



To: Danielle Blake, ARE

Date: July 20, 2021
Project #: 15366.00

Memorandum

From: Randall Hart, Principal
Noah Yoskowitz, P.E.

Re: Riverside Center Trip Generation Summary

VHB has prepared this memo to summarize trip generation associated with the proposed change in use of a portion of the building at Riverside Center located at 275 Grove Street in Newton, MA. Currently, the development is comprised of three buildings with a total of 419,608 square feet of office and lab space. It is proposed that building three, which currently contains 126,107 square feet of general office space be changed to include 126,107 square feet of lab space. Table 1 summarizes the existing and proposed square footage summary for Riverside Center.

Table 1 Riverside Center Square Footage Summary, Existing vs. Proposed

| Existing Buildout | | | | |
|--------------------------|-------------------|-------------------|-------------------|----------------------|
| | Building 1 | Building 2 | Building 3 | Total |
| Office | 124,261 | 101,995 | 126,107 | 352,363 |
| Lab | <u>67,244</u> | <u>0</u> | <u>0</u> | <u>67,244</u> |
| Total | 191,505 | 101,995 | 126,107 | 419,607 |

| Proposed Buildout | | | | |
|--------------------------|-------------------|-------------------|-------------------|-----------------------|
| | Building 1 | Building 2 | Building 3 | Total |
| Office | 124,261 | 101,995 | 0 | 226,256 |
| Lab | <u>67,244</u> | <u>0</u> | <u>126,107</u> | <u>193,351</u> |
| Total | 191,505 | 101,995 | 126,107 | 419,607 |

Trip Generation

The ITE *Trip Generation Manual*¹ was used to estimate trips associated with the existing and proposed office and lab spaces. The trip generation estimates for these uses were calculated using Land Use Code (LUC) 710 (General Office Building) and LUC 760 (Research & Development Center). The unadjusted existing and proposed vehicle trip estimates are presented in Table 2.

¹ Trip Generation Manual, 10th Edition, Institute of Transportation Engineers, Washington, D.C., 2017



Table 2 Unadjusted Trip Generation Summary

| | <u>Existing Buildout</u> | | | <u>Proposed Buildout</u> | | |
|----------------------------------|--------------------------|-------------------------------------|------------------------------------|--------------------------|-------------------------------------|------------------------------------|
| | Office ^a | Research & Development ^b | Total New Unadjusted Vehicle Trips | Office ^a | Research & Development ^b | Total New Unadjusted Vehicle Trips |
| Weekday Daily | | | | | | |
| Enter | 1,800 | 379 | 2,179 | 1,171 | 1,089 | 2,260 |
| Exit | <u>1,800</u> | <u>379</u> | <u>2,179</u> | <u>1,171</u> | <u>1,809</u> | <u>2,260</u> |
| Total | 3,600 | 758 | 4,358 | 2,342 | 2,178 | 4,520 |
| Weekday Morning Peak Hour | | | | | | |
| Enter | 308 | 21 | 329 | 206 | 61 | 267 |
| Exit | <u>50</u> | <u>7</u> | <u>57</u> | <u>33</u> | <u>20</u> | <u>53</u> |
| Total | 358 | 28 | 386 | 239 | 81 | 320 |
| Weekday Evening Peak Hour | | | | | | |
| Enter | 60 | 316 | 376 | 40 | 14 | 54 |
| Exit | <u>5</u> | <u>28</u> | <u>33</u> | <u>208</u> | <u>81</u> | <u>289</u> |
| Total | 65 | 344 | 409 | 248 | 95 | 343 |

a Based on ITE LUC 710 (General Office Building) for 352,363 SF (existing) and 226,256 SF (proposed)

b Based on ITE LUC 760 (Research & Development Center) for 67,244 (existing) and 193,351 SF (proposed)

The unadjusted vehicle trips were then converted into person-trips by applying the average vehicle occupancy of 1.18 for office and research and development trips as outline by the U.S. Department of Transportation². The unadjusted vehicle trips were converted to person-trips to apply mode share credits. Applying these credits to person-trips allows for estimates to be made for the total number of site-generated transit users, walkers, and cyclists in addition to the total number of site-generated vehicles.

The Riverside Center development is located adjacent to the Riverside MBTA Station providing direct access to MBTA Green Line and several MBTA bus routes and local shuttles. It is therefore expected that a portion of the employees who will work on-site will use the Green Line or bus to travel to and from the Riverside Center. It was assumed that the mode share percentages used for The Station at Riverside Redevelopment TIAS would apply to Riverside Center as well. The mode split in the TIAS was based on 2010-2015 Journey-to-Work data for employees who work in the City of Newton. It was therefore assumed that 88 percent of person-trips would be made to Riverside Center by vehicle, 7

² Summary of Travel Trends: 2017 National Household Survey, US Department of Transportation, Federal Highway Administration, Washington, D.C. 2017



percent by transit, and 5 percent by walking or bicycling. Lastly, the person-trips were converted back to vehicle trips by applying the local average vehicle occupancy of 1.12 for office and research and development workers, which was based on City of Newton Census data. Table 3 presents the peak hour trips by mode for the existing and proposed buildouts.

Table 3 Peak-Hour Trips by Mode

| | <u>Existing Buildout</u> | | | <u>Proposed Buildout</u> | | | <u>Change in Vehicle Trips</u> |
|----------------------------------|--------------------------|------------------------|-------------------------------|--------------------------|------------------------|-------------------------------|--------------------------------|
| | <u>Transit Trips</u> | <u>Walk/Bike Trips</u> | <u>Adjusted Vehicle Trips</u> | <u>Transit Trips</u> | <u>Walk/Bike Trips</u> | <u>Adjusted Vehicle Trips</u> | |
| Weekday Daily | | | | | | | |
| Enter | 180 | 128 | 2,020 | 187 | 133 | 2,096 | +76 |
| Exit | <u>180</u> | <u>128</u> | <u>2,020</u> | <u>187</u> | <u>133</u> | <u>2,096</u> | <u>+76</u> |
| Total | 360 | 256 | 4,040 | 374 | 266 | 4,192 | +152 |
| Weekday Morning Peak Hour | | | | | | | |
| Enter | 27 | 19 | 305 | 22 | 16 | 247 | - 58 |
| Exit | <u>5</u> | <u>4</u> | <u>53</u> | <u>5</u> | <u>4</u> | <u>50</u> | <u>- 3</u> |
| Total | 32 | 23 | 358 | 27 | 20 | 297 | - 61 |
| Weekday Evening Peak Hour | | | | | | | |
| Enter | 5 | 4 | 61 | 4 | 3 | 50 | - 11 |
| Exit | <u>28</u> | <u>21</u> | <u>319</u> | <u>24</u> | <u>17</u> | <u>268</u> | <u>- 51</u> |
| Total | 33 | 25 | 380 | 28 | 20 | 318 | - 62 |

As can be seen, compared to the existing conditions the proposed Riverside Center development is expected to generate approximately 152 additional vehicle trips (76 more entering and 76 more exiting) on a daily basis, 61 fewer vehicle trips (58 fewer entering and 3 fewer exiting) during the weekday morning peak hour, and 62 fewer vehicle trips (11 fewer entering and 51 fewer exiting) during the weekday evening peak hour. The trip generation worksheets are provided as an attachment to this memorandum.



Parking Generation

The ITE *Parking Generation Manual*³ was used to estimate the parking demand associated with the existing and proposed office and lab spaces. Similar to trip generation, parking generation estimates for these uses were calculated using LUC 710 and LUC 760. The existing and proposed parking demand estimates are presented in Table 4. As can be seen, the existing Riverside Center development is expected to generate a parking demand of 1015 parking spaces, and the proposed Riverside Center development is expected to generate a parking demand of 25 additional spaces for a new total parking demand of 1040 parking spaces. The parking generation worksheets are provided as an attachment to this memorandum.

Table 4 Parking Demand Summary

| | Office ^a | Research & Development ^b | Total Parking Demand |
|-------------------------------------|---------------------|-------------------------------------|----------------------|
| Existing Buildout | 842 | 173 | 1015 |
| Proposed Buildout | 541 | 499 | 1040 |
| Net Change in Parking Demand | -301 | +326 | +25 |

a Based on ITE LUC 710 (General Office Building) for 352,363 SF (existing) and 226,256 SF (proposed)

b Based on ITE LUC 760 (Research & Development Center) for 67,244 (existing) and 193,351 SF (proposed)

We understand that the Riverside Center site currently has a parking supply of approximately 1100 garage spaces plus approximately 300 surface parking spaces for a total of approximately 1400 on-site parking spaces, which can accommodate the anticipated parking demand.

In summary, the change in land use of the 126,107 square feet of office space to lab space will result in additional vehicle trips on a daily basis, but it will result in fewer trips during the weekday morning and weekday evening peak hours. Also, with the proposed change in land use the parking demand will also increase by 25 parking spaces to a new parking demand of 1040 spaces, which can be accommodated by the existing parking supply.

³ Parking Generation Manual, 5th Edition, Institute of Transportation Engineers, Washington, D.C., 2019

Riverside Center EXISTING
Trip Generation Estimate
VHB
7/13/2021

| | Size | Trip Rate | Unadjusted Vehicle Trips | VOR | Person Trips | Transit Share | Walk/Other Share | Vehicle Share | Local VOR | Transit Trips | Walk/Other Trips | Adjusted Vehicle Trips |
|---------------------------|---------|-----------|--------------------------|------|--------------|---------------|------------------|---------------|-----------|---------------|------------------|------------------------|
| Daily Office | | | 3600 | | 4,248 | | | | | 298 | 212 | 3,338 |
| In | 352.364 | | 1800 | 1.18 | 2,124 | 7% | 5% | 88% | 1.12 | 149 | 106 | 1,669 |
| Out | KSF | | 1800 | 1.18 | 2,124 | 7% | 5% | 88% | 1.12 | 149 | 106 | 1,669 |
| Daily R&D | | 11.26 | 757 | | 894 | | | | | 62 | 44 | 702 |
| In | 67.244 | 5.63 | 379 | 1.18 | 447 | 7% | 5% | 88% | 1.12 | 31 | 22 | 351 |
| Out | KSF | 5.63 | 379 | 1.18 | 447 | 7% | 5% | 88% | 1.12 | 31 | 22 | 351 |
| Total Daily | | | 4,357 | | | | | | | 360 | 256 | 4,040 |
| In | | | 2,179 | | | | | | | 180 | 128 | 2,020 |
| Out | | | 2,179 | | | | | | | 180 | 128 | 2,020 |
| AM Office | | | 358 | | 422 | | | | | 29 | 21 | 331 |
| In | 352.364 | | 308 | 1.18 | 363 | 7% | 5% | 88% | 1.12 | 25 | 18 | 285 |
| Out | KSF | | 50 | 1.18 | 59 | 7% | 5% | 88% | 1.12 | 4 | 3 | 46 |
| AM R&D | | 0.42 | 28 | | 33 | | | | | 3 | 2 | 27 |
| In | 67.244 | 0.32 | 21 | 1.18 | 25 | 7% | 5% | 88% | 1.12 | 2 | 1 | 20 |
| Out | KSF | 0.11 | 7 | 1.18 | 8 | 7% | 5% | 88% | 1.12 | 1 | 1 | 7 |
| Total AM Peak Hour | | | 386 | | | | | | | 32 | 23 | 358 |
| In | | | 329 | | | | | | | 27 | 19 | 305 |
| Out | | | 57 | | | | | | | 5 | 4 | 53 |
| PM Office | | | 377 | | 444 | | | | | 31 | 23 | 349 |
| In | 352.364 | | 60 | 1.18 | 71 | 7% | 5% | 88% | 1.12 | 5 | 4 | 56 |
| Out | KSF | | 316 | 1.18 | 373 | 7% | 5% | 88% | 1.12 | 26 | 19 | 293 |
| PM R&D | | 0.49 | 33 | | 39 | | | | | 2 | 2 | 31 |
| In | 67.244 | 0.07 | 5 | 1.18 | 6 | 7% | 5% | 88% | 1.12 | 0 | 0 | 5 |
| Out | KSF | 0.42 | 28 | 1.18 | 33 | 7% | 5% | 88% | 1.12 | 2 | 2 | 26 |
| Total PM Peak Hour | | | 410 | | | | | | | 33 | 25 | 380 |
| In | | | 65 | | | | | | | 5 | 4 | 61 |
| Out | | | 344 | | | | | | | 28 | 21 | 319 |

Notes:

LUC 710 - General Office Building Office Size = 352.364 KSF
LUC 760 - Research and Development Center R&D Size = 67.244 KSF
Mode Split: Based on 2010-2015 Journey-to-Work data for employees who work in the City of Newton
VOR from 2017 National Household Travel Survey (page 58), 1.18 to/from work
Local VOR based on City of Newton Census Data, 1.12 for workers
ITE 10th Edition Trip Generation Manual

Riverside Center PROPOSED
Trip Generation Estimate
VHB
7/13/2021

| | Size | Trip Rate | Unadjusted Vehicle Trips | VOR | Person Trips | Transit Share | Walk/Other Share | Vehicle Share | Local VOR | Transit Trips | Walk/Other Trips | Adjusted Vehicle Trips |
|---------------------------|---------|-----------|--------------------------|------|--------------|---------------|------------------|---------------|-----------|---------------|------------------|------------------------|
| Daily Office | | | 2343 | | 2,764 | | | | | 194 | 138 | 2,172 |
| In | 226.257 | | 1171 | 1.18 | 1,382 | 7% | 5% | 88% | 1.12 | 97 | 69 | 1,086 |
| Out | KSF | | 1171 | 1.18 | 1,382 | 7% | 5% | 88% | 1.12 | 97 | 69 | 1,086 |
| Daily R&D | | 11.26 | 2,177 | | 2570 | | | | | 180 | 128 | 2019 |
| In | 193.351 | 5.63 | 1,089 | 1.18 | 1285 | 7% | 5% | 88% | 1.12 | 90 | 64 | 1010 |
| Out | KSF | 5.63 | 1,089 | 1.18 | 1285 | 7% | 5% | 88% | 1.12 | 90 | 64 | 1009 |
| Total Daily | | | 4,520 | | | | | | | 374 | 266 | 4,191 |
| In | | | 2,260 | | | | | | | 187 | 133 | 2,096 |
| Out | | | 2,260 | | | | | | | 187 | 133 | 2,095 |
| AM Office | | | 239 | | 282 | | | | | 20 | 14 | 222 |
| In | 226.257 | | 206 | 1.18 | 243 | 7% | 5% | 88% | 1.12 | 17 | 12 | 191 |
| Out | KSF | | 33 | 1.18 | 40 | 7% | 5% | 88% | 1.12 | 3 | 2 | 31 |
| AM R&D | | 0.42 | 81 | | 96 | | | | | 7 | 6 | 75 |
| In | 193.351 | 0.32 | 61 | 1.18 | 72 | 7% | 5% | 88% | 1.12 | 5 | 4 | 56 |
| Out | KSF | 0.11 | 20 | 1.18 | 24 | 7% | 5% | 88% | 1.12 | 2 | 2 | 19 |
| Total AM Peak Hour | | | 320 | | | | | | | 27 | 20 | 297 |
| In | | | 267 | | | | | | | 22 | 16 | 247 |
| Out | | | 54 | | | | | | | 5 | 4 | 50 |
| PM Office | | | 247 | | 292 | | | | | 20 | 14 | 230 |
| In | 226.257 | | 40 | 1.18 | 47 | 7% | 5% | 88% | 1.12 | 3 | 2 | 37 |
| Out | KSF | | 208 | 1.18 | 245 | 7% | 5% | 88% | 1.12 | 17 | 12 | 193 |
| PM R&D | | 0.49 | 95 | | 112 | | | | | 8 | 6 | 88 |
| In | 193.351 | 0.07 | 14 | 1.18 | 17 | 7% | 5% | 88% | 1.12 | 1 | 1 | 13 |
| Out | KSF | 0.42 | 81 | 1.18 | 95 | 7% | 5% | 88% | 1.12 | 7 | 5 | 75 |
| Total PM Peak Hour | | | 342 | | | | | | | 28 | 20 | 318 |
| In | | | 54 | | | | | | | 4 | 3 | 50 |
| Out | | | 288 | | | | | | | 24 | 17 | 268 |

Notes:

LUC 710 - General Office Building Office Size = 226.257 KSF
LUC 760 - Research and Development Center R&D Size = 193.351 KSF
Mode Split: Based on 2010-2015 Journey-to-Work data for employees who work in the City of Newton
VOR from 2017 National Household Travel Survey (page 58), 1.18 to/from work
Local VOR based on City of Newton Census Data, 1.12 for workers
ITE 10th Edition Trip Generation Manual

Trip Generation Estimate
 (10th Edition, Updated 2017)

LANDUSE: General Office Building
 LANDUSE CODE: 710
 SETTING/LOCATION: General Urban/Suburban
 JOB NAME: **Riverside Center, Existing**
 JOB NUMBER: **15366**

Independent Variable --- 1,000 Sq. Feet Gross Floor Area

FLOOR AREA (KSF): 352.364

WEEKDAY

| RATES: | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|-----------------------|-----------|------|-----------------|------|-------|----------------------------|-----|-------|--------------------------|------|
| | | | Average | Low | High | Average | Low | High | Enter | Exit |
| DAILY | 66 | 0.83 | 9.74 | 2.71 | 27.56 | 171 | 6 | 1,300 | 50% | 50% |
| AM PEAK OF GENERATOR | 228 | 0.84 | 1.47 | 0.57 | 4.93 | 209 | 6 | 2,408 | 88% | 12% |
| PM PEAK OF GENERATOR | 243 | 0.82 | 1.42 | 0.49 | 6.20 | 205 | 6 | 2,408 | 18% | 82% |
| AM PEAK (ADJACENT ST) | 35 | 0.85 | 1.16 | 0.37 | 4.23 | 117 | 5 | 511 | 86% | 14% |
| PM PEAK (ADJACENT ST) | 32 | 0.88 | 1.15 | 0.47 | 3.23 | 114 | 6 | 511 | 16% | 84% |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-----------------------|------------|-------|-------|---------------|-------|-------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 3,432 | 1,716 | 1,716 | 3,600 | 1,800 | 1,800 |
| AM PEAK OF GENERATOR | 518 | 456 | 62 | 503 | 443 | 60 |
| PM PEAK OF GENERATOR | 500 | 90 | 410 | 453 | 82 | 371 |
| AM PEAK (ADJACENT ST) | 409 | 352 | 57 | 358 | 308 | 50 |
| PM PEAK (ADJACENT ST) | 405 | 65 | 340 | 377 | 60 | 316 |

SATURDAY

| RATES: | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
| | | | Average | Low | High | Average | Low | High | Enter | Exit |
| DAILY | 5 | -- | 2.21 | 1.24 | 7.46 | 94 | 28 | 183 | 50% | 50% |
| PEAK OF GENERATOR | 3 | -- | 0.53 | 0.30 | 1.57 | 82 | 28 | 183 | 54% | 46% |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-------------------|------------|-------|------|---------------|-------|------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 779 | 389 | 389 | N/A | N/A | N/A |
| PEAK OF GENERATOR | 187 | 101 | 86 | N/A | N/A | N/A |

SUNDAY

| RATES: | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
| | | | Average | Low | High | Average | Low | High | Enter | Exit |
| DAILY | 5 | -- | 0.70 | 0.19 | 3.05 | 94 | 28 | 183 | 50% | 50% |
| PEAK OF GENERATOR | 3 | -- | 0.21 | 0.11 | 0.68 | 82 | 28 | 183 | 58% | 42% |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-------------------|------------|-------|------|---------------|-------|------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 247 | 123 | 123 | N/A | N/A | N/A |
| PEAK OF GENERATOR | 74 | 43 | 31 | N/A | N/A | N/A |

Trip Generation Estimate
(10th Edition, Updated 2017)

LANDUSE: Research and Development Center
 LANDUSE CODE: 760 Independent Variable --- 1,000 Sq. Feet Gross Floor Area
 SETTING/LOCATION: General Urban/Suburban
 JOB NAME: **Riverside Center, Existing** FLOOR AREA (KSF): 67.244
 JOB NUMBER: **15366**

WEEKDAY

| RATES: | | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|--------|-----------------------|-----------|------|-----------------|------|-------|----------------------------|-----|------|--------------------------|------|
| | | | | Average | Low | High | Average | Low | High | Enter | Exit |
| | DAILY | 24 | 0.89 | 11.26 | 3.48 | 24.95 | 200 | 22 | 705 | 50% | 50% |
| | AM PEAK OF GENERATOR | 41 | 0.81 | 1.22 | 0.17 | 3.73 | 186 | 10 | 800 | 83% | 17% |
| | PM PEAK OF GENERATOR | 42 | 0.63 | 1.11 | 0.13 | 4.13 | 185 | 10 | 800 | 16% | 84% |
| | AM PEAK (ADJACENT ST) | 11 | -- | 0.42 | 0.17 | 2.19 | 111 | 10 | 260 | 75% | 25% |
| | PM PEAK (ADJACENT ST) | 5 | 0.65 | 0.49 | 0.26 | 1.35 | 108 | 25 | 200 | 15% | 85% |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-----------------------|------------|-------|------|---------------|-------|------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 757 | 379 | 379 | 893 | 446 | 446 |
| AM PEAK OF GENERATOR | 82 | 68 | 14 | 73 | 61 | 12 |
| PM PEAK OF GENERATOR | 75 | 12 | 63 | 83 | 13 | 70 |
| AM PEAK (ADJACENT ST) | 28 | 21 | 7 | N/A | N/A | N/A |
| PM PEAK (ADJACENT ST) | 33 | 5 | 28 | 46 | 7 | 39 |

SATURDAY

| RATES: | | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|--------|-------------------|-----------|------|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
| | | | | Average | Low | High | Average | Low | High | Enter | Exit |
| | DAILY | 20 | 0.69 | 1.90 | 0.18 | 6.96 | 172 | 22 | 650 | 50% | 50% |
| | PEAK OF GENERATOR | 13 | 0.65 | 0.24 | 0.08 | 0.71 | 146 | 46 | 608 | Not Available | |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-------------------|------------|-------|------|---------------|-------|------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 128 | 64 | 64 | 196 | 98 | 98 |
| PEAK OF GENERATOR | 16 | N/A | N/A | 23 | N/A | N/A |

SUNDAY

| RATES: | | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|--------|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
| | | | | Average | Low | High | Average | Low | High | Enter | Exit |
| | DAILY | 20 | -- | 1.11 | 0.13 | 4.18 | 172 | 22 | 650 | 50% | 50% |
| | PEAK OF GENERATOR | 13 | -- | 0.16 | 0.05 | 0.64 | 146 | 46 | 608 | Not Available | |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-------------------|------------|-------|------|---------------|-------|------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 75 | 37 | 37 | N/A | N/A | N/A |
| PEAK OF GENERATOR | 11 | N/A | N/A | N/A | N/A | N/A |

Trip Generation Estimate
 (10th Edition, Updated 2017)

LANDUSE: General Office Building
 LANDUSE CODE: 710
 SETTING/LOCATION: General Urban/Suburban
 JOB NAME: **Riverside Center, Proposed**
 JOB NUMBER: **15366**

Independent Variable --- 1,000 Sq. Feet Gross Floor Area

FLOOR AREA (KSF): 226.257

WEEKDAY

| RATES: | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|-----------------------|-----------|------|-----------------|------|-------|----------------------------|-----|-------|--------------------------|------|
| | | | Average | Low | High | Average | Low | High | Enter | Exit |
| DAILY | 66 | 0.83 | 9.74 | 2.71 | 27.56 | 171 | 6 | 1,300 | 50% | 50% |
| AM PEAK OF GENERATOR | 228 | 0.84 | 1.47 | 0.57 | 4.93 | 209 | 6 | 2,408 | 88% | 12% |
| PM PEAK OF GENERATOR | 243 | 0.82 | 1.42 | 0.49 | 6.20 | 205 | 6 | 2,408 | 18% | 82% |
| AM PEAK (ADJACENT ST) | 35 | 0.85 | 1.16 | 0.37 | 4.23 | 117 | 5 | 511 | 86% | 14% |
| PM PEAK (ADJACENT ST) | 32 | 0.88 | 1.15 | 0.47 | 3.23 | 114 | 6 | 511 | 16% | 84% |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-----------------------|------------|-------|-------|---------------|-------|-------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 2,204 | 1,102 | 1,102 | 2,343 | 1,171 | 1,171 |
| AM PEAK OF GENERATOR | 333 | 293 | 40 | 341 | 300 | 41 |
| PM PEAK OF GENERATOR | 321 | 58 | 263 | 314 | 57 | 258 |
| AM PEAK (ADJACENT ST) | 262 | 226 | 37 | 239 | 206 | 33 |
| PM PEAK (ADJACENT ST) | 260 | 42 | 219 | 247 | 40 | 208 |

SATURDAY

| RATES: | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
| | | | Average | Low | High | Average | Low | High | Enter | Exit |
| DAILY | 5 | -- | 2.21 | 1.24 | 7.46 | 94 | 28 | 183 | 50% | 50% |
| PEAK OF GENERATOR | 3 | -- | 0.53 | 0.30 | 1.57 | 82 | 28 | 183 | 54% | 46% |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-------------------|------------|-------|------|---------------|-------|------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 500 | 250 | 250 | N/A | N/A | N/A |
| PEAK OF GENERATOR | 120 | 65 | 55 | N/A | N/A | N/A |

SUNDAY

| RATES: | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
| | | | Average | Low | High | Average | Low | High | Enter | Exit |
| DAILY | 5 | -- | 0.70 | 0.19 | 3.05 | 94 | 28 | 183 | 50% | 50% |
| PEAK OF GENERATOR | 3 | -- | 0.21 | 0.11 | 0.68 | 82 | 28 | 183 | 58% | 42% |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-------------------|------------|-------|------|---------------|-------|------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 158 | 79 | 79 | N/A | N/A | N/A |
| PEAK OF GENERATOR | 48 | 28 | 20 | N/A | N/A | N/A |

Trip Generation Estimate
(10th Edition, Updated 2017)

LANDUSE: Research and Development Center
 LANDUSE CODE: 760 Independent Variable --- 1,000 Sq. Feet Gross Floor Area
 SETTING/LOCATION: General Urban/Suburban
 JOB NAME: **Riverside Center, Proposed** FLOOR AREA (KSF): 193.351
 JOB NUMBER: **15366**

WEEKDAY

| RATES: | | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|--------|-----------------------|-----------|------|-----------------|------|-------|----------------------------|-----|------|--------------------------|------|
| | | | | Average | Low | High | Average | Low | High | Enter | Exit |
| | DAILY | 24 | 0.89 | 11.26 | 3.48 | 24.95 | 200 | 22 | 705 | 50% | 50% |
| | AM PEAK OF GENERATOR | 41 | 0.81 | 1.22 | 0.17 | 3.73 | 186 | 10 | 800 | 83% | 17% |
| | PM PEAK OF GENERATOR | 42 | 0.63 | 1.11 | 0.13 | 4.13 | 185 | 10 | 800 | 16% | 84% |
| | AM PEAK (ADJACENT ST) | 11 | -- | 0.42 | 0.17 | 2.19 | 111 | 10 | 260 | 75% | 25% |
| | PM PEAK (ADJACENT ST) | 5 | 0.65 | 0.49 | 0.26 | 1.35 | 108 | 25 | 200 | 15% | 85% |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-----------------------|------------|-------|-------|---------------|-------|-------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 2,177 | 1,089 | 1,089 | 2,183 | 1,091 | 1,091 |
| AM PEAK OF GENERATOR | 236 | 196 | 40 | 185 | 154 | 32 |
| PM PEAK OF GENERATOR | 215 | 34 | 180 | 214 | 34 | 180 |
| AM PEAK (ADJACENT ST) | 81 | 61 | 20 | N/A | N/A | N/A |
| PM PEAK (ADJACENT ST) | 95 | 14 | 81 | 67 | 10 | 57 |

SATURDAY

| RATES: | | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|--------|-------------------|-----------|------|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
| | | | | Average | Low | High | Average | Low | High | Enter | Exit |
| | DAILY | 20 | 0.69 | 1.90 | 0.18 | 6.96 | 172 | 22 | 650 | 50% | 50% |
| | PEAK OF GENERATOR | 13 | 0.65 | 0.24 | 0.08 | 0.71 | 146 | 46 | 608 | Not Available | |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-------------------|------------|-------|------|---------------|-------|------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 367 | 184 | 184 | 354 | 177 | 177 |
| PEAK OF GENERATOR | 46 | N/A | N/A | 42 | N/A | N/A |

SUNDAY

| RATES: | | # Studies | R^2 | Total Trip Ends | | | Independent Variable Range | | | Directional Distribution | |
|--------|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
| | | | | Average | Low | High | Average | Low | High | Enter | Exit |
| | DAILY | 20 | -- | 1.11 | 0.13 | 4.18 | 172 | 22 | 650 | 50% | 50% |
| | PEAK OF GENERATOR | 13 | -- | 0.16 | 0.05 | 0.64 | 146 | 46 | 608 | Not Available | |

TRIPS:

| | BY AVERAGE | | | BY REGRESSION | | |
|-------------------|------------|-------|------|---------------|-------|------|
| | Total | Enter | Exit | Total | Enter | Exit |
| DAILY | 215 | 107 | 107 | N/A | N/A | N/A |
| PEAK OF GENERATOR | 31 | N/A | N/A | N/A | N/A | N/A |

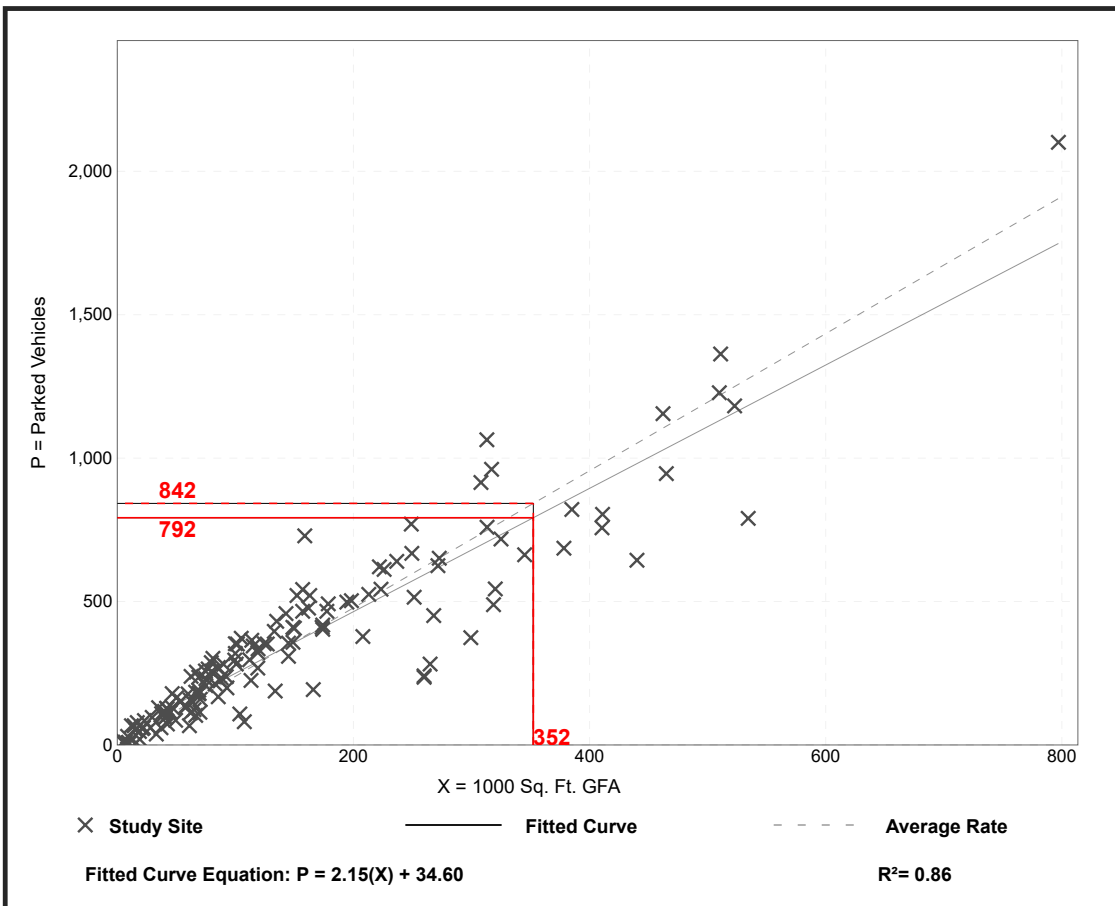
General Office Building (710)

Peak Period Parking Demand vs: 1000 Sq. Ft. GFA
On a: Weekday (Monday - Friday)
Setting/Location: General Urban/Suburban
Peak Period of Parking Demand: 9:00 a.m. - 3:00 p.m.
 Number of Studies: 148
 Avg. 1000 Sq. Ft. GFA: 145

Peak Period Parking Demand per 1000 Sq. Ft. GFA

| Average Rate | Range of Rates | 33rd / 85th Percentile | 95% Confidence Interval | Standard Deviation (Coeff. of Variation) |
|--------------|----------------|------------------------|-------------------------|--|
| 2.39 | 0.50 - 5.58 | 2.30 / 3.30 | 2.28 - 2.50 | 0.69 (29%) |

Data Plot and Equation



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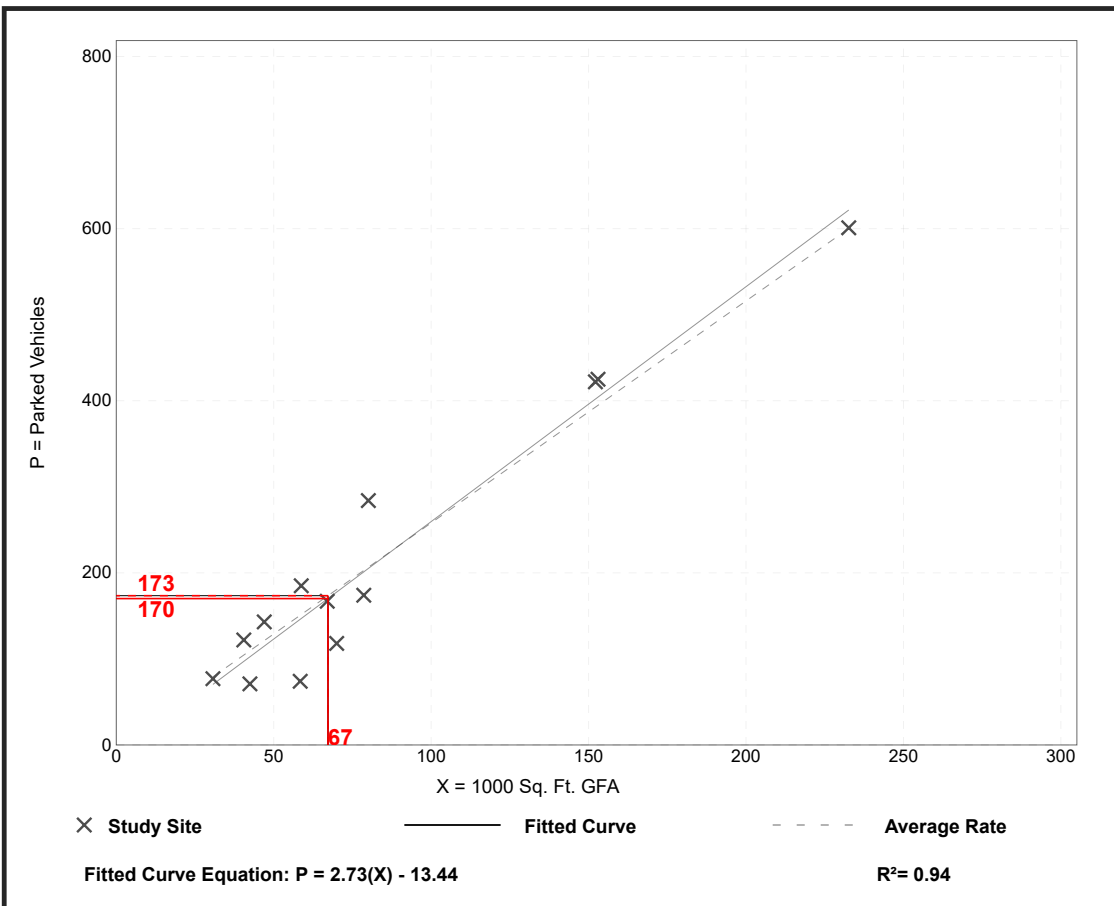
Research and Development Center (760)

Peak Period Parking Demand vs: 1000 Sq. Ft. GFA
On a: Weekday (Monday - Friday)
Setting/Location: General Urban/Suburban
Peak Period of Parking Demand: 8:00 a.m. - 4:00 p.m.
 Number of Studies: 13
 Avg. 1000 Sq. Ft. GFA: 85

Peak Period Parking Demand per 1000 Sq. Ft. GFA

| Average Rate | Range of Rates | 33rd / 85th Percentile | 95% Confidence Interval | Standard Deviation (Coeff. of Variation) |
|--------------|----------------|------------------------|-------------------------|--|
| 2.58 | 1.27 - 3.55 | 2.39 / 3.14 | *** | 0.56 (22%) |

Data Plot and Equation



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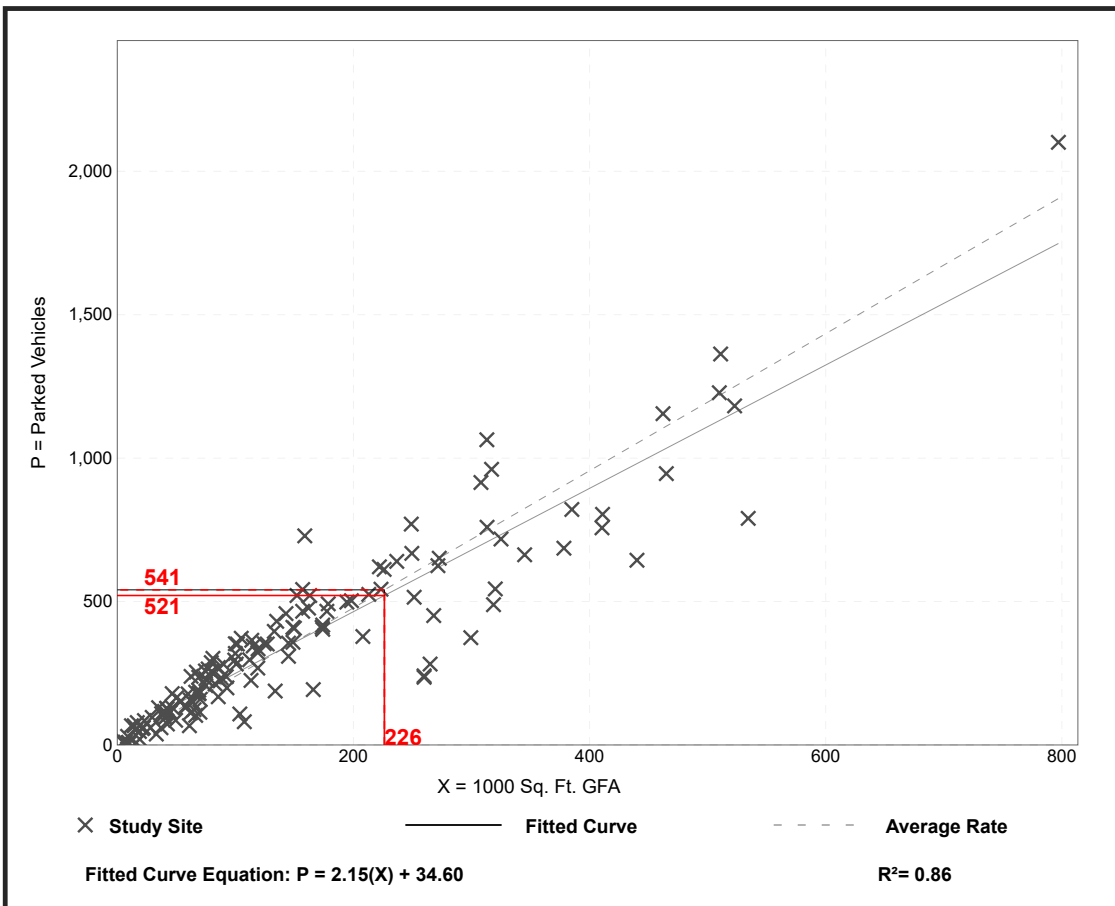
General Office Building (710)

Peak Period Parking Demand vs: 1000 Sq. Ft. GFA
On a: Weekday (Monday - Friday)
Setting/Location: General Urban/Suburban
Peak Period of Parking Demand: 9:00 a.m. - 3:00 p.m.
 Number of Studies: 148
 Avg. 1000 Sq. Ft. GFA: 145

Peak Period Parking Demand per 1000 Sq. Ft. GFA

| Average Rate | Range of Rates | 33rd / 85th Percentile | 95% Confidence Interval | Standard Deviation (Coeff. of Variation) |
|--------------|----------------|------------------------|-------------------------|--|
| 2.39 | 0.50 - 5.58 | 2.30 / 3.30 | 2.28 - 2.50 | 0.69 (29%) |

Data Plot and Equation



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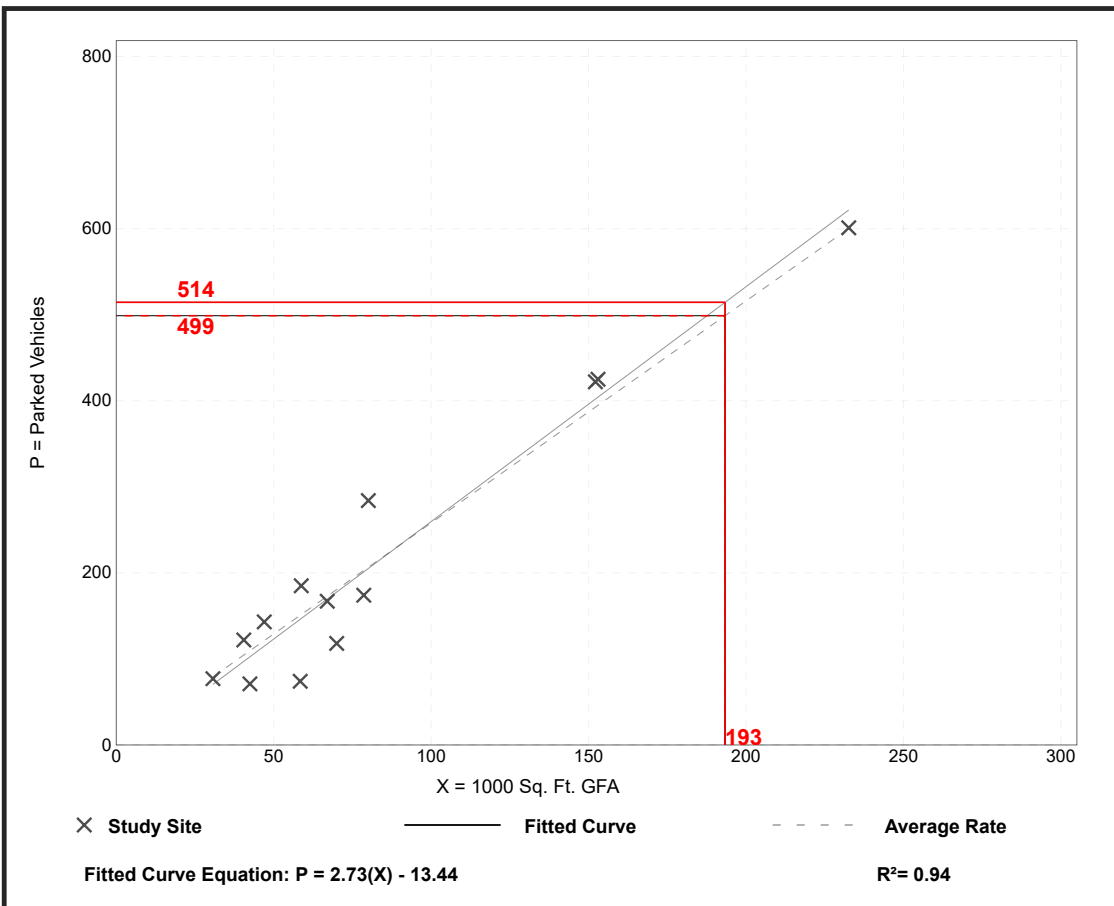
Research and Development Center (760)

Peak Period Parking Demand vs: 1000 Sq. Ft. GFA
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Peak Period Parking Demand per 1000 Sq. Ft. GFA

| Average Rate | Range of Rates | 33rd / 85th Percentile | 95% Confidence Interval | Standard Deviation (Coeff. of Variation) |
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Data Plot and Equation



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