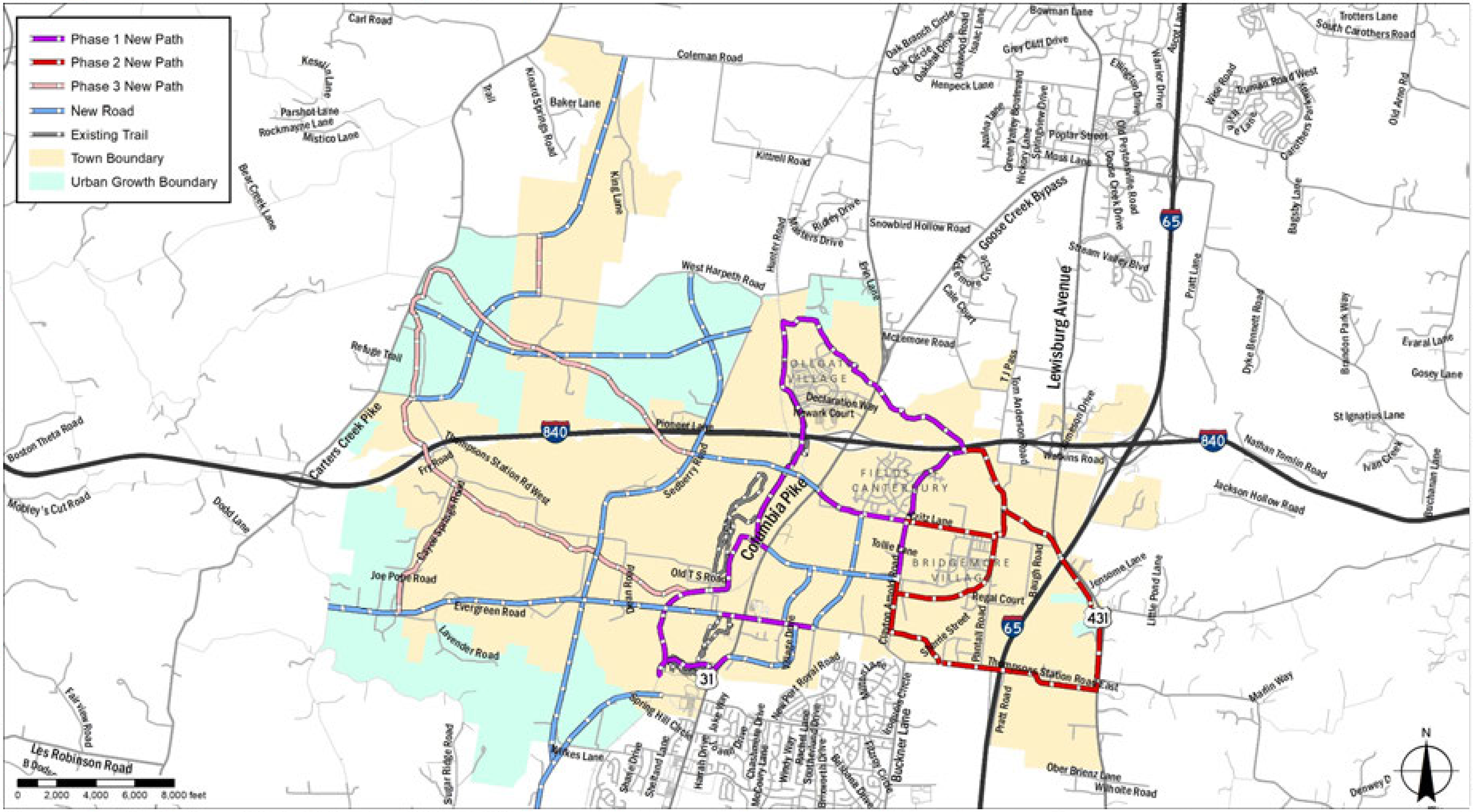
2040 Projected with Improvement LOS



Level of Service	Description
A	Free-flow conditions with unimpeded maneuverability. Stopped delay at signalized intersection is minimal.
B	Reasonably unimpeded operations with slightly restricted maneuverability. Stopped delays are not bothersome.
C	Stable operations with somewhat more restrictions in making mid-block lane changes than LOS B. Motorists will experience appreciable tension while driving.
D	Approaching unstable operations where small increases in volume produce substantial increases in delay and decreases in speed.
E	Operations with significant intersection approach delays and low average speeds.
F	Operations with extremely low speeds caused by intersection congestion, high delay, and adverse signal progression.

Thompson's Station Major Thoroughfare Plan

Greenways



Thompson's Station Major Thoroughfare Plan

Appendix A
Recommended Improvement Projects

Project	Length	Total Cost (Estimated)	Town Share of Cost (Est'd)	Roadway Classification	Priority
01. Columbia Pike Widening	4.59 miles	$26,699,800	$5,339,900	Arterial	Short-Term
02. Lewisburg Pike Widening	3.70 miles	$25,818,100	$5,163,600	Arterial	Mid-Term
03. Thompson's Station Road East Improvements	3.59 miles	$17,895,800	$3,579,100	Major Collector	Private Dev.
04. Clayton Arnold Road Improvements	1.26 miles	$4,243,900	$848,800	Minor Collector	Private Dev.
05. Pantall Road Improvements	1.29 miles	$4,492,500	$0	Minor Collector	Private Dev.
06. Tom Anderson Road Improvements	0.61 miles	$2,490,200	$0	Minor Collector	Private Dev.
07. Evergreen Road Realignment and Extension	4.05 miles	$18,568,800	$3,713,700	Major Collector	Private Dev.
08. Sedberry Road Realignment and Extension	5.32 miles	$22,336,300	$4,467,300	Major Collector	Private Dev.
09. Buckner Road Extension	1.53 miles	$8,689,200	$0	Major Collector	Private Dev.
10. Future Road 1	1.31 miles	$6,622,300	$0	New Minor Collector	Private Dev.
11. Future Road 2	1.24 miles	$5,798,800	$0	New Minor Collector	Private Dev.
12. Future Road 3	0.61 miles	$3,219,500	$0	New Minor Collector	Private Dev.
13. Future Road 4 (Critz Lane Extension)	1.28 miles	$6,882,400	$0	New Minor Collector	Private Dev.
14. Future Road 5 (Chaucer Park Lane Extension)	0.58 miles	$3,572,600	$0	New Minor Collector	Private Dev.
15. Future Road 6 (Critz - Tom Anderson Connector)	0.73 miles	$4,217,800	$0	New Minor Collector	Private Dev.
16. Future Road 7 (T.S. West - Harpeth Connector)	1.80 miles	$8,121,900	$0	New Minor Collector	Private Dev.
17. Future Road 8 (Harpeth - Coleman Connector)	2.04 miles	$9,058,900	$0	New Minor Collector	Private Dev.
18. Future Road 9 (Carters Cr. - Sedberry Connector)	3.42 miles	$13,700,100	$0	New Minor Collector	Private Dev.
19. Off-Street Greenways (Phase 1)	11.05 miles	$11,050,000	$2,210,000	New Greenway	Short-Term
20. Off-Street Greenways (Phase 2)	8.28 miles	$8,280,000	$1,656,000	New Greenway	Mid-Term
21. Off-Street Greenways (Phase 3)	10.25 miles	$10,250,000	$2,050,000	New Greenway	Long-Term
Total	**68.52 miles**	**$222,008,900**	**$29,028,400**		

Based on 2018 dollars

Estimated 20% match as part of TDOT projects

Possible for State funding at an 80/20 match

Area may not be developed by 2040, Town may want to pursue at an 80/20 match with TDOT

Anticipated to be 80/20 grants with TDOT

BARGEDESIGN.COM

Thank You!

TS.MTP@bargedesign.com

Road and Park Impact Fee Study

Presentation to Town of Thompson's Station
Board of Mayor and Aldermen

January 14, 2020

duncan associates

Overview

- Summary of recommendations
- Methodology
- Changes in road fees
- Potential impact fee revenue
- Comparison to fees charged by nearby cities
- Implementation Options

Summary of Recommendations

- Change road methodology from “plan-based” to “demand-driven”
- Account for length of trips, not just number of trips
- Standardize land use categories
- Base fees on current travel demand data
- Consider potential new park impact fees

Methodology

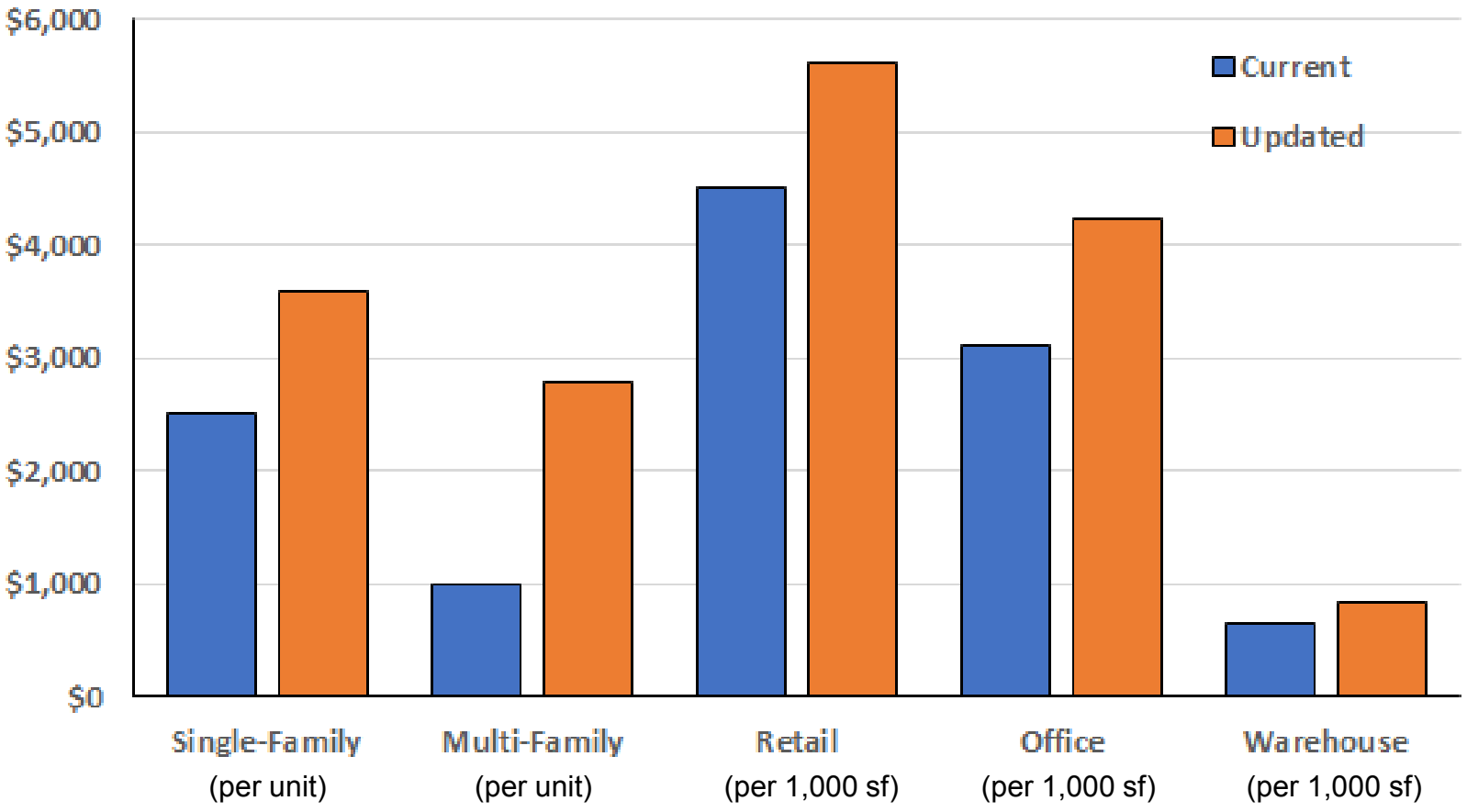
- Current “plan-based” approach not feasible to update
  - Major Thoroughfare Plan not sufficient to establish nexus between planned costs and growth
- “Demand-based” approach has advantages
  - Most bullet-proof from legal attacks
  - Provides most flexibility in expenditures
  - Used by most other jurisdictions in the Nashville area
- Modified variation recommended
  - Charge for more than 1-1 ratio of capacity to demand
  - Higher ratio needed because demand not evenly distributed

Road Fee Changes, Major Land Uses

Land Use Type	Unit	Current Fees	Updated Fees	Percent Change
Single-Family Detached*	Dwelling	$2,500	$3,593	44%
Multi-Family*	Dwelling	$1,000	$2,786	179%
Retail/Commercial/Shopping Center	1,000 sf	$4,513	$5,601	24%
Office/Institutional	1,000 sf	$3,097	$4,238	37%
Warehouse	1,000 sf	$652	$823	26%

* Current fees are $1 per sq. ft. (assumes 2,500 sq. ft. single-family unit and 1,000 sq. ft. multi-family unit)

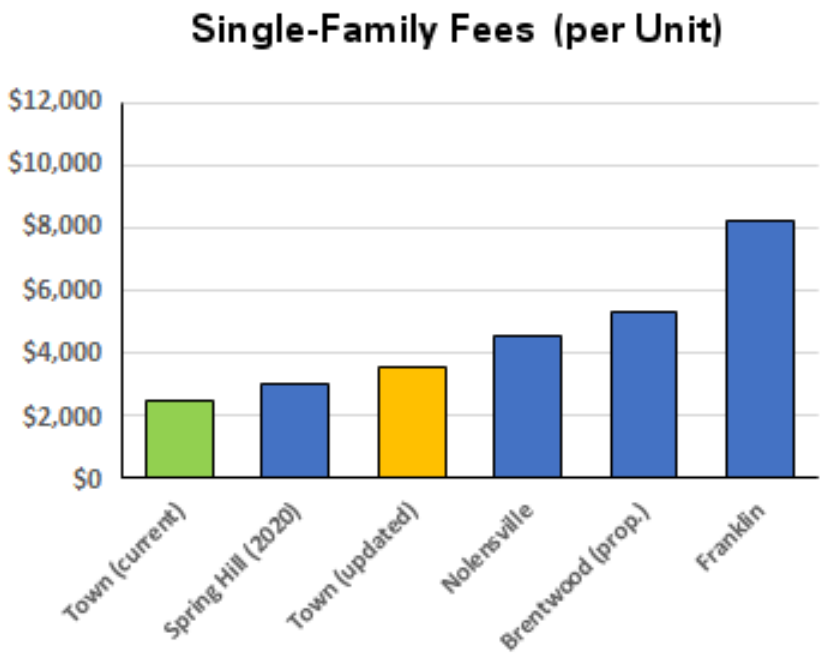
Road Fee Changes by Land Use

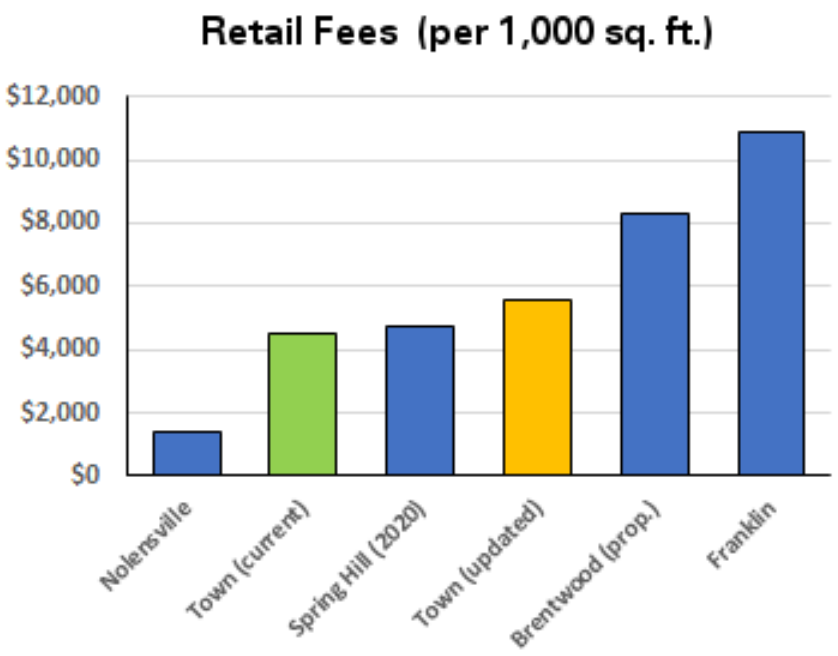


Potential Impact Fee Revenue

	Roads	Parks	Total
Current Fee per Unit	$2,500	$0	$2,500
Proposed Fee per Unit	$3,593	$488	$4,081
x Units Permitted per Year	200	200	200
Annual Revenue under Current Fees	$500,000	$0	$500,000
Annual Revenue under Proposed Fees Fees	$718,600	$97,600	$816,200
Percent Increase	44%	n/a	63%

Comparative Fees (nearby cities)





Implementation Options

- Adopt updated fees at 100%
- Adopt updated fees at less than 100% initially, and increase percentage to 100% over a fixed period
- Adopt updated fees at less than 100%
- Adjust fees annually based on a cost inflation index

Phone: (615) 794-4333
Fax: (615) 794-3313
www.thompsons-station.com

1550 Thompson's Station Road W.
P.O. Box 100
Thompson's Station, TN 37179

DATE: January 3, 2019

TO: The Board of Mayor and Aldermen (BOMA)

FROM: Wendy Deats, Town Planner

SUBJECT: **Roadway Impact Fee Study**

The Town released an RFQ to solicit statements of qualifications for an impact fee study to update and clarify the Town's roadway impact fees. The Town received two statements of qualifications for the roadway impact fee study. The companies that submitted their qualifications were Tishler Bise and Duncan & Associates. Upon review of the two submittals, Staff finds that both companies have national and local experience and meet the requirements set forth within the request for qualifications. Staff believes that both firms have presented information to demonstrate their competency in preparing our impact fee study. Upon review of the references, both companies received positive feedback related to their work product, communication and adhering to a schedule. However, the submittal for Duncan & Associates did provide more references in Tennessee, one of which had used Duncan for review of fees a few times since 1999. Staff believes Duncan & Associates can provide well thought out information, communicate well and deliver the work product on schedule. Therefore Staff recommends that the Board of Mayor and Aldermen adopt a resolution authorizing the mayor to enter into an agreement with Duncan for the preparation of the impact fee study.

Attachments
Resolution 2019-005

ORDINANCE NO. 13-016

AN ORDINANCE OF THE TOWN OF THOMPSON'S STATION, TENNESSEE, TO AMEND TITLE 14, CHAPTER 5 AND TITLE 12 OF THE MUNICIPAL CODE REGARDING THE IMPACT ASSESSMENT FEE FOR NEW DEVELOPMENT.

WHEREAS, the Town is authorized pursuant to Tennessee Code Annotated § 6-2-201(15) and other applicable law to assess fees for use of or impact upon certain public infrastructure; and

WHEREAS, the Town is experiencing and anticipating both rapid growth and an increase in commercial development which requires public facilities and infrastructure improvements to meet the demand created by such growth and development;

WHEREAS, the Board of Mayor and Aldermen has determined that it is in the best interest of the Town to amend the current code provisions related to its Impact Assessment Fees.

NOW, THEREFORE, BE IT ORDAINED by the Town of Thompson's Station as follows:

Section 1. That Title 14, Chapter 5 of the Municipal Code, Impact Assessment Fees, be deleted in its entirety upon the effective date of this ordinance and that Title 12 shall be amended by adding a new Chapter 4, Impact Fees as set forth below.

CHAPTER 4

IMPACT FEES

SECTION

14-401. Title, authority, applicability. (a) This article shall be known and may be cited as the "Impact Fee Ordinance."

(b) Authority to implement this article is granted under the General Law Mayor-Aldermanic Charter, and such other additional powers granted to municipalities by the state legislature. The enumeration of particular powers in this article is not exclusive of others, not restrictive of general words or phrases granting powers and all powers shall be construed so as to permit the town to exercise freely any one or more such powers.

(c) Except as provided herein, this article shall be applicable to all new buildings constructed or additions to existing buildings constructed after the effective date of this Ordinance.

12-402. Definitions. The following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Accessory building or accessory structure means a detached, subordinate building or structure, the use of which is clearly incidental and related to a principal building or use of the land, and which is located on the same lot as that of the principal building or use.

Adjusted base trip cost means the base trip cost as defined in this section, adjusted for estimated future contributions toward the cost of public works projects from currently unidentified sources other than locally generated revenues.

Base trip cost means the town's share of the cost of certain public works projects, as determined by action of the board of mayor and aldermen, divided by total trips, as determined pursuant to this article.

Bonds means bonds, interim certificates or other financial obligations of a municipality issued by its governing body pursuant to this article, or pursuant to any other law, as supplemented by, or in conjunction with this article.

Building means any permanent structure having a roof and used or built for the enclosure or shelter of persons, animals, vehicles, goods, merchandise, equipment, materials or property of any kind.

Building permit means an official document or certificate issued by the town authorizing the construction of a building.

Capacity means the maximum number of vehicles for a given time period which a road can safely and efficiently carry; usually expressed in terms of vehicles per day.

Dwelling unit means a structure designed and intended for human habitation.

Impact fee means the fee established by this article based upon traffic generation information, growth projections, public works project cost estimates, and future public works project requirements as established by the board of mayor and aldermen.

Land development activity and building activity that generates increased traffic means any building activity on a tract of land or vacant lot on which may be constructed one or more structures or any change in the use or appearance of any structure within the guidelines of the applicable land use zoning that attracts or produces vehicular trips over and above that produced by the existing use of land.

Major road network system means all arterial and collector roads within the town, including future arterial and collector roads necessitated by land development and building activity.

Worship facility means a building or a portion thereof which is used by a religious institution for worship services and customarily incidental functions.

Public works project includes any one or more or any combination of the following improvements: bridges, tunnels, viaducts, flood control, streets, roads, avenues, alleys, highways, sidewalks, curbs, gutters, stormwater sewers or drains, and all property real and personal, appurtenant thereto or connected with such work, including an extension, addition, betterment or improvement.

Site related improvements means road construction or road improvements at or near the development site which are necessary to interface the development with the major road network system. Site related improvements shall include acceleration and deceleration lanes and necessary right-of-way dedications which are related to the development and any other right-of-way dedicated to the town within 30 feet of the centerline of existing roadways.

Traffic impact analysis means a study prepared by a qualified professional engineer, licensed to practice within the state, to determine the vehicular impact of a development upon the major road network system. This study shall include, but is not limited to, determination of trip generation; trip distribution; traffic assignment; capacity analyses; and improvements to the roadway system necessitated by the development, such as required new roads, additional lanes and signalization.

Trip means a one-way movement of vehicular travel from an origin (one trip end) to a destination (the other trip end). For the purposes of this article, trip shall have the meaning which it has in commonly accepted traffic engineering practice and which is substantially the same as that definition in the previous sentence.

Trip generation means the attraction or production of trips caused by a given type of land development.

12-403. Intent and Purposes. (a) The Board of Mayor and Aldermen has determined that the rapid growth rate which the Town has experienced and is expected to experience in the foreseeable future necessitates public works projects and makes it necessary to regulate land development and building activity that generates increased traffic. It is the intent of the town that the capacity of the road network in the community should handle the traffic demands generated by new development, thus maintaining a satisfactory quality of life in Thompson's Station.

(b) In order to finance the necessary public works projects required to meet the traffic demands created by growth in population and business activity, a variety of financial sources shall be used to fund the planning, engineering, and construction of future road projects.

(c) It shall be the purpose of this article to establish a regulatory system and method by which the town calculates, collects, and obligates a regulatory fee hereinafter referred to as the impact fee. Except as otherwise provided for in this article, this fee shall be assessed on each new building or addition to an existing structure constructed within the town. The fee shall provide a portion of the revenues required to complete infrastructure and public works projects necessary to service this new development.

(d) The public health, safety, and general welfare is protected when adequate financial resources are available to fund the public works projects needed to handle traffic demand generated from land development activities and the construction of new buildings in the Town.

(e) The intent of this chapter is to allow for continued land development and new building construction in accordance with orderly fulfillment of appropriate transportation related public works projects.

(f) The impact fee shall be assessed to each new land development and building based on a reasonably estimated proportionate share of the anticipated cost of future public works projects. The traffic generation for each land use category shall serve as the basis for establishing and modifying the fee.

12-404. Basis for fees. The Board of Mayor and Aldermen shall approve by resolution the capital improvement projects and the estimated costs of each project, which shall establish the basis for the impact fee schedule. The impact fee schedule shall also be based upon use of available land use planning data related to the Town, other transportation studies in the vicinity and other available transportation related studies and traffic general analysis and basic assumptions as updated by the Institute of Transportation Engineers (ITE).

12-405. Use of fees. The impact fees generated by this ordinance shall be used to pay for the public infrastructure required by new development. Upon the recommendation of the Town Administrator, the Board of Mayor and Aldermen shall approve all impact fee fund expenditures as related to the costs of public infrastructure.

12-406. Fee calculations. (a) A schedule of impact fees, based on the method of calculation promulgated by this section, shall be adopted by resolution of the board of mayor and aldermen.

(b) For each land use, a demand factor shall be determined for use in calculating the appropriate impact fee. Such demand factors shall be based on the estimated trip generation rates for various land uses as identified in the latest edition of the ITE's Trip Generation. In order to avoid the double counting of vehicular trips between land uses, the ITE's estimated trip generation rate shall be divided by two to determine the appropriate demand factor.

(c) The base trip cost shall be determined by dividing the total estimated cost to the Town of the public works projects, as designated by the board of mayor and aldermen, by the number of total daily trips for all land uses in the prior year as estimated by the town's planning and codes department. The base trip cost as so determined may be adjusted for estimated future contributions toward the cost of public works projects from currently unidentified sources other than locally generated revenues. The demand factor for each land use shall be multiplied by the adjusted base trip cost to yield the appropriate impact fee per type of land use.

(d) Any land use generating local sales tax revenues from retail operations shall be eligible for a 20 percent reduction of the per unit impact fee calculation based on space allocated within that land use for retail operations.

(e) Revisions to fee schedule:

(1) Construction data used as a basis for the calculation of impact fees shall be reviewed annually as a part of the town's capital improvements program and periodically modified based upon actual bid documentation. Fluctuation in the base trip cost resulting from changes in the technical data base or in the scope, size, status or cost of the designated public works projects shall not necessarily dictate an adjustment in the impact fee structure. Adjustments in the fee structure shall occur, when, in the determination of the Board of Mayor and Aldermen, based on a recommendation from the Town Administrator:

a. The variance between the estimated base trip cost and the base trip cost used to establish impact fees is significant enough to warrant a change; or

b. The variance between the estimated demand factors and the demand factors used to establish impact fees is significant enough to warrant a change.

(2) Upon such a determination, a revised schedule of impact fees shall be adopted by resolution of the board of mayor and aldermen.

(f) Alternative fee determination: An alternative determination of the impact fee for a land use may be allowed under the following criteria and conditions:

(1) An applicant may appeal in writing to the town administrator for review of an alternative proposal related to land use traffic generation calculations.

(2) Documentation in support of an alternative trip generation calculation shall be provided in the form of a traffic impact analysis and shall include, but not be limited to, the following factors:

a. Traffic characteristics and levels of service of existing major road network systems directly affected by the proposed new development.

b. Trip generation, trip distribution, and trip projections for the proposed new development.

c. Impacts of the proposed new development on affected major road network systems including anticipated changes in the level of service.

d. Impacts of previously approved new development affecting the same major road network systems combined with the proposed new development.

e. Benefits of proposed roadway system improvements to be made a part of the new development, including intersection improvements such as turn lanes and signalization.

(3) If the applicant's alternative calculation of the public work project fee is accepted by the town commission, the Town reserves the right to review the actual traffic trip generation for the development for a period of two years after completion. If the actual traffic generation is found to exceed by ten percent that figure previously projected by the development, the town reserves the right to require an additional payment up to 150 percent of the scheduled impact fee level.

(g) If a land use for a specific property or facility is changed to one which would fall into a land use category for which a higher fee would apply, then a fee based upon the current fee schedule shall be assessed for the new land use, less the amount applicable for the prior land use under the then existing fee schedule.

12-407. Payment of fee; appeals. (a) Payment of the impact fee shall be made at the time that a building permit is issued by the town.

(b) Appeals. (1) A person may challenge the calculation or application of a fee imposed pursuant to this article by filing with the Town Administrator a written notice of appeal with a full statement of the grounds and an appeal fee of two hundred dollars ($200.00) or such other amount as may be fixed from time to time by resolution of the Board of Mayor and Aldermen. Notwithstanding the appeal, the building permit for the land use may be issued if the notice of appeal is accompanied by a bond, cashier's check or other security acceptable to the town administrator in an amount equal to the fee. Appeals filed pursuant to this section must be submitted prior to issuance of the building permit or within ten days thereafter.

(2) The appellant bears the burden of demonstrating that the amount of the fee was not calculated or applied according to the procedures established in this article.

(3) The Board of Mayor and Aldermen shall hear the appeal at a regularly scheduled meeting or special call meeting which falls within 30 days following receipt of the notice of appeal by the town administrator. The determination of the Board of Mayor and Aldermen shall be announced at the conclusion of the hearing or at the next regular meeting of the Board of Mayor and Aldermen. The determination of the Board of Mayor and Aldermen shall be final.

Section 5. All Prior Conflicting Ordinances Repealed; Interpretation. That upon the effective date of this ordinance, all prior ordinances and resolutions in conflict herewith be repealed

Section 6. Severability. If any section, sentence, clause or phrase of this ordinance should be held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause, or phrase of this ordinance.

Section 7. Effective date. This ordinance shall take effect upon its passage on final reading, provided that it shall not take effect earlier than fifteen (15) days after the first passage thereof, the public welfare requiring.

Duly approved and adopted by the Board of Mayor and Aldermen of the Town of Thompson's Station, Tennessee.

Corey Napier, Mayor

ATTEST:

Leah Rainey, Town Recorder

Passed First Reading: August 13, 2013

Passed Second Reading: Sept 10, 2013

Submitted to Public Hearing on the 10th day of September 2013, at 7:00 p.m., after being advertised in the *Williamson AM* Newspaper on the 5th day of September, 2013.

APPROVED AS TO FORM AND LEGALITY:

Todd Moore, Town Attorney

RESOLUTION NO. 2019-005

A RESOLUTION OF THE TOWN OF THOMPSON'S STATION, TENNESSEE TO AUTHORIZE THE MAYOR AND TOWN ADMINISTRATOR TO NEGOTIATE AN AGREEMENT WITH DUNCAN & ASSOCIATES TO CONDUCT AN IMPACT FEE STUDY

WHEREAS, the Town has advertised and received responses to its Request for Qualifications ("RFQ") for a contractor to conduct an impact fee study (the "Project"); and.

WHEREAS, based on the responses received, the Board of Mayor and Aldermen has determined that it is in the best interest of the Town to enter into negotiations for an agreement with Duncan & Associates for the Project.

NOW, THEREFORE, BE IT RESOLVED by the Board of Mayor and Aldermen of the Town of Thompson's Station as follows:

That the Mayor and Town Administrator is authorized to negotiate an agreement with Duncan & Associates for the Project consistent with the RFQ and proposed budget, the final agreement to be considered for approval by the Board of Mayor and Aldermen.

RESOLVED AND ADOPTED this 8th day of January 2019.

Corey Napier, Mayor

ATTEST:

Jennifer Jones, Town Recorder

APPROVED AS TO LEGALITY AND FORM:

Todd Moore, Town Attorney

RESOLUTION NO. 2019 - 006

A RESOLUTION OF THE TOWN OF THOMPSON'S STATION, TENNESSEE APPROVING A CONTRACT WITH BARGE DESIGN SOLUTIONS, INC. FOR ENGINEERING SERVICES RELATED FOR THE PREPARATION OF A MAJOR THOROUGHARE PLAN AND TO AUTHORIZE THE MAYOR TO SIGN THE CONTRACT

WHEREAS, Barge Designs Solutions, Inc. is currently working with the Town on road construction and traffic-related projects; and

WHEREAS, the Town needs professional engineering services to develop a major thoroughfare plan; and

WHEREAS, the Board of Mayor and Aldermen has determined that it is in the best interest of the Town to approve a professional services contract with Barge Design Solutions, Inc. to provide these services to the Town.

NOW, THEREFORE, BE IT RESOLVED by the Board of Mayor and Aldermen of the Town of Thompson's Station as follows:

That the professional services contract with Barge Design Solutions, Inc. attached hereto as Exhibit "A" is hereby approved, and the Mayor is authorized to sign the contract on behalf of the Town.

RESOLVED AND ADOPTED this ____ day of January 2019.

_____
Corey Napier, Mayor

ATTEST:

_____
Jennifer Jones, Town Recorder

APPROVED AS TO LEGALITY AND FORM:

_____
Todd Moore, Town Attorney

Road and Park Impact Fee Study

for the Town of Thompson's Station, Tennessee

prepared by

Duncan Associates

November 2019
Review Draft

Table of Contents

prepared by Duncan Associates
Clancy Mullen, Principal/Project Manager
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(512) 423-0480, clancy@duncanassociates.com

List of Tables

EXECUTIVE SUMMARY

The purpose of this project is to assist the Town of Thompson's Station in an update of the Town's impact fees. The current fees are used only for road improvements. This update updates the road impact fees and calculates potential park impact fees.

Current Road Impact Fees

The Town's current road impact fee ordinance is Ordinance No. 13-016, which became effective on September 10, 2013. As the ordinance notes, authority to adopt impact fees is provided under Tennessee statutes for General Law Mayor-Aldermanic Charter municipalities. The ordinance lays out the general methodology by which the fees are to be calculated, and the fee schedule is adopted by separate resolution. The current fee schedule is shown Table 1. Average daily trip ends are divided by two to avoid double-counting. The number of daily trips per unit rate is multiplied by the base trip cost to determine the fee (the residential trip rate and fee shown in the table is for a single-family detached dwelling, but the fees are assessed on all residential based on $1 per square foot.) As set forth in the ordinance, the base trip cost is determined by dividing the total cost of planned improvements designated by the Board of Mayor and Aldermen (BOMA) by the total number of daily trips estimated to be generated by all land uses in the previous year by the Planning and Codes Department. Retail uses are given a 20% reduction in recognition of sales tax revenues they generate.

Table 1. Current Road Impact Fees

Land Use Category	Unit	Avg. Rate	Demand	Base Trip	Retail Adjustment	Unit Rate
Residential*	Dwelling	9.57	4.785	$262.75	100%	$1,257.27
Hotel/Motel	Room	9.02	4.510	$262.75	80%	$948.01
Golf Course	Acre	5.04	2.520	$262.75	100%	$662.14
Recreational Facility	1,000 sq. ft.	1.62	0.810	$262.75	100%	$212.83
Elementary Schoool	Student	1.29	0.645	$262.75	100%	$169.48
Middle School	Student	1.62	0.810	$262.75	100%	$212.83
High School	Student	1.71	0.855	$262.75	100%	$224.65
Community Co9llege	Student	1.20	0.600	$262.75	100%	$157.65
Day Care Center	Student	4.48	2.240	$262.75	100%	$588.57
Hospital	Bed	11.81	5.905	$262.75	100%	$1,551.56
Assisted Living	Bed	2.74	1.370	$262.75	100%	$359.97
General Office Building	1,000 sq. ft.	23.57	11.785	$262.75	100%	$3,096.54
General Retail Building	1,000 sq. ft.	42.94	21.470	$262.75	80%	$4,513.05
Restaurant	1,000 sq. ft.	89.95	44.975	$262.75	80%	$9,453.75
High Turnover Restaurant	1,000 sq. ft.	127.15	63.575	$262.75	80%	$13,363.62
Gas Station w/Conv. Mkt	1,000 sq. ft.	96.37	48.185	$262.75	80%	$10,128.60
Gas Station	Pump	15.65	7.825	$262.75	80%	$1,644.83
Warehousing	1,000 sq. ft.	4.96	2.480	$262.75	100%	$651.63
Church	1,000 sq. ft.	9.11	4.555	$262.75	100%	$1,196.84

* Residential impact fees to remain at $1.00 per sq. ft.

Source: "Exhibit C - Schedule of Impact Fees," Thompson's Station Town Planner, October 29, 2018.

Recommended Road Fee Changes

Methodology. The major recommendation for this update is to base the fees on a "demand-based" methodology. The Town's current impact fees were calculated using the methodology described in the ordinance. This is an unusual variation of the "plan-based" methodology, which divides total planned improvement costs by new trips generated over the same time period. In the Town's formulation, a planning horizon is not specified, and total planned costs are simply divided by existing trips. Regardless of how the calculation is performed, a list of planned improvements is not a sufficient basis for an impact fee calculation. It does not, by itself, establish that the planned improvements are necessary to serve growth, as opposed to remedying existing capacity deficiencies or increasing the level of service beyond what is currently provided to existing development. This update uses the alternative "demand-based" methodology (see the Methodology chapter for a detailed description of this approach).

Service Unit. While a plan-based fee calculation can be based on either the number of vehicle trips or vehicle-miles of travel (VMT) generated by the development, the demand-based methodology requires the use of VMT for the unit of impact, or "service unit." Consequently, the updated fees need to take into account not only the number of trips generated, but the average length of those trips. They also need to exclude pass by trips, which do not add additional VMT. These adjustments will more than compensate for the removal of the 20% reduction for retail uses, which does not appear to have an empirical basis.

Land Use Categories. The major proposed changes to the land use categories in the fee schedule are to differentiate residential fees by single-family detached and multi-family and to assess residential uses on the basis of dwelling units rather than square feet of living area. While there is some evidence that trip generation increases somewhat with dwelling unit size, available data is scant and the relationship does not appear to be linear (e.g., a unit twice as large will not generate twice as many trips).

Additional categories have been included, such as senior adult housing, golf course, industrial and mini-warehouse. Finally, some nonresidential categories (schools, day care centers, hospitals and nursing homes) that are currently assessed on characteristics that are difficult to quantify, such as number of students or beds, are proposed to be assessed on the amount of building square footage. Definitions of the proposed land use categories are provided in Appendix B.

Updated Road Fees

The updated road fees are compared to current fees in Table 2. Current residential fees, which are assessed at $1 per square foot, are assumed based on typical sizes for single-family and multifamily units. Current fees cannot be shown for new land uses or those with different assessment bases. The wide variation in percentage changes for specific land use categories reflects the inclusion of new trip factors and average trip lengths, the elimination of the 20% retail reduction, and changes in trip generation rates in the latest edition of the ITE *Trip Generation Manual*.

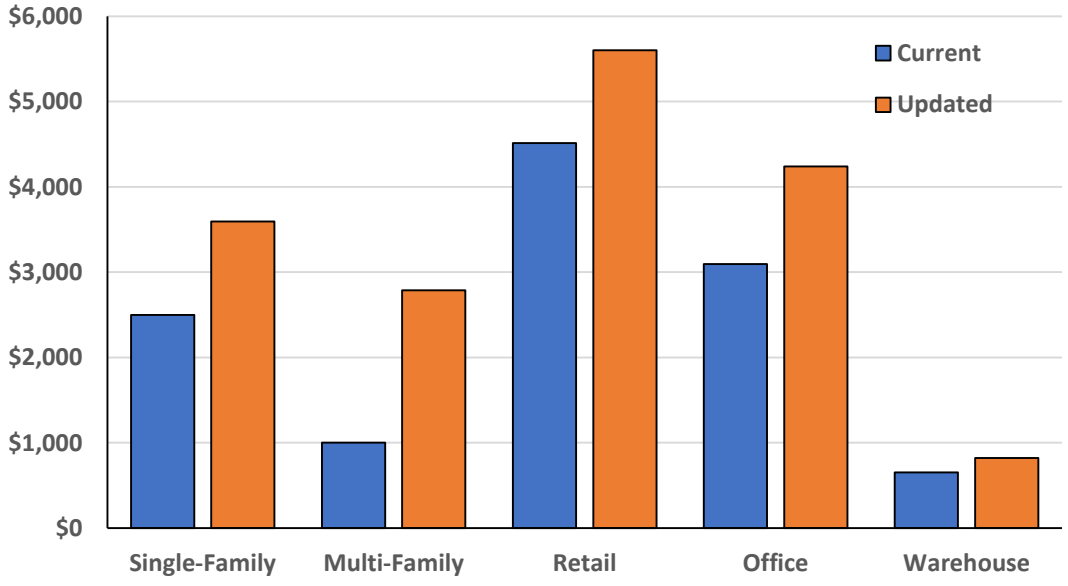
Table 2. Updated Road Impact Fees

Land Use Type	Unit	Current Fees	Updated Fees	Percent Change
Single-Family Detached*	Dwelling	$2,500	$3,593	44%
Multi-Family*	Dwelling	$1,000	$2,786	179%
Senior Adult Housing, Detached	Dwelling	n/a	$1,621	n/a
Senior Adult Housing, Attached	Dwelling	n/a	$1,408	n/a
Golf Course	Hole	n/a	$1,028	n/a
Hotel/Motel	Room	$948	$2,230	135%
Retail/Commercial/Shopping Center	1,000 sf	$4,513	$5,601	24%
Restaurant, Standard	1,000 sf	$9,454	$10,744	14%
Restaurant, Drive-Through	1,000 sf	n/a	$23,904	n/a
Gas Station w/Convenience Mkt.	1,000 sf	$10,129	$9,274	-8%
Office/Institutional	1,000 sf	$3,097	$4,238	37%
Elementary/Secondary School	1,000 sf	n/a	$1,312	n/a
Community College	1,000 sf	n/a	$2,963	n/a
Day Care Center	1,000 sf	n/a	$3,487	n/a
Hospital	1,000 sf	n/a	$3,275	n/a
Nursing Home	1,000 sf	n/a	$1,997	n/a
Place of Worship	1,000 sf	$1,197	$2,119	77%
Industrial	1,000 sf	n/a	$1,590	n/a
Warehouse	1,000 sf	$652	$823	26%
Mini-Warehouse	1,000 sf	$652	$711	9%

* current fee is $1 per square foot; unit sizes of 2,500 sq. ft. single-family and 1,000 sq. ft. multi-family are assumed for comparison purposes.

Source: Current fees from Table 1; updated fees from Table 16.

Figure 1. Current and Updated Road Impact Fees, Major Land Uses



Comparative Road Fees

Communities in the process of updating impact fees are naturally interested in knowing what nearby or comparable jurisdictions are charging. However, often-expressed concerns about the need to be "competitive" with other jurisdictions are not necessarily well-founded. Studies have found differences in impact fees between cities or counties in a state or region had no measurable effect on the rates of development. This is not surprising, given the myriad other market and regulatory factors that differ between jurisdictions besides impact fees.

The Town's current and updated road impact fees are compared to road impact fees currently charged by four nearby Tennessee municipalities in Table 3. Brentwood is currently in the process of updating its fees, which were last adjusted in 2007. Spring Hill's fees were updated earlier this year and after a phase-in will be at 100% in 2020.

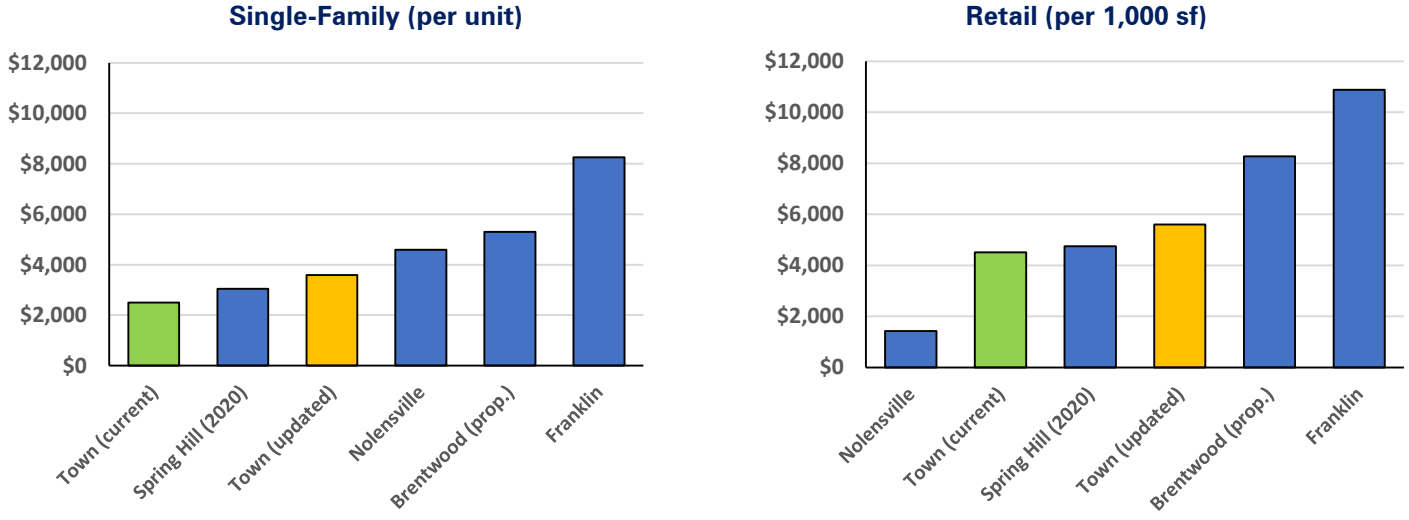
Table 3. Comparative Road Impact Fees

Municipality	Single-Family (unit)	Multi-Family (unit)	Retail (1,000 sf)	Office (1,000 sf)	Industrial (1,000 sf)	Ware-house (1,000 sf)	Rest-aurant (1,000 sf)
Town (current)	$2,500	$1,000	$4,513	$3,097	n/a	$652	$9,454
Town (updated)	$3,593	$2,786	$5,601	$4,238	$1,590	$823	$10,744
Brentwood (proposed)	$5,297	$4,107	$8,269	$6,252	$2,346	$1,214	$15,860
Franklin	$8,251	$5,233	$10,878	$7,801	$6,120	$3,187	$20,255
Nolensville	$4,594	$2,527	$1,424	$2,619	$1,470	$551	$1,424
Spring Hill (2020)	$3,048	$2,364	$4,753	$3,599	$1,350	$697	$9,118

Source: Current and updated Town fees from Table 2; other fees from Duncan Associates internet survey (Spring Hill fees shown are 100% of fees calculated in 2019 study, which become effective July 1, 2020 – current fees are at 33%).

Single-family and retail road impact fees from the table above are illustrated in Figure 2.

Figure 2. Comparative Single-Family and Retail Road Impact Fees



Potential Park Fees

The Town does not currently assess park impact fees. This study calculates potential park impact fees of $488 per single-family detached and $327 per multi-family unit (see Table 27 in Parks chapter). Park impact fee revenue could be used to acquire additional park land, construct new park improvements, or retire existing debt on existing park facilities.

Potential Impact Fee Revenue

Development in Thompson's Station is predominately residential, and consists mostly of new single-family detached units. The Town has issued an average of 204 residential permits annually for the last nine years, which can be rounded down to 200 permits per year. The proposed 44% increase in road fees, coupled with new park fees, would generate about $800,000 annually, compared to about $500,000 under the current road fees, or over 60% more revenue.

Table 4. Potential Road and Park Impact Fee Revenue

	Roads	Parks	Total
Current Fee per Unit	$2,500	$0	$2,500
Proposed Fee per Unit	$3,593	$488	$4,081
x Units Permitted per Year	200	200	200
Annual Revenue under Current Fees	$500,000	$0	$500,000
Annual Revenue under Proposed Fees Fees	$718,600	$97,600	$816,200
Percent Increase	44%	n/a	63%

Source: Current and proposed fees per single-family detached unit from Table 2 (roads) and Table 27 (parks); annual residential permits from 2010 through 2018 derived from Table 28.

LEGAL FRAMEWORK

Impact fees are imposed on new development to pay for improvements necessitated by growth. Impact fees are a way for local governments to require new developments to pay a proportionate share of the infrastructure costs they impose on the community. In contrast to "negotiated" developer exactions, impact fees are charges assessed on new development using a standard formula based on objective characteristics, such as the number and type of dwelling units constructed. The fees are a one-time, up-front charge, with the payment made at the time of building permit issuance. Impact fees require that each new development project pay a pro-rata share of the cost of new capital facilities required to serve that development.

Statutory Authority

State law provides mayor-aldermanic charter municipalities like the Town of Thompson's Station with very broad authority to levy taxes and fees. The general powers enumerated in Tennessee Code, Title 66, Chapter 2, Part 2, Section 6-2-201 have been interpreted to include the authority to impose impact fees. The enumerated powers do not contain the term "impact fee" or otherwise provide any guidance about how such fees should be calculated. For this we need to turn to case law.

Case Law

Impact fees were pioneered in states that lacked specific enabling legislation, and the authority to impose them has generally been based on local government's broad "police power" to regulate land development in order to protect the health, safety and welfare of the community. In general, it is necessary to meet the following requirements to qualify as an impact fee and to avoid having the fee struck down as an illegal tax.

Proportionality

One of the fundamental legal principles of impact fee case law is that the fees for each individual land use type should be proportional to the impact of that use. Policy reductions or waivers for selected land use categories or types of development weaken that relationship and should be avoided or at least strictly limited. At a minimum, the impact fee fund should be reimbursed for the lost revenue from general fund sources. In addition, a revenue credit may need to be provided for other land uses not subject to the reduction. Even if the targeted reductions are replaced with general funds, new development that is not eligible for the reduction will generate future general fund revenues that will be used to pay for the reduced fees for future development. This could arguably amount to new development that is not eligible paying more than its proportionate share of transportation improvement costs. While this issue has not been litigated, the prudent course would be either not to apply targeted fee reductions or else make up the lost revenue and calculate an appropriate revenue credit for non-eligible development types.

Developer Credits

Another fundamental requirement articulated in impact fee case law is the need to avoid double-charging new development through impact fees and other requirements or taxes. Developers should not be required to make site-specific dedications or improvements that meet the same need being addressed by the impact fees, while also being required to pay the fee. In general, impact fees should be reduced by the value of dedications or improvements required of developers for the same type of improvements that would be eligible to be funded with the impact fees. These reductions are referred to as developer credits.

It is reasonable to have some restrictions on the types of improvements that are eligible for credit. Granting credits is essentially spending future impact fees, and the fees should be spent for priority improvements that benefit the community at large. Developers should not be allowed to monopolize the fees for localized improvements if they choose to develop in areas that lack adequate infrastructure. For example, credit eligibility could be restricted to contributions related to projects identified in an adopted list of planned road improvements. However, developers should be eligible for credits for required improvements related to projects that are consistent with the jurisdiction's land use and capital plans.

Revenue Credits

A revenue credit is a reduction from the cost per service unit designed to equalize the burden between existing and new development arising from the expenditure of future revenues that can be attributed in part to new development. While developer credits are provided on a case-by-case basis, revenue credits must be addressed in the fee calculation study.

As noted previously, if there are existing deficiencies with respect to the level of service used in the fee calculation, the fees should be reduced by a credit that accounts for the contribution of new development toward remedying the existing deficiencies. A similar situation arises when the existing level of service has not been fully paid for. Outstanding debt on existing facilities that are counted in the existing level of service will be retired, in part, by revenues generated from new development. Given that new development will pay impact fees to provide the existing level of service for itself, the fact that new development may also be paying for the facilities that provide that level of service for existing development could amount to paying for more than its proportionate share. Consequently, impact fees should be reduced to account for future payments that will retire outstanding debt on existing facilities that provide the level of service on which the fees are based for existing development.

The issue is less clear-cut when it comes to other types of revenue that may be used to make capacity-expanding capital improvements of the same type being funded by impact fees. The clearest case occurs when general fund tax revenues are programmed for capacity-expanding improvements on an "as available" basis because impact fees are insufficient to fund all needed growth-related improvements. These general fund contributions could be booked as a loan to the impact fee fund, to be repaid when sufficient impact fee funds are available.

Similar considerations apply to dedicated funding sources, such as special taxes that can only be used for the same type of facilities as the impact fees. Like discretionary revenue, these types of dedicated revenue sources are typically not specifically dedicated only for capacity-expanding improvements, and even if they are, their use to fund capacity-related improvements improves the level of service for both existing and new development.

Outside funding or grants for capacity-expanding improvements to major roads that can reasonably be anticipated in the future could warrant a credit, but again this is not clear-cut. In addition to the argument made above (i.e., the additional funding raises the level of service and benefits both new development and existing development), two additional arguments can be made against providing credits for such funding. First, new development in a community does not directly pay for State and Federal grants in the same way they pay local gasoline and property taxes. Second, future grant funding is far more uncertain than dedicated revenue streams.

While these arguments are compelling, they have not been litigated, and the law on whether revenue credits may be warranted in situations other than existing deficiencies or outstanding debt on existing facilities is currently unclear. This update incorporates revenue credits for Federal/State funding anticipated to be available to help fund growth-related transportation improvements.

Summary

The Town derives its authority to impose impact fees from the statutory powers granted to mayor-aldermanic municipalities. The principles derived from impact fee case law can be stated briefly as follows:

1) Don't charge new development for a higher level of service than is provided to existing development;
2) Make the fee proportional to the impact of the development;
3) Don't charge twice through other taxes or fees for the same improvements;
4) Give developers credit for the value of their contributions to projects programmed in the long-range plan; and
5) Spend the funds on improvements that benefit new development.

ROADS

This chapter calculates updated road impact fees. The updated fees are based on a different methodology from the one used to calculate the current fees.

Methodology

The methodology used to calculate an impact fee should comply with the legal principles described in the Legal Framework chapter. In impact fee analysis, existing and projected development is translated into "service units," which is a common indicator of demand (such as vehicle trips). Fees are based on the cost per service unit, which is then multiplied by service units generated per development unit (e.g., dwelling unit or 1,000 square feet) to calculate the fee schedule.

A methodology is defined by how the cost per service unit is calculated. There are two basic types of methodologies: plan-based and demand-based. The Town's current fees were calculated using a variation of the plan-based methodology. The consultant recommends switching to a demand-based methodology in this update. Regardless of the methodology used, the final fee calculations may need to reduce the fees to ensure there is no double-charging, as discussed in the revenue credits section of the Legal Framework chapter.

Plan-Based Methodology

A plan-based methodology calculates the cost per service unit by dividing planned improvement costs over a fixed time horizon by the anticipated growth in service units over the same period. Dividing anticipated growth costs by anticipated new service units yields the cost per service unit to accommodate growth. A plan-based road impact fee methodology may utilize either vehicle trips or vehicle-miles of travel as the service unit. As the name implies, the plan-based methodology presupposes the existence of a plan.

The legal requirements for impact fees set a relatively high bar for a plan-based methodology. The plan must create a tight nexus between the amount of growth projected over a specified period and the improvements needed to serve that growth. The list of planned improvements must be developed using a rigorous analysis, such as the modeling used to develop a transportation master plan, to establish the required nexus between the anticipated growth and the specific list of improvements required to serve that growth. The Town does not have a long-range transportation master plan that would meet this requirement.

The Town's ordinance specifies an unusual variation of the plan-based approach that divides planned costs by existing trips (see description in Executive Summary). There is no available analysis of existing levels of service, identification of existing deficiencies, or documentation on how the cost per service unit was determined. The method for calculating the current fees does not appear to demonstrate the strong nexus between planned growth and improvement needs required to support a plan-based methodology.

Demand-Based Methodology

The alternative to the plan-based methodology is referred to as "demand-based" (also called "consumption-based" when used for road fees). This approach is probably more commonly-used in Tennessee than the plan-based approach. It bases the fee on the average cost to replace major roadway capacity consumed by new development. It does not depend on having a list of planned improvements or growth projections, although planned improvement costs may be used to determine the average cost to add new roadway capacity, credit against the fee may be restricted to the list of planned improvements, and growth projections may be used to forecast future revenues. It allows fee revenues to be used for any needed capacity-expanding improvement, although expenditures could be limited to a pre-determined list of projects. It is based on a level of service expressed as a system-wide capacity to demand ratio (i.e., vehicle-miles of capacity per vehicle-miles of travel, or VMC/VMT). If the fees are based on a ratio no higher than the existing one, there are no deficiencies. The consultant recommends using this methodology in the update.

The service unit for the demand-based methodology must be in terms of vehicle-miles of travel (VMT), because it is not possible to determine the capacity needed to accommodate a trip without considering the length of the trip. VMT (trips times trip length) takes into account not only the number of trips, but the average length of those trips. Retail trips, for example, tend to be shorter than trips to office or industrial uses. Adding the trip length component more accurately assesses road impacts by land use. Trips for retail and certain other land uses should also be reduced to recognize pass-by traffic; that is, trips that are stopping at the use on their way to another primary destination. Pass-by trips do not place any additional burden on the road system.

An issue that arises with the demand-based road fee methodology is what the appropriate level of service (LOS) should be. The "standard" demand-based road methodology multiplies the cost of a vehicle-mile of capacity (VMC) by the vehicle-miles of travel (VMT) generated by a development to calculate the fee. However, a VMC is not the same as a VMT. In mathematical terms, the cost per VMC must be multiplied by the VMC/VMT ratio to get the cost per VMT. The standard demand-based approach implicitly assumes that the VMC/VMT ratio is one. That is, it assumes that the roadway system can function adequately with every road carrying exactly its full capacity. In the real world, however, travel is not evenly distributed proportional to roadway capacity. Drivers may try to avoid driving on congested roadways, but they will always have limited options. Under conditions of full system-wide utilization, any roadway with some excess capacity will be balanced by a roadway that is over-capacity. Reasonably functioning roadways systems must have more aggregate capacity than aggregate demand (e.g., VMC/VMT ratios considerably higher than one-to-one).

The "modified" demand-based approach recognizes this by explicitly using the VMC/VMT ratio in the formula. It either uses the actual existing VMC/VMT ratio, or a lower ratio that is greater than one. If the existing ratio is used, that makes the modified approach conceptually similar to the incremental expansion approach often used for types of facilities for which capacity is more difficult to measure, because it basically says that existing roadway capacity must be expanded in direct proportion to the increase in travel demand to maintain an adequate level of service. Few studies use this approach, however, particularly in less-developed jurisdictions, because the VMC/VMT ratio tends to decline as the community matures. This update incorporates the VMC/VMT ratio.

The formula for the demand-based methodology used in this study is summarized in Figure 3 on the following page. The maximum fee amount calculated with this methodology is the number of service units (VMT) that will be generated by the development times the net cost per service unit.

Figure 3. Demand-Based Road Impact Fee Formula

IMPACT FEE	**=**	**VMT x NET COST/VMT**
Where:		
VMT	=	**TRIPS x % NEW x LENGTH**
TRIPS	=	Trip ends during average weekday ÷ 2
% NEW	=	Percent of trips that are primary trips, as opposed to pass by or diverted-link trips
LENGTH	=	Average length of a trip on the major roadway system
NET COST/VMT	=	**COST/VMT - CREDIT/VMT**
COST/VMT	=	COST/VMC x VMC/VMT
COST/VMC	=	Average cost to add a vehicle-mile of capacity
VMC/VMT	=	Ratio of system-wide capacity to demand in the major roadway system
CREDIT/VMT	=	Credit for certain future revenues to be generated by new development

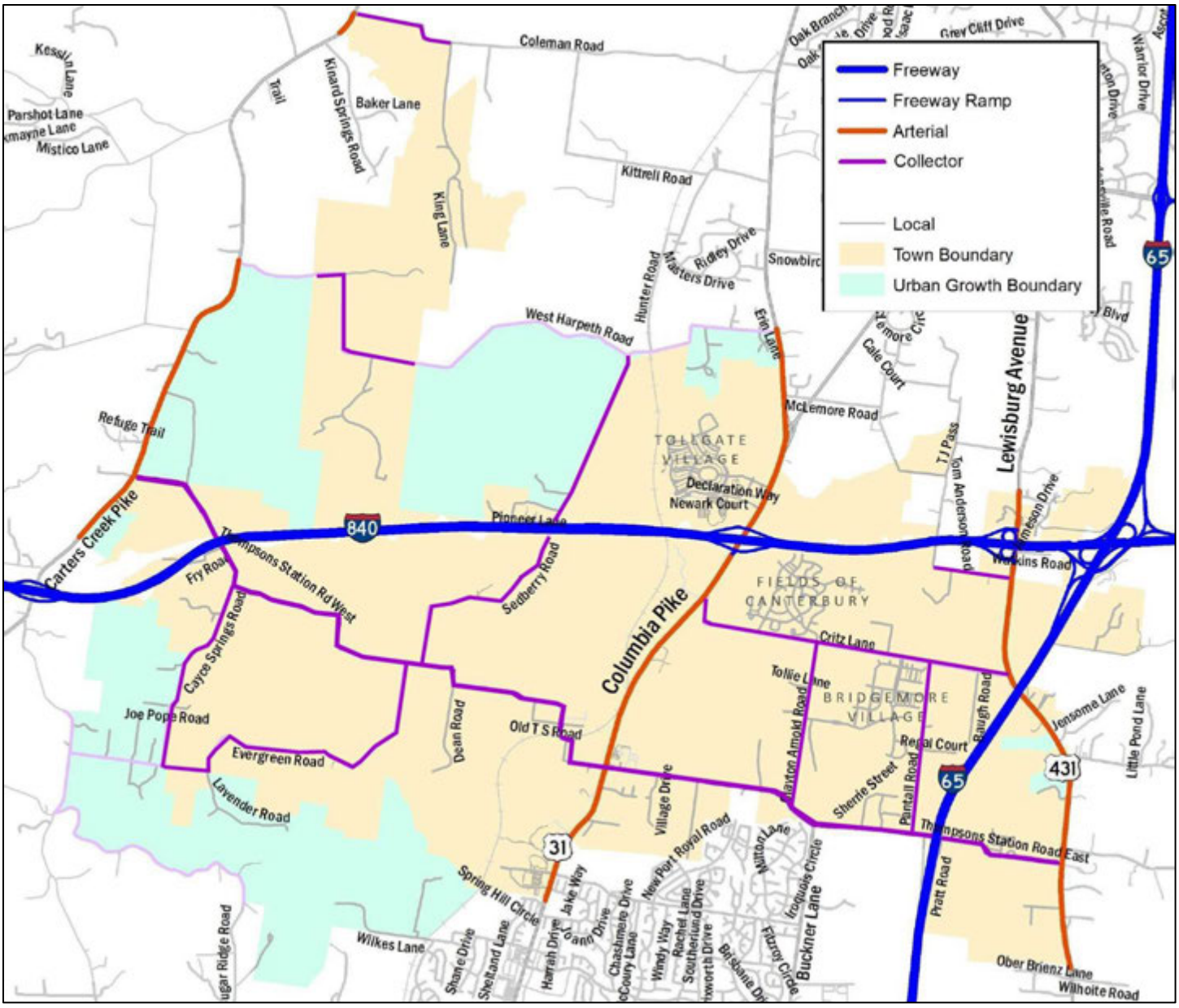
Major Roadway System

A road impact fee program should include a clear definition of the major roadway system that is to be funded with the impact fees. There is no such definition in the Town road impact fee ordinance – presumably the fees could be spent to improve any roadway within the Town limits, including local residential streets of the type typically installed by developers within new subdivisions. Such minor roadways primarily serve to provide access to individual properties and seldom experience capacity constraints. Most road impact fees are restricted to improving major roads that may provide access to adjacent properties but primarily serve to convey traffic over larger areas. Major roads can be categorized as expressways, arterials, and collectors. Major roads within the Town are illustrated in Figure 4.

Expressways are often excluded from municipal road impact fees because cities and towns rarely use the funds for improvements to these facilities, which predominately serve through traffic rather than trips generated by local development. Expressways within Thompson's Station include I-65 and I-640, and these are excluded from the major roadway system as defined in this update. State and Federal roads are often included, because municipal funds are often provided by municipalities for such improvements,[1] and although they may carry a significant amount of through traffic, locally-generated traffic also impacts such roads in adjacent communities. The arterial roads within Thompson's Station are Columbia Pike (US 31/SR 6) and Lewisburg Pike (US 431/SR 106). The collector roads within the Town are all Town roads. Arterial and collector roads are included in the major roadway system as defined in this update.

[1] Spring Hill, for example, has spent close to $11 million in recent years on the widening of Duplex Road (SR 24), while Brentwood has spent about $4 million on widening projects for Franklin Road (US 31) and Concord Road (SR 253).

Figure 4. Existing Major Roads



The characteristics of the Town's existing major roadway system are summarized in Table 5 below. The data are largely drawn from the Town's 2019 *Major Thoroughfare Plan* (MTP). The exception is daily volumes. We compared the model-generated 2018 volumes provided in the MTP with actual 2018 traffic counts conducted by the Tennessee Department of Transportation for eight roadway segments that had estimates from both sources. The modeled volumes averaged 1.5 times as many trips as the counts. The table below contains the TDOT counts that are available, as well as 0.67 (inverse of 1.5) times the modeled volumes for segments where counts are not available (indicated by italics).

Table 5. Existing Major Roadway Inventory

Road		Miles	Lanes	Daily Trips	Capa-city	VMT	VMC
Carters Creek Pike	Coleman Rd to S of Coleman	0.15	2	*2,182*	18,700	327	2,805
Carters Creek Pike	Thompson's Stn Rd to S Limits	0.56	2	4,492	18,700	2,516	10,472
Columbia Pike (US 31/SR 6)	S Town Lmt to Thompson's Stn	1.08	2	*21,299*	18,700	23,003	20,196
Columbia Pike (US 31/SR 6)	Thompson's Stn to Critz Ln	1.35	2	22,396	18,700	30,235	25,245
Columbia Pike (US 31/SR 6)	Critz Lane to I-840	0.57	5	*23,485*	35,300	13,386	20,121
Columbia Pike (US 31/SR 6)	I-840 to Tollgate Blvd	0.44	5	*18,226*	35,300	8,019	15,532
Columbia Pike (US 31/SR 6)	Tollgate Blvd to Goose Crk Bypass	0.47	2	*17,125*	18,700	8,049	8,789
Columbia Pike (US 31/SR 6)	Goose Crk Bypass to N Town Limi	0.49	2	14,690	18,700	7,198	9,163
Lewisburg Pike (US 431/SR 106)	S Limits to Thompson's Stn Rd	0.87	2	6,188	18,700	5,384	16,269
Lewisburg Pike (US 431/SR 106)	Thompson's Stn Rd to Critz Ln	1.57	2	*12,668*	18,700	19,889	29,359
Lewisburg Pike (US 431/SR 106)	Critz Lane to I-840	0.98	2	*16,572*	18,700	16,183	18,261
Lewisburg Pike (US 431/SR 106)	I-840 to N Town Limits	0.41	2	8,330	18,700	3,433	7,707
Subtotal, Arterials		8.94				137,622	183,919
Cayce Springs Road	Thompson's Stn to Evergreen Rd	0.71	2	*235*	18,700	167	13,277
Clayton Arnold Road	Thompson's Stn tp Critz Ln	1.26	2	*8,566*	14,700	10,793	18,522
Coleman Road	Carters Crk Pike to King Ln	0.81	2	*1,675*	18,700	1,357	15,147
Critz Lane	Columbia Pike to Clayton Arnold	0.97	2	*9,872*	14,700	9,576	14,259
Critz Lane	Clayton Arnold to Pantail Rd	0.87	2	*3,551*	14,700	3,089	12,789
Critz Lane	Pantail Rd to Lewisburge Pike	0.59	2	*7,457*	14,700	4,400	8,673
Evergreen Road	Thompson's Stn-Cayce Spgs Rd	2.50	2	*463*	18,700	1,158	46,750
Harpeth Rd W	Town Limits to W of Sedberry	1.38	2	*543*	18,700	749	25,806
Pantall Road	Thompson's Stn Rd to Critz Ln	1.29	2	*4,938*	14,700	6,370	18,963
Sedberry Road	Thompson's Stn to W Harpeth Rd	1.80	2	*1,146*	18,700	2,063	33,660
Thompson's Station Rd W	Carters Crk to Cayce Spgs Rd	1.25	2	1,424	18,700	1,780	23,375
Thompson's Station Rd W	Cayce Spgs to Evergreen Rd	1.58	2	*2,285*	18,700	3,610	29,546
Thompson's Station Rd W	Evergreen to Sedberry Rd	0.11	2	*1,856*	18,700	204	2,057
Thompson's Station Rd W	Sedberry to Columbia Pike	1.95	2	3,568	14,700	6,958	28,665
Thompson's Station Rd E	Columbia Pike to Clayton Arnold	1.46	2	4,009	14,700	5,853	21,462
Thompson's Station Rd E	Clayton Arnold to Pantall Rd	0.95	2	*10,301*	14,700	9,786	13,965
Thompson's Station Rd E	Pantall Rd to Lewisburg Pike	0.18	2	*5,996*	14,700	1,079	2,646
Tom Anderson Rd	Lewisburg Pike to jog in road	0.61	2	*1,675*	14,700	1,022	8,967
Subtotal, Collectors		20.27				70,014	338,529
Total		29.21				207,636	522,448

Source: Segment descriptions, number of lanes and daily capacities from Town of Thompson's Station *Major Thoroughfare Plan* (MTP), adopted by Planning Commission on August 27, 2019; daily trips are 2018 annual average day trip counts from Tennessee Department of Transportation website (trips in italics are two-thirds modeled daily volumes from Table 1 of the MTP – see explanation above); capacities are service volume thresholds at LOS E from Table 2 of the MTP (5- and 6-lane arterial capacities are switched in the table per Barge Design Solutions, October 9, 2019).

As described in the Methodology section, the appropriate level of service for a demand-based fee is the system-wide ratio of capacity (VMC) to demand (VMT). The existing system-wide ratio for the arterial/collector system is 2.52 VMC per VMT, well above the 1.00 ratio used in the standard demand-based methodology. The recommended level of service used to calculate the updated road impact fees is a VMC/VMT ratio of 1.25. This is somewhat lower than the existing level of service for arterial roads, and only about one-half the system-wide average level of service. As long as the updated fees are not based on a higher level of service than currently provided to existing development, there is no existing deficiency on a system-wide basis.

Table 6. Roadway Level of Service

	Arterials	Collectors	Total
Existing Daily Vehicle-Miles of Capacity (VMC)	183,919	338,529	522,448
÷ Existing Daily Vehicle-Miles of Travel (VMT)	137,622	70,014	207,636
Existing VMC/VMT Ratio	1.34	4.84	2.52
Recommended VMC/VMT Ratio			1.25

Source: Table 5.

Travel Demand

The travel demand generated by specific land use types is a product of three factors: 1) trip generation, 2) percent new trips, and 3) average trip length. The first two factors are well documented in the professional literature – the average trip generation characteristics identified in studies of communities around the nation should be reasonably representative of trip generation characteristics in Thompson's Station. In contrast, trip lengths are much more likely to vary between communities, depending on the geographic size and shape of the community and its major roadway system.

Trip Generation

Trip generation rates are based on information published in the most recent edition of the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*. Trip generation rates represent trip ends, or driveway crossings at the site of a land use. Thus, a single trip from home to work counts as one trip end for the residence and one trip end for the workplace, for a total of two trip ends. To avoid over-counting, all trip rates are divided by two. This allocates travel equally between the origin and destination of the trip and avoids double charging. This update utilizes the most current edition of the ITE manual (the 10th edition published in 2017).

New Trip Factor

Trip rates must also be adjusted by a "new trip factor" to exclude pass by and diverted-linked trips. This adjustment is intended to reduce the possibility of over-counting by only including primary trips generated by the development. Pass by trips are those trips that are already on a particular route for a different purpose and simply stop at a development on that route. For example, a stop at a convenience store on the way home from the office is a pass by trip for the convenience store. A pass by trip does not create an additional burden on the street system and therefore should not be counted in the assessment of impact fees. A diverted-linked trip is similar to a pass by trip, but a diversion is made from the regular route to make an interim stop. The reduction for pass by and diverted-linked trips is drawn from ITE manual and other published information.

Average Trip Length

In the context of a road impact fee using a demand-based methodology, it is necessary to determine the average length of a trip on the major roadway system. The average trip length can be determined by dividing the total vehicle-miles of travel (VMT) on the major roadway system by the total number of trips generated by existing development in the service area. Total VMT on the major roadway system is estimated by multiplying the length of each road segment by the current traffic volume on that segment and summing for the entire system. Total trips can be estimated by multiplying existing land uses by the appropriate trip generation rates (adjusted for new trip factors and divided by two) and summing for all existing development within the Town limits.

Existing land use information was compiled from the 2010 Census, residential building permits since 2010, property assessor data for nonresidential non-tax-exempt uses, and scaled estimates of square footage from aerial photography for exempt uses such as government facilities, schools, and churches. Existing land uses in six general categories are multiplied by average daily trip generation rates and summed to determine a reasonable estimate of total daily trips. As shown in Table 7, existing land uses within the Town are estimated to generate 17,284 average daily trips.

Table 7. Existing Average Daily Trips

Land Use	ITE Code	Unit	Existing Units	Trips/ Unit	Daily Trips
Single-Family Detached	210	Dwelling	2,137	4.72	10,087
Multi-Family	220/221	Dwelling	540	3.66	1,976
Subtotal, Residential			2,677		12,063
Retail/Commercial	820	1,000 sq. ft.	246	8.30	2,042
Office	710	1,000 sq. ft.	42	4.87	205
Industrial/Warehouse	130/150	1,000 sq. ft.	168	2.58	433
Public/Institutional	620	1,000 sq. ft.	777	3.27	2,541
Subtotal, Nonresidential			1,233		5,221
Total					17,284

Source: Existing development units from Table 28 (residential) and Table 29 (nonresidential) in Appendix A; trips per unit from Table 10.

A reasonable estimate of the average trip length in the Town can be derived by dividing total daily VMT on the collector road system by the total number of daily trips generated by existing development within the Town. This is conservative, because it excludes travel on the arterials, which carry two-thirds of major roadway traffic. However, given the relatively undeveloped nature of the Town, it is likely that much of the current travel on Columbia and Lewisburg Pikes is through traffic. As presented in Table 8, the average trip length on the major roadway system is estimated to be 4.05 miles.

Table 8. Average Trip Length

Daily VMT on Collector Roads	70,014
÷ Daily Trips	17,284
Average Trip Length (Miles)	4.05

Source: VMT from Table 5; trips from Table 7.

Average trip lengths by trip purpose for the southern region of the U.S. are available from the U.S. Department of Transportation's 2017 *National Household Travel Survey*. Note that the regional average trip length is considerably longer than the local average. This is to be expected, since the regional trip lengths include travel on local streets, expressways, and roads outside to any particular jurisdictional boundary. Using the local-to-regional trip length ratio, reasonable local trip lengths can be derived for specific trip purposes, including home-to-work trips, shopping, school/church and other personal trips, as shown in Table 9.

Table 9. Average Trip Lengths by Trip Purpose

Trip Purpose	Regional Trip Length (miles)	Local/ Regional Ratio	Local Trip Length (miles)
To or from work	11.99	0.421	5.04
Residential	9.62	0.421	4.05
Doctor/Dentist	11.01	0.421	4.63
School/Church	7.74	0.421	3.25
Family/Personal	6.98	0.421	2.93
Shopping	8.55	0.421	3.59
All Trips*	9.62	0.421	4.05

* weighted average (not simple average of trip purposes shown)

Source: Regional average trip lengths for the South Census Region from U.S. Department of Transportation, *National Household Travel Survey*, 2017 (residential trip length assumed same as overall average); "all trips" local trip length from Table 8; local/regional ratio is all trips local to regional trip length; local trip length by trip purpose is the product of regional trip length and local/regional ratio.

Travel Demand Summary

The result of combining trip generation rates, new trip factors, and average trip lengths is the travel demand schedule. The travel demand schedule establishes the average daily vehicle-miles of travel (VMT) generated by various land use types per unit of development on the major roadway system. The updated demand schedule reflects trip generation rates from the Institute of Transportation Engineers (ITE), *Trip Generation*, 10th edition, 2017. Average trip lengths are from the 2017 *National*

Household Travel Survey, calibrated to reflect the average trip length on Thompson's Station's major roadway system. For each land use, daily VMT is the product of trip rate, new trip factor, and trip length. The updated travel demand schedule is presented in Table 10 below.

Some modifications to the land use categories are made in this update to better reflect available data and to simplify the process of fee determination and collection. The major proposed change is to differentiate residential fees by single-family detached and multi-family, and to assess on residential uses on the basis of dwelling units rather than square feet of living area. While there is some evidence that trip generation increases somewhat with dwelling unit size, available data is scant and the relationship does not appear to be linear (i.e., a unit twice as large will not generate twice as many trips). Some additional categories have also been included, such as senior adult housing, golf course, industrial and mini-warehouse. Finally, some nonresidential categories (schools, day care centers, hospitals and nursing homes) that are currently assessed on characteristics that are difficult to quantify, such as number of students or beds, are proposed to be assessed based on building square footage. Definitions of the proposed land use categories are provided in Appendix B to assist Town staff in classifying proposed land uses.

Table 10. Travel Demand Schedule

ITE Code	Land Use	Unit	Trip Ends/ Unit	Trips/ Unit	% New Trips	New Trips/ Unit	Trip Length (mi.)	VMT/ Unit
210	Single-Family Detached	Dwelling	9.44	4.72	100%	4.72	4.05	19.11
220	Multi-Family	Dwelling	7.32	3.66	100%	3.66	4.05	14.82
240	Mobile Home Park	Pad	5.00	2.50	100%	2.50	4.05	10.12
251	Senior Adult Housing, Detached	Dwelling	4.27	2.13	100%	2.13	4.05	8.62
252	Senior Adult Housing, Attached	Dwelling	3.70	1.85	100%	1.85	4.05	7.49
430	Golf Course	Acre	3.74	1.87	100%	1.87	2.93	5.47
310/320	Hotel/Motel	Room	5.86	2.93	100%	2.93	4.05	11.86
820	Retail/Commercial/Shopping Center	1,000 sf	37.75	18.87	44%	8.30	3.59	29.79
931	Restaurant, Standard	1,000 sf	83.84	41.92	38%	15.92	3.59	57.15
934	Restaurant, Drive-Through	1,000 sf	470.95	235.47	30%	70.64	1.80	127.15
853	Gas Station w/Convenience Mkt.	Pump	322.50	161.25	17%	27.41	1.80	49.33
710	Office/Institutional	1,000 sf	9.74	4.87	100%	4.87	4.63	22.54
520/22/30	Elementary/Secondary School	1,000 sf	17.92	8.96	24%	2.15	3.25	6.98
540	Community College	1,000 sf	20.25	10.12	48%	4.85	3.25	15.76
565	Day Care Center	1,000 sf	47.62	23.81	24%	5.71	3.25	18.55
610	Hospital	1,000 sf	10.72	5.36	100%	5.36	3.25	17.42
620	Nursing Home	1,000 sf	6.54	3.27	100%	3.27	3.25	10.62
560	Place of Worship	1,000 sf	6.95	3.47	100%	3.47	3.25	11.27
130	Industrial	1,000 sf	3.37	1.68	100%	1.68	5.04	8.46
150	Warehouse	1,000 sf	1.74	0.87	100%	0.87	5.04	4.38
151	Mini-Warehouse	1,000 sf	1.51	0.75	100%	0.75	5.04	3.78

Source: Daily trip ends from Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 10th Edition, 2017; trips per unit is ½ of trip ends to avoid double-counting; new trip percentages from ITE, *Trip Generation Handbook*, 3rd Edition, 2017; new trip percentage for day care and schools based on Preston Hitchens, "Trip Generation of Day Care Centers," *1990 ITE Compendium* (new trips for community college estimated to be double); average trip lengths from Table 9 (drive-through restaurant and convenience store are one-half retail); VMT is product of new trips per unit and average trip length.

Cost per Service Unit

There are two components to determining the average cost to add a unit of capacity to the major roadway system: the cost of constructing the roadway improvement, and the capacity added by the improvement. Roadway systems do not solely consist of travel lanes. Intersection configurations, signals, and signalization timing infrastructure are other critical components of vehicular capacity. Roadways also require rights-of-way and often multi-modal components, including sidewalks, bike lanes, and multi-use paths. These component costs are often included in improvements that add vehicular capacity.

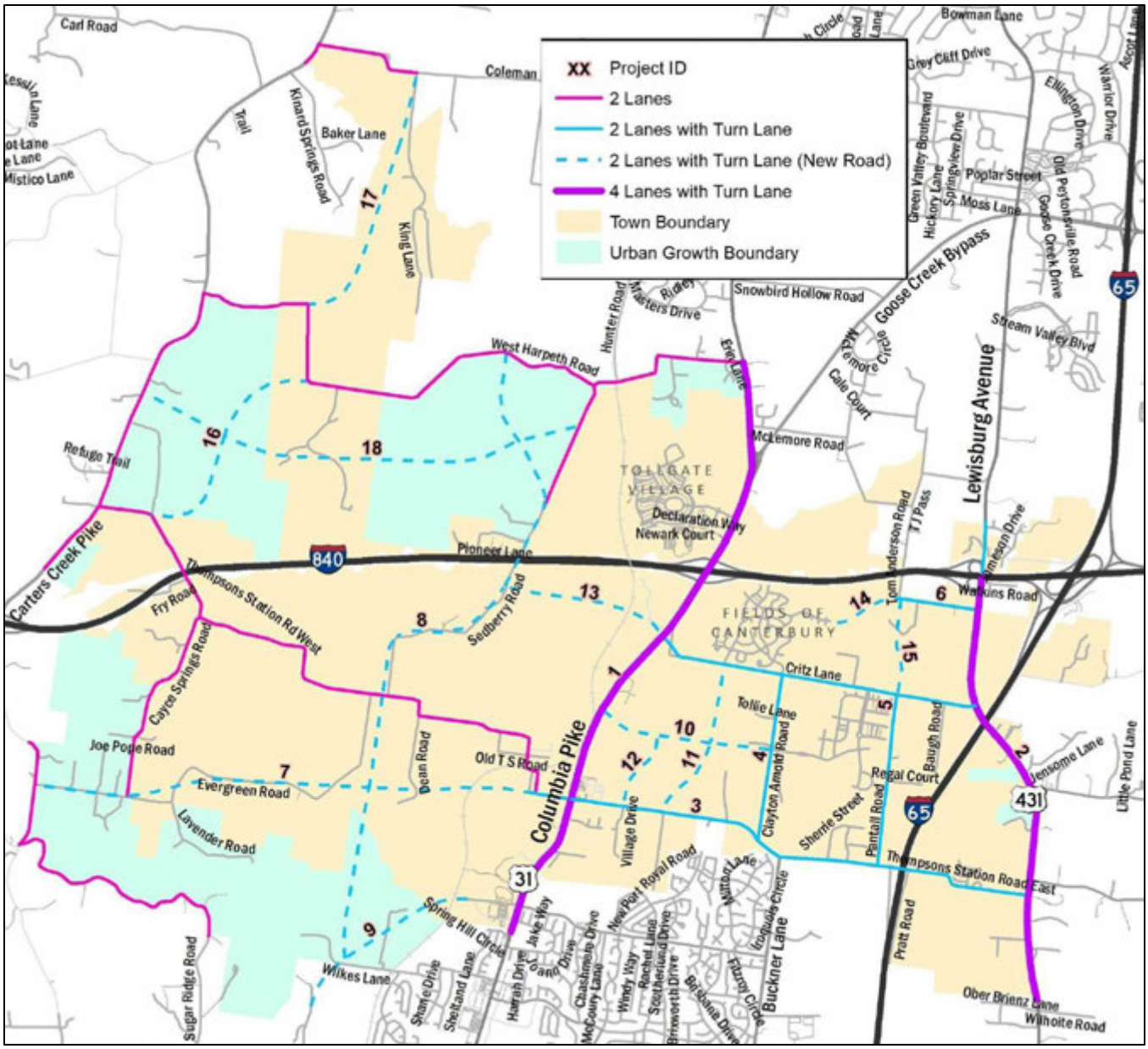
Supporting analysis for the *Major Thoroughfare Plan* (MTP) recently approved by the Planning Commission includes cost estimates for planned projects. These planning-level cost estimates, which include engineering, right-of-way and construction, were prepared by the Town's transportation consultant using Tennessee Department of Transportation cost estimation data and procedures. Planned MTP projects are summarized in Table 11 and illustrated in Figure 5.

Table 11. Major Thoroughfare Plan Projects

ID		Func.		No. of Lanes			New	
No.	Project	Class.	Miles	Ex.	Fut.	New	Ln/Mi.	Total Cost
1	Columbia Pike Widening	Arterial	4.59	2	5	3	13.77	$26,699,800
2	Lewisburg Pike Widening	Arterial	3.70	2	5	3	11.10	$25,818,100
3	Thompson's Stn Rd E Imprvmnts	Maj Coll	3.59	2	2	0	n/a	$17,895,800
4	Clayton Arnold Rd Improvements	Min Coll	1.26	2	2	0	n/a	$4,243,900
5	Pantall Road Improvements	Min Coll	1.29	2	2	0	n/a	$4,492,500
6	Tom Anderson Rd Improvements	Min Coll	0.61	2	2	0	n/a	$2,490,200
7	Evergreen Rd Realign//Extension	Maj Coll	4.05	2	2	0	n/a	$18,568,800
8	Sedberry Rd Realign/Extension	Maj Coll	5.32	2	2	0	n/a	$22,336,300
9	Buckner Road Extension	Maj Coll	1.53	0	3	3	5.00	$8,689,200
10	Columbia Pk-Clayton Arnold Connect	Min Coll	1.31	0	3	3	4.00	$6,622,300
11	Thompson's. Stn-Critz Ln Connector	Min Coll	1.24	0	3	3	4.00	$5,798,800
12	Thompson's. Stn-Project 10 Connector	Min Coll	0.61	0	3	3	2.00	$3,219,500
13	Critz Lane Extension	Min Coll	1.28	0	3	3	4.00	$6,882,400
14	Chaucer Park Lane Extension	Min Coll	0.58	0	3	3	2.00	$3,572,600
15	Critz-Tom Anderson Connector	Min Coll	0.73	0	3	3	2.00	$4,217,800
16	T.S. West-Harpeth Connector	Min Coll	1.80	0	3	3	5.00	$8,121,900
17	Harpeth -Coleman Connector	Min Coll	2.04	0	3	3	6.00	$9,058,900
18	Carters Cr.-Sedberry Connector	Min Coll	3.42	0	3	3	10.00	$13,700,100
19	Off-Street Greenways (Phase 1)	Greenwy	11.05	n/a	n/a	n/a	n/a	$11,050,000
20	Off-Street Greenways (Phase 2)	Greenwy	8.28	n/a	n/a	n/a	n/a	$8,280,000
21	Off-Street Greenways (Phase 3)	Greenwy	10.25	n/a	n/a	n/a	n/a	$10,250,000
Total			68.53					$222,008,900

Source: Barge Design Solutions, *Major Thoroughfare Plan, Appendix A: Recommended Improvement Projects* (not part of the adopted plan).

Figure 5. Locations of Major Thoroughfare Plan Projects



The average cost to add a vehicle-mile of capacity (VMC) is based on the cost estimates in the MTP for projects for which the capacity added can be readily determined. Most of these projects include greenways with multi-use paths. The weighted average cost is $319 per VMC.

Table 12. Average Cost per Vehicle-Mile of Capacity

ID No.	Project	Func. Class.	Miles	Capacity at LOS E Exist.	Future	New	New VMC	Total Cost	Cost/ VMC
1	Columbia Pike Widening	Arterial	3.39	18,700	35,300	16,600	56,274	$26,699,800	$474
2	Lewisburg Pike Widening	Arterial	3.70	18,700	35,300	16,600	61,420	$25,818,100	$420
9	Buckner Road Extension	Maj Coll	1.53	0	18,300	18,300	27,999	$8,689,200	$310
10	Columbia Pk-Clayton Arnold Connect	Min Coll	1.31	0	18,300	18,300	23,973	$6,622,300	$276
11	Thompson's. Stn-Critz Ln Connector	Min Coll	1.24	0	18,300	18,300	22,692	$5,798,800	$256
12	Thompson's. Stn-Project 10 Connector	Min Coll	0.61	0	18,300	18,300	11,163	$3,219,500	$288
13	Critz Lane Extension	Min Coll	1.28	0	18,300	18,300	23,424	$6,882,400	$294
14	Chaucer Park Lane Extension	Min Coll	0.58	0	18,300	18,300	10,614	$3,572,600	$337
15	Critz-Tom Anderson Connector	Min Coll	0.73	0	18,300	18,300	13,359	$4,217,800	$316
16	T.S. West-Harpeth Connector	Min Coll	1.80	0	18,300	18,300	32,940	$8,121,900	$247
17	Harpeth -Coleman Connector	Min Coll	2.04	0	18,300	18,300	37,332	$9,058,900	$243
18	Carters Cr.-Sedberry Connector	Min Coll	3.42	0	18,300	18,300	62,586	$13,700,100	$219
Total/Weighted Average			21.63				383,776	$122,401,400	$319

Source: Table 11, except capacities from Table 5.

The road cost per service unit (VMT) is the cost per VMC times the recommended VMC/VMT ratio of 1.25. The result is $399 per VMT, as shown in Table 13.

Table 13. Road Cost per Service Unit

Cost per Vehicle-Mile of Capacity (VMC)	$319
x Recommended VMT/VMC Ratio	1.25
Cost per Vehicle-Mile of Travel (VMT)	$399

Source: Cost per VMC from Table 13; recommended VMC/VMT ratio from Table 6.

Net Cost per Service Unit

As discussed in the Legal Framework chapter, revenue credits may be warranted for existing deficiencies, outstanding debt, and the availability of State/Federal funding. There are no existing deficiencies from the perspective of the updated road impact fees, because the fees are based on a level of service that is lower than what is currently provided to existing development. The Town does not have any outstanding debt related to past road capacity improvements.

No State/Federal funds are currently programmed in the current (FY 2017-2022) four-year Nashville Area Transportation Improvement Program for roads within the Town limits. Future State and Federal funding of capacity improvements to the major roadway system within the Town limits is hard to predict with any certainty. However, a reasonable guide is historical expenditures over the last decade in the more developed municipalities to the north and south. As summarized in Table 14, the average historical funding for capacity road improvements in Brentwood and Spring Hill results in the present-value equivalent of $211 per VMT. This amount will be used as an estimate of the anticipated future State/Federal funding that will be attributed to new development in Thompson's Station.

Table 14. Road State/Federal Funding Credit

Annual State Federal Funding per VMT, Brentwood	$7.79
Annual State Federal Funding per VMT, Spring Hill	$11.43
Average Annual State/Federal Funding per VMT	$9.61
x Present Value Factor (30 Years)	21.94
State/Federal Funding Credit per Daily VMT	$211

Source: State/Federal funding from Nashville Area Metropolitan Planning Organization, *Transportation Improvement Programs* from FY 2008-2017; present value based on a discount rate of 2.15%, which was the national average yield on AAA 30-year municipal bonds from fmsbonds.com on September 21, 2019.

The net cost per service unit is the cost per VMT less the revenue credit for State/Federal funding. As shown in Table 15, the net cost per service unit is $188 per VMT.

Table 15. Road Net Cost per Service Unit

Cost per Vehicle-Mile of Travel	$399
– State/Federal Funding Credit per VMT	-$211
Net Cost per Daily VMT	$188

Source: Net cost per VMT from Table 13; State/Federal funding credit from Table 14.

Net Cost Schedule

The updated road impact fees for the various land use categories are shown in Table 16. The impact fee calculation for each land use category is the product of daily VMT per development unit on the major roadway system and the net cost per VMT. This takes into account the average cost to add roadway capacity as well as future revenue that will be generated by new development to help offset those costs. The comparison of the updated fees with current fees is presented in the Executive Summary.

Table 16. Updated Road Impact Fees

Land Use Type	Unit	VMT/ Unit	Net Cost/ VMT	Net Cost per Unit
Single-Family Detached	Dwelling	19.11	$188	$3,593
Multi-Family	Dwelling	14.82	$188	$2,786
Mobile Home Park	Pad	10.12	$188	$1,903
Senior Adult Housing, Detached	Dwelling	8.62	$188	$1,621
Senior Adult Housing, Attached	Dwelling	7.49	$188	$1,408
Golf Course	Acre	5.47	$188	$1,028
Hotel/Motel	Room	11.86	$188	$2,230
Retail/Commercial/Shopping Center	1,000 sf	29.79	$188	$5,601
Restaurant, Standard	1,000 sf	57.15	$188	$10,744
Restaurant, Drive-Through	1,000 sf	127.15	$188	$23,904
Gas Station w/Convenience Mkt.	1,000 sf	49.33	$188	$9,274
Office/Institutional	1,000 sf	22.54	$188	$4,238
Elementary/Secondary School	1,000 sf	6.98	$188	$1,312
Community College	1,000 sf	15.76	$188	$2,963
Day Care Center	1,000 sf	18.55	$188	$3,487
Hospital	1,000 sf	17.42	$188	$3,275
Nursing Home	1,000 sf	10.62	$188	$1,997
Place of Worship	1,000 sf	11.27	$188	$2,119
Industrial	1,000 sf	8.46	$188	$1,590
Warehouse	1,000 sf	4.38	$188	$823
Mini-Warehouse	1,000 sf	3.78	$188	$711

Source: VMT per unit from Table 10; net cost per VMT from Table 15.

PARKS

This chapter calculates a potential new impact fee for parks and recreation facilities. The Town provides a number of park facilities for the benefit of residents and will need to expand those facilities as the population grows to maintain the current level of service.

Service Units

A service unit is a standardized measure of demand. The service unit for the park impact fees is the Equivalent Dwelling Unit (EDU). An EDU represents the average number of people residing in an occupied single-family detached dwelling unit. A single-family detached unit is, by definition, one EDU. The number of EDUs per dwelling unit for other housing types is the ratio of the average household size to the average household size of a single-family detached unit.

The only U.S. Census data available on average household size by housing type comes in the form of a 5% sample data set, which an aggregation of annual 1% samples over a five year period. The most recent sample was collected between 2013 and 2017. The published data combine single-family detached and attached units, but the underlying data can be analyzed for different housing types.

Unfortunately, the census data for the Town itself are unreliable, due to small sample sizes in the various categories. However, average household sizes in Williamson County as a whole should be reasonably representative of local conditions. The results of the analysis of the census sample data for Williamson County are shown in Table 17. Mobile home is grouped with single-family detached because it has too small a sample and the two have similar household sizes. Townhomes (single-family attached) clearly have an average household size that is much closer to other forms of multi-family (duplexes, apartments and condominiums) than to single-family detached units. Townhomes and other multi-family types are grouped together because their individual sample sizes are small. The key difference here is that single-family detached and mobile home units have an average household size of almost three people, while multi-family units have only two.

Table 17. Average Household Size by Housing Type, Williamson County

Housing Type	Sample Occ. Units	Weighted Persons	Weighted Occ. Units	Average HH Size
Single-Family Detached	3,222	176,285	59,409	2.97
Mobile Home	48	3,674	1,151	3.19
Single-Family Detached/MH	3,270	179,959	60,560	**2.97**
Multi-Family (except SF Att.)	261	19,185	9,348	2.05
Single-Family Attached	184	6,062	3,252	1.86
Multi-Family	445	25,247	12,600	**2.00**
Total	3,715	205,206	73,160	2.80

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5% sample housing unit microdata for Williamson County, Tennessee.

As described above, park service units are expressed in terms of equivalent dwelling units (EDUs), based on the average number of residents compared to a single-family detached unit. A multi-family unit represents about two-thirds as many residents as a single-family unit, as shown in Table 18.

Table 18. Park Service Unit Multipliers

Housing Type	Average HH Size	EDUs/ Unit
Single-Family Detached/MH	2.97	1.00
Multi-Family	2.00	0.67

Source: Average household size from Table 17; EDUs/unit is ratio to single-family detached.

The number of existing service units is determined by multiplying the existing numbers of units of each housing type by its respective service unit multiplier and summing for all housing types. As shown in Table 19, the Town currently has an estimated 2,499 park service units.

Table 19. Existing Park Service Units

Housing Type	EDUs/ Unit	Existing Units	Existing EDUs
Single-Family Detached/MH	1.00	2,137	2,137
Multi-Family	0.67	540	362
Total			2,499

Source: EDUs per unit from Table 18; existing units from Table 28.

Cost per Service Unit

The Town currently provides 258 acres of park land, as summarized in Table 20.

Table 20. Existing Park Acres

Parks and Recreation Facility	Acres
Sarah Benson Park	25.52
Preservation Park	207.68
Gardens & Dog Park	20.92
Soccer Fields	4.13
Total Park Acres	258.25

Source: Town Planner, March 8, 2019.

Most of the existing park land is in Preservation Park. Based on the 2014 purchase of just over 100 acres, the land cost about $12,000 per acre, as shown below.

Table 21. Park Land Cost per Acre

2014 Preservation Park Purchase	$1,231,200
÷ Number of Acres	102.61
Cost per Acre	$11,999

Source: Town Finance Director, April 16, 2019.

Over the last several years, the Town has invested in several improvements to the parks, totaling about $836,000.

Table 22. Existing Park Improvements

Improvement	Year	Cost
Trails	2012	$25,298
Dog Park Improvements	2014	$111,547
Greenway Trail	2017	$648,255
Greenway Hiking Trail	2017	$50,782
Total Improvement Cost		$835,882

Source: Town Finance Director, April 17, 2019.

The total estimated replacement cost of the Town's existing parks is estimated to be about $4 million, as shown in Table 23. Dividing the replacement cost by existing service units yields a park cost of $1,574 per equivalent dwelling unit (EDU).

Table 23. Park Cost per Service Unit

Land Cost per Acre	$11,999
x Total Park Acres	258.25
Park Land Value	$3,098,742
Park Improvement Cost	$835,882
Total Park Replacement Value	$3,934,624
÷ Existing Service Units (EDUs)	2,499
Park Cost per EDU	$1,574

Source: Land cost per acre from Table 21; acres from Table 21; improvement cost from Table 22; existing EDUs from Table 19.

Net Cost per Service Unit

As described in the Legal Framework chapter, impact fees should be reduced by a credit to account for future revenues that will be generated by new development and used for the same facilities for which the fees are being charged. The Town has about $2.7 million in outstanding debt for the purchase of Preservation Park, as summarized in Table 24. New development will also be paying some of that debt with tax revenue that it will generate.

Table 24. Outstanding Park Debt

Debt Issuer	Date	Purpose	Orig. Amt.	Outstanding
First Farmers Bank	9/26/2013	Preservation Park - park/drip field	$1,153,000	$691,800
Franklin Synergy	5/13/2014	Hill Property - passive park/drip field	$1,000,000	$472,222
First TN Bank	3/2/2018	Preservation Park - wastwater/park facilities	$1,550,000	$1,550,000
Total			$3,703,000	$2,714,022

Source: Town Finance Director, March 8, 2019.

The cost per service unit has been calculated above based on the replacement value of all park facilities. An alternative level of service would be the cost per service unit that has been paid for by existing development. This would explicitly acknowledge that the Town's current parks have excess capacity to serve new development. However, the fee is the same either way, and the Town can use the fee revenue to either acquire and build new park facilities or pay some of the outstanding debt on existing facilities.

The debt credit is calculated as the amount of outstanding debt per service unit. Providing this credit puts new development on an equal footing with existing development. The amount of the credit is identified in Table 25.

Table 25. Park Debt Credit

Outstanding Park Debt	$2,714,022
÷ Existing Service Units (EDUs)	2,499
Park Debt Credit per EDU	$1,086

Source: Outstanding debt from Table 24; existing EDUs from Table 19.

Subtracting the debt credit from the cost per service unit yields the net cost per service unit. As shown in Table 26, the net cost to provide new development with the same level of service provided to existing development is $488 per service unit.

Table 26. Park Net Cost per Service Unit

Park Cost per Service Unit	$1,574
– Park Debt Credit per Service Unit	-$1,086
Net Park Cost per Service Unit	$488

Source: Cost per service unit from Table 23; debt credit from Table 25.

Net Cost Schedule

Park impact fees that reflect the current level of service are calculated in Table 27 by multiplying the service unit multipliers by the net cost per service unit (EDU).

Table 27. Park Net Cost Schedule

Housing Type	EDUs/ Unit	Net Cost/ EDU	Net Cost/ Unit
Single-Family Detached	1.00	$488	$488
Multi-Family	0.67	$488	$327

Source: EDUs per unit from Table 18; net cost per EDU from Table 26.

APPENDIX A: EXISTING LAND USE

Table 28. Existing Residential Units

Housing Type	2010 Units	2010-2018 Permits	2019 Estimate
Single-Family Detached	n/a	n/a	2,137
Multi-Family	n/a	n/a	540
Total	841	1,836	2,677

Source: 2019 total based on 2010 Census and residential building permits since 2010 from Town Planner, March 8, 2019; 2019 multi-family units from Town Planner; 2019 single-family detached is remainder.

Table 29. Existing Nonresidential Square Feet

Land Use Type	Sq. Feet
Retail/Commercial	246,162
Office	41,592
Industrial/Warehouse	168,228
Public/Institutional	777,270
Total Nonresidential Sq. Ft.	1,233,252

Source: Williamson County Property Assessor data for nonresidential non-tax-exempt uses; Town building permit records or scaled estimates of square footage from aerial photography for exempt uses.

APPENDIX B: LAND USE DEFINITIONS

Recommended definitions for the land use categories in the updated road impact fee schedule are provided below. These definitions are intended to assist Town staff in classifying proposed developments and assessing appropriate impact fees. If these definitions are adopted by ordinance or resolution, those that differ from or overlap with zoning or general definitions should have a disclaimer that they only apply to interpretation of the schedule for road impact fees.

Single-Family Detached means a building containing only one dwelling unit, including a mobile home not located in a mobile home park.

Multi-Family means a building containing two or more dwelling units. It includes duplexes, apartments, residential condominiums, townhouses, and timeshares.

Mobile Home/RV Park means a parcel (or portion thereof) or abutting parcels of land designed, used or intended to be used to accommodate two or more occupied mobile homes or recreational vehicles, with necessary utilities, vehicular pathways, and concrete pads or vehicle stands.

Hotel/Motel means a building or group of buildings on the same premises and under single control, consisting of sleeping rooms kept, used, maintained or advertised as, or held out to the public to be, a place where sleeping accommodations are supplied for pay to transient guests or tenants. This land use category includes rooming houses, boardinghouses, and bed and breakfast establishments.

Retail/Commercial/Shopping Center means an integrated group of commercial establishments planned, developed, owned or managed as a unit, or a free-standing retail or commercial use not otherwise listed in the impact fee schedule. Uses located on a shopping center outparcel are considered free-standing for the purposes of this definition. A retail or commercial use shall mean the use of a building or structure primarily for the sale to the public of nonprofessional services, or goods or foods that have not been made, assembled or otherwise changed in ways generally associated with manufacturing or basic food processing in the same building or structure. This category includes but is not limited to all uses located in shopping centers and the following free-standing uses:

Amusement park
Auto parts store
Auto wrecking yard
Automobile repair
Bank without drive-through facilities
Bar and cocktail lounge
Camera shop
Car wash
Convenience food and beverage store without gas pumps
Department store
Florist shop
Food store
Grocery

Hardware store
Health or fitness club
Hobby, toy and game shop
Junkyard
Laundromat
Laundry or dry cleaning
Lawn and garden supply store
Massage establishment
Music store
Newsstand
Nightclub
Racetrack
Recreation facility, commercial
Rental establishment
Repair shop, including auto repair
School, commercial
Specialty retail shop
Supermarket
Theater, indoor (including movie theater)
Used merchandise store
Variety store
Vehicle and equipment dealer

Gas Station with Convenience Market means an establishment offering the sale of motor fuels and convenience items to motorists.

Golf Course means a golf course that is not restricted primarily for use by residents of a residential development of which it is a part, including commercial uses such as pro shop or bar that are designed primarily to serve golfers on the site.

Office/Institutional means a general office, medical office or public/institutional use, as hereby defined, not located in a shopping center.

> **General Office** means a building exclusively containing establishments providing executive, management, administrative, financial, or non-medical professional services, and which may include ancillary services for office workers, such as a restaurant, coffee shop, newspaper or candy stand, or child care facilities. It may be the upper floors of a multi-story office building with ground floor retail uses. Typical uses include banks without drive-in facilities, real estate, insurance, property management, investment, employment, travel, advertising, secretarial, data processing, telephone answering, telephone marketing, music, radio and television recording and broadcasting studios; professional or consulting services in the fields of law, architecture, design, engineering, accounting and similar professions; interior decorating consulting services; and business offices of private companies, utility companies, trade associations, unions and nonprofit organizations. This category does not include an administrative office that is ancillary to a principal commercial or industrial use.

Medical Office means a building primarily used for the examination and/or treatment of patients on an outpatient basis (with no overnight stays by patients) by health professionals, and which may include ancillary services for medical office workers or a medical laboratory to the extent necessary to carry out diagnostic services for the medical office's patients. It includes the use of a site primarily for the provision of medical care and treatment of animals, which may include ancillary boarding facilities.

Public/Institutional means a governmental, quasi-public or institutional use, or a non-profit recreational use, not separately listed in the impact fee schedule. Typical uses include higher education institutions, city halls, courthouses, post offices, jails, libraries, museums, military bases, airports, bus stations, fraternal lodges, parks and playgrounds. It also includes bus terminals, fraternal clubs, adult day care centers, college dormitories, and prisons.

Restaurant, Standard means a stand-alone establishment, not located in a shopping center but may be located on an out-parcel, that sells meals prepared on site, and does not provide drive-through or drive-in service.

Restaurant, Drive-Through means a stand-alone establishment, not located in a shopping center but may be located on an out-parcel, that sells meals prepared on site, and provides drive-through or drive-in service.

Hospital means an establishment primarily engaged in providing medical, surgical, or skilled nursing care to persons, including overnight or longer stays by patients.

Nursing Home means an establishment primarily engaged in providing limited health care, nursing and health-related personal care but not continuous nursing services.

Place of Worship means a structure designed primarily for accommodating an assembly of people for the purpose of religious worship, including related religious instruction for 100 or fewer children during the week and other related functions.

Day Care Center means a facility or establishment that provides care, protection and supervision for six or more children unrelated to the operator and which receives a payment, fee or grant for any of the children receiving care, whether or not operated for profit. The term does not include public or nonpublic schools.

Elementary/Secondary School means a school offering an elementary through high school curriculum.

Industrial means an establishment primarily engaged in the fabrication, assembly or processing of goods. Typical uses include manufacturing plants, industrial parks, research and development laboratories, welding shops, wholesale bakeries, dry cleaning plants, and bottling works.

Warehouse means an establishment primarily engaged in the display, storage and sale of goods to other firms for resale, as well as activities involving significant movement and storage of products or equipment. Typical uses include wholesale distributors, storage warehouses, trucking terminals, moving and storage firms, recycling facilities, trucking and shipping operations and major mail processing centers.

Mini-Warehouse means an enclosed storage facility containing independent, fully enclosed bays that are leased to persons for storage of their household goods or personal property.

ORDINANCE NO. 2020-004

AN ORDINANCE OF THE TOWN OF THOMPSON'S STATION, TENNESSEE TO AMEND ORDINANCE NO. 10-007 PURSUANT TO TITLE 18, CHAPTER 1 REGARDING WASTEWATER

WHEREAS, the Utility Board and Town Staff for the Town of Thompson's Station is recommending amendments to certain provisions of the Town's Ordinance No. 10-007 as authorized under Title 18, Chapter 1, Subsection 18-114 of the Municipal Code for the Town of Thompson's Station, and specifically, based on and pursuant to the Jackson Thornton, Certified Public Accountants and Consultants study titled *Town of Thompson's Station, TN Wastewater System Development Charge Analysis*; and

WHEREAS, the Board of Mayor and Aldermen have for their consideration the adoption of amendments to Ordinance No. 10-007 as proposed herein to increase the fees as necessitated by the demand on the Town of Thompson's Station's Wastewater System; and

WHEREAS, the Board of Mayor and Alderman understand there exist growth in the population of the Town, and further, understand the occurrence of expansion of development to accommodate that growth in population, and further recognize a greater demand for wastewater treatment needs as a result of the growth and expansion; and

WHEREAS, the Board of Mayor and Alderman further believe and understand that growth should, where possible, pay for itself as to the expansion and demands on the Town of Thompson's Station's Wastewater System infrastructure; and

WHEREAS, the Board of Mayor and Alderman have further determined that it is in the best interest of the Town to amend the language of Ordinance No. 10-007 as to the components of system development fees, access/tap fees, and effluent disposal fees to be known as the Wastewater Impact Fees; and

WHEREAS, the Board of Mayor and Aldermen have reviewed Ordinance No. 10-007 as developed under Title 18, Chapter 1, Subsection 18-114 and determined, based upon the considerations of the recommendations of the Utility Board, Town Staff and the study on which the recommendations were made, it is necessary and prudent to increase the Wastewater Impact Fees to $9,225.00 toward contributions of capital for existing or planned future plant facilities necessary to meet the service needs of new and existing customers;

NOW, THEREFORE, BE IT ORDAINED by the Board of Mayor and Aldermen of the Town of Thompson's Station, Tennessee, as follows:

Section 1. That the Town of Thompson's Station's Ordinance No. 10-007 is amended, as provided hereinafter, and that Ordinance No. 14-001 be repealed as provided under Title 18, Chapter 1, Section 18-114;

Section 2. That Ordinance No. 10-007 is amended to add the following language to Section 3 (a):

The components of system development fees, access/tap fees, and effluent disposal fees shall be known as Wastewater Impact Fees.

Section 3. That Ordinance No. 10-007 is amended by deleting Section 3 (b) of said ordinance in its entirety and replacing it with the following new subsection:

(b) This portion of the Ordinance shall take effect on July 1, 2020, unless otherwise provided herein, and the following shall become the Wastewater Impact Fee amount to be charged to developers, contractors, builders and/or property owners proposing to connect to the Town's Wastewater Treatment Facilities:

Wastewater Impact Fee: $9,225.00 per EDU

Section 4. That Ordinance No. 10-007 is amended by deleting Section 3 (c) of said ordinance in its entirety and replacing it with the following new subsection:

(c) There shall be a review of the Wastewater Impact Fee in January of each odd year to start in 2023.

Section 5. After final passage, Town Staff is directed to incorporate these changes into an updated ordinance document and said document shall constitute the Wastewater Reclamation and Reuse ordinances of the Town.

Section 6. If any section or part of the Ordinance, including any amendments thereto, is determined to be invalid for any reason, such section or part shall be deemed to be a separate and independent provision. All other sections or parts shall remain in full force and effect. If any section or part of the Ordinance is invalid in one or more of its applications, that section or part shall remain in effect for all other valid applications.

Section 7. This ordinance shall take effect on July 1, 2020 upon the publication of its caption in a newspaper of general circulation after final reading by the Board of Mayor and Aldermen, the public welfare requiring it.

Duly approved and adopted by the Board of Mayor and Aldermen of the Town of Thompson's Station, Tennessee, on the _____ day of _____, 2020.

_____
Corey Napier, Mayor

ATTEST:

_____
Regina Fowler, Town Recorder

Passed First Reading: _____

Passed Second Reading: _____

Submitted to Public Hearing on the ____ day of _____, 2020, at 7:00 p.m., after being advertised in the *Williamson AM* Newspaper on the ____ day of _____, 2020.

APPROVED AS TO FORM AND LEGALITY:

_____
Town Attorney

ORDIANCE NO. 10-007

AN ORDIANCE OR THE TOWN OF THOMPSON'S STATION, TENNESSEE, ESTABLISHING USER REATES FOR TOSE PERSONS UTILIZING THE TOWN'S WASTEWATER TREATMENT FACILITIES

WHEREAS, the Town of Thompson's Station has implemented a wastewater treatment facility for treatment of swage of waste water; and

WHEREAS, the Town's wastewater treatment facility must be self-sustaining, it is necessary to establish sewer user rates, the same being in conformity with State law and provisions of the grants and bonds to which the Town is committed; and

WHEREAS, the Board of Mayor and Aldermen have determined that it is in the best interest of the Town to separate the wastewater tap fees into separate components: system development, access/tap, and effluent disposal fees to more efficiently plan for the growth of the wastewater system.

NOW, THEREFORE, BE IT ORDAINED by the Board of Mayor and Aldermen of the town of Thompson's Station as follows:

Section 1. All Prior Conflicting Ordinances Repealed. That upon the effective date of this ordinance, all prior ordinances and resolutions in conflict herewith be repealed.

Section 2. User rates. That from and after the date of adoption, the following become the user rates to be charged to customers of the Town's wastewater treatment facility, to wit:

Residential & Nonresidential Uses:	107.5% of water fees
Maximum Monthly Residential Fee:	$55.00

Section 3. System Development, Access/Tap and Effluent Disposal Fee.

(a) Estimated water usage is based on calculations derived from several professional water use estimation formulas and a usage calculation worksheet is included in this ordinance as exhibit A. An equivalent dwelling unit (EDU) is based on an estimated single-family dwelling water usage at three hundred fifty (350) gallons per day (GPD). Water usage calculations for the purpose of calculating fees shall deem any usage less than three hundred fifty (350) GPD as one (1) EDU and

any usage calculated to exceed 350 GPD (or multiplies thereof) shall be counted as an additional EDU. For example, a proposed use calculated at 700 or less GPD would be 2 EDUs, but a use calculated at 701 GPD would be 3 EDUs.

The components of system development fees, access/tap fees, and effluent disposal fees shall be known as Wastewater Impact Fees.

~~(b) From and after the date of adoption, the following shall become the system development fee, access and tap fee, and effluent disposal fees to be charged to developers and builders proposing to connect to the Town's wastewater treatment facility, to wit:~~

~~System Development Fee: $2,500.00 Per EDU~~
~~(To be paid in conjunction with Preliminary Plat submittal)~~
~~Access and Tap Fee: $1,100.00 Per EDU~~
~~(To be paid prior to recordation of Final Plat)~~
~~Effluent Disposal Fee $1,700.00 Per EDU~~

(b) This portion of the Ordinance shall take effect on July 1, 2020, unless otherwise provided herein, and the following shall become the Wastewater Impact Fee amount to be charged to developers, contractors, builders and/or property owners proposing to connect to the Town's Wastewater Treatment Facilities:

Wastewater Impact Fee: $9,225.00 per EDU

~~(c) Any developer, builder or property owner who has purchased sewer taps before the effective date of this Ordinance shall be credited with the System Development Fee and Access and Tap Fee. From and after the effective date of this Ordinance, developers, builders, and property owners seeking the issuance of building permits shall be responsible for payment of the Effluent Disposal Fee in lieu of the dedication and deeding of property for effluent disposal, unless otherwise specifically approved by the Board of Mayor and Aldermen.~~

(c) There shall be a review of the Wastewater Impact Fee in January of each odd year to start in 2023.

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Section 4. Residential capacity letters. That from and after the date of adoption, the following become the fee to be charged for the initial capacity reservation letter for lots proposing to connect to the Town's wastewater treatment facility, to wit:

Residential Capacity Letter:	$10.00 Per Lot
Nonresidential Capacity Letter:	$20.00 Per Lot

(To be paid prior to submittal of a Site Development Plan)

Section 5. Pump and Haul. Any developer, builder or property owner who proposes to provide sewage disposal service to their development, business or residence utilizing pump and haul must submit an application for approval to the Town. A non-refundable $900.00 deposit will be required as part of application. Pump and haul service shall only be permitted when it is determined by the Town that : (1) sewer or septic service is not available to the property, (2) sewer service will be made available within a reasonable time, (3) that an adequate bond or surety has been provided by the property owner to the Town to ensure payment of the pump and haul service contract, and (4) that said service is in the best interest of the Town. Upon approval by the Town the property owner shall agree to the terms of the pump and haul contract. The pump and haul contracts shall be administered by the Town for treatment by the Town's wastewater system and shall be approved by the Board of Mayor and Aldermen.

Section 6. Violation and penalty. In addition to any other action the Town may take against a permit holder in violation of this chapter, such violation shall be punishable by civil penalty not to exceed $50.00. Each day a violation occurs shall constitute a separate offense. Nothing herein shall prohibit the Town from seeking other remedies, including injunctive relief or claims for damages to its rights-of-way, to enforce the purposes of the ordinance.

Section 7. Severability. If any section, sentence, clause or phrase of this ordinance should be held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause, or phrase of this ordinance.

Section 8. Effective date. This ordinance shall take effect upon its passage on final reading by the governing body and upon publication in a newspaper of general circulation, the public welfare requiring.

Duly approved and adopted by the Board of Mayor and Aldermen of the Town of Thompson's Station, Tennessee, on the 18th day of January, 2011

_____
Corey Napier, Town Mayor

ATTEST:

_____
Doug Goetsch, Town Recorder

Passed Frist Reading: November 16 2010

Passed Second Reading: January 18, 2011

Submitted to Public Hearing on the 18th day of January, 2011 at 7:00p.m., after being advertised in the Williamson AM Newspaper on the 27th day of December, 2010.

APROVED AS TO FORM AND LEGALITY:

_____
~~Kirk Vandivort,~~ Town Attorney

EXHIBIT A
(Water Usage Calculation Table)

The water usage table below is for non-residential and multifamily uses only. Residential uses shall constitute one (1) EDU for each separate living unit or quarters. Accessory living quarters both attached and detached also constitute one (1) EDU.

Churches		
Church	Per Seat	5 GPD
Church with Kitchen Facility	Per Seat	8 GPD
Church with Daycare Facilities	Per Person (Children & Adults)	20 GPD
Church with Multiple Buildings	Calculate Uses Separately	----
Commercial/ Industrial Facilities		
Airports, Bus & Rail Depots – No Food	Per 1, 000 Square Feet	150 GPD
Barber Shop	Per Chair	5 GPD
Beauty Salon	Per Chair	100 GPD
Bowling Alley	Per Lane	75 GPD
Child Day-care Facility (Commercial)	Per Person (Children & Adults)	20 GPD
Child Day -care (Home)	Per Bedroom	170 GPD
Temp. Const. Office/ Work Camp (no showers)	Per Person	40 GPD
Temp. Const. Office/ Work Camp (showers)	Per Person	80 GPD
Factory or Plant (no showers)	Per Employee	20 GPD
Factory or Plant (showers)	Per Employee	40 GPD
Grocery Store (no food service)	Per 1,000 Square Feet	80 GPD
Grocery Store (food services)	Per 1,000 Square Feet	100 GPD
Highway Rest Area/ Visitor Center	Per Square Food	10 GPD
Landry (self service)	Per Machine	500 GPD
Marina (no bathing facilities)	Per Boat Slip	25 GPD
Marina (with bathing facilities)	Per Boat Slip	50 GPD
Office Buildings	Per Total Number of Employees	20 GPD
Individual Retail Store (not mall or shopping center)	Per Square Foot	5 GPD
Vehicle Service Station (no food/public restroom)	Per Employee	20 GPD

Shopping Center Mall	Per 1,000 Square Feet	150 GPD
Stadium, Auditorium, Theater (any type)	Per Seat	5 GPD
Veterinary Hospital	Per 1,000 Square Feet	200 GPD
Apartment Buildings		
For Each-one Bedroom	Per Apartment Unit	250 GPD
For Each -Two Bedroom	Per Apartment Unit	300 GPD
For Each- Three Bedroom	Per Apartment Unit	350 GPD
Bed & Breakfast Establishment	Per Bedroom (All)	175 GPD
Boarding or Rooming House (no meals)	Per Bedroom (All)	175 GPD
Boarding or Rooming House (meals)	Per Bedroom (All)	200 GPD
Hotels or Motels (with private bathrooms)	Per Room	150 GPD
Food Services/ Drinking Establishments		
Ordinary Restaurant (not 24 hr.)	Per Seat	40 GPD
Restaurant Operating 24 Hrs. Per Day (no interstate)	Per Seat	80 GPD
Restaurant Operating 24 Hrs. Per Day (interstate)	Per Seat	150 GPD
Drive-in or Take-out Restaurant	Per Hour Open for Business	70 GPD
Tavern, Bar, Lounge (with no food)	Per Seat	40 GPD
Tavern, Bar, Lounge (with no food)	Per Seat	60 GPD
Catering Business- Banquet Facilities	Per Person	30 GPD
Institutions		
Assembly Halls, Public Buildings	Per Seat	5 GPD
Home for Aged	Per Bed	125 GPD
Medical Hospital	Per Bed	300 GPD
Medical Hospital	Per Bed	180 GPD
Nursing Home	Per Bed	1850 GPD
Prison or Jail	Per Bed	125 GPD
Schools (with showers & cafeterias)	Per Person	16 GPD
Schools (without showers & cafeterias)	Per Person	12 GPD
Recreational & Establishments		
Camps (Daytime Use Only- Toilets no meals)	Per Person	15 GPD

Camps (Daytime Use Only- Toilets & meals)	Per Person	25 GPD
Fairgrounds or Mass Gathering Facility	Per Person	3 GPD
Golf Course Clubhouse (on peak daily attendance)	Per Person	10 GPD
Park - Public Restroom	Per parking Space	5 GPD
Swimming Pool & Bathhouse (on peak attendance)	Per Person	10 GPD
Travel Trailer Park (water & sewer hookups)	Per Trailer Space	100 GPD
Travel Trailer Park (No water & sewer hookups)	Per Trailer Space	75 GPD

ORDIANCE NO. 14-001

AN ORDIANCE OF THE TOWN OF THOMPSON'S STATION, TENNESSEE, TO INCREASE THE EFFLUENT DISPOSAL USER RATES FOR THE TOWN'S WASTEWATER TREATMENT FACILITIE

WHEREAS, the Town of Thompson's Station has implemented a wastewater treatment facility for treatment of sewage and waste water; and

WHEREAS, the Town's wastewater treatment facility must be self-sustaining, it is necessary to establish sewer user rates and fees, the same being in conformity with State law and provisions of the grants and bonds to which the Town is committed; and

WHEREAS, the Board of Mayor and Aldermen have determined that it is necessary to increase the effluent disposal fees from $1,700 per EDU to $2,500 per EDU to cover the increased cost related to the acquisition and installation of drop field systems to the standards now required by the Tennessee Department of Environment and Conservation, and to more efficiently plan for the growth of the wastewater system.

NOW, THEREFORE, BE ORDAINED by the Board of Mayor and Aldermen of the Town of Thompson's Station as follows:

Section 1. That Ordinance No. 10-007 is amended by deleting Section 3(b) of said ordinance I its entirety and replacing it with the following new subsection:

(b) From and after the date of adoption, the following shall become the system development fee, access and tap fee, and effluent disposal fees to be charged to developers and builders proposing to connect to the Town's wastewater treatment facility:

System Development fee: $2,500.00 Per EDU
(To be paid in conjunction with Preliminary Plat submittal)
Access and Tap Fee: $1,100.00 Per EDU
(To be paid prior to recordation of Final Plat)
Effluent Disposal Fee: $2,500.00 Per EDU
(To be paid prior to issuance of Building Permit)

Section 2. That upon the effective date of this ordinance, all prior ordinances and resolutions in conflict herewith are repealed.

Section 3. This ordnance shall take effect upon its passage on final reading by the governing body and upon publication in a newspaper of general circulation, the public welfare requiring.

Duly approved and adopted by the Mayor and Board of Aldermen of the Town of Thompson's Station, Tennessee, on the 11th day of February, 2014.

Corey Napler, Town Mayor

ATTEST:

Leah Rainey, Town Recorder

Passed First Reading:

Passed Second Reading:

Submitted to Public Hearing on the _____ day of _____ 2014, at 7:00p.m., after being advertised I the Williamson AM Newspaper on the _____ day of _____, 2014.

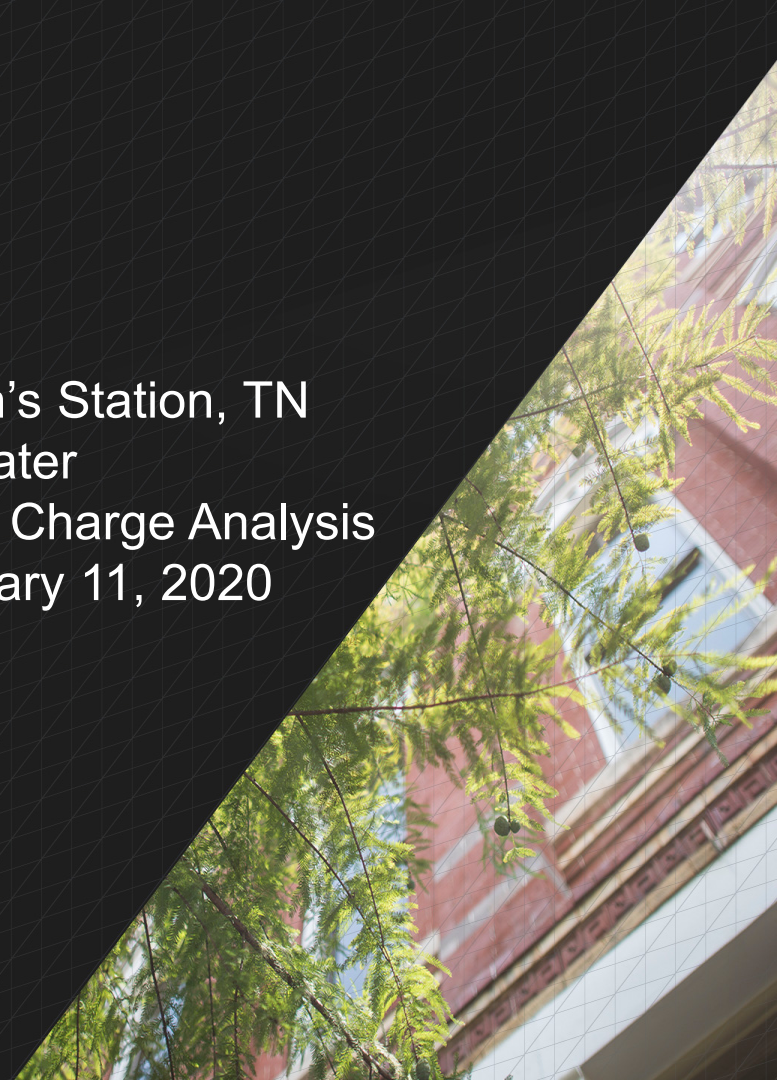
APPROVED AS TO FORM AND LEGILITY:

Kirk Vandivort, Town Attorney

JACKSON THORNTON

Certified Public Accountants
& Consultants

Town of Thompson's Station, TN
Wastewater
System Development Charge Analysis
Presented February 11, 2020



System Development Fees - Definition

- A contribution of capital toward existing or planned future plant facilities necessary to meet the service needs of new customers to which such fees apply.
- Two methods used to determine the amount of these charges are the buy-in method and the incremental-cost pricing method.
- Charges are intended to provide funds to be used to finance all or part of capital improvements necessary to serve new customers.

*AWWA's, Principles of Water Rates, Fees and Charges, p328

System Development Fees – Methodologies

- Equity (Buy-In) Method – This approach attempts to assess new customers a fee to approximate the equity position of current customers. (AWWA M-1, p199)

- Incremental Cost Method – Assigns to new development the incremental cost of system expansion needed to serve the new development. (AWWA M-1, p202).

- Given the dynamics of the Town's wastewater system, the Incremental Cost Method was applied.

Process Overview

1. Develop Equivalent Residential Unit using 12 months ended June 2018 billing statistics.

2. Determine the number of ERU's of capacity being added.

3. Incremental Cost - Calculate the average investment per ERU on the additional capacity being added.

Develop Equivalent Residential Unit

Incremental Approach	
Annual Residential Sales (Gals)	85,481,600
Annual Residential Billings	17,448
Monthly Volume/Customer (Gals)	4,899
Annual Volume/Customer (Gals)	58,791
530,000 gallons Additional Daily Capacity	193,450,000
Equivalent Residential Units (ERU)	**3,290**

Determine the Avg. Investment Per ERU in New Capacity

Equivalent Residential Units (ERU)	3,290
Projected Growth Related Investment in Plant	*$ 20,000,000*
Projected Interest Expense on Long Term Debt	$ 10,356,250
Projected Cost of Capacity Related Investment	$ 30,356,250
Average Investment/ERU	**$ 9,225**

*Does not include labor, materials, inspection, etc.

Fee Escalation by Meter Size

Meter Size (Inches)	Multiplier		Fee
3/4	1.00	$	9,225
1	1.33	$	12,301
1 1/2	2.00	$	18,451
2	2.67	$	24,601
3	4.00	$	36,902
4	5.33	$	49,202
6	8.00	$	73,804
8	10.67	$	98,405
10	13.33	$	123,006
12	16.00	$	147,607

Fee Escalation by Estimated Max Flow

Maximum Rated Flow GPM	Meter Size	Multiplier		Fee
30	3/4	1.00	$	9,225
50	1	1.67	$	15,376
100	1 1/2	3.33	$	30,752
160	2	5.33	$	49,202
320	3	10.67	$	98,405
500	4	16.67	$	153,758
1,000	6	33.33	$	307,515
1,600	8	53.33	$	492,024
4,200	10	140.00	$	1,291,563
5,300	12	176.67	$	1,629,830

*Meter flows would need to be confirmed by water provider

Town of Thompson's Station
Utility Board
Meeting Minutes
December 18, 2019 6:00 p.m.

Call to Order:
The meeting of the Utility Board of the Town of Thompson's Station was called to order at 6:00 p.m. on December 18, 2019 at the Thompson's Station Community Center with the required quorum. Members and staff in attendance were: Chairman Jeff Risden, Alderman Brian Stover, Bruce DiFrancisco, Joe Whitson, Skip Beasley, Brad Wilson, Town Administrator Ken McLawhon, Finance Director Steve Banks, Town Recorder/Clerk Regina Fowler and Town Attorney Kirk Vandivort.

Minutes:
Consideration of the minutes of the November 20, 2019, regular meeting was presented.
Mr. Stover made a motion to approve the November 20, 2019 regular meeting minutes. The motion was seconded and carried unanimously.

1. **System Operators Update:**
   Brandon Haskins updated the Utility Board. Everything is about the same as last month. Smoke testing begins tomorrow in Canterbury. Matthew Johnson, Barge Design noted that approximately 96,000 ft. of drip lines are in the ground. If a defect is found Comcast would be contacted to repair said defect. The second option would be to expand smoke testing. The third option is to collect data in the high tide units and analyze said data for anything unusual at the pump stations. The fourth option is to conduct CCTV (camera in lines) testing.

Wastewater Impact Fee Presentation – Jim Marshall

System Development Fees – Definition

- A contribution of capital toward existing or planned future plant facilities necessary to meet the service needs of new customers to which such fees apply.
- Two methods used to determine the amount of these charges are the buy-in method and the incremental-cost pricing method.
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- Given the dynamics of the Town's wastewater system, the Incremental Cost Method was applied.

Process Overview

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Develop Equivalent Residential Unit

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Fee Escalation by Estimated Max Flow

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1,600	8	53.33	$ 492,024
4,200	10	140.00	$ 1,291,563
5,300	12	176.67	$ 1,629,830

*Meter Flows would need to be confirmed by water provider

Discussion:

The Utility Board discussed how to proceed forward. it was determined that a recommendation for a new rate be referred to BOMA for their consideration at the February BOMA meeting. Jeff Risden noted that at present, there is a $6,100 (all in fee) which consists of a disposal fee, builder fee and a developer fee. Ken McLawhon noted there would need to be documents updated by Town Attorneys. He also believes its most beneficial to the Town to replicate the collection of these fees on the front end. A future Open House was discussed for the Utility Board. The Utility Board did ask Mr. Jim Marshall with Jackson Thornton to make the above presentation at the 6:00 p.m. BOMA Work Session February 11, 2020.

Recommendation to BOMA for the Endorsement of Jackson Thornton's Presentation - Town of Thompson's Station, TN Wastewater System Development Charge Analysis. Mr. Whitson made a motion to approve the recommendation to BOMA for the Endorsement of Jackson Thornton's Presentation – Town of Thompson's Station, TN Wastewater System Development Charge Analysis. The motion was seconded and carried unanimously.

Announcements:

John Peterson resigned from the Utility Board therefore, the vacant position has been advertised.

Adjourn:

There being no further business, the meeting adjourned at 6:53 p.m.

Chairman, Jeff Risden

Town of Thompson's Station
Board of Mayor and Aldermen
Meeting Minutes
April 9, 2019

Meeting Called to Order

Pledge of Allegiance

Minutes –

Consideration of the March 12, 2019 regular meeting minutes and the March 26, 2019 special sessio minutes

Appointment of the Interim Town Recorder Caryn Miller

Public Comments

New Business:

1. **First Reading of Ordinance 2019-005:** An Ordinance to incorporate a definition for "religious institution" within Section 1.3 of the Land Development Ordinance and to modify Section 4.5.2 to incorporate standards to govern private schools within the T5 district.

2. **First Reading of Ordinance 2019-06**: An Ordinance of the Town of Thompson's Station to amend Title 18, Chapter 2 of the Municpal Code regarding wastewater system user fees.

3. **Discussion related to Fry Road Bridge**

4. **Attorney Rankings**

5. **Approval of new positions based on current staffing needs.**

6. **Approval of Agreement with HB&TS for sewer non payment collection penalties.**

7. **Approval of Resolution 2019-010** – Approval of an easement to MTEMC in Preservation Park

8. **Approval of Proposal from Jackson Thornton for Sewer Impact Fee study.**

Announcements/Agenda Requests

Adjourn

Information Only:
Town Administrator Report
Finance Report
Follow up to Crosslin Presentation regarding the audit

This meeting will be held at 7:00 p.m. at Thompson's Station Community Center
1555 Thompson's Station Road West

Town of Thompson's Station
Board of Mayor and Aldermen
Minutes of the Meeting
April 9, 2019

Call to Order.

The meeting of the Board of Mayor and Aldermen of the Town of Thompson's Station was called to order at 7:00 p.m. on Tuesday, April 9, 2019 with the required quorum. Members and staff in attendance were: Alderman Shaun Alexander; Alderman Brandon Bell; Alderman Ben Dilks; Alderman Brian Stover; Town Planner Wendy Deats; Finance Director Steve Banks; Town Attorney Todd Moore; Assistant Town Administrator Caryn Miller and IT Coordinator Tyler Rainey. Mayor Corey Napier was absent.

Pledge of Allegiance.

Consideration of Minutes. Consideration of the March 12, 2019 regular meeting minutes and the March 26, 2019 special session minutes.

Alderman Dilks wanted the Minutes for March 12, 2019 meeting be amended to show a 3-2 vote on the Utility Board Appointments showing the nay votes from Alderman Alexander and Alderman Dilks. He also wanted it noted in the minutes amended that he felt that Mr. Peterson was not qualified and felt that Alderman Stover was the least qualified BOMA member to be appointed.

A motion was made by Alderman Dilks to approve the minutes of both meetings as amended and was seconded by Alderman Alexander. The Motion carried unanimously.

Appointment of the Interim Town Recorder Caryn Miller

A motion was made by Alderman Bell to appoint Caryn Miller as Interim Town Recorder and seconded by Alderman Alexander. The motion carried unanimously.

Public Comments

There were no public comments

New Business:

1. **First Reading of Ordinance 2019-005:** An Ordinance to incorporate a definition for "religious institution" within Section 1.3 of the Land Development Ordinance and to modify Section 4.5.2 to incorporate standards to govern private schools within the T5 district.

Mr. Mason with the Thompson's Station Church answered questions from the Board.

After discussion related to the hours of operation Alderman Bell made a motion to approve the Ordinance on First Reading and amend it to strike the hours of operation prior to Second Reading. The motion was seconded by Alderman Alexander. The motion carried unanimously.

2. **First Reading of Ordinance 2019-06**: An Ordinance of the Town of Thompson's Station to amend Title 18, Chapter 2 of the Municipal Code regarding wastewater system user fees.

After discussion and clarification deposits would go toward the final billing and any funds left over would be sent to the customer, Alderman Bell made a motion to approve the Ordinance on First Reading with the changes to the deposit language. The motion was seconded by Alderman Alexander. The motion carried unanimously.

3. **Discussion related to Fry Road Bridge**

Caryn Miller explained the project and that TDOT had given the Town a grant to repair the bridge in the amount of $151,470. She recommended that the Town repair the bridge and select Option C of the estimates received.

A motion to move forward with the project and accept the grant from TDOT and use option C of the estimated costs was made by Alderman Alexander and seconded by Alderman Bell. The motion carried unanimously.

4. **Attorney Rankings**

After discussion Assistant Town Administrator Caryn Miller was asked to send the formal questions that the Town Attorney had sent out to BOMA earlier to those finalists in rankings. Those answers were to be compiled and then sent to all the members and they would rank those they want to interview by sending their preferences back to her. It was also suggested that a special meeting would be called to interview those finalists. A date for the interviews was not chosen.

5. **Approval of new positions based on current staffing needs.**

Assistant town Administrator made her presentation and explained the staffing needs.

After discussion Alderman Bell made a motion that the matter be deferred to the June meeting. The motion was seconded. The motion carried unanimously.

6. **Approval of Agreement with HB&TS for sewer non payment collection penalties.**

This item was pulled due to the need for additional input from the Town and District Attorneys.

7. **Approval of Resolution 2019-010** – Approval of an easement to MTEMC in Preservation Park

Tom Puckett with HB&TS was present to answer questions and presented the area that the easement was needed in. The Town Attorney indicated that the easement language should include that the improvements would be placed underground.

After discussion Alderman Bell made a motion to Approve Resolution 2019-10. The motion was seconded. The motion carried unanimously.

8. **Approval of Proposal from Jackson Thornton for Sewer Impact Fee study.**

After a brief discussion Alderman Bell made a motion to approve the proposal from Jackson Thornton for the Sewer Impact Fee Study. The motion was seconded. Motion carried unanimously.

Announcements/Agenda Requests

Assistant Town Administrator asked for consensus related to the Fall Festival this year. She explained the cost of the event has gone up to $10,000 which brings total expenses estimated to be $30,000 this year to put on the event. After discussion consensus was reached by the Board that we skip the festival this year and rebrand ourselves. They tasked the Parks Board to come up with some ideas, go back to a grass roots approach and maybe do a Spring event.

Wendy Deats, Town Planner, announced that the Major Thoroughfare Plan meeting was set for Tuesday April 16, 2019 at 6:30 pm in the Community Center.

Information Only:
Town Administrator Report
Finance Report
Follow up to Crosslin Presentation regarding the audit

Adjourn
There being no further business, the meeting was adjourned at 8:35 p.m.

Corey Napier, Mayor

Town Recorder

JACKSON
THORNTON

Certified Public Accountants
& Consultants

April 2, 2019

Mayor Corey Napier
Town of Thompson's Station
1550 Thompson's Station Rd W
Thompson's Station, TN 37179

Re: Proposal to Evaluate Sewer Impact Fees

Dear Mayor Napier:

Thank you for this opportunity to provide professional services to the Town of Thompson's Station ("the Town"). As I understand, you would like for us to assist the Sewer Department in determining the fairness of the existing tap fees charged by the Town. We have performed similar services for many other of our utility clients and would appreciate assisting you with this service.

The procedures that will by employed by us for this project will be based on the M-1 Manual (*Principles of Water Rates, Fees and Charges*) as prescribed by the American Water Works Association. We will follow these industry prescribed analyses so as to support the recommended fees that we believe should be charged by the Town.

We believe that we can complete this service for a cost not to exceed $8,500. We are allowing for two (2) meetings with management to review and discuss the results of the analysis. All reasonable travel and out-of-pocket expenses will be billed at cost. The above fees do not include travel time, which will be billed at one-half our standard billing rates and capped to 8 hours per person, per round trip. Should additional presentations or meetings be required, we reserve the right to estimate how much time and effort will be required and will offer such as a change order to meet the needs and desires of your management team.

Professional rules concerning auditor independence require that we confirm your overall responsibility for evaluating our nonaudit services, and a failure to confirm your management responsibility could affect our independence. Before we agree to provide a non-audit service to the Town, we must determine whether providing such a service would create a significant threat to our independence for audit purposes, either by itself or in aggregate with other nonaudit services provided. A critical component of our determination is consideration of management's ability to effectively oversee the nonaudit service to be performed. You have designated Caryn Miller, Assistant Town Administrator, a senior member of management, to oversee our services, and you have indicated that they possess suitable skill, knowledge, and experience to understand the services to be performed sufficiently to oversee them. You have also agreed that they will assume all management responsibilities for subject matter and scope of the services under this arrangement letter. You have agreed to evaluate the adequacy and results of our services performed and you accept responsibility for the results and ultimate use of the services.

Auditing standards further require that we establish an understanding with the management (and those charged with governance) of the Town of the objectives of the nonaudit service, the services to be performed, the entity's acceptance of its responsibilities, our responsibilities, and any limitations of the nonaudit service. We believe this letter documents that understanding.

Please contact us if you have any questions related to the above proposal or if we can be of further assistance.

Please sign below and return to us to indicate your acknowledgment of, and agreement with, the arrangements for our services.

Sincerely,

James B. Marshall, III
Principal
Jackson Thornton Utilities Consultants

Sarah V. Chandler
Senior Manager
Jackson Thornton Utilities Consultants

Confirmed on behalf of the addressee:

Signature

MAYOR

Thompson's Station, Tennessee

Wastewater System Master Plan Update

January 11, 2020

Matthew Johnson, P.E.

Master Plan Implementation Review

- Master Plan Overview
- Wastewater System Schedule
- Recommendations
- Implementation Status

2018 Master Plan Overview

- Population expected to continue growth
  - Reach >20,000 by 2048
- Collection System
  - Modeling revealed no hydraulic constraints
  - One recommended project along US-31
  - Recommend new developments contribute funds to tie-in to wastewater system
- Treatment/Disposal
  - Recommend upgrading and maintaining one WWTP
  - Utilize purchased property for drip irrigation

Master Plan Projects

Project	Construction Cost Opinion	Project Start
Regional Plant – Cell #1 Repair	$0.3 million	May 2020
Hill Property Drip Fields	$2.9 million*	Ongoing
Regional Plant – MBR Installation – 0.75 MGD	$8.5 million	2020
Alexander Site Drip Fields	$8.6 million	2023
Regional Plant – MBR Expansion – 1.0 MGD	$3.4 million	2023
Regional Plant – MBR Expansion – 1.5 MGD	$3.5 million	2038

*Contract amount

Treatment Facilities Alternatives Evaluation

- Regional Treatment Facility Alternative 1
  - Upgrade Existing Lagoon System
- Regional Treatment Facility Alternative 2 – **Selected Alternative**
  - Expand Facility with Alternate Technology
    - Membrane Bioreactors – **Selected Technology**
    - Sequencing Batch Reactors
    - Oxidation Ditch
    - Conventional Activated Sludge
- Regional Treatment Facility Alternative 3
  - Construct a Second Regional Plant

Wastewater Disposal Sites

Site Name	Total Acres	Suitable Area (ac)	Utilized Area (ac)	WW Disposal Capacity (mgd)
Ozzad Property	33	20	20	0.20
Tollgate	30	8	8	0.08
Hill Property	63	21	0	0.21
Alexander Property	107	67*	0	0.67*

*Further investigation/analysis necessary to confirm

Recommended Master Plan Projects

Project	Recommended Project Start	Original Recommended Project Start	Status
Regional Plant – Cell #1 Repair	May 2020	2018	Recommend completing as change order to Hill Property Drip Field Project
Hill Property Drip Fields	Ongoing	2019	
Regional Plant – MBR Installation – 0.75 MGD	2020	2020	Exploring funding options
Alexander Site Drip Fields	2023	2028	Survey completed in 2019 and soils survey beginning 2020
Regional Plant – MBR Expansion – 1.0 MGD	2023	2023	Expansions can be proactively implemented as growth occurs
Regional Plant – MBR Expansion – 1.5 MGD	2038	2038	

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Monthly Finance Report

Town of Thompson's Station
For the period ended January 31, 2020

Prepared by
Steve Banks, Finance Director

Prepared on
February 4, 2020

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Financial Summary - Notes

January 2020

General Fund

- Continued ROW acquisitions on Critz Lane
- Issued 11 Building permits in January (9 SFR, 2 Add)
- FY19 Financial Audit completed and summitted to the State

Wastewater Fund

- Hill property progress billing no. 3 received
- Total of 28 new accounts established
- Funds transferred from General Fund to WW ($450,000)
- Smoke testing in Canterbury completed

General Fund - Statement of Activity

July 2019 - January 2020

	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Total
REVENUES								
34100 Total Property Tax Revenues	716.99	2,134.65	36.28	4.33	17,954.63	15,617.59	170,753.74	207,218.21
34200 Total Sales Tax Revenues	123,972.49	131,054.96	119,652.66	124,474.68	142,265.53	126,395.48	151,518.32	919,334.12
34300 Total Gas Tax Revenues	15,418.17	14,834.83	16,456.98	16,173.23	15,701.34	15,534.75	15,305.01	109,424.31
34400 Total Building/Impact Fees	65,272.75	114,346.00	80,040.15	25,342.50	96,506.59	219,648.00	49,518.10	650,674.09
34500 Total Alcohol Tax Revenues	10,237.13	12,364.69	11,696.80	11,548.53	10,712.06	11,014.00	12,123.10	79,696.31
34700 Total All Other Revenues	9,412.94	7,538.47	4,211.23	3,647.81	7,050.71	5,905.52	7,040.89	44,807.57
Total Revenues	**225,030.47**	**282,273.60**	**232,094.10**	**181,191.08**	**290,190.86**	**394,115.34**	**406,259.16**	**2,011,154.61**
GROSS REVENUES	**225,030.47**	**282,273.60**	**232,094.10**	**181,191.08**	**290,190.86**	**394,115.34**	**406,259.16**	**2,011,154.61**
EXPENDITURES								
43100 Total Payroll Costs	57,232.60	63,967.32	70,689.20	86,388.78	66,484.07	73,948.65	97,727.80	516,438.42
43200 Total Streets and Roads	4,245.45	8,183.04	6,093.15	7,298.32	5,549.11	4,953.81	15,115.03	51,437.91
43300 Total Professional Fees	37,675.00	11,377.66	38,060.88	70,700.20	75,313.30	28,240.00	38,817.03	300,184.07
43400 Total Operating Costs	36,998.96	46,022.00	11,598.40	16,613.85	15,953.72	23,975.18	8,431.75	159,593.86
43500 Total County Services	8,992.50	8,992.50	8,992.50	8,992.50	8,992.50	8,992.50	8,992.50	62,947.50
49030 Debt Service			144,105.13					144,105.13
49900 Total Capital Improvement Costs		4,200.00	1,966.22	79,502.38	26,958.00	99,832.00	211,217.00	423,675.60
Total Expenditures	**145,144.51**	**142,742.52**	**281,505.48**	**269,496.03**	**199,250.70**	**239,942.14**	**380,301.11**	**1,658,382.49**
NET CHANGE	**79,885.96**	**139,531.08**	**-49,411.38**	**-88,304.95**	**90,940.16**	**154,173.20**	**25,958.05**	**352,772.12**
NET CHANGE IN FUND BALANCE	**$79,885.96**	**$139,531.08**	**$ -49,411.38**	**$ -88,304.95**	**$90,940.16**	**$154,173.20**	**$25,958.05**	**$352,772.12**

EXPANDED Statement of Activity General Fund

July 2019 - January 2020

	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Total
REVENUES								
34100 Total Property Tax Revenues								0
31111 Real Property Tax Revenue	717	2,135	36	4	17,955	15,618	170,754	207,218
Total 34100 Total Property Tax Revenues	**717**	**2,135**	**36**	**4**	**17,955**	**15,618**	**170,754**	**207,218**
34200 Total Sales Tax Revenues								0
31610 Local Sales Tax - Trustee	77,907	75,536	78,839	79,335	80,963	83,733	92,592	568,905
31810 Adequate School Facilities Tax	4,854	5,072	5,842	3,814	6,651	5,872	7,869	39,975
32260 Business Tax Revenue	4,258	8,505	4,019	303	3,902	64	488	21,540
33320 TVA Payments in Lieu of Taxes					14,532		14,532	29,064
33510 Local Sales Tax - State	36,953	41,942	30,952	41,022	36,217	36,726	36,037	259,850
Total 34200 Total Sales Tax Revenues	**123,972**	**131,055**	**119,653**	**124,475**	**142,266**	**126,395**	**151,518**	**919,334**
34300 Total Gas Tax Revenues								0
33552 State Streets & Trans. Revenue	782	782	782	782	782	782	782	5,473
33553 SSA - Motor Fuel Tax	7,897	7,627	7,954	7,871	7,659	7,547	7,403	53,959
33554 SSA - 1989 Gas Tax	1,256	1,183	1,321	1,253	1,195	1,200	1,199	8,606
33555 SSA - 3 Cent Gas Tax	2,327	2,192	2,447	2,322	2,214	2,223	2,222	15,947
33556 SSA - 2017 Gas Tax	3,156	3,051	3,953	3,945	3,852	3,783	3,699	25,440
Total 34300 Total Gas Tax Revenues	**15,418**	**14,835**	**16,457**	**16,173**	**15,701**	**15,535**	**15,305**	**109,424**
34400 Total Building/Impact Fees								0
32200 Building Permits	26,220	44,271	33,391	10,540	33,892	171,783	16,256	336,353
32230 Submittal & Review Fees	425	800	275	3,013	400	5,292	8,177	18,382
32300 Impact Fees	38,628	69,275	46,374	11,790	62,214	42,573	25,085	295,939
Total 34400 Total Building/Impact Fees	**65,273**	**114,346**	**80,040**	**25,343**	**96,507**	**219,648**	**49,518**	**650,674**
34500 Total Alcohol Tax Revenues								0
31710 Wholesale Beer Tax	9,430	9,856	10,137	9,179	9,756	7,624	9,182	65,165
31720 Wholesale Liquor Tax	187	1,354	992	1,802	86	1,897	2,245	8,564
32000 Beer Permits					300	300	100	700
33535 Mixed Drink Tax	620	1,155	568	567	570	1,193	596	5,268
Total 34500 Total Alcohol Tax Revenues	**10,237**	**12,365**	**11,697**	**11,549**	**10,712**	**11,014**	**12,123**	**79,696**
34700 Total All Other Revenues								0
31900 CATV Franchise Fee Income	4,799	2,948			2,966		3,855	14,568

	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Total
32245 Miscellaneous Fees				392				392
36120 Interest Earned - Invest. Accts	3,189	3,328	3,036	2,561	2,664	3,026	2,436	20,240
37746 Parks Revenue	1,050	2,087	600	1,320	1,395	655	150	7,257
37747 Parks Deposit Return	-200	-1,400		-1,200	-500	-400		-3,700
Total 37746 Parks Revenue	**850**	**687**	**600**	**120**	**895**	**255**	**150**	**3,557**
37990 Other Revenue	575	575	575	575	525	2,625	600	6,050
Total 34700 Total All Other Revenues	**9,413**	**7,538**	**4,211**	**3,648**	**7,051**	**5,906**	**7,041**	**44,808**
Total Revenues	**225,030**	**282,274**	**232,094**	**181,191**	**290,191**	**394,115**	**406,259**	**2,011,155**
GROSS REVENUES	**225,030**	**282,274**	**232,094**	**181,191**	**290,191**	**394,115**	**406,259**	**2,011,155**
EXPENDITURES								
43100 Total Payroll Costs								0
41110 Payroll Expense	44,300	52,810	55,663	63,228	53,976	58,532	76,263	404,772
41141 Payroll Taxes - FICA	2,850	3,274	3,451	3,914	3,336	3,617	4,716	25,159
41142 Payroll Taxes - Medicare	667	766	807	917	780	848	1,103	5,887
41147 Payroll Taxes - SUTA	110	58	86	143	39		1,124	1,560
41289 Employee Retirement Expense	2,431	2,164	2,221	2,669	2,337	2,019	3,474	17,315
41514 Insurance - Employee Medical	6,876	4,895	8,461	15,518	6,016	8,932	11,048	61,746
Total 43100 Total Payroll Costs	**57,233**	**63,967**	**70,689**	**86,389**	**66,484**	**73,949**	**97,728**	**516,438**
43200 Total Streets and Roads								0
41264 Repairs & Maint - Vehicles	160	2,300	1,198	259	1,108	5	374	5,404
41268 Repairs & Maint-Roads, Drainage	1,015	2,188	1,792	2,078	2,177	947	688	10,885
41269 SSA - Street Repair Expense	630	2,092	838	3,211	2,181	1,749	13,142	23,843
41270 Vehicle Fuel & Oil Expense	2,441	1,603	2,266	1,750	82	2,253	911	11,305
Total 43200 Total Streets and Roads	**4,245**	**8,183**	**6,093**	**7,298**	**5,549**	**4,954**	**15,115**	**51,438**
43300 Total Professional Fees								0
41252 Prof. Fees - Legal Fees	20,680		21,810	18,339	30,047	26,240	10,428	127,543
41253 Prof. Fees - Auditor		1,500	2,500			2,000	9,000	15,000
41254 Prof. Fees-Consulting Engineers	1,815	9,878	13,751	52,362	45,081		8,200	131,086
41259 Prof. Fees - Other	15,180				185		11,190	26,555
Total 43300 Total Professional Fees	**37,675**	**11,378**	**38,061**	**70,700**	**75,313**	**28,240**	**38,817**	**300,184**
43400 Total Operating Costs								0
41211 Postage, Freight & Express Chgs	156				270	165	13	604
41221 Printing, Forms & Photocopy Exp	467							467

	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Total
41231 Publication of Legal Notices	95	208	52	307	568	1,164	229	2,624
41235 Memberships & Subscriptions	1,750			840	213	269	160	3,232
41241 Utilities - Electricity	938	1,223	1,168	1,080	905	792	1,021	7,128
41242 Utilities - Water	257	210	271	283	292	285	252	1,850
41244 Utilities - Gas	78	82	82	78	99	256	164	839
41245 Telecommunications Expense	405	425	440	440	440	440	440	3,030
41265 Parks & Rec. Expense	500	500	1,817	563	6,346	836	1,453	12,015
41266 Repairs & Maint - Bldg					761	361	790	1,912
41280 Travel Expense	774							774
41285 Continuing Education Expense	1,493		165	200	755	1,463	405	4,481
41300 Economic Development Expense	500		599	200	75	200	297	1,871
41311 Office Expense	6,521	10,185	7,004	12,623	4,970	17,744	3,209	62,257
41511 Insurance - Property	23,064							23,064
41512 Insurance - Workers Comp.		14,486			258			14,744
41513 Insurance - Liability		16,009						16,009
41515 Insurance - Auto		2,694						2,694
Total 43400 Total Operating Costs	**36,999**	**46,022**	**11,598**	**16,614**	**15,954**	**23,975**	**8,432**	**159,594**
43500 Total County Services								0
41291 Animal Control Services	659	659	659	659	659	659	659	4,614
41800 Emergency Services	8,333	8,333	8,333	8,333	8,333	8,333	8,333	58,333
Total 43500 Total County Services	**8,993**	**8,993**	**8,993**	**8,993**	**8,993**	**8,993**	**8,993**	**62,948**
49030 Debt Service			144,105					144,105
49900 Total Capital Improvement Costs								0
41940 Capital Projects								0
1555 Office Renovations			1,966					1,966
Approved Budget Capital Expenditures				79,502	12,558			92,060
Critz Lane Phase 1		4,200			9,800	99,832	211,217	325,049
Park Improvements					4,600			4,600
Total 41940 Capital Projects		**4,200**	**1,966**	**79,502**	**26,958**	**99,832**	**211,217**	**423,676**
Total 49900 Total Capital Improvement Costs		**4,200**	**1,966**	**79,502**	**26,958**	**99,832**	**211,217**	**423,676**
Total Expenditures	**145,145**	**142,743**	**281,505**	**269,496**	**199,251**	**239,942**	**380,301**	**1,658,382**
NET CHANGE	**79,886**	**139,531**	**-49,411**	**-88,305**	**90,940**	**154,173**	**25,958**	**352,772**
NET CHANGE IN FUND BALANCE	**$79,886**	**$139,531**	**$ -49,411**	**$ -88,305**	**$90,940**	**$154,173**	**$25,958**	**$352,772**

Budget Vs Actual General Fund

July 2019 - January 2020

	General Fund				Total			
	Actual	Budget	over Budget	% of Budget	Actual	Budget	over Budget	% of Budget
REVENUES								
34100 Total Property Tax Revenues	207,218	165,375	41,843	125.00 %	207,218	165,375	41,843	125.00 %
34200 Total Sales Tax Revenues	919,334	957,833	-38,499	96.00 %	919,334	957,833	-38,499	96.00 %
34300 Total Gas Tax Revenues	109,424	103,833	5,591	105.00 %	109,424	103,833	5,591	105.00 %
34400 Total Building/Impact Fees	650,674	627,667	23,007	104.00 %	650,674	627,667	23,007	104.00 %
34500 Total Alcohol Tax Revenues	79,696	72,100	7,596	111.00 %	79,696	72,100	7,596	111.00 %
34600 Total Grants		333,667	-333,667		0	333,667	-333,667	0%
34700 Total All Other Revenues	44,808	75,483	-30,676	59.00 %	44,808	75,483	-30,676	59.00 %
Total Revenues	**2,011,155**	**2,335,958**	**-324,804**	**86.00 %**	**2,011,155**	**2,335,958**	**-324,804**	**86.00 %**
GROSS REVENUES	**2,011,155**	**2,335,958**	**-324,804**	**86.00 %**	**2,011,155**	**2,335,958**	**-324,804**	**86.00 %**
EXPENDITURES								
43100 Total Payroll Costs	516,438	540,372	-23,934	96.00 %	516,438	540,372	-23,934	96.00 %
43200 Total Streets and Roads	51,438	147,000	-95,562	35.00 %	51,438	147,000	-95,562	35.00 %
43300 Total Professional Fees	300,184	210,292	89,892	143.00 %	300,184	210,292	89,892	143.00 %
43400 Total Operating Costs	159,594	120,021	39,573	133.00 %	159,594	120,021	39,573	133.00 %
43500 Total County Services	62,948	77,583	-14,636	81.00 %	62,948	77,583	-14,636	81.00 %
49030 Debt Service	144,105	175,739	-31,634	82.00 %	144,105	175,739	-31,634	82.00 %
49900 Total Capital Improvement Costs	423,676	2,282,000	-1,858,324	19.00 %	423,676	2,282,000	-1,858,324	19.00 %
Total Expenditures	**1,658,382**	**3,553,007**	**-1,894,625**	**47.00 %**	**1,658,382**	**3,553,007**	**-1,894,625**	**47.00 %**
NET CHANGE	**352,772**	**-1,217,049**	**1,569,821**	**-29.00 %**	**352,772**	**-1,217,049**	**1,569,821**	**-29.00 %**
NET CHANGE IN FUND BALANCE	**$352,772**	**$ -1,217,049**	**$1,569,821**	**-29.00 %**	**$352,772**	**$ -1,217,049**	**$1,569,821**	**-29.00 %**

General Fund Capital Expenditures Activity

July 2019 - June 2020

Date	Transaction Type	Num	Name	Division	Class	Memo/Description	Amount	Balance
Expenditures								
49900 Total Capital Improvement Costs								
41940 Capital Projects								
1555 Office Renovations								
09/05/2019	Bill	10820	Southern Contracting	General Fund	4500 Community Development	Security Door for Comm Govt	1,966	1,966
Total for 1555 Office Renovations							**$1,966**	
Approved Budget Capital Expenditures								
10/04/2019	Bill	T0M001	Ford of Murfreesboro	General Fund	6000 - Streets & Maintenance	F-350 Crew Cab	48,297	48,297
10/09/2019	Check	5589	Volunteer Paving	General Fund	6000 - Streets & Maintenance	Final payment of Clayton Arnold Road project	31,205	79,502
11/11/2019	Bill	65532A-01	StringFellow Inc	General Fund	6000 - Streets & Maintenance	Hopper - Spreader - Snow plow, Snowdogg - Lift frame and kit	12,558	92,060
Total for Approved Budget Capital Expenditures							**$92,060**	
Critz Lane Phase 1								
08/08/2019	Bill	465	R & D Enterprises, Inc.	General Fund	8000 - Town Hall	Tract 22, 24, 26 Acquistion	4,200	4,200
11/20/2019	Bill	481	R & D Enterprises, Inc.	General Fund	8000 - Town Hall	Tract 23,29, 31 - Acquistions	4,200	8,400
11/30/2019	Bill	483	R & D Enterprises, Inc.	General Fund	8000 - Town Hall	Tract 1,2,3,25 Acquistions	5,600	14,000
12/12/2019	Check	5654	Mary B. Batey	General Fund	8000 - Town Hall	Tract 28	11,050	25,050
12/12/2019	Check	5653	William H. Marlin and Mattie Lou Marlin	General Fund	8000 - Town Hall	Tract 19 Acquistion	12,600	37,650

Date	Transaction Type	Num	Name	Division	Class	Memo/Description	Amount	Balance
12/12/2019	Check	5655	Troy Batey	General Fund	8000 - Town Hall	Tract 30	12,300	49,950
12/12/2019	Check	5656	Teddy K. Peay	General Fund	8000 - Town Hall	Tract 36	6,700	56,650
12/18/2019	Bill	494	R & D Enterprises, Inc.	General Fund	8000 - Town Hall	Acquistion - Tract 40	1,400	58,050
12/23/2019	Check	5697	Benjamine and Laura Scott	General Fund	8000 - Town Hall	Tract 25	20,082	78,132
12/23/2019	Check	5698	Robert Baughman Jr and Elissa Baughman	General Fund	8000 - Town Hall	Tract 8	4,100	82,232
12/30/2019	Check	5703	Patricia L. White	General Fund	8000 - Town Hall	Tract 32	10,533	92,765
12/30/2019	Check	5702	Cynthia P. Giles	General Fund	8000 - Town Hall	Tract 32	10,533	103,299
12/30/2019	Check	5701	Mary B. Batey	General Fund	8000 - Town Hall	Tract 32	10,533	113,832
01/02/2020	Check	5705	Williamson County Clerk	General Fund	8000 - Town Hall	Filing Fees on ROW acquistions	0	113,832
01/10/2020	Check	5707	Williamson County Register of Deeds	General Fund	8000 - Town Hall	Tract 8, 19, 25,28, 30 32, 36 - filing fees	179	114,011
01/14/2020	Bill	1372	Reynolds, Potter, Ragan & Vandivort, PLC	General Fund	8000 - Town Hall	Legal Fees with Critz Lane related activities	5,700	119,711
01/15/2020	Check	5723	Michael and Susan McClanahan	General Fund	8000 - Town Hall	Tract 22 - Critz Lane Acquistion	24,500	144,211
01/15/2020	Check	5722	Wayne and Cyntia Giles	General Fund	8000 - Town Hall	Tract 20 - Critz Lane Acquistion	9,850	154,061
01/15/2020	Check	5720	Ferrari Partners, LP	General Fund	8000 - Town Hall	Tract 1 Acquisition	55,425	209,486
01/15/2020	Check	5721	Affitto, LLC	General Fund	8000 - Town Hall	Tract 2 - Critz Lane Acquisition	66,063	275,549
01/17/2020	Check	5724	Betty Ann Phair	General Fund	8000 - Town Hall	Tract 34 - Crtiz Lane	48,100	323,649
01/21/2020	Bill	507	R & D Enterprises, Inc.	General Fund	8000 - Town Hall	Tract 14 Acquistion	1,400	325,049
Total for Critz Lane Phase 1							**$325,049**	
Park Improvements								
11/30/2019	Bill	479537	Martin Brothers Concrete	General Fund	9000 - Parks & Recreation	Pavilion in Park concrete park	4,600	4,600
Total for Park Improvements							**$4,600**	

Date	Transaction Type	Num	Name	Division	Class	Memo/Description	Amount	Balance
Total for 41940 Capital Projects							**$423,676**	
Total for 49900 Total Capital Improvement Costs							**$423,676**	

Debt Service of General Fund

July 2019 - June 2020

Date	Transaction Type	Num	Name	Division	Class	Memo/Description	Amount	Balance
49030 Debt Service								
09/26/2019	Bill	Note Series	First Farmers & Merchants Bank	General Fund	8000 - Town Hall	Interest on Note Series	8,215	8,215
09/26/2019	Bill	Note Series	First Farmers & Merchants Bank	General Fund	8000 - Town Hall	Principal Payment on Note Series	115,300	123,515
09/30/2019	Bill	Oct2019	First Tennessee Bank	General Fund	8000 - Town Hall	Interest Payment	20,590	144,105
Total for 49030 Debt Service							**$144,105**	

Wastewater Fund Activity by Month

July 2019 - January 2020

	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Total
INCOME								
34090 Total Wastewater Fees	105,788	108,054	103,597	110,650	113,135	94,844	103,811	739,879
341090 Total Tap Fees	32,500	62,500	35,000	15,000	75,000	40,000	22,500	282,500
34700 Total All Other Revenues	1,986	2,088	1,984	-45	2,079	2,131	2,040	12,263
Total Income	**140,274**	**172,642**	**140,580**	**125,605**	**190,214**	**136,975**	**128,352**	**1,034,642**
GROSS PROFIT	**140,274**	**172,642**	**140,580**	**125,605**	**190,214**	**136,975**	**128,352**	**1,034,642**
EXPENSES								
43100 Total Payroll Costs	11,722	12,011	11,867	11,867	11,867	11,866	17,042	88,241
43300 Total Professional Fees	3,120	5,556	8,723	16,295	22,807	9,478	16,985	82,963
43400 Total Operating Costs	23,266	13,952	12,955	12,735	13,579	25,561	19,009	121,057
43600 Total Interest Expense	889	899	879	832	840	794	801	5,933
49900 Total Capital Improvement Costs				30,739	169,036	307,507	422,269	929,552
Total Expenses	**38,997**	**32,417**	**34,424**	**72,467**	**218,129**	**355,207**	**476,106**	**1,227,746**
NET OPERATING INCOME	**101,277**	**140,225**	**106,156**	**53,138**	**-27,915**	**-218,231**	**-347,754**	**-193,104**
OTHER EXPENSES								
Depreciation	37,500	37,500	37,500	37,500	37,500	37,500	37,500	262,500
Total Other Expenses	**37,500**	**37,500**	**37,500**	**37,500**	**37,500**	**37,500**	**37,500**	**262,500**
NET OTHER INCOME	**-37,500**	**-37,500**	**-37,500**	**-37,500**	**-37,500**	**-37,500**	**-37,500**	**-262,500**
NET INCOME	**$63,777**	**$102,725**	**$68,656**	**$15,638**	**$ -65,415**	**$ -255,731**	**$ -385,254**	**$ -455,604**

EXPANDED Wastewater Activity by month

July 2019 - January 2020

	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Total
INCOME								
34090 Total Wastewater Fees								0
31000 Wastewater Treatment Fees	101,578	105,522	99,268	108,070	109,792	91,215	100,314	715,759
31010 Septage Disposal Fees	750	750	650	350	800	750	900	4,950
31050 Late Payment Penalty	3,460	1,782	3,678	2,230	2,543	2,880	2,597	19,170
Total 34090 Total Wastewater Fees	**105,788**	**108,054**	**103,597**	**110,650**	**113,135**	**94,844**	**103,811**	**739,879**
341090 Total Tap Fees								0
33000 Tap Fees	32,500	62,500	35,000	15,000	75,000	40,000	22,500	282,500
Total 341090 Total Tap Fees	**32,500**	**62,500**	**35,000**	**15,000**	**75,000**	**40,000**	**22,500**	**282,500**
34700 Total All Other Revenues								0
36120 Interest Earned - Invest. Accts	1,916	2,088	1,984	-45	2,079	2,061	2,040	12,123
37990 Other Revenue	70					70		140
Total 34700 Total All Other Revenues	**1,986**	**2,088**	**1,984**	**-45**	**2,079**	**2,131**	**2,040**	**12,263**
Total Income	**140,274**	**172,642**	**140,580**	**125,605**	**190,214**	**136,975**	**128,352**	**1,034,642**
GROSS PROFIT	**140,274**	**172,642**	**140,580**	**125,605**	**190,214**	**136,975**	**128,352**	**1,034,642**
EXPENSES								
43100 Total Payroll Costs								0
41110 Payroll Expense	9,061	9,317	9,189	9,189	9,189	9,189	13,784	68,918
41141 Payroll Taxes - FICA	562	578	570	570	570	570	855	4,273
41142 Payroll Taxes - Medicare	131	135	133	133	133	133	200	999
41289 Employee Retirement Expense	453	466	459	459	459	459	689	3,446
41514 Insurance - Employee Medical	1,515	1,515	1,515	1,515	1,515	1,515	1,515	10,605
Total 43100 Total Payroll Costs	**11,722**	**12,011**	**11,867**	**11,867**	**11,867**	**11,866**	**17,042**	**88,241**
43300 Total Professional Fees								0
41252 Prof. Fees - Legal Fees			3,960	3,440	2,300	720	1,240	11,660
41254 Prof. Fees-Consulting Engineers		4,553		12,855	20,507	8,758	3,966	50,638
41259 Prof. Fees - Other	3,120	1,003	4,763				11,779	20,665
Total 43300 Total Professional Fees	**3,120**	**5,556**	**8,723**	**16,295**	**22,807**	**9,478**	**16,985**	**82,963**
43400 Total Operating Costs								0
41211 Postage, Freight & Express Chgs	456	669	456	655	914	648	456	4,255
41220 Lab Water Testing			163	163	676			1,001

	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Total
41221 Printing, Forms & Photocopy Exp			1,140		1,393	458		2,992
41235 Memberships & Subscriptions						700		700
41241 Utilities - Electricity	8,314	7,726	7,360	7,871	8,298	7,065	8,181	54,815
41242 Utilities - Water	111	292	338	295	223	235	224	1,718
41245 Telecommunications Expense	155	155	165	155	155	165	165	1,114
41260 Repairs & Maint WW	12,256	3,984	1,550	830		12,018	9,206	39,844
41320 Supplies Expense	629	607	516	2,250	1,317	618		5,937
41691 Bank Charges	518	519	517	517	604	535	528	3,736
42100 Permits and Fees	827		750			3,120	250	4,947
Total 43400 Total Operating Costs	**23,266**	**13,952**	**12,955**	**12,735**	**13,579**	**25,561**	**19,009**	**121,057**
43600 Total Interest Expense								0
41633 Interest Expense - Note Payable	889	899	879	832	840	794	801	5,933
Total 43600 Total Interest Expense	**889**	**899**	**879**	**832**	**840**	**794**	**801**	**5,933**
49900 Total Capital Improvement Costs								0
41940 Capital Projects								0
Approved Budget Capital Expenditures				30,739	169,036	307,507	422,269	929,552
Total 41940 Capital Projects				**30,739**	**169,036**	**307,507**	**422,269**	**929,552**
Total 49900 Total Capital Improvement Costs				**30,739**	**169,036**	**307,507**	**422,269**	**929,552**
Total Expenses	**38,997**	**32,417**	**34,424**	**72,467**	**218,129**	**355,207**	**476,106**	**1,227,746**
NET OPERATING INCOME	**101,277**	**140,225**	**106,156**	**53,138**	**-27,915**	**-218,231**	**-347,754**	**-193,104**
OTHER EXPENSES								
Depreciation	37,500	37,500	37,500	37,500	37,500	37,500	37,500	262,500
Total Other Expenses	**37,500**	**37,500**	**37,500**	**37,500**	**37,500**	**37,500**	**37,500**	**262,500**
NET OTHER INCOME	**-37,500**	**-37,500**	**-37,500**	**-37,500**	**-37,500**	**-37,500**	**-37,500**	**-262,500**
NET INCOME	**$63,777**	**$102,725**	**$68,656**	**$15,638**	**$ -65,415**	**$ -255,731**	**$ -385,254**	**$ -455,604**

Wastewater Fund Budget Vs Actual

July 2019 - January 2020

	Total			
	Actual	Budget	over Budget	% of Budget
INCOME				
34090 Total Wastewater Fees				
31000 Wastewater Treatment Fees	715,759	686,594	29,165	104.00 %
31010 Septage Disposal Fees	4,950	5,600	-650	88.00 %
31050 Late Payment Penalty	19,170	8,750	10,420	219.00 %
Total 34090 Total Wastewater Fees	**739,879**	**700,944**	**38,934**	**106.00 %**
341090 Total Tap Fees				
33000 Tap Fees	282,500	291,667	-9,167	97.00 %
Total 341090 Total Tap Fees	**282,500**	**291,667**	**-9,167**	**97.00 %**
34700 Total All Other Revenues				
36120 Interest Earned - Invest. Accts	12,123	23,333	-11,211	52.00 %
37990 Other Revenue	140	204	-64	69.00 %
Total 34700 Total All Other Revenues	**12,263**	**23,538**	**-11,275**	**52.00 %**
Total Income	**1,034,642**	**1,016,149**	**18,493**	**102.00 %**
GROSS PROFIT	**1,034,642**	**1,016,149**	**18,493**	**102.00 %**
EXPENSES				
43100 Total Payroll Costs				
41110 Payroll Expense	68,918	124,311	-55,393	55.00 %
41141 Payroll Taxes - FICA	4,273	7,707	-3,434	55.00 %
41142 Payroll Taxes - Medicare	999	1,678	-679	60.00 %
41147 Payroll Taxes – SUTA		368	-368	
41289 Employee Retirement Expense	3,446	6,215	-2,769	55.00 %
41514 Insurance - Employee Medical	10,605	9,100	1,505	117.00 %
Total 43100 Total Payroll Costs	**88,241**	**149,379**	**-61,138**	**59.00 %**
43300 Total Professional Fees				
41252 Prof. Fees - Legal Fees	11,660		11,660	
41253 Prof. Fees – Auditor		1,458	-1,458	
41254 Prof. Fees-Consulting Engineers	50,638	58,333	-7,695	87.00 %
41259 Prof. Fees – Other	20,665	2,917	17,748	709.00 %
Total 43300 Total Professional Fees	**82,963**	**62,708**	**20,255**	**132.00 %**
43400 Total Operating Costs				
41211 Postage, Freight & Express Chgs	4,255	5,250	-996	81.00 %
41220 Lab Water Testing	1,001	2,333	-1,333	43.00 %
41221 Printing, Forms & Photocopy Exp	2,992	4,667	-1,675	64.00 %
41235 Memberships & Subscriptions	700		700	
41241 Utilities – Electricity	54,815	49,583	5,231	111.00 %
41242 Utilities – Water	1,718	3,500	-1,782	49.00 %
41245 Telecommunications Expense	1,114	2,100	-986	53.00 %
41260 Repairs & Maint WW	39,844	58,333	-18,490	68.00 %
41320 Supplies Expense	5,937	2,917	3,020	204.00 %
41513 Insurance – Liability		11,667	-11,667	
41691 Bank Charges	3,736		3,736	

	Total			
	Actual	Budget	over Budget	% of Budget
41899 Other Expenses		583	-583	
42100 Permits and Fees	4,947	3,500	1,447	141.00 %
Total 43400 Total Operating Costs	**121,057**	**144,433**	**-23,376**	**84.00 %**
43500 Total County Services				
41720 Donations		146	-146	
Total 43500 Total County Services		**146**	**-146**	
43600 Total Interest Expense				
41633 Interest Expense - Note Payable	5,933	5,542	391	107.00 %
Total 43600 Total Interest Expense	**5,933**	**5,542**	**391**	**107.00 %**
49900 Total Capital Improvement Costs				
41940 Capital Projects				
Approved Budget Capital Expenditures	929,552	2,158,333	-1,228,781	43.00 %
Total 41940 Capital Projects	**929,552**	**2,158,333**	**-1,228,781**	**43.00 %**
Total 49900 Total Capital Improvement Costs	**929,552**	**2,158,333**	**-1,228,781**	**43.00 %**
Total Expenses	**1,227,746**	**2,520,541**	**-1,292,796**	**49.00 %**
NET OPERATING INCOME	**-193,104**	**-1,504,393**	**1,311,288**	**13.00 %**
OTHER EXPENSES				
Depreciation	262,500	262,500	0	100.00 %
Total Other Expenses	**262,500**	**262,500**	**0**	**100.00 %**
NET OTHER INCOME	**-262,500**	**-262,500**	**0**	**100.00 %**
NET INCOME	**$ -455,604**	**$ -1,766,893**	**$1,311,288**	**26.00 %**

Wastewater Fund Capital Improvement Activity

July 2019 - June 2020

Date	Transaction Type	Num	Name	Division	Class	Memo/Description	Amount	Balance
Expenses								
49900 Total Capital Improvement Costs								
41940 Capital Projects								
Hill Property Drip Fields								
10/18/2019	Bill	173183	Barge Design Solutions, Inc.	Wastewater	WW	Hill Property WW	30,739	30,739
11/19/2019	Bill	36724-01	W & O Construction Co.	Wastewater	WW	Hill Property Drip Fields installation	169,036	199,775
12/06/2019	Bill	174643	Barge Design Solutions, Inc.	Wastewater	WW	Hill property Drip Field project management	4,794	204,570
12/11/2019	Bill	36724-01 #2	W & O Construction Co.	Wastewater	WW	Hill Property Drip Fields installation No 2	302,713	507,283
01/03/2020	Bill	175424	Barge Design Solutions, Inc.	Wastewater	WW	pass through expenses - Hill property drip field manangement	317	507,600
01/03/2020	Bill	175424	Barge Design Solutions, Inc.	Wastewater	WW	Hill property Drip Field project management thru 12/27/2019	11,123	518,723
01/10/2020	Bill	No 3	W & O Construction Co.	Wastewater	WW	Hill Property Drip Fields installation payment No. 3	410,829	929,552
Total for Hill Property Drip Fields							**$929,552**	
Total for 41940 Capital Projects							**$929,552**	
Total for 49900 Total Capital Improvement Costs							**$929,552**	

Cash Balances

Cash Balances

General Fund Cash Position	Jan 2020
Checking	$ 687,963
Savings	$ 5,905,325
Less: Reserve	$ (1,037,536)
Total Cash	$ 5,555,752
Less:	
Note Balance (First Farmers)	$ (461,200)
Note Balance (First Tennessee)	$ (1,420,000)
Due to Wastewater Fund	$ (48,472)
Accounts Payable	$ (148)
Committed	$
Total Available Funds	**$ 3,,625,932**

Wastewater Funds Cash Position	Jan 2020
Checking	$ 25,106
Savings	$ 4,083,620
Less: Reserve	$ (520,020)
Total Cash	**$ 3,934,581**
Add:	
Accounts Receivable	$ 191,935
Due from Gen Fund	$ 48,472
Less:	
Note Balance (Franklin Synergy)	$ (370,370)
Accounts Payable	$
Deposits	$ (19,425)
Total Available Funds	**$ 3,439,318**
Less Committed:	
- Hill Prop. Drip fields	$ (2,203,027)
- Cell #1 repairs	$ (500,000)
- Equipment	$ (100,000)
Estimated Ending Funds	**$ 636,291**

REYNOLDS, POTTER, RAGAN & VANDIVORT, PLC

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*RULE 31 LISTED MEDIATOR - FAMILY
** RULE 31 LISTED MEDIATOR – GENERAL CIVIL

OF COUNSEL:
LISA LITTLETON HOLLEY

January 23, 2020

Town of Thompson's Station
Board of Mayor and Aldermen
1550 Thompson Station Road West
Thompson's Station, Tennessee 37179

RE: Second Quarter Report Fiscal Year 2019-2020 - Legal Expenses

Board of Mayor and Aldermen,

Please let this letter serve as the second quarter report on legal expenses as relates to the Town Attorney, in follow up to the first quarter report sent to your attention on October 25, 2019. Legal expenses for Q1 and Q2 combined totaled $130,945.00. Our understanding of the budget for legal expenses as relates to the Town Attorney is that said budget item totals $150,000.00 for the fiscal year. Currently, the pace of legal fees will likely exceed said budget item.

Our office, as the Town Attorney, has been dealing with a litany of backlogged, latent issues in addition to current, pending issues. Our office has spent over six hundred hours addressing various legal needs for the Town related to litigation, research, document preparation, letter, resolution and ordinance drafting, compliance issues, zoning violations, contract negotiations, open records requests, general counsel, attendance at meetings of the BOMA, PC, Utility Board, BZA, etc., and advising on numerous day to day activities and issues that have arisen. Significant progress has been made towards the Town's goals in this amount of time.

Additionally, approximately ten percent (10%) of the legal expenses above relate directly to closings for Critz Lane easements, for which the Town budgeted separately as a cost for said closings. We are over half-way complete on the acquisitions and anticipate completing said acquisitions under the budget amount allocated for those closings.

With this update, our office is informing you it may be necessary for the Town to amend the budget at the appropriate time as to accommodate legal work being provided.

Please let us know if you have any questions or concerns.

Sincerely,

REYNOLDS, POTTER, RAGAN & VANDIVORT, PLC

ANDREW E. MILLS

KIRK VANDIVORT

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