Included in this packet are:

Powerpoint for the January 10 Capital Needs Committee meeting

Summary of Council Districts with Hillwood Cluster Students

Law Summary re: Real Estate Acquisitions

A matrix comparing Hillwood High School Options

Student Assignment Information

Diversity Study

Construction Drawings

Traffic Study

Students attending Hillwood cluster schools from each Council district

	Cluster-Wide	Hillwood HS
District 20 (Roberts)	21.4%	25.8%
District 22 (Weiner)	23.2%	20.3%
District 35 (Rosenberg)	26.9%	17.9%
District 23 (M Johnson)	9.7%	9.9%
District 21 (Kindall)	5.0%	8.6%
District 2 (Hastings)	4.1%	5.1%
District 34 (Henderson)	3.9%	3.4%
District 19 (O'Connell)	2.2%	2.8%
District 1 (Leonardo)	0.6%	1.2%
District 24 (Murphy)	0.9%	0.8%

-Cluster-Wide includes all students attending Charlotte Park, Gower, Harpeth Valley, Westmeade, Bellevue MS, HG Hill MS and Hillwood HS.

-Hillwood HS includes all students attending Hillwood HS.

RE the purchase of Hope Park as it relates to the purchase of the land should the Board decide to move forward with the purchase of Hope Park Church's property.

- **2.24.240 - Acquisition of real estate.**

A.

The director or other chief administrative official of any department, commission, board or agency of the metropolitan government, with the approval of the mayor, is authorized to acquire land on behalf of the metropolitan government, either by purchase or by condemnation, for use for public purposes in accordance with the procedures to be established as provided in Section 8.103(k) of the Metropolitan Charter.

B.

Any land acquired by, or on behalf of the metropolitan government shall be paid for out of the unencumbered balance of any appropriation for such purpose, and an appropriation for the construction of any public project or extension thereof shall be considered as an authorization for the acquisition, by purchase or condemnation of any land necessary or convenient to effecting the purposes of the project.

C.

In the event it becomes necessary or convenient to acquire any land, by purchase or by condemnation, under the authority of this section, the director or other chief administrative official of the department, commission, board or agency seeking to have land acquired shall make a request in writing to the mayor giving in detail the location of the land sought to be acquired, the purpose for the acquisition, and all other information which shall be required by the rules and regulations of the director of public property administration or by executive order of the mayor.

D.

No land shall be acquired by or on behalf of any commission or board unless such acquisition has been authorized by a resolution of the commission or board, specifying in detail the land to be acquired, the public purpose or use for which the land is needed, and containing such other information as the commission or board may wish to include, or as may be required by the procedures established by rules and regulations of the director of public property administration or by executive order of the mayor.

E.

When the mayor has approved a request for the acquisition of land, as provided by this section, he shall transmit the request with his approval to the director of public property administration, and the director of public property administration shall proceed to acquire the land, by purchase or by condemnation, in conformity with the procedures established by his rules and regulations in accordance with Section 8.103(k) of the Metropolitan Charter.

F.

The mayor may delegate to the director of public property administration his authority to approve requests for the acquisition of land, and the director or chief administrative officer of any commission, board or agency who is dissatisfied with the disapproval of such request by the director of public property administration shall have the right to appeal such disapproval to the mayor for a decision.

G.

The director of public property administration, with the assistance of the department of law and the metropolitan planning commission, shall establish standard procedures for acquiring land for metropolitan departments, boards and commissions, which standard procedures shall be in the form of rules and regulations approved by the mayor and filed with the metropolitan clerk as a public record. The director of public property administration shall prescribe by such rules and regulations the form and content of the request to the mayor for the acquisition of land as provided by this section, and he

may provide for other forms and procedures consistent with this code and other ordinances and the Metropolitan Charter.

H.

The provisions of this section relating to land acquisition shall not apply to land acquisition for the Nashville Electric Service and the Nashville Housing Authority, which agencies are excluded from such land acquisition procedures by Section 8.103(k) of the Metropolitan Charter, or to the Nashville Transit Authority, the land acquisition for which is provided for by Appendix Four to the Charter.

I.

Prior to the adoption of an ordinance, on second reading, by the council authorizing the acquisition by purchase or condemnation of real estate to be utilized as a site for the construction of a new public school or relocation of existing public school, a public hearing shall be held on said ordinance. The metropolitan planning commission shall give notice in two newspapers of general circulation in the area of metropolitan government at least fifteen days but no more than thirty days prior to the public hearing and shall provide additional written notice of such hearing to the district member of council in whose district the property to be acquired is to be located and to all members of the metropolitan board of public education. In addition to such notice, the metropolitan planning commission shall cause signs to be posted on the site in the same manner and under the same conditions as provided in Article XV of Chapter 17.40 and Section 17.08.030 of the Metropolitan Code; provided, however, the wording shall clearly state the intended use rather than zoning provisions. Such public hearing shall be held in the council chambers; however, such hearing need not be held during a regular meeting of the council.

J.

Notwithstanding any other provision of this section to the contrary, no land to be maintained as open space or to be used for recreational purposes having a purchase price in excess of two hundred thousand dollars shall be acquired unless and until the director of public property administration has obtained an appraisal from a 'state certified real estate appraiser', as defined in Tennessee Code Annotated Section 62-39-102 or as the same may be hereafter amended.

(Ord. BL2013-577 § 1, 2013; Amdt. 1 to Ord. 95-1396, 5/16/95; Ord. 95-1396 § 1, 1995; prior code § 2-1-103)

HILLWOOD HIGH SCHOOL OPTIONS

LOCATION	Hillwood HS Campus	Bellevue MS Campus	Hope Park Church Site
GENERAL DESCRIPTION	Build new Hillwood High School on current site and demolish existing building.	Relocate Hillwood High School to existing Bellevue Middle campus and build a new high school; Bellevue Middle School remains as is.	Relocate Hillwood High School to existing Hope Park church site (8001 US-70S) and build a new high school.
CAPACITY	1,600 students	1,600 students	1,600 students
SITE FEATURES	Required Parking Football/Track Stadium Baseball Field Softball Field Tennis Courts Soccer Field	Required Parking Football/Track Stadium Softball Field Tennis Courts Soccer Field Flex Field(s)	Required Parking Football/Track Stadium Baseball Field Softball Field Tennis Courts Soccer Field
PROJECT COST	**$76.6 million** (No land purchase required)	**$81 million** (No land purchase required)	**$90.8+ million** (Land purchase and building costs)
LAND USE IMPLICATIONS	• No existing municipal facilities would need to be relocated. • Phased construction.	• Red Caboose park remains. • Bellevue Community Center relocated. • Fire Station 37 relocated. • Bell Gardens would be reconfigured. • New parking garage to accommodate high school parking. • Colice Jeanne would no longer be used for through traffic.	• Some alterations on US-70S for right turn lanes to enter the campus.
CONSTRUCTION IMPLICATIONS	• Students remain in current building during construction. • Current building demolished after students relocate to new facility.	• Students remain in current building during construction. • Current Hillwood High School available for other potential community use.	• Students remain in current building during construction. • Current Hillwood High School available for other potential community use.
STUDENT ASSIGNMENT & TRANSPORTATION	• High school would remain centrally located to current Hillwood High School population, including those with a zoned option from the Pearl-Cohn cluster. • Nearest MTA stop is on Harding Pike.	• High school would be closer to potential student population growth in cluster and farther from zoned option students in the Pearl-Cohn cluster. • Better MTA access.	• High school would be closer to potential student population growth in cluster and farther from zoned option students in the Pearl-Cohn cluster. • The closest MTA stop is on US-70S, east of the I-40 underpass.
ADDITIONAL CONSIDERATIONS	• Two-story high school. • New tennis courts. • New soccer field. • Baseball and softball displaced for two years. • Allows for potential of for Westmeade Elementary to be relocated to Bellevue Middle campus.	• Three-story high school. • Two-story parking deck. • The baseball field would be located an off-site facility. • Eliminates possibility of relocating Westmeade Elementary to this campus.	• Three-story high school. • All new sports facilities on site. • Allows for potential of Westmeade Elementary to be relocated to Bellevue Middle campus. • Ample parking. • Site allows for potential Metro Parks partnership to create a new park.

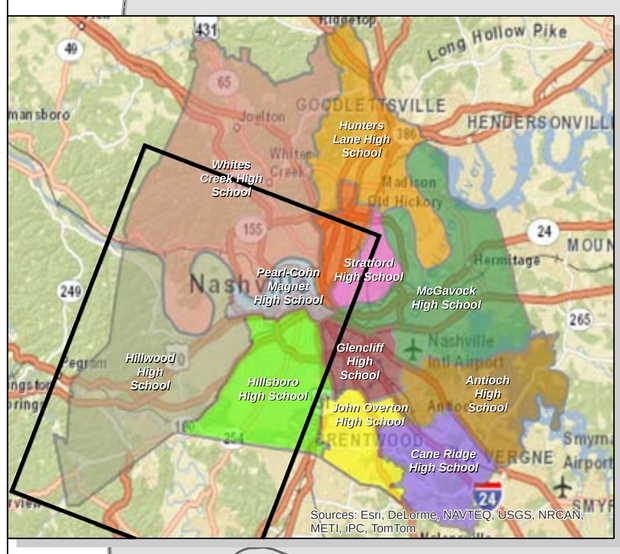
Student Assignment Information and Attached Reports:

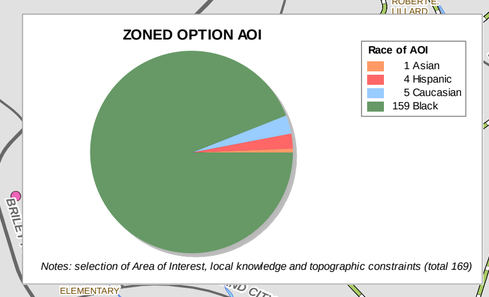
- Hillwood Student Location Analysis 2015_16 - This is a series of maps that help to identify where the current students that attend Hillwood HS live and the diversity of the student population. The large map is followed by three detailed maps that focus on each of the main areas of interest (AOI).
    - Bellevue AOI – Makes up 44% of the current Hillwood HS student enrollment, this area has 529 students and is majority White.
    - Charlotte Park, Hillwood and Westmead AOI – Makes of 33% of the current Hillwood HS student enrollment, this area has 392 students and the student population is diverse.
    - Zoned Option AOI - Makes up 14% of the current Hillwood HS student enrollment, this area has 169 students and is majority Black. The zoned option area is the area that has guaranteed choice to attend Hillwood and receives school bus transportation to Hillwood.
    - Pearl-Cohn AOI - Makes up 4% of the current Hillwood HS student enrollment, this area has 52 students and is majority Black but is more diverse than the zoned option area. The students attending Hillwood from this part of the Pearl-Cohn Cluster used the district choice process but do not have a guaranteed zoned option for Hillwood.
    -
- MNPS Other Private – This report shows how many students live within 1 or 1-1/2 mile radius of the current Hillwood HS site vs. the Hope Park Church site.

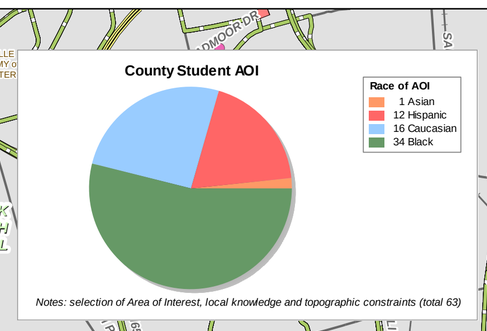
- Hillwood Cluster Capacity and Projection Analysis – This report indicate enrollment trends and capacity for the Hillwood Cluster. In addition, there is a map that identifies the undeveloped land that is zoned residential and some other land zone changes. The last page provides a brief summary of the projection information for Hillwood HS.
- 2016-17 In Zone vs. Out of Zone Hillwood Cluster – This report shows where the current MNPS living in the Hillwood Cluster attend school and how many students are enrolled in their zoned school vs. other choice schools. The last two pages show the zoned school for all of the current students enrolled in Hillwood Cluster schools.

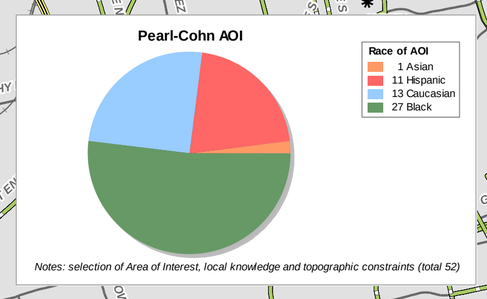
Hillwood Cluster - HS Student Race

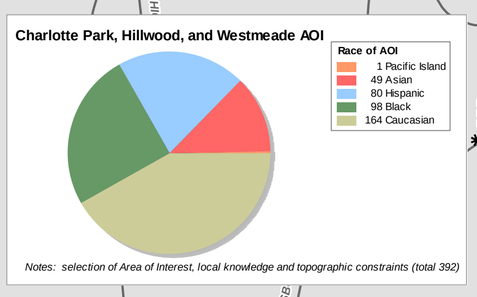
METRO NASHVILLE PUBLIC SCHOOLS

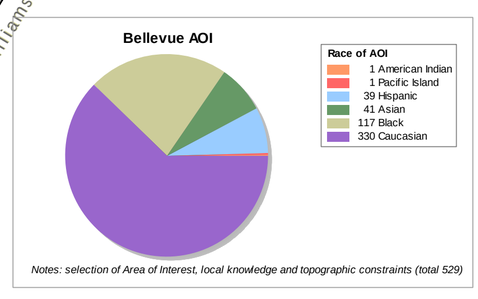












Schools of Interest
All other Schools
HS
Metro Bus Route
Interstate
Roads
Railroads
County Line

Hillwood HS - 1206 (total by race)

- American Indian (1)
- Pacific Island (2)
- Asian (92)
- Hispanic (140)
- Black (421)
- Caucasian (517)

Other Clusters
Pearl-Cohn
Hillwood High School

Study Areas

Bellevue
Charlotte Park
Zoned Option
Pearl-Cohn
Building Site Options

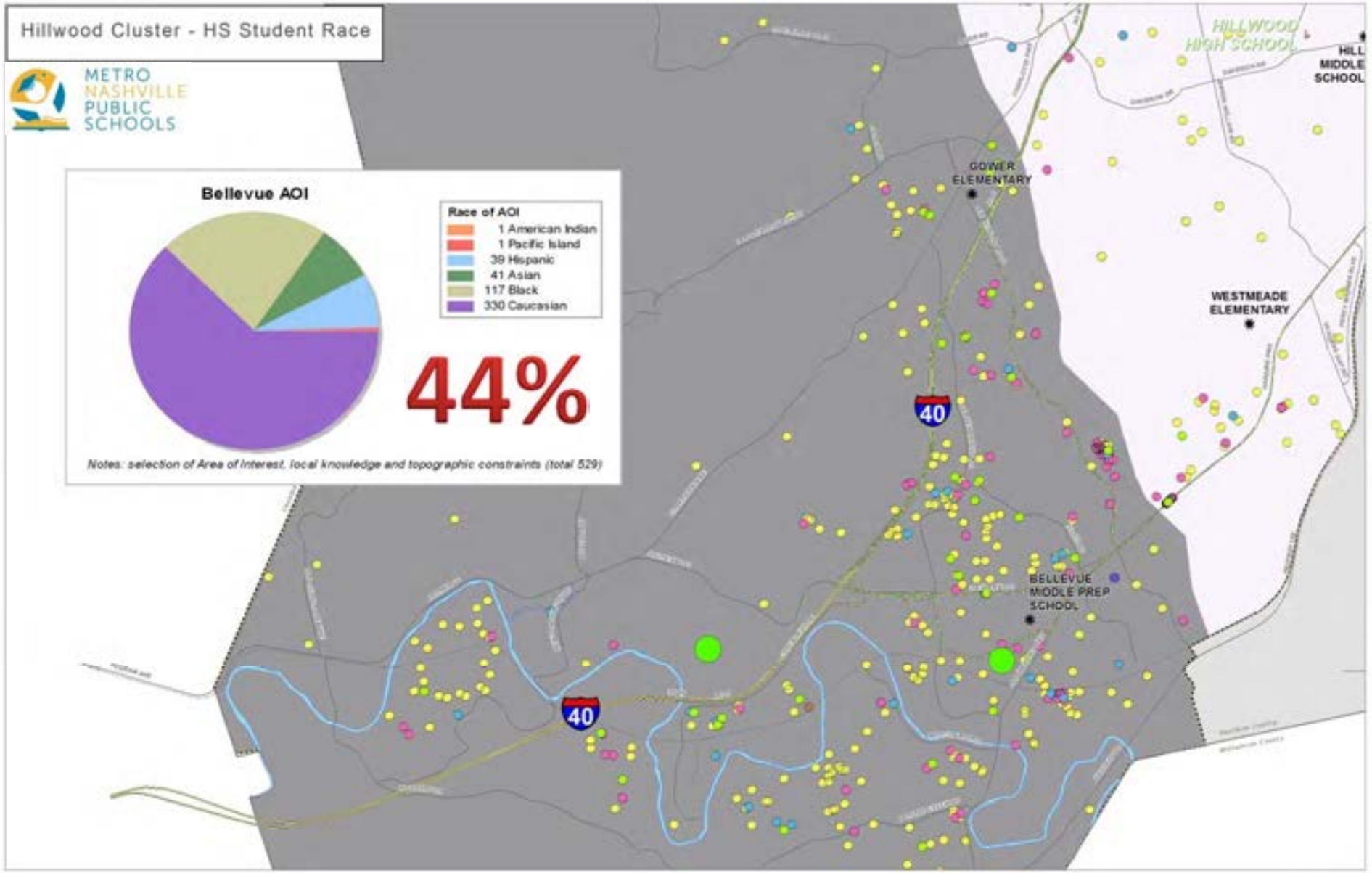
N

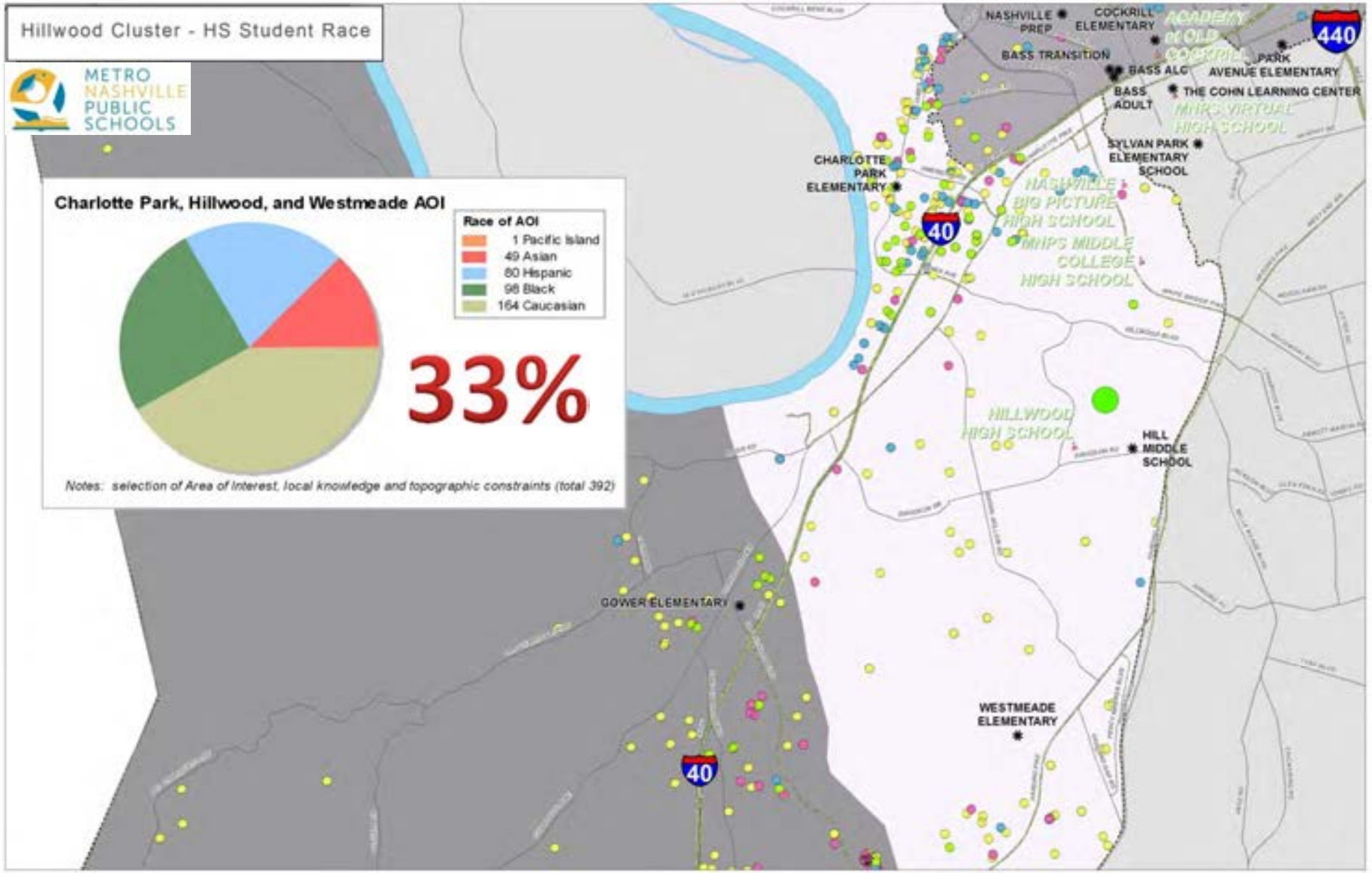
0 1.5 3 Miles

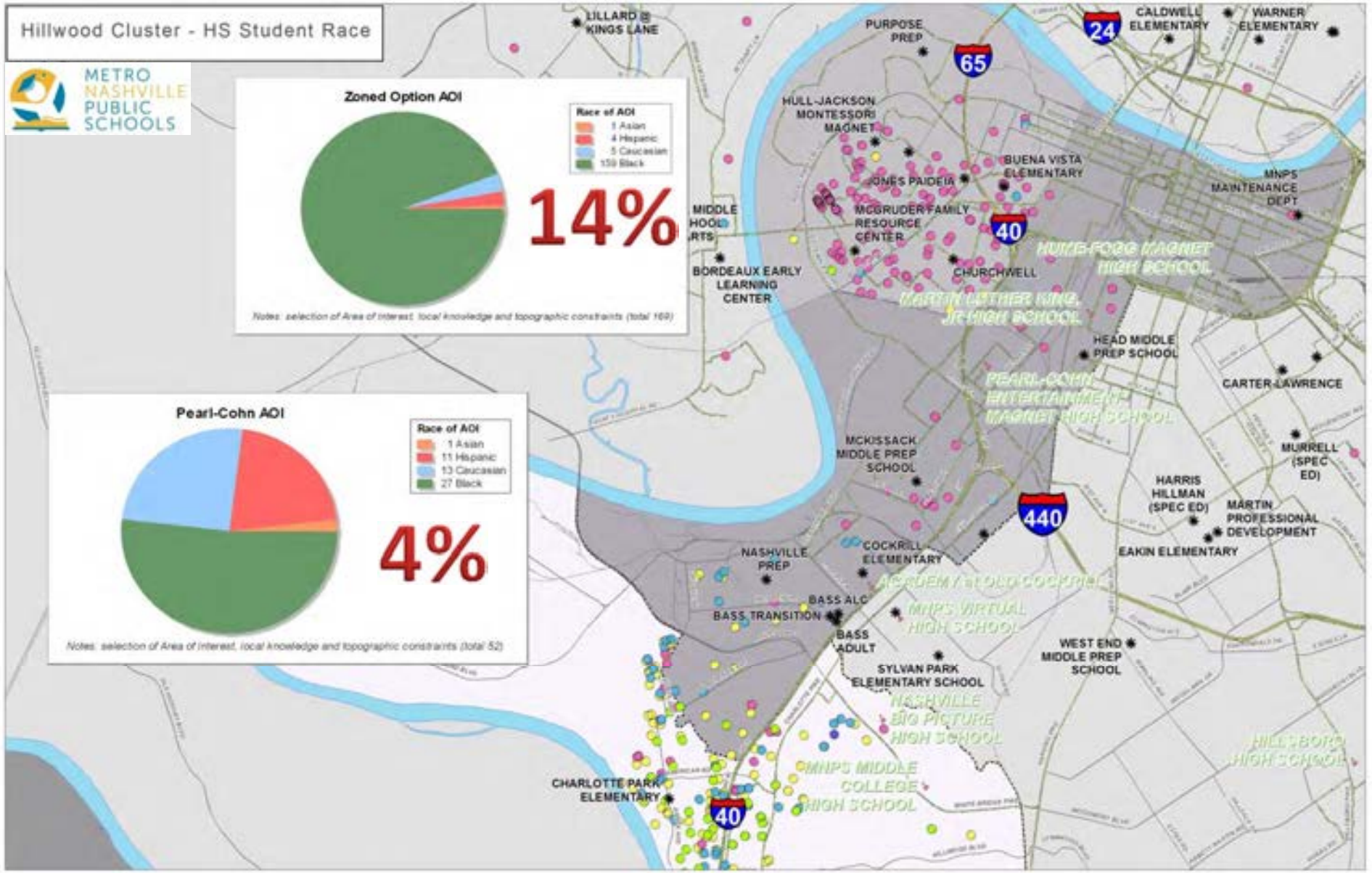
Produced by the Metropolitan Nashville Public Schools
Student Assignment Services
April 2016

Print Date: 1/6/2017

Document Path: G:\GIS\Projects\Boundary_Research_1617\Hillwood\Len_Hillwood_StudRace_1516.mxd


Hillwood Cluster - HS Student Race
METRO NASHVILLE PUBLIC SCHOOLS
Bellevue AOI
Race of AOI
1 American Indian
1 Pacific Island
39 Hispanic
41 Asian
117 Black
330 Caucasian
44%
Notes: selection of Area of Interest, local knowledge and topographic constraints (total 529)
HILLWOOD HIGH SCHOOL
HILL MIDDLE SCHOOL
GOWER ELEMENTARY
WESTMEADE ELEMENTARY
BELLEVUE MIDDLE PREP SCHOOL
40
40


Hillwood Cluster - HS Student Race
METRO NASHVILLE PUBLIC SCHOOLS
Charlotte Park, Hillwood, and Westmeade AOI
Race of AOI
1 Pacific Island
49 Asian
80 Hispanic
98 Black
164 Caucasian
33%
Notes: selection of Area of Interest, local knowledge and topographic constraints (total 392)
NASHVILLE PREP
COCKRILL ELEMENTARY
BASS TRANSITION
BASS ALC
BASS ADULT
PARK AVENUE ELEMENTARY
THE COHN LEARNING CENTER
SYLVAN PARK ELEMENTARY SCHOOL
CHARLOTTE PARK ELEMENTARY
NASHVILLE BIG PICTURE HIGH SCHOOL
MNPS MIDDLE COLLEGE HIGH SCHOOL
HILLWOOD HIGH SCHOOL
HILL MIDDLE SCHOOL
GOWER ELEMENTARY
WESTMEADE ELEMENTARY
40
440


Hillwood Cluster - HS Student Race
METRO NASHVILLE PUBLIC SCHOOLS
Zoned Option AOI
Race of AOI
1 Asian
4 Hispanic
5 Caucasian
159 Black
14%
Notes: selection of Area of Interest, local knowledge and topographic constraints (total 169)
Pearl-Cohn AOI
Race of AOI
1 Asian
11 Hispanic
13 Caucasian
27 Black
4%
Notes: selection of Area of Interest, local knowledge and topographic constraints (total 52)
LILLARD @ KINGS LANE
PURPOSE PREP
CALDWELL ELEMENTARY
WARNER ELEMENTARY
HULL-JACKSON MONTESSORI MAGNET
BUENA VISTA ELEMENTARY
JONES PAIDEIA
MNPS MAINTENANCE DEPT
MCGRUDER FAMILY RESOURCE CENTER
MIDDLE HOOD RTS
BORDEAUX EARLY LEARNING CENTER
CHURCHWELL
HUME-FOGG MAGNET HIGH SCHOOL
MARTIN LUTHER KING, Jr. HIGH SCHOOL
HEAD MIDDLE PREP SCHOOL
CARTER-LAWRENCE
PEARL-COHN ENTERTAINMENT MAGNET HIGH SCHOOL
MCKISSACK MIDDLE PREP SCHOOL
MURRELL (SPEC ED)
HARRIS HILLMAN (SPEC ED)
MARTIN PROFESSIONAL DEVELOPMENT
EAKIN ELEMENTARY
NASHVILLE PREP
COCKRILL ELEMENTARY
ACADEMY AT COCKRILL
BASS ALC
BASS TRANSITION
BASS ADULT
MNPS VIRTUAL HIGH SCHOOL
WEST END MIDDLE PREP SCHOOL
SYLVAN PARK ELEMENTARY SCHOOL
NASHVILLE BIG PICTURE HIGH SCHOOL
HILLSBORO HIGH SCHOOL
MNPS MIDDLE COLLEGE HIGH SCHOOL
CHARLOTTE PARK ELEMENTARY
65
24
40
440
40

Hillwood HS\Hope Park Church Study

1 Mile Radius														
	Hope Park							Hillwood						
Tier	Zoned		Other MNPS		Private		Total	Zoned		Other MNPS		Private		Total
ES	163	79.1%	7	3.4%	36	17.5%	206	8	4.8%	15	9.0%	144	86.2%	167
MS	51	48.6%	28	26.7%	26	24.8%	105	6	4.3%	10	7.2%	123	88.5%	139
HS	42	43.3%	28	28.9%	27	27.8%	97	8	3.1%	10	3.8%	242	93.1%	260
Total	256	62.7%	63	15.4%	89	21.8%	408	22	3.9%	35	6.2%	509	89.9%	566

1.5 Mile Radius														
	Hope Park							Hillwood						
Tier	Zoned		Other MNPS		Private		Total	Zoned		Other MNPS		Private		Total
ES	290	69%	13	3%	115	28%	418	60	18.7%	39	12.1%	222	69.2%	321
MS	96	37%	66	25%	101	38%	263	40	15.1%	33	12.5%	192	72.5%	265
HS	78	27%	83	29%	125	44%	286	36	9.1%	37	9.4%	321	81.5%	394
Total	464	48%	162	17%	341	35%	967	136	13.9%	109	11.1%	735	75.0%	980

Notes

1 and 1.5 mile straight-line radius from Hillwood HS and Hope Park Church

1.5 mile radius for Hillwood HS was clipped at the cluster line with Hillsboro HS

Zoned - Attend zoned elmentary, middle or high School

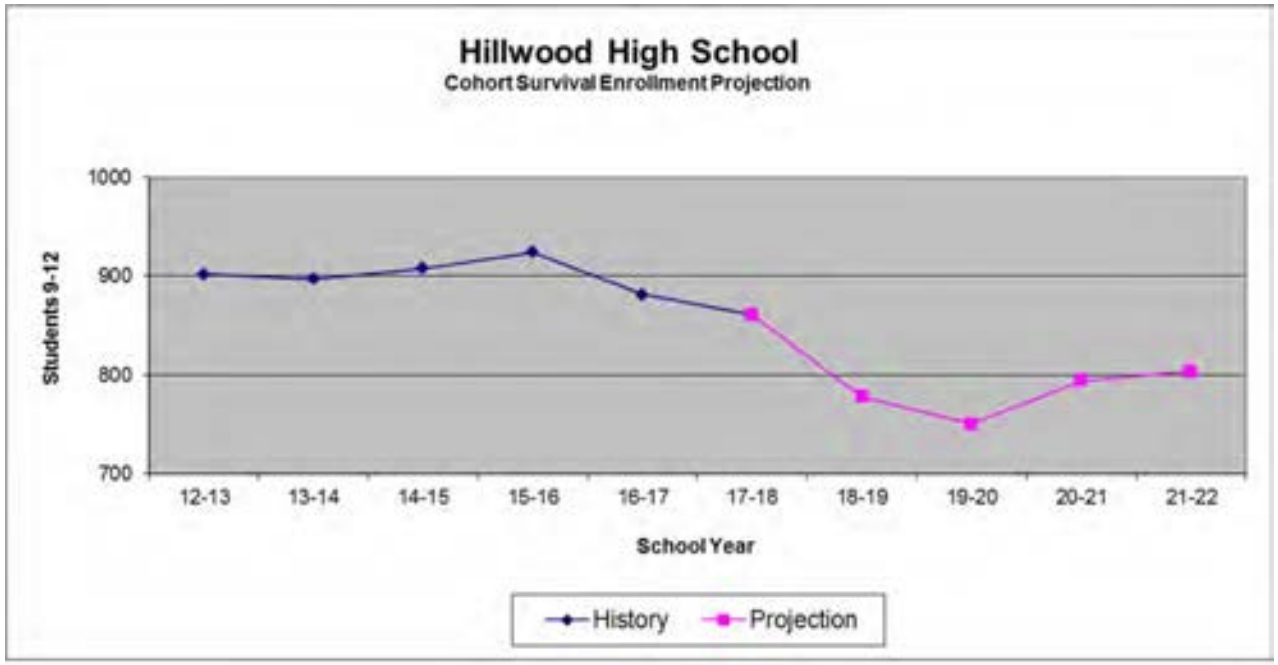
Other MNPS - Attend a optional school, open enrollment, magnet or charter

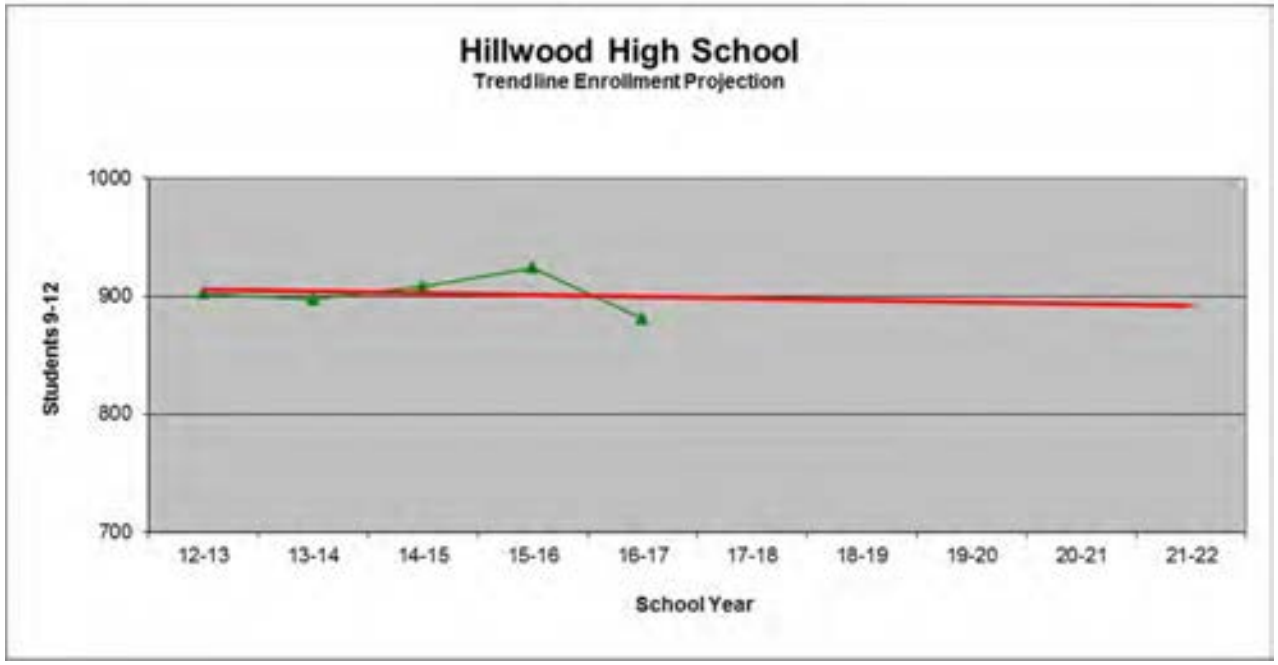
Private - Attend a private elmentary, middle or high School

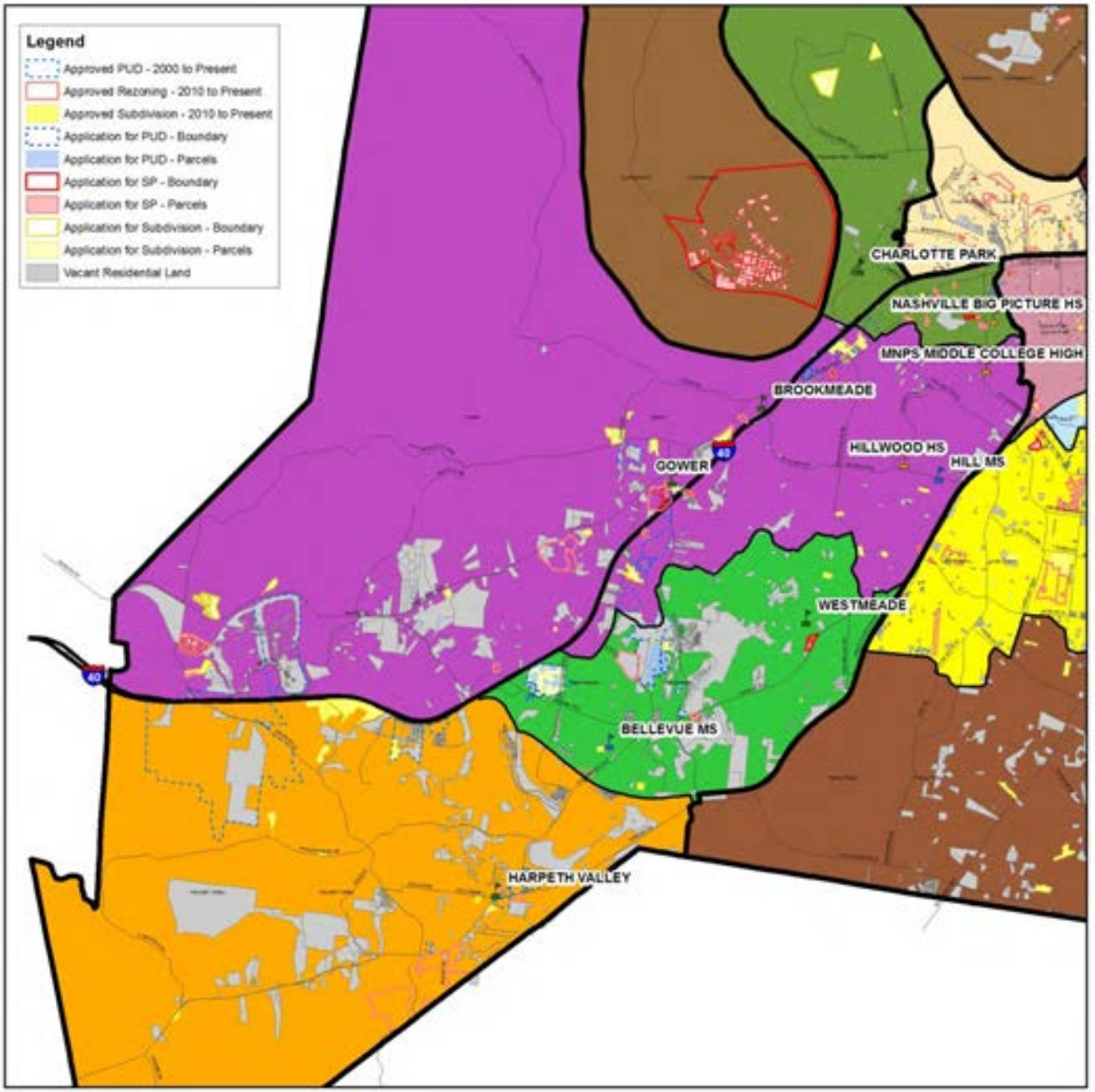
Private school data is from 2015-16

Hillwood Cluster Facility Utilization

Hillwood Cluster	Oct. 12/13	Oct. 13/14	Oct. 14/15	Oct. 15/16	Oct. 16/17	2021-22 5yr Proj.	Program Capacity	
Charlotte Park Elementary School	448	497	457	491	497	513	513	96.9%
Gower Elementary School	648	664	707	721	699	750	708	98.7%
Harpeth Valley Elementary School	748	775	762	784	780	825	789	98.9%
Westmeade Elementary School	487	503	535	512	460	500	437	105.3%
Elementary Cluster Totals	**2,331**	**2,439**	**2,461**	**2,508**	**2,436**	**2,588**	**2,447**	**99.6%**
Bellevue Middle School	695	731	679	649	692	775	643	107.6%
H G Hill Middle School	640	623	610	621	627	700	591	106.1%
Middle School Cluster Totals	**1,335**	**1,354**	**1,289**	**1,270**	**1,319**	**1,475**	**1,234**	**106.9%**
Hillwood High School	1,214	1,200	1,157	1,209	1,172	1,275	1,541	76.1%
Hillwood Cluster School Totals	**4,880**	**4,993**	**4,907**	**4,987**	**4,927**	**5,338**	**5,222**	**94.4%**


Hillwood High School
Cohort Survival Enrollment Projection
Students 9-12
1000
900
800
700
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
21-22
School Year
History
Projection


Hillwood High School
Trendline Enrollment Projection
Students 9-12
1000
900
800
700
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
21-22
School Year


Legend
Approved PUD - 2000 to Present
Approved Rezoning - 2010 to Present
Approved Subdivision - 2010 to Present
Application for PUD - Boundary
Application for PUD - Parcels
Application for SP - Boundary
Application for SP - Parcels
Application for Subdivision - Boundary
Application for Subdivision - Parcels
Vacant Residential Land
CHARLOTTE PARK
NASHVILLE BIG PICTURE HS
MNPS MIDDLE COLLEGE HIGH
BROOKMEADE
HILLWOOD HS
HILL MS
GOWER
WESTMEADE
BELLEVUE MS
HARPETH VALLEY
40

Hillwood Student Projections

- Roughly 600 new residential permits within the past five years.
- Large amount of undeveloped land that is zoned residential.
- Actual student enrollment at Hillwood has been relatively flat with little growth.

2016-17 Student Enrollment for Hillwood Cluster (Grades 9-12)		
Enrollment by School	**Student Count**	**Percent**
Cane Ridge High School (9-12)	2	0%
Cora Howe School (K-12)	2	0%
Harris-Hillman Exceptional Education School (PK-12)	7	0%
Hillsboro High School (9-12)	103	7%
Hillwood High School (9-12)	881	59%
Hume-Fogg Magnet High School (9-12)	180	12%
John Overton High School (9-12)	1	0%
KIPP High School (9-10)	1	0%
Knowledge Academy High (9)	1	0%
LEAD Academy (5-12)	10	1%
Maplewood High School (9-12)	3	0%
Martin Luther King, Jr. Magnet High School (7-12)	152	10%
McGavock High School (9-12)	1	0%
Metro Nashville Virtual School (7-12)	6	0%
MNPS Middle College High School (10-12)	21	1%
Nashville Big Picture High (9-12)	26	2%
Nashville School of the Arts (9-12)	74	5%
Pearl-Cohn High School (9-12)	2	0%
RePublic High (9)	3	0%
The Academy at Old Cockrill (12)	12	1%
The Academy at Opry Mills (12)	1	0%
The Cohn School (9-11)	5	0%
W. A. Bass Alternative Learning Center (9-12)	6	0%
Grand Total	**1500**	

2016-17 Student Enrollment for Hillwood Cluster (Grades 5-8)				
Enrollment by School	**BELLEVUE MS**	**H. G. HILL MS**	**Total**	**Percent**
Bellevue Middle School (5-8)	565	8	573	38%
H G Hill Middle School (5-8)	9	487	496	33%
Cameron College Preparatory (5-8)		7	7	0%
Cora Howe School (K-12)	1		1	0%
Donelson Middle School (5-8)	1		1	0%
East End Preparatory (K-4)		1	1	0%
East Nashville Middle School (5-8)	1		1	0%
Harris-Hillman Exceptional Education School (PK-12)	3	2	5	0%
Haynes Middle School (5-8)	2		2	0%
Head Middle School (5-8)	53	30	83	5%
Intrepid Preparatory (5-7)		1	1	0%
Isaac Litton Middle School (5-8)	1		1	0%
Isaiah T. Creswell Middle School (5-8)		3	3	0%
J T Moore Middle School (5-8)	18	21	39	3%
Joelton Middle School (5-8)	2	1	3	0%
John Early Middle School (5-8)	8	1	9	1%
Johnson Alternative Learning Center (5-12)	1		1	0%
KIPP College Preparatory (5-7)	1		1	0%
Martin Luther King, Jr. Magnet High School (7-12)	30	23	53	3%
McKissack Middle School (5-8)		1	1	0%
Meigs Magnet Middle School (5-8)	81	38	119	8%
Metro Nashville Virtual School (7-12)	3		3	0%
Nashville Preparatory (5-8)	12	23	35	2%
New Vision Academy (5-8)		1	1	0%
Rose Park Middle School (5-8)	3	7	10	1%
STEM Preparatory Academy (5-8)		2	2	0%
Stratford STEM Magnet School (5-12)		2	2	0%
Two Rivers Middle School (5-8)		2	2	0%
Valor Collegiate SE (5-6)	4	5	9	1%
Valor Flagship Academy (5-6)	10	4	14	1%
West End Middle School (5-8)	15	26	41	3%
Neelys Bend College Prep (5-6)	1		1	0%
Grand Total	**825**	**696**	**1521**	

2016-17 Student Enrollment for Hillwood Cluster (Grades PK-4)						
Enrollment by School	**CHARLOTTE PARK**	**GOWER**	**HARPETH VALLEY**	**WESTMEADE**	**Total**	**Percent**
Charlotte Park Elementary School (PK-4)	415	9		6	430	18%
Gower Elementary School (PK-4)	8	559	3	25	595	24%
Harpeth Valley Elementary School (PK-4)	1	12	660	17	690	28%
Westmeade Elementary School (K-4)		7	5	433	445	18%
Bordeaux Early Learning Center (PK)		2	1	5	8	0%
Buena Vista Elementary School (PK-4)				2	2	0%
Caldwell Elementary School (K-4)	2				2	0%
Carter-Lawrence Elementary School (PK-4)	3	2	1		6	0%
Casa Azafran Early Learning Center (PK)		1			1	0%
Cockrill Elementary School (PK-4)	13	5	2	6	26	1%
Cora Howe School (K-12)		1			1	0%
Crieve Hall Elementary School (K-4)			1		1	0%
Cumberland Elementary School (K-4)	2			1	3	0%
Eakin Elementary School (K-4)	4	19	5	10	38	2%
East End Preparatory (K-4)	2	3		1	6	0%
Fall-Hamilton Elementary School (PK-4)		1		1	2	0%
Glendale Elementary School (PK-4)		13	5	1	19	1%
Harris-Hillman Exceptional Education School (PK-12)	2	9	7	5	23	1%
Hattie Cotton Elementary School (PK-4)	2	1			3	0%
Hermitage Elementary School (PK-4)		2		1	3	0%
Hull-Jackson Montessori Magnet Elementary School (PS-4)	4	2	1	12	19	1%
J E Moss Elementary School (PK-4)	1				1	0%
Jones Paideia Magnet School (K-4)		4		1	5	0%
Julia Green Elementary School (K-4)		4	2	2	8	0%
May Wherthan Shayne Elementary School (PK-4)		1			1	0%
McGavock Elementary School (PK-4)				2	2	0%
Nashville Classical (K-2)	2	1	1	1	5	0%
Park Avenue Elementary School (PK-4)	1	1		1	3	0%
Percy Priest Elementary School (K-4)		1	1		2	0%
Purpose Preparatory (K-3)	3				3	0%
Rocketship TN (K-4)		1		1	2	0%
Rocketship United (K-4)			1		1	0%
Rosebank Elementary School (PK-4)		1			1	0%
Ross Early Learning Center (PK)	2	2	1	1	6	0%
Sylvan Park Elementary School (K-4)	26	36	6	5	73	3%
Waverly-Belmont Elementary (K-4)	2	11	2	5	20	1%
Grand Total	**495**	**711**	**705**	**545**	**2456**	

2016-17 Hillwood Cluster Student Enrollment by Zoned School																
Attending School (Header Row) Zoned School (Subheading)	**P3**	**P4**	**K**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**	**Percent**
Bellevue Middle School (5-8)								**196**	**182**	**138**	**176**					**692**	
BELLEVUE MS								170	144	109	142					565	82%
CAMERON COLLEGE PREP										1						1	0%
GRA-MAR MS											1					1	0%
H. G. HILL MS								1	1	1	5					8	1%
JOELTON MS								1	1							2	0%
JOHN EARLY PAIDEIA MS								22	32	24	25					103	15%
KENNEDY									1							1	0%
MARGARET ALLEN MS											1					1	0%
MARSHALL MS								1								1	0%
MOORE MS									2		1					3	0%
OLIVER MS										2						2	0%
Unknown								1	1	1	1					4	1%
Charlotte Park Elementary School (PK-4)	**6**	**43**	**101**	**93**	**67**	**96**	**91**									**497**	
ALEX GREEN				1												1	0%
CANE RIDGE		1														1	0%
CHARLOTTE PARK	1	26	84	87	57	83	77									415	84%
CHURCHWELL	2															2	0%
COCKRILL		2	6	1	1	9	5									24	5%
CUMBERLAND		1	3		1	2	1									8	2%
DODSON			1													1	0%
GOWER	1	1	2	1	2		2									9	2%
LILLARD, ROBERT E		1														1	0%
MT. VIEW							1									1	0%
PARK AVENUE ENAHANCED OPTION	2	4	3	3	2	1	4									19	4%
RUBY MAJOR		1														1	0%
SHAYNE		1			1											2	0%
SHWAB			1		1											2	0%
STRATTON					1											1	0%
SYLVAN PARK PAIDEIA DESIGN CENTER		1														1	0%
Unknown		1	1													2	0%
WESTMEADE		3			1	1	1									6	1%
Gower Elementary School (PK-4)	**11**	**34**	**117**	**136**	**118**	**156**	**127**									**699**	
ALEX GREEN			1			1										2	0%
BELLSHIRE DESIGN CENTER							1									1	0%
BUENA VISTA ENHANCED OPTION	1															1	0%
CANE RIDGE							1									1	0%
CHADWELL					1	1										2	0%
CHARLOTTE PARK	1	2		1	1	2	1									8	1%
CHURCHWELL	1		13	14	9	10	8									55	8%
COCKRILL	1	1					3									5	1%
EAKIN							1									1	0%
GLENVIEW				1												1	0%
GOODLETTSVILLE						1	1									2	0%
GOWER	5	23	92	111	99	125	104									559	80%
HARPETH VALLEY		1				1	1									3	0%
J. E. MOSS				1												1	0%
JOELTON				1												1	0%
LILLARD, ROBERT E			1				1									2	0%
NAPIER ENHANCED OPTION							1									1	0%
PARK AVENUE ENAHANCED OPTION		1	1		1	1										4	1%
PENNINGTON							1									1	0%
STRATTON				1		1										2	0%
SYLVAN PARK PAIDEIA DESIGN CENTER		1														1	0%
TUSCULUM							1									1	0%
Unknown	1	3	8	1	1	4										18	3%
WESTMEADE	1	2	1	5	6	8	2									25	4%
WHITSITT						1										1	0%

2016-17 Hillwood Cluster Student Enrollment by Zoned School

Attending School (Header Row) Zoned School (Subheading)	P3	P4	K	1	2	3	4	5	6	7	8	9	10	11	12	Total	Percent
H G Hill Middle School (5-8)								**178**	**153**	**147**	**149**					**627**	
APOLLO MS								1			1					2	0%
BELLEVUE MS								4		2	3					9	1%
BRICK CHURCH COLLEGE PREP									1		1					2	0%
CAMERON COLLEGE PREP										1						1	0%
DUPONT-HADLEY MS											1					1	0%
GOODLETTSVILLE MS											1					1	0%
H. G. HILL MS								140	118	113	116					487	78%
JOELTON MS										1	2					3	0%
JOHN EARLY PAIDEIA MS								30	32	27	19					108	17%
MCKISSACK MS								1	1	2	1					5	1%
MCMURRAY MS											1					1	0%
MOORE MS											1					1	0%
STRATFORD										1						1	0%
Unknown								2	1		2					5	1%
Harpeth Valley Elementary School (PK-4)	**3**	**17**	**162**	**139**	**127**	**184**	**148**									**780**	
ALEX GREEN							1									1	0%
ANDREW JACKSON						1										1	0%
BUENA VISTA ENHANCED OPTION			16	6	5	21	14									62	8%
CHARLOTTE PARK					1											1	0%
CHURCHWELL			1			1										2	0%
CUMBERLAND					1											1	0%
EAKIN		1				1										2	0%
GOWER			1	1	3	2	5									12	2%
GRANBERY					1											1	0%
HARPETH VALLEY	2	13	134	127	111	151	122									660	85%
MAXWELL	1															1	0%
OLD CENTER							1									1	0%
PERCY PRIEST			1			1										2	0%
ROSEBANK				1	1											2	0%
STRATTON							1									1	0%
Unknown		1	7	1	2	2										13	2%
WESTMEADE		2	2	3	2	4	4									17	2%
Hillwood High School (9-12)												**308**	**307**	**300**	**257**	**1172**	
ANTIOCH HS												3	1	1		5	0%
CANE RIDGE HS													1		2	3	0%
GLENCLIFF HS												3	3	3		9	1%
HILLSBORO HS												1			1	2	0%
HILLWOOD HS												226	236	233	186	881	75%
HUNTERS LANE HS												1	1	1	2	5	0%
MAPLEWOOD HS													3	2	1	6	1%
MCGAVOCK HS												1	1	3	3	8	1%
OVERTON HS															7	7	1%
PEARL-COHN HS												66	50	50	51	217	19%
STRATFORD HS													1			1	0%
Unknown													3	2	1	6	1%
WHITES CREEK HS												7	7	5	3	22	2%
Westmeade Elementary School (K-4)	**3**	**3**	**84**	**96**	**91**	**96**	**87**									**460**	
DUPONT			1													1	0%
EAKIN						1										1	0%
GLENCLIFF						1										1	0%
GOODLETTSVILLE			1													1	0%
GOWER	1			1	1	2	2									7	2%
HARPETH VALLEY					2	3										5	1%
STRATTON					1											1	0%
UNA					1											1	0%
Unknown	2	1	2	1	1	2										9	2%
WESTMEADE		2	80	94	85	87	85									433	94%
Grand Total	**23**	**97**	**464**	**464**	**403**	**532**	**453**	**374**	**335**	**285**	**325**	**308**	**307**	**300**	**257**	**4927**	

Hillwood High School: An Analysis of School Location

Leonard B. Stevens, Ed.D.

June 2016

The Hillwood High School facility, built in 1959, is recognized by the district as in need of renovation or replacement. The district has been studying the matter for at least two years.

A current issue before the district is whether to rebuild the school on its current site or on a new site.

At least two alternative sites are potentially available. Both are located to the southwest of the current site, closer to the community of Bellevue, a community with growth potential. The current site is in a suburban area closer to North Nashville.

In brief, the essence of the case to relocate the school to the Bellevue area is that this area has grown in recent years and has potential for additional growth, and, in addition, that placing the school here would encourage more students from this area to make use of Hillwood High School. The essence of the case to keep the school at its current location is that the school has been at this location for more than 50 years, and is an established element of a stable surrounding neighborhood that values the presence of the school.

Like school site decisions generally, the question before the district involves factors including but not limited to site availability and feasibility, site and construction cost, school size, student assignment, student transportation, and renovation versus new construction costs. But this particular decision is more complex than typical school location decisions, because the district places high value on diversity in its schools. It is the diversity factor that is the focus of this analysis.

This report is in response to a request from the district to analyze the location issue in terms of best next step for the district.

A. MNPS is organized into 12 clusters, each of which has elementary schools, middle schools and a comprehensive high school. Hillwood High School is the high school for the Hillwood cluster. Like all of the district's comprehensive high schools, Hillwood High School is organized into academic academies that students choose to attend. Hillwood operates three academies: 1) health science, 2) business and hospitality, and 3) art, design and communications.

The cluster also contains four elementary schools and two middle schools. Cluster-resident students are entitled to attend school from Kindergarten through high school within the cluster. See Table 1 for enrollments in the Hillwood cluster schools.

In addition, the Hillwood cluster serves two geographic areas in North Nashville in the Pearl-Cohn cluster called Zoned Option areas. Students living in these Zoned Option areas are entitled to attend schools in the Hillwood cluster at all grade levels with the same entitlements as cluster-resident students—i.e., their enrollment in cluster schools does not depend on space availability, there are no special admission requirements, and they are provided district transportation to and from school. As a practical matter, the Zoned Option areas are extensions of the cluster.

At present, a total of 414 students who live in the Zoned Option areas attend Hillwood schools at all grade levels: 88 attend Hillwood elementary schools, 157 attend Hillwood middle schools and 169 attend Hillwood High School. See Table 1.

An additional 52 students live in the Pearl-Cohn cluster but not in designated Zoned Option areas and attend Hillwood High School through open enrollment. See Table 1.

Zoned Options were created by the district in 2009 when the district modified its student assignment plan. From 1998 to 2008, the district, in the interest of desegregation, operated an assignment plan that assigned some students (mostly Black) to schools (mostly white) in non-contiguous attendance zones. In shorthand, this part of the district assignment plan was one-way busing, since only Black students were bused. The modified plan, implemented in 2009 and in operation now, converted mandatory assignments to voluntary choices. The former non-contiguous assignment areas in dominantly Black neighborhoods were termed Zoned Option areas, since the students in them could elect to attend a zoned school closer to home or an optional school with greater diversity. In brief, the Zoned Option areas that are part of the Hillwood cluster have a connection to Hillwood that goes back to about 2002.

Conclusion: In deciding the location of Hillwood High School, it is important that the district when considering where students live who are entitled to attend Hillwood High School consider not just the geographic cluster but the <u>cluster-as-extended</u> by the Zoned Option areas. The Zoned Option areas are integral to the Hillwood cluster.

B. The Hillwood cluster-as-extended by its Zoned Option areas serves a high school student body that lives both north and south of Hillwood High School. See Table 2.

1. As shown in Table 2:

• Hillwood students who live to the north of the high school live in the Charlotte Park and Pearl-Cohn areas and comprise 51% of the high school's enrollment.

• Hillwood students who live to the south of the high school live in the Bellevue area and comprise 44% of the high school's enrollment.

• Another 5% of the school's enrollment lives outside the cluster-as-extended in various parts of the district.

• In brief, students currently attending Hillwood High School live in roughly equal proportions north and south of the school in a cluster-as-extended that runs from northeast to southwest.

2. Table 2 also shows student transportation information. The table shows comparative travel data to the current Hillwood High School site and to the two alternative sites 1) for Zoned Option students, 2) for students who live in the Gower area and 3) for students who live in the Harpeth Valley area. For these students:

• Travel distance to the current high school site is rather similar for Zoned Option students (8-11 miles), Gower students (9-12 miles) and Harpeth Valley students (9-20 miles). Similarly, travel times are in the same general range: 20-27 minutes for Zoned Option students, 22-24 minutes for Gower students, 24-40 minutes for Harpeth Valley students. See Table 2.

• The alternative sites reduce travel distance for Gower and Harpeth Valley students while increasing travel distance for Zoned Option students. See Table 2.

• The alternative sites also reduce travel time for Gower and Harpeth Valley students. One alternative site increases travel time and one reduces it for Zoned Option students. See Table 2.

In short, when comparing the transportation factor for Zoned Option students who live north of Hillwood High School and cluster students who live south of the school there is greater similarity (and thus fairness) with the current school site than with the alternative sites. The alternative sites introduce a dissimilarity in travel distance and travel time to the disadvantage of the Zoned Option students.

Whether lengthening transportation distance would affect the magnitude of future enrollment of Zoned Option students in the high school is open to speculation—the question has not been studied in depth by the district. But it is commonly accepted that travel distance is a factor considered by parents and students in school choice decisions.

Conclusion: In assessing the current location of Hillwood High School and the alternative sites, the district should seek to locate the school where it is reasonably central to the students it serves so that travel time and travel distance to the school for students and families have both the reality and the appearance of fairness.

C. In 2012, the Board of Education adopted a Resolution on diversity. (Adopted unanimously November 13, 2012) The Resolution expresses the district's commitment to operate schools that "preserve, support and further diversity in education by being planned and operated in a manner that maximizes diversity …."

In 2013, the Board approved a Diversity Management Plan. (Approved unanimously March 12, 2013.) The Plan sets forth a definition of diversity for students and staff and sets forth methods for supporting and pursuing diversity. The district's annual diversity reports are one result of the plan.

Of particular relevance to the Hillwood issue, the plan provides that:

> "In decisions regarding the following matters and those closely related to them, MNPS will consider foreseeable diversity impact with a view toward preserving or enhancing diversity as much as practicable using race-neutral means …."

Among the "following matters" cited in the plan are "school expansion and renovation" and "siting of new schools." (Section G of the Plan)

In keeping with the plan, the district has implemented this foreseeable impact provision in making student assignment decisions: for example, in designing a student assignment plan for Waverley-Belmont Elementary School. As a result, Waverley-Belmont opened in 2015 with an enrollment that meets the MNPS diversity standard.

Applying the diversity definition in the MNPS Diversity Management Plan, Hillwood High School is a plurality school, which means its student body comprises multiple racial/ethnic groups but no group represents a majority of the student body. See Table 1. In MNPS, the plurality school is the paradigm of diversity, since it mirrors the district as a whole.

In 2015-16, MNPS has 48 plurality schools. Hillwood High School has been a plurality school since Board approval of the MNPS Diversity Management Plan.

Hillwood High School is a plurality school because of the presence of Zoned Option students.

• At present, there are 169 Zoned Option students in the school. Black Zoned Option students represent more than one-third (37%) of the Black students in Hillwood High School. See Table 2.

• Without Zoned Option students, the school would have a smaller and whiter enrollment: 50% white, 27% Black. See Table 1. With this racial composition, the school would remain a plurality school but at the outer limit of the definition; an increase in White proportion to 51% would both end the school's plurality status and also not permit the school to meet either of the alternative diversity standards for race/ethnicity.[1]

If the additional Pearl-Cohn students who attend the high school through open enrollment are added to the Zoned Option students from Pearl-Cohn and removed from the school's enrollment, the school would be 52% white/25% Black and not meet the MNPS diversity definition. See Table 1.

Conclusion: since the Pearl-Cohn students are indispensable to the diversity of Hillwood High School and in light of the district's commitment to diversity, the district should place significant weight on this factor and avoid a location decision that places the school's diversity at risk and, in particular, its plurality school status.

D. The Office for Civil Rights, U.S. Department of Education is currently monitoring student assignment matters in the district.

[1] The MNPS Diversity Management Plan provides three alternative measures for a school to meet the MNPS definition of diversity. Having a plurality enrollment is one of the three.

Conclusion: In light of this ongoing review, the district should ensure that its decision on the Hillwood location matter is consistent in all respects with its Diversity Management Plan.

E. In decisions of this kind in a district with a lengthy history of both segregation and desegregation, perceptions as well as data count.

The alternative sites for Hillwood High School lie in the Bellevue area. The district operated a high school in Bellevue (Grades 7-12) until 1980 when the high school grades were eliminated and the school became a school for Grades 7-8. The high school closure occurred during the desegregation period in Nashville pursuant to a court order which noted that "Hillwood was built to accommodate Bellevue students." (492 F.Supp.167 U.S. District Court, M.D.Tennessee, Nashville Division, *Kelley v. Metropolitan County Board of Education of Nashville and Davidson County, Tennessee et al*, May 20, 1980, page 20.) Bellevue was one of four high schools ordered closed or converted to other uses at the time. In the final year of the high school, 1979-80, the 7-12 school was 12% Black. (MNPS Integration Report 1979-80)

Currently, three schools in the Hillwood cluster meet the MNPS diversity standard: Hillwood High School, H.G. Hill Middle School and Charlotte Park Elementary School. All three are plurality schools. See Table 1.

The other four schools—Bellevue Middle School; and Westmeade, Harpeth Valley and Gower Elementary Schools— do not meet the diversity standard for race/ethnicity. Harpeth Valley, the largest of the four elementary schools in the cluster, is also the whitest school in the cluster (76%) and the school farthest to the south. See Table 1.

In this context, a decision to relocate Hillwood High School south of its current location would move the school toward the cluster's higher concentration of white population and away from the considerable number of Black students who live in the north end of the cluster-as-extended. Almost inevitably, such a move would raise a race-connected question: who benefits, and why?

The district should be sensitive to the potential for generating perceptions that this school location decision, however unintentionally, would disfavor Black students or students of color who live north of Hillwood High School and thereby could become a basis for racial distrust of the district.

Conclusion: The district should seek to make a decision that affirmatively contributes to public confidence in the district's expressed commitment to "preserve, support and further" diversity.

F. The district's comprehensive high schools "capture" various proportions of the high school-age students in their respective clusters. The rates range from 34% to 82%.[2] See Table 3.

Hillwood High School enrolls 47% of the high school-age students who live in its cluster. The two middle schools capture 43% of the middle school-age cluster population. The four elementary schools capture 62% of the elementary school-age cluster population. See Table 3.

A total of 447 high school students who live in the Hillwood cluster elect to attend MNPS magnet high schools; 385 of them attend three magnet high schools—Hume-Fogg, Martin Luther King and Nashville School of the Arts. See Table 3.

There are multiple reasons for the variance among the high schools in their respective ability to capture their cluster-resident students, and for the rate for Hillwood High School in particular. But the rates do beg at least three questions: what are the causes, would it be desirable for Hillwood High School to capture a larger proportion of its cluster students, and what strategies might produce that result? The district should consider studying the issue.

Conclusion: This is an opportune occasion for the district to review the Hillwood cluster at all grade levels with a view toward the potential to strengthen the attractiveness of the cluster's schools to families living in the Hillwood cluster-as-

[2] This calculation is a rough approximation of "capture" rate. It does not factor in students who enter or leave a cluster via the multiple school choices offered by MNPS. The calculation represents school enrollments in a cluster as a percentage of age-appropriate cluster population.

extended. The study should explore program offerings, grade organization, and possible development of a Pre-Kindergarten center as strategies to attract cluster students to cluster elementary and middle schools and ultimately to Hillwood High School.

Overall Recommendation. The best next step for the district is to rebuild Hillwood High School at its present site.

The case to relocate the school falls short on four points.

First, a premise that locating the school in the Bellevue area would place it closer to a larger share of its students is not supported by the data (see B. above and Table 2), which show that the current location serves about equal proportions of students who live north and south of the school.

Second, a premise that relocating the school to Bellevue would accommodate population growth in the area is not supported by enrollment projections which foresee modest growth of fewer than 70 students by 2020 at Hillwood High School, leaving the school well within its capacity. (See Table 4.)

Third, an assumption that relocation of the school to the Bellevue area would cause more students in this area to use Hillwood High School is speculative—this issue has not been studied— and, in addition, is undermined by the fact that 447 potential Hillwood High School students are choosing to attend MNPS magnet high schools instead. (See Table 3). It seems unlikely that such students in substantial numbers would change their high school plans based on relocation of the cluster comprehensive high school. It is more likely that capturing more cluster students in cluster schools will require changes in the schools that students and families find sufficiently attractive.

Fourth, a premise that relocating the school to Bellevue would do no harm to the school's current diversity status as a plurality school is a high risk assumption that does not place sufficient weight on the significance of the Pearl-Cohn students who attend the school through Zoned Options or open enrollment. See C. above. Among the factors described in this

report leading to the recommendation to rebuild on the current Hillwood High School site, the diversity factor is the most significant.

Background. I have served as a consultant to the district since 2012 on matters of diversity. I testified as an expert witness for the district in the *Spurlock* lawsuit, a case that unsuccessfully challenged the district's 2008 student assignment plan. After being asked in April to perform this current study, I made a site visit to the district on April 28-29 to confer with staff, gather study-related information and to meet with the MNPS Interim Director. I continued to confer with MNPS staff after the site visit.

Leonard B.Stevens, Ed.D.
June 2016

Table 1

Metro Nashville Public Schools			**Hillwood Cluster 2015-16**									
MNPS data @ Spring 2016												
Enrollment by School	Grades	Enrollment	White	Black	Hispanic	Asian	Pacific Islander	American Indian	Other	% White	% Black	*Status re: MNPS race/ ethnic diversity metric
Charlotte Park ES	K-4	491	160	103	177	49	0	1	1	33%	21%	plurality school
Gower ES	K-4	721	430	169	57	59	2	2	2	60%	23%	non-comply
H.G.Hill MS (receives above schools)	5-8	622	286	158	120	56	1	1	0	46%	25%	plurality school
Westmeade ES	K-4	512	287	116	69	37	3	0	0	56%	23%	non-comply
Harpeth Valley ES	K-4	784	599	101	19	64	0	1	0	76%	13%	non-comply
Bellevue MS (receives above schools)	5-8	649	378	189	36	41	4	1	0	58%	29%	non-comply
Hillwood HS	9-12	1205	528	435	146	93	2	1	0	44%	36%	plurality school

Table 1

Metro Nashville Public Schools			**Hillwood Cluster 2015-16**									
	Grades	Enrollment	White	Black	Hispanic	Asian	Pacific Islander	American Indian	Other	% White	% Black	*Status re: MNPS race/ ethnic diversity metric
Enrollment by Level												
Elementary Schools (4)	K-4	2508	1476	489	322	209	5	4	3	59%	19%	
Middle Schools (2)	5-8	1271	664	347	156	97	5	2	0	52%	27%	
Hillwood High School	9-12	1205	528	435	146	93	2	1	0	44%	36%	
Zoned Option students in Hillwood cluster		Enrollment	White	Black	Hispanic	Asian	Pacific Islander	American Indian	Other			
at Harpeth Valley ES		44										
at Gower ES		44										
at Bellevue MS		74										
at H.G. Hill MS		83										
At Hillwood HS		169										
Total		414										

Table 1

Metro Nashville Public Schools			**Hillwood Cluster 2015-16**									
	Grades	Enrollment	White	Black	Hispanic	Asian	Pacific Islander	American Indian	Other	% White	% Black	*Status re: MNPS race/ ethnic diversity metric
Zoned Option students at Hillwood HS		169	5	159	4	1						
Additional Hillwood HS students from Pearl-Cohn area (open enrollment)		52	13	27	11	1						
Pearl-Cohn student sub-total		221	18	186	15	2						
Hillwood HS without Zoned Option students		1036	523	276	142	92	2	1		50%	27%	plurality school
Hillwood HS without any students from Pearl-Cohn area		984	510	249	131	91	2	1		52%	25%	non-comply
* The MNPS Diversity Management Plan defines diversity by 4 factors: race/ ethnicity, income, language and disability. The metric here is race/ ethnicity only. “Plurality” means the school’s enrollment has no majority group among its racial/ ethnic groups.												

Table 2

Metro Nashville Public Schools		**Hillwood High School 2015-16 by Residence**							
Hillwood High School	**Students by Area of Residence (north and south of school)**								
MNPS enrollment data @ 5/4/16.									
	Enrollment	White	Black	Hispanic	Asian	Pacific Islander	American Indian	Other	% by area
North of HS									
From Charlotte Park area	392	164	98	80	49	1			33%
From Pearl-Cohn Zoned Option areas	169	5	159	4	1				14%
From Pearl-Cohn area/not Zoned Option	52	13	27	11	1				4%
subtotal	613	182	284	95	51	1			51%
South of HS									
From Bellevue area	529	330	117	39	41	1	1		44%
From district-wide	63	16	34	12	1				5%
Total enrollment	1205	528	435	146	93	2	1		
Zoned Option Students									
Total students	169	5	159	4	1				
% of students in Hillwood HS	14%								
% of Black students in Hillwood HS			37%						
Transportation	To Current HS site			To Bellevue MS site			To second Bellevue site		
MNPS transportation data	Miles	Minutes		Miles	Minutes		Miles	Minutes	
From Zoned Option areas									
current routes/ranges	8-11	20-27		15-16	27-28				
*estimated							13	15-16	
From Gower area									
current routes/ranges	9-12	22-24							
*estimated				4-8	8-14		2-4	3-5	
From Harpeth Valley area									
current routes/ranges	9-20	24-40		6-8	19-27				
*estimated							3-8	6-11	
*Estimates do not account for multiple pick-up/drop-off points or other potential delays built into planning a bus route.									

Metro Nashville Public Schools **Attraction Power of Cluster High Schools**

ESRI data & MNPS data. Enrollment data @ 10/2/15 except Hillwood HS data updated to 5/4/16.

	2015	2015-16	
Cluster High Schools	Cluster population age 15-18	HS enrollment	Cluster HS enrollment as % of cluster HS-age population
Cane Ridge HS	2146	1756	82%
Antioch HS	2738	2133	78%
Glencliff HS	1984	1449	73%
Overton HS	2636	1916	73%
McGavock HS	3461	2351	68%
Hunters Lane HS	2633	1615	61%
Maplewood HS	1795	1014	56%
Stratford Magnet HS	1368	713	52%
Hillwood HS	2543	1205	47%
Whites Creek HS	1771	708	40%
Pearl-Cohn Magnet HS	2096	791	38%
Hillsboro HS	3808	1280	34%
Hillwood Cluster	Age- appropriate Cluster Population	Enrollment	Enrollment as % of cluster population
Elementary Schools (4)	4056	2508	62%
Middle Schools (2)	2956	1271	43%
Hillwood High School	2543	1205	47%

Table 3

Metro Nashville Public Schools	**Attraction Power of Cluster High Schools**							
ESRI data & MNPS data. Enrollment data @ 10/2/15 except Hillwood HS data updated to 5/4/16.								
High School Choices by Hillwood students	Enrolled @ Hillwood HS	Enrolled Out of Cluster	White	Black	Hispanic	Asian	American Indian	Pacific Islander
Zoned to Hillwood HS	921		494	215	119	90	1	2
Zoned Option students	169		5	159	4	1	0	0
Open Enrollment	115		29	61	23	2	0	0
sub-total	1205		528	435	146	93	1	2
High School Choices by Hillwood students	Enrolled @ Hillwood HS	Enrolled Out of Cluster	White	Black	Hispanic	Asian	American Indian	Pacific Islander
To Hume-Fogg Magnet High School		182	147	6	4	25	0	0
To Martin Luther King Magnet School		151	85	25	1	39	0	1
To Nashville School of the Arts (magnet)		52	44	3	3	2	0	0
To other magnets		62	49	10	2	1	0	0
magnet sub-total		447	325	44	10	67	0	1
To Hillsboro HS		110	78	21	4	6	1	0
To other MNPS schools		24	13	4	6	1	0	0
To charters		15	1	9	3	2	0	0
Out of cluster total		596	417	78	23	76	1	1

Table 4

Metro Nashville Public Schools		**Hillwood High School Enrollment Last Three Years & 2020-21**			
MNPS Annual Diversity Reports with 2015-16 data updated to Spring 2016, and MNPS Five-Year Student Enrollment Projections 2015-16					
Hillwood High School	**2013-14**	**2014-15**	**2015-16**	**2020-21 projected**	**School Capacity**
Enrollment	1202	1155	1205	1275	1508
White	47%	46%	44%		
Black	37%	35%	36%		
Hispanic	9%	11%	12%		
Asian	7%	8%	8%		
American Indian	0%	0%	0%		
Pacific Islander	0%	0%	0%		
Income	58%	66%	57%		
Language (ELL)	5%	5%	6%		
Disability	18%	16%	16%		
Other Cluster Schools					
Charlotte Park ES			491	550	546
Gower ES			721	800	741
Westmeade ES			512	525	441
Harpeth Valley ES			784	825	770
H.G. Hill MS			622	675	591
Bellevue MS			649	775	643

DR. LEONARD B. STEVENS is a full-time education consultant with expertise in race-related school issues. He has worked in school districts of all sizes and in all regions of the U.S., typically in venues with racial, cultural and economic diversity. His expertise on race equity overlays broad experience with school improvement.

His work has included magnet schools, school choice, leadership development, special education, student assignment planning, program effectiveness analysis, staff training, program financing, and communications strategy. He holds a school superintendent license in Massachusetts, is listed in *Who's Who in American Education,* and earned a doctor of education degree from the University of Massachusetts-Amherst. His undergraduate degree in journalism is from Boston University. His education career began in the New York City Public Schools.

Recognized by courts as an expert in school desegregation, he has worked in about 40 court cases involving more than 80 school districts, providing testimony, developing desegregation plans and plan improvements, and working on negotiated settlements of longstanding, complex desegregation cases. His clients include the U.S. Department of Justice, and his case work includes Topeka, Kansas, the district of Brown v. Board of Education, in the mid-nineties when Topeka finally was desegregated. In non-litigation situations, he has worked in another two dozen school districts.

Between 1970 and 1990, he held chief executive or senior administrative positions in New York City, Cleveland and Milwaukee.

¶ At the historic advent of school decentralization in New York City, he served as special assistant to the first Chancellor of the newly decentralized New York City Public Schools, with lead responsibility for advising on policy issues and drafting the Chancellor's public papers which were central to the Chancellor's school reform agenda.

¶ As school desegregation approached in Cleveland, he organized and served as chief executive of a foundation-funded coalition of more than 60 parent groups, community organizations, social service agencies and religious institutions. The coalition provided civic leadership on integrated education and school desegregation practices.

¶ During the first 10 years of desegregation in the Cleveland Public Schools, he served as the Federal court monitor, assessing desegregation implementation, educational improvements, and school district reorganization, while also disseminating information citywide. He organized and staffed an office of educators, attorneys, researchers, community organizers and consultants. It was the only such agency ever funded by the Federal government.

¶ In Milwaukee, after settlement of a metropolitan school desegregation lawsuit, he organized and served as chief executive of a consortium of the 24 school districts previously engaged as adversaries in the litigation. The consortium provided support services for the second-largest program in the U.S. of school integration through inter-district public school choice.

In workshops and lectures, he has addressed school board members, principals, teachers, parents, university students and faculty, educational researchers, journalists, foundation directors, school attorneys and federal judges. Co-author with Harvey B. Scribner of *Make Your Schools Work* (1975, Simon & Schuster), his most recent publication is "Integration: New Concepts for a New Era" in *Education Week*, May 14, 2014.

He is based in Sarasota, Florida.

BELLEVUE SITE

NEW HIGH SCHOOL - OPTION 1 DRAFT

LEGEND

- NEW BUILDINGS PROPOSED
- EXISTING BUILDINGS TO REMAIN
- EXISTING BUILDINGS TO BE REMOVED

1"= 100' 0' 50' 100' 200'

OPTION 2A

NEW HIGH SCHOOL

GENERAL DESCRIPTION

- BUILD NEW HILLWOOD HIGH SCHOOL ON CURRENT SITE AND DEMOLISH CURRENT BUILDING

HIGH SCHOOL LOCATION

- CURRENT HILLWOOD HIGH SCHOOL SITE

STUDENT ASSIGNMENT IMPLICATIONS

- HIGH SCHOOL WOULD REMAIN CLOSER TO STUDENTS IN PEARL COHN CLUSTER WHO HAVE A ZONED OPTION TO ATTEND HILLWOOD HIGH SCHOOL

COST IMPLICATIONS

- $72,500,000

WESTMEADE ELEMENTARY SCHOOL IMPACT

- ALLOWS FOR POTENTIAL OF A REPLACEMENT BUILDING FOR WESTMEADE ELEMENTARY TO BE LOCATED ON BELLEVUE MIDDLE CAMPUS

PRE-K HUB SERVING WEST NASHVILLE IMPACT

- CURRENT WESTMEADE ELEMENTARY BUILDING COULD BE REPURPOSED AS A PRE-K HUB IF CURRENT SCHOOL IS RELOCATED TO A POTENTIAL NEW ELEMENTARY SCHOOL ON BELLEVUE MIDDLE SCHOOL CAMPUS.

LAND USE IMPLICATIONS

- NO EXISTING MUNICIPAL FACILITIES NEAR THE BELLEVUE CAMPUS WOULD NEED TO BE RELOCATED

CONSTRUCTION IMPLICATIONS

- HILLWOOD STUDENTS STAY IN CURRENT BUILDING DURING CONSTRUCTION OF NEW BUILDING
- HILL BUILDING DEMOLISHED AND SERVICES RELOCATED DURING CONSTRUCTION

STUDENT TRANSPORTATION IMPACT

- MTA ACCESS FOR HIGH SCHOOL STUDENTS REQUIRES WALKING FROM THE NEAREST BUS STOP ON HARDING PIKE; FARTHER COMMUTE FOR HIGH SCHOOL STUDENTS LIVING IN BELLEVUE (6 MI. VIA HWY 70)

FURTHER CONSIDERATIONS

- 2 STORY HIGH SCHOOL
- NEW TENNIS COURTS
- NEW SOCCER FIELD
- BASEBALL AND SOFTBALL IS DISPLACED FOR TWO YEARS

LEGEND

- NEW BUILDINGS PROPOSED
- EXISTING BUILDINGS TO REMAIN
- EXISTING BUILDINGS TO BE REMOVED

1"= 100' 0' 50' 100' 200'

HASTINGS ARCHITECTURE ASSOCIATES, LLC

HILLWOOD HIGH SCHOOL, HILLWOOD SITE

METROPOLITAN Nashville PUBLIC SCHOOLS

NOVEMBER 2015

1"= 100' 0' 50' 100' 200'

PROPERTY INFORMATION

ACREAGE:

273.34

ZONING

- R40 WITH FLOODPLAIN OVERLAY (DOES NOT IMPACT THE PROPOSED SITE)
- ADJACENT ZONING - R40
- COMMUNITY EDUCATION FACILITIES PERMITTED WITH CONDITIONS

CONCEPT FEATURES

SITE FEATURES

- 1600 STUDENT HIGH
- FOOTBALL/TRACK STADIUM
- BASEBALL STADIUM
- SOFTBALL STADIUM
- TENNIS COURTS
- SOCCER FIELD

PARKING SPACES

161	P1 PARKING SPACES
188	P2 PARKING SPACES
100	P3 PARKING SPACES
60	P4 PARKING SPACES
92	P5 PARKING SPACES
601	TOTAL PARKING SPACES

LEGEND

- NEW BUILDINGS PROPOSED
- EXISTING BUILDINGS TO REMAIN
- EXISTING BUILDINGS TO BE REMOVED
- 50' STREAM BUFFER

SITE PLAN | SCALE 1:1000

HASTINGS ARCHITECTURE ASSOCIATES, LLC

SITE OPTION - 8001 HWY 70 SOUTH

METROPOLITAN Nashville PUBLIC SCHOOLS

JANUARY 2016

HASTINGS
ARCHITECTURE ASSOCIATES, LLC

HILLWOOD HIGH SCHOOL | HOPE PARK CHURCH SITE

HASTINGS
ARCHITECTURE ASSOCIATES, LLC

HILLWOOD HIGH SCHOOL | HOPE PARK CHURCH SITE

NOVEMBER 2016

TRAFFIC IMPACT STUDY

HOPEPARK HIGH SCHOOL SITE
NASHVILLE, TENNESSEE

PREPARED FOR:
METROPOLITAN NASHVILLE PUBLIC SCHOOLS

Transportation Consultants, LLC

1101 17TH AVENUE SOUTH
NASHVILLE, TENNESSEE 37212

TRAFFIC IMPACT STUDY
HOPEPARK HIGH SCHOOL SITE
NASHVILLE, TENNESSEE

PREPARED FOR:
METROPOLITAN NASHVILLE PUBLIC SCHOOLS

11/28/2016

PREPARED BY:
RPM TRANSPORTATION CONSULTANTS, LLC
1101 17th Avenue South
Nashville, TN 37212
615.370.8410 office 615.370.8455 fax
www.rpmtraffic.net

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EXECUTIVE SUMMARY

Project Description

Metropolitan Nashville Public Schools (MNPS) is evaluating sites to relocate Hillwood High School. One option is to redevelop the HopePark Church site on the west side of Highway 70S north of Interstate 40 in the Bellevue area of Nashville, Tennessee. The proposed development is located within an area that is characterized by a mix of medium to low density land uses. According to the architect, Hastings Architecture Associates, the proposed development plans to utilize the existing HopePark Church as a one-story auditorium and to build a three-story high school, a two-story athletic facilities and gym building, a softball field, a baseball field, a soccer field, and a football stadium with a track. Primary access to the development is planned to be provided on Highway 70S at the location of the existing HopePark Church access drive. Gated emergency access is planned to be located at the terminus of Hooten Hows Road. Surface parking is planned to accommodate the high school. 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 unsignalized intersections:

- Highway 70S and HopePark Access Drive/Site Access
- Highway 70S and Hooten Hows Road
- Highway 70S and Highway 70
- Highway 70 and Newsom Station Road/Buffalo Road

Specifically, RPM Transportation Consultants, LLC, conducted the traffic counts from 7:00 – 9:00 AM and 3:00 – 6:00 PM on a typical weekday in June 2016. From the counts, it was determined that the peak hours of traffic flow for the study intersections occurred from 7:00 – 8:00 AM and 4:45 – 5:45 PM.

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, which includes general background growth as well as the site-specific traffic expected to be generated by the redevelopment of the Bellevue Mall. Then, the estimated project-generated traffic

volumes 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:

Highway 70S

- The 40 mph speed limit on Highway 70S should be extended approximately 1,050 feet north of the HopePark/Site Access.

- School entrance warning assemblies should be installed on Highway 70S in advance of the HopePark/Site Access.

    - Approximately 750 feet south of the HopePark/Site Access, install a flashing beacon, a "Side Road" (W2-2L) sign, a "School" (S4-3P) plaque, and a "30 MPH" (W13-1P) advisory speed plaque facing northbound traffic on Highway 70S.

    - Approximately 750 feet north of the HopePark/Site Access, install a flashing beacon, a "Side Road" (W2-2R) sign, a "School" (S4-3P) plaque, and a "30 MPH" (W13-1P) advisory speed plaque facing southbound traffic on Highway 70S.

Hooten Hows Road

- Restrict on-street parking on the north and south sides of Hooten Hows Road.

    - A "No Parking This Block" (R7-2 mod.) sign should be provided on the north side of Hooten Hows Road, approximately 50 feet west of the existing "Dead End" (W14-1) sign, facing westbound traffic.

Intersection of Highway 70s and HopePark/Site Access

- A right turn lane should be provided for the southbound approach of Highway 70S to the HopePark/Site Access. The right turn lane should include a minimum of 150 feet of storage.

- A two-way left-turn lane (TWLTL) should be provided for the southbound approach of Highway 70S to the HopePark/Site Access. The TWLTL should extend a minimum of 150 feet north of the HopePark/Site Access. The purpose of the TWLTL is to allow for vehicles turning left onto Highway 70S from the HopePark/Site Access to make a two-stage left-turn.

- A "STOP" (R1-1) sign should be provided on the south side of the HopePark/Site Access, facing eastbound traffic.

- The pavement markings should be refurbished on the eastbound approach of the HopePark/Site Access.

- Based on our conservative analysis, the intersection of Highway 70S and the HopePark/Site Access is expected to operate acceptably during the AM and PM peak hours under two-way stop-control without a traffic control officer. However, once school is in session the intersection should be monitored to determine if additional traffic control is required.

<u>Intersection of Highway 70 and Highway 70S</u>

- Based on existing, background, and projected conditions, the intersection of Highway 70 and Highway 70S should be signalized.

The recommended improvements on Highway 70S are illustrated conceptually in Figure 8, on Hooten Hows Road in Figure 9, and at the intersection of Highway 70S and the HopePark/Site Access in Figure 10. In summary, based on the analyses conducted, no further recommendations are presented for the proposed HopePark high school site.

1. INTRODUCTION

The purpose of this study is to analyze the traffic impacts and access plan associated with a proposed high school located at the existing HopePark Church site on the west side of Highway 70S north of Interstate 40 in the Bellevue area of Nashville, Tennessee. According to information provided by the architect, Hastings Architecture Associates, the development plans to utilize the existing HopePark Church as a one-story auditorium and to build a 1,600-student, three-story high school, a two-story athletic facilities and gym building, a softball field, a baseball field, a soccer field, and a football stadium with a track. It was assumed that the development would be completed by 2019, which is a three-year horizon.

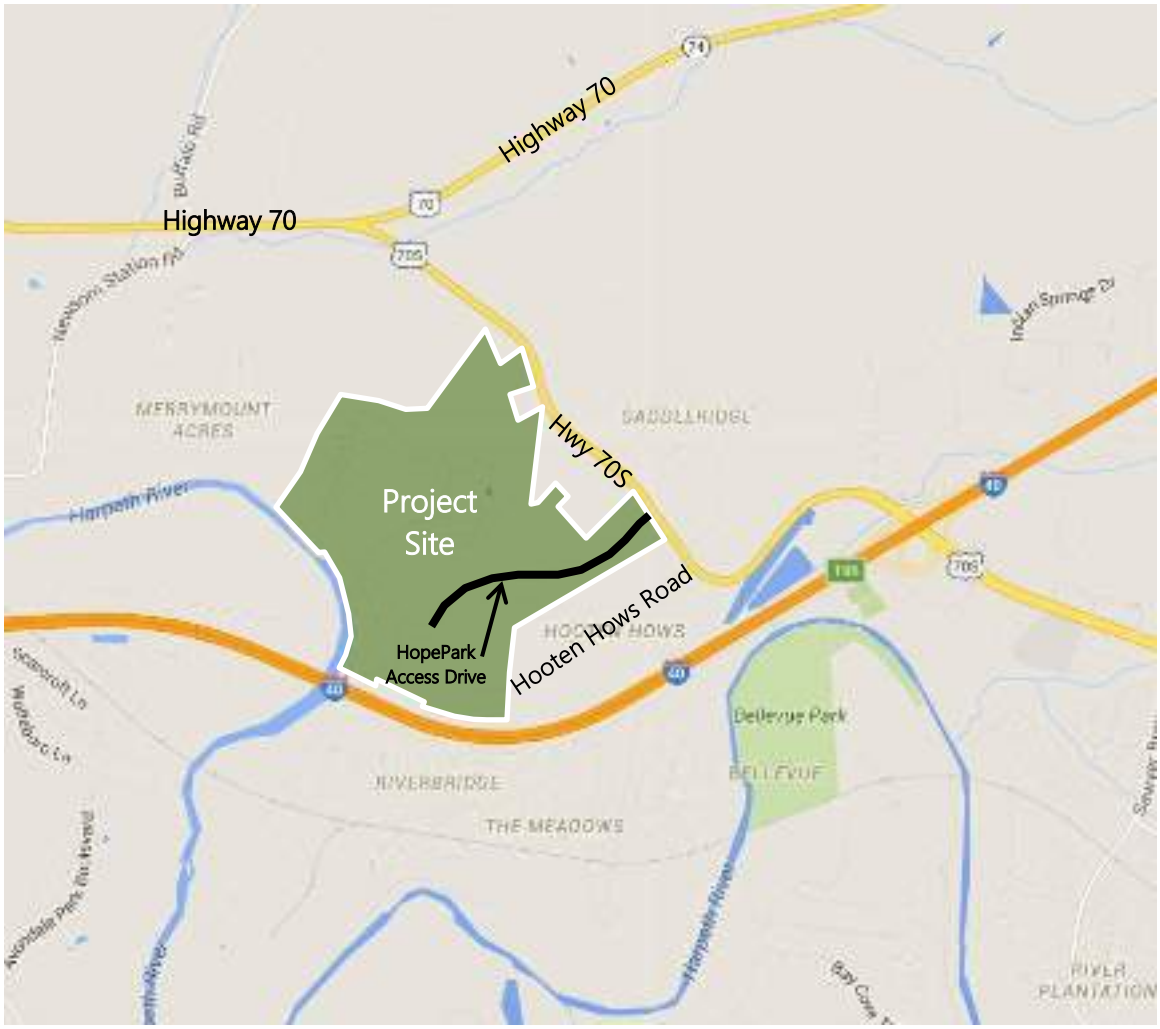
The property is generally bounded on the east by Highway 70S, on the west by the Harpeth River and single-family homes, on the north by vacant residential land and single-family homes, and on the south by Interstate 40 and single-family homes. The proposed primary vehicular access point for the development will be provided by the existing HopePark Church access drive on Highway 70S on the east side of the site, and a gated emergency access will be located at the terminus of Hooten Hows Road.

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.

2. PROJECT DESCRIPTION

Metropolitan Nashville Public Schools (MNPS) is evaluating sites to relocate Hillwood High School, and one option is to redevelop the HopePark Church site in the Bellevue area of Nashville, Tennessee. As shown by Figure 1, the property is located on the west side of Highway 70S north of Interstate 40. The property is zoned R40 (Low Density Residential – minimum 40,000 square-foot lot). The proposed development is within an area that is characterized by a mix of low to medium density land uses. According to the architect, the proposed development plans to utilize the existing HopePark Church as a one-story auditorium and to build a 1,600-student, three-story high school, a two-story athletic facilities and gym building, a softball field, a baseball field, a soccer field, and a football stadium with a track.

The current concept plan for the HopePark high school site is shown in Appendix A. Approximately 601 surface parking spaces are planned to accommodate the development. Primary access to the development is planned to be provided on Highway 70S at the location of the existing HopePark Church access drive. Emergency access is planned to be located at the terminus of Hooten Hows Road, which will remain gated to prevent non-emergency usage.



N

Location of the Project Site
(Not to Scale)

Figure 1.

3. EXISTING CONDITIONS

3.1 Existing Roadway Network

Local access to the site will be provided by Highway 70S, the existing HopePark access drive, Hooten Hows Road, Highway 70, Newsom Station Road, and Buffalo Road. A description of these roadways within the project vicinity is as follows:

Highway 70S Looking North
North of the Project Site

Highway 70S is a two-way roadway that generally travels in an east-west direction; however, adjacent to the project site, Highway 70S generally travels in a north-south direction and includes one travel lane in each direction. Near the study area, Highway 70S serves as a major commercial corridor for the Bellevue area, and it provides connection between Downtown, Midtown, and Belle Meade to the east and Bellevue and Highway 70 to the west. According to the *Metro Nashville Major and Collector Street Plan*, Highway 70S is categorized as an arterial-boulevard scenic (T3-R-AB2-S) in the vicinity of the project site. The posted speed limit on Highway 70S north of the HopePark access drive is 50 mph and south of the HopePark access drive is 40 mph. In the vicinity of the project site, on-street parking is not provided on Highway 70S. Sidewalk is not provided on either side of Highway 70S in the vicinity of the project site. No MTA transit service or bike facilities are provided on Highway 70S in the vicinity of the project site.

HopePark Access Drive Looking West
West of Highway 70S

The existing **HopePark Access Drive** is a private, two-way roadway that generally travels in an east-west direction with two travel lanes in the eastbound direction and one travel lane in the westbound direction. The total pavement width of the HopePark access drive is approximately 36 feet. The HopePark access drive provides connection between Highway 70S to the east and the existing HopePark Church to the west. No speed limit is posted on the private roadway. On-street parking is not provided on the HopePark access drive. Sidewalk is not provided on either side of the HopePark access drive. No transit service or bike facilities are provided on the HopePark access drive.

Hooten Hows Road Looking West
West of Highway 70S

Hooten Hows Road is a two-way roadway that generally travels in an east-west direction. Although centerline pavement striping is not provided on Hooten Hows Road, sufficient pavement width is provided for one travel lane in each direction. The total pavement width of Hooten Hows Road is approximately 17 feet. Hooten Hows Road provides connection between Highway 70S to the east and single-family homes to the west. A gated access for the existing HopePark Church is located at the western terminus of Hooten Hows Road. According to the *Metro Nashville Major and Collector Street Plan*, Hooten Hows Road is categorized as a local street. A posted speed limit was not observed on Hooten Hows Road; however, it is assumed to be 30 mph. On-street parking is not provided on Hooten Hows Road. No MTA transit service or bike facilities are provided on Hooten Hows Road.

Highway 70 Looking East
East of Highway 70S

Highway 70 is a two-way roadway that generally travels in an east-west direction with one travel lane in each direction. East of Highway 70S, Highway 70 is titled Charlotte Pike near the project site. Highway 70 provides connection between downtown Nashville and West Nashville to the east and Bellevue and Pegram to the west in the vicinity of the project site. According to the *Metro Nashville Major and Collector Street Plan*, Highway 70 is categorized as an arterial-boulevard scenic (T2-R-AB2-S) near the project site. East of Highway 70S, the posted speed limit on Highway 70 near the project site is 55 mph. West of Highway 70S, the posted speed limit on Highway 70 near the project site is 50 mph. On-street parking is not provided on either side of Highway 70 in the vicinity of the project site. No sidewalk or transit service is provided on Highway 70 in the vicinity of the project site. Highway 70 is a signed bike route near the project site.

Newsom Station Road Looking South
South of Highway 70

Newsom Station Road is a two-way roadway th.at generally travels in a northeast-southwest direction with one travel lane in each direction. Newsom Station Road provides connection between Highway 70 to the northeast and McCrory Lane to the southwest. Newsom Station Road aligns with Buffalo Road at Highway 70. According to the *Metro Nashville Major and Collector Street Plan*, Newsom Station Road is categorized as a collector-avenue. The posted speed limit on Newsom Station Road is 30 mph. On-street parking is not provided on either side of Newsom Station Road. No sidewalk is provided on Newsom Station Road. No transit service or bike facilities are provided on Newsom Station Road.

Buffalo Road is a two-way roadway that generally travels in a north-south direction with one travel lane in each direction. Buffalo Road provides connection between Highway 70 to the south and Old Charlotte Pike to the north. Buffalo Road aligns with Newsom Station Road at Highway 70. According to the *Metro Nashville Major and Collector Street Plan*, Buffalo Road is categorized as a collector-avenue. The posted speed limit on Buffalo Road is 30 mph. On-street parking is not provided on either side of Buffalo Road. No sidewalk is provided on Buffalo Road. No transit service or bike facilities are provided on Buffalo Road.

Buffalo Road Looking North
North of Highway 70

The study area includes four existing intersections described as follows:

Highway 70S and the HopePark Access Drive is an unsignalized intersection with three approaches. Although a stop sign is not provided, the eastbound approach of the HopePark access drive is considered stop-controlled. The northbound approach of Highway 70S includes one left turn lane with approximately 180 feet of storage and one through lane. The southbound approach of Highway 70S includes one shared through/right turn lane. The eastbound approach of the HopePark access drive includes one left turn lane and one right turn lane. No pedestrian crosswalks are provided for the intersection.

Looking Northbound on Highway 70S
at the HopePark Access Drive

Highway 70S and Hooten Hows Road is an unsignalized intersection with three approaches. Stop-control is provided for the eastbound approach of Hooten Hows Road. The northbound approach of Highway 70S includes one shared through/left turn lane. The southbound approach of Highway 70S includes one shared through/right turn lane. The eastbound approach of Hooten Hows Road includes one shared left/right turn lane. No pedestrian crosswalks are provided for the intersection.

Hooten Hows Road Looking Eastbound at Highway 70S

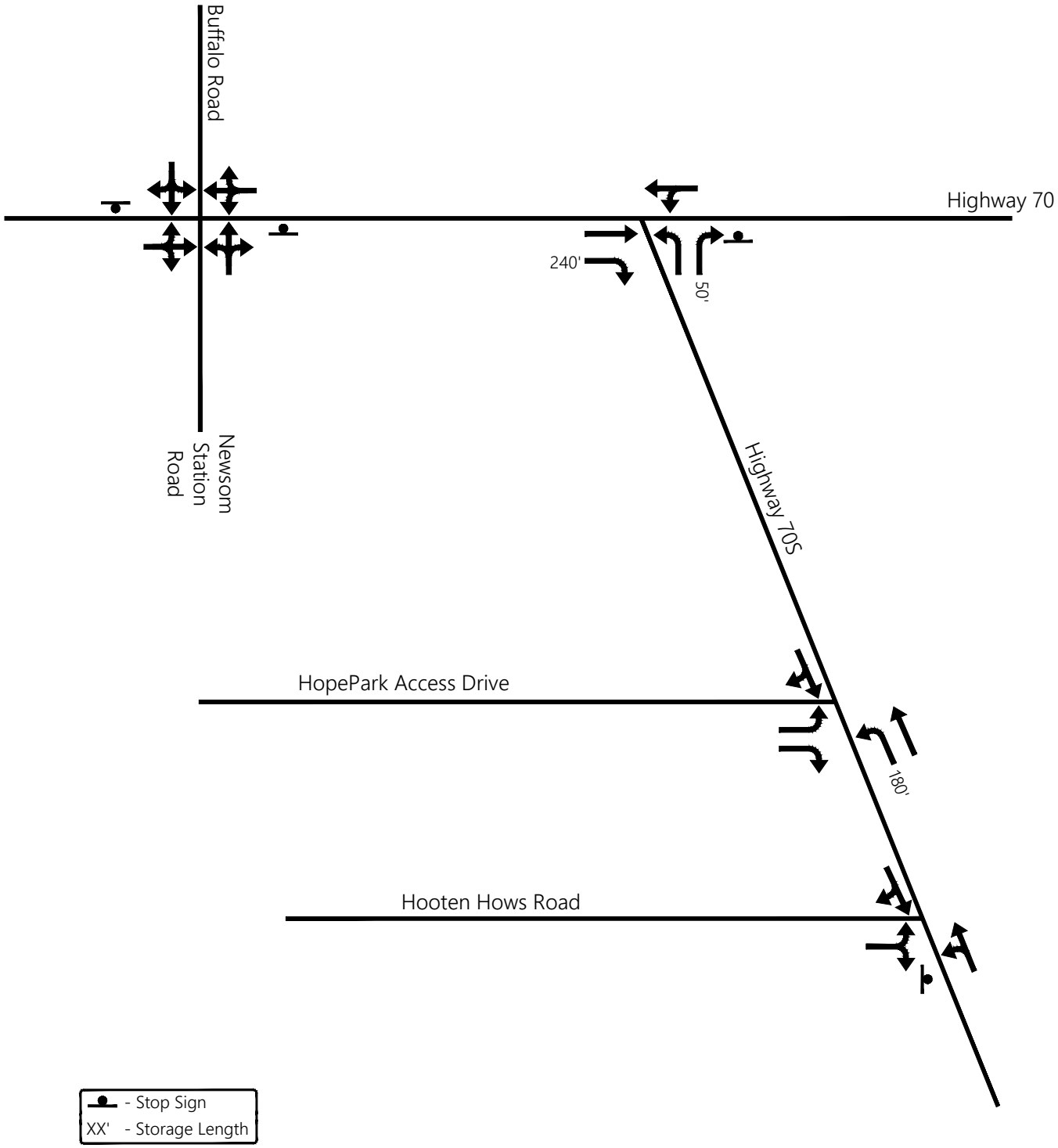
Highway 70S and Highway 70 is an unsignalized intersection with three approaches. The northbound approach of Highway 70S is stop-controlled. The eastbound approach of Highway 70 includes one through lane and one channelized, free-flowing right turn lane with approximately 240 feet of storage. The westbound approach of Highway 70 includes one shared through/left turn lane, and the left turns are yield-controlled. The northbound approach of Highway 70S includes one left turn lane and one channelized, yield-controlled right turn lane with approximately 50 feet of storage. No pedestrian crosswalks are provided for the intersection.

Looking Northbound on Highway 70S at Highway 70

Highway 70 and Newsom Station Road/Buffalo Road is an unsignalized intersection with four approaches. The northbound approach of Newsom Station Road and the southbound approach of Buffalo Road are stop-controlled. All approaches to the intersection include one shared lane for all turning movements. No pedestrian crosswalks are provided for the intersection.

Looking Westbound on Highway 70 at Newsom Station Road/Buffalo Road

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



Existing Laneage
(Not to Scale)

Figure 2.

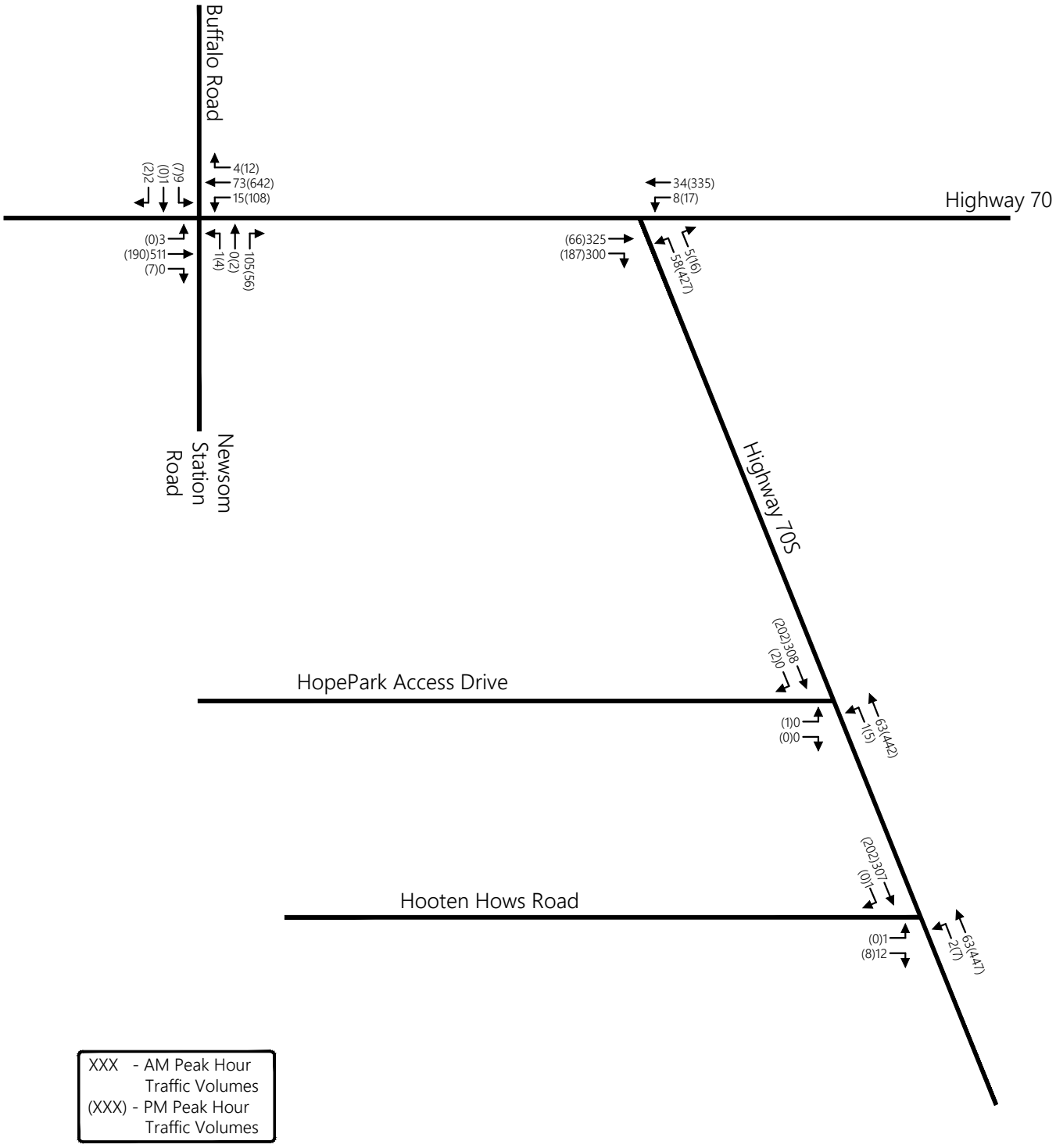
3.2 Existing Traffic Volumes

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

- Highway 70S and HopePark Access Drive/Site Access
- Highway 70S and Hooten Hows Road
- Highway 70S and Highway 70
- Highway 70 and Newsom Station Road/Buffalo Road

Traffic counts for the study intersections were conducted in June 2016 by RPM Transportation Consultants, LLC (RPM). Specifically, the turning movement counts were conducted from 7:00 – 9:00 AM and 3:00 – 6:00 PM on Thursday, June 30, 2016. From the counts, it was determined that the peak hours of traffic flow for the study intersections occurred from 7:00 – 8:00 AM and 4:45 – 5:45 PM. The existing peak hour turning movement volumes are presented in Figure 3. It should be noted that the turning movement counts were conducted while Metro Nashville Public Schools were not in session; however, the closest school to the project site is Bellevue Middle School, which is located over two miles east of the project site on the opposite side of Interstate 40 from the project site. Therefore, it is not expected that the variation in peak hour traffic volumes between school being in session and out of session is significant in the vicinity of the project site. A detailed summary of the turning movement counts is included in Appendix B.

In addition to the above information, average daily traffic volumes were obtained from the Tennessee Department of Transportation (TDOT). There are several TDOT count stations located in the vicinity of the project site. There is a count station located on Highway 70S north of the project site. According to the TDOT count data, the annual average daily traffic (AADT) in 2016 on Highway 70S north of the site was approximately 5,440 vehicles per day (vpd). A TDOT count station is located on Highway 70S south of the project site and east of Coley Davis Road. According to the TDOT count data, the AADT in 2016 on Highway 70S south of the project site was approximately 25,330 vpd. A TDOT count station is located on Highway 70 between Highway 70S and Newsom Station Road/Buffalo Road. According to the TDOT count data, the AADT in 2016 on Highway 70 west of Highway 70S was approximately 8,833 vpd. A TDOT count station is located on Highway 70 east of Highway 70S. According to the TDOT count data, the AADT in 2016 on Highway 70 east of Highway 70S was approximately 4,269 vpd. TDOT Count Station data is included in Appendix C.



Existing Peak Hour Traffic Volumes
(Not to Scale)

Figure 3.

3.3 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 an intersection in an urbanized area. Table 1 presents the descriptions of LOS for unsignalized intersections.

TABLE 1: 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

The results of the capacity analyses for the existing conditions at the four study intersections are presented in Table 2. As shown, all of the critical turning movements at the unsignalized intersection of Highway 70S and the HopePark access drive operate at LOS A during the AM peak hour and LOS B or better during the PM peak hour. All of the critical turning movements at the unsignalized intersection of Highway 70S and Hooten Hows Road operate at LOS B or better during the AM and PM peak hours. All of the critical turning movements at the unsignalized intersection of Highway 70S and Highway 70 operate at LOS B or better during both AM and PM peak hours, with one exception. During the PM peak hour, the northbound left turn lane of Highway 70S at Highway 70 operates at LOS E. All of the critical turning movements at the unsignalized intersection of Highway 70 and Newsom Station Road/Buffalo Road operate at LOS C or better during the AM peak hour and LOS D or better during the PM peak hour. Capacity analyses worksheets are included in Appendix D.

TABLE 2: EXISTING PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE	
		AM Peak Hour (Average Approach Delay in sec/veh)	PM Peak Hour (Average Approach Delay in sec/veh)
Highway 70S and HopePark Access	Northbound Left Turn	A (7.9)	A (7.7)
	Eastbound Left Turn	A (0.0)	B (14.1)
	Eastbound Right Turn	A (0.0)	A (0.0)
Highway 70S and Hooten Hows Road	Northbound Left Turn	A (7.9)	A (7.7)
	Eastbound Approach	B (10.3)	A (9.4)
Highway 70S and Highway 70	Northbound Left Turn	B (11.8)	E (39.4)
	Northbound Right Turn	B (10.3)	A (8.7)
	Westbound Left Turn	A (8.0)	A (7.4)
Highway 70 and Newsom Station Road/ Buffalo Road	Northbound Approach	B (13.7)	B (11.9)
	Eastbound Left Turn	A (7.4)	A (0.0)
	Westbound Left Turn	A (8.6)	A (7.9)
	Southbound Approach	C (17.3)	D (28.8)
Note: For two-way stop-controlled intersections, an LOS is presented for each critical turning movement.			

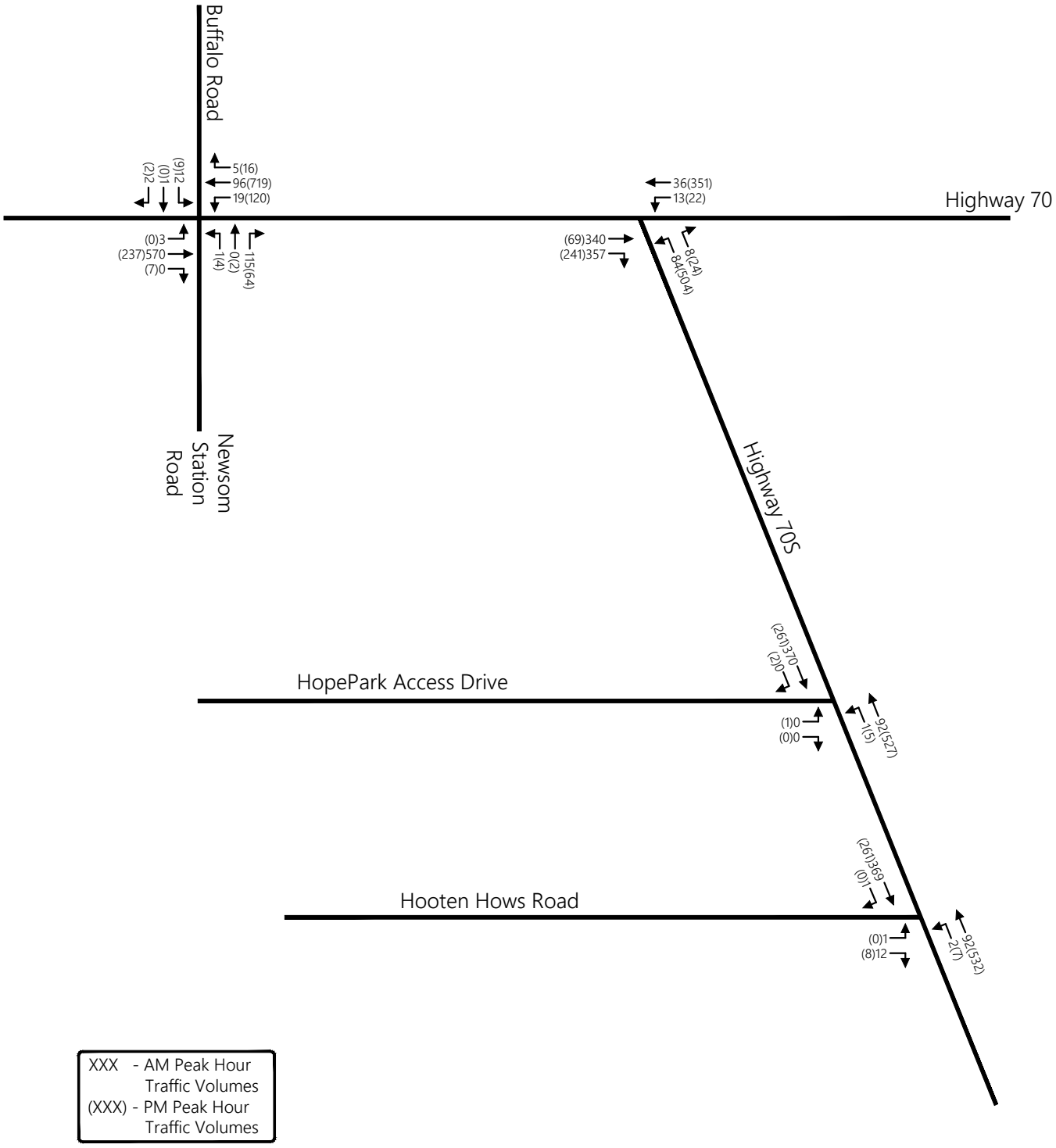
4. BACKGROUND TRAFFIC VOLUMES

4.1 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 2019, which is a three-year horizon. Historical daily traffic volumes were obtained from the TDOT count stations located on Highway 70S (north and south of the site) and Highway 70 (east and west of Highway 70S) in the vicinity of the project site. Since 2010, the combined traffic at these four TDOT count stations has increased by an average of 1.29% 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 conservatively increased by 1.5% per year for three years to account for background traffic growth within the study area. The background traffic growth for the study intersections is included in Appendix E.

There is one site-specific development planned in the vicinity of the project. The Bellevue Mall redevelopment, located on the north side of Highway 70S east of Interstate 40, is currently under construction. The traffic assignment for the Bellevue Mall redevelopment was taken from the traffic impact study prepared by RPM. It was assumed that 5% of the total new traffic generated by the Bellevue Mall redevelopment would be distributed to the north along Highway 70S west of Interstate 40. The total site-specific background traffic for this offsite development is included in Appendix E. The site-specific traffic was added to the background growth peak hour traffic volumes. Figure 4 presents the background peak hour traffic volumes for the proposed HopePark high school site, even if the proposed school is not completed.



Background Peak Hour Traffic Volumes
(Not to Scale) Figure 4.

4.2 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 as the existing conditions.

As shown in Table 3, under background conditions the capacity analyses indicate that the study intersections are expected to continue to operate at similar levels of service as under the existing conditions, with two exceptions. During the PM peak hour, the northbound left turn lane of Highway 70S at Highway 70 is expected to deteriorate from LOS E under existing conditions to LOS F under background conditions. During the PM peak hour, the southbound approach of Buffalo Road to Highway 70 is expected to deteriorate from LOS D under existing conditions to LOS E under background conditions. It is important to note that this level of service is typical for the minor road approach to an arterial such as Highway 70. Capacity analyses worksheets are included in Appendix D.

TABLE 3: BACKGROUND PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE	
		AM Peak Hour (Average Approach Delay in sec/veh)	PM Peak Hour (Average Approach Delay in sec/veh)
Highway 70S and HopePark Access	Northbound Left Turn	A (8.1)	A (7.8)
	Eastbound Left Turn	A (0.0)	C (16.3)
	Eastbound Right Turn	A (0.0)	A (0.0)
Highway 70S and Hooten Hows Road	Northbound Left Turn	A (8.1)	A (7.8)
	Eastbound Approach	B (10.8)	A (9.8)
Highway 70S and Highway 70	Northbound Left Turn	B (12.5)	F (84.5)
	Northbound Right Turn	B (10.4)	A (8.8)
	Westbound Left Turn	A (8.1)	A (7.4)
Highway 70 and Newsom Station Road/ Buffalo Road	Northbound Approach	C (15.0)	B (12.9)
	Eastbound Left Turn	A (7.4)	A (0.0)
	Westbound Left Turn	A (8.8)	A(8.1)
	Southbound Approach	C (21.2)	E (39.9)
Note: For two-way stop-controlled intersections, an LOS is presented for each critical turning movement.			

5. IMPACTS

5.1 Trip Generation

A traffic generation process was used to estimate the amount of traffic expected to be generated by the proposed HopePark high school site. Factors for the trip generation were taken from ITE's *Trip Generation*, Ninth Edition. As previously discussed, the proposed development plans to utilize the existing HopePark Church as a one-story auditorium and to build a three-story high school, a two-story athletic facilities and gym building, a softball field, a baseball field, a soccer field, and a football stadium with a track. The description of the high school land use in *Trip Generation* states that "The percentage of students at the sites who were transported to school via bus varied considerably." Therefore, it was assumed that the trip generation rates provided by ITE account for average bus ridership, and no trip generation reductions were taken to account for bus ridership.

The school site is located in a suburban setting adjacent to residences with access to limited transit and bicycle facilities. Conservatively, no reductions were applied to the base trip generation to account for alternative modes. In addition, the PM peak hour trip generation calculations were based on the PM peak hour of the generator, although the PM peak hour is 4:45 – 5:45 PM and school dismissal is expected to occur by 3:00 PM. The calculations for trip generation are included in Appendix F.

Table 4 presents the daily, AM, and PM peak hour trip generation for the proposed high school. As shown in Table 4, the school can be expected to generate approximately 2,530 new vehicle trips per day. The AM and PM peak hour trip generations will equal approximately 688 and 412 new trips, respectively. These trips represent the new traffic that will be generated by the proposed HopePark high school site.

TABLE 4: DEVELOPMENT TRIP GENERATION

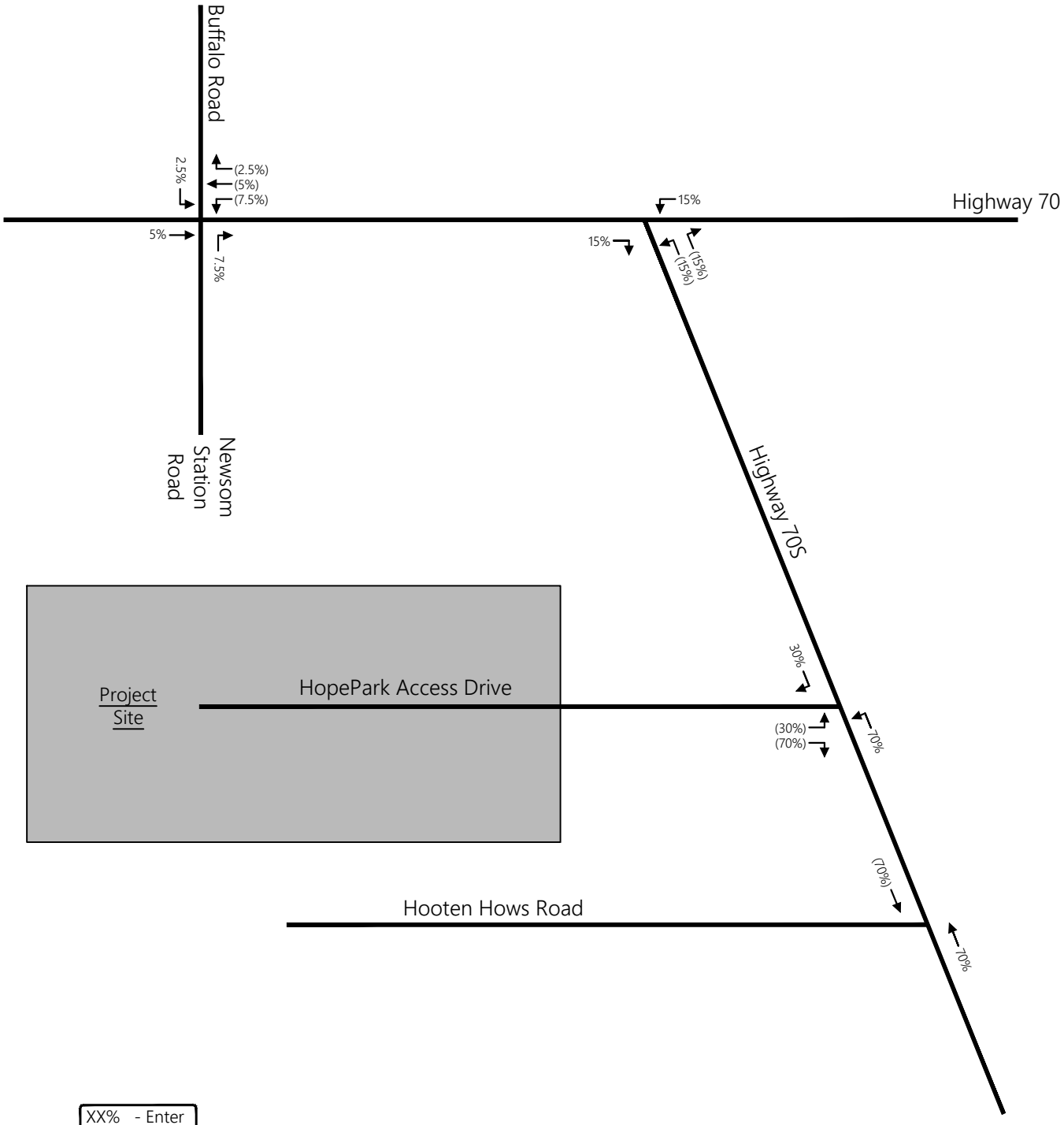
LAND USE	SIZE	GENERATED TRAFFIC				
		DAILY TRAFFIC	AM PEAK		PM PEAK	
			Enter	Exit	Enter	Exit
High School (LU 530)	1,600 students	2,530	468	220	136	276
NEW TRIPS	--	**2,530**	**688**		**412**	

Source: *Trip Generation*, Ninth Edition

5.2 Trip Distribution and Traffic Assignment

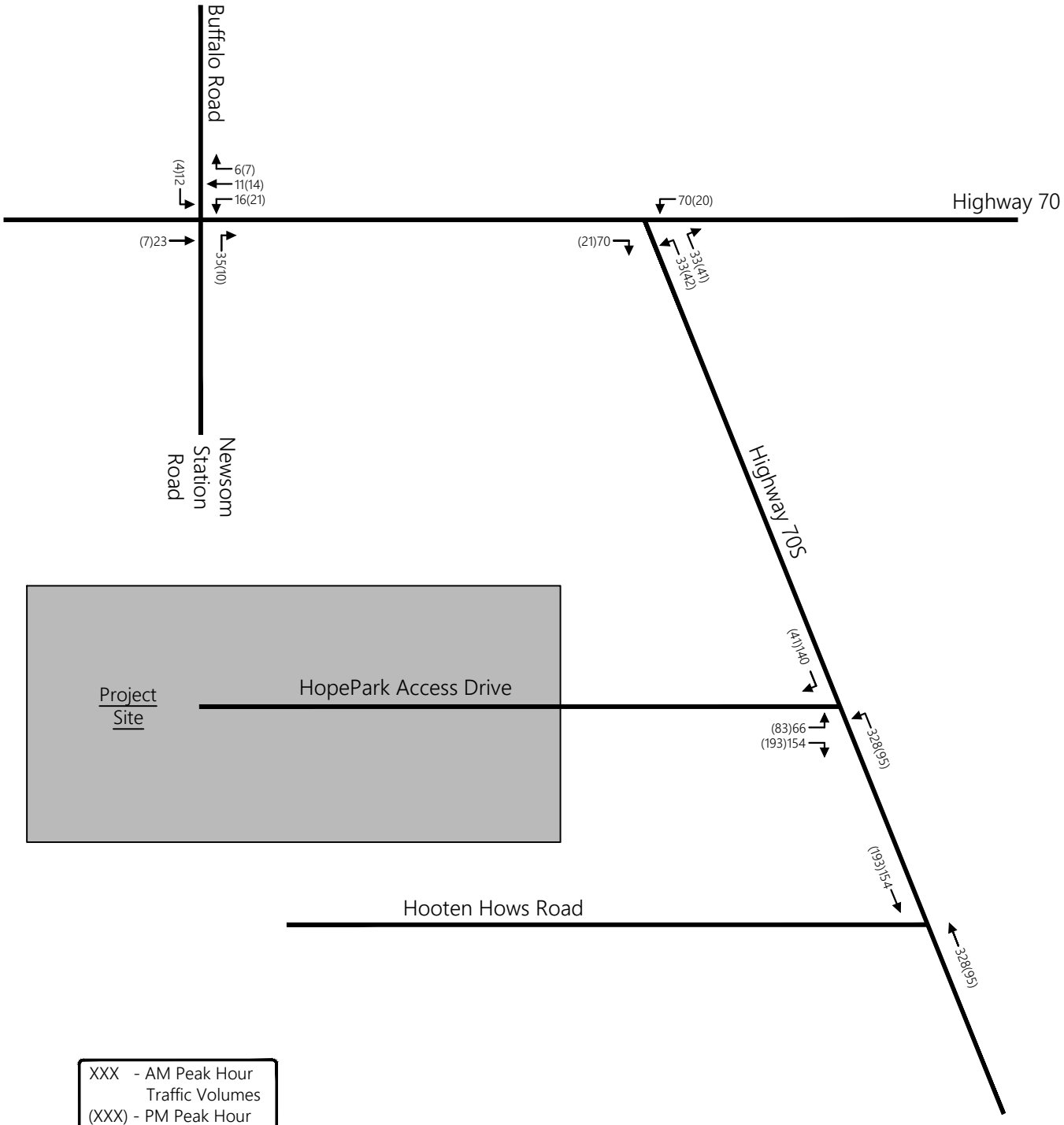
A directional distribution of traffic generated by the proposed project was established based on the proposed access, the existing roadway network, and the existing travel patterns developed from the existing peak hour traffic counts. As previously discussed, access to the high school will be provided by the existing HopePark Church access drive on the west side of Highway 70S.

The directional distribution for the high school site is shown in Figure 5. As shown in the figure, approximately 70% of the traffic generated by the development will be oriented to the south on Highway 70S, 15% to the east on Highway 70, 7.5% to the south on Newsom Station Road, 5% to the west on Highway 70, and 2.5% to the north on Buffalo Road. Based on this directional distribution, the project-generated traffic was assigned to the roadway network. The traffic assignment for the proposed development is shown in Figure 6.



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

Figure 5.



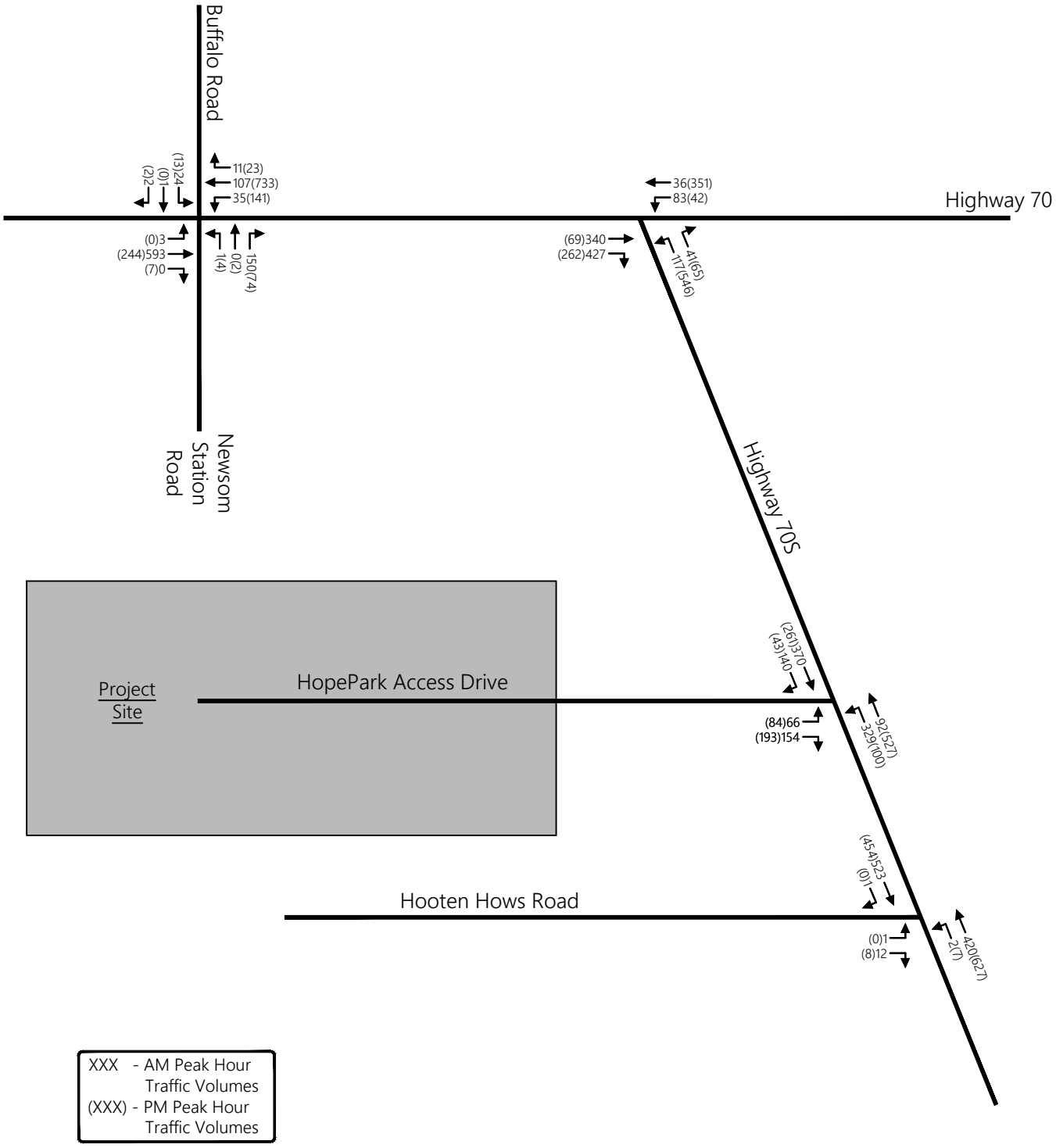
Assignment of Peak Hour Traffic Volumes Generated by the Project Site

(Not to Scale) Figure 6.

5.3 Capacity / Level of Service Analyses

The total site-generated traffic volumes were added to the background peak hour traffic volumes for the proposed HopePark high school site in order to obtain the total projected traffic volumes for the study intersections. Figure 7 presents the total projected AM and PM peak hour traffic volumes expected at the completion of the proposed high school.

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 Table 8. For the analyses, the intersection configurations were the same as the existing and background conditions. For the entering and exiting turning movements at the site access, the peak hour factors (PHF) were adjusted to account for the peaking characteristics associated with school traffic. Specifically, a PHF of 0.5 was utilized for the AM entering and the PM exiting traffic volumes, and a PHF of 0.75 was utilized for the AM exiting and the PM entering traffic volumes. Capacity analyses worksheets are included in Appendix D.



Total Projected Peak Hour Traffic Volumes
(Not to Scale) Figure 7.

TABLE 5: PROJECTED PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVEL OF SERVICE	
		AM Peak Hour (Average Approach Delay in sec/veh)	PM Peak Hour (Average Approach Delay in sec/veh)
Highway 70S and HopePark/Site Access	Northbound Left Turn	C (18.5)	A (8.3)
	Eastbound Left Turn	F (2,042.4)	F (82.5)
	Eastbound Right Turn	C (15.7)	C (15.4)
Highway 70S and HopePark/Site Access with Recommended Improvements	*Northbound Left Turn*	*B (12.1)*	*A (8.1)*
	Eastbound Left Turn	*F (201.1)*	*D (28.8)*
	Eastbound Right Turn	*B (13.1)*	*B (14.4)*
Highway 70S and Hooten Hows Road	Northbound Left Turn	A (8.6)	A (8.4)
	Eastbound Approach	B (12.7)	B (11.3)
Highway 70S and Highway 70	Northbound Left Turn	C (16.7)	F (151.5)
	Northbound Right Turn	B (10.7)	A (8.9)
	Westbound Left Turn	A (8.3)	A (7.4)
Highway 70S and Highway 70 with Recommended Traffic Signal	*Northbound Approach*	*C (28.9)*	*B (19.3)*
	Westbound Approach	*A (2.5)*	*B (11.6)*
	Eastbound Approach	*A (2.9)*	*A (8.2)*
	Overall Intersection	*A (8.1)*	*B (15.5)*
Highway 70 and Newsom Station Road/ Buffalo Road	Northbound Approach	C (16.7)	B (13.4)
	Eastbound Left Turn	A (7.5)	A (0.0)
	Westbound Left Turn	A (9.0)	A (8.2)
	Southbound Approach	D (30.7)	F (51.8)
Note: For two-way stop-controlled intersections, an LOS is presented for each critical turning movement. For signalized intersections, an overall LOS is presented.			

As shown in Table 5, under the projected conditions the capacity analyses indicate that the study intersections are expected to continue to operate at similar levels of service as under the background conditions, with two exceptions. During the AM peak hour, the eastbound left turn lane of the HopePark/Site Access is expected to deteriorate from LOS A under background conditions to LOS F under projected conditions, and during the PM peak hour from LOS C under background conditions to LOS F under projected conditions. During the AM peak hour, the southbound

approach of Buffalo Road to Highway 70 is expected to deteriorate from LOS C under background conditions to LOS D under projected conditions, and during the PM peak hour from LOS E under background conditions to LOS F under projected conditions. It is important to note that this level of service is typical for the minor road approach to an arterial such as Highway 70.

In addition, capacity analyses were conducted with the inclusion of a southbound right turn lane on Highway 70S at the HopePark/Site Access as well as with the addition of a two-way left-turn lane on Highway 70S north of the HopePark/Site Access. The purpose of this two-way left-turn lane is to allow vehicles turning left onto Highway 70S from the site access drive to make a two-stage left turn. As shown in Table 5, with these recommended improvements during the AM peak hour the average approach delay of the eastbound left turn lane of the site access at Highway 70S is expected to decrease from approximately 2,050 seconds/vehicle to approximately 200 seconds/vehicle, and during the PM peak hour from approximately 85 seconds/vehicle to approximately 30 seconds/vehicle.

Capacity analyses were also conducted with a traffic signal at the intersection of Highway 70 and Highway 70S. As shown, with a traffic signal the intersection of Highway 70 and Highway 70S is expected to operate at overall LOS A during the AM peak hour and LOS B during the PM peak hour. During the PM peak hour, the northbound approach is expected to improve from approximately 150 seconds of delay per vehicle to approximately 20 seconds of delay per vehicle. Capacity analyses worksheets are included in Appendix D.

6. ANALYSIS OF SITE PLAN

6.1 Site Access Review

The proposed development plans to utilize the existing HopePark Church as a one-story auditorium and to build a three-story high school, a two-story athletic facilities and gym building, a softball field, a baseball field, a soccer field, and a football stadium with a track. Primary access to the development is planned to be provided on Highway 70S at the location of the existing HopePark Church access drive. Gated emergency access is planned to be located at the terminus of Hooten Hows Road. Surface parking is planned to accommodate the high school. Approximately 601 surface parking spaces are planned to accommodate the high school.

6.2 Pedestrian and Bicycle Access

In general, sidewalks are not provided in the study area. There are no sidewalks on either side of Highway 70S, the HopePark access drive, Hooten Hows Road, Highway 70, Newsom Station Road, or Buffalo Road in the vicinity of the project site. No pedestrian crosswalks are provided at the unsignalized intersections of Highway 70S with the HopePark access drive or Hooten Hows Road. No pedestrian crosswalks are provided for the unsignalized intersections of Highway 70 with Highway 70S or Newsom Station Road/Buffalo Road.

Highway 70 is a signed bike route in the vicinity of the project site. No bike facilities are provided on the HopePark access drive, Hooten Hows Road, Highway 70S, Newsom Station Road, or Buffalo Road in the vicinity of the project site.

6.3 Transit Access

The project site is located in the Bellevue area of Nashville on the west side of Highway 70S, north of Interstate 40. South of Interstate 40, Highway 70S is served by two MTA bus routes. The #5 Bellevue route provides local transit service along Highway 70S with stops every 10-15 minutes on weekdays and every 20 minutes on weekends. The #5 provides connection between Bellevue, Belle Meade, West End, and Downtown along Highway 70S and Baugh Road. The nearest stop for the #5 route is on Highway 70S at Coley Davis Road, approximately one mile east of the project site. The #24 Bellevue Express route provides express transit between Bellevue and downtown Nashville along Highway 70S, Todd Preis Drive, Old Hickory Boulevard, and Interstate 40. The #24 makes limited stops during the AM and PM peak hours on Highway 70S at Coley Davis Road. In addition, a Park-N-Ride lot for the #24 route is

located on Coley Davis Road just south of Highway 70S, approximately one mile east of the project site.

6.4 Turn Lane Analyses

The site access point on Highway 70S was evaluated for the need to provide a right turn lane based on the projected traffic volumes. According to the Intersection Channelization Design Guide (NCHRP 279), a full-width right turn lane is warranted at the site access point based on the projected AM peak hour traffic volumes. The right turn lane analysis is included in Appendix G.

6.5 Parking Analyses

The standard parking rates outlined in the Metro Government of Nashville and Davidson County's *Code of Ordinances* were referenced to determine if the appropriate number of parking spaces are planned to be provided. It was assumed there would be a maximum of 140 staff members. Table 6 presents the minimum required parking based on a total of 1,600 students and 140 staff members.

TABLE 6: DEVELOPMENT PARKING REQUIREMENT

LAND USE	SIZE	ZONING RATE	PARING REQUIREMENT (SPACE)
Community Education (High School)	140 staff members	1 space per staff member	140 Spaces
	1,600 students	1 space per each 5 students	320 Spaces
		TOTAL	460 Spaces

Source: Based on Parking Demand Rates per Metro Nashville's *Code of Ordinances*

As shown in Table 6, based on the parking demand rates for the community education (high school) land use established in Metro Nashville's *Code of Ordinances*, the proposed development requires a minimum of 460 parking spaces. Thus, the proposed number of 601 parking spaces in the surface parking lot exceeds the parking requirements. Therefore, more than sufficient parking will be available for the development. In addition, the proposed number of parking spaces is expected to meet the parking demand of special events such as football games and prom.

6.6 Sight Distance

As previously mentioned, access to the proposed HopePark high school site will be provided by the existing HopePark access drive on Highway 70S. Field investigations and sight distance measurements were conducted to determine if adequate sight distance would be available for motorists exiting the project site onto Highway 70S from the site access based on the current site plan. For a 40 mph speed, as posted on Highway 70S south of the HopePark access drive, the guidelines from *A Policy on Geometric Design of Highways and Streets*, by the American Association of State Highway and Transportation Officials (AASHTO), call for a minimum stopping sight distance of 305 feet as a design value; for a 50 mph speed, as posted on Highway 70S north of the HopePark access drive, AASHTO calls for a minimum stopping sight distance of 425 feet as a design value. This is the distance required for a motorist to detect an object in the roadway necessitating a stop and be able to stop before reaching the object.

Subsequently, AASHTO also provides minimum design values for intersection sight distance. For example, the intersection sight distance allows enough time gap for a motorist to turn from the site access onto Highway 70S without requiring a motorist on Highway 70S to significantly reduce speed. For a speed of 40 mph, the design value for intersection sight distance for a motorist turning left from a stop onto a two-lane roadway such as Highway 70S is 445 feet and for a motorist turning right from a stop is 385 feet. For a speed of 50 mph, the design value for intersection sight distance for a motorist turning right from a stop onto a two-lane roadway such as Highway 70S is 480 feet. Therefore, it is desirable to provide a minimum of 480 feet looking to the north of the site access onto Highway 70S and a minimum of 445 feet looking to the south. Also, it is desirable to provide a minimum of 385 feet looking to the north of Hooten Hows Road onto Highway 70S and a minimum of 445 feet looking to the south.

Intersection of Highway 70S and HopePark/Site Access

The field investigations indicate that the sight distance available at the existing intersection of the HopePark access drive and Highway 70S is more than adequate for left and right turns onto Highway 70S.

Intersection of Highway 70S and Hooten Hows Road

The sight distance measurements indicate that the sight distance available at the existing intersection of Highway 70S and Hooten Hows Road is sufficient for right turns onto Highway 70S but is not sufficient for left turns onto Highway 70S. Due to grade difference between Hooten Hows Road and the property on the northwest corner on

the inside of the curve, approximately 350 feet of intersection sight distance is provided looking to the east for a left turn onto Highway 70S from Hooten Hows Road, where a minimum of 445 feet is desirable. However, the existing and projected traffic volumes reflect little to no traffic making a left turn from Hooten Hows Road onto Highway 70S. Therefore, the available intersection sight distance at the intersection of Highway 70S and Hooten Hows Road is satisfactory.

6.7 Speed Analysis

In addition to turning movement counts, RPM collected speed data on Highway 70S just north of the HopePark access drive in June 2016. According to the tube data, the 85th percentile speed on Highway 70S just north of the HopePark access drive is approximately 58 mph, where the posted speed limit is 50 mph. Details of the speed data collected are included in Appendix B.

7. SIGNAL WARRANT ANALYSIS

As previously discussed, five hours of volume data as collected at the intersection of Highway 70 and Highway 70S. The analyses presented in this TIS indicate that the northbound left turn lane of Highway 70S at Highway 70 is expected to experience significant delays under existing and projected conditions during the PM peak hour under the existing two-way stop-control; therefore, the intersection of Highway 70 and Highway 70S was evaluated for the need to provide traffic signal control.

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. The MUTCD states "traffic control signals should not be installed unless one or more of the signal warrants in the manual are met." A complete description of the relevant traffic signal warrants, as presented in the MUTCD, is included in Appendix H.

In order to obtain volume data for the warrant analyses, an estimate of the eight highest hours of existing and projected traffic volumes for the intersection was conducted. The existing and projected eight highest hours of traffic volumes at the intersection were based on the assumption that the PM peak hour represents 10% of the ADT and the eight highest hours will exceed 6.25% of the ADT for the intersection (ITE Manuel of Traffic Signal Design). Therefore, the calculation for the eighth highest hour was determined by multiplying the existing and projected PM peak hours by 0.625.

7.1 Existing Volume-Related Signal Warrants

The existing traffic volumes at the intersection of Highway 70 and Highway 70S were compared to the three volume-related traffic signal warrants. The analyses were based on one-lane major approaches and one-lane minor approaches.

The results of the signal warrant analyses based on the existing traffic volumes are shown in Table 7. As shown in Table 7, the existing traffic volumes at the study intersection meets Warrants #1A, #2, and #3. Therefore, a traffic signal is warranted at the intersection of Highway 70 and Highway 70S based on the existing traffic volumes.

TABLE 7: TRAFFIC SIGNAL WARRANT ANALYSIS
HIGHWAY 70 AND HIGHWAY 70S
EXISTING TRAFFIC VOLUMES

HOUR	Traffic Volumes		REDUCED WARRANTS				
	Main Street Both Directions	Minor Street Highest Approach	#1A	#1B	#1C	#2	#3
7:00-8:00	639	62	--	Yes	--	--	--
8:00-9:00	455	65	--	--	--	--	--
11:00-12:00 PM	378	277	Yes	--	--	Yes	--
12:00-1:00	378	277	Yes	--	--	Yes	--
1:00-2:00	378	277	Yes	--	--	Yes	--
2:00-3:00	378	277	Yes	--	--	Yes	--
3:00-4:00	433	274	Yes	--	Yes	Yes	Yes
4:00-5:00	504	334	Yes	--	Yes	Yes	Yes
5:00-6:00	588	389	Yes	Yes	Yes	Yes	Yes
6:00-7:00	378	277	Yes	--	--	Yes	--
		TOTAL	8	2	3	8	3

Notes:
1) Warrants 1A, 1B, and 1C must be satisfied for at least 8 hours of a typical day. Warrant 2 must be met for at least 4 hours and Warrant 3 must be met for at least one hour of a typical day.
2) Volume warrant requirements are based on one-lane major approaches and one-lane minor approaches.
3) 5-hour turning movement counts collected by RPM in June 2016.

7.2 Projected Volume-Related Signal Warrants

Additional signal warrant analyses were conducted for the projected traffic volumes following the development of the proposed HopePark high school site. The projected signal warrant analysis included the hourly traffic expected to be generated by the proposed development included in the background traffic, which is the Bellevue Mall redevelopment. In addition, the hourly traffic expected to be generated by the HopePark high school were included in the projected signal warrant analysis. The projected signal warrant analysis also included a growth rate factor of 1.5% for three years that was applied to the background traffic. The results of the signal warrant analyses for the projected conditions are shown in Table 8.

As shown, the projected hourly traffic volumes at the intersection of Highway 70 and Highway 70S are expected to meet the volume thresholds for a signal warrant

following the development of the HopePark high school and the planned Bellevue Mall redevelopment included in the background traffic. Specifically, Warrants #1A, #1C, #2, and #3 are expected to be met.

TABLE 8: TRAFFIC SIGNAL WARRANT ANALYSIS
HIGHWAY 70 AND HIGHWAY 70S
PROJECTED TRAFFIC VOLUMES

HOUR	Traffic Volumes		REDUCED WARRANTS				
	Main Street Both Directions	Minor Street Highest Approach	#1A	#1B	#1C	#2	#3
7:00-8:00	845	168	Yes	Yes	Yes	Yes	Yes
8:00-9:00	526	119	Yes	Yes	Yes	Yes	--
11:00-12:00 PM	446	340	Yes	--	Yes	Yes	Yes
12:00-1:00	446	340	Yes	--	Yes	Yes	Yes
1:00-2:00	446	340	Yes	--	Yes	Yes	Yes
2:00-3:00	446	340	Yes	--	Yes	Yes	Yes
3:00-4:00	530	406	Yes	Yes	Yes	Yes	Yes
4:00-5:00	593	419	Yes	Yes	Yes	Yes	Yes
5:00-6:00	680	477	Yes	Yes	Yes	Yes	Yes
6:00-7:00	446	340	Yes	--	Yes	Yes	Yes
		TOTAL	10	5	10	10	9

Notes:
1) Warrants 1A, 1B, and 1C must be satisfied for at least 8 hours of a typical day. Warrant 2 must be met for at least 4 hours and Warrant 3 must be met for at least one hour of a typical day.
2) Volume warrant requirements are based on one-lane major approaches and one-lane minor approaches.
3) 5-hour turning movement counts collected by RPM in June 2016.

8. CONCLUSIONS AND RECOMMENDATIONS

Metropolitan Nashville Public Schools (MNPS) is evaluating sites to relocate Hillwood High School. One option is to redevelop the HopePark Church site on the west side of Highway 70S north of Interstate 40. According to the architect, the proposed development plans to utilize the existing HopePark Church as a one-story auditorium and a to build a three-story, 1,600-student high school, a two-story athletic facilities and gym building, a softball field, a baseball field, a soccer field, and a football stadium with a track. 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:

Highway 70S

- The 40 mph speed limit on Highway 70S should be extended approximately 1,050 feet north of the HopePark/Site Access.

- School entrance warning assemblies should be installed on Highway 70S in advance of the HopePark/Site Access.

    - Approximately 750 feet south of the HopePark/Site Access, install a flashing beacon, a "Side Road" (W2-2L) sign, a "School" (S4-3P) plaque, and a "30 MPH" (W13-1P) advisory speed plaque facing northbound traffic on Highway 70S.

    - Approximately 750 feet north of the HopePark/Site Access, install a flashing beacon, a "Side Road" (W2-2R) sign, a "School" (S4-3P) plaque, and a "30 MPH" (W13-1P) advisory speed plaque facing southbound traffic on Highway 70S.

Hooten Hows Road

- Restrict on-street parking on the north and south sides of Hooten Hows Road.

    - A "No Parking This Block" (R7-2 mod.) sign should be provided on the north side of Hooten Hows Road, approximately 50 feet west of the existing "Dead End" (W14-1) sign, facing westbound traffic.

Intersection of Highway 70s and HopePark/Site Access

- A right turn lane should be provided for the southbound approach of Highway 70S to the HopePark/Site Access. The right turn lane should include a minimum of 150 feet of storage.

- A two-way left-turn lane (TWLTL) should be provided for the southbound approach of Highway 70S to the HopePark/Site Access. The TWLTL should extend a minimum of 150 feet north of the HopePark/Site Access. The purpose of the TWLTL is to allow for vehicles turning left onto Highway 70S from the HopePark/Site Access to make a two-stage left-turn.

- A "STOP" (R1-1) sign should be provided on the south side of the HopePark/Site Access, facing eastbound traffic.

- The pavement markings should be refurbished on the eastbound approach of the HopePark/Site Access.

- Based on our conservative analysis, the intersection of Highway 70S and the HopePark/Site Access is expected to operate acceptably during the AM and PM peak hours under two-way stop-control without a traffic control officer. However, once school is in session the intersection should be monitored to determine if additional traffic control is required.

Intersection of Highway 70 and Highway 70S

- Based on existing, background, and projected conditions, the intersection of Highway 70 and Highway 70S should be signalized.

The recommended improvements on Highway 70S are illustrated conceptually in Figure 8, on Hooten Hows Road in Figure 9, and at the intersection of Highway 70S and the HopePark/Site Access in Figure 10. In summary, based on the analyses conducted, no further recommendations are presented for the proposed HopePark high school site.

N

Recommended Improvements: Highway 70S

GRAPHIC SCALE
0' 200' 400'

Figure 8.

Recommended Improvements: Hooten Hows Road

Figure 9.

Recommended Improvements: Intersection of Highway 70S and HopePark/Site Access

Figure 10.

APPENDICES

APPENDIX A
PRELIMINARY CONCEPT PLAN

APPENDIX B
DETAILED TURNING MOVEMENT COUNTS
SPEED DATA

APPENDIX C
TDOT COUNT DATA

APPENDIX D
CAPACITY ANALYSES

APPENDIX E
BACKGROUND TRAFFIC FIGURES

APPENDIX F
TRIP GENERATION CALCULATIONS

APPENDIX G
TURN LANE ANALYSES

APPENDIX H
SIGNAL WARRANT ANALYSIS

APPENDIX A
PRELIMINARY CONCEPT PLAN

1"= 100' 0' 50' 100' 200'

PROPERTY INFORMATION

ACREAGE:

273.34

ZONING

- R40 WITH FLOODPLAIN OVERLAY (DOES NOT IMPACT THE PROPOSED SITE)
- ADJACENT ZONING - R40
- COMMUNITY EDUCATION FACILITIES PERMITTED WITH CONDITIONS

CONCEPT FEATURES

SITE FEATURES

- 1600 STUDENT HIGH
- FOOTBALL/TRACK STADIUM
- BASEBALL STADIUM
- SOFTBALL STADIUM
- TENNIS COURTS
- SOCCER FIELD

PARKING SPACES

161	P1 PARKING SPACES
188	P2 PARKING SPACES
100	P3 PARKING SPACES
60	P4 PARKING SPACES
92	P5 PARKING SPACES
601	TOTAL PARKING SPACES

LEGEND

- NEW BUILDINGS PROPOSED
- EXISTING BUILDINGS TO REMAIN
- EXISTING BUILDINGS TO BE REMOVED
- 50' STREAM BUFFER

SITE PLAN | SCALE 1:1000

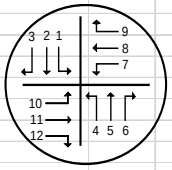
HASTINGS ARCHITECTURE ASSOCIATES, LLC

SITE OPTION - 8001 HWY 70 SOUTH

METROPOLITAN Nashville PUBLIC SCHOOLS

JANUARY 2016

APPENDIX B
DETAILED TURNING MOVEMENT COUNTS
SPEED DATA



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Hwy 70s & Hope Prk Dr
DATE: 6/27/2016
RECORDER: Peter Schmidt
NOTES: no bikes or peds

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	Hwy 70s			Hwy 70s			NA			Hope Park Dr			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													**77**
6:30-6:45													**167**
6:45-7:00													**276**
7:00-7:15		66			11								**355**
7:15-7:30		75		1	14								**352**
7:30-7:45		91			18								**359**
7:45-8:00		62			17								**327**
8:00-8:15		57		1	16								**311**
8:15-8:30		78			18							1	**237**
8:30-8:45		58		1	18								**140**
8:45-9:00		44		1	18								**63**
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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10:45-11:00													
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11:30-11:45													
11:45-12:00 PM													
12:00-12:15													
12:15-12:30													
12:30-12:45													
12:45-1:00													
1:00-1:15													
1:15-1:30													
1:30-1:45													
1:45-2:00													
2:00-2:15													
2:15-2:30													**98**
2:30-2:45													**212**
2:45-3:00													**343**
3:00-3:15		29		1	67							1	**470**
3:15-3:30		39		1	73							1	**511**
3:30-3:45	1	44			85							1	**522**
3:45-4:00		37	1	1	87					1			**500**
4:00-4:15		47			92								**516**
4:15-4:30		31			94								**540**
4:30-4:45		27		2	80								**594**
4:45-5:00		47		2	94								**629**
5:00-5:15		55		2	105					1			**623**
5:15-5:30		54			125								**460**
5:30-5:45		41	2	1	100								**281**
5:45-6:00		44		3	88					1		1	**137**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
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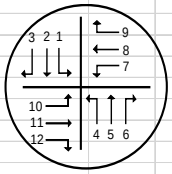
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	1	1,026	3	17	1,220					3		5	
AM PK HR		294		1	60								7:00 AM - 8:00 AM
MID PK HR													
PM PK HR		197	2	5	424					1			4:45 PM - 5:45 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Hwy 70s & Hooten Hows Rd
DATE: 6/27/2016
RECORDER: Drew Randolph
NOTES: no bikes or peds

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	Hwy 70s			Hwy 70s			NA			Hooten			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													**83**
6:30-6:45													**175**
6:45-7:00													**292**
7:00-7:15		66		1	14							2	**386**
7:15-7:30		76			14							2	**389**
7:30-7:45		95	1		20							1	**404**
7:45-8:00		70		1	15					1		7	**368**
8:00-8:15		62			21							3	**349**
8:15-8:30		87			18							2	**263**
8:30-8:45		59		1	21								**156**
8:45-9:00		48		2	22							3	**75**
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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1:15-1:30													
1:30-1:45													
1:45-2:00													
2:00-2:15													
2:15-2:30													**105**
2:30-2:45													**238**
2:45-3:00													**373**
3:00-3:15		37	1	2	61							4	**515**
3:15-3:30		44		2	86							1	**565**
3:30-3:45		39	3	4	88					1			**567**
3:45-4:00		44	1	2	91							4	**566**
4:00-4:15		46	1	3	96					3		6	**582**
4:15-4:30		35	1	2	97								**595**
4:30-4:45		34		7	91					1		1	**644**
4:45-5:00		44		1	109							4	**664**
5:00-5:15		57		1	107							3	**665**
5:15-5:30		53		5	125							1	**497**
5:30-5:45		48			106								**313**
5:45-6:00		49	1	8	101								**159**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
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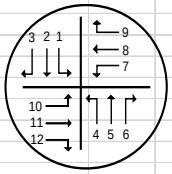
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL		1,093	9	42	1,303					6		44	
AM PK HR		307	1	2	63					1		12	7:00 AM - 8:00 AM
MID PK HR													
PM PK HR		202		7	447							8	4:45 PM - 5:45 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Hwy 70s & Hwy 70
DATE: 6/27/2016
RECORDER: Darryl Glascock
NOTES: no bikes or peds

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	NA			Hwy 70s			Highway 70			Highway 70			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													**187**
6:30-6:45													**373**
6:45-7:00													**558**
7:00-7:15				15			3	7			98	64	**701**
7:15-7:30				12				8			96	70	**644**
7:30-7:45				19		2	1	7			72	84	**605**
7:45-8:00				11		3	3	12			59	55	**563**
8:00-8:15				14			2	5			54	55	**520**
8:15-8:30				17		1		9			44	76	**390**
8:30-8:45				14		2	2	13			58	54	**243**
8:45-9:00				16		1	1	14			27	41	**100**
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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1:15-1:30													
1:30-1:45													
1:45-2:00													
2:00-2:15													
2:15-2:30													**139**
2:30-2:45													**302**
2:45-3:00													**502**
3:00-3:15				49		4	3	42			17	24	**707**
3:15-3:30				63		3	4	45			17	31	**778**
3:30-3:45				77		4	3	62			19	35	**840**
3:45-4:00				69		5	4	75			19	33	**814**
4:00-4:15				76		2	2	77			17	36	**838**
4:15-4:30				85		4	1	85			20	30	**876**
4:30-4:45				72		2	4	59			13	24	**898**
4:45-5:00				92		1	3	86			12	35	**982**
5:00-5:15				94		4	1	89			16	44	**977**
5:15-5:30				97		4	2	79			20	45	**729**
5:30-5:45				107		5	9	81			18	38	**482**
5:45-6:00				73		5	3	86			18	39	**224**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													
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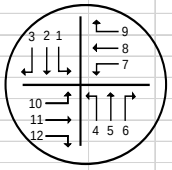
8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL				1,072		52	51	941			714	913	
AM PK HR				57		5	7	34			325	273	7:00 AM - 8:00 AM
MID PK HR													
PM PK HR				390		14	15	335			66	162	4:45 PM - 5:45 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Highway 70 & Newsom Station Road/Buffalo Road
DATE: 6/30/2016
RECORDER: Zack Murphy
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	Buffalo Road			Newsom Station Road			Highway 70			Highway 70			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													**177**
6:30-6:45													**359**
6:45-7:00													**540**
7:00-7:15	1		1			26	1	16	3		129		**672**
7:15-7:30	1	1				26	4	17		2	131		**630**
7:30-7:45	3			1		24	5	22			126		**592**
7:45-8:00	3		1			21	4	15	1	1	86		**554**
8:00-8:15	3	1	1	1		20	5	14		1	88	1	**515**
8:15-8:30	1		1			24	7	19			91	1	**380**
8:30-8:45	3					17	6	23	2		92		**236**
8:45-9:00						13	7	22			51		**93**
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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1:30-1:45													
1:45-2:00													
2:00-2:15													
2:15-2:30													**139**
2:30-2:45													**302**
2:45-3:00													**499**
3:00-3:15	1		1			7	15	79	1		34	1	**702**
3:15-3:30	2		1	1		6	11	100	3		38	1	**753**
3:30-3:45	2	1				16	25	111	1		40	1	**809**
3:45-4:00	1					7	19	132	3	1	39	1	**796**
4:00-4:15	1	2	1	1		11	12	123	3		36		**816**
4:15-4:30	1					9	25	139	8		36	1	**868**
4:30-4:45	3	1			1	5	19	122	3		29	1	**899**
4:45-5:00	2			1		9	22	148	2		38	1	**956**
5:00-5:15	1		1		1	13	32	145	2		43	4	**952**
5:15-5:30	1		1	3		17	20	153	5		49	1	**710**
5:30-5:45	2				1	11	27	156	3		40	1	**460**
5:45-6:00	2		1			13	21	137			44	1	**219**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
7:15-7:30													
7:30-7:45													
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8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	34	6	10	8	3	295	287	1,693	40	5	1,260	16	
AM PK HR	8	1	2	1		97	14	70	4	3	472		7:00 AM - 8:00 AM
MID PK HR													
PM PK HR	6		2	4	2	50	101	602	12		170	7	4:45 PM - 5:45 PM

RPM Transportation/Nashville, TN

Daily Total Speeds (MPH)

Study Date: Tuesday, 05/03/2016

Lane #1

Location :

	5-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-99	Total
00:00 - 00:14	0	0	2	0	0	1	0	3	0	1	1	1	0	0	0	7
00:15 - 00:29	0	0	2	0	0	2	1	3	1	0	0	0	0	0	0	5
00:30 - 00:44	0	0	2	0	0	2	2	0	2	0	0	0	0	0	0	4
00:45 - 00:59	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	1
01:00 - 01:14	0	0	2	0	0	1	0	0	3	0	2	0	0	0	0	5
01:15 - 01:29	0	0	2	0	0	2	1	1	4	1	2	0	0	0	0	9
01:30 - 01:44	0	0	2	0	0	2	1	1	2	3	0	0	0	0	0	5
01:45 - 01:59	0	0	2	0	0	2	0	0	4	2	0	0	0	0	0	8
02:00 - 02:14	0	0	2	0	0	2	0	1	0	1	1	0	0	0	0	1
02:15 - 02:29	0	0	2	0	0	2	0	0	0	0	1	0	0	0	0	1
02:30 - 02:44	0	0	2	0	0	1	0	0	1	2	0	0	0	0	0	4
02:45 - 02:59	0	0	2	0	0	2	0	0	1	2	0	0	0	0	0	3
03:00 - 03:14	0	0	2	0	0	2	0	1	0	2	0	0	0	0	0	4
03:15 - 03:29	0	0	2	0	0	2	0	0	0	4	0	0	0	0	0	4
03:30 - 03:44	0	0	2	0	0	2	1	0	1	0	0	0	0	0	0	4
03:45 - 03:59	0	0	2	0	0	2	1	0	0	1	0	0	0	0	0	3
04:00 - 04:14	0	0	2	0	0	2	0	0	1	2	1	0	0	0	0	4
04:15 - 04:29	0	0	2	0	0	2	0	1	1	1	1	0	2	0	0	4
04:30 - 04:44	0	0	2	1	0	2	0	0	2	2	1	0	0	0	0	14
04:45 - 04:59	0	0	2	0	0	2	1	1	2	1	0	0	0	0	0	5
05:00 - 05:14	0	0	2	0	0	2	0	1	3	4	0	0	0	0	0	10
05:15 - 05:29	0	0	2	0	0	2	0	1	7	1	0	0	0	0	0	10
05:30 - 05:44	0	0	2	0	0	2	0	1	11	10	0	0	0	0	0	22
05:45 - 05:59	0	0	2	0	0	2	0	0	6	11	2	1	0	0	0	25
06:00 - 06:14	0	0	2	0	0	2	0	3	7	8	0	1	0	0	0	23
06:15 - 06:29	0	0	2	1	0	2	2	6	12	10	0	0	0	0	0	35
06:30 - 06:44	0	0	2	0	0	2	2	5	20	31	0	0	0	0	0	52
06:45 - 06:59	0	0	2	0	0	2	0	5	22	10	0	0	0	0	0	32
07:00 - 07:14	0	0	2	0	0	2	1	0	26	20	3	2	0	0	0	52
07:15 - 07:29	0	0	2	0	0	1	2	9	13	16	0	1	0	0	0	48
07:30 - 07:44	0	0	2	0	0	2	2	13	20	23	0	1	0	0	0	71
07:45 - 07:59	0	0	2	1	1	2	1	7	21	16	8	1	0	0	0	68
08:00 - 08:14	1	0	2	0	0	2	3	3	13	13	10	3	0	0	0	48
08:15 - 08:29	0	1	1	0	0	2	2	0	27	11	1	1	0	0	0	71
08:30 - 08:44	0	0	2	0	0	1	3	7	28	15	0	0	0	0	0	57
08:45 - 08:59	0	0	2	0	0	1	0	12	15	11	0	0	0	0	0	41
09:00 - 09:14	0	0	2	0	0	1	3	12	31	14	2	0	0	0	0	65
09:15 - 09:29	0	0	2	0	0	2	1	8	17	15	6	0	0	0	0	49
09:30 - 09:44	0	0	2	0	0	2	2	12	23	17	5	0	0	0	0	59
09:45 - 09:59	1	0	2	0	0	1	3	14	24	23	2	1	0	0	0	68
10:00 - 10:14	0	0	2	0	0	2	3	8	16	9	2	0	0	0	0	38
10:15 - 10:29	0	0	2	0	0	2	0	14	30	6	2	0	0	0	0	49
10:30 - 10:44	0	0	2	0	0	2	0	12	22	22	1	0	0	0	0	65
10:45 - 10:59	0	0	1	0	0	1	1	21	28	11	6	1	0	0	0	33
11:00 - 11:14	0	0	2	0	0	1	0	16	27	10	2	0	0	0	0	58
11:15 - 11:29	0	2	1	2	0	1	0	19	38	15	2	0	0	0	0	80
11:30 - 11:44	0	0	2	0	0	2	0	24	24	11	6	0	0	0	0	31
11:45 - 11:59	0	2	2	2	2	1	0	19	30	17	2	0	0	0	0	77
12:00 - 12:14	0	0	1	0	0	1	0	21	21	11	5	0	0	0	0	70
12:15 - 12:29	0	0	2	1	0	2	1	21	23	19	3	0	0	0	0	74
12:30 - 12:44	0	0	2	0	0	1	0	23	33	11	2	1	0	0	0	74

RPM Transportation/Nashville, TN
Daily Total Speeds (MPH)

Study Date: Thursday, 10/20/2016
Unit ID:
Location:

	0-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-99	Total
12:45 - 12:59	0	0	0	0	0	0	0	14	23	17	2	2	1	0	0	60
13:00 - 13:14	0	0	0	0	1	3	3	15	29	18	4	0	0	0	0	73
13:15 - 13:29	0	0	0	0	0	0	7	13	35	16	6	1	0	0	0	79
13:30 - 13:44	0	0	0	0	0	1	5	22	34	12	5	0	0	0	0	79
13:45 - 13:59	1	1	0	0	0	5	6	24	30	13	3	0	0	0	0	84
14:00 - 14:14	1	0	0	0	0	2	2	10	29	16	4	0	0	0	0	86
14:15 - 14:29	0	0	0	0	3	1	1	27	33	12	5	0	0	0	0	86
14:30 - 14:44	0	0	2	0	1	2	5	10	26	28	10	0	0	1	0	87
14:45 - 14:59	0	0	0	0	0	0	4	13	30	20	2	0	0	2	0	71
15:00 - 15:14	0	1	0	0	0	0	9	26	31	11	2	0	0	0	0	74
15:15 - 15:29	0	0	0	4	0	2	4	18	22	18	3	1	0	0	0	102
15:30 - 15:44	1	0	1	0	0	1	12	27	32	21	5	1	0	0	0	102
15:45 - 15:59	0	0	0	0	1	0	7	25	42	32	4	0	0	0	0	113
16:00 - 16:14	0	1	0	1	0	1	6	29	45	27	3	0	0	0	0	114
16:15 - 16:29	0	0	0	2	0	1	9	30	37	19	3	0	0	0	0	121
16:30 - 16:44	0	0	0	0	0	0	0	12	39	31	3	0	0	0	0	114
16:45 - 16:59	0	0	0	0	0	0	3	23	40	32	3	1	0	0	0	130
17:00 - 17:14	0	0	0	1	1	0	0	33	72	36	4	2	1	0	0	148
17:15 - 17:29	0	0	0	0	0	0	4	43	67	34	2	0	0	0	0	150
17:30 - 17:44	0	0	0	0	0	1	10	31	77	29	10	0	0	0	0	158
17:45 - 17:59	0	0	0	0	0	0	10	31	46	32	5	0	0	0	0	127
18:00 - 18:14	0	0	0	0	0	2	10	34	51	16	4	1	0	0	0	118
18:15 - 18:29	0	0	0	0	0	0	10	22	47	29	0	1	0	0	1	124
18:30 - 18:44	0	1	0	0	0	1	2	22	45	32	3	1	1	0	0	109
18:45 - 18:59	0	0	0	0	1	1	1	27	15	24	3	2	0	0	0	104
19:00 - 19:14	0	0	0	0	0	0	0	14	31	18	1	0	0	0	0	86
19:15 - 19:29	0	0	0	0	0	1	5	16	21	17	4	0	1	0	0	89
19:30 - 19:44	0	0	0	0	0	0	10	10	22	17	4	0	0	0	0	65
19:45 - 19:59	0	0	0	0	0	0	0	13	24	10	1	0	1	0	0	63
20:00 - 20:14	0	0	0	0	0	0	1	6	26	17	1	1	0	0	0	52
20:15 - 20:29	0	0	0	0	0	1	3	13	25	10	3	1	0	0	0	56
20:30 - 20:44	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	46
20:45 - 20:59	0	1	0	0	1	0	5	20	20	9	3	0	0	0	0	61
21:00 - 21:14	0	0	0	0	0	0	3	14	6	8	0	0	0	0	0	40
21:15 - 21:29	0	0	0	0	0	0	2	13	21	9	0	2	0	0	0	47
21:30 - 21:44	0	0	0	0	0	2	2	13	13	4	2	1	0	0	0	36
21:45 - 21:59	0	0	0	0	1	0	2	3	11	4	4	1	0	0	0	27
22:00 - 22:14	0	0	0	0	0	0	0	7	11	6	1	0	0	0	0	25
22:15 - 22:29	0	0	0	1	0	0	1	0	13	7	1	0	0	0	0	23
22:30 - 22:44	0	0	0	0	0	0	3	0	4	2	2	0	0	0	0	14
22:45 - 22:59	0	0	0	0	0	0	0	0	4	5	1	0	0	0	0	11
23:00 - 23:14	0	0	0	0	0	0	2	0	7	3	0	1	0	0	0	14
23:15 - 23:29	0	0	0	0	0	0	0	2	3	1	1	0	0	0	0	7
23:30 - 23:44	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	10
23:45 - 23:59	0	0	0	0	1	0	0	0	3	0	0	1	0	0	0	9
Totals	5	9	9	22	27	51	319	1136	2004	1169	280	35	9	5	1	5202
Percent of Total	0.1	0.2	0.2	0.4	0.5	1.0	6.1	21.8	48.1	22.9	5.4	0.7	0.1	0.0	0.0	100
Percent of AM	0.1	0.2	0.2	0.4	0.3	1.0	5.6	18.0	36.3	28.8	6.3	0.8	0.0	0.0	0.0	100
Percent of PM	0.1	0.1	0.2	0.4	0.6	1.0	6.4	23.6	49.8	20.1	5.0	0.6	0.1	0.0	0.0	100

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V9.00 (x64)

RPM Transportation/Nashville, TN
Daily Total Speeds (MPH)

Study Date	Thursday, 06/30/2016
Unit ID	
Location	

Standard Deviation:	6.4 MPH	Ten Mile Pace:	50 to 59 MPH	85th Percentile:	58.1 MPH
Mean Speed:	52.0 MPH	Percent in Ten Mile Pace:	62.9%	15th Percentile:	46.4 MPH
Median Speed:	52.4 MPH			90th Percentile:	59.2 MPH
Modal Speed:	52.5 MPH			95th Percentile:	61.1 MPH

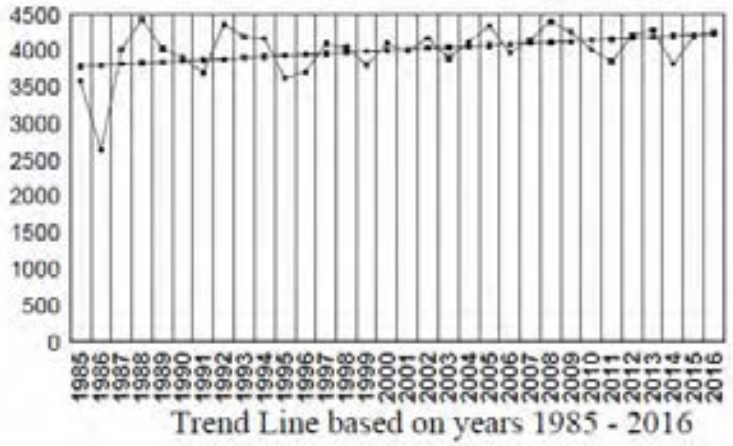
APPENDIX C
TDOT COUNT DATA

County: Davidson Station Number: 000119

Route: SR024 Station Type: Other Rural Station Out: NO

Location: NEAR SR-1

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
05	1985	3,963	3,646	3,573	0.98	
04	1986	2,899	2,696	2,642	0.98	LOOKS LOW
08	1987	4,412		4,021	0.98	
05	1988	4,866		4,135	0.98	
05	1989	4,333		4,034	0.98	
05	1990	4,282		3,902	0.98	
05	1991	4,109	3,780	3,705	0.98	
05	1992	4,787	4,452	4,363	0.98	
02	1993	2,326	2,165	4,200	0.98	ACTUAL = 2120
03	1994	4,480	4,256	4,171	0.98	
02	1995	3,742	3,705	3,630	0.98	
02	1996	3,830	3,792	3,716	0.98	
01	1997	4,019	3,180	3,096	0.98	
01	1998	1,012	1,132	3,050	0.98	
01	1999	3,845	3,886	3,808	0.98	
03	2000	4,408	4,188	4,104	0.98	
01	2001	4,076	4,076	3,994	0.98	
01	2002	4,263	4,263	4,178	0.98	
01	2003	3,982	3,982	3,902	0.98	
01	2004	0	0	3,130	0.98	EST
01	2005	4,300	4,435	4,346	0.98	
01	2006	4,227	4,058	5,977	0.98	
03	2007	1,462	1,239	1,151	0.98	
03	2008	4,999	4,499	4,409	0.98	
02	2009	4,480	4,346	4,259	0.98	
02	2010	4,228	4,101	4,019	1.00	
02	2011	4,285	3,856	3,857	1.00	
05	2012	0	0	4,223	1.00	EST
02	2013	0	0	4,296	1.00	USED CLASS COUNT
02	2014	1,021	5,820	5,820	1.00	
02	2015	0	0	4,207	1.00	EST
01	2016	5,953	4,269	4,269	1.00	



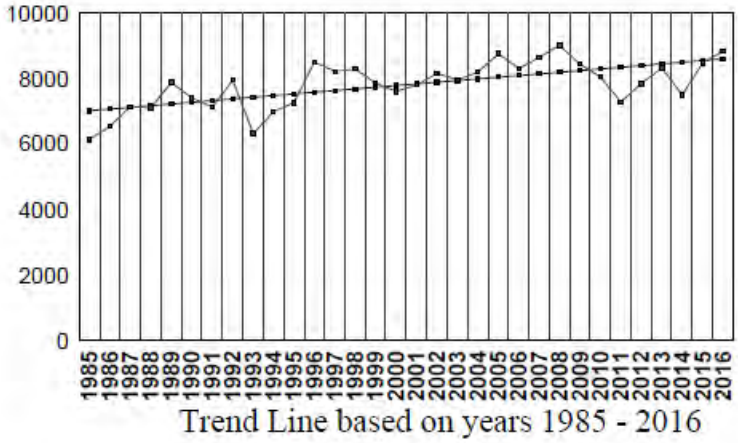
Trend Line based on years 1985 - 2016

County: Davidson Station Number: 000129

Route: SR001 Station Type: Urban Station On: NO

Location: NEAR CHEATHAM CO LINE

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
05	1985	6,156	6,257	6,132	0.98	
01	1986	7,170	6,668	6,535	0.98	
08	1987	7,837		7,113	0.98	
05	1988	7,803		7,112	0.98	
05	1989	8,459		7,875	0.98	
05	1990	7,957		7,408	0.98	
05	1991	7,911	7,278	7,135	0.98	
05	1992	8,721	8,111	7,948	0.98	LOOKS HIGH
02	1993	6,932	6,447	6,318	0.98	STA 269 DOWN
03	1994	7,500	7,125	6,983	0.98	
02	1995	7,180	7,405	7,257	0.98	
02	1996	8,670	8,670	8,497	0.98	
01	1997	8,060	8,382	8,215	0.98	
01	1998	8,213	8,450	8,290	0.98	
01	1999	7,940	8,010	7,859	0.98	
03	2000	8,710	7,762	7,609	0.98	
01	2001	7,965	7,965	7,806	0.98	
01	2002	8,325	8,325	8,158	0.98	
01	2003	8,129	8,129	7,966	0.98	
01	2004	0	0	8,190	0.98	TST
01	2005	8,673	8,933	8,755	0.98	
01	2006	8,821	8,168	8,299	0.98	
03	2007	9,281	8,820	8,643	0.98	
03	2008	10,222	9,200	9,016	0.98	
02	2009	8,877	8,611	8,438	0.98	
02	2010	8,471	8,217	8,053	0.98	
02	2011	8,266	7,439	7,291	0.98	
02	2012	8,434	8,012	7,852	0.98	
02	2013	8,662	8,489	8,319	0.98	
02	2014	8,414	7,657	7,504	0.98	
02	2015	0	0	8,474	0.98	EST
01	2016	8,346	9,014	8,833	0.98	



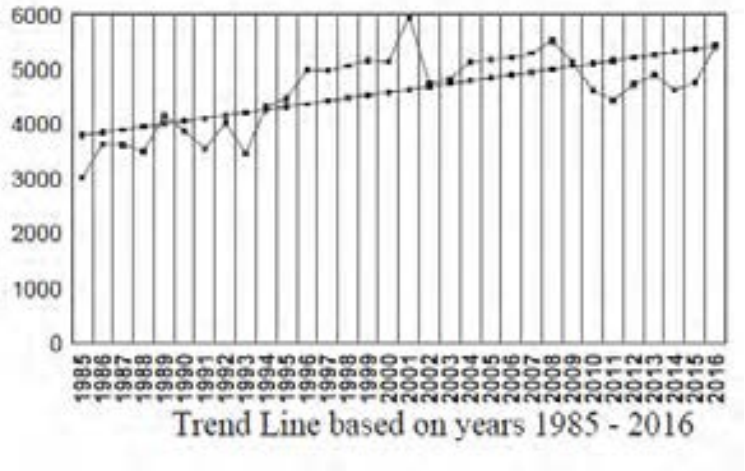
Trend Line based on years 1985 - 2016

County: Davidson Station Number: 000122

Route: SR001 Station Type: Urban Station Out: NO

Location: NEAR CHEATHAM CO LINE

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
05	1985	3,353	3,085	3,023	0.98	
04	1986	3,993	3,713	3,639	0.98	
08	1987	5,971		5,619	0.98	
05	1988	3,847		3,506	0.98	
05	1989	4,158		4,150	0.98	
05	1990	4,266		3,888	0.98	
05	1991	3,926	3,612	3,540	0.98	
05	1992	4,422	4,112	4,030	0.98	
02	1993	3,531	3,531	3,460	0.98	
03	1994	4,640	4,108	4,320	0.98	
02	1995	4,610	4,564	4,473	0.98	
02	1996	5,091	5,091	4,989	0.98	
01	1997	4,881	5,076	4,975	0.98	
01	1998	5,024	5,175	5,071	0.98	
01	1999	5,225	5,277	5,171	0.98	
05	2000	5,534	5,257	5,152	0.98	
01	2001	6,086	6,086	5,964	0.98	
01	2002	4,841	4,841	4,744	0.98	
01	2003	4,932	4,932	4,833	0.98	
01	2004	0	0	5,146	0.98	EST
01	2005	5,139	5,295	5,187	0.98	
01	2006	5,550	5,328	5,221	0.98	
03	2007	5,687	5,403	5,295	0.98	
03	2008	6,265	5,638	5,526	0.98	
02	2009	5,412	5,250	5,145	0.98	
02	2010	4,857	4,711	4,617	0.98	
02	2011	5,036	4,532	4,442	0.98	
02	2012	5,085	4,831	4,734	0.98	
02	2013	5,103	5,001	4,901	0.98	
02	2014	5,190	4,723	4,628	0.98	
02	2015	0	0	4,761	0.98	EST
01	2016	5,140	5,551	5,440	0.98	



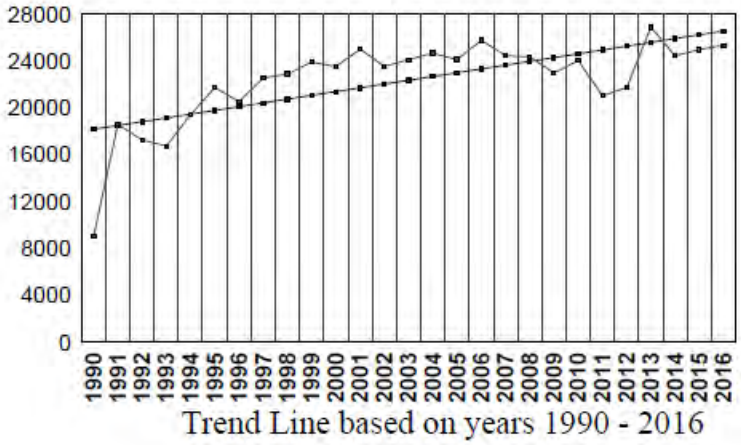
Trend Line based on years 1985 - 2016

County: Davidson Station Number: 000484

Route: SR001 Station Type: Urban Station Out: NO

Location: NEAR HARPETH RIVER

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
06	1990	9,105		9,012	0.98	1ST YR COUNT
05	1991	20,609	18,960	18,581	0.98	
06	1992	19,572	17,615	17,263	0.98	
02	1993	17,231	17,059	16,718	0.98	
03	1994	20,625	19,800	19,404	0.98	
02	1995	22,397	22,173	21,730	0.98	
02	1996	20,914	20,914	20,496	0.98	
01	1997	22,116	23,001	22,541	0.98	
01	1998	23,345	23,345	22,876	0.98	
01	1999	24,392	24,392	23,904	0.98	
04	2000	25,528	23,996	23,516	0.98	2ND COUNT
01	2001	25,528	25,528	25,017	0.98	
01	2002	23,767	24,005	23,525	0.98	
03	2003	25,353	24,592	24,100	0.98	AADT GREATER THAN EXPECTED VALUE BASED ON PREVIOUS YEARS DATA
01	2004	24,926	25,175	24,671	0.98	
01	2005	23,888	24,605	24,113	0.98	
01	2006	26,020	26,280	25,755	0.98	
03	2007	27,132	24,963	24,464	0.98	
03	2008	26,445	24,858	24,361	0.98	
02	2009	26,057	23,451	22,982	0.98	
02	2010	26,080	24,515	24,025	0.98	
02	2011	23,852	21,167	21,037	0.95	SEE 2009
02	2012	24,075	22,869	21,726	0.95	
02	2013	29,181	28,306	26,890	0.95	TRAFFIC UP AND DOWN, HIGH THIS YEAR
02	2014	28,012	25,752	24,464	0.95	
02	2015	0	0	24,975	0.95	EST
01	2016	25,887	26,664	25,330	0.95	



Trend Line based on years 1990 - 2016

APPENDIX D
CAPACITY ANALYSES

EXISTING CONDITIONS CAPACITY ANALYSES

HCM 2010 TWSC
1: Highway 70S & HopePark Access

HopePark High School Site TIS
Existing AM

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	0	0	1	63	308	0
Future Vol, veh/h	0	0	1	63	308	0
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	0	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	0	0	1	68	335	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	405	335	335	0	-	0
Stage 1	335	-	-	-	-	-
Stage 2	71	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	601	707	1224	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Platoon blocked, %						
Mov Cap-1 Maneuver	601	707	1224	-	-	-
Mov Cap-2 Maneuver	601	-	-	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	951	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1224	-	-	-	-	-
HCM Lane V/C Ratio	0.001	-	-	-	-	-
HCM Control Delay (s)	7.9	-	0	0	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	-

HCM 2010 TWSC
2: Highway 70S & Hooten Hows Road

HopePark High School Site TIS
Existing AM

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	1	12	2	53	307	1
Future Vol, veh/h	1	12	2	53	307	1
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	1	13	2	58	334	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	407	334	335	0	-	0
Stage 1	334	-	-	-	-	-
Stage 2	73	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	600	708	1224	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	950	-	-	-	-	-
Platoon blocked, %				-		
Mov Cap-1 Maneuver	599	708	1224	-	-	-
Mov Cap-2 Maneuver	599	-	-	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	946	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.3	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1224	-	698	-	-
HCM Lane V/C Ratio	0.002	-	0.02	-	-
HCM Control Delay (s)	7.9	0	10.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0		0.1		

HCM 2010 TWSC
3: Highway 70S & Highway 70

HopePark High School Site TIS
Existing AM

Intersection	
Int Delay, s/veh	1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	325	0	9	34	58	5
Future Vol, veh/h	325	0	9	34	58	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	-	-	0	50
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	353	0	9	37	63	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	353	0	407	353
Stage 1					353	
Stage 2	-	-	-	-	54	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1206	-	600	691
Stage 1	-	-	-	-	711	-
Stage 2	-	-	-	-	969	-
Platoon blocked, %						
Mov Cap-1 Maneuver	-	-	1206	-	595	691
Mov Cap-2 Maneuver	-	-	-	-	595	-
Stage 1	-	-	-	-	711	-
Stage 2	-	-	-	-	961	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	11.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	595	691	-	-	1206	-
HCM Lane V/C Ratio	0.106	0.008	-	-	0.007	-
HCM Control Delay (s)	11.8	10.3	-	-	8	0
HCM Lane LOS	B	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-

HCM 2010 TWSC
4: Newsom Station Road/Buffalo Road & Highway 70

HopePark High School Site TIS
Existing AM

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	3	511	0	15	73	4	1	0	105	9	1	2
Future Vol, veh/h	3	511	0	15	73	4	1	0	105	9	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-		None			None			None			None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	555	0	16	79	4	1	0	114	10	1	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	84	0	0	555	0	0	678	678	555	733	676	82
Stage 1	-	-	-	-	-	-	562	562	-	114	114	-
Stage 2	-	-	-	-	-	-	116	116	-	619	562	-
Critical Hdwy	4.12			4.12			7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2							6.12	5.52		6.12	5.52	
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1513	-	-	1015	-	-	366	374	551	338	375	978
Stage 1	-	-	-	-	-	-	512	510	-	891	801	-
Stage 2	-	-	-	-	-	-	880	800	-	476	510	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1513	-	-	1015	-	-	359	367	551	280	368	978
Mov Cap-2 Maneuver							359	367		280	368	
Stage 1	-	-	-	-	-	-	510	506	-	888	787	-
Stage 2							871	786		373	509	

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.4	13.7	17.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	529	1513	-	-	1015	-	-	305
HCM Lane V/C Ratio	0.216	0.002			0.016	-	-	0.043
HCM Control Delay (s)	13.7	7.4	0	-	8.6	0	-	17.3
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.8	0	-		0	-	-	0.1

HCM 2010 TWSC
1: Highway 70S & HopePark Access

HopePark High School Site TIS
Existing PM

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	1	0	5	442	202	2
Future Vol, veh/h	1	0	5	442	202	2
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	0	180	-	-	-
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	1	0	5	480	220	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	712	221	222	0	-	0
Stage 1	221	-	-	-	-	-
Stage 2	491					
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42					
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	399	819	1347	-	-	-
Stage 1	816	-	-	-	-	-
Stage 2	615					
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	398	819	1347	-	-	-
Mov Cap-2 Maneuver	398	-	-	-	-	-
Stage 1	816					
Stage 2	613	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.1	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1 EBLn2	SBT	SBR
Capacity (veh/h)	1347	- 398 - -	-	-
HCM Lane V/C Ratio	0.004	- 0.003 - -	-	-
HCM Control Delay (s)	7.7	- 14.1 0 -	-	-
HCM Lane LOS	A	- B A -	-	-
HCM 95th %tile Q(veh)	0	- 0 - -	-	-

HCM 2010 TWSC
2: Highway 70S & Hooten Hows Road

HopePark High School Site TIS
Existing PM

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	0	8	7	447	202	0
Future Vol, veh/h	0	8	7	447	202	0
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	9	8	486	220	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	721	220	220	0	-	0
Stage 1	220	-	-	-	-	-
Stage 2	501					
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	394	820	1349	-	-	-
Stage 1	817	-	-	-	-	-
Stage 2	609					
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	391	820	1349	-	-	-
Mov Cap-2 Maneuver	391	-	-	-	-	-
Stage 1	817					
Stage 2	604	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.4	0.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1349	-	820	-	-
HCM Lane V/C Ratio	0.006	-	0.011	-	-
HCM Control Delay (s)	7.7	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

HCM 2010 TWSC
3: Highway 70S & Highway 7D

HopePark High School Site TIS
Existing PM

Intersection	
Int Delay, s/veh	19.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	66	0	17	335	427	16
Future Vol, veh/h	66	0	17	335	427	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	-	-	0	50
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	72	0	18	364	464	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	72	0	473	72
Stage 1			-	-	72	-
Stage 2	-	-	-	-	401	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver			1529	-	560	990
Stage 1	-	-	-	-	951	-
Stage 2	-	-	-	-	678	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver			1529	-	542	990
Mov Cap-2 Maneuver	-	-	-	-	542	-
Stage 1	-	-	-	-	951	-
Stage 2	-	-	-	-	666	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	38.3
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	542	990			1529	
HCM Lane V/C Ratio	0.856	0.018	-	-	0.012	-
HCM Control Delay (s)	38.4	8.7	-	-	7.4	0
HCM Lane LOS	E	A	-	-	A	A
HCM 95th %tile Q(veh)	9.2	0.1	-	-	0	-

RPM Transportation Consultants, LLC

Synchro 9 Report
Page 3

HCM 2010 TWSC
4: Newsom Station Road/Buffalo Road & Highway 70

HopePark High School Site TIS
Existing PM

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	0	190	7	106	642	12	4	2	56	7	0	2
Future Vol, veh/h	0	190	7	106	642	12	4	2	56	7	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	207	8	117	698	13	4	2	61	8	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	711	0	0	214	0	0	1150	1156	210	1181	1153	704
Stage 1	-	-	-	-	-	-	210	210	-	939	939	-
Stage 2	-	-	-	-	-	-	940	946	-	242	214	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	888	-	-	1356	-	-	175	197	830	167	197	437
Stage 1	-	-	-	-	-	-	792	728	-	317	343	-
Stage 2	-	-	-	-	-	-	316	340	-	782	725	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	888	-	-	1356	-	-	155	169	830	136	169	437
Mov Cap-2 Maneuver	-	-	-	-	-	-	155	169	-	136	169	-
Stage 1	-	-	-	-	-	-	792	728	-	317	294	-
Stage 2	-	-	-	-	-	-	269	291	-	704	725	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.1	11.9	28.8
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	590	888	-	-	1356	-	-	181
HCM Lane V/C Ratio	0.114	-	-	-	0.087	-	-	0.051
HCM Control Delay (s)	11.9	0	-	-	7.9	0	-	28.8
HCM Lane LOS	B	A	-	-	A	A	-	D
HCM 95th %tile Q(veh)	0.4	0	-	-	0.3	-	-	0.2

BACKGROUND CONDITIONS
CAPACITY ANALYSES
YEAR 2019

HCM 2010 TWSC
1: Highway 70S & HopePark Access

HopePark High School Site TIS
Background AM

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	0	0	1	92	370	0
Future Vol, veh/h	0	0	1	92	370	0
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	0	180	-	-	-
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	0	1	100	402	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	504	402	402	0	-	0
Stage 1	402	-	-	-	-	-
Stage 2	102	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	528	648	1157	-	-	-
Stage 1	678	-	-	-	-	-
Stage 2	922	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	528	648	1157	-	-	-
Mov Cap-2 Maneuver	528	-	-	-	-	-
Stage 1	678	-	-	-	-	-
Stage 2	921	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1157	-	-	-	-	-
HCM Lane V/C Ratio	0.001	-	-	-	-	-
HCM Control Delay (s)	8.1	-	0	0	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	-

HCM 2010 TWSC
2: Highway 70S & Hooten Hows Road

HopePark High School Site TIS
Background AM

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	1	12	2	92	389	1
Future Vol, veh/h	1	12	2	92	389	1
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	1	13	2	100	401	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	506	402	402	0	-	0
Stage 1	402	-	-	-	-	-
Stage 2	104	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	526	646	1157	-	-	-
Stage 1	678	-	-	-	-	-
Stage 2	620	-	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	525	646	1157	-	-	-
Mov Cap-2 Maneuver	525	-	-	-	-	-
Stage 1	678	-	-	-	-	-
Stage 2	618	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1157	-	637	-	-
HCM Lane V/C Ratio	0.002	-	0.022	-	-
HCM Control Delay (s)	8.1	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 2010 TWSC
3: Highway 70S & Highway 70

HopePark High School Site TIS
Background AM

Intersection	
Int Delay, s/veh	2.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	340	0	13	36	84	8
Future Vol, veh/h	340	0	13	36	84	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	-	-	0	50
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	370	0	14	39	91	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	370	0	437	370
Stage 1	-	-	-	-	370	-
Stage 2	-	-	-	-	67	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1189	-	577	678
Stage 1					699	
Stage 2	-	-	-	-	956	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1189	-	570	678
Mov Cap-2 Maneuver	-	-	-	-	570	-
Stage 1					699	
Stage 2	-	-	-	-	945	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	570	678	-	-	1189	-
HCM Lane V/C Ratio	0.16	0.013	-	-	0.012	-
HCM Control Delay (s)	12.5	10.4			8.1	0
HCM Lane LOS	B	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	0	-	-	0	-

RPM Transportation Consultants, LLC

Synchro 9 Report
Page 3

HCM 2010 TWSC
4: Newsom Station Road/Buffalo Road & Highway 70

HopePark High School Site TIS
Background AM

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	3	570	0	19	98	5	1	0	115	12	1	2
Future Vol, veh/h	3	570	0	19	98	5	1	0	115	12	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized			None			None			None			None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	620	0	21	104	5	1	0	125	13	1	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	110	0	0	620	0	0	776	777	620	837	774	107
Stage 1	-	-	-	-	-	-	628	625	-	148	148	-
Stage 2	-	-	-	-	-	-	150	151	-	689	626	-
Critical Hdwy	4.12			4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1480	-	-	960	-	-	315	328	488	286	329	947
Stage 1	-	-	-	-	-	-	472	477	-	855	775	-
Stage 2	-	-	-	-	-	-	853	772	-	435	477	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1480	-	-	960	-	-	307	319	488	239	320	947
Mov Cap-2 Maneuver	-	-	-	-	-	-	307	319	-	239	320	-
Stage 1	-	-	-	-	-	-	471	476	-	852	757	-
Stage 2	-	-	-	-	-	-	830	754	-	323	476	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.4	15	21.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	488	1480	-	-	960	-	-	239
HCM Lane V/C Ratio	0.259	0.002	-	-	0.022	-	-	0.068
HCM Control Delay (s)	15	7.4	0	-	8.8	0	-	21.2
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1	0	-	-	0.1	-	-	0.2

HCM 2010 TWSC
1: Highway 70S & HopePark Access

HopePark High School Site TIS
Background PM

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	1	0	5	527	261	2
Future Vol, veh/h	1	0	5	527	261	2
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	0	100	-	-	
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	1	0	5	573	284	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	869	285	286	0	-	0
Stage 1	285					
Stage 2	584	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	322	754	1276	-	-	-
Stage 1	753	-	-	-	-	-
Stage 2	557	-	-	-	-	-
Platoon blocked, %				-		
Mov Cap-1 Maneuver	321	754	1276	-	-	-
Mov Cap-2 Maneuver	321	-	-	-	-	-
Stage 1	753	-	-	-	-	-
Stage 2	555	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.3	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1276	-	321	-	-	-
HCM Lane V/C Ratio	0.004	-	0.003	-	-	-
HCM Control Delay (s)	7.8	-	16.3	0	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-	-

HCM 2010 TWSC
2: Highway 70S & Hooten Hows Road

HopePark High School Site TIS
Background PM

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	0	8	7	532	281	0
Future Vol, veh/h	0	8	7	532	281	0
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	9	8	578	284	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	877	284	284	0	-	0
Stage 1	284	-	-	-	-	-
Stage 2	593	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	319	755	1278	-	-	-
Stage 1	754	-	-	-	-	-
Stage 2	552	-	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	315	755	1278	-	-	-
Mov Cap-2 Maneuver	318	-	-	-	-	-
Stage 1	784					
Stage 2	547	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.8	0.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	1278	- 755	-	-
HCM Lane V/C Ratio	0.006	- 0.012	-	-
HCM Control Delay (s)	7.8	0 9.8	-	-
HCM Lane LOS	A	A A	-	-
HCM 95th %ile Q(veh)	0	- 0	-	-

HCM 2010 TWSC
3: Highway 70S & Highway 70

HopePark High School Site TIS
Background PM

Intersection	
Int Delay, s/veh	44.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	69	0	22	351	504	24
Future Vol, veh/h	69	0	22	351	504	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	-	-	0	50
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	75	0	24	382	548	26

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	75	0	504	75
Stage 1					75	
Stage 2	-	-	-	-	429	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1524	-	~ 528	986
Stage 1	-	-	-	-	948	-
Stage 2	-	-	-	-	657	-
Platoon blocked, %						
Mov Cap-1 Maneuver	-	-	1524	-	~ 517	986
Mov Cap-2 Maneuver	-	-	-	-	~ 517	-
Stage 1	-	-	-	-	948	-
Stage 2	-	-	-	-	644	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	81.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	517	986	-	-	1524	-
HCM Lane V/C Ratio	1.06	0.026	-	-	0.016	-
HCM Control Delay (s)	84.5	8.8	-		7.4	0
HCM Lane LOS	F	A	-	-	A	A
HCM 95th %tile Q(veh)	16.4	0.1	-	-	0	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 2010 TWSC
4: Newsom Station Road/Buffalo Road & Highway 70

HopePark High School Site TIS
Background PM

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	0	237	7	120	719	16	4	2	84	9	0	2
Future Vol, veh/h	0	237	7	120	719	16	4	2	84	9	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	258	8	130	782	17	4	2	70	10	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	799	0	0	255	0	0	1313	1321	251	1348	1316	790
Stage 1	-	-	-	-	-	-	261	261	-	1051	1051	-
Stage 2							1052	1060		297	265	
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	824	-	-	1299	-	-	185	157	778	128	158	390
Stage 1							744	682		274	304	
Stage 2	-	-	-	-	-	-	274	301	-	712	689	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	824	-	-	1299	-	-	116	129	778	99	129	390
Mov Cap-2 Maneuver	-	-	-	-	-	-	116	129	-	99	129	-
Stage 1	-	-	-	-	-	-	744	682	-	274	249	-
Stage 2	-	-	-	-	-	-	223	247	-	648	689	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.1	12.9	39.9
HCM LOS			B	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	529	824	-	-	1299	-	-	115
HCM Lane V/C Ratio	0.144				0.1			0.104
HCM Control Delay (s)	12.9	0	-	-	8.1	0	-	39.9
HCM Lane LOS	B	A	-	-	A	A	-	E
HCM 95th %tile Q(veh)	0.5	0	-	-	0.3	-	-	0.3

PROJECTED CONDITIONS
CAPACITY ANALYSES
YEAR 2019

HCM 2010 TWSC
1: Highway 70S & HopePark/Site Access

HopePark High School Site TIS
Projected AM

Intersection	
Int Delay, s/veh	112.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	66	154	329	92	370	140
Future Vol, veh/h	66	154	329	92	370	140
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	0	160	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0			0	0	
Peak Hour Factor	75	75	50	92	92	50
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	88	205	658	100	402	280

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1958	542	682	0	-	0
Stage 1	542	-	-	-	-	-
Stage 2	1416	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42					
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 70	540	911	-	-	-
Stage 1	553	-	-	-	-	-
Stage 2	224	-	-	-	-	-
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 19	540	911		-	-
Mov Cap-2 Maneuver	~ 19	-	-	-	-	-
Stage 1	553	-	-	-	-	-
Stage 2	~ 62	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 923.7	16.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	911	-	19	540	-	-
HCM Lane V/C Ratio	0.722	-	4.832	0.38	-	-
HCM Control Delay (s)	18.5	-	$ 2042.4	15.7	-	-
HCM Lane LOS	C	-	F	C	-	-
HCM 95th %tile Q(veh)	6.5	-	11.5	1.8	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

RPM Transportation Consultants, LLC

Synchro 9 Report
Page 1

HCM 2010 TWSC
2: Highway 70S & Hooten Hows Road

HopePark High School Site TIS
Projected AM

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	1	12	2	420	523	1
Future Vol, veh/h	1	12	2	420	523	1
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	1	13	2	457	568	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1030	569	570	0	-	0
Stage 1	569	-	-	-	-	-
Stage 2	461	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12			
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42					
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	259	522	1002	-	-	-
Stage 1	568	-	-	-	-	-
Stage 2	635	-	-	-	-	-
Platoon blocked, %				-		-
Mov Cap-1 Maneuver	258	522	1002	-	-	-
Mov Cap-2 Maneuver	258	-	-	-	-	-
Stage 1	568	-	-	-	-	-
Stage 2	633	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.7	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1002	-	484	-	-
HCM Lane V/C Ratio	0.002	-	0.029	-	-
HCM Control Delay (s)	8.6	0	12.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 2010 TWSC
3: Highway 70S & Highway 70

HopePark High School Site TIS
Projected AM

Intersection	
Int Delay, s/veh	5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	340	0	83	35	117	41
Future Vol, veh/h	340	0	83	35	117	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	-	-	0	50
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	370	0	90	38	127	45

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	370	0	590	370
Stage 1					370	
Stage 2					220	
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1189	-	470	678
Stage 1					699	
Stage 2					817	
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1189	-	434	678
Mov Cap-2 Maneuver	-	-	-	-	434	-
Stage 1					699	
Stage 2	-	-	-	-	754	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.8	15.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	434	676	-	-	1189	-
HCM Lane V/C Ratio	0.293	0.066	-	-	0.076	-
HCM Control Delay (s)	18.7	10.7	-	-	8.3	0
HCM Lane LOS	C	B	-	-	A	A
HCM 95th %tile Q(veh)	1.2	0.2	-	-	0.2	-

HCM 2010 TWSC
4: Newsom Station Road/Buffalo Road & Highway 70

HopePark High School Site TIS
Projected AM

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	3	593	0	36	107	11	1	0	150	24	1	2
Future Vol, veh/h	3	593	0	36	107	11	1	0	150	24	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	645	0	39	116	12	1	0	163	26	1	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	128	0	0	645	0	0	851	855	645	931	849	122
Stage 1	-	-	-	-	-	-	651	651	-	198	198	-
Stage 2	-	-	-	-	-	-	200	204	-	733	651	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1458	-	-	940	-	-	280	296	472	247	296	929
Stage 1	-	-	-	-	-	-	457	466	-	804	737	-
Stage 2	-	-	-	-	-	-	802	733	-	412	465	-
Platoon blocked, %												
Mov Cap-1 Maneuver	1458	-	-	940	-	-	269	282	472	156	284	929
Mov Cap-2 Maneuver	-	-	-	-	-	-	269	282	-	153	284	-
Stage 1	-	-	-	-	-	-	456	464	-	802	705	-
Stage 2	-	-	-	-	-	-	764	701	-	289	464	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.1	16.7	30.7
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	470	1458	-	-	940	-	-	169
HCM Lane V/C Ratio	0.349	0.002	-	-	0.04	-	-	0.174
HCM Control Delay (s)	16.7	7.5	0	-	9	0	-	30.7
HCM Lane LOS	C	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	1.5	0	-	-	0.1	-	-	0.6

HCM 2010 TWSC
1: Highway 70S & HopePark/Site Access

HopePark High School Site TIS
Projected PM

Intersection	
Int Delay, s/veh	13.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	84	193	100	527	261	43
Future Vol, veh/h	84	193	100	527	261	43
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	0	180	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	75	92	92	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	168	386	133	573	284	57

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1151	312	341	0	-	0
Stage 1	312	-	-	-	-	-
Stage 2	839	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	219	728	1218	-	-	-
Stage 1	742	-	-	-	-	-
Stage 2	424	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	195	728	1218	-	-	-
Mov Cap-2 Maneuver	195	-	-	-	-	-
Stage 1	742	-	-	-	-	-
Stage 2	378	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	35.7	1.6	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1218	-	195	728	-	-
HCM Lane V/C Ratio	0.109	-	0.862	0.53	-	-
HCM Control Delay (s)	8.3	-	82.5	15.4	-	-
HCM Lane LOS	A	-	F	C	-	-
HCM 95th %tile Q(veh)	0.4	-	6.4	3.2	-	-

HCM 2010 TWSC
2: Highway 70S & Hooten Hows Road

HopePark High School Site TIS
Projected PM

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	0	8	7	627	454	0
Future Vol, veh/h	0	8	7	627	454	0
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	9	8	682	493	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1180	493	493	0	-	0
Stage 1	493	-	-	-	-	-
Stage 2	687	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12			
Critical Hdwy Stg 1	5.42	-	-	-	-	
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218		-	
Pot Cap-1 Maneuver	207	576	1071	-	-	-
Stage 1	614	-	-	-	-	-
Stage 2	494	-	-	-	-	-
Platoon blocked, %						
Mov Cap-1 Maneuver	205	576	1071	-	-	-
Mov Cap-2 Maneuver	205	-	-	-	-	-
Stage 1	614	-	-	-	-	-
Stage 2	488	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.3	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1071	-	576	-	-
HCM Lane V/C Ratio	0.007	-	0.015	-	-
HCM Control Delay (s)	8.4	0	11.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

HCM 2010 TWSC
3: Highway 70S & Highway 70

HopePark High School Site TIS
Projected PM

Intersection	
Int Delay, s/veh	77.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	69	0	42	351	546	66
Future Vol, veh/h	69	0	42	351	546	66
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized		None		None		Yield
Storage Length	-	-	-	-	0	50
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	75	0	46	382	593	71

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	75	0	548	75
Stage 1	-	-	-	-	75	-
Stage 2	-	-	-	-	473	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1524	-	~ 497	986
Stage 1	-	-	-	-	948	-
Stage 2					627	
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1524	-	~ 478	986
Mov Cap-2 Maneuver	-	-	-	-	~ 478	-
Stage 1					948	
Stage 2	-	-	-	-	803	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	133.3
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	478	986	-	-	1524	-
HCM Lane V/C Ratio	1.242	0.072	-	-	0.03	-
HCM Control Delay (s)	151.5	8.9			7.4	0
HCM Lane LOS	F	A	-	-	A	A
HCM 95th %tile Q(veh)	23.8	0.2	-	-	0.1	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 2010 TWSC
4. Newsom Station Road/Buffalo Road & Highway 70

HopePark High School Site TIS
Projected PM

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	0	244	7	141	733	23	4	2	74	13	0	2
Future Vol, veh/h	0	244	7	141	733	23	4	2	74	13	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	265	8	153	797	25	4	2	80	14	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	822	0	0	273	0	0	1398	1397	289	1426	1389	809
Stage 1	-	-	-	-	-	-	269	269	-	1116	1116	-
Stage 2	-	-	-	-	-	-	1117	1128	-	310	273	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	807	-	-	1290	-	-	126	141	770	113	142	380
Stage 1	-	-	-	-	-	-	737	697	-	252	283	-
Stage 2	-	-	-	-	-	-	252	279	-	700	684	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	807	-	-	1290	-	-	99	110	770	83	111	380
Mov Cap-2 Maneuver	-	-	-	-			99	110		93	111	-
Stage 1	-	-	-	-	-	-	737	697	-	252	221	-
Stage 2	-	-	-	-	-	-	198	218	-	825	384	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.3	13.4	51.8
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	517	807	-	-	1290	-	-	93
HCM Lane V/C Ratio	0.168	-	-	-	0.119	-	-	0.175
HCM Control Delay (s)	13.4	0	-	-	8.2	0	-	51.8
HCM Lane LOS	B	A	-	-	A	A	-	F
HCM 95th %tile Q(veh)	0.6	0	-	-	0.4	-	-	0.6

PROJECTED CONDITIONS WITH IMPROVEMENTS CAPACITY ANALYSES YEAR 2019

HCM 2010 TWSC
1: Highway 70S & HopePark/Site Access

HopePark High School Site TIS
Projected AM with Improvements

Intersection	
Int Delay, s/veh	18.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	66	154	329	92	370	140
Future Vol, veh/h	66	154	329	92	370	140
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	0	150	-	-	150
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	50	92	92	50
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	88	205	658	100	402	280

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1818	402	402	0	-	0
Stage 1	402	-	-	-	-	-
Stage 2	1416	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 86	648	1157	-	-	-
Stage 1	676	-	-	-	-	-
Stage 2	224	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 37	648	1157	-	-	-
Mov Cap-2 Maneuver	~ 94	-	-	-	-	-
Stage 1	676	-	-	-	-	-
Stage 2	97	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	89.5	10.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1157	- 34	648	-	-
HCM Lane V/C Ratio	0.569	- 1.048	0.317	-	-
HCM Control Delay (s)	12.1	- 201.1	13.1	-	-
HCM Lane LOS	B	- F	B	-	-
HCM 95th %tile Q(veh)	3.7	- 6	1.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 2010 Signalized Intersection Summary
3: Highway 70S & Highway 70

HopePark High School Site TIS
Projected AM with Improvements

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	340	427	93	36	117	41
Future Volume (veh/h)	340	427	93	36	117	41
Number	4	14	3	8	5	12
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	1900	1900	1863	1863	1863
Adj Flow Rate, veh/h	370	0	90	39	127	0
Adj No. of Lanes	1	0	0	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	1353	0	359	285	166	150
Arrive On Green	0.73	0.00	0.73	0.73	0.09	0.00
Sat Flow, veh/h	1863	0	740	395	1774	1583
Grp Volume(v), veh/h	370	0	129	0	127	0
Grp Sat Flow(s),veh/h/ln	1863	0	1135	0	1774	1583
Q Serve(g_s), s	3.4	0.0	0.8	0.0	3.5	0.0
Cycle Q Clear(g_c), s	3.4	0.0	4.0	0.0	3.5	0.0
Prop In Lane		0.00	0.70		1.00	1.00
Lane Grp Cap(c), veh/h	1353	0	924	0	166	150
V/C Ratio(X)	0.27	0.00	0.14	0.00	0.76	0.00
Avail Cap(c_a), veh/h	1353	0	924	0	688	614
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	2.4	0.0	2.2	0.0	22.2	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.3	0.0	6.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	0.7	0.0	2.0	0.0
LnGrp Delay(d),s/veh	2.9	0.0	2.5	0.0	28.9	0.0
LnGrp LOS	A		A		C	
Approach Vol, veh/h	370			129	127	
Approach Delay, s/veh	2.9			2.5	28.9	
Approach LOS	A			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		9.3		41.0				41.0
Change Period (Y+Rc), s		4.5		4.5				4.5
Max Green Setting (Gmax), s		19.5		36.5				36.5
Max Q Clear Time (g_c+I1), s		5.5		5.4				6.0
Green Ext Time (p_c), s		0.2		2.6				2.8

Intersection Summary	
HCM 2010 Ctrl Delay	8.1
HCM 2010 LOS	A

RPM Transportation Consultants, LLC

Synchro 9 Report
Page 2

HCM 2010 TWSC
1: Highway 70S & HopePark/Site Access

HopePark High School Site TIS
Projected PM with Imps

Intersection	
Int Delay, s/veh	7.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	84	193	100	527	261	43
Future Vol, veh/h	84	193	100	527	261	43
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	0	180	-	-	180
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	50	75	85	85	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	168	386	133	555	275	57

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1086	275	275	0	-	0
Stage 1	275	-	-	-	-	-
Stage 2	821	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	238	764	1288	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	432	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	212	764	1288			
Mov Cap-2 Maneuver	315	-	-	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	387	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.9	1.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1288	-	315	764	-	-
HCM Lane V/C Ratio	0.104	-	0.533	0.505	-	-
HCM Control Delay (s)	8.1	-	28.8	14.4	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.3	-	3	2.9	-	-

HCM 2010 Signalized Intersection Summary
3: Highway 70S & Highway 70

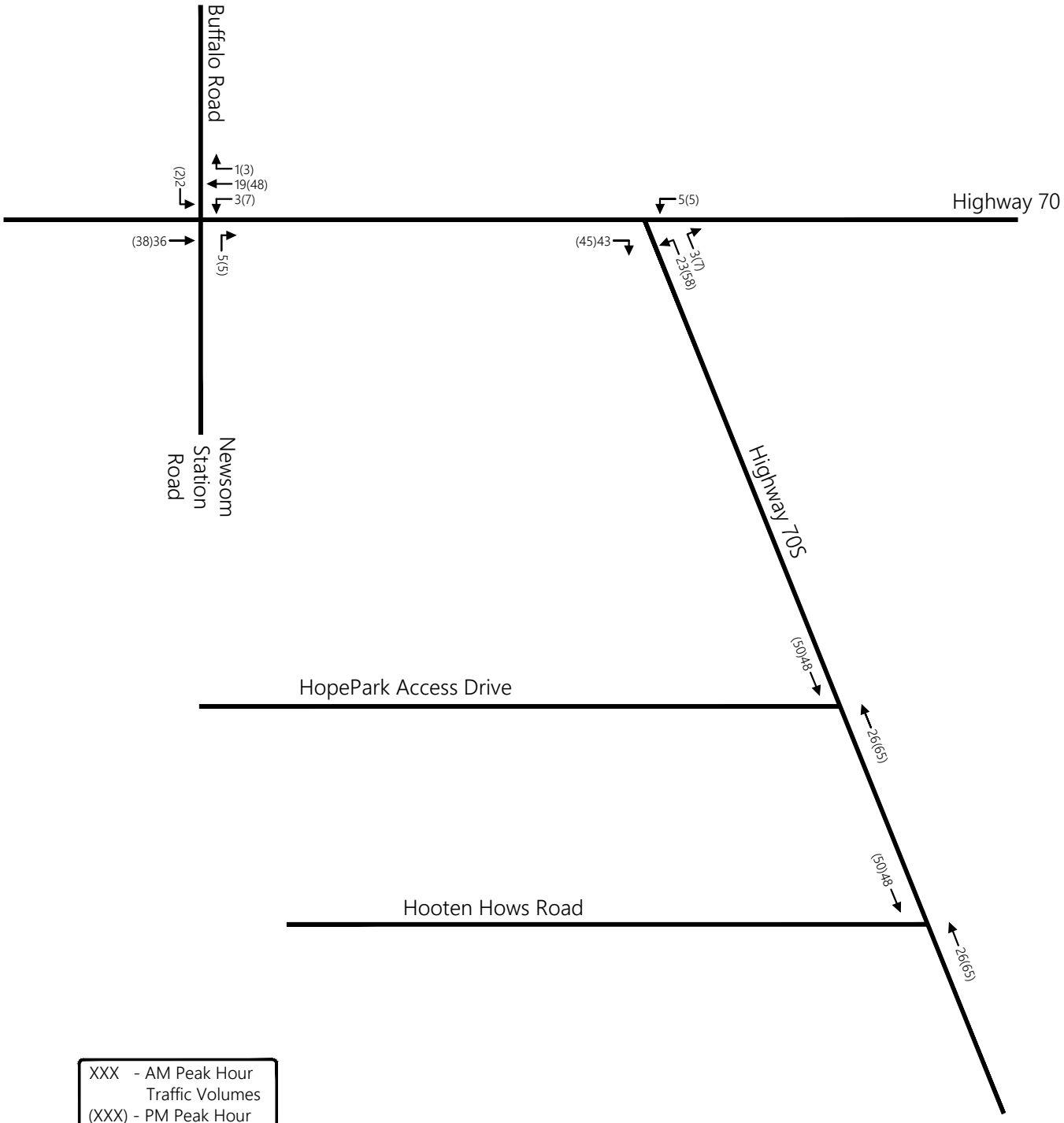
HopePark High School Site TIS
Projected PM with Imps

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	69	262	42	351	546	65
Future Volume (veh/h)	69	262	42	351	543	65
Number	4	14	3	8	5	12
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	1900	1900	1863	1863	1863
Adj Flow Rate, veh/h	73	0	44	369	575	0
Adj No. of Lanes	1	0	0	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	847	0	125	778	859	588
Arrive On Green	0.45	0.00	0.45	0.45	0.37	0.00
Sat Flow, veh/h	1863	0	107	1713	1774	1583
Grp Volume(v), veh/h	73	0	413	0	575	0
Grp Sat Flow(s),veh/h/ln	1863	0	1819	0	1774	1583
Q Serve(g_s), s	1.2	0.0	8.0	0.0	15.6	0.0
Cycle Q Clear(g_c), s	1.2	0.0	8.0	0.0	15.6	0.0
Prop In Lane		0.00	0.11		1.00	1.00
Lane Grp Cap(c), veh/h	847	0	904	0	859	588
V/C Ratio(X)	0.09	0.00	0.46	0.00	0.67	0.00
Avail Cap(c_a), veh/h	847	0	904	0	1115	995
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	9.0	0.0	9.9	0.0	15.1	0.0
Incr Delay (d2), s/veh	0.2	0.0	1.7	0.0	4.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	0.8	0.0	4.5	0.0	8.3	0.0
LnGrp Delay(d),s/veh	9.2	0.0	11.6	0.0	19.3	0.0
LnGrp LOS	A		B		B	
Approach Vol, veh/h	73			413	575	
Approach Delay, s/veh	9.2			11.6	19.3	
Approach LOS	A			B	B	

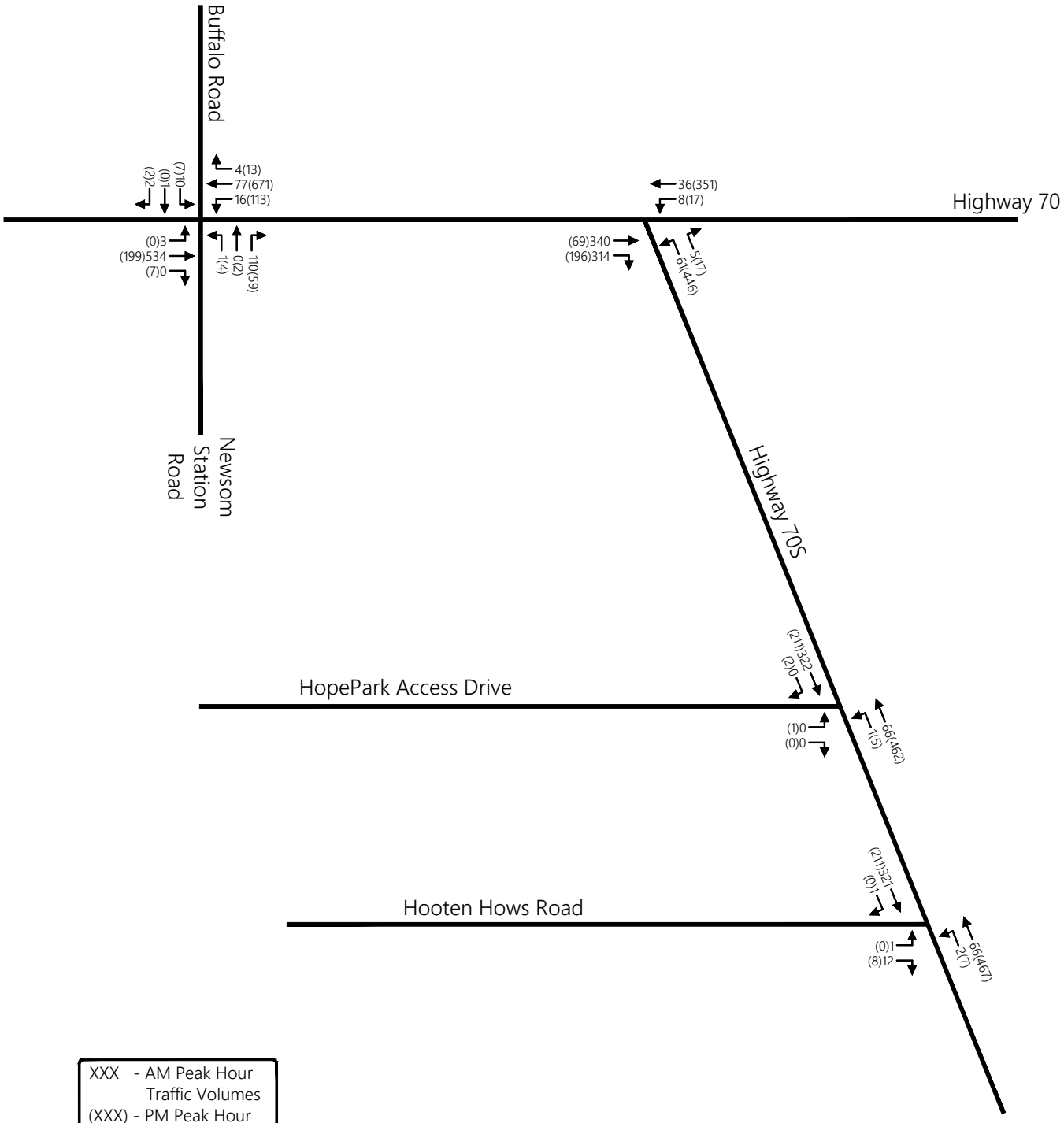
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		23.7		29.0				29.0
Change Period (Y+Rc), s		4.5		4.5				4.5
Max Green Setting (Gmax), s		32.5		23.5				23.5
Max Q Clear Time (g_c+I1), s		17.8		3.2				10.0
Green Ext Time (p_c), s		1.8		2.4				2.1

Intersection Summary	
HCM 2010 Ctrl Delay	15.5
HCM 2010 LOS	B

APPENDIX E
BACKGROUND TRAFFIC FIGURES



Assignment of Peak Hour Traffic Volumes
Generated by Off-Site Development (Bellevue Mall)
(Not to Scale) Figure E1.



Background Traffic Growth
(Assumes 1.5% Annual Growth for 3 Years)
(Not to Scale)

Figure E2.

APPENDIX F
TRIP GENERATION CALCULATIONS

TRIP GENERATION
HOPE PARK HIGH SCHOOL SITE TIS

High School – 1,600 students

Use ITE Lane Use Code 530 and associated trip generation rates for 24-hour total trips and peak hour trips.

Average Daily Traffic

Ln(T) = 0.81 Ln(X) + 1.86
Ln(T) = 0.81 Ln(1,600) + 1.86
T = 2,530

A.M. Peak Hour - Use average rate for Weekday, A.M. Peak Hour

T = 0.43(X)
T = 0.43(1,600)
T = 688

Enter = 0.68(688) = 468
Exit = 0.32(688) = 220

P.M. Peak Hour – Use fitted curve equation for Weekday, P.M. Peak Hour of Generator

Ln(T) = 0.61 Ln(X) + 1.52
Ln(T) = 0.61 Ln(1,600) + 1.52
T = 412

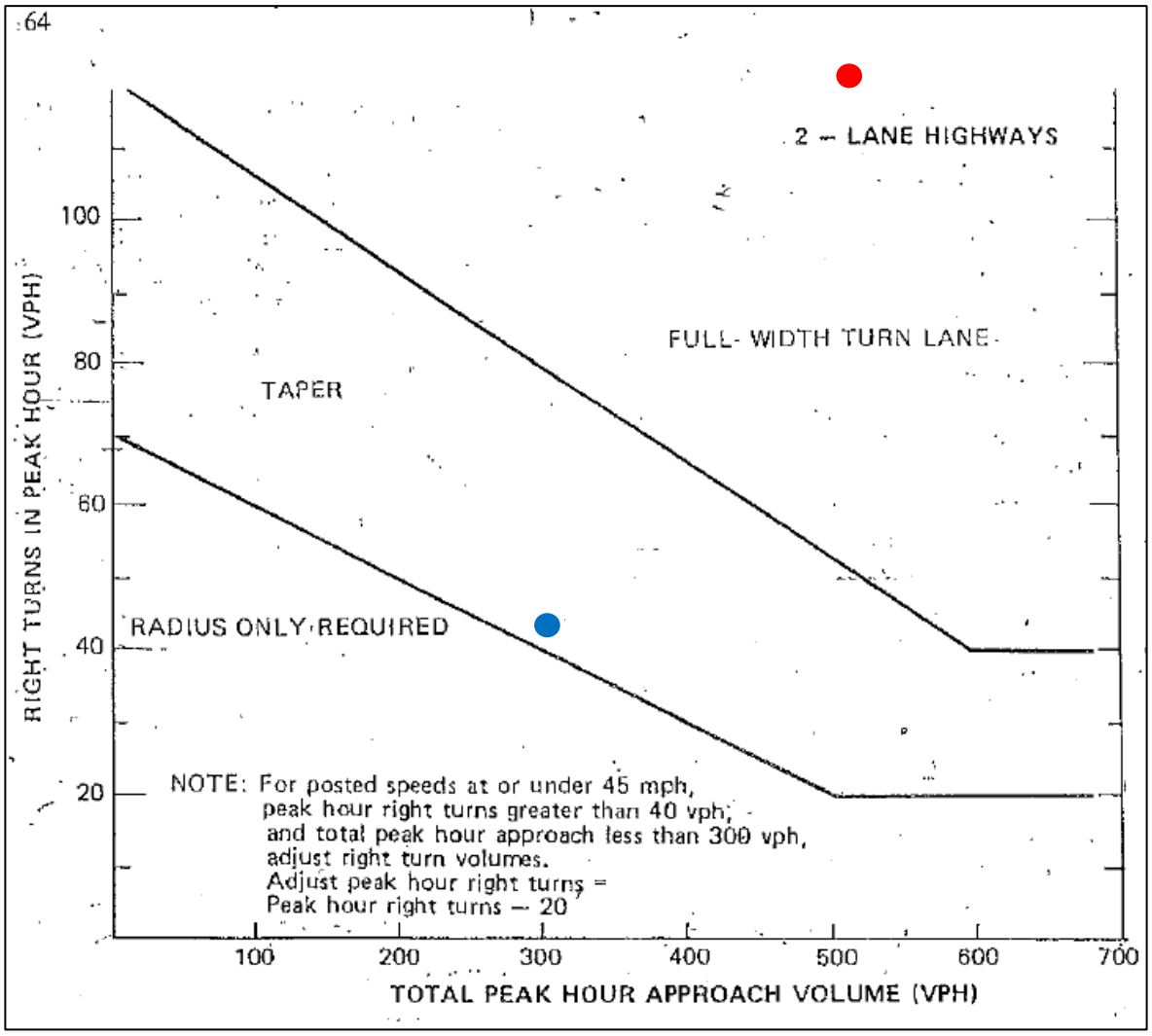
Enter = 0.33(412) = 136
Exit = 0.67(412) = 276

APPENDIX G
TURN LANE ANALYSES

RIGHT TURN LANE WARRANT ANALYSES
(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?
Southbound Highway 70S at the HopePark/Site Access	140	510	Yes	43	304	No

* V_R = Right Turn Volumes, V_A = Advancing Volumes



A full width right turn lane is warranted on southbound Highway 70S the HopePark/site access based on the projected AM peak hour traffic volumes.

APPENDIX H
SIGNAL WARRANT ANALYSIS

SIGNAL WARRANT ANALYSES

The methodology for determining if traffic signal control will be warranted at the intersection of Highway 70 and Highway 70S based on the PM peak hour volumes. This evaluation is based on the assumption that the eight highest hours of traffic volumes at the intersection will each exceed 6.25% of the Average Daily Traffic (ADT) and the PM peak hour represents 10% of the ADT. This methodology assumption is documented in ITE's Manual of Traffic Signal Design. Therefore, the eighth highest hour of a typical day was determined by multiplying the peak hour by 0.625.

Analysis of Existing Peak Hour Traffic Volumes: Highway 70 and Highway 70S

PM peak hour on Highway 70 (both approaches) = 605 vph
8th highest hour on Highway 70 (both approaches) = 605 vph * 0.625 = **378** vph

PM peak hour on Highway 70S (highest approach) = 443 vph
8th highest hour on Highway 70S (highest approach) = 443 vph * 0.625 = **277** vph

EXISTING CONDITIONS (1-lane approaches)

TRAFFIC SIGNAL WARRANT ANALYSIS

		Highway 70S	&	Highway 70			
	Speed Limit	50	Factor:	0.7	W1A	W1B	W1C
	Major Lanes	1			350	525	420
	Minor Lanes	1			105	53	84

	Traffic Volumes			REDUCED WARRANTS			
	Main Street	Minor Street					
HOUR	Both Directions	Highest Approach	#1A	#1B	#1C	#2	#3
6:00-7:00 AM	0	0	--	--	--	--	--
7:00-8:00	639	62	--	Yes	--	--	--
8:00-9:00	455	65	--	--	--	--	--
9:00-10:00	0	0	--	--	--	--	--
10:00-11:00	0	0	--	--	--	--	--
11:00-12:00 PM	378	277	Yes	--	--	Yes	--
12:00-1:00	378	277	Yes	--	--	Yes	--
1:00-2:00	378	277	Yes	--	--	Yes	--
2:00-3:00	378	277	Yes	--	--	Yes	--
3:00-4:00	433	274	Yes	--	Yes	Yes	Yes
4:00-5:00	504	334	Yes	--	Yes	Yes	Yes
5:00-6:00	588	389	Yes	Yes	Yes	Yes	Yes
6:00-7:00	378	277	Yes	--	--	Yes	--
7:00-8:00	0	0	--	--	--		
8:00-9:00	0	0	--	--	--	--	--
9:00-10:00 PM	0	0	--	--	--	--	--
Total Hours Met			**8**	**2**	**3**	**8**	**3**

Analysis of Background Peak Hour Traffic Volumes: Highway 70 and Highway 70S

REVISED BELLEVUE MALL REDEVELOPMENT TIS
23,676 daily trips – Assuming 5% pass our study area: 1,184 daily trips
6.25% for 8th highest hour: 74 trips (37 entering and 37 exiting)

PM peak hour on Highway 70 (both approaches) = 605 * 1.045 = 632 vpd
8th highest hour on Highway 70 (both approaches) = (632 vph * 0.625) + 37 = **432 vph**

PM peak hour on Highway 70S (highest approach) = 443 * 1.045 = 463 vph
8th highest hour on Highway 70S (highest approach) = (463 * 0.625) + 37 = **326 vph**

BACKGROUND CONDITIONS (1-lane approaches)

TRAFFIC SIGNAL WARRANT ANALYSIS

		Highway 70S	&	Highway 70			
	Speed Limit	50	Factor:	0.7	W1A	W1B	W1C
	Major Lanes	1			350	525	420
	Minor Lanes	1			105	53	84

	Traffic Volumes			REDUCED WARRANTS			
	Main Street	Minor Street					
HOUR	Both Directions	Highest Approach	#1A	#1B	#1C	#2	#3
6:00-7:00 AM	0	0	--	--	--	--	--
7:00-8:00	705	102	--	Yes	Yes	Yes	--
8:00-9:00	512	105	--	--	Yes	--	--
9:00-10:00	0	0	--	--	--	--	--
10:00-11:00	0	0	--	--	--	--	--
11:00-12:00 PM	432	326	Yes	--	Yes	Yes	Yes
12:00-1:00	432	326	Yes	--	Yes	Yes	Yes
1:00-2:00	432	326	Yes	--	Yes	Yes	Yes
2:00-3:00	432	326	Yes	--	Yes	Yes	Yes
3:00-4:00	489	323	Yes	--	Yes	Yes	Yes
4:00-5:00	564	386	Yes	Yes	Yes	Yes	Yes
5:00-6:00	651	444	Yes	Yes	Yes	Yes	Yes
6:00-7:00	432	326	Yes	--	Yes	Yes	Yes
7:00-8:00	0	0	--	--	--	--	--
8:00-9:00	0	0	--	--	--	--	--
9:00-10:00 PM	0	0	--	--	--	--	--
Total Hours Met			**8**	**3**	**10**	**9**	**8**

Analysis of Projected Peak Hour Traffic Volumes: Highway 70 and Highway 70S

SITE GENERATED TRAFFIC

AM Peak Hour:

30% of 468 enter = **Background + 140 vph** on Highway 70 from 7:00 – 8:00 AM

30% of 220 exit = **Background + 66 vph** on Highway 70S from 7:00 – 8:00 AM

PM Peak Hour of Generator:

30% of 136 enter = **Background + 41 vph** on Highway 70 from 3:00 – 4:00 PM

30% of 276 exit = **Background + 83 vph** on Highway 70S from 3:00 – 4:00 PM

PM Peak Hour of Adjacent Street Traffic:

30% of 98 enter = **Background + 29 vph** on Highway 70 from 4:00 – 6:00 PM

30% of 110 exit = **Background + 33 vph** on Highway 70S from 4:00 – 6:00 PM

2,530 daily trips – AM and PM peak hours = 2,530 – 688 – 412 = 1,430

6.25% of 1,430 for 8th highest hour: 89 trips (45 entering and 45 exiting)

30% of 45 enter = **Background + 14** on Highway 70 from 8:00 – 9:00 AM; 11:00 AM – 3:00 PM and 6:00 – 7:00 PM

30% of 45 exit = **Background + 14** on Highway 70S from 8:00 – 9:00 AM; 11:00 AM – 3:00 PM and 6:00 – 7:00 PM

PROJECTED CONDITIONS (1-lane approaches)

TRAFFIC SIGNAL WARRANT ANALYSIS

		Highway 70S	&	Highway 70			
	Speed Limit	50	Factor:	0.7	W1A	W1B	W1C
	Major Lanes	1			350	525	420
	Minor Lanes	1			105	53	84
	Traffic Volumes			REDUCED			
	Main Street	Minor Street		WARRANTS			
HOUR	Both Directions	Highest Approach	#1A	#1B	#1C	#2	#3
6:00-7:00 AM			--	--	--	--	--
7:00-8:00	845	168	Yes	Yes	Yes	Yes	Yes
8:00-9:00	526	119	Yes	Yes	Yes	--	Yes
9:00-10:00			--	--	--	--	--
10:00-11:00			--	--	--	--	--
11:00-12:00 PM	446	340	Yes	--	Yes	Yes	Yes
12:00-1:00	446	340	Yes	--	Yes	Yes	Yes
1:00-2:00	446	340	Yes	--	Yes	Yes	Yes
2:00-3:00	446	340	Yes	--	Yes	Yes	Yes
3:00-4:00	530	406	Yes	Yes	Yes	Yes	Yes
4:00-5:00	593	419	Yes	Yes	Yes	Yes	Yes
5:00-6:00	680	477	Yes	Yes	Yes	Yes	Yes
6:00-7:00	446	340	Yes	--	Yes	Yes	Yes
7:00-8:00			--	--	--	--	--
8:00-9:00			--	--	--	--	--
9:00-10:00 PM			--	--	--	--	--
Total Hours Met			**10**	**5**	**10**	**9**	**10**

DESCRIPTIONS OF TRAFFIC SIGNAL WARRANTS

The *Manual on Uniform Traffic Control Devices* (MUTCD) sets forth nine different warrants that have been developed by the traffic engineering profession to aid in the determination of when a signal is warranted. These warrants present minimum conditions that normally indicate when a traffic signal is justified at a particular location. The MUTCD states that "traffic control signals should not be installed unless one or more of the factors… are met."

Although the MUTCD provides nine different warrants, only four of these are potentially applicable at the intersection under study. These four warrants, described in the MUTCD, are 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 H1 exist on the major street and on the higher volume minor street approach to the intersection.

TABLE H1. 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	d200
1 Lane	2 Lanes or more	500	200

When the 85th percentile speed of the major street traffic exceeds 40 mph in either an urban or a rural area, or when the intersection lies within the built up area of an isolated community having a population of less than 10,000, the Minimum Vehicular Volume warrant is 70 percent of the requirements stated in Table H1.

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 H2 exist on the major street and on the higher volume minor street approach to an intersection. Also, the signal installation shall not seriously disrupt progressive traffic flow.

TABLE H2. 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

When the 85th percentile speed of major street traffic exceeds 40 mph in either an urban or a rural area, or when the intersection lies within the built up area of an isolated community having a population of less than 10,000, the Interruption of Continuous Traffic warrant is 70 percent of the requirements above.

In exceptional cases, 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)

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 curves in Figure H1 (existing conditions) and Figure H2 (projected conditions), for the existing combination of approach lanes.

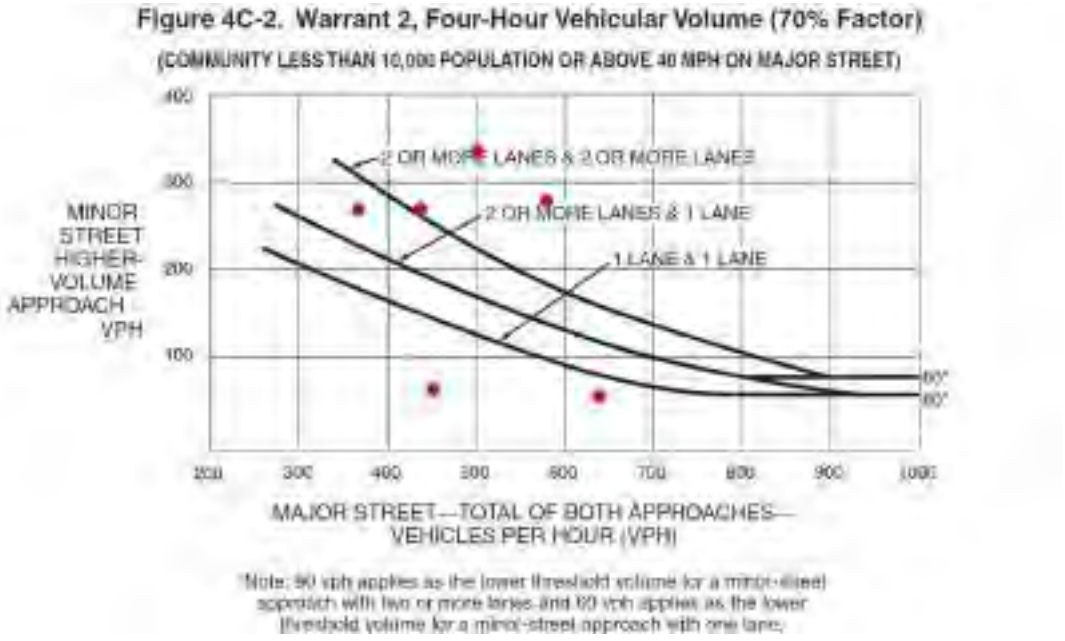


Figure H1. Warrant 2, Four-Hour Vehicular Volume – Existing Conditions

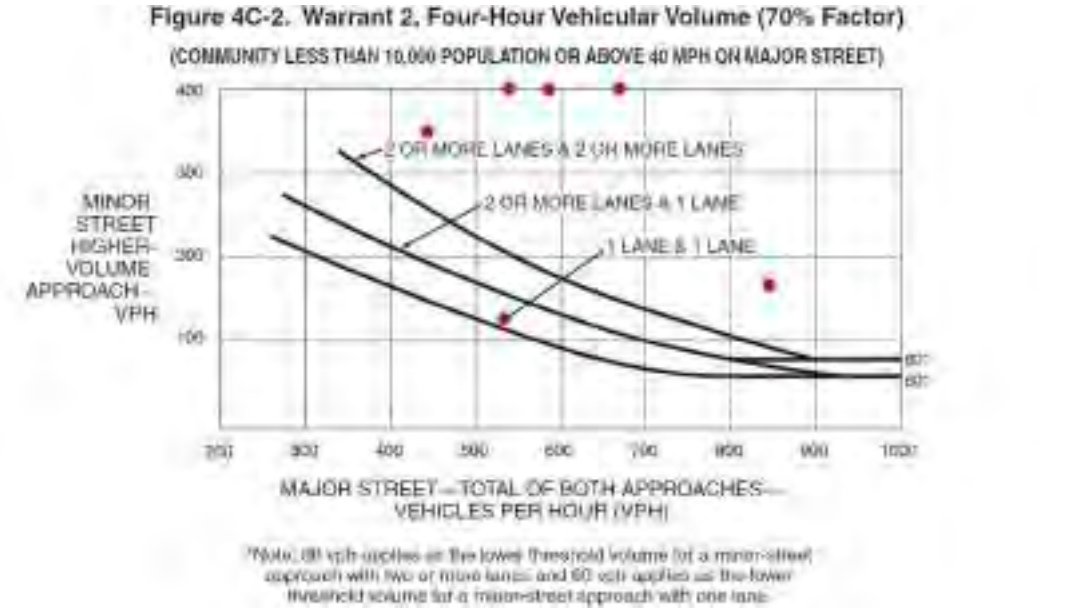


Figure H2. Warrant 2, Four-Hour Vehicular Volume – Projected Conditions

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 H3 (existing conditions) and Figure H4 (projected conditions), for the existing combination of approach lanes.

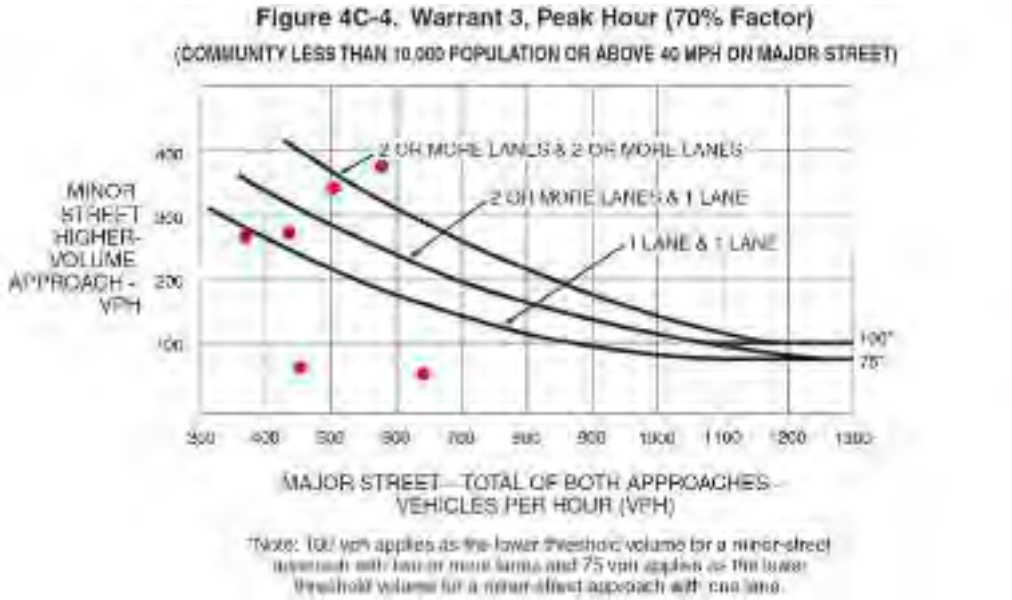


Figure H3. Warrant 3, Peak-Hour Vehicular Volume – Existing Conditions

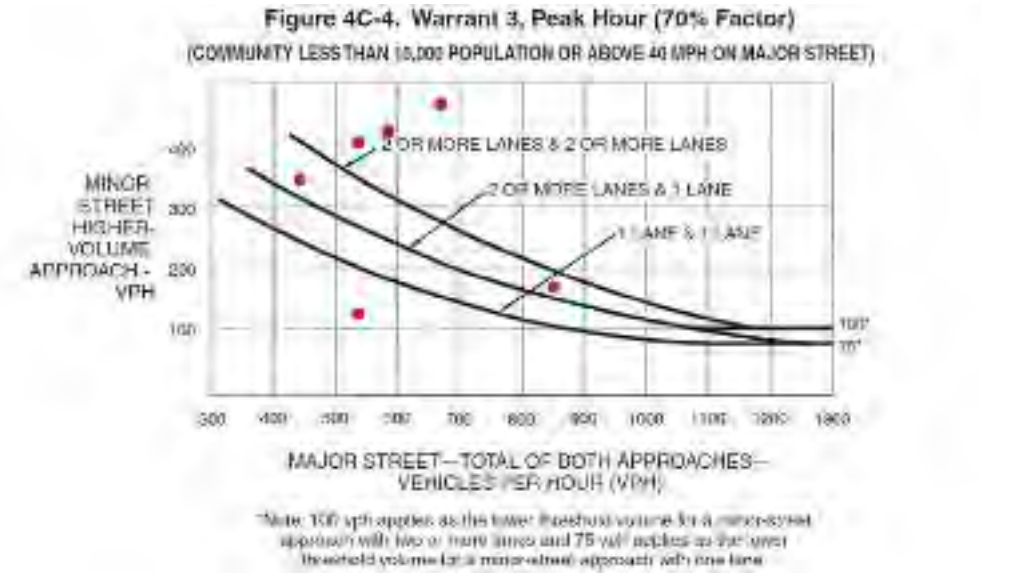


Figure H4. Warrant 3, Peak-Hour Vehicular Volume – Projected Conditions