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Letter of Transmittal

October 6, 2025

To:

Attn: Amy Love alove@franklinma.gov
Town Planner
Town of Franklin Municipal Building,
355 E Central St, Franklin, MA 02038

Re: 380 King Street, Franklin, MA [Plat: 303 Lot: 42] / Design Review

Contents:

- Revised Civil Plan Sheets – per BETA Comments
- Response to comments – NEI
- Response to comments – VHB
- Mounding Analysis
- Illicit Discharge Statement
- Sewer Flow Memo

Notes:
Revised items per BETA's comments provided on September 29, 2025

PM / Signoff:____jm_____

"N:\PROJECTS\24.0168_MARGUERITE-COMMONWEALTH (UNION CROSSING)\SUBMISSIONS\Design Review Commision Prints\Landscape Plan Franklin Crossing 5-15-25.pdf"

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9.30.25

BETA Group – Comments provided on 6-26-25, Additional Comments provided 9-18-25, Responses provided 9-19-25

BETA Group Rev 1 – Comments provided on 9-29-25

380 King Street – Site Plan

Franklin, MA 02038

REVIEW COMMENTS BY BETA GROUP

ORIGINAL RESPONSES IN BLUE **REV 1 COMMENTS IN BOLD** REV 1 RESPONSES ARE UNDERLINED

Z1. BETA recommends that the Zoning summary be expanded to show that the setback dimensions for the proposed building comply with the zoning requirements.

Zoning setback requirements and provided distances to said setbacks have been added to the Zoning summary table on sheet C-100A of the revised plan set. **BETA2: Zoning summary revised; item resolved.**

Z2. Depict existing and proposed sidewalk width on the plans. The sidewalk along the frontage must be at least 6 feet in width. BETA defers to the Town if the existing width can be maintained. (§ 185-28).

The proposed sidewalk width is noted on plan sheet C-100A. The proposed work on the section of sidewalk along the frontage of King Street shall match existing sidewalk width. Per discussions with the Town Planning Board the existing sidewalk does not need to be altered. **BETA2: Plans revised; item resolved.**

Z3. Based upon the plans, it appears that the proposed interior sidewalk will be 4' wide. At the front of the building at the west corner, the sidewalk width measures only 3'. BETA recommends that this sidewalk be a minimum of 5' wide.

The proposed width of interior sidewalk has been revised to provide a continuous width of 4 feet. The width of interior sidewalks is in conformance with the 2010 ADA Standards for Accessible Design dated September 15, 2010. **BETA2: Plans revised, and explanation provided; item resolved.**

Z4. BETA recommends that a sidewalk connection from the proposed site to King Street be designed and shown.

A connection to the existing sidewalk on King Street has been provided in the revised plan set.

BETA2: The proposed sidewalk connection to King Street is not accessible as shown. Sidewalks that exceed 5.0% running slope are considered ramps and should be equipped with hand railings and a landing at each end. Revise the sidewalk segment to be accessible.

The proposed sidewalk connection to King Street has been revised and is less than 5 percent (%).

Z5. Snow storage areas should be identified in the plans. (§ 185-31.C.(3).(i)).

Snow storage areas can be located on plan sheet C-100A of the provided plan set. BETA2: Snow storage areas provided; item resolved.

Z6. Provide note that all plantings shall come from the Best Development Practices Guidebook (§ 185-31.C.(3).(k)).

Note 16 on Sheet C-201 states that all plantings shall conform from the Town of Franklin's Best Development Practices Guidebook. See landscape plan for additional detail. BETA2: Zoning summary revised; item resolved.

Z7. Indicate if site lighting is proposed and provide photometric plan if applicable (§ 185-31.C.(3).(L)).

Site lighting is proposed as part of this project and the proposed light locations can be found on Sheet C-101. A lighting plan and photometric plan has been provided in the revised plan set. BETA2: Photometric plan provided; item resolved.

Z8. Provide description of traffic circulation and safety especially since the abutting commercial uses will be granted access easements at both the front and rear of the parcel. (§ 185-31.C.(3).(s)).

Access has been revised in the provided plan set. Access is no longer granted for the eastern Lot, housing Sierra's Brick Oven Pizza, on the southern portion of the site. The entrance onto the subject parcel from King Street has been closed. A traffic circulation plan and traffic impact report has been provided by VHB as part of the revised plan set. BETA2: Site access revised, and traffic impact report provided; item resolved.

T1. The planning board should discuss whether a Traffic Impact Analysis is warranted for this project.

A traffic impact report prepared by VHB is included in the revised package.

See Response to comments provided by VHB

T2. Apparatus circulation shown on sheet C-200 is dependent upon entrance into the site from the adjacent lot. BETA defers this final assessment to the fire department but recommends that this be modified to show access from the main driveway entrance.

The fire apparatus circulation has been modified to include entry and egress from the entrance on 370 as well as 390 King Street. The entrance on 380 King Street to the public right-of-way is proposed to be closed in lieu of the cross access provided by both adjacent lots. This modification has been reviewed and approved by the local fire chief. The email from the fire chief

is included in the revised package. BETA2: Letter from Fire Chief provided and circulation revised; item resolved.

T3. Confirm that the proposed configuration has been reviewed by the Town Fire Department.

Refer to the response to comment T2. BETA2: Item resolved.

T4. The proposed grade across the parking spaces at the rear of the parcel are shown at a 4.3%± grade. Recommended maximum grades for parking spaces is 3.0%. BETA recommends that the design review modifying the design to adhere to this maximum grade.

Site grading has been revised as part of the attached plan set. Due to the existing slopes of the adjoining sites as well as the existing site, the provided grades for parking and drive aisles have been reduced to the maximum extent practicable.

BETA2: The parking lot on the south side of the building is currently graded at approximately 8.0%, which exceeds standard practice for parking areas. MassDOT guidance recommends that grades do not exceed 7.0% where buses will use a facility. Although buses are not anticipated to use this parking area, emergency vehicles such as fire trucks and ambulances will. BETA recommends that the engineer evaluate alternatives to reduce the slope. Options such as incorporating a retaining wall or increasing the slope along the southern property line may help achieve a more compliant grade. This item remains outstanding.

The site grading has been revised throughout the plans to ensure the grades in the parking area at or less than 7%.

T5. Proposed curb material should be designated on the plans.

The curb type and material shall be precast concrete curbing as called out on plan sheet C-100A. BETA2: Callout provided; item resolved.

T6. There are no designated guest parking spaces on the site. BETA recommends an adequate number of spaces be provided for guest spaces or an easement be granted for the potential use of the parking spaces on one of the abutting commercial sites.

This project meets the required parking requirements. A waiver for 59 spaces (one less than the required 60 spaces) is being requested. This was discussed and recommended by planning board members to provide additional green space. BETA2: BETA defers to the Town regarding the waiver for reduced parking requirements; item resolved.

SL1. Identify the size, type and number of fixtures to be mounted at each pole location.

There are 5 proposed 150W pole mounted light fixtures as shown on the provided photometric plan and details. BETA2: Lighting cut sheets and Photometric Plan provided; item resolved.

SL2. Provide a Photometric plan with sufficient illuminance values to document that there are no adverse impacts on the abutting parcels.

Refer to response to comment Z7. All proposed light fixtures will be dark sky compliant. BETA2: Item resolved.

U1. BETA recommends that a construction detail for the proposed electrical conduit bank and trench be provided.

A construction detail for the proposed electrical service connection has been provided on the revised plan set sheet C-204. BETA2: Details provided; item resolved.

LA1. Provide a landscaping plan which documents compliance with the bylaws.

A landscape plan has been provided as part of the revised plan set. BETA2: Landscape Plan provided; item resolved.

LA2. Indicate method to be utilized to protect the existing trees which as shown will be maintained.

Details pertaining to the protection of existing trees during construction has been included in the landscape plans as part of this revised plan set. BETA2: Tree protection detail provided; item resolved.

LA3. BETA will defer to the Board whether the naturally vegetated buffer ta the rear of the parcel will satisfy the requirements of §185-35 for screening.

Noted. BETA2: No further comment.

G1. The sidewalk along the southern side of the proposed building is indicated at 6.5% running slope which qualifies as an ADA ramp. Running slopes greater than 5.0% slope require handrails and landings at each end of the ramp. Revise grading or provide the required handrails and landings.

The sidewalk along the building on the south side has been revised to ensure no section is steeper than 5%.

G2. The sidewalk along the northern side of the proposed building is indicated as 8.0% and 5.4% running slopes, which qualifies them as ADA ramps. Running slopes greater than 5.0% slope require handrails and landings at each end of the ramp. Revise grading or provide the required handrails and landings.

The grading has been revised to ensure pedestrians has an assessable route (5% of less) from King Street to all proposed building entrance. The entire site has been regraded to ensure no slopes are more than 7%. There is no requirement that the entire site has to be ADA complainant and due to the existing grades of the property this is not feasible. The site provides an Assessable route from all handicap spaces to the proposed building.

G3. The sidewalk connecting the property to King Street proposed a 7.5% running slope which qualifies it as an ADA ramp. Running slopes greater than 5.0% slope require handrails and landings at each end of the ramp. Revise grading or provide the required handrails and landings.

The sidewalk from the north parking area connecting to King Street has been regraded to meet ADA compliance with less than 5% slopes.

G4. Grading at the southeast corner of the building does not work. The 139 contour meets the curbing at the same location as a 340 spot grade, creating a grading discrepancy of 0.5'. Revise grading plan.

The grading at the southeast corner of the building has been revised.

G5. A significant portion of the western parking lot is graded at 0.5% slope. In BETA's experience, 0.5% slope is not a sufficient slope to allow water to sheet flow and provides little to no wiggle room for the contractor to install the pavement correctly, leading to standing water. BETA strongly recommends revising the grades in this area to provide a minimum of 1.0% slope.

NEI agrees, the grading throughout the property has been revised to ensure no paved areas are less than 1%.

G6. The "Typical Gravity Retaining Wall Section" detail on sheet C204 indicates filter fabric extending out the back of the wall face. The wall along the eastern property line is shown approximately one foot off the property line with a parking lot flush against the property line. BETA is concerned with how this retaining wall will be constructed given the proximity of the parking lot. BETA is also concerned with the load of cars being parked so close to the proposed retaining wall. BETA recommends moving the retaining wall off of the property line to provide more of a buffer between the parking and the retaining wall.

The retaining wall has been shifted to two feet off the property line. The retaining wall will be designed for the surcharge load of vehicles parked on the upgradient side of the retaining wall. The wall is close to the property line per discussion with the board to maximize courtyard area greenspace as much as feasible. A stamped retaining wall detail and design shall be supplied by a Massachusetts licensed engineer upon approval of the project (prior to construction).

SW1. Review the existing outlet erosion protection at each of the outfalls on Spruce Pond to determine if any maintenance is required.

Note No. 5 on Sheet C-001 has been added to the plans to inspect and rehabilitate the existing outfalls on Spruce Pond as required for the benefit of this project prior to the connection of the proposed stormwater facilities. BETA2: Note provided; item resolved.

SW2. Provide timing schedules and sequences of development including clearing, stripping, rough grading, construction, final grading, and vegetative stabilization.

A stormwater pollution and prevention plan can be found in the appendix of the stormwater report and includes timing and sequencing of construction.

BETA2: Construction schedule and sequence provided. Indicate the approximate timing schedules for the project; item is outstanding.

Section 2.4 Sequence pf Construction within the Stormwater Pollution and Prevent Plan has been updated to include the approximate timing schedule for the project.

SW3. The applicant is reminded that a stormwater permit from the Town of Franklin DPW is required for the proposed activity.

Correspondence is underway between NEI and the Town of Franklin DPW regarding the stormwater permit required for the proposed activity. Stormwater report and calculations can be found in the package. BETA2: Item resolved.

SW4. Provide an O & M Plan in accordance with the requirements of §153-18 signed by the Owner.

An O&M plan in accordance with the requirements of §153-18 within the Town of Franklin Code of Ordinances can be found in the appendix of the stormwater report. BETA2: O&M Plan provided; item resolved.

SW5.Drainage piping is proposed to be HDPE with less than 42" of cover depth. BETA recommends that the stormwater piping be revised to RCP consistent with the requirements of the section. Either request the waiver of bring the piping into compliance with the regulations. (§300-11.B(2.a)).

Technical Note 2.01 Minimum and Maximum Burial Depth for Corrugated HDPE Pipe (per AASHTO) sets the minimum cover of 12" diameter HDPE piping at 12" below grade to provide H20 loading. The design set forth in the revised plans is in conformance with this requirement. Standing water shall not exist within proposed pipes as designed for this project. A waiver for the depth and material requirement of the Town shall be filed and included with this project submission. BETA2: Waiver requested – BETA defers to the Town on waiver request.

SW6.Indicate if proposed seed mix and plantings will reflect native vegetation, particularly near woodland areas (BDPG Page 7).

The landscape features including seed mix and plantings are in conformance with the Best Development Practices Guidebook and the details can be found on the landscape plan. BETA2: Item resolved.

SW7.Confirm that landscaping plan has been designed in accordance with the planting bed and seeding guidelines outlined on Poage 15.

Refer to the response to comment SW6. BETA2: Item resolved.

SW8.A small portion of the runoff from the proposed driveway connection with 370 King Street will flow untreated towards the collection system on the adjacent site. BETA recommends that this area be addressed to demonstrate compliance with the standards.

The driveway connection to 370 King Street on the southern portion of the site has been revised to treat all proposed impervious cover in this area with proposed stormwater treatment facilities.

Due to site constraints, the small impervious area on the north driveway access to 370 King Street cannot be collected. The proposed site collects a portion of impervious area from the site west of the subject parcel (390 King Street) through the northern and southern driveway entrances. The impervious areas are collected and treated in the proposed systems. Overall the project is collecting and treating more impervious area than the site contributes. These calculations can be found in the water quality calculations within the stormwater report. BETA2: Stormwater calculations provided; BETA defers to Franklin DPW as to whether this is acceptable.

SW9.Provide individual watershed areas for the catch basins to document that the impervious surface area tributary to these structures is less than ¼ of acre.

A watershed map (CB Sheds) has been included in the stormwater report appendix to show all catchment areas are less than the required ¼ acre. BETA2: Sub-catchment watershed plan provided; item resolved.

SW10.The exfiltration rate utilized in the design of the subsurface systems is 1.02 inches per hour. BETA agrees that the Rawls rate for the material as described in the soil evaluation was used, however: the soil evaluations identify the layers as a dense layer. Based upon our experience with these soil types, BETA recommends that an exfiltration rate of 0.17 inches per hour be used for the design of these 3 systems or perform an in-situ saturated conductivity test to determine a rate.

A percolation test was conducted on November 26th, 2024 during the soil evaluations, concluding perc rates of greater than 1.02 inches per hour. The perc tests were completed in the C layer ranging from 32 inches to 35 inches from the surface. To remain conservative, the Rawls rate for sandy loam as found in the soil evaluations were utilized for this design. This percolation test can be found in the revised site plan package. We appreciated BETA's experience, however our observations yielded sandy soils, and we do feel comfortable with the rates used, especially when blackboarded against the in-situ rates. The perc testing data is now included in the appendix. BETA2: Explanation provided; item resolved. BETA notes that typically subgrade soils will be observed during construction as part of a condition of approval. If soils do not look as designed in the field observation, the design will need to be redone at that time.

NEI will be complete site inspections throughout the construction process. NEI will inspect the bottom of the excavation to ensure the subgrade soils are what were designed for and will modify if necessary.

SW11.Review subcatchment boundary for EDA-1. It appears that the catchment area behind the building flows onto the site rather than the King Street system area. This issue will also apply to the proposed conditions analysis where all of EDA-1 is assumed to bypass the proposed system on the site.

EDA-1 and EDA-3 have been revised to capture the runoff from 390 King Street. The proposed watershed maps have been revised to include these additional areas. BETA2: Watershed maps revised; item resolved.

SW12.Only three test pits were conducted on site, however, based upon the consistency of the results BETA does not believe that any additional test pits are required for the design.

Noted. BETA2: Item resolved.

SW13.BETA recommends that a construction detail be added to the plans which show the remove and replace required beneath the proposed subsurface infiltration system.

The depth of the proposed infiltration basins should be below all fill amounts. In the event there is remaining fill a note has been added to sheet C-300 to remove and replace all fill with clean C-33 Sand. BETA2: Note provided; item resolved.

SW14.The Estimated seasonal high groundwater level on site has been determined based on a "Frimpter" adjustment above the bottom of the test pits of 29". BETA does not agree with this adjustment, based upon the redoximorphic features encountered and the density of the underlying mineral soils, the top of the C horizon soils should be used as ESGHW.

The proposed stormwater facilities have been redesigned as part of the revised plan set. The stormwater features now provide adequate separation from the elevations in which redox features were found during the site's soil evaluations. BETA2: Stormwater facilities revised; item resolved.

SW15.Since the proposed infiltration systems are being used for both Standards 2 & 4, in accordance with the standards, a mounding analysis is required.

The mounding analysis for each infiltration system can be found in the appendix of the Stormwater Report.

BETA2: Mounding analyses provided is not consistent with the infiltration rate used for drawdown. It looks like 0.17 inches per hour was utilized for the mounding analysis but 1.02 inches per hour was used for the Hydro CAD design. Reconcile the Hydro CAD model, drawdown calculations, and mounding analysis; item is outstanding.

The mounding analyses have been revised to be consistent with the stormwater analysis and still meet the design requirements.

SW16.Please review the Diversion manhole detail on sheet C-300 it appears that the diversion manhole outlets are mislabeled.

The labels for the Diversion manholes on sheet C-300 have been revised. BETA2: Labels revised; item resolved.

SW17.A setback of at least 10 feet from the property lines and buildings for all SCM's is typically required per (MA Handbook V1C1 Pg 8). Infiltration system No. 2 should be moved to meet this setback.

All Stormwater Control Measures (SCM's) have been relocated on the revised plan set to conform with the 10' minimum separation setback from property lines and buildings. BETA2: Location of SCM's revised to comply with required setbacks; item resolved.

SW18.Provide impervious surface area tributary to each catch basin to document compliance with the requirements of Volume 2, Chapter 2 page 4 for maximum tributary area. (See SW3)

Refer to response to comment SW9. BETA2: Sub-watershed Plan provided; item resolved.

SW19.The plans should identify what treatment will be provided by the swale located along the easterly side of the building. TSS Removal calculations should be provided for this train also.

Per the previous design, the conveyance swale located due east of the proposed building was for conveyance purposes only. As part of the revised design provided here within, this swale has been removed. BETA2: Comment is no longer applicable; item resolved.

SW20.Remove pretreatment devices from TSS worksheet for total TTS; the 80% TSS provided by the subsurface system is inclusive of required pretreatment.

The pretreatment devices have been removed and the calculation only show the isolator pretreatment row. The revised TSS worksheet provided as attached. BETA2: TSS calculations revised; item resolved.

SW21.BETA recommends that silt sacks be added to the catch basins at 370 King Street site. In addition, features needed to protect the existing collection system once the catch basins are removed should also be spelled out.

Inlet protection has been called out on the revised plan set on 370 King Street and within the downstream catch basin along King Street. (See sheet C-001)

Note No. 15 on Sheet C-101 has been added to the revised plan set stating the utilization of inlet protection at all new catch basins until site stabilization has occurred. BETA2: Inlet protection provided; item resolved.

SW22.Provide construction sequence to identify timing associated with the removal of the existing pavement at the front of the lot.

Refer to response to comment SW2. The existing pavement at the front of the lot shall be removed during the sequence to remove other existing site features and utilities.

BETA2: See BETA response to SW2.

SW23.Clearly indicate inlet protection will be provided at all new catch basins until the Site is fully stabilized. In coordination with the DPW provide inlet protection at existing catch basins adjacent to the site on King Street.

Refer to response to comment SW21. BETA2: Item resolved; see SW21.

SW24.Provide the O & M report and a Long-Term Pollution prevention plan.

Refer to response to comment SW2 & SW4. BETA2: O&M Plan provided; item resolved.

SW25.Provide a signed Illicit Discharge Compliance Statement.

An Illicit Discharge Compliance Statement has been included in the revised stormwater report as attached.

BETA2: BETA notes that there is a section in the stormwater report discussing illicit discharges. Typically, a single-sheet form is provided stating that the owner is responsible for identifying and eliminating any illicit discharges. This item is outstanding.

An Illicit Discharge Compliance Statement stating the owner is responsible for identifying and eliminating any illicit discharges has been included in this resubmission.

Additional Comments from BETA provided by email 9-18-25:

1. The existing left turn lane providing access to 380 King Street will need to be removed or relocated.

   The existing left turn lane has been conceptually shown on the revised plan set to be removed and replaced with stripping. NEI and VHB shall coordinate with the Town and DPW for final stripping removal and replacement. BETA2: Response provided; item resolved.

2. Related to this, the applicant should provide a plan with the proposed changes to the King Street lane configuration as a result of the driveway closure.

   See response to comment 1. BETA2: Item resolved; see AC1 (comment 1).

3. The applicant should clarify why the driveway proposed to be closed was selected and not one of the adjacent driveways at either 370 and 390 King Street.

   The Board recommended the closure of this accessway at 380 King Street. This entrance was chosen to be closed following discussion with the Board members. This option provided addition green space and increases the driveway spacing of the remaining entrances. BETA2: Explanation provided; item resolved.

4. The applicant should provide a discussion of how they expect the traffic generated by the proposed residential development to be distributed to and from the other access driveways on King Street.

   A traffic memorandum by VHB has been attached as part of this submission. BETA2: Traffic memorandum by VHB provided; item resolved.

5. An analysis of the existing and expected operations at the King Street and Union Street signalized intersection, should be provided. Specifically, the expected queue length along the southbound King Street approach to Union Street should be provided for the future build, or post-development conditions. This is critical to understand whether additional off-site mitigation measures are warranted.

   See response to comment 4. BETA2: Item resolved; see AC4 (comment 4).

6. The speed hump shown at the proposed connection between 380 and 390 King Street is not needed. Vehicles will be slowing down to make the right turning maneuvers to and from the proposed connection.

   The speed hump locations have been discussed with the Board members. If requested, this speed hump at this location can be removed. BETA2: BETA defers to the Planning Broad on this matter; item resolved.

7. The stop sign and stop line at the proposed connection are also not needed.

   The stop sign and stop lines have also been previously discussed and recommended by the Board members. If requested, the stop sign and stop bar can be removed. BETA2: Explanation provided; item resolved.

8. A detail for the proposed speed table should be provided.

   A detail for the proposed speed table has been provided in the updated plan set on sheet C-203. BETA2: Detail provided; item resolved.

/s_____
Joseph Malo, PE
Vice President

/s_____
Neal Hingorany, PLS, MS.
President

Should you have any questions or comments please don't hesitate to contact my office, 4016836630, or email nhingorany@nei-cds.com.

Memorandum

To: Mr. Gregory Rondeau, Chairman
Franklin Planning Board
355 East Central Street
Franklin, MA 02038

Date: October 3, 2025

Project #: R175768

From: Patrick Dunford, P.E.
Senior Project Manager

Re: **Responses to transportation peer review comments**
380 King Street
Franklin, Massachusetts

VHB is providing the following responses to the transportation-related comments contained in the September 30, 2025 comment letter from BETA Group, Inc. (BETA) regarding the proposed 30-unit residential development (the "Project") proposed to be located 380 King Street in Franklin, Massachusetts (the "Site"). This memorandum responds to the transportation-related comments from BETA, with the other remaining comments being addressed by other Project team members under separate cover.

This memorandum follows the format of BETA's comments in Section 4.0 "Traffic Assessment and Impact" section of its September 30, 2025 letter. Some of the comments in that section already have been addressed in responses from the Project Team under seperate cover. However, the remaining comments have been addressed below. For ease of review, comments in that original letter have been excerpted below followed by VHB's responses.

4.0 Traffic Assessment and Impact

Additional Comments – Traffic Impact Memorandum

T7. ***Provide traffic volume collected as part of the previously conducted Transportation Impact Assessment that was utilized for the analysis.***

VHB response: The requested traffic volume networks from the nearby childcare daycare study[1] referenced in VHB's September 16, 2025 transportation evaluation are provided attached for reference. The underlying raw traffic count data sheets also have been provided for reference.

T8. ***Clarify why the 2022 traffic volumes, collected as part of a previously conducted Transportation Impact Assessment, were not projected to 2025 volumes to represent existing conditions.***

VHB response: The analysis presented in VHB's transportation was intended to document the Project's potential impacts and not to provide a fully comprehensive evaluation of traffic conditions in the surrounding area. As documented in the study, the Project is estimated to generate 24, 22, and 15 vehicle trips during the respective weekday morning, weekday evening, and Saturday midday peak hours. This nominal traffic generation will have a negligible impact on the operation of King's Street's signalized intersection with Union Street regardless of the underlying volumes used. While adjusting the volumes to a new 2025 No-Build condition (without the Project) would result in higher intersection volumes, the net increase from the Project would remain unchanged. Accordingly, with only one vehicle being generated every three minutes under

1 Transportation Impact Assessment – Proposed Child Day Care Center, Stonefield Engineering & Design, LLC, Salem, Massachusetts, June 22, 2022.

Engineers | Scientists | Planners | Designers
260 Arsenal Place #2, Watertown, Massachusetts 02472
P 617.924.1770 F 617.924.2286 www.vhb.com

peak conditions, and not all of that traffic passing through this intersection, the analysis confirms that there will be minimal impacts.

T9. ***Clarify whether the speed used for the sight distance analysis was based on measured travel speeds or the posted speed limit.***

VHB response: The study's sight distance analysis was based on the currently posted speed limits within the study area. As noted in the study, the proponent will be pruning and cutting back brush near the Project Site driveways to help further enhance sight lines beyond those noted.

Memorandum

APPENDIX

- **Traffic Volumes:** Transportation Impact Assessment – Proposed Child Day Care Center, Stonefield Engineering & Design, LLC, Salem, Massachusetts, June 22, 2022.

TURNING MOVEMENT COUNT DATA

Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 1

Groups Printed- Cars - Trucks

	Union St From North			King St From East			Union St From South			King St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	4	9	37	8	113	3	22	4	10	32	104	5	351
07:15 AM	7	12	37	5	108	5	28	8	12	26	132	9	389
07:30 AM	14	7	44	9	107	5	37	8	12	26	136	12	417
07:45 AM	5	7	34	13	94	4	34	8	7	35	102	17	360
Total	30	35	152	35	422	17	121	28	41	119	474	43	1517
08:00 AM	6	9	39	8	103	7	21	7	9	36	116	11	372
08:15 AM	9	15	44	8	102	8	35	9	13	28	106	11	388
08:30 AM	4	13	35	10	105	5	36	8	12	20	103	23	374
08:45 AM	10	8	34	11	115	4	37	9	8	29	126	20	411
Total	29	45	152	37	425	24	129	33	42	113	451	65	1545
Grand Total	59	80	304	72	847	41	250	61	83	232	925	108	3062
Apprch %	13.3	18.1	68.6	7.5	88.2	4.3	63.5	15.5	21.1	18.3	73.1	8.5	
Total %	1.9	2.6	9.9	2.4	27.7	1.3	8.2	2	2.7	7.6	30.2	3.5	
Cars	59	80	297	72	820	39	248	61	83	228	894	108	2989
% Cars	100	100	97.7	100	96.8	95.1	99.2	100	100	98.3	96.6	100	97.6
Trucks	0	0	7	0	27	2	2	0	0	4	31	0	73
% Trucks	0	0	2.3	0	3.2	4.9	0.8	0	0	1.7	3.4	0	2.4

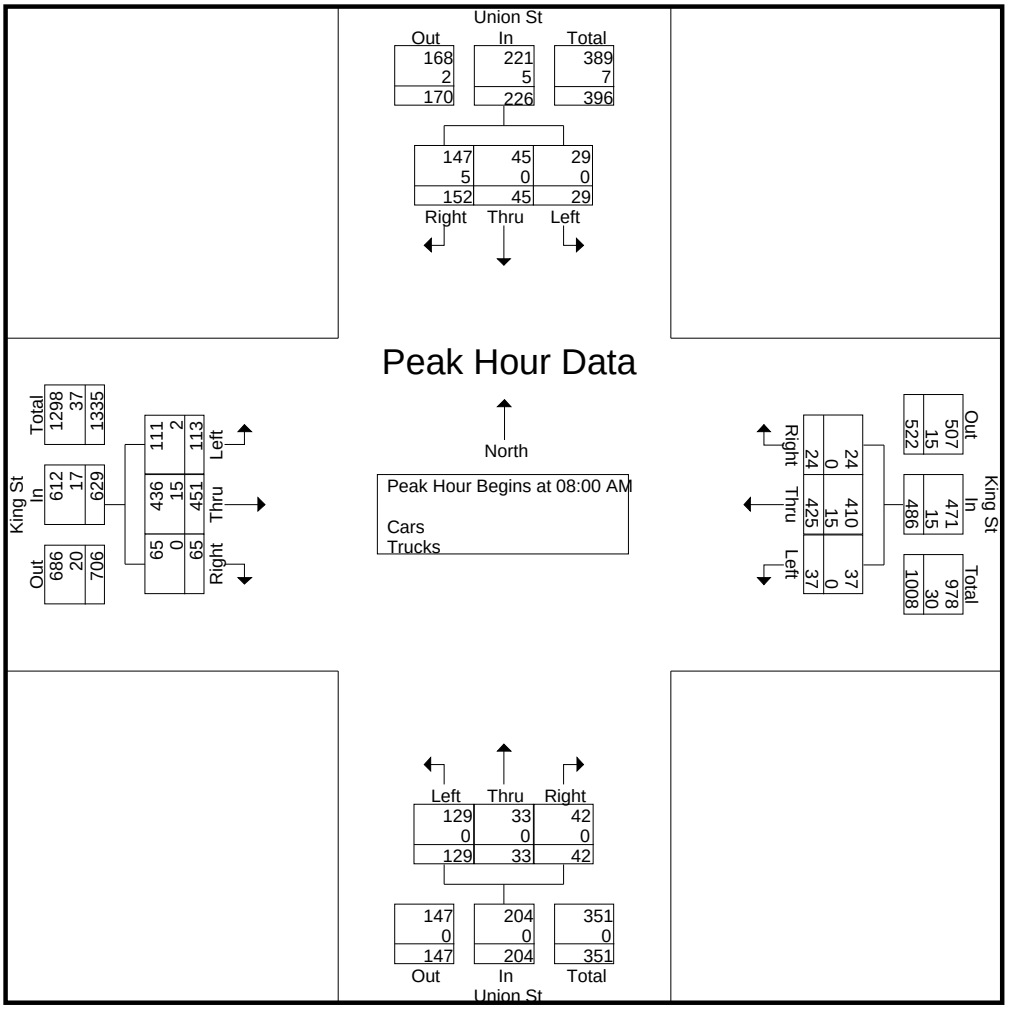
	Union St From North				King St From East				Union St From South				King St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	6	9	39	54	8	103	7	118	21	7	9	37	**36**	116	11	163	372
08:15 AM	9	**15**	**44**	**68**	8	102	**8**	118	35	**9**	**13**	**57**	28	106	11	145	388
08:30 AM	4	13	35	52	10	105	5	120	36	8	12	56	20	103	**23**	146	374
08:45 AM	**10**	8	34	52	**11**	**115**	4	**130**	**37**	9	8	54	29	**126**	20	**175**	**411**
Total Volume	29	45	152	226	37	425	24	486	129	33	42	204	113	451	65	629	1545
% App. Total	12.8	19.9	67.3		7.6	87.4	4.9		63.2	16.2	20.6		18	71.7	10.3		
PHF	.725	.750	.864	.831	.841	.924	.750	.935	.872	.917	.808	.895	.785	.895	.707	.899	.940
Cars	29	45	147	221	37	410	24	471	129	33	42	204	111	436	65	612	1508
% Cars	100	100	96.7	97.8	100	96.5	100	96.9	100	100	100	100	98.2	96.7	100	97.3	97.6
Trucks	0	0	5	5	0	15	0	15	0	0	0	0	2	15	0	17	37
% Trucks	0	0	3.3	2.2	0	3.5	0	3.1	0	0	0	0	1.8	3.3	0	2.7	2.4

Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

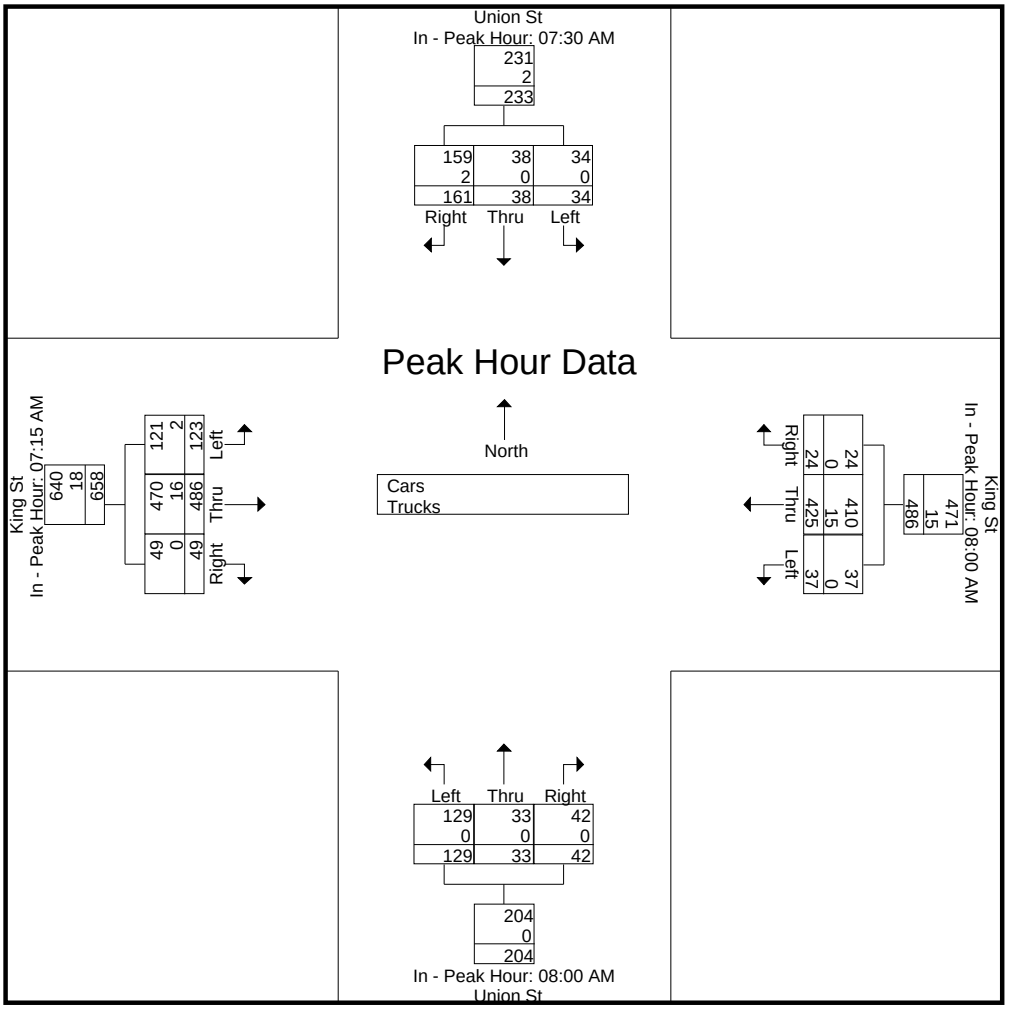
	07:30 AM				08:00 AM				08:00 AM				07:15 AM			
+0 mins.	**14**	7	**44**	65	8	103	7	118	21	7	9	37	26	132	9	167
+15 mins.	5	7	34	46	8	102	**8**	118	35	**9**	**13**	**57**	26	**136**	12	**174**
+30 mins.	6	9	39	54	10	105	5	120	36	8	12	56	35	102	**17**	154
+45 mins.	9	**15**	44	**68**	**11**	**115**	4	**130**	**37**	9	8	54	**36**	116	11	163
Total Volume	34	38	161	233	37	425	24	486	129	33	42	204	123	486	49	658
% App. Total	14.6	16.3	69.1		7.6	87.4	4.9		63.2	16.2	20.6		18.7	73.9	7.4	
PHF	.607	.633	.915	.857	.841	.924	.750	.935	.872	.917	.808	.895	.854	.893	.721	.945
Cars	34	38	159	231	37	410	24	471	129	33	42	204	121	470	49	640
% Cars	100	100	98.8	99.1	100	96.5	100	96.9	100	100	100	100	98.4	96.7	100	97.3
Trucks	0	0	2	2	0	15	0	15	0	0	0	0	2	16	0	18
% Trucks	0	0	1.2	0.9	0	3.5	0	3.1	0	0	0	0	1.6	3.3	0	2.7

Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 4

Groups Printed- Cars

	Union St From North			King St From East			Union St From South			King St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	4	9	36	8	111	2	21	4	10	32	102	5	344
07:15 AM	7	12	37	5	105	5	28	8	12	26	129	9	383
07:30 AM	14	7	44	9	104	4	37	8	12	26	133	12	410
07:45 AM	5	7	33	13	90	4	33	8	7	33	94	17	344
Total	30	35	150	35	410	15	119	28	41	117	458	43	1481
08:00 AM	6	9	39	8	98	7	21	7	9	36	114	11	365
08:15 AM	9	15	43	8	99	8	35	9	13	27	101	11	378
08:30 AM	4	13	31	10	102	5	36	8	12	20	100	23	364
08:45 AM	10	8	34	11	111	4	37	9	8	28	121	20	401
Total	29	45	147	37	410	24	129	33	42	111	436	65	1508
Grand Total	59	80	297	72	820	39	248	61	83	228	894	108	2989
Apprch %	13.5	18.3	68.1	7.7	88.1	4.2	63.3	15.6	21.2	18.5	72.7	8.8	
Total %	2	2.7	9.9	2.4	27.4	1.3	8.3	2	2.8	7.6	29.9	3.6	

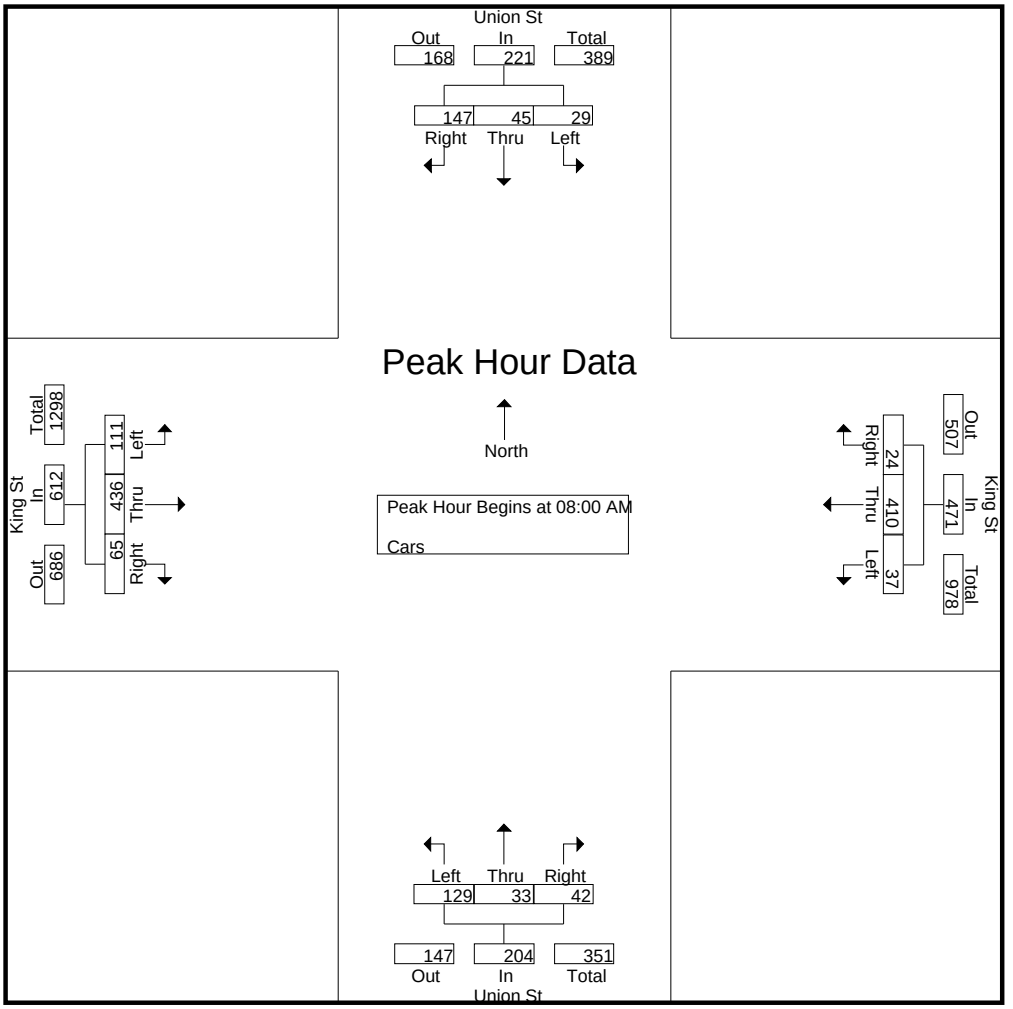
	Union St From North				King St From East				Union St From South				King St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	6	9	39	54	8	98	7	113	21	7	9	37	**36**	114	11	161	365
08:15 AM	9	**15**	**43**	**67**	8	99	**8**	115	35	**9**	**13**	**57**	27	101	11	139	378
08:30 AM	4	13	31	48	10	102	5	117	36	8	12	56	20	100	**23**	143	364
08:45 AM	**10**	8	34	52	**11**	**111**	4	**126**	**37**	9	8	54	28	**121**	20	**169**	**401**
Total Volume	29	45	147	221	37	410	24	471	129	33	42	204	111	436	65	612	1508
% App. Total	13.1	20.4	66.5		7.9	87	5.1		63.2	16.2	20.6		18.1	71.2	10.6		
PHF	.725	.750	.855	.825	.841	.923	.750	.935	.872	.917	.808	.895	.771	.901	.707	.905	.940

Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 5



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

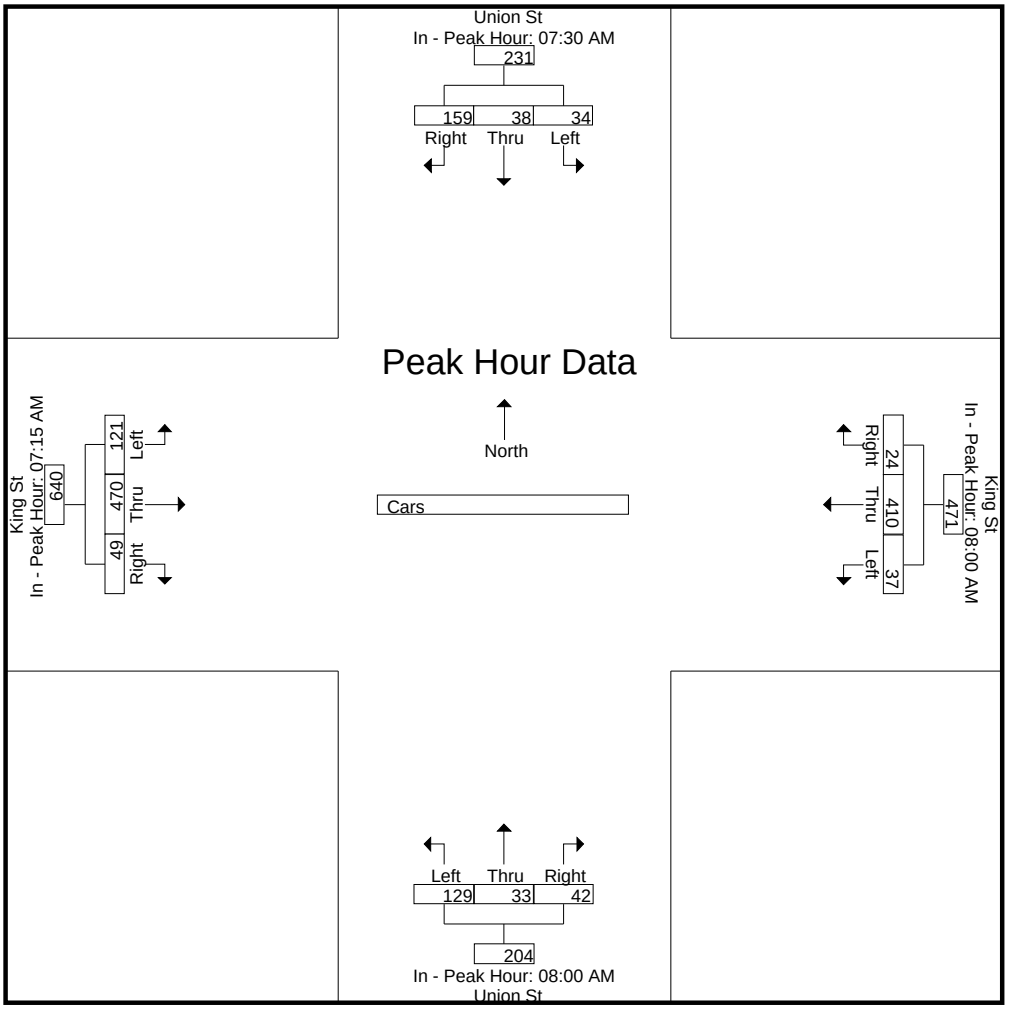
	07:30 AM				08:00 AM				08:00 AM				07:15 AM			
+0 mins.	**14**	7	**44**	65	8	98	7	113	21	7	9	37	26	129	9	164
+15 mins.	5	7	33	45	8	99	**8**	115	35	**9**	**13**	**57**	26	**133**	12	**171**
+30 mins.	6	9	39	54	10	102	5	117	36	8	12	56	33	94	**17**	144
+45 mins.	9	**15**	43	**67**	**11**	**111**	4	**126**	**37**	9	8	54	**36**	114	11	161
Total Volume	34	38	159	231	37	410	24	471	129	33	42	204	121	470	49	640
% App. Total	14.7	16.5	68.8		7.9	87	5.1		63.2	16.2	20.6		18.9	73.4	7.7	
PHF	.607	.633	.903	.862	.841	.923	.750	.935	.872	.917	.808	.895	.840	.883	.721	.936

Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 7

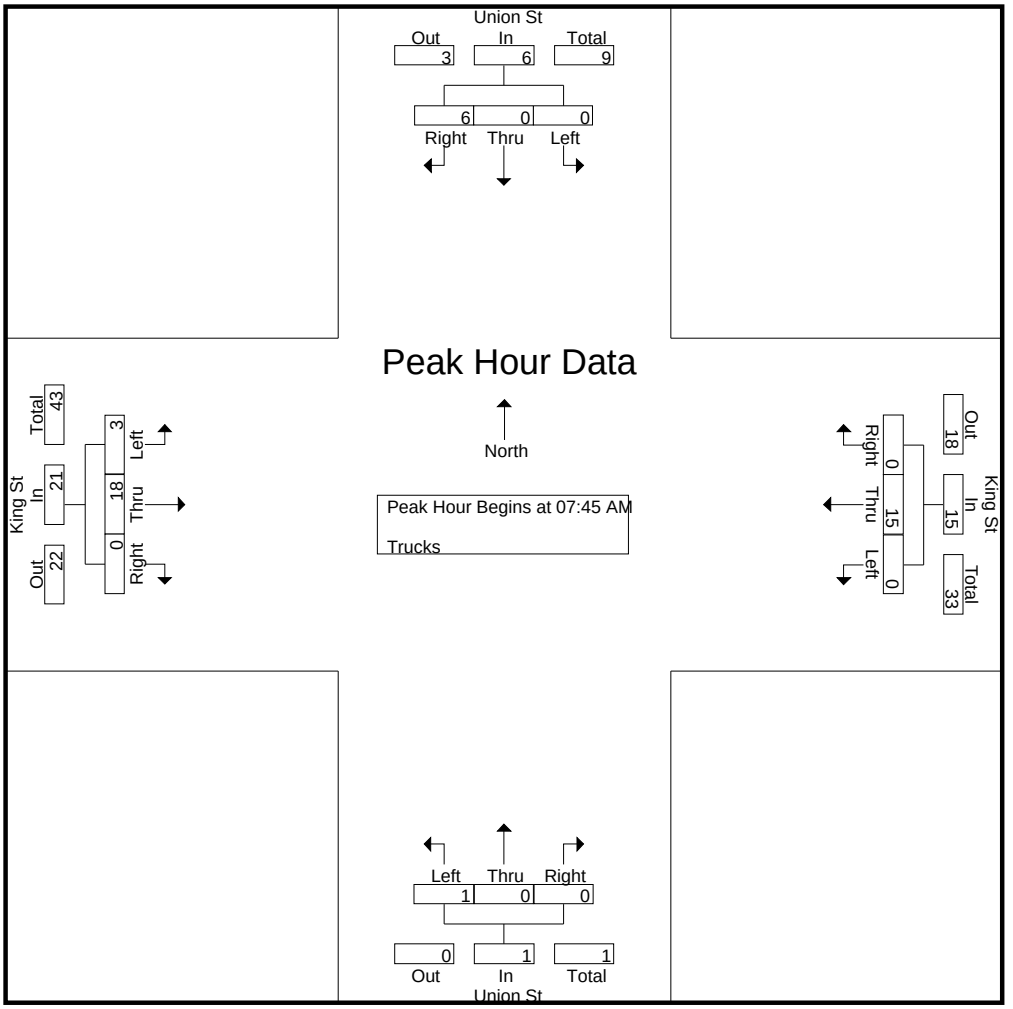
Groups Printed- Trucks

	Union St From North			King St From East			Union St From South			King St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	1	0	2	1	1	0	0	0	2	0	7
07:15 AM	0	0	0	0	3	0	0	0	0	0	3	0	6
07:30 AM	0	0	0	0	3	1	0	0	0	0	3	0	7
07:45 AM	0	0	1	0	4	0	1	0	0	2	8	0	16
Total	0	0	2	0	12	2	2	0	0	2	16	0	36
08:00 AM	0	0	0	0	5	0	0	0	0	0	2	0	7
08:15 AM	0	0	1	0	3	0	0	0	0	1	5	0	10
08:30 AM	0	0	4	0	3	0	0	0	0	0	3	0	10
08:45 AM	0	0	0	0	4	0	0	0	0	1	5	0	10
Total	0	0	5	0	15	0	0	0	0	2	15	0	37
Grand Total	0	0	7	0	27	2	2	0	0	4	31	0	73
Apprch %	0	0	100	0	93.1	6.9	100	0	0	11.4	88.6	0	
Total %	0	0	9.6	0	37	2.7	2.7	0	0	5.5	42.5	0	

	Union St From North				King St From East				Union St From South				King St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	0	0	1	1	0	4	0	4	**1**	0	0	**1**	**2**	**8**	0	**10**	**16**
08:00 AM	0	0	0	0	0	**5**	0	**5**	0	0	0	0	0	2	0	2	7
08:15 AM	0	0	1	1	0	3	0	3	0	0	0	0	1	5	0	6	10
08:30 AM	0	0	**4**	**4**	0	3	0	3	0	0	0	0	0	3	0	3	10
Total Volume	0	0	6	6	0	15	0	15	1	0	0	1	3	18	0	21	43
% App. Total	0	0	100		0	100	0		100	0	0		14.3	85.7	0		
PHF	.000	.000	.375	.375	.000	.750	.000	.750	.250	.000	.000	.250	.375	.563	.000	.525	.672

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 8



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

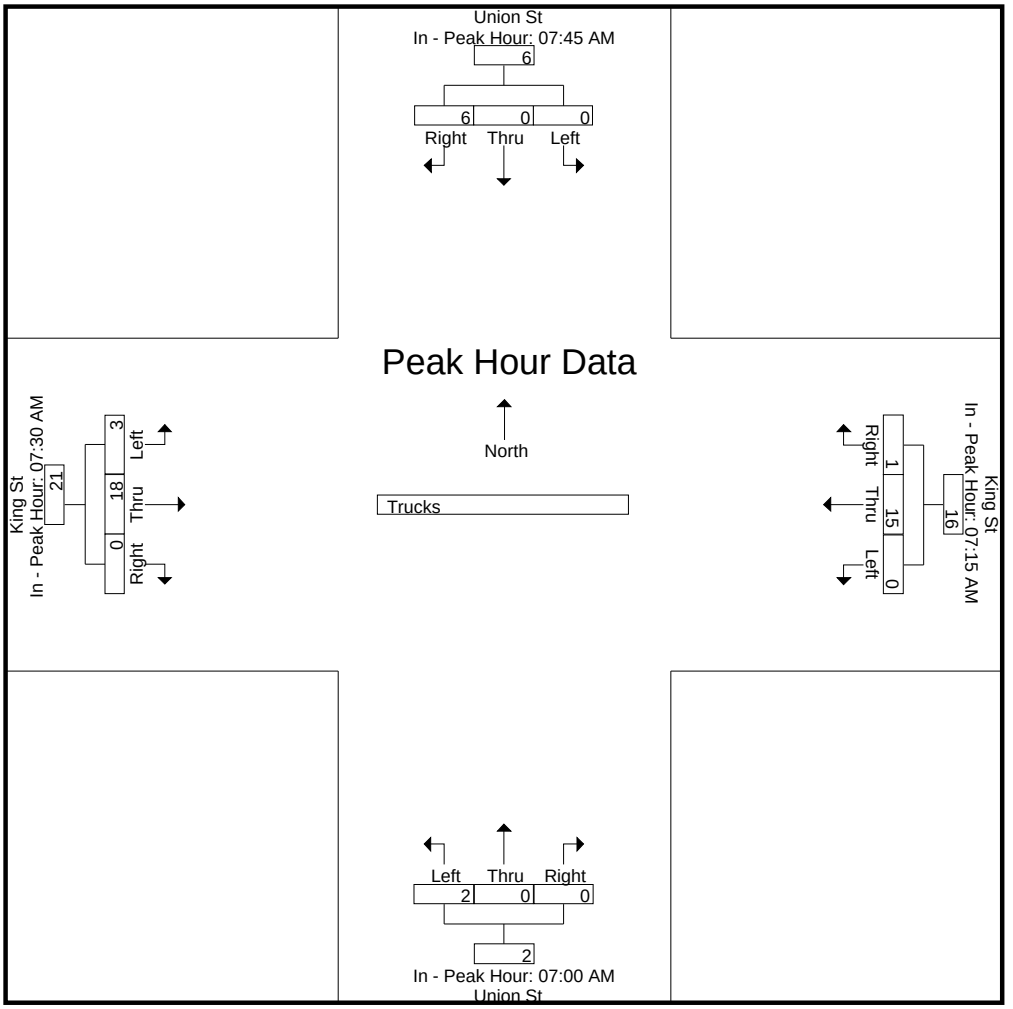
	07:45 AM				07:15 AM				07:00 AM				07:30 AM			
+0 mins.	0	0	1	1	0	3	0	3	**1**	0	0	**1**	0	3	0	3
+15 mins.	0	0	0	0	0	3	**1**	4	0	0	0	0	**2**	**8**	0	**10**
+30 mins.	0	0	1	1	0	4	0	4	0	0	0	0	0	2	0	2
+45 mins.	0	0	**4**	**4**	0	**5**	0	**5**	1	0	0	1	1	5	0	6
Total Volume	0	0	6	6	0	15	1	16	2	0	0	2	3	18	0	21
% App. Total	0	0	100		0	93.8	6.2		100	0	0		14.3	85.7	0	
PHF	.000	.000	.375	.375	.000	.750	.250	.800	.500	.000	.000	.500	.375	.563	.000	.525

Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 10

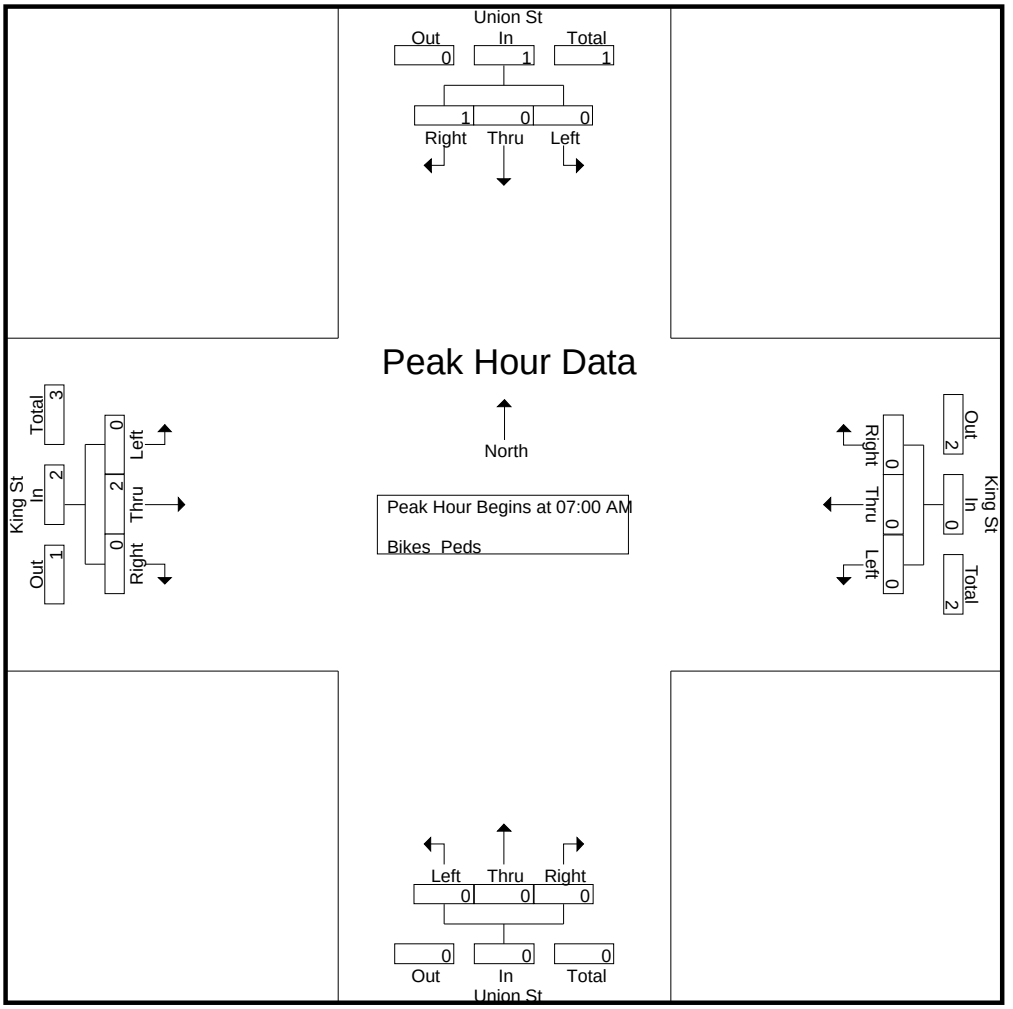
Groups Printed- Bikes Peds

	Union St From North				King St From East				Union St From South				King St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	1	0	0	0	0	2	0	0	0	0	0	1	0	0	2	2	4
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1	2
07:45 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1
Total	0	0	1	0	0	0	0	4	0	0	0	0	0	2	0	0	4	3	7
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
08:30 AM	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	6	0	6
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	4	0	0	0	0	0	0	0	2	0	0	0	2	8	0	8
Grand Total	0	0	1	4	0	0	0	4	0	0	0	2	0	2	0	2	12	3	15
Apprch %	0	0	100		0	0	0		0	0	0		0	100	0				
Total %	0	0	33.3		0	0	0		0	0	0		0	66.7	0		80	20	

	Union St From North				King St From East				Union St From South				King St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	**1**	**1**	0	0	0	0	0	0	0	0	0	**1**	0	**1**	**2**
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	1	1	0	0	0	0	0	0	0	0	0	2	0	2	3
% App. Total	0	0	100		0	0	0		0	0	0		0	100	0		
PHF	.000	.000	.250	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.000	.500	.375

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 11



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

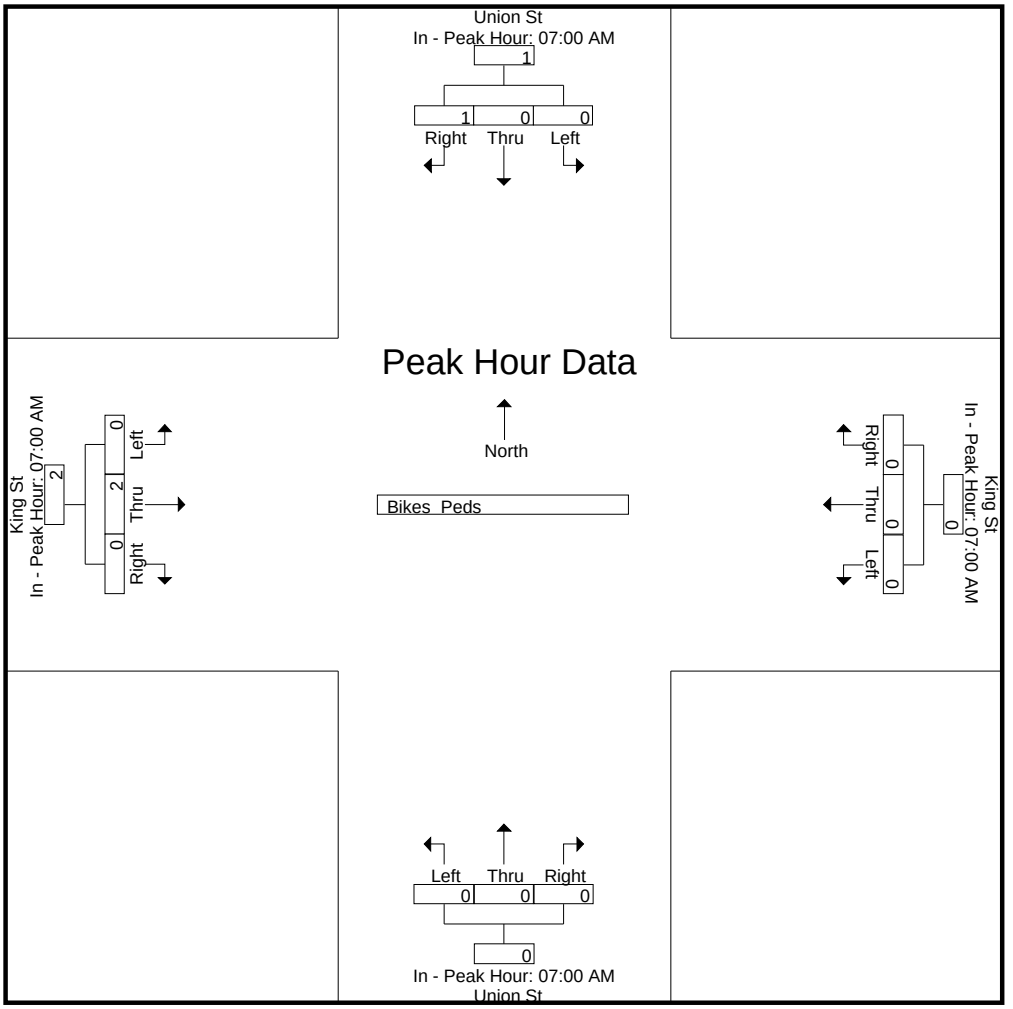
	07:00 AM				07:00 AM				07:00 AM				07:00 AM			
+0 mins.	0	0	**1**	**1**	0	0	0	0	0	0	0	0	0	**1**	0	**1**
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	1	1	0	0	0	0	0	0	0	0	0	2	0	2
% App. Total	0	0	100		0	0	0		0	0	0		0	100	0	
PHF	.000	.000	.250	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.000	.500

Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 1

Groups Printed- Cars - Trucks

	Union St From North			King St From East			Union St From South			King St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	8	8	60	9	128	5	39	11	7	61	125	25	486
04:15 PM	18	7	45	4	145	14	25	6	16	49	103	13	445
04:30 PM	12	3	41	6	130	8	37	4	3	52	123	13	432
04:45 PM	16	7	47	10	124	8	23	6	9	45	130	11	436
Total	54	25	193	29	527	35	124	27	35	207	481	62	1799
05:00 PM	12	3	51	2	151	9	28	5	10	55	163	9	498
05:15 PM	13	12	41	10	147	12	24	6	8	62	128	6	469
05:30 PM	11	5	60	8	117	5	29	5	7	45	120	15	427
05:45 PM	8	3	34	7	113	10	28	4	6	58	115	14	400
Total	44	23	186	27	528	36	109	20	31	220	526	44	1794
Grand Total	98	48	379	56	1055	71	233	47	66	427	1007	106	3593
Apprch %	18.7	9.1	72.2	4.7	89.3	6	67.3	13.6	19.1	27.7	65.4	6.9	
Total %	2.7	1.3	10.5	1.6	29.4	2	6.5	1.3	1.8	11.9	28	3	
Cars	98	47	374	56	1049	71	230	47	65	422	1005	106	3570
% Cars	100	97.9	98.7	100	99.4	100	98.7	100	98.5	98.8	99.8	100	99.4
Trucks	0	1	5	0	6	0	3	0	1	5	2	0	23
% Trucks	0	2.1	1.3	0	0.6	0	1.3	0	1.5	1.2	0.2	0	0.6

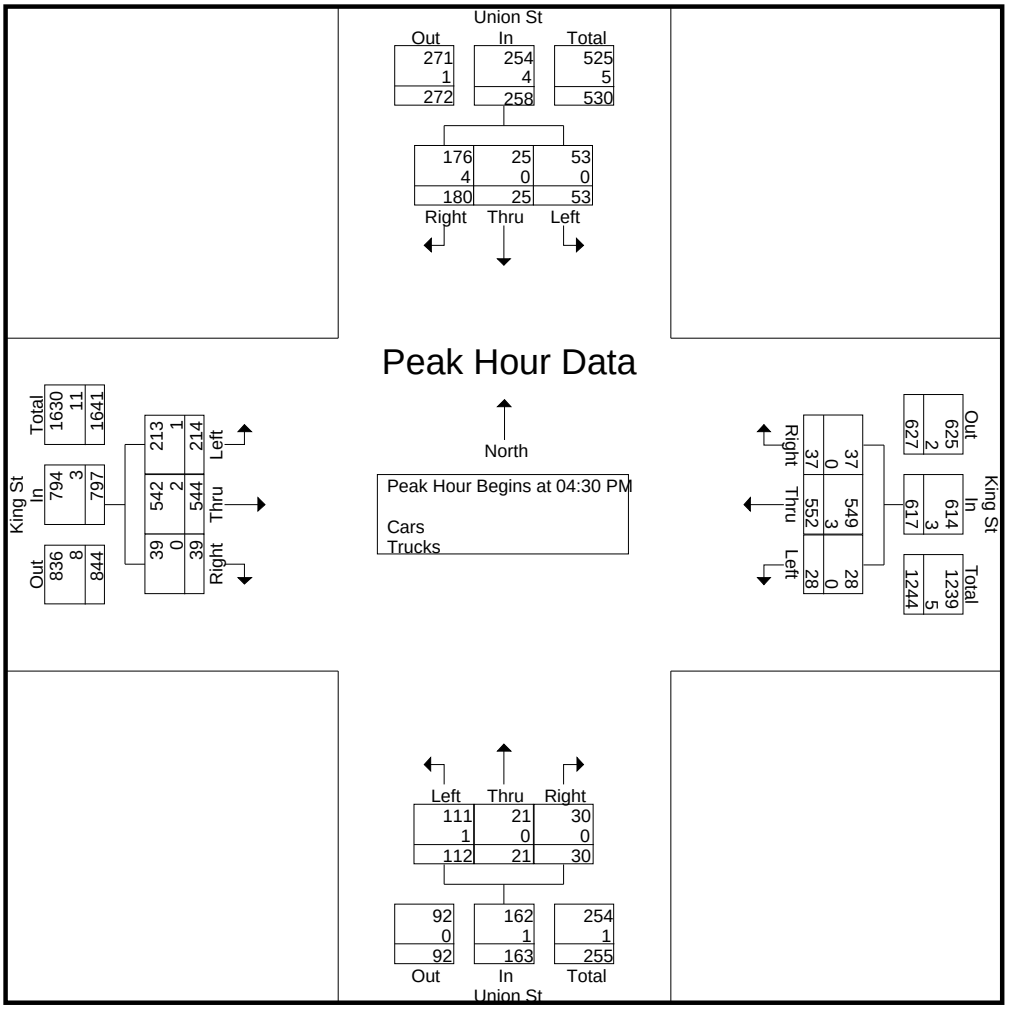
	Union St From North				King St From East				Union St From South				King St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	12	3	41	56	6	130	8	144	**37**	4	3	**44**	52	123	**13**	188	432
04:45 PM	**16**	7	47	**70**	**10**	124	8	142	23	**6**	9	38	45	130	11	186	436
05:00 PM	12	3	**51**	66	2	**151**	9	162	28	5	**10**	43	55	**163**	9	**227**	**498**
05:15 PM	13	**12**	41	66	10	147	**12**	**169**	24	6	8	38	**62**	128	6	196	469
Total Volume	53	25	180	258	28	552	37	617	112	21	30	163	214	544	39	797	1835
% App. Total	20.5	9.7	69.8		4.5	89.5	6		68.7	12.9	18.4		26.9	68.3	4.9		
PHF	.828	.521	.882	.921	.700	.914	.771	.913	.757	.875	.750	.926	.863	.834	.750	.878	.921
Cars	53	25	176	254	28	549	37	614	111	21	30	162	213	542	39	794	1824
% Cars	100	100	97.8	98.4	100	99.5	100	99.5	99.1	100	100	99.4	99.5	99.6	100	99.6	99.4
Trucks	0	0	4	4	0	3	0	3	1	0	0	1	1	2	0	3	11
% Trucks	0	0	2.2	1.6	0	0.5	0	0.5	0.9	0	0	0.6	0.5	0.4	0	0.4	0.6

Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

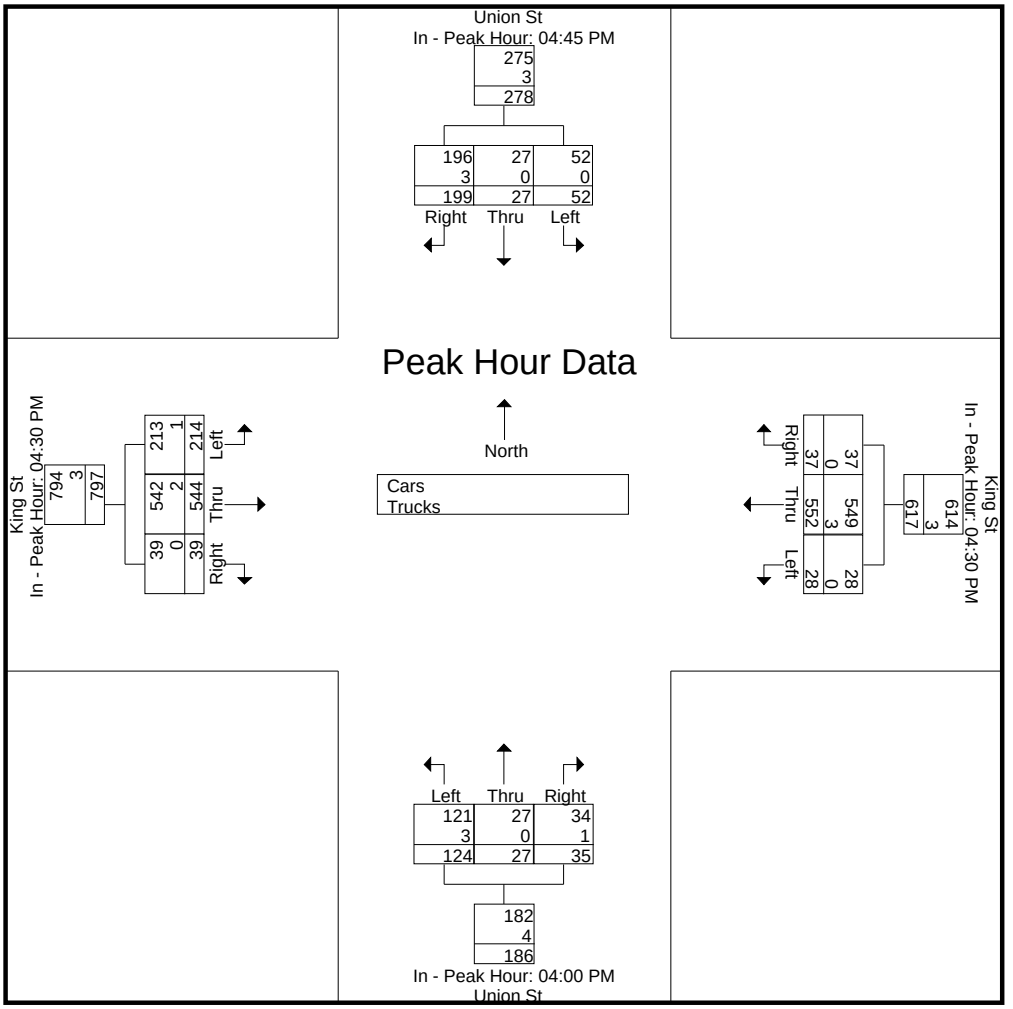
	04:45 PM				04:30 PM				04:00 PM				04:30 PM			
+0 mins.	**16**	7	47	70	6	130	8	144	**39**	**11**	7	**57**	52	123	**13**	188
+15 mins.	12	3	51	66	**10**	124	8	142	25	6	**16**	47	45	130	11	186
+30 mins.	13	**12**	41	66	2	**151**	9	162	37	4	3	44	55	**163**	9	**227**
+45 mins.	11	5	**60**	**76**	10	147	**12**	**169**	23	6	9	38	**62**	128	6	196
Total Volume	52	27	199	278	28	552	37	617	124	27	35	186	214	544	39	797
% App. Total	18.7	9.7	71.6		4.5	89.5	6		66.7	14.5	18.8		26.9	68.3	4.9	
PHF	.813	.563	.829	.914	.700	.914	.771	.913	.795	.614	.547	.816	.863	.834	.750	.878
Cars	52	27	196	275	28	549	37	614	121	27	34	182	213	542	39	794
% Cars	100	100	98.5	98.9	100	99.5	100	99.5	97.6	100	97.1	97.8	99.5	99.6	100	99.6
Trucks	0	0	3	3	0	3	0	3	3	0	1	4	1	2	0	3
% Trucks	0	0	1.5	1.1	0	0.5	0	0.5	2.4	0	2.9	2.2	0.5	0.4	0	0.4

Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 4

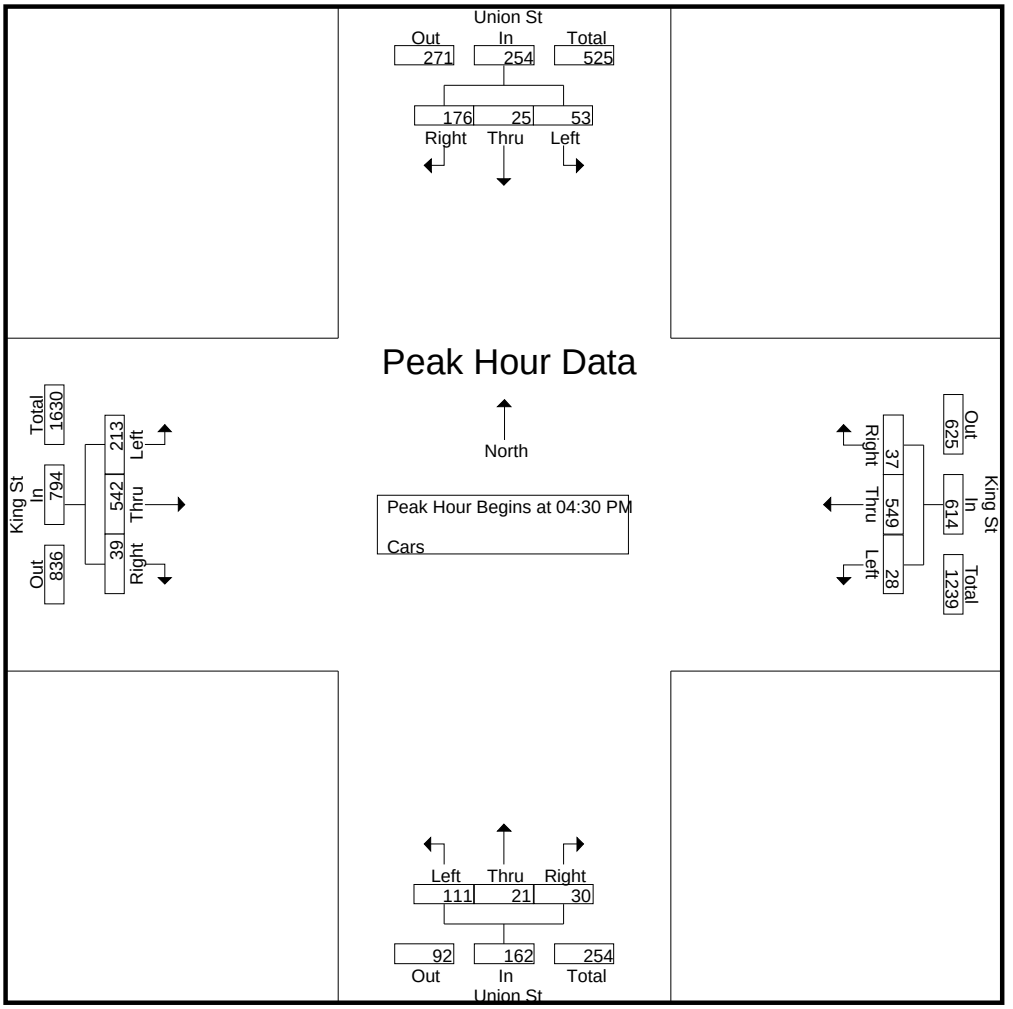
Groups Printed- Cars

	Union St From North			King St From East			Union St From South			King St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	8	7	59	9	126	5	38	11	6	59	125	25	478
04:15 PM	18	7	45	4	144	14	24	6	16	49	103	13	443
04:30 PM	12	3	40	6	130	8	36	4	3	52	123	13	430
04:45 PM	16	7	46	10	124	8	23	6	9	45	129	11	434
Total	54	24	190	29	524	35	121	27	34	205	480	62	1785
05:00 PM	12	3	50	2	151	9	28	5	10	54	163	9	496
05:15 PM	13	12	40	10	144	12	24	6	8	62	127	6	464
05:30 PM	11	5	60	8	117	5	29	5	7	45	120	15	427
05:45 PM	8	3	34	7	113	10	28	4	6	56	115	14	398
Total	44	23	184	27	525	36	109	20	31	217	525	44	1785
Grand Total	98	47	374	56	1049	71	230	47	65	422	1005	106	3570
Apprch %	18.9	9.1	72.1	4.8	89.2	6	67.3	13.7	19	27.5	65.6	6.9	
Total %	2.7	1.3	10.5	1.6	29.4	2	6.4	1.3	1.8	11.8	28.2	3	

	Union St From North				King St From East				Union St From South				King St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	12	3	40	55	6	130	8	144	**36**	4	3	**43**	52	123	**13**	188	430
04:45 PM	**16**	7	46	**69**	**10**	124	8	142	23	**6**	9	38	45	129	11	185	434
05:00 PM	12	3	**50**	65	2	**151**	9	162	28	5	**10**	43	54	**163**	9	**226**	**496**
05:15 PM	13	**12**	40	65	10	144	**12**	**166**	24	6	8	38	**62**	127	6	195	464
Total Volume	53	25	176	254	28	549	37	614	111	21	30	162	213	542	39	794	1824
% App. Total	20.9	9.8	69.3		4.6	89.4	6		68.5	13	18.5		26.8	68.3	4.9		
PHF	.828	.521	.880	.920	.700	.909	.771	.925	.771	.875	.750	.942	.859	.831	.750	.878	.919

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 5

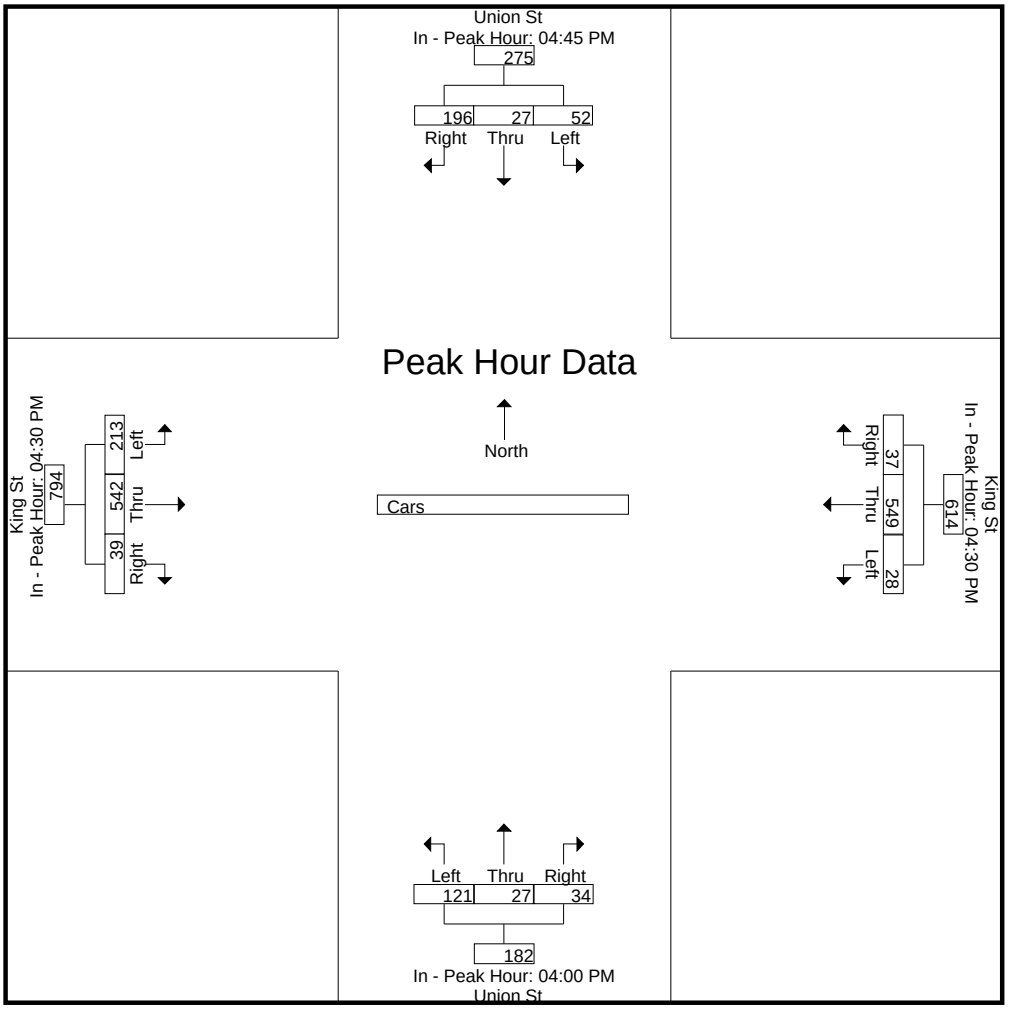


Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:30 PM				04:00 PM				04:30 PM			
+0 mins.	**16**	7	46	69	6	130	8	144	**38**	**11**	6	**55**	52	123	**13**	188
+15 mins.	12	3	50	65	**10**	124	8	142	24	6	**16**	46	45	129	11	185
+30 mins.	13	**12**	40	65	2	**151**	9	162	36	4	3	43	54	**163**	9	**226**
+45 mins.	11	5	**60**	**76**	10	144	**12**	**166**	23	6	9	38	**62**	127	6	195
Total Volume	52	27	196	275	28	549	37	614	121	27	34	182	213	542	39	794
% App. Total	18.9	9.8	71.3		4.6	89.4	6		66.5	14.8	18.7		26.8	68.3	4.9	
PHF	.813	.563	.817	.905	.700	.909	.771	.925	.796	.614	.531	.827	.859	.831	.750	.878

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 7

Groups Printed- Trucks

	Union St From North			King St From East			Union St From South			King St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	0	1	1	0	2	0	1	0	1	2	0	0	8
04:15 PM	0	0	0	0	1	0	1	0	0	0	0	0	2
04:30 PM	0	0	1	0	0	0	1	0	0	0	0	0	2
04:45 PM	0	0	1	0	0	0	0	0	0	0	1	0	2
Total	0	1	3	0	3	0	3	0	1	2	1	0	14
05:00 PM	0	0	1	0	0	0	0	0	0	1	0	0	2
05:15 PM	0	0	1	0	3	0	0	0	0	0	1	0	5
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	2	0	0	2
Total	0	0	2	0	3	0	0	0	0	3	1	0	9
Grand Total	0	1	5	0	6	0	3	0	1	5	2	0	23
Apprch %	0	16.7	83.3	0	100	0	75	0	25	71.4	28.6	0	
Total %	0	4.3	21.7	0	26.1	0	13	0	4.3	21.7	8.7	0	

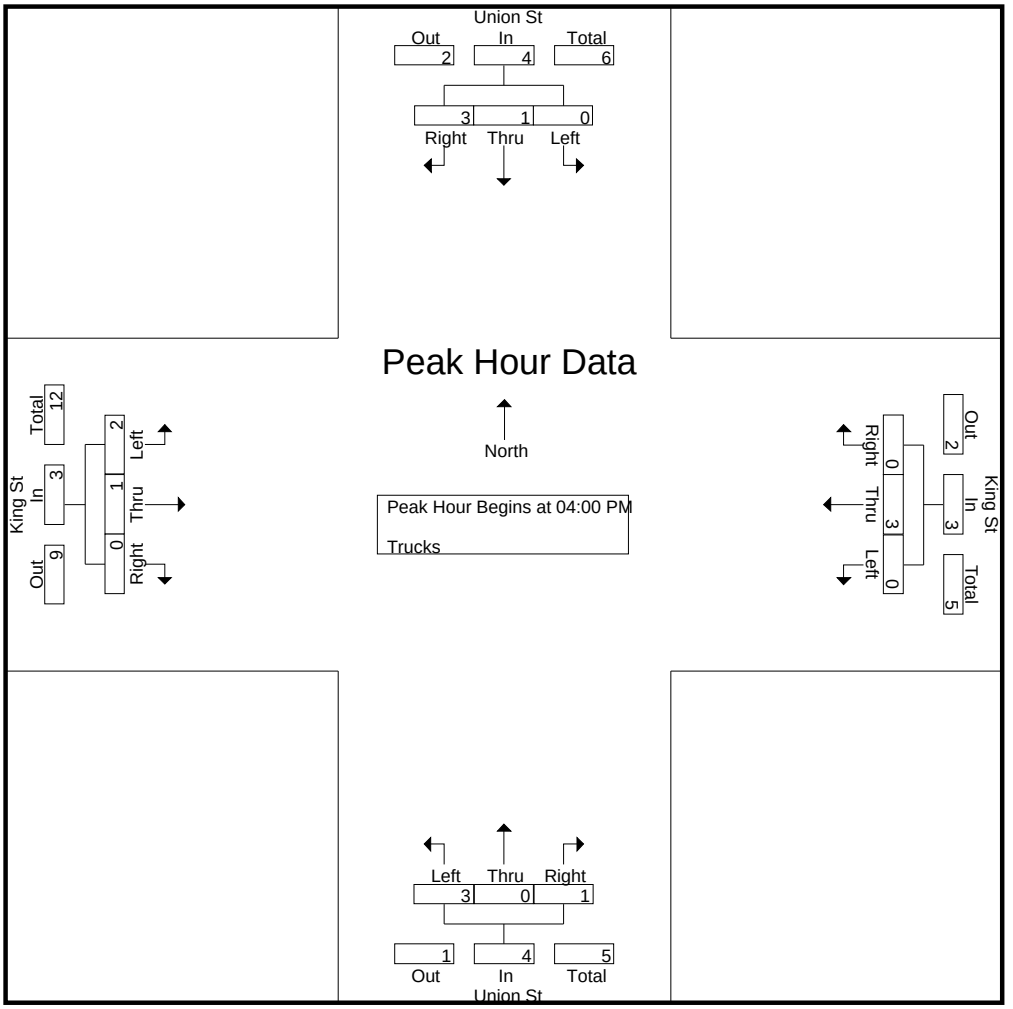
	Union St From North				King St From East				Union St From South				King St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	**1**	**1**	**2**	0	**2**	0	**2**	**1**	0	**1**	**2**	**2**	0	0	**2**	**8**
04:15 PM	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	0	2
04:30 PM	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	0	2
04:45 PM	0	0	1	1	0	0	0	0	0	0	0	0	0	**1**	0	1	2
Total Volume	0	1	3	4	0	3	0	3	3	0	1	4	2	1	0	3	14
% App. Total	0	25	75		0	100	0		75	0	25		66.7	33.3	0		
PHF	.000	.250	.750	.500	.000	.375	.000	.375	.750	.000	.250	.500	.250	.250	.000	.375	.438

Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 8



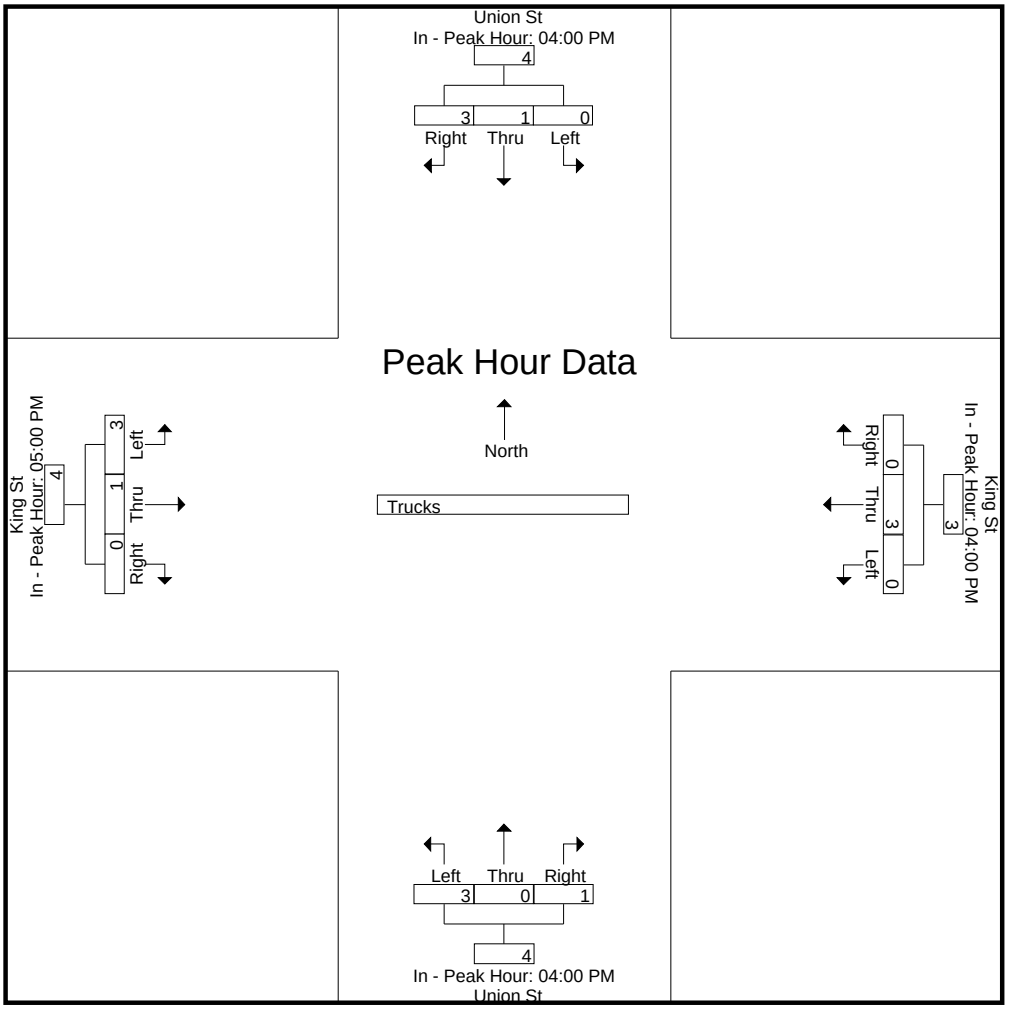
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:00 PM				05:00 PM			
+0 mins.	0	**1**	**1**	**2**	0	**2**	0	**2**	**1**	0	**1**	**2**	1	0	0	1
+15 mins.	0	0	0	0	0	1	0	1	1	0	0	1	0	**1**	0	1
+30 mins.	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	0
+45 mins.	0	0	1	1	0	0	0	0	0	0	0	0	**2**	0	0	**2**
Total Volume	0	1	3	4	0	3	0	3	3	0	1	4	3	1	0	4
% App. Total	0	25	75		0	100	0		75	0	25		75	25	0	
PHF	.000	.250	.750	.500	.000	.375	.000	.375	.750	.000	.250	.500	.375	.250	.000	.500

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 10

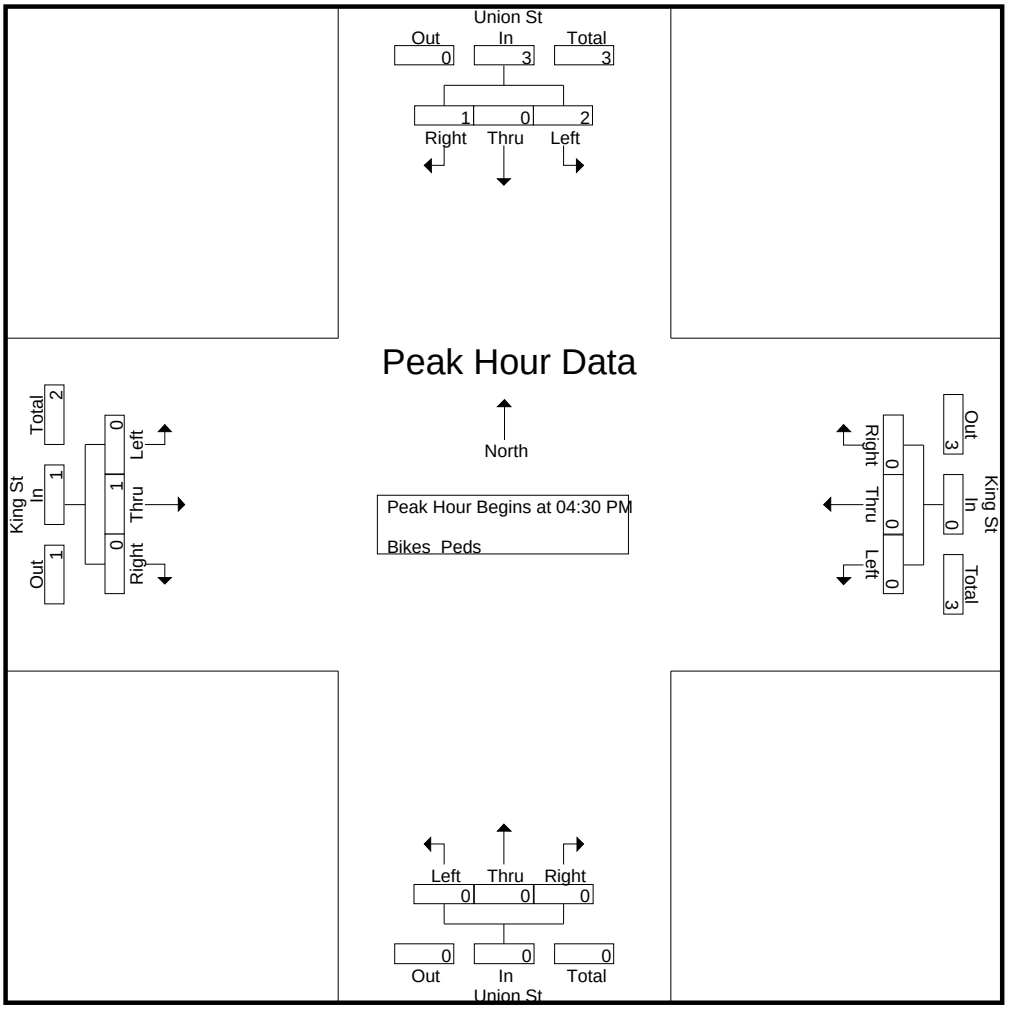
Groups Printed- Bikes Peds

	Union St From North				King St From East				Union St From South				King St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	3
04:45 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Total	2	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	3	4
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	1	2	0	0	0	2	0	0	0	0	0	0	0	0	4	1	5
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
05:45 PM	0	0	0	2	0	0	0	2	0	0	0	1	0	0	0	0	5	0	5
Total	0	0	1	4	0	0	0	4	0	0	0	1	0	0	0	1	10	1	11
Grand Total	2	0	1	5	0	0	0	4	0	0	0	1	0	1	0	1	11	4	15
Apprch %	66.7	0	33.3		0	0	0		0	0	0		0	100	0				
Total %	50	0	25		0	0	0		0	0	0		0	25	0		73.3	26.7	

	Union St From North				King St From East				Union St From South				King St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	**2**	0	0	**2**	0	0	0	0	0	0	0	0	0	**1**	0	**1**	**3**
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	**1**	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	2	0	1	3	0	0	0	0	0	0	0	0	0	1	0	1	4
% App. Total	66.7	0	33.3		0	0	0		0	0	0		0	100	0		
PHF	.250	.000	.250	.375	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.333

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 11

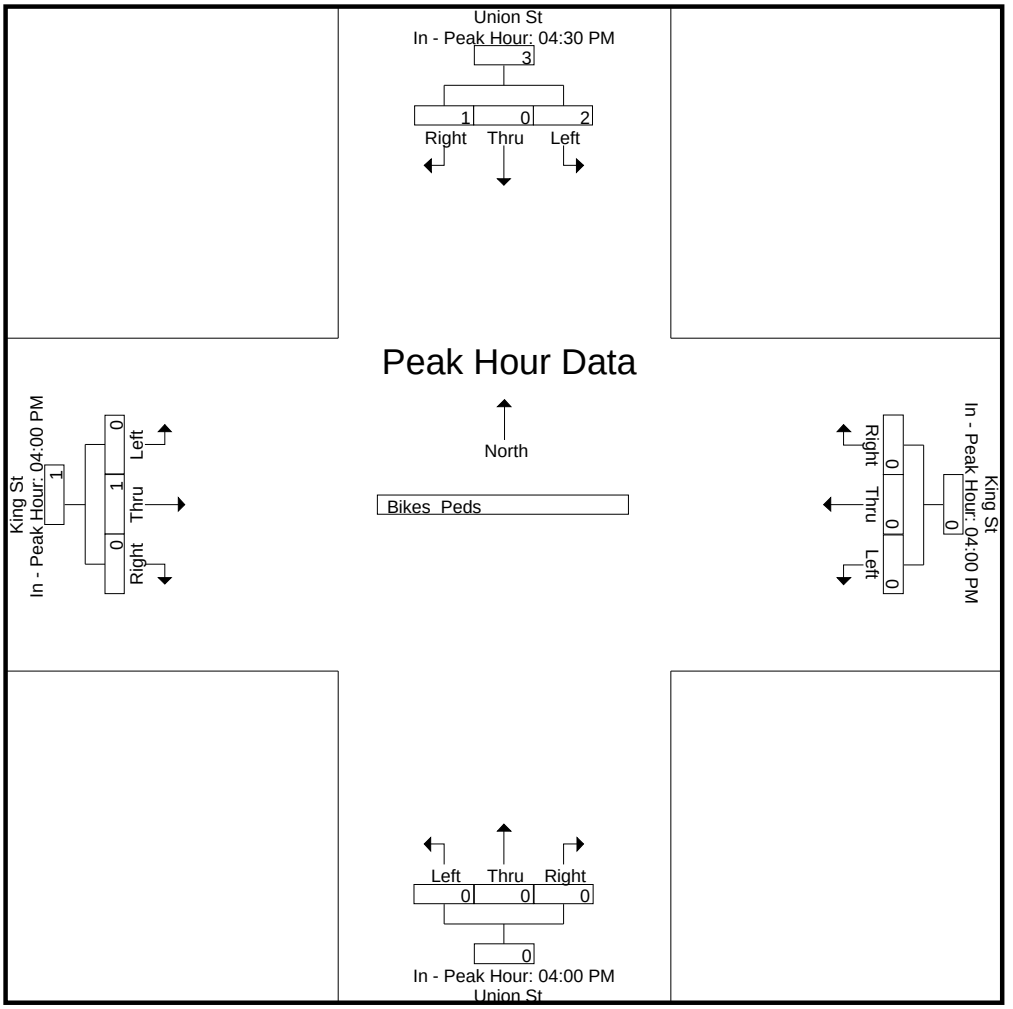


Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				04:00 PM				04:00 PM				04:00 PM			
+0 mins.	**2**	0	0	**2**	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	**1**
+45 mins.	0	0	**1**	1	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	2	0	1	3	0	0	0	0	0	0	0	0	0	1	0	1
% App. Total	66.7	0	33.3		0	0	0		0	0	0		0	100	0	
PHF	.250	.000	.250	.375	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250

N/S Street : Union Street
E/W Street : King Street
City/State : Franklin, MA
Weather : Clear

File Name : 88630004
Site Code : 88630004
Start Date : 5/26/2021
Page No : 12



AUTOMATIC TRAFFIC RECORDER COUNT DATA

Accurate Counts

978-664-2565

Location : King Streetr 88630001
Location : East of Constitution Boulevard
City/State: Franklin, MA

5/26/2021	EB,		Hour Totals		WB,		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	24	139			12	121				
12:15	9	147			10	124				
12:30	10	154			12	124				
12:45	7	151	50	591	5	124	39	493	89	1084
1:00	3	134			6	123				
1:15	6	116			9	121				
1:30	6	150			7	131				
1:45	13	134	28	534	5	140	27	515	55	1049
2:00	6	173			6	128				
2:15	4	155			10	171				
2:30	6	167			8	175				
2:45	5	148	21	643	7	184	31	658	52	1301
3:00	8	192			8	184				
3:15	8	199			11	186				
3:30	8	176			3	148				
3:45	11	125	35	692	12	153	34	671	69	1363
4:00	22	184			10	214				
4:15	27	148			13	209				
4:30	39	177			22	198				
4:45	52	155	140	664	36	196	81	817	221	1481
5:00	55	199			31	214				
5:15	63	155			43	219				
5:30	100	157			66	170				
5:45	118	149	336	660	78	170	218	773	554	1433
6:00	141	132			73	176				
6:15	181	124			78	168				
6:30	181	133			113	142				
6:45	188	108	691	497	131	122	395	608	1086	1105
7:00	201	87			118	137				
7:15	236	88			118	119				
7:30	210	66			119	122				
7:45	191	73	838	314	141	89	496	467	1334	781
8:00	164	79			138	105				
8:15	207	78			131	98				
8:30	158	72			130	81				
8:45	202	49	731	278	126	71	525	355	1256	633
9:00	158	31			107	66				
9:15	122	47			99	54				
9:30	136	33			94	64				
9:45	133	23	549	134	113	37	413	221	962	355
10:00	120	19			103	41				
10:15	133	20			85	33				
10:30	143	25			99	36				
10:45	141	25	537	89	118	32	405	142	942	231
11:00	137	40			110	27				
11:15	134	23			106	36				
11:30	135	22			132	23				
11:45	159	14	565	99	131	16	479	102	1044	201
Total	4521	5195			3143	5822			7664	11017
Percent	46.5%	53.5%			35.1%	64.9%			41.0%	59.0%

Accurate Counts

978-664-2565

Location : King Streetr 88630001
Location : East of Constitution Boulevard
City/State: Franklin, MA

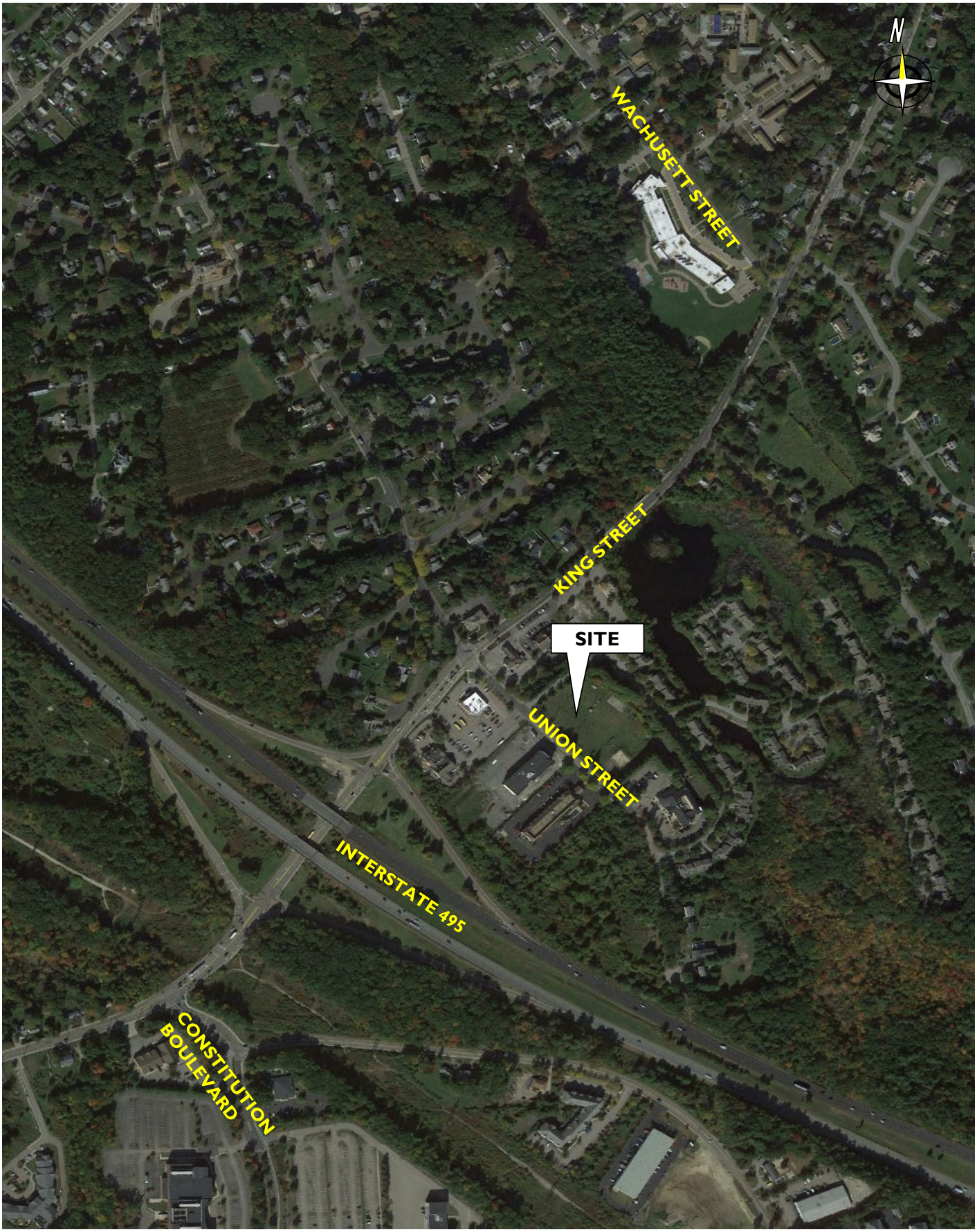
5/27/2021	EB,		Hour Totals		WB,		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	17	146			20	113				
12:15	5	146			11	123				
12:30	6	150			9	118				
12:45	13	151	41	593	7	126	47	480	88	1073
1:00	11	152			8	128				
1:15	7	121			9	145				
1:30	8	126			2	140				
1:45	8	162	34	561	1	128	20	541	54	1102
2:00	11	180			7	131				
2:15	3	180			5	153				
2:30	6	152			5	181				
2:45	6	165	26	677	11	204	28	669	54	1346
3:00	3	236			10	170				
3:15	3	188			6	184				
3:30	5	192			5	190				
3:45	15	155	26	771	10	182	31	726	57	1497
4:00	18	148			8	192				
4:15	26	152			22	175				
4:30	35	173			24	169				
4:45	45	139	124	612	25	167	79	703	203	1315
5:00	56	146			27	172				
5:15	76	193			35	243				
5:30	103	130			56	170				
5:45	114	149	349	618	64	194	182	779	531	1397
6:00	130	112			76	166				
6:15	174	117			96	153				
6:30	155	116			104	140				
6:45	171	89	630	434	123	112	399	571	1029	1005
7:00	193	116			122	130				
7:15	232	93			112	133				
7:30	219	77			116	90				
7:45	188	72	832	358	145	110	495	463	1327	821
8:00	174	42			133	79				
8:15	183	78			127	95				
8:30	178	76			154	85				
8:45	217	44	752	240	142	79	556	338	1308	578
9:00	135	46			112	74				
9:15	165	27			113	56				
9:30	132	30			116	68				
9:45	146	28	578	131	104	49	445	247	1023	378
10:00	129	32			99	38				
10:15	132	35			104	41				
10:30	133	15			105	32				
10:45	131	24	525	106	114	28	422	139	947	245
11:00	160	18			101	25				
11:15	152	11			105	20				
11:30	131	24			113	22				
11:45	136	7	579	60	129	27	448	94	1027	154
Total	4496	5161			3152	5750			7648	10911
Percent	46.6%	53.4%			35.4%	64.6%			41.2%	58.8%
Grand Total	9017	10356			6295	11572			15312	21928
Percent	46.5%	53.5%			35.2%	64.8%			41.1%	58.9%
ADT		ADT: 18,620		AADT: 18,620						

Accurate Counts

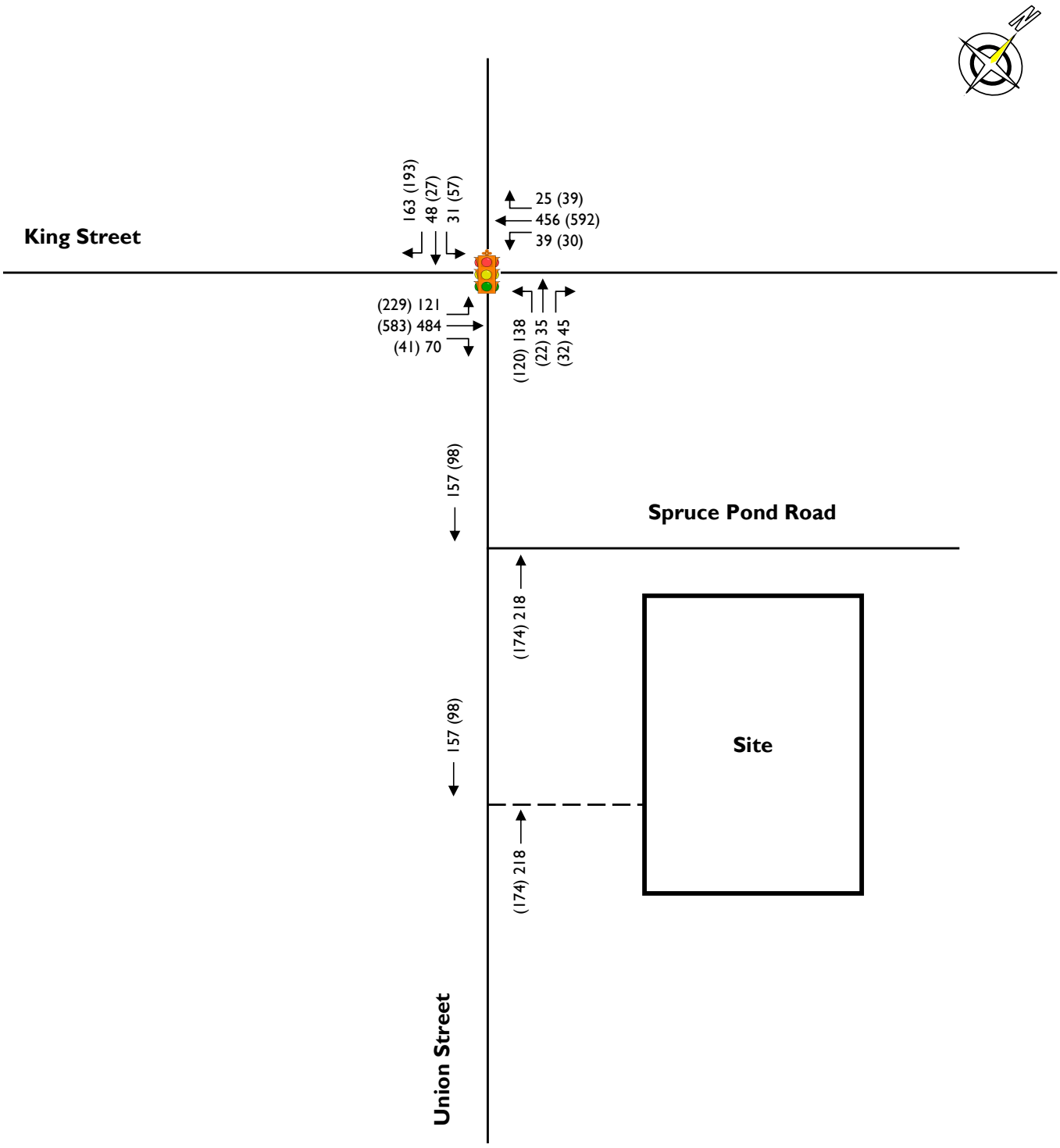
978-664-2565

Location : King Streetr 88630001
Location : East of Constitution Boulevard
City/State: Franklin, MA

5/24/2021	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Week Average	
Time	EB,	WB,	EB,	WB,	EB,	WB,	EB,	WB,	EB,	WB,	EB,	WB,	EB,	WB,	EB,	WB,
12:00 AM	*	*	*	*	50	39	41	47	*	*	*	*	*	*	46	43
1:00	*	*	*	*	28	27	34	20	*	*	*	*	*	*	31	24
2:00	*	*	*	*	21	31	26	28	*	*	*	*	*	*	24	30
3:00	*	*	*	*	35	34	26	31	*	*	*	*	*	*	30	32
4:00	*	*	*	*	140	81	124	79	*	*	*	*	*	*	132	80
5:00	*	*	*	*	336	218	349	182	*	*	*	*	*	*	342	200
6:00	*	*	*	*	691	395	630	399	*	*	*	*	*	*	660	397
7:00	*	*	*	*	838	496	832	495	*	*	*	*	*	*	835	496
8:00	*	*	*	*	731	525	752	556	*	*	*	*	*	*	742	540
9:00	*	*	*	*	549	413	578	445	*	*	*	*	*	*	564	429
10:00	*	*	*	*	537	405	525	422	*	*	*	*	*	*	531	414
11:00	*	*	*	*	565	479	579	448	*	*	*	*	*	*	572	464
12:00 PM	*	*	*	*	591	493	593	480	*	*	*	*	*	*	592	486
1:00	*	*	*	*	534	515	561	541	*	*	*	*	*	*	548	528
2:00	*	*	*	*	643	658	677	669	*	*	*	*	*	*	660	664
3:00	*	*	*	*	692	671	771	726	*	*	*	*	*	*	732	698
4:00	*	*	*	*	664	817	612	703	*	*	*	*	*	*	638	760
5:00	*	*	*	*	660	773	618	779	*	*	*	*	*	*	639	776
6:00	*	*	*	*	497	608	434	571	*	*	*	*	*	*	466	590
7:00	*	*	*	*	314	467	358	463	*	*	*	*	*	*	336	465
8:00	*	*	*	*	278	355	240	338	*	*	*	*	*	*	259	346
9:00	*	*	*	*	134	221	131	247	*	*	*	*	*	*	132	234
10:00	*	*	*	*	89	142	106	139	*	*	*	*	*	*	98	140
11:00	*	*	*	*	99	102	60	94	*	*	*	*	*	*	80	98
Total	0	0	0	0	9716	8965	9657	8902	0	0	0	0	0	0	9689	8934
Day	0		0		18681		18559		0		0		0		18623	
AM Peak					7:00	8:00	7:00	8:00							7:00	8:00
Volume					838	525	832	556							835	540
PM Peak					3:00	4:00	3:00	5:00							3:00	5:00
Volume					692	817	771	779							732	776
Comb Total	0		0		18681		18559		0		0		0		18623	
ADT	ADT: 18,620		AADT: 18,620													



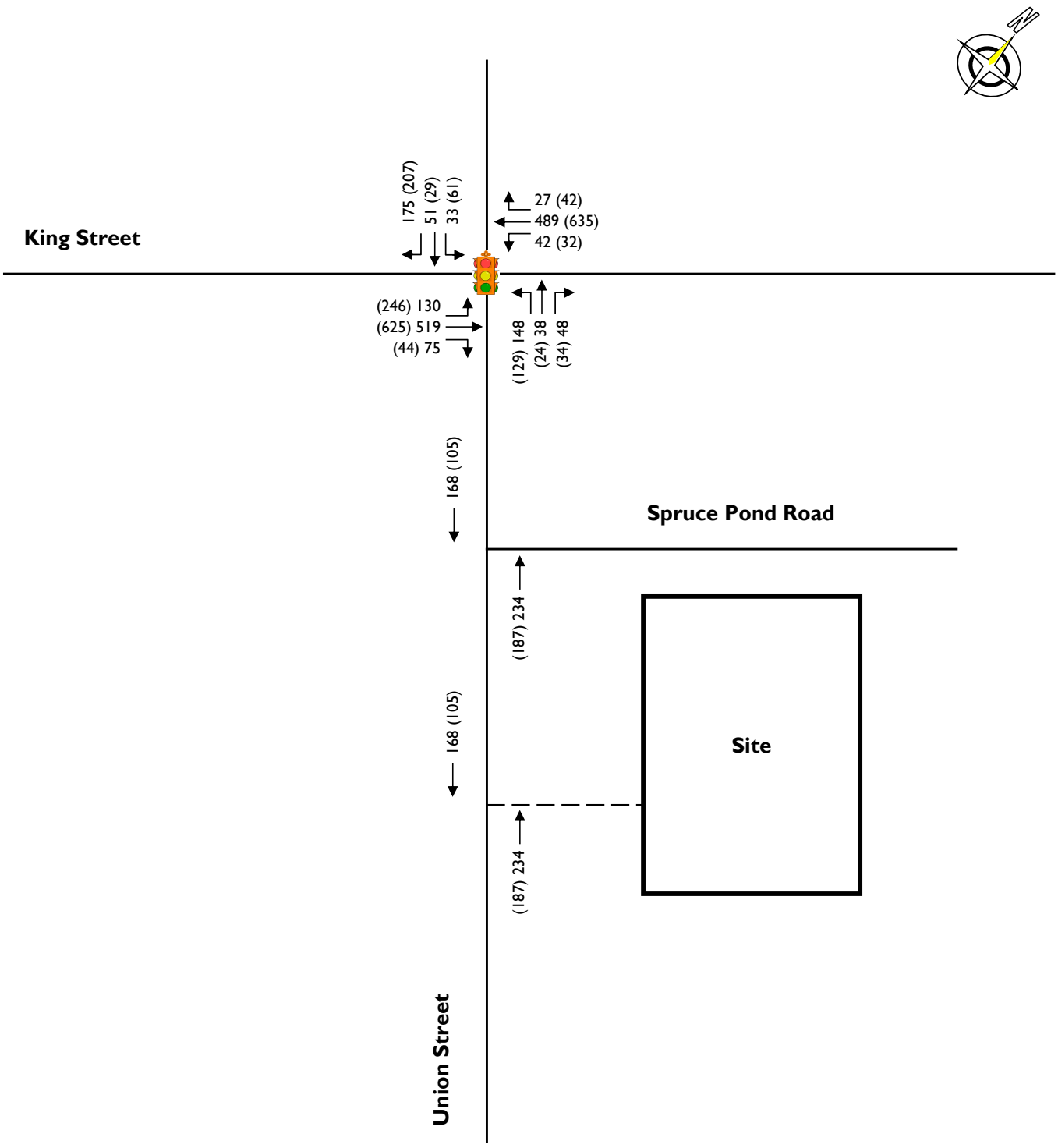
STONEFIELD	Proposed Child Care Center 700-712 Union Street Town of Franklin, Norfolk County, Massachusetts Traffic Impact Study	FIGURE 1 Site Location Map



LEGEND

- Existing Roadway
- Proposed Driveway
- Existing Private Driveway
- AM (PM) Peak Hour Volumes
- Signalized Intersection

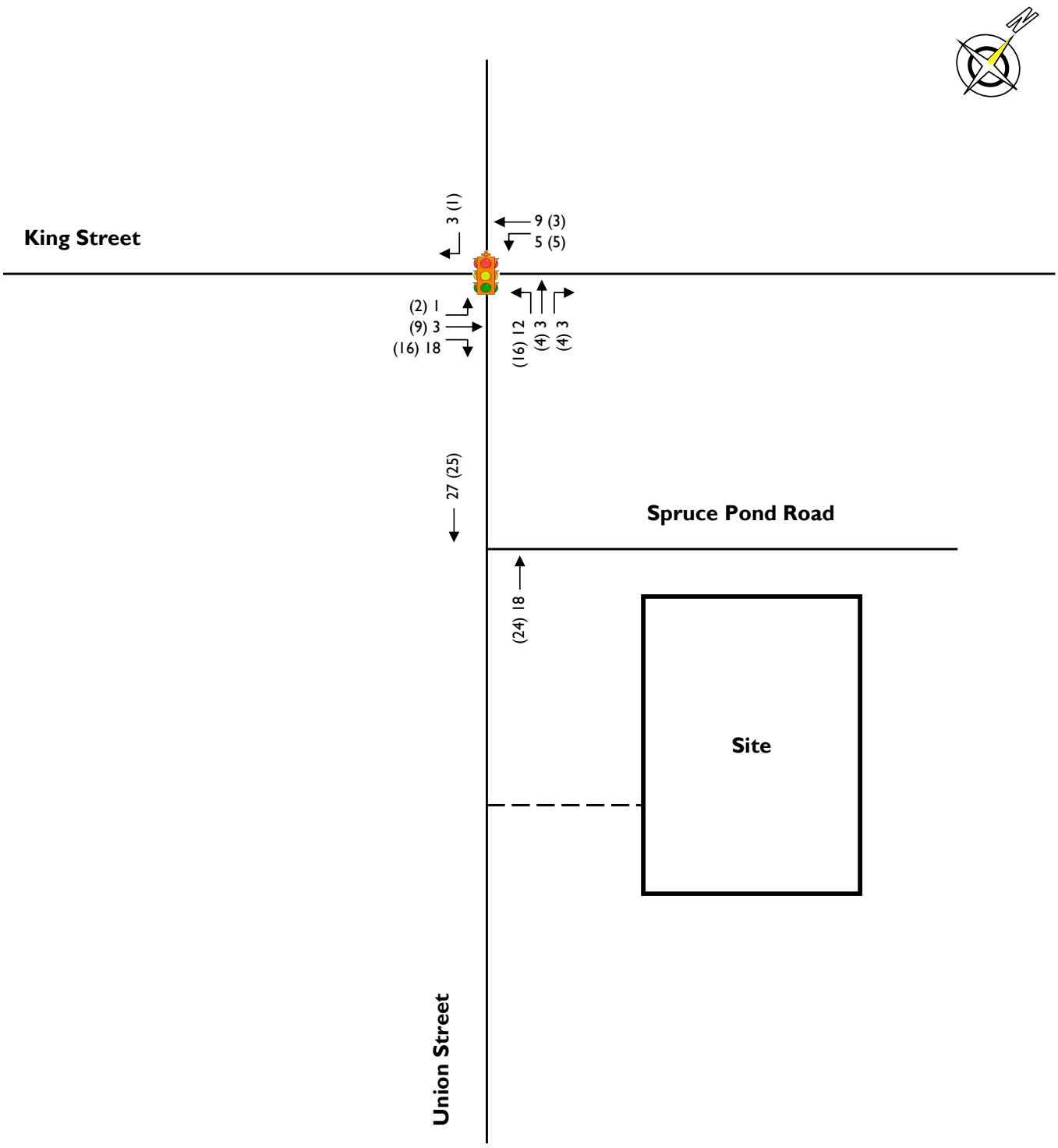
STONEFIELD	**Proposed Child Care Center** **700-712 Union Street** **Town of Franklin, Norfolk County, Massachusetts** **Traffic Impact Study**	**FIGURE 2** **2022 Existing Traffic Volumes**



LEGEND

- Existing Roadway
- Proposed Driveway
- Existing Private Driveway
- AM (PM) Peak Hour Volumes
- Signalized Intersection

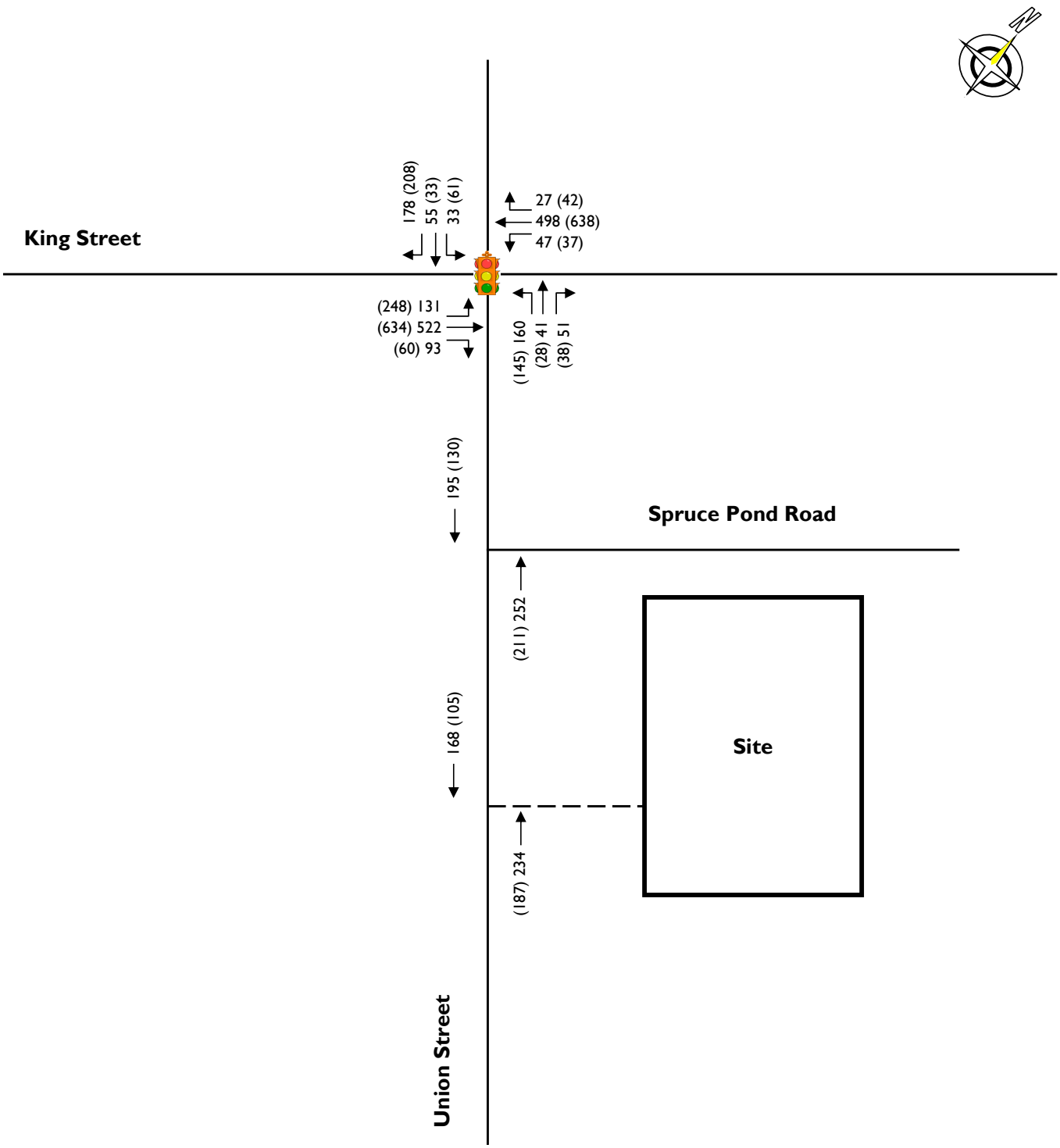
STONEFIELD	**Proposed Child Care Center** **700-712 Union Street** **Town of Franklin, Norfolk County, Massachusetts** **Traffic Impact Study**	**FIGURE 3** **2029 Base Traffic Volumes**



LEGEND

- Existing Roadway
- Proposed Driveway
- Existing Private Driveway
- AM (PM) Peak Hour Volumes
- Signalized Intersection

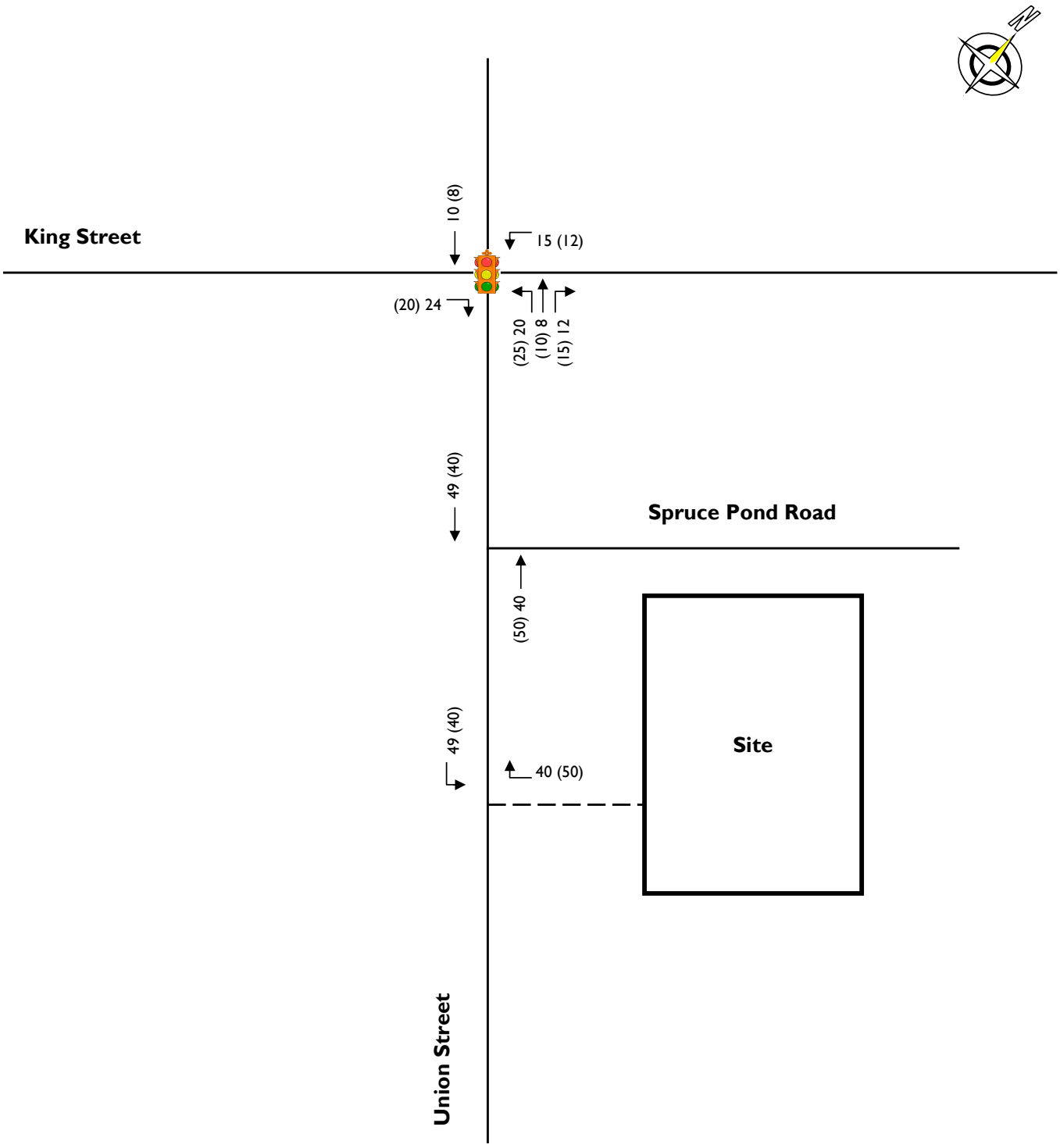
STONEFIELD	**Proposed Child Care Center** **700-712 Union Street** **Town of Franklin, Norfolk County, Massachusetts** **Traffic Impact Study**	**FIGURE 4** **Other Planned Projects** **Future Traffic Volumes**



LEGEND

- Existing Roadway
- Proposed Driveway
- Existing Private Driveway
- AM (PM) Peak Hour Volumes
- Signalized Intersection

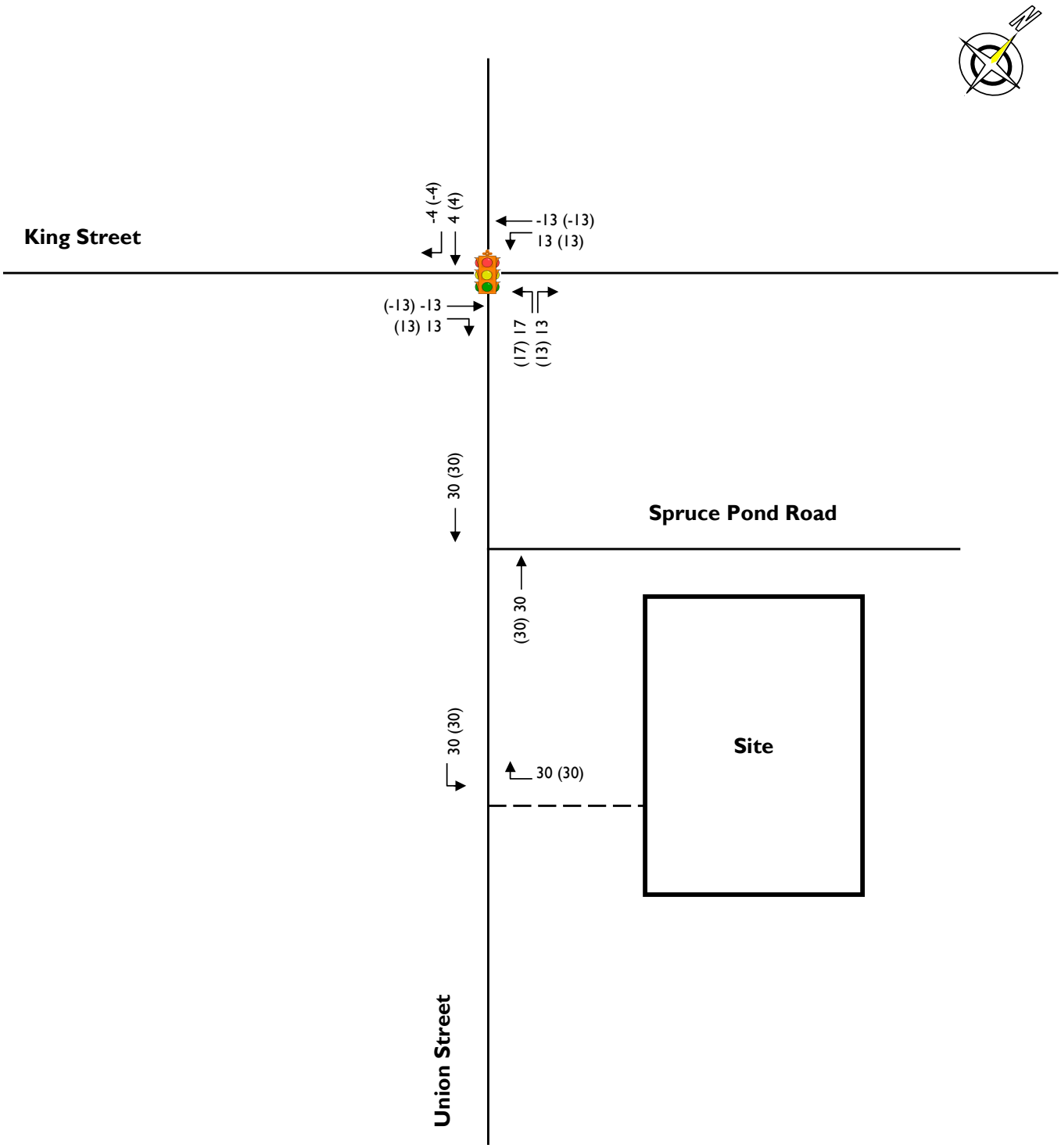
STONEFIELD	**Proposed Child Care Center** **700-712 Union Street** **Town of Franklin, Norfolk County, Massachusetts** **Traffic Impact Study**	**FIGURE 5** **2029 No-Build Traffic Volumes**



LEGEND

- Existing Roadway
- Proposed Driveway
- Existing Private Driveway
- AM (PM) Peak Hour Volumes
- Signalized Intersection

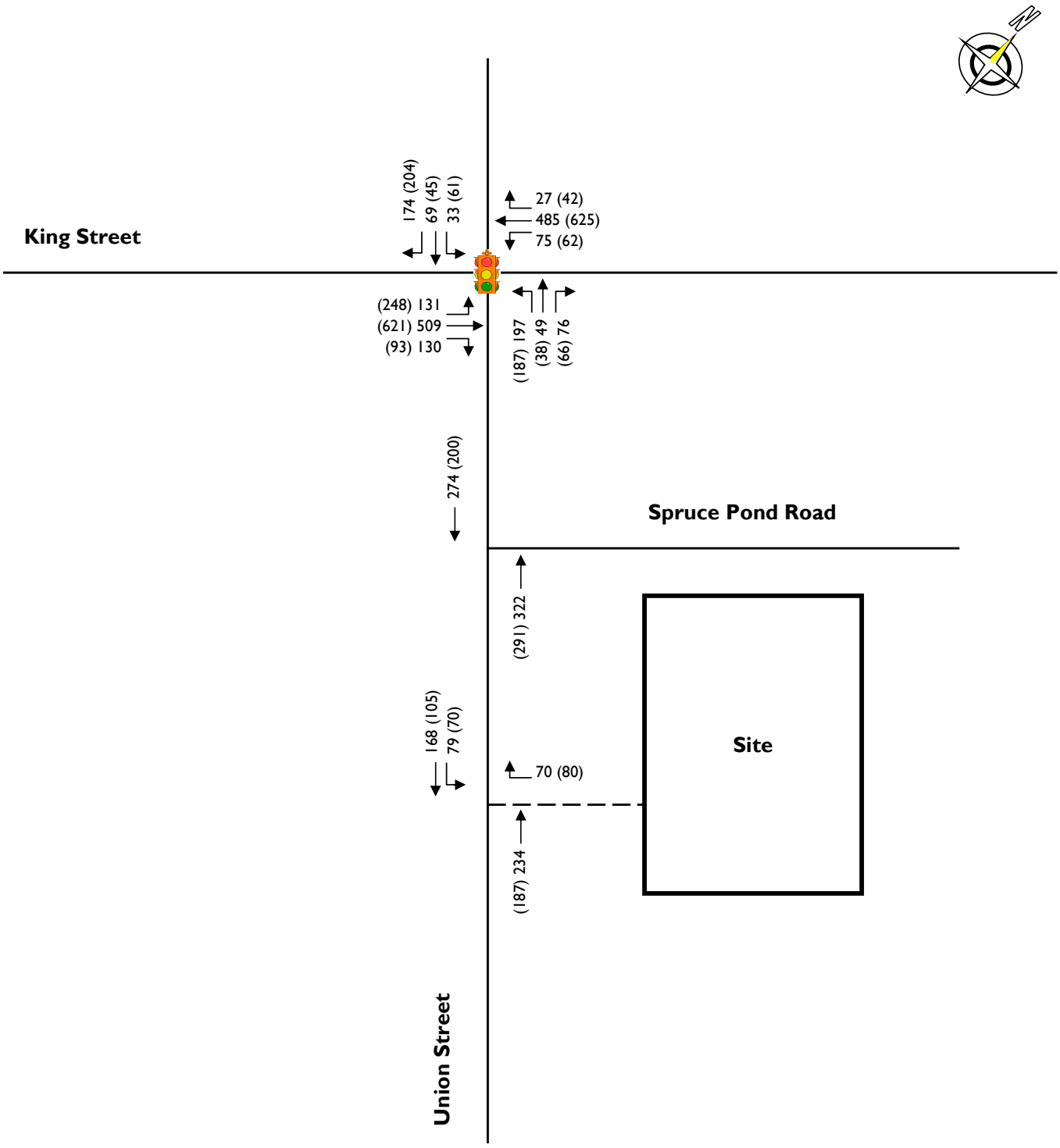
STONEFIELD	**Proposed Child Care Center** **700-712 Union Street** **Town of Franklin, Norfolk County, Massachusetts** **Traffic Impact Study**	**FIGURE 6** **"New" Site-Generated Traffic Volumes**



LEGEND

- Existing Roadway
- Proposed Driveway
- Existing Private Driveway
- AM (PM) Peak Hour Volumes
- Signalized Intersection

STONEFIELD	**Proposed Child Care Center** **700-712 Union Street** **Town of Franklin, Norfolk County, Massachusetts** **Traffic Impact Study**	**FIGURE 7** **"Pass-By" Site-Generated Traffic Volumes**



LEGEND

- Existing Roadway
- Proposed Driveway
- Existing Private Driveway
- AM (PM) Peak Hour Volumes
- Signalized Intersection

STONEFIELD	**Proposed Child Care Center** **700-712 Union Street** **Town of Franklin, Norfolk County, Massachusetts** **Traffic Impact Study**	**FIGURE 8** **2029 Build Traffic Volumes**

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Conversion Table

	inch/hour	**feet/day**
	0.67	1.33
	2.00	4.00
hours	**days**	
36	1.50	

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

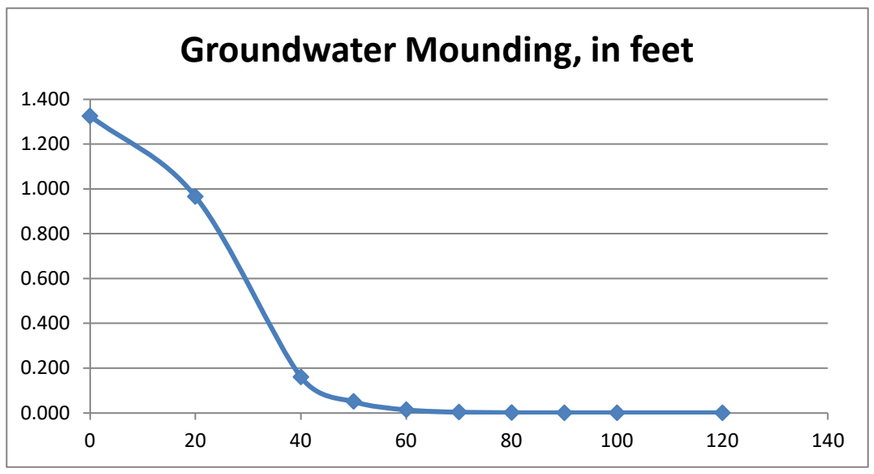
Input Values

2.0400	***R***	**Recharge (infiltration) rate (feet/day)**
0.210	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
20.40	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
24.500	**x**	**1/2 length of basin (x direction, in feet)**
14.500	**y**	**1/2 width of basin (y direction, in feet)**
0.208	**t**	**duration of infiltration period (days)**
10.000	**hi(0)**	**initial thickness of saturated zone (feet)**

11.325	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.325	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
1.325	**0**
0.965	**20**
0.160	**40**
0.051	**50**
0.014	**60**
0.004	**70**
0.001	**80**
0.001	**90**
0.001	**100**
0.001	**120**

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

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use consistent units (e.g. feet & days **or** inches & hours)

Conversion Table

	inch/hour	**feet/day**
	0.67	1.33
	2.00	4.00
hours		**days**
	36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

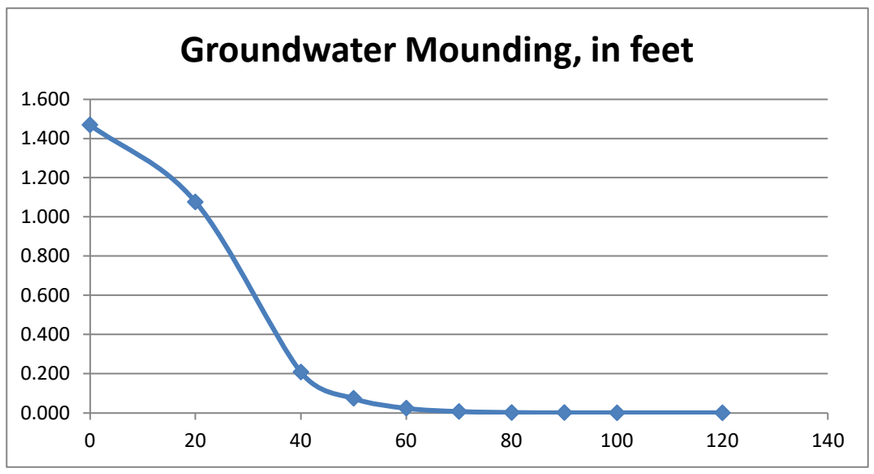
Input Values

2.0400	***R***	**Recharge (infiltration) rate (feet/day)**
0.210	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
20.40	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
24.500	**x**	**1/2 length of basin (x direction, in feet)**
14.500	**y**	**1/2 width of basin (y direction, in feet)**
0.250	**t**	**duration of infiltration period (days)**
10.000	**hi(0)**	**initial thickness of saturated zone (feet)**

11.469	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.469	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
1.469	**0**
1.077	**20**
0.208	**40**
0.074	**50**
0.024	**60**
0.007	**70**
0.002	**80**
0.001	**90**
0.001	**100**
0.001	**120**

Re-Calculate Now



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use consistent units (e.g. feet & days **or** inches & hours)

Conversion Table

	inch/hour	**feet/day**
	0.67	1.33
	2.00	4.00
hours	**days**	
36	1.50	

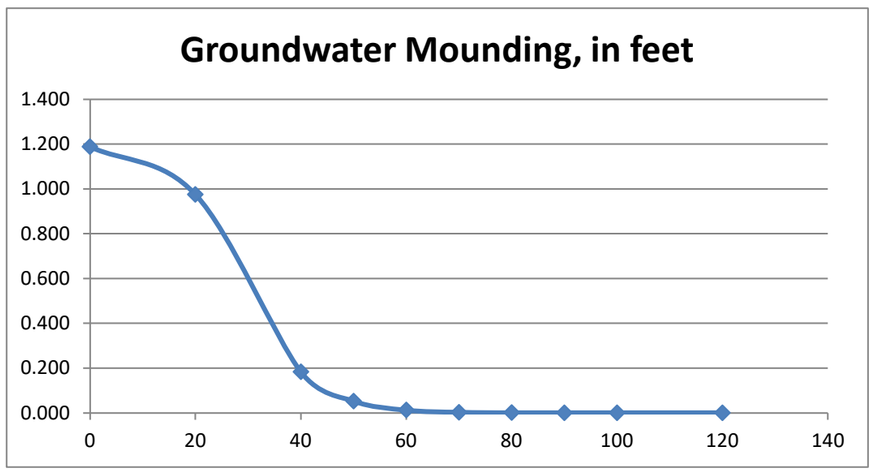
In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Input Values		
2.0400	***R***	**Recharge (infiltration) rate (feet/day)**
0.210	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
20.40	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
28.500	**x**	**1/2 length of basin (x direction, in feet)**
14.500	**y**	**1/2 width of basin (y direction, in feet)**
0.167	**t**	**duration of infiltration period (days)**
10.000	**hi(0)**	**initial thickness of saturated zone (feet)**

11.188	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.188	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
1.188	**0**
0.975	**20**
0.183	**40**
0.053	**50**
0.013	**60**
0.003	**70**
0.001	**80**
0.001	**90**
0.001	**100**
0.001	**120**

Re-Calculate Now



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Illicit Discharge Compliance Statement

Responsibility:

The Owner is responsible for ultimate compliance with all provisions of the Massachusetts Stormwater Management Policy, the USEPA NPDES Construction General Permit and responsible for identifying and eliminating illicit discharges (as defined by the USEPA).

OWNER NAME: Patrick Marguerite

ADDRESS: PO Box 211
Franklin, MA 02038

TEL. NUMBER: 305-849-2953

Engineer's Compliance Statement:

To the best of my knowledge, the attached plans, computations and specifications meet the requirements of Standard 10 of the Massachusetts Stormwater Handbook regarding illicit discharges to the stormwater management system and that no detectable illicit discharges exist on the site. All documents and attachments were prepared under my direction and qualified personnel properly gathered and evaluated the information submitted, to the best of my knowledge.

Included with this statement are site plans, drawn to scale, that identify the location of systems for conveying stormwater on the site and show that these systems do not allow the entry of any illicit discharges into the stormwater management system. The plans also show any systems for conveying wastewater and/or groundwater on the site and show that there are no connections between the stormwater and wastewater systems.

For a redevelopment project (if applicable), all actions taken to identify and remove illicit discharges, including without limitation, visual screening, dye or smoke testing, and the removal of any sources of illicit discharges to the stormwater management system are documented and included with this statement.

Narragansett Engineering Inc.
Civil • Survey • Structural • Environmental • Design
3102 East Main Road, Portsmouth RI 02871
Tel. 401.683.6630 www.nei-cds.com

MEMORANDUM

TO: Town of Franklin, Massachusetts
Department of Public Works / Sewer Department

DATE: September 29, 2025

Revised October 6, 2025

RE: Sewer Capacity Analysis for 10-Inch Gravity Sewer Line – Proposed 30-Unit Residential Development

Union Crossing - 380 King St, Franklin MA

PURPOSE

This memorandum presents a sewer capacity analysis for an existing 10-inch gravity sewer line that this project is proposing to tie into. This memo evaluates the adequacy of the existing line to accommodate a proposed additional 30-unit, 2-bedroom condominium development.

EXISTING INFLUENT SOURCES

The existing 10-inch sewer line currently serves the following developments (see figure above):

1. Residential Condominiums: 100 units (2-bedroom each) – Spruce Pond Condos
2. Residential Condominiums:
    1. 758 Union Street – 8 Bedrooms (2 Buildings)
    2. 760 Union Street – 3 Bedrooms

    3. 762 Union Street – 11 Bedrooms (2 Buildings)
    4. 764 Union Street – 3 Bedrooms
3. Day Care Facility: 13,588 square feet, 18 half bathrooms - 700 Union Street
4. Commercial Building: 15,000 +/- square feet (eye doctor, pain management doctor, general office), 20 bathrooms - 750 Union Street
5. Pizza Shop: 5,400 square feet, 3 bathrooms – 390 King Street

---

PROPOSED ADDITIONAL INFLUENT

New Residential Development: 30 condominium units (2-bedroom each)

DESIGN CRITERIA AND ASSUMPTIONS

The following design criteria were applied consistent with standard engineering practice and Massachusetts Department of Environmental Protection (MassDEP) guidelines and Massachusetts 310 CMR 15.000: Septic Systems ("Title 5"):

- Pipe Diameter: 10 inches
- Pipe Slope: 0.5% (0.005 ft/ft) - typical design slope
- Manning's Roughness Coefficient (n): 0.013 (PVC/smooth pipe)
- Design Flow Depth: 75% of pipe diameter (standard design practice)
- Residential Flow Rate: 110 gallons per capita per day (gpcd)
- Day Care Flow Rate: 8 gallons per day per person (capacity-based estimate: 115 persons)
- Commercial Office Flow Rate: 250 gpd per doctor (7 doctors)
- Restaurant/Food Service Flow Rate: 35 gpd per seat (estimated capacity)
- Peaking Factor: 2.0 (converts average daily flow to peak hourly flow)

WASTEWATER FLOW CALCULATIONS

Current Influent Flows

Source	Calculation	Average Daily Flow (gpd)
Spruce Pond Residential (100 units)	100 × 110 x 2	22,000
Union ST - Residential (25 bedrooms)	25 × 110	2,750
Day Care - 700 Union Street	115 persons × 15	1,725
Commercial Building - 750 Union Street	250 × 7 doctors	1,750
King Street Café - 390 King Street	60 seats × 35	2,100
Current Total Average Daily Flow		30,325 gpd
Current Peak Hourly Flow	30,325 × 2.0	**60,650 gpd (26.8 gpm)**

Proposed Additional Flow

Source	Calculation	Average Daily Flow (gpd)
New Residential (30 units- 2 bedroom)	60 × 110	6,600
Proposed Peak Hourly Flow	6,600 × 2.0	**13,200 gpd (9.2 gpm)**

Total Future Flow

Total Future Peak Hourly Flow: 73,850 gpd (36 gpm)

SEWER LINE CAPACITY ANALYSIS

Manning's Equation Calculation

The capacity of the 10-inch gravity sewer line was calculated using Manning's Equation:

$Q = (1.486/n) \times A \times R^{(2/3)} \times S^{(1/2)}$

Where:

- Q = Flow rate (cubic feet per second)
- n = Manning's roughness coefficient (0.013)
- A = Cross-sectional area of flow (square feet)
- R = Hydraulic radius (A/P, in feet)

- S = Slope of pipe (0.005 ft/ft)

Hydraulic Properties at 75% Full Depth:

- Pipe Diameter (D): 0.833 feet (10 inches)
- Flow Depth (d): 0.625 feet (75% × D)
- Central Angle (θ): 4.189 radians (240°)
- Flow Area (A): 0.41 square feet
- Wetted Perimeter (P): 1.746 feet
- Hydraulic Radius (R): 0.251 feet

Capacity Calculation Results:

$Q = (1.486/0.013) \times 0.41 \times (0.251)^{(2/3)} \times (0.005)^{(1/2)}$

$Q = 114.31 \times 0.41 \times 0.398 \times 0.0707$

$Q = 1.32$ cfs = 592 gpm = 851,139 gpd

CAPACITY ANALYSIS SUMMARY

Category	Flow (GPD)	Flow (GPM)	% of Capacity
Current Peak Flow	60,650	42.1	7.1%
Proposed Additional Flow	13,200	9.2	1.6%
Total Future Peak Flow	73,850	51.3	8.7%
Design Capacity (75% full)	851,139	590	100.0%
Remaining Available Capacity	**777,289**	**539.8**	**91.3%**

In summary, the pipe is at 8.7% maximum capacity in the proposed condition which is below the 75% design standard.

FINDINGS AND CONCLUSIONS

1. The existing 10-inch gravity sewer line has a design capacity of 590 gpm (at 75% flow depth with 0.5% slope).
2. Current peak hourly flow from existing developments is 42.1 gpm, representing 7.1% of the design capacity.

3. The proposed 30-unit residential development will generate an additional peak flow of 9.2 gpm.
4. Total future peak hourly flow will be 51.3 gpm, representing only 8.7% of the design capacity.
5. The sewer line will retain 91.3% available capacity after the proposed development, ensuring the proposed development will not negatively impact the existing sewer capacity.
6. The proposed development will not adversely impact the existing sewer infrastructure and is well within acceptable design parameters.

This assessment was performed with various assumptions including but not limited to

Pipe Slope. Flows for Existing Conditions (estimated, conservatively, no water records were used). It should not be taken as a precise calculation for flows but merely to demonstrate that the existing line is more than adequate, given the influents, for the proposed 30 Unit Condo Development. The current number of bedrooms and building sizes were complied from the Town of Franklin GIS website.

Should you have any questions or concerns, please don't hesitate to contact my office.

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