

January 7, 2005

Mr. Joseph F. Tulimieri
Executive Director
Cambridge Redevelopment Authority
One Cambridge Center
Cambridge, MA 02142

Subject: Kendall Square Urban Renewal Area
2004 Traffic Count Program and Trip Generation Analyses

Dear Mr. Tulimieri:

Fay, Spofford & Thorndike, LLC (FST) is pleased to submit this summary annual update of the Kendall Square Urban Renewal Area (the "Area") traffic count program to reflect May 2004 traffic conditions in the Area in compliance with the Area's Section 61 Finding requirements. Also included in this letter is an updated evaluation of the Area's existing trip generation characteristics compared to earlier projections FST made in connection with Plan Amendment # 6 in our letter dated May 12, 2004. Year 2004 tenant/employee travel surveys and parking garage data compiled by Boston Properties, LLP and Spaulding & Slye have also been analyzed and summarized. The 2004 count program represents the tenth year of the annual count update program.

Task I - Traffic Count Program

Figure 1 illustrates the program of ATR and the manual vehicle count locations conducted within the Area. Copies of the ATR and manual count field sheets are provided in the attached Technical Appendix. The latest automatic traffic recorder count program was conducted during the third and fourth weeks in May 2004. Counts were conducted at the following locations:

- Main Street, east of Ames Street (May 24 - 28).
- Broadway, east of the Mid-Block Connector (May 24 - 28).
- Binney Street, west of Fifth Street (May. 24 - 28).
- Third Street, north of Broadway (May 17 - 21).
- Vassar Street, southwest of Main Street and the Western Connector (May 17 - 21).

Additionally, on Tuesday, May 18, 2004 manual vehicle counts were conducted to determine drop-off/pick-up activity and ins/outs from the Cambridge Center East and North garages between 7 AM - 9 AM, 11 AM - 1 PM, and 4 PM - 6 PM in the following areas:

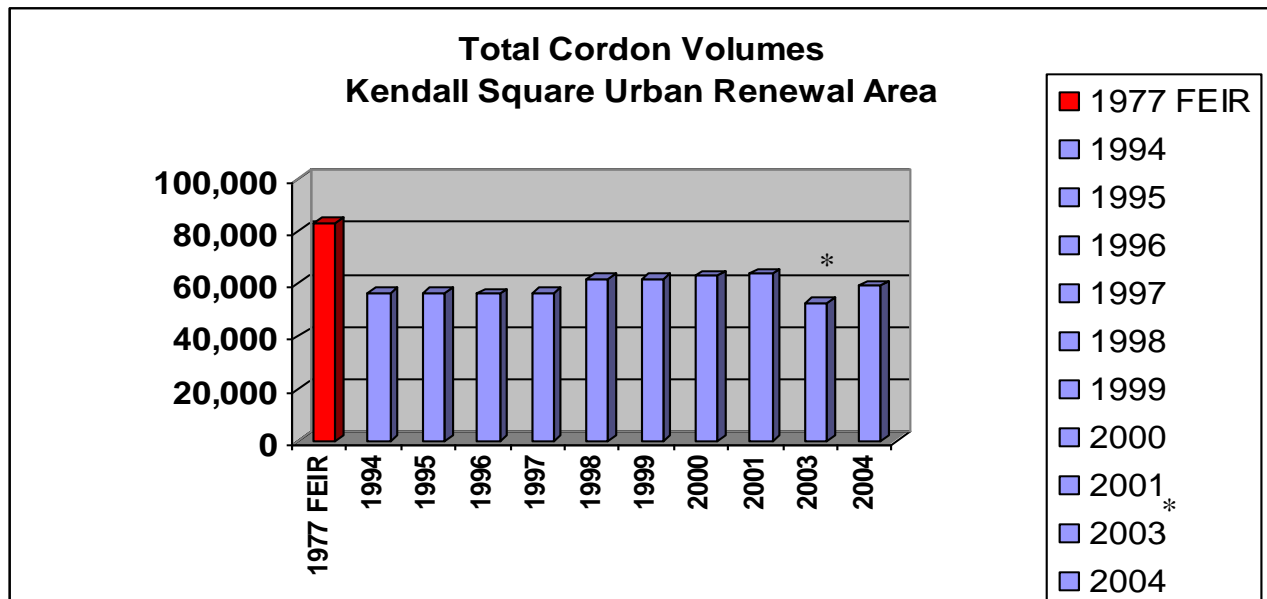
- Main Street, between Ames Street and Wadsworth Street.
- Main Street, between Ames Street and Vassar Street.
- Broadway, between the Mid-Block Connector and Third Street.
- Broadway, between the Mid-Block Connector and Binney Street.
- Mid-Block Connector, between Main Street and Broadway.

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Figure 1

- Western Connector, between Main Street and Broadway.
- Binney Street, in the vicinity of the Cambridge Center North Garage driveways.

Refer to the Technical Appendix for detailed automatic and manual count data. Table 1 provides a comparison of the Average Annual Weekday Traffic volumes (AAWDT) projected in the 1977 FEIR to the Area's AAWDT volumes counted by FST during 1989-2004. Locations of the 1994-2004 AAWDT volumes summary comparison are illustrated on Figure 2. Because Vassar Street was under construction during the 2003 count program, overall AAWDT volumes increased 12.7% in 2004. However, during the ten-year period between 1994 and 2004, the Area's AAWDT volumes have increased less than 5.1% or approximately 0.5% annually. Overall AAWDT volumes measured in 2004 were actually lower than those measured six years ago in 1998 (see below).



* Vassar Street was under construction during count program and open to one-way traffic only.

Two types of field data were collected manually -- entering and exiting vehicles to/from the Cambridge Center East and North Garages, and curbside drop-off/pick-up activities on Area streets and in designated zones at the local land uses. A summary of this data, by type and location, is contained in Table 2, which compares year 2004 to year 2003 manual count data.

Between the 2004 and 2003 manual count programs, the total occupied development square footage has remained the same. During the same period, measured overall trip generation during the combined AM, mid-day, and PM peak hours increased by approximately 4%, inclusive of drop-off/pick-up activity. Area trip generation decreased approximately 3% during the AM peak hour, was approximately 27% higher during the mid-day, and decreased approximately 1% during the PM peak hour. The year 2004 count program took place during a period when drop-off/pick-up

activity was 35% of all trip making, within the average range of drop-off/pick-up activity observed during prior years. Overall rates of AM, mid-day, and PM peak hour trip generation from Area developments are generally comparable to trip generation rates found during previous count programs.

During the combined AM, mid-day, and PM peak hours, Cambridge Center East and North garage activity increased by approximately 9% compared to the year 2003. Similarly, year 2004 drop-off/pick-up activity increased overall by approximately 10% compared to the year 2003. The Area's 2004 drop-off/pick-up activity represents approximately 35% of its actual year 2004 AM, mid-day, and PM peak hour traffic generation. As it has in prior years, drop-off/pick-up activity represents the most significant variable in the Area's trip generation totals.

Binney Street remains the only roadway that has exceeded its projection of average weekday volumes at full buildout provided in the 1977 EIR. ***Overall, actual year 2004 average weekday volumes measured on the Area roadway cordon are approximately 29% below those projected at full buildout of the Area in the 1977 EIR.***

As it has in prior years, the AM peak hour within the Area varies by location but typically occurs between the one-hour period from 8AM to 9AM. The Area's PM peak hour also varies by location but typically occurs during 5 PM to 6 PM. Count data indicates that the mid-day peak hour is typically between 12:00 Noon and 1 PM.

Table 3 provides a breakdown of the existing year 2004 land use quantities and types within the Area, and compares these development quantities to the maximum Area development permitted under Plan Amendment No. 5. As of May 2004, buildings in the Area contained approximately 2,381,700 square feet of gross floor area (sf GFA). This represents approximately 80% of the Area's maximum approved build-out potential of 3,002,100 gross square feet with Area Plan Amendment No. 6.

Both Boston Properties and Spaulding & Slye indicate that Area buildings under their control were fully occupied at the time the late May count program and early June tenant surveys were conducted.

FST's May 12, 2004 letter to you contained estimates of AM peak hour, PM peak hour, and daily trip generation projected for the Area at maximum buildout with Area Plan Amendment No. 6. In that letter, trip generation rates (i.e., trips per 1,000 sf GFA of development) were developed for each of the development land use types using the ITE Trip Generation manual. FST adjusted these rates to reflect the Area's localized proximity to transit, walk-in activity, employer shuttles, carpool promotion, etc. The adjusted trip generation rates, verified by ten years of counts performed between 1994-2004, were used as the basis for trip generation estimates associated with the maximum buildout condition under MEPA-approved Area Plan Amendment No. 6. Table 4 provides a summary of adjusted trip generation rates for Area land uses from FST's May 12, 2004 letter.

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INSERT
TABLE 1
11" x8" VOLUME COMPARISONS

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INSERT FIGURE 2
AAWDT MAP

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Insert Table 2

Kendall Square Urban Renewal Project Area
Peak Hour Manual Vehicle Count Summary

Table 3

Kendall Square Urban Renewal Project Area
 Existing 2004 and Future Development Quantities
 By Land Use Category¹

| LAND USE TYPE | 2004 EXISTING | PROJECTED MAXIMUM AREA DEVELOPMENT WITH PLAN AMENDMENT NO. 6 |
|------------------------------|------------------|--|
| Biotech Manufacturing | 2,000 | 214,550 ² |
| General and Technical Office | 1,769,700 | 1,977,550 ² |
| Retail | 90,000 | 90,000 |
| <i>Residential</i> | 0 | 200,000 ³ |
| Business Hotel | 190,000 | 190,000 |
| Hotel | <u>330,000</u> | <u>330,000</u> |
| TOTAL | 2,381,700 | 3,002,100 |

- 1 Quantities indicate square feet (sf) of Gross Floor Area (GFA) from Plan Amendment # 6.
- 2 Plan Amendment 6 adds a total of 29,100 gsf split between the biotech manufacturing and General and Technical Office land use categories.
- 3 The residential land use category added to the maximum area development plan during summer 2001 at the request of the City of Cambridge.

Table 4
 Kendall Square Urban Renewal Project Area ¹
 Adjusted Trip Generation Rates

| LAND USE TYPE | AM PEAK HOUR | PM PEAK HOUR | DAILY |
|-------------------------------------|-----------------|-----------------|-------|
| Biotech Manufacturing | 0.48 | 0.48 | 2.60 |
| General and Technical Office | 0.62 | 0.57 | 4.56 |
| Hotel | 0.46 | 0.48 | 5.71 |
| Business Hotel | 0.35 | 0.38 | 5.98 |
| Retail | 0.29 | 1.58 | 12.79 |
| Residential² | 0.21 | 0.26 | 2.56 |

¹ Trips per 1,000 sf GFA based on trip generation adjustments made in FST's May 12, 2004 letter concerning Plan Amendment No. 6.

Table 5 applies adjusted trip generation rates from FST's May 12, 2004 letter. Table 5 contains an estimate of the number of trips projected for land uses in the Area assuming existing 2004 development quantities from Table 3 above. From Table 5, combined AM and PM peak hour trips to/from the Area constitute approximately 22.9% of the Area's 2004 projected total daily trip ends (i.e., 1,341 AM peak hour + 1,359 PM peak hour trips represent 22.9% of the 11,770 daily trips).

Drop-off/pick-up and goods delivery trips measured during May 2004 accounted for approximately 35% of Area trips occurring during the combined AM, mid-day, and PM peak hours -- 30% of the AM, 44% of the mid-day, and 33% of the PM peak hour trips. Measured drop-off/pick-up activity in the year 2004 was 10% higher than measured during the year 2003, but is generally consistent with earlier Area projections made by FST. Drop-off/pick-up activity has been generally volatile over the years.

Table 6 provides a summary comparison of projected 2004 Area AM and PM peak hour trip generation (from rates contained in the FST's May 12, 2004 letter and summarized in Table 5) to 2004 rates calculated from measured 2004 Area ground counts (from Table 2). Table 6 also contains a comparison of 2004 daily Area trip ends based upon measured AM and PM peak hour volumes to 2004 daily trip end volumes based on the adjusted trip generation rates contained in the Plan Amendment No. 6 analysis and reiterated in Table 5.

Table 5

Kendall Square Urban Renewal Area
 Adjusted ITE Rate Trip Generation Computations for May 2004¹

| LAND USE TYPE | Gross Floor Area (000's SF) | AM Peak Hour | | PM Peak Hour | | Daily | |
|------------------------------|-----------------------------------|-----------------|--------------|-----------------|--------------|-------|---------------|
| | | RATE | TRIPS | RATE | TRIPS | RATE | TRIPS |
| Biotech Manufacturing | 2 | 0.48 | 1 | 0.48 | 1 | 2.49 | 5 |
| General and Technical Office | 1770 | 0.62 | 1,097 | 0.55 | 973 | 4.41 | 7,804 |
| Business Hotel | 190 | 0.35 | 67 | 0.38 | 72 | 4.40 | 835 |
| Hotel | 330 | 0.46 | 153 | 0.48 | 158 | 5.71 | 1,884 |
| Retail | 90 | 0.26 | 23 | 1.71 | 154 | 13.79 | 1,241 |
| Residential | 0 | 0.21 | 0 | 0.26 | 0 | 2.56 | 0 |
| TOTAL | 2,382 | | 1,341 | | 1,359 | | 11,770 |

1 Trips per 1,000 sf GFA adjusted to reflect assumed high use of transit and other non-single occupant vehicles per FST's May 12, 2004 letter concerning Plan Amendment No. 6.

From Table 6 on the page that follows, the year 2004 actual trip generation for Area uses in the AM peak hour is 16% lower than the level calculated by applying the Amendment No. 6 trip generation projection methodology (1,125 trips versus 1,341 trips). Similarly, the actual PM peak hour trip generation is 11% lower than the projected volume from the Amendment No. 6 trip generation projection methodology (1,207 versus 1,359 trips). Area development continues to generate traffic at rates generally lower than projected.

Similarly, actual daily trip ends to and from Area land uses during the year 2004 were found to be 14% lower than would be expected using the 2004 Plan Amendment No. 6 analysis methodology.

Task II - Review of Tenant/Employee Travel Surveys

Two types of tenant/employee travel surveys were reviewed: 1) a survey by Boston Properties and Spaulding & Slye of their tenants; and 2) surveys of tenant garage use in the North and East Cambridge Center garages.

During June 2004, Boston Properties and Spaulding and Slye conducted surveys of its Cambridge Center tenants to provide an indication of employee travel mode choices and use within the Area. This information is supplemental to the actual count data. Refer to the Technical Appendix for a copy of the overall survey results.

Table 6

Kendall Square Urban Renewal Area
 Actual vs. Projected 2004 Trip Generation

| | AM PEAK HOUR ¹ | PM PEAK HOUR ¹ | DAILY TRIP ENDS |
|---|---------------------------------|---------------------------------|-----------------------|
| 2004 PROJECTED (FORECAST) ² | 1,341 | 1,359 | 11,770 |
| 2004 EXISTING ³ | 1,125 | 1,207 | 10,139 ³ |
| NET DIFFERENCE (%) | (- 16%) | (-11%) | (- 14%) |
| | | | |

- 1 AM and PM peak hour trips represent both entering and exiting vehicle trip ends.
- 2 Predicted trip totals are based on adjusted trip generation rates developed for FST's May 12, 2004 letter regarding Area Plan Amendment No. 6 and the 2004 Area development quantities reported in Table 3 of this correspondence.
- 3 Refer to Table 2 for existing May 2004 AM and PM peak hour trip counts. Daily trip ends were **estimated** from the actual AM and PM peak hour trip generation totals and their expected relationship to daily trip generation based upon the relationship of AM and PM peak hours to daily generation reported in Table 5 (adjusted ITE rates).

The tenant survey was completed by a total of 10 firms and businesses representing 579 employees or approximately 14% of the Area's total number of employees, estimated at approximately 4,000. Overall tenant survey results are generally consistent with prior year surveys. Respondents to the June 2004 survey indicated that their employees arrive to Kendall Square as follows:

- 39% drive alone;
- 56% use MBTA services;
- 4% walk or bicycle; and
- Less than 1% carpool with 2 or more people.

Approximately 61% of respondents indicated they use alternative modes of transportation to and from work rather than drive alone. The proportion of employees who indicated they drive alone decreased by 17% compared to respondents of the 2003 survey. Likewise, the proportion of respondents who report using MBTA services increased by 22% over those who responded to the 2003 survey. Navimedix, the largest of the employer respondents, estimates 70% of its employees use the MBTA. All of the responding Area businesses, start business operations between 7:00-9:00 AM and all conclude between 5:00-6:00 PM. Of the respondents, 90% offer flextime hours. Of employers surveyed, 40% offer incentives for free or subsidized parking (i.e., driving) incentives, while 90% offer MBTA (i.e., transit) pass use incentives. Approximately 44% of the employers offering transit incentives also offer driving incentives. Overall, survey responses are compatible with earlier FST projections. Survey responses continue to indicate a very strong reliance on alternative travel modes compared to typical suburban areas where 90% or more employees drive alone to work sites.

The *ITE Trip Generation* report (6th Edition, 2003) indicates that the vehicle trips per employee for the General Office category are 0.48 during the AM peak hour and 0.46 during the PM peak hour. The May 2004 update data indicates that 0.28 vehicle trips are actually generated per employee during the AM peak hour. During the PM peak hour, 0.30 vehicle trips are actually generated per employee. ***Therefore, during 2004, actual employee-based trip generation rates were 35%-42% lower than unadjusted ITE employee-based AM and PM peak hour rates estimated for the Area.***

Task III - Review of Area Parking Garage Data

Boston Properties and Spaulding & Slye provided a weeklong usage survey of the Cambridge Center North and East parking garages for the period from May 24-28, 2004. These records indicate that a maximum of 1,667 tenant employees who leased monthly parking in the East and North Cambridge Center garages and transient parkers were parked in the garages simultaneously. This represents a 7% increase in parked vehicles compared to the 1,555 parked vehicles, at maximum occupancy, counted during the May 2003 survey period. If the number of employees is assumed to be relatively constant throughout the year, during peak demand times, the Area averaged approximately 0.42 occupied parking spaces per employee during 2004.

May 2004 traffic counts at the garages were assumed to reflect average annual conditions. Detailed hour-by-hour garage occupancy data was compared to garage data collected for a similar period during May 2003.

The number of trips destined for the Area that park outside the Area, and subsequently would not have been accounted for in the data collection program is likely to be small. Similarly, the amount of vehicles that may have parked in the Area, and were not destined for the Area is also likely to be small.

Copies of comparative weeklong garage surveys are contained in the attached Technical Appendix.

Table 7 summarizes and compares average trip activity data during the AM and PM peak hours when one-day garage surveys were conducted on May 28, 2003 and May 18, 2004. The AM peak hour at both garages continues to occur from 8 to 9 AM, and the PM peak hour continues to occur between 5 to 6 PM. Findings of the garage peak hours are consistent with findings for the Area's street peaks (from the ATR data) and the Area's drop-off/pick-up activity.

Table 8 contains an estimated comparison of peak parking accumulation, as well as a comparison to the total spaces available in the Cambridge Center North garage during the week average for May 2004 and October 2003. While there was no change in the occupied building square footage, a comparison of the manual count data to the submitted garage operator data indicates that overall garage utilization during May 2004 was higher than what it was in October 2003.

This count program accurately accounts for the vast majority of vehicle trips related to the Area. This finding is due to the proximity of the East and North Garages to the Area's land uses, the modest price differential to surface lots external to the Area, and the slight increase in overall traffic growth on the Area's roadways.

Table 7

Kendall Square Urban Renewal Project Area
Cambridge Center East and North Garages
 Summary and Comparison of 2003-2004 Garage Vehicle Trip Activity¹

| LOCATION | May 28, 2003 ² | | May 18, 2004 ³ | | PERCENT CHANGE BETWEEN MAY 2003 AND MAY 2004 | |
|-------------------------------|---------------------------|------------|---------------------------|------------|--|-------------|
| | AM | PM | AM | PM | AM | PM |
| Cambridge Center North Garage | 279 | 294 | 325 | 342 | +17% | +16% |
| Cambridge Center East Garage | 239 | 223 | 231 | 238 | -3% | +5% |
| COMBINED TOTAL | 518 | 517 | 556 | 580 | +7% | +12% |

- 1 Volumes represent total vehicular movements entering and exiting the two garages.
- 2 Volumes represent a typical one-day sample on Wednesday, May 28, 2003.
- 3 Volumes represent a typical one-day sample on Tuesday, May 18, 2004.

Table 8

Kendall Square Urban Renewal Project Area
Cambridge Center East and North Parking Garages
 Summary and Comparison of Peak Parking Occupancy - 2001 to 2004

| LOCATION | CAPACITY Number of Spaces ¹ | PEAK PARKING OCCUPANCY 10/22-10/26/01 ² | | PEAK PARKING OCCUPANCY 10/27-10/31/03 ³ | | PEAK PARKING OCCUPANCY 5/24-5/28/04 ⁴ | |
|---|---|---|---------------|---|---------------|---|---------------|
| | | Number Occupied | % of Capacity | Number Occupied | % of Capacity | Number Occupied | % of Capacity |
| Cambridge Center North Garage | 1,170 | 937 | 80% | 937 | 80% | 927 | 79% |
| Cambridge Center East Garage¹ | 767 | 703 | 92% | 653 | 85% | 740 | 96% |
| COMBINED TOTAL | 1,937 | 1,640 | 85% | 1,555 | 80% | 1667 | 86%-- |

- 1 Does not include 75 spaces in the Marriott "nest"; garage capacity has been increased from 762 to 767 since 2000, according to Spaulding & Slye occupancy data.
- 2 Average peak garage occupancy data for the week of October 22-26, 2001, for the Cambridge Center East Garage and for Tuesday, October 23, 2001, for the Cambridge Center North Garage.
- 3 Average peak garage occupancy data during the week of October 27-31, 2003, for the Cambridge Center East Garage and during the week of October 6-10, 2003 for the Cambridge Center North Garage.
- 4 Average peak garage occupancy data during the week of May 24-28, 2004 for the Cambridge Center North and East Garages.

While higher than the 2003 survey, but similar to the results of the 2001 survey, the peak 86% combined garage data for May 2004 indicates the two Area garages are at their practical capacity during peak demand periods. Monthly garage occupancy data for the Cambridge Center East garage indicates that it regularly exceeds its practical capacity (85% of actual capacity) during the peak demand period of 11 AM – 2 PM. The 79% occupancy of the Cambridge Center North garage, while down 1% from 2003, is also approaching its practical capacity. Therefore, the data indicates that additional parking provided by the 1,100-space Cambridge Center West Garage (under construction) will be needed to accommodate the remainder of the Area's buildout. While the Area is well served by public transportation, enough additional parking must be provided to ensure that Area parking demands are accommodated within the Area.

Conclusion

'Background' traffic found during May 2004 was found to be comparable to that found six years ago. The Area continues to generate vehicle trips at rates far lower than those contained in the *ITE Trip Generation* report.

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Actual Area vehicle trip generation rates -- including garage trips plus drop-off/pick-up trips -- continue to be similar to, but lower than, those contained in FST's May 12, 2004 Amendment No. 6 letter to you. ***We therefore conclude there is no 'significant variation' to report regarding the traffic generation and its impacts within the Area.***

Please do not hesitate to contact me should you have questions on the study update or require additional information.

Very truly yours,

FAY, SPOFFORD & THORNDIKE
By

Gary L. Hebert, P.E., PTOE
Vice President

GLH:gh
LG-038B:000E57
Attmts: Technical Appendix

cc: Mr. M. Cantalupa, Boston Properties
Mr. A. Spaulding, Spaulding & Slye
Mr. D. McGarrah, Foley, Hoag & Eliot
City of Cambridge Traffic and Parking Department