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Memorandum

To: Pip Lewis & Laura Wernick
HMFH Architects, Inc.
130 Bishop Allen Drive
Cambridge, MA 02139

Date: January 21, 2010

Project No.: 52071.00

From: Robin Bousa
Director of Transportation Systems

Re: **Kimball School Parking Study**
Concord Schools Project
Concord, NH

Meghan Miller, E.I.T

Vanasse Hangen Brustlin, Inc. has completed a Parking Study in support of the Concord Schools Project as requested by HMFH Architects. The Parking Study has been performed for the Kimball School located on North Spring Street in Concord, NH. The development program consists of consolidating two existing schools through the demolition of the existing Kimball School and construction of a larger replacement school to accommodate approximately 535 students and 70 employees. In addition, the development program includes the demolition of the existing School Administration Unit (SAU) building located at 16 Rumford Street. The SAU building currently houses 37 employees. The study area for the parking assessment is limited to Warren and Pleasant Streets from Federal Street to Merrimack Street, Rumford Street from Short Street to Pleasant Street, and North Spring Street/South Spring Street from Short Street to Marshall Street as shown in Figure 1. Additionally, the study also includes the on-site parking lots that serve employees of the Kimball School. This memorandum addresses the following items:

- An inventory of the existing on-street parking supply;
- A detailed summary of the existing parking utilization data;
- A parking demand estimate for the proposed school; and
- Conclusions.

PARKING INVENTORY

VHB conducted a detailed on-street and on-site parking inventory within the parking study area. The inventory identified the number and type of parking spaces, the parking time limit, and the hours of enforcement for each block face. Figure 1 shows the general parking information within the study area. The inventory revealed a total of 159 parking spaces in the study area, of which, 54 spaces are unrestricted and 36 are off-street parking spaces in the two lots on the school site. To provide a conservative assessment of parking accommodations in the vicinity of the school, this study focuses on the unrestricted parking supply adjacent to the school since employees

theoretically may not be able to park in the other types of time restricted spaces and cannot park in the law enforcement spaces. A detailed summary table of the field inventory is provided in Table 1.

EXISTING PARKING UTILIZATION

Parking utilization counts identifying the number of occupied parking spaces on each block face were conducted on a typical school-day within the study area. The utilization counts were conducted on Thursday December 16, 2009 at 7:00 AM, 10:00 AM, 1:00 PM, 3:00 PM and 4:00 PM. Utilization rates for the unrestricted parking and the on-site school lots throughout the study area were highest at 10:00 AM with slightly lower rates at the 1:00 PM and 3:00 PM periods, while rates were lowest at 7:00 AM and 4:00 PM. Chart 1 illustrates the existing parking demand over the course of the day.

At 10:00 AM, the on-site school lot located off of North Spring Street was fully occupied with 31 parked vehicles, four of which were not in designated striped spaces. The smaller on-site lot behind the school on Rumford Street was at full capacity with seven vehicles, two of which were not in striped parking spaces. Unrestricted on-street parking along Blocks A, B, D, and F was 90 percent or greater utilized during the peak period at 10:00 AM. The parking count data indicated that of the 90 available on-site lot and unrestricted on-street spaces in the study area, the maximum number utilized was 87 spaces (97 percent utilized). Detailed summaries of the utilization counts are provided in Table 1.

FUTURE PARKING DEMAND

Since the proposed Kimball School Project is a consolidation of two schools, the additional employee parking demand needs to be quantified to determine whether there will be adequate parking once the project is complete. Future parking demand estimates for the proposed Kimball School Project were determined using projected employee population estimates provided by the client with assistance from the parking demand data published by the Institute of Transportation Engineers (ITE) in Parking Generation¹. It is projected that the future school will accommodate 70 full-time and part-time employees (27 employees more than the existing condition of 43 full-time and part-time employees). In addition, as noted previously, the existing School Administration Unit (SAU) building located on Rumford Street will be razed as part of the project. Therefore, 37 employees that currently park on-street in the study area will be relocated. With regard to parking supply, the future condition as shown on the latest site plan for the project calls for 41 on-site parking spaces, 5 more spaces than currently provided.

Under a worst-case scenario, the proposed Kimball School Project is expected to create a peak parking demand for approximately 27 additional employee parking spaces during the weekday peak hour at 10:00 AM. This is a conservative analysis approach since it is unlikely that all 27 additional employees will be present at the school at the same time. Existing data collected over the course of the day for the on-site parking lot located on North Spring Street was used to determine the time of day distribution pattern for the parking demand of new employees of the Kimball School. Table 2 presents the proposed parking demand for the additional employees by time of day.

It was estimated that the relocation of the 37 SAU employees results in a peak parking demand loss of 31 spaces during the average peak hour. This average peak parking demand estimate is based on ITE data for office buildings (LUC 701) which presents a rate of 0.83 vehicles/employee. This rate was applied to the 37 employees to determine the average peak parking demand. The weekday

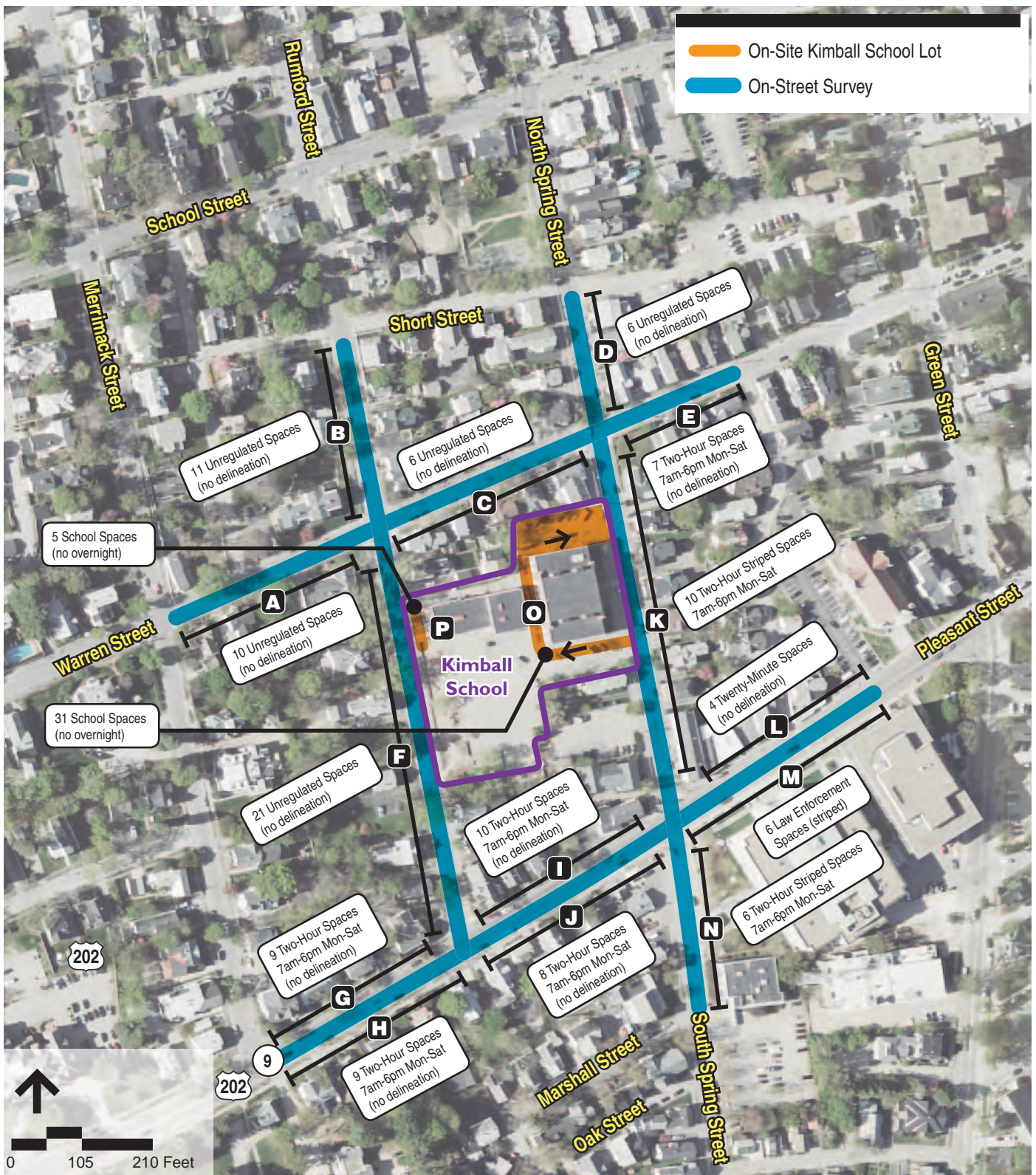
¹ Parking Generation 3rd Edition, Institute of Transportation Engineers, Washington, D.C., 2004.

suburban office (LUC 701) time of day distribution demonstrates a peak demand at 10:00 AM. Table 2 presents the expected reduction in parking demand over the course of the day that is related to the relocation of the 37 SAU employees.

The future parking demand for the study area was estimated by summing the existing parking demand, the parking demand of the additional employees of the Kimball School Project, and the resulting parking demand reduction due to the relocation of the SAU employees. It is expected that utilization rates will be highest at 10:00 AM and lowest at 3:00 PM and 4:00 PM. Chart 2 illustrates the expected future parking demand of the study area over the course of the day. This shift in time of day from the existing utilization is due to the change in land use: office employees to school employees. During the peak period at 10:00 AM, it is expected that the peak parking demand will be 83 vehicles which is a utilization rate of 88 percent. This drop in peak parking demand utilization is attributed to the fact that there are less additional school employees as a result of the project than there are SAU employees being relocated and due to the fact that the parking supply will slightly increase by 5 parking spaces with the new construction of the parking lot. Table 2 presents the future parking demand by time of day. Based on this evaluation, it is expected that the future parking supply, including existing on-street spaces and the on-site school lot to be constructed, will adequately accommodate the future parking demands of the Kimball School.

CONCLUSIONS

This evaluation has identified that the proposed Kimball School Project is expected to result in a peak parking demand of approximately 83 spaces within the study area during the weekday peak hour at 10:00 AM. With a future parking supply of 95 unrestricted spaces, this yields a utilization rate of 88 percent. The parking study provides a conservative methodology for estimating the parking demand over the course of the school day as a result of the Kimball School Project and the relocation of the 37 SAU employees. Based on the data collected in December 2009, and assuming no major changes to the parking utilization in the study area, the future unrestricted parking supply is expected to adequately meet parking demands within the study area even with the school expansion project. Therefore, the size of the parking lot that is illustrated in the latest Kimball School Project site plan (41 spaces) from HMFH is adequately sized to meet the needs of the Kimball School Project.



Source: New Hampshire DOT 2005 Imagery

Vanasse Hangen Brustlin, Inc.

Parking Study Area Limits and Parking Inventory Map

Figure 1

Kimball School
 Concord, New Hampshire

**Table 1
Existing Parking Utilization Study**

Street Block		Parking Spaces Information				Parking Utilization Information														
Name	Block Face ID	# of Spaces	Type (all on-street are parallel)	Meter	Duration	7:00 AM			10:00AM			1:00 PM			3:00 PM			4:00 PM		
						# Parked Vehicles	# Empty Spaces	% Utilization	# Parked Vehicles	# Empty Spaces	% Utilization	# Parked Vehicles	# Empty Spaces	% Utilization	# Parked Vehicles	# Empty Spaces	% Utilization	# Parked Vehicles	# Empty Spaces	% Utilization
Warren St (Merrimack St to Rumford St, south)	A	10	unregulated	no	unlimited	1	9	10%	9	1	90%	9	1	90%	8	2	80%	7	3	70%
Rumford St (Warren St to Short St, west)	B	11	unregulated	no	unlimited	3	8	27%	10	1	91%	8	3	73%	10	1	91%	9	2	82%
Warren St (Rumford St to N Spring St, south)	C	6	unregulated	no	unlimited	3	3	50%	4	2	67%	3	3	50%	4	2	67%	1	5	17%
N Spring St (Short St to Warren St, east)	D	6	unregulated	no	unlimited	1	5	17%	6	0	100%	5	1	83%	6	0	100%	6	0	100%
Warren St (N Spring St to Federal St, south)	E	7	7 am - 6 pm Mon-Sat	no	2 hour	1	6	14%	1	6	14%	3	4	43%	1	6	14%	3	4	43%
Rumford St (Warren St to Pleasant St, west)	F	21	unregulated	no	unlimited	12	9	57%	20	1	95%	15	6	71%	14	7	67%	13	8	62%
Pleasant St (Merrimack St to Rumford St, north)	G	9	7 am - 6 pm Mon-Sat	no	2 hour	0	9	0%	3	6	33%	1	8	11%	2	7	22%	2	7	22%
Pleasant St (Merrimack St to Rumford St, south)	H	9	7 am - 6 pm Mon-Sat	no	2 hour	3	6	33%	6	3	67%	6	3	67%	5	4	56%	3	6	33%
Pleasant St (Rumford St to N Spring St, north)	I	10	7 am - 6 pm Mon-Sat	no	2 hour	1	9	10%	10	0	100%	8	2	80%	7	3	70%	6	4	60%
Pleasant St (Rumford St to N Spring St, south)	J	8	7 am - 6 pm Mon-Sat	no	2 hour	5	3	63%	5	3	63%	4	4	50%	5	3	63%	3	5	38%
N Spring St (Pleasant St to Warren St, east)	K	10	7 am - 6 pm Mon-Sat	no	2 hour	1	9	10%	8	2	80%	9	1	90%	10	0	100%	4	6	40%
Pleasant St (N Spring St to Federal St, north)	L	4	short-term	no	20 min	0	4	0%	3	1	75%	4	0	100%	3	1	75%	2	2	50%
Pleasant St (N Spring St to Federal St, south)	M	6	law enforcement	no	unlimited	1	5	17%	7	0	117%	3	3	50%	2	4	33%	2	4	33%
S Spring St (Marshall St to Pleasant St, east)	N	6	7 am - 6 pm Mon-Sat (2 HC)	no	2 hour	1	5	17%	6	0	100%	6	0	100%	5	1	83%	2	4	33%
School Lot (N Spring St)	O	31	on-site school lot (2 HC)	no	no overnight	29	2	94%	31	0	100%	28	3	90%	19	12	61%	18	13	58%
School Lot (Rumford St)	P	5	on-site school lot (1 HC, 1 Visitor)	no	no overnight	4	1	80%	7	0	140%	1	4	20%	0	5	0%	0	5	0%
Total for Entire Study Area	-	159	-	-	-	66	93	42%	136	23	86%	113	46	71%	101	58	64%	81	78	51%
Total for Unlimited Parking & School Lots	-	90	-	-	-	53	37	59%	87	5	97%	69	21	77%	61	29	68%	54	36	60%

Note: All other block faces not listed in chart do not allow parking

Chart 1

2009 Existing Parking Utilization Kimball School Study Area

Existing Unrestricted Parking Supply
Existing Parking Demand

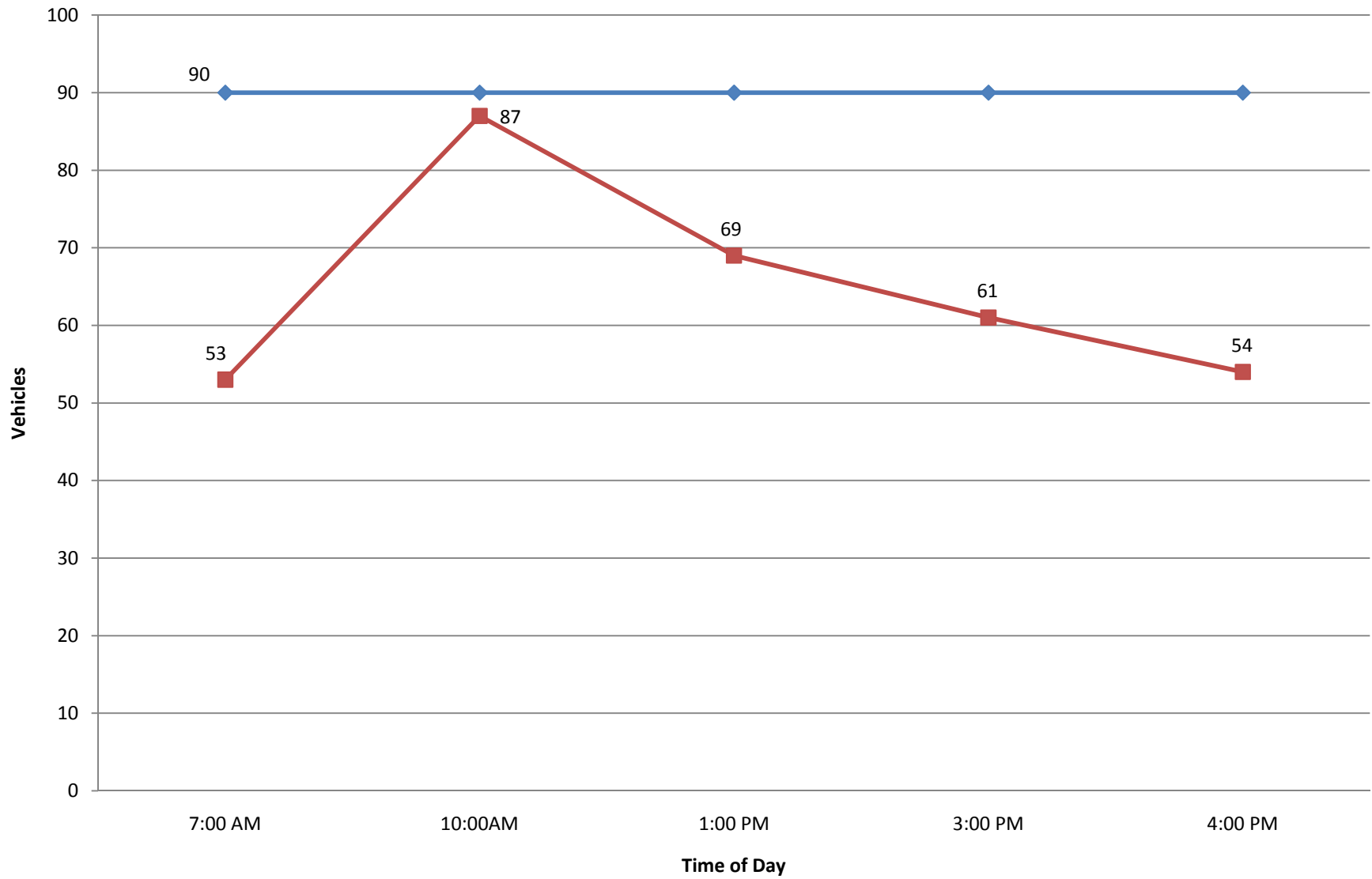


Table 2
Future Parking Utilization Analysis

	Parking Utilization Information														
	7:00 AM			10:00AM			1:00 PM			3:00 PM			4:00 PM		
	# Parked Vehicles	# Empty Spaces	% Utilization	# Parked Vehicles	# Empty Spaces	% Utilization	# Parked Vehicles	# Empty Spaces	% Utilization	# Parked Vehicles	# Empty Spaces	% Utilization	# Parked Vehicles	# Empty Spaces	% Utilization
Existing Parking Supply (Includes unlimited spaces and on-site school parking lots)	90			90			90			90			90		
Existing parking demand (only includes unlimited spaces and on-site school parking lots)	53	37	59%	87	5	97%	69	21	77%	61	29	68%	54	36	60%
Existing time of day distribution for Kimball School on-site lot (North Spring Street)	94%			100%			90%			61%			58%		
Net new future employee parking demand by time of day (27 new employees) ¹	25			27			24			17			16		
School Administration Unit (SAU) Building - office parking demand distribution by time of day ²	56%			100%			75%			87%			75%		
# Of SAU employees to be removed from on-street parking (37 existing employees)	(17)			(31)			(23)			(27)			(23)		
Future Parking Supply (Includes unlimited spaces and on-site school parking lots)	95			95			95			95			95		
Future Parking Demand in Study Area (Existing Parking Demand plus Additional Employee Parking Demand minus SAU office Parking Demand)	61	34	64%	83	12	88%	70	25	74%	51	44	54%	47	48	49%

¹ Employee projection provided by HMFH. Analysis assumes the most conservative approach that all 37 employees would demand a space at the same time during the peak hour of 10:00 AM

² Parking Generation 3rd Edition, Institute of Transportation Engineers, Washington, D.C., 2004.

Assumptions

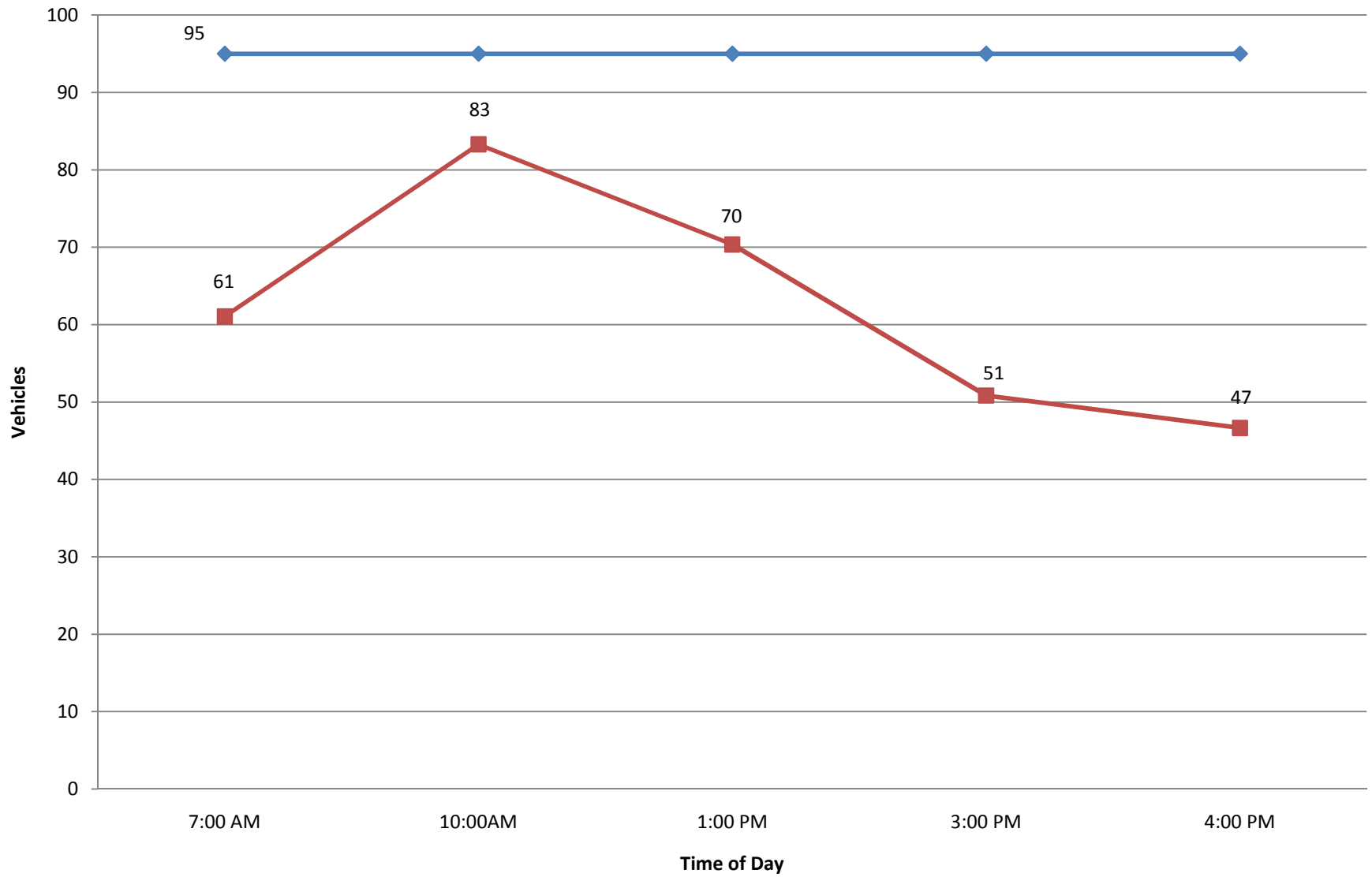
Net New future Kimball School Employees	27
Existing Parking Supply	90
Existing SAU Employees to be Relocated	37
Average Peak Parking Demand for Office (veh/employee)	0.83
Average Peak Parking Demand for SAU employees	31
Proposed Parking Supply* (Kimball School site plan)	95

*Includes 3 HC and 1 van spot for the on-site school lot

Chart 2

2012 Future Parking Utilization Kimball School Study Area

◆ Future Unrestricted Parking Supply
■ Future Parking Demand



Land Use: 701 Office Building

Land Use Description

ITE defines office uses in several categories. In reviewing the statistics for office parking demand, it was found that five of the basic office land uses had virtually no difference in parking demand characteristics. The following section merges these uses together for analysis purposes. **Analysts should continue to record the specific ITE land use category for data that they submit.**

710: General Office Building—A general office building houses multiple tenants; it is a location where affairs of businesses, commercial or industrial organizations, or professional persons or firms are conducted. An office building or buildings may contain a mixture of tenants including professional services; insurance companies; investment brokers; and tenant services, such as a bank or savings and loan institution, a restaurant or cafeteria and service retail facilities. Corporate headquarters (Land Use 714), single tenant office building (Land Use 715), office park (Land Use 750) and research and development center (Land Use 760) are related uses.

714: Corporate Headquarters Building—A corporate headquarters building is a single tenant office building that houses the corporate headquarters of a company or organization, which generally consists of offices, meeting rooms, space for file storage and data processing, a restaurant or cafeteria and other service functions. General office building (Land Use 710), single tenant office building (Land Use 715), office park (Land Use 750) and research and development center (Land Use 760) are related uses.

715: Single Tenant Office Building—A single tenant office building generally contains offices, meeting rooms and space for file storage and data processing for a single business or company, and possibly other service functions, including a restaurant or cafeteria. General office building (Land Use 710), corporate headquarters building (Land Use 714), office park (Land Use 750) and research and development center (Land Use 760) are related uses.

750: Office Park—Office parks are usually suburban subdivisions or planned unit developments containing general office buildings and support services, such as banks, restaurants and service stations, arranged in a park- or campus-like atmosphere. General office building (Land Use 710), corporate headquarters building (Land Use 714), single tenant office building (Land Use 715) and research and development center (Land Use 760) are related uses.

760: Research and Development Center—Research and development centers are facilities or groups of facilities devoted almost exclusively to research and development activities. The range of specific types of businesses contained in this land use varies significantly. Research and development centers may contain offices and light fabrication areas. General office building (Land Use 710), corporate headquarters building (Land Use 714), single tenant office building (Land Use 715) and office park (Land Use 750) are related uses.

Database Description

The database consisted of a mix of suburban and urban sites. Parking demand differed between the area types for one independent variable (1,000 sq. ft. GFA) but not for another (employees). Therefore, parking demand was analyzed separately for 1,000 sq. ft. and was combined for employees.

- Average parking supply ratios: 4.0 spaces per 1,000 sq. ft. GFA (84 study sites) and 1.1 spaces per employee (48 study sites).
- Average employee density: 3.3 employees per 1,000 sq. ft. GFA (54 study sites). Employee densities for corporate headquarter buildings and research and development centers tended to be slightly lower than the average.

Land Use: 701 Office Building

As noted, peak parking demand rates were different between sites located in suburban settings and those located in urban settings for the independent variable 1,000 sq. ft. GFA. The individual site surveys did not enable a quantitative explanation of the factors that caused the difference. One potential explanation may relate to differences in the availability of alternative modes (for example, transit, bike and pedestrian) available at the urban sites. Of the studies with data on transit availability and presence of a TDM program, the suburban sites reported about 55 percent with available transit services and 20 percent with TDM programs. The urban sites reported 100 percent with available transit and 83 percent with TDM programs of some form.

Weekend parking demand data were available at two study sites. At one site, the Saturday peak demand was less than 10 percent of peak weekday demand at the same site. At the other site, the Saturday and Sunday demand approached 90 percent of the weekday peak demand for the same site. It was not possible to derive reliable weekend parking demand rates due to lack of information on the nature of work conducted during the weekend at the two sites.

The size of one site (1.9 million sq. ft. GFA) resulted in a data plot with a scale that did not allow the 12 data points for sites less than 500,000 sq. ft. GFA to be reasonably distinguished for user analysis. Therefore, the large site was not included in the data plot for urban sites. The peak parking demand rate for the 1.9 million sq. ft. GFA site was 2.58 vehicles per 1,000 sq. ft. GFA, which was approximately the same as the average for the other 12 study sites.

The following table presents the time-of-day distributions of parking demand variation for suburban and urban sites. The only sites included in the table data were those that submitted at least four consecutive hours of parking demand observations (note: the majority of the parking demand data in the overall database consisted of one or two hourly observations).

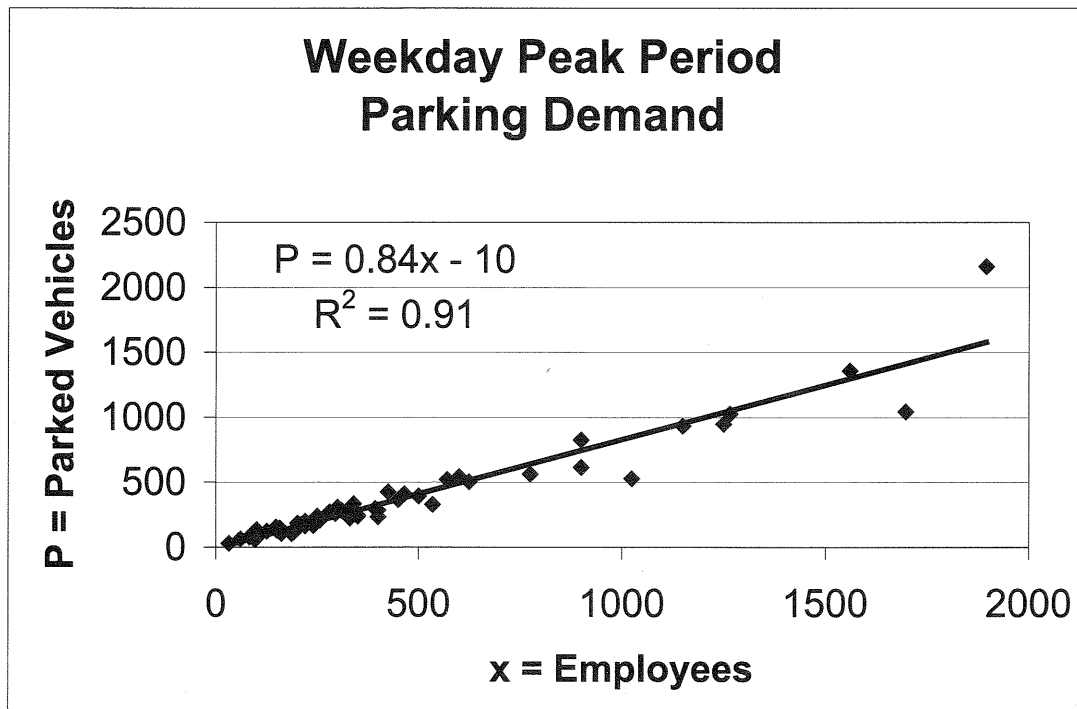
<i>Based on Vehicles per 1,000 sq. ft. GFA</i>	<i>Weekday Suburban Data</i>		<i>Weekday Urban Data</i>	
Hour Beginning	Percent of Peak Period	Number of Data Points*	Percent of Peak Period	Number of Data Points*
12:00–4:00 a.m.	–	0	–	0
5:00 a.m.	–	0	–	0
6:00 a.m.	6	1	–	0
7:00 a.m.	56	2	20	2
8:00 a.m.	86	11	68	4
9:00 a.m.	97	13	90	4
10:00 a.m.	100	12	96	4
11:00 a.m.	98	12	95	4
12:00 p.m.	87	11	94	4
1:00 p.m.	75	6	96	4
2:00 p.m.	84	6	100	4
3:00 p.m.	87	6	99	4
4:00 p.m.	75	6	92	4
5:00 p.m.	43	7	62	3
6:00 p.m.	18	2	–	0
7:00 p.m.	–	0	–	0
8:00 p.m.	–	0	–	0
9:00 p.m.	–	0	–	0
10:00 p.m.	–	0	–	0
11:00 p.m.	–	0	–	0

* Subset of database

Land Use: 701 Office Building

Average Peak Period Parking Demand vs: Employees On a Weekday

Statistic	Peak Period Demand
Peak Period	9:00 a.m.–12:00 p.m.; 2:00–4:00 p.m.
Number of Study Sites	58
Average Size of Study Sites	440 employees
Average Peak Period Parking Demand	0.83 vehicles per employee
Standard Deviation	0.16
Coefficient of Variation	19%
95% Confidence Interval	0.79–0.87 vehicles per employee
Range	0.52–1.35 vehicles per employee
85th Percentile	0.98 vehicles per employee
33rd Percentile	0.76 vehicles per employee



◆ Actual Data Points

— Fitted Curve/Average Rate