# CITY OF BELLAIRE TEXAS

**PLANNING AND ZONING COMMISSION**

**AUGUST 10, 2017**

| Council Chamber | Regular Session | 6:00 PM |
|---|---|---|

**7008 S. RICE AVENUE**
**BELLAIRE, TX 77401**

| | | |
|---|---|---|
| **Commissioner** | **Commissioner** | |
| Jonathan Saikin | Weldon Taylor | |
| **Commissioner** | **Commissioner** | **Commissioner** |
| Mike Axelrad | Marc Steinberg | S. Lynne Skinner |
| **Commissioner** | **Vice Chair** | |
| Ross Gordon | Dirk Stiggins | |

***Mission Statement:***
***The City of Bellaire is dedicated to outstanding quality service and facilities to ensure an open, progressive, and secure community.***

## I. CALL TO ORDER AND ANNOUNCEMENT OF QUORUM

## II. APPROVAL OF MINUTES FROM PAST MEETINGS

1. Planning and Zoning Commission - Regular Session - Jul 13, 2017 6:00 PM

## III. REMINDER TO CITIZENS DESIRING TO ADDRESS THE COMMISSION

## IV. GENERAL PUBLIC COMMENTS

**Persons at the meeting who have indicated their desire to be herd on matters of general interest to the Commission by submitting the form provided shall have three minutes to present their comments. The Commission is not permitted to fully discuss, debate, or consider items that are not on the agenda. Questions presented to the Commission may be referred to staff.**

## V. CURRENT BUSINESS (ITEMS FOR DISCUSSION, CONSIDERATION, AND/OR POSSIBLE ACTION)

1. Docket #SU-2017-02-Consideration of an application filed by Steven Gee, Project Manager, Houston Independent School District, for a Specific Use Permit, as required by Chapter 24, Planning and Zoning, Section 24-531 C. (2) a), for the re-construction and operation of Bellaire High School, at 5100 Maple Street, within the R-1 Residential Zoning District; and for a second Specific Use Permit, as required by Section 24-532 B. (2) a), for the re-purposing of Gordon Elementary School/Mandarin Chinese Language Immersion Magnet School as Bellaire High School's baseball practice facility, at 6300 Avenue B, within the R-3 Residential Zoning District.

2. Approval of the Commission's Report and Recommendation to City Council regarding the request for Specific Use Permits at 5100 Maple Street and 6300 Avenue B.

3. Amendment to the Planning and Zoning Commission's 2017-2018 Rules of Procedure to reflect the temporary change in the Regular Meeting schedule.

## VI. COMMITTEE REPORTS

## VII. CORRESPONDENCE

## VIII. REQUESTS FOR NEW BUSINESS, ANNOUNCEMENTS AND COMMENTS

1. **Staff liaison report on the status of projects previously addressed by the commission as well as projects for future meetings.**

   a. **Visioning Bellaire: Urban Design and Conceptual Master Plan**

   b. **Bellaire Boulevard Estate Overlay District**

   c. **Newcastle/Bissonnet property**

   d. **Commission Training**

2. **The Chairman shall recognize any Commissioner who wishes to bring New Business to the attention of the Commission. Consideration of New Business shall be for the limited purpose of determining whether the matter is appropriate for inclusion of a future Agenda of the Commission or for the referral to staff for investigation**

## IX. ADJOURNMENT

# CITY OF BELLAIRE TEXAS

## PLANNING AND ZONING COMMISSION

## JULY 13, 2017

| Council Chamber | Regular Session | 6:00 PM |
|---|---|---|

**7008 S. RICE AVENUE**
**BELLAIRE, TX 77401**



### I. CALL TO ORDER

Chairman Frazier called the meeting to order at 6:00 PM.

### II. ANNOUNCEMENT OF QUORUM

Chairman Frazier announced that a quorum was present, consisting of the following members:

Chairman Win Frazier
Commissioner Mike Axelrad
Commissioner Jonathan Saikin
Commissioner Lynne Skinner
Commissioner Marc Steinberg
Commissioner Bill Thorogood

Interim Director of Development Services, ChaVonne Sampson, Assistant City Attorney, Zachary Petrov, Planning and Zoning Secretary, Ashley Parcus, and City Council Liaison, Trisha Pollard were also in attendance.

Vice Chairman Dirk Stiggins was absent from the proceedings.

### III. REMINDER TO CITIZENS DESIRING TO ADDRESS THE COMMISSION

Chairman Frazier reminded anyone who wished to address the Commission to fill out a speaker form. He also mentioned that although many people were expecting a discussion on Bellaire High School to take place, that item was pushed to the Commission's August meeting.

### IV. APPROVAL OF MINUTES FROM PAST MEETINGS

1. Planning and Zoning Commission - Regular Session - Jun 13, 2017 6:00 PM

**Motion:** a motion was made by Commissioner Steinberg and seconded by Commissioner Thorogood to accept the minutes as written.

**Vote:** the motion carried with a unanimous vote of 6-0.

### V. UNFINISHED BUSINESS, COMMUNICATIONS, AND REPORTS

Commissioner Steinberg mentioned that he had received a phone call from a City Council Member to discuss who the new Chair and Vice Chair of the Commission were going to be. He stated that he was very offended by the phone call and felt as though the call was very inappropriate. He urged the other Commissioners to vote for who they believe will be best for the job.

Several of the other Commissioners mentioned that they also got the phone call.

Chairman Frazier stated that Vice Chairman Stiggins was not able to be in attendance, but had written a letter that he would like to share with the Commission. The letter read as follows:

"I am unable to attend the next P&Z meeting.

I would like to request you pass on my thanks to the P&Z members who are leaving the commission. It has been a pleasure to serve with this commission. There have been some contentious issues that were considered by this commission and yet there was always a thoughtful and civil consideration and discussion by all the members. Members prepared for the meetings and a informative discussion developed during the commission's consideration of agenda items. I would add a special thanks to Win Frazier for his leadership during all of our discussions/meetings. His even tempered approach to all our considerations set a tone that we should all emulate. He was always well prepared for each meeting."

Chairman Frazier then thanked all of the Commission members for their hard work and dedication and stated that it was an honor to serve with each one of them. He also thanked the members of City Council, specifically Mayor Friedberg and the Commission's liaison, Trisha Pollard. Chairman Frazier extended his gratittude to previous members of the Commission as well, including Peter Boecher, Lori Aylett, and Donna Rickenbacker for their guidance and support throughout the years. He stated that is it going to be difficult to leave, but that he is confident it is being left in very capable hands.

## VI. SWEARING IN OF NEW COMMISSIONERS (INCOMING COMMISSIONERS ASSUME DUTIES AND OUTGOING COMMISSION RETIRES)

Assistant City Attorney, Zach Petrov, swore in the two new members of the Commission, Ross Gordon and Weldon Taylor, as well as Jonathan Saikin, who was being re-appointed.

Chairman Win Frazier and Commissioner Bill Thorogood retired.

## VII. GENERAL PUBLIC COMMENTS

**Persons at the meeting who have indicated their desire to be heard on matters of general interest to the Commission by submitting the form provided shall have three minutes to present their comments. The Commission is not permitted to fully discuss, debate, or consider items that are not on the agenda. Questions presented to the Commission may be referred to staff.**

**Lynn McBee**-Ms. McBee thanked Win Frazier and Bill Thorogood for their time served on the Commission. She stated that she knows that she is not alone in the community for recognizing the excellence of service that they have submitted. Ms. McBee added that they will be missed, but she knows that the newly appointed Commissioners will quickly fill those roles. She then reminded the Commission that the Comprehensive Plan for the City of Bellaire is like a bible and is taken very literally. Ms. McBee explained that residents understand that it is the protection guideline for the community. She asked that each time the Commission take action on an item that has come before them, they specifically draft their own letter of recommendation to the City Council, including the exerpt from the Comprehensive Plan that relates to that decision. She then provided the Commission with a cheat sheet for the Comprehensive Plan. Ms. McBee mentioned that the City of Bellaire is a residential community and that the residents take residential protection very seriously. She added that altering a tax base in the interest of more development and more tax revenues is not an acceptable message to send within this community. Ms. McBee urged the Commission to be sensitive to that.

Minutes Acceptance: Minutes of Jul 13, 2017 6:00 PM (Approval of Minutes from Past Meetings)

## VIII. INCOMING COMMISSION

### 1. Introduction of Incoming Commissioners

**Weldon Taylor**-Commissioner Taylor stated that he lives on Palmetto Street and has lived in Bellaire for 4 1/2 years. He added that he is looking forward to being on the Commission and working with the community and the City Council to find the right balance of interest for the City.

**Ross Gordon**-Commissioner Gordon stated that he resides on Pocahontas Street and is excited to be a part of the Commission. He added that he is looking forward to contributing to the community and continuing to make Bellaire a great place to raise a family.

### 2. Election of Chair and Vice Chair

**Nominations for Chair:**

A nomination was made by Commissioner Steinberg and seconded by Commissioner Axelrad to elect Dirk Stiggins as Chairman of the Commission.

**Vote**: 6-0.

**Nominations for Vice Chair:**

A nomination was made by Commissioner Axelrad and seconded by Commissioner Saikin to elect Marc Steinberg as Vice Chairman of the Commission.

**Vote**: 5-0-1, with Commissioner Steinberg abstaining from the vote.

3. Adoption of the Rules of Procedure

| | |
|---|---|
| **RESULT:** | **ADOPTED [UNANIMOUS]** |
| **MOVER:** | Mike Axelrad, Commissioner |
| **SECONDER:** | S. Lynne Skinner, Commissioner |
| **AYES:** | Saikin, Axelrad, Gordon, Taylor, Steinberg, Skinner |
| **ABSENT:** | Stiggins |

## IX. CURRENT BUSINESS (ITEMS FOR DISCUSSION, CONSIDERATION, AND/OR POSSIBLE ACTION)

There was no current business.

## X. REPORT OF STAFF, COMMITTEES & CORRESPONDENCE

### 1. Staff liaison report on the status of projects previously addressed by the commission as well as projects for future meetings.

**ChaVonne Sampson, Interim Director of Development Services**-Ms. Sampson explained that Houston Independent School District has made some slight modifications to their site plan based off of the comments/concerns that were voiced at the public hearing. She added that the changes are not significant enough to require an additional public hearing, but due to the fact that they were just recently submitted to the City, the item was pushed back to the August meeting in an effort to give staff and the other necessary parties a chance to appropriately review the changes that were made. Ms.

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Sampson also mentioned the action that the Commission took at the June meeting asking staff to put together a plan regarding the Visioning Bellaire: Urban Design and Conceptual Master Plan. She informed the Commission that she will be prepared to give an update on this at the August meeting. Ms. Sampson also reminded the Commission that Board and Commission training will be held on July 27th and to RSVP for that event if they have not already done so. She stated that in the future there will be some type of workshop or training which will be specifically geared toward the Planning and Zoning Commission.

Commissioner Skinner asked what the status is on the 610/59 interchange.

Ms. Sampson stated that she was not privy to that knowledge, but that the City Manager was in attendance and may be able to answer the question.

**Mr. Hofmann, City Manager**-Mr. Hofmann explained that the 610/59 interchange improvement project that has been in design and development by TxDOT for several years now is rapidly approaching the time when they will go out for bids. He added that the last he heard from the City Engineer, James Andrews, who has been in close contact with TxDOT, is that they will be letting in August. Mr. Hofmann stated that TxDOT has worked very well with the City of Bellaire and has been very responsive to concerns and suggestions that have been voiced. He added that this is a very large and complicated project that will include multiple phases, with the first being on the southeastern quadrant. Mr. Hofmann stated that according to TxDOT, 610/59 is one of the most congested interchanges in the United States, and this will be a valuable and beneficial project for the City of Bellaire.

Commissioner Skinner then asked if Houston Independent School District (HISD) understands that the Commission and public are very concerned with the egress of the parking garage.

Mr. Hofmann and Ms. Sampson confirmed that the message was conveyed loud and clear.

Mr. Hofmann then took the opportunity to introduce Ms. Sampson as Interim Director of the Development Services Department and added that a re-organization of Development Services and Public Works is in the near future. He stated that the concept will be presented to City Council at their next meeting.

Vice Chairman Steinberg mentioned that the Board of Adjustment did not grant Bellaire High School the 80% lot coverage that was requested.

Ms. Sampson and Attorney Petrov explained that 67% lot coverage was granted. Attorney Petrov mentioned that HISD could either replace the artificial turf with natural grass on the sports field, or move the buildings around in order to get to 67%.

Vice Chairman Steinberg then asked if HISD would be modifiying the site plan to something that conforms with that 67% prior to the Commission's consideration of the specific use permit application, or if the Commission will be asked to vote on something that would then need to go back before the Board of Adjustment.

Ms. Sampson explained that the lot coverage will be reviewed during the permitting process and that it should not have a huge bearing on the Commission's consideration of the application.

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Attorney Petrov stated that if changes to the site plan are significant then it would be required to have an additional public hearing before the Commission, first and foremost.

Ms. Sampson mentioned that HISD and PBK are doing their best to work from what they have, and doing everything possible to avoid having another public hearing.

Commissioner Gordon asked what the threshold is for changes that would require another public hearing.

Attorney Petrov explained that changes made must be in direct response to comments/concerns voiced at the public hearing, and anything outside of that would most likely require an additional public hearing. He then gave the example of the ingress and egress of the parking garage and stated that where the re-location of the entrance or exit of the garage would be acceptable, the complete re-location of the parking garage to somewhere else on the site would probably need to come back.

Commissioner Axelrad stated that he was now also concerned that the Commission would be voting on an application in which the site plan has not be finalized.

Ms. Sampson stated that the site plan that is approved by the Commission is the site plan that HISD will have to go with. She added that if they want to change something down the road then it will need to come back before the appropriate parties for approval, whether its the Board of Adjustment for a variance, the Planning and Zoning Commission for the site plan, or both.

Commissioner Saikin asked if staff has been given any updates on what they are doing to the site plan.

Ms. Sampson confirmed that staff has been working with HISD on a revised site plan. She added that she is working with the City's Traffic Engineer to ensure that they have no concerns with the changes made, and once that is done the information will be provided to the Commission members.

Commissioner Skinner mentioned the discussion of potential traffic signals at South Rice, Holly, Holt, and Maple Streets, and asked if that would be included as part of the revisions.

Ms. Sampson confirmed that the site plan will include proposals for traffic lights.

Commissioner Gordon asked staff if they could confirm when the Commission members would be receiving the new information.

Staff informed the Commission that they will get it out to them as soon as possible, once a response has been received from the traffic engineer.

## XI. NEW BUSINESS

Minutes Acceptance: Minutes of Jul 13, 2017 6:00 PM (Approval of Minutes from Past Meetings)

1. **The Chairman shall recognize any Commissioner who wishes to bring New Business to the attention of the Commission. Consideration of New Business shall be for the limited purpose of determining whether the matter is appropriate for inclusion of a future Agenda of the Commission or for the referral to staff for investigation**

Commissioner Steinberg mentioned a conversation regarding a possible review of the Bellaire Boulevard Estate Overlay District, and stated that he would like for that to be added to a future agenda to determine if changes need to be made.

Ms. Sampson confirmed that the current overlay district became more of a sub-district, and that it would be helpful to amend the language in order to create a real overlay for those properties on Bellaire Boulevard.

Commissioner Skinner asked if there was any update on the Newcastle/Bissonnet properties.

Ms. Sampson stated that she would look into that and have an update ready for the August meeting.

## XII. ADJOURNMENT

**Motion:** a motion was made by Commissioner Skinner and seconded by Commissioner Saikin to adjourn the Regular Meeting.

**Vote:** the motion carried on a unanimous vote of 6-0.

**The meeting was adjourned at 6:37 PM.**

Minutes Acceptance: Minutes of Jul 13, 2017 6:00 PM (Approval of Minutes from Past Meetings)

**Planning and Zoning Commission**
Council Chamber, First Floor of City Hall
Bellaire, TX 77401-4411

**SCHEDULED**
**ACTION ITEM (ID # 2333)**

Meeting: 08/10/17 06:00 PM
Department: Development Services
Category: Specific Use Permit
Department Head: ChaVonne Sampson
DOC ID: 2333

**Item Title:**

Docket #SU-2017-02-Consideration of an application filed by Steven Gee, Project Manager, Houston Independent School District, for a Specific Use Permit, as required by Chapter 24, Planning and Zoning, Section 24-531 C. (2) a), for the re-construction and operation of Bellaire High School, at 5100 Maple Street, within the R-1 Residential Zoning District; and for a second Specific Use Permit, as required by Section 24-532 B. (2) a), for the re-purposing of Gordon Elementary School/Mandarin Chinese Language Immersion Magnet School as Bellaire High School's baseball practice facility, at 6300 Avenue B, within the R-3 Residential Zoning District.

**Background/Summary:**

On June 13, 2017, the Commission held a public hearing on a request filed by Houston Independent School District (HISD) for two (2) specific use permits, the first for the reconstruction and operation of a new Bellaire High School, and a second for the re-purposing of the former Gordon Elementary School as Bellaire High School's baseball practice facility. During the public hearing, 26 members of the public spoke on the proposal, and one (1) written comment was submitted. Additionally, six (6) written comments were submitted prior to the public hearing, and were included in the Commission's agenda packet.

No comments have been submitted since the conclusion of the public hearing.

The *Code of Ordinances, Chapter 24, Planning and Zoning, Section 24-615, Standards Applicable to all Planned Development Amendments and Specific Use Permits,* details the five criteria that must be met for the issuance of this request:

BELLAIRE HIGH SCHOOL

1. **The proposed planned development amendment or specific use permit is consistent with the purposes, goals, objectives, and standards of the comprehensive plan of the City of Bellaire.**

   The Comprehensive Plan's Future Land Use and Character Map designates this site as a school. Goal 2.1 speaks to mitigating institutional impacts through redevelopment. The proposed plan provides more than the required amount of parking on site, reducing the current schools dependency on neighborhood streets. Additionally, the site plan shows extensive landscaping and tree plantings that will serve as buffers for the surrounding residential properties.

2. **The design of the proposed development, considered as part of the...**

**specific use permit, minimizes adverse effects, including visual impacts of the proposed use on adjacent properties.**

Visual impacts are minimized through the use of landscaping and trees for aesthetics as well as screening and buffering. Additionally, the high school is not maximizing height along the property adjacent to residential properties in an effort to develop a campus that is compatible with the community. This would allow the applicant additional height in the middle of the school site, similar to the requirement of a "height-setback plane" that is used in commercial districts to address development of property adjacent to residentially zoned areas. The proposed traffic circulation around the school will maintain its current level with this proposal. Furthermore, the inclusion of an on-site drop off is an improvement in the current condition of pick up and drop offs occurring on South Rice Avenue. The Traffic Impact Analysis provided shows that a majority of the traffic will be dumped onto South Rice Avenue during peak school hours, which will decrease the burden on the surrounding neighborhood streets.

3. **The proposed development will not have an adverse effect on the value of the adjacent property**.

Discussion with real estate professionals, who are familiar with the Bellaire area, stated that while generally the location of schools near residential properties may have an adverse impact on the value of adjacent property, the reconstruction of Bellaire High School would not increase the negative impacts, and may actually be beneficial due to the updated construction and increased screening and buffering of the site.

4. **The proposed development will not unduly burden essential public facilities and services, including streets, police and fire protection, sanitary sewers, storm sewers, solid waste disposal and schools.**

The proposal has been reviewed by the City Engineer, the Public Works Department, and the Police and Fire Departments. This plan will not unduly burden essential public facilities and services.

5. **The applicant for the development has adequate financial and technical capacity to complete the development as proposed and has met all requirements of this Code, including such conditions as has been imposed as a part of this...specific use permit.**

The applicant is funding this project through a voter approved bond package and has adequate financial and technical capacity to complete this project. The site plan meets all zoning requirements as set forth for schools under Sec. 24-531, R-1 Residential District.

GORDON ELEMENTARY/MANDARIN

1. **The proposed planned development amendment or specific use permit is consistent with the purposes, goals, objectives, and standards of the comprehensive plan of the City of Bellaire.**

   The Comprehensive Plan's Future Land Use and Character Map designates this site as a school. Goal 2.1 speaks to mitigating institutional impacts through redevelopment. The proposed plan adds additional off-street parking, reducing the dependency on neighborhood streets. Additionally, the site plan shows extensive landscaping and tree plantings, including existing site trees that will remain, which will serve as buffers and add to the screening of the proposed baseball field.

2. **The design of the proposed development, considered as part of the... specific use permit, minimizes adverse effects, including visual impacts of the proposed use on adjacent properties.**

   Visual impacts are minimized through use of landscaping and trees for aesthetics as well as screening and buffering. The Traffic Impact Analysis provided shows no negative impacts based on the proposed plan.

3. **The proposed development will not have an adverse effect on the value of the adjacent property**.

   Discussion with real estate professionals, who are familiar with the Bellaire area, stated that while generally the location of school facilities near residential properties may have an adverse impact on the value of adjacent property, the construction of a baseball field would not add increase the negative impacts and may actually be beneficial due to the updated construction and increased screening and buffering on site.

4. **The proposed development will not unduly burden essential public facilities and services, including streets, police and fire protection, sanitary sewers, storm sewers, solid waste disposal and schools.**

   The proposal has been reviewed by the City Engineer, the Public Works Department, and the Police and Fire Departments. This plan will not unduly burden essential public facilities and services.

5. **The applicant for the development has adequate financial and technical capacity to complete the development as proposed and has met all requirements of this Code, including such conditions as has been imposed as a part of this...specific use permit.**

The applicant is funding this project through a voter approved bond package and has adequate financial and technical capacity to complete this project. The site plan meets all zoning requirements as set forth for schools under Sec. 24-532, R-3 Residential District.

**Recommendation:**

Finding that the application meets the standards set forth in Section 24-615 for the approval of a Specific Use Permit, the Development Services Department recommends approval of the applicant's requests for two (2) Specific Use Permits for the re-construction and operation of a new Bellaire High School, and the re-purposing of the former Gordon Elementary School as Bellaire High School's baseball practice facility, with the following conditions:

1. The student enrollment shall not exceed 3,100 students, and the registrar's office should submit an enrollment certificate/affidavit at the beginning and end of each school year.

2. No field lights shall be installed at 6300 Avenue B without an amendment to the Specific Use Permit.

**ATTACHMENTS:**

- Changes from Original SUP Submission (PDF)
- P&Z_081017_PACKETS_Bellaire HS Rebuild (PDF)
- Summary of Bellaire High School Traffic Infrastructure Improvements (PDF)
- Bellaire High School - Traffic Study Comments + Responses (PDF)
- Gordon TIA (PDF)
- City Planning Letter-BHS (PDF)
- City Planning Letter-6300 Ave B (PDF)

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July 31, 2017

PBK
Architecture
Engineering
Planning
Technology
Facility Consulting

The City of Bellaire
Development Services / Ms. ChaVonne Sampson
7008 South Rice Avenue
Bellaire, TX 77401

**VIA EMAIL**

**RE: Changes from Original SUP Submission**
Bellaire HS Rebuild
Houston Independent School District

Dear Ms. Sampson,

PBK has worked with HISD on making modifications to the proposed plans as submitted to the City of Bellaire on May 15, 2017. Based on comments made by the citizens of Bellaire during the June 15, 2017 public hearing, the following modifications were made to the plans of both sites to accommodate some of the comments made.

Bellaire HS Site on South Rice – public comments primarily focused on the amount of traffic originally proposed on Maple Street.

1) Removed all traffic exiting garage away from Maple Street and through the east part of the BHS site and then onto South Rice – choices from the BHS site being southbound (right) or northbound (left) on South Rice.
2) By rerouting the exiting garage traffic the number of surface parking spaces was significantly reduced – now 41 versus the original 160.
3) By reducing the number of surface spaces the garage had to be revised in size from 640 spaces as shown originally and increased to 760 spaces.
4) Also, in order to accommodate the revised exiting traffic flow the garage was rotated 90 degrees – this also creates more green space for the outdoor commons which is a desire of HISD.
5) Maple Street is currently one lane each way and the proposed plan has a dedicated right-turn lane on Maple Street for entry into the parking garage in addition to the existing one lane each way. The City of Bellaire has the option to keep the one-way traffic at certain times of the day or to have two-way traffic all of the time. The right-turn lane right-of-way will be taken out of the property currently owned by HISD.
6) Proposing that southbound on South Rice have a dedicated right-turn lane from just south of Valerie all the way to Maple. This will be beneficial for the turn-in south of Valerie and the right-turn at Maple. The existing on-street parallel parking will be removed and turned into this new dedicated right-turn lane.
7) For northbound South Rice, proposing an extended full-length left-turn lane from Mimosa Street up to Maple Street.
8) Proposing the relocation of the Metro bus stop approximately 200 feet to the north from its current location, remaining on the west side of South Rice.
9) The shape of the building has been modified some due to internal workings of the plan and program requirements.

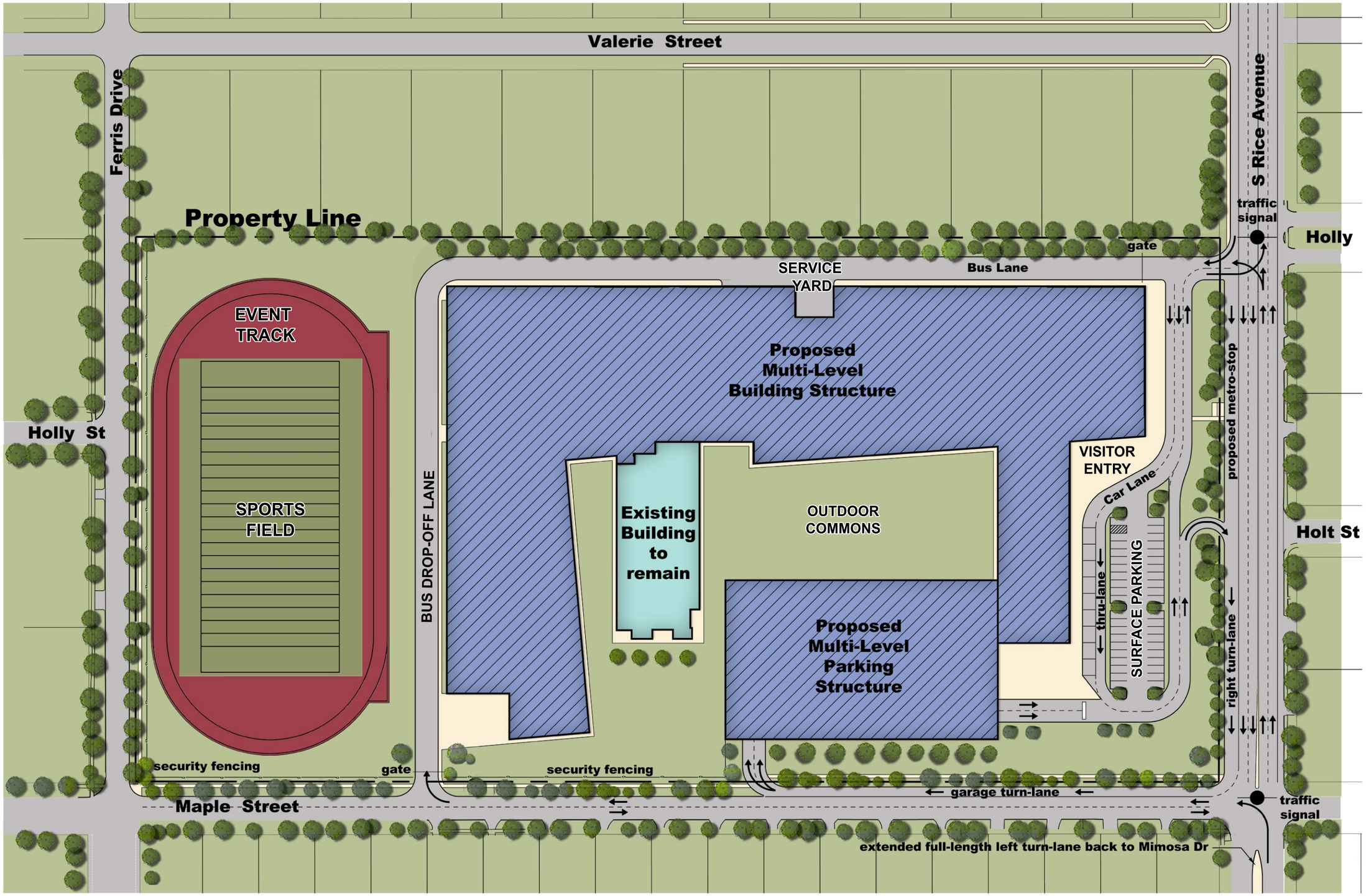
10) As before, all prescribed setbacks and landscape ordinance requirements will be incorporated into the project.

Bellaire HS Baseball Field Site on Avenue B – public comments primarily focused on the loss of many mature trees on the old Gordon Elementary School site.

1) Batting cages and other site functions that were shown on the northeast corner of the property near Avenue B and Bissonnet in the original SUP submission have now moved to the southwest corner of the property. All the trees in the triangular area near Avenue B and Bissonnet will remain.
2) Girls' softball is also shown sharing space with the baseball field.
3) 45-foot high sports fence is shown around the perimeter of the baseball/softball field. This is within the height restriction for this site.
4) As before, all prescribed setbacks and landscape ordinance requirements will be incorporated into the project.

Sincerely,

Samuel S. Savage, AIA, LEED AP
*Principal*




**BELLAIRE HIGH SCHOOL**

**HOUSTON INDEPENDENT SCHOOL DISTRICT**

**Traffic Site Plan**

0 40 80 160 FT N



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

PBK


**BELLAIRE HS Baseball / Softball Field - Bellaire, TX**

HOUSTON INDEPENDENT SCHOOL DISTRICT

**Proposed Site Plan**

0 40 80 160 FT N



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# Bellaire High School Rebuild

# Traffic Impact Analysis

Prepared for

Prepared by
**Traffic Engineers, Inc.**
*Texas Registration #F-3158*

*June 29, 2017*

STATE OF TEXAS
DUSTIN W. QUALLS
97337
LICENSED
PROFESSIONAL ENGINEER

Dustin W. Qualls, PE, PTOE

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

This report presents a documentation of the Traffic Study for proposed Bellaire High School. The proposed Bellaire High School rebuild consists of demolishing existing structures and constructing new buildings along with parking facilities. The proposed Bellaire High School is expected to accommodate an attendance of 3,100 students between grade 9 and grade 12. The contents in the report are arranged as follows:



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# 1. Site Plan

The site plan for Bellaire High School is shown in **Figure 1**. Access to the high school will be provided by two driveways on Maple Street and two driveways on South Rice Avenue. The western driveway on Maple Street will provide access to the entrance of the bus loading/unloading zone and the eastern driveway will provide access to the entrance of the parking garage (right-turn only entrance). The northern driveway at the intersection of South Rice Avenue at Holly Street will provide access to the student pick-up/drop-off driveway, surface parking lot and bus loading/unloading zone. The southern driveway on South Rice Avenue will provide access to the surface parking lot and the student pick-up/drop-off zone (right-turn only exit).

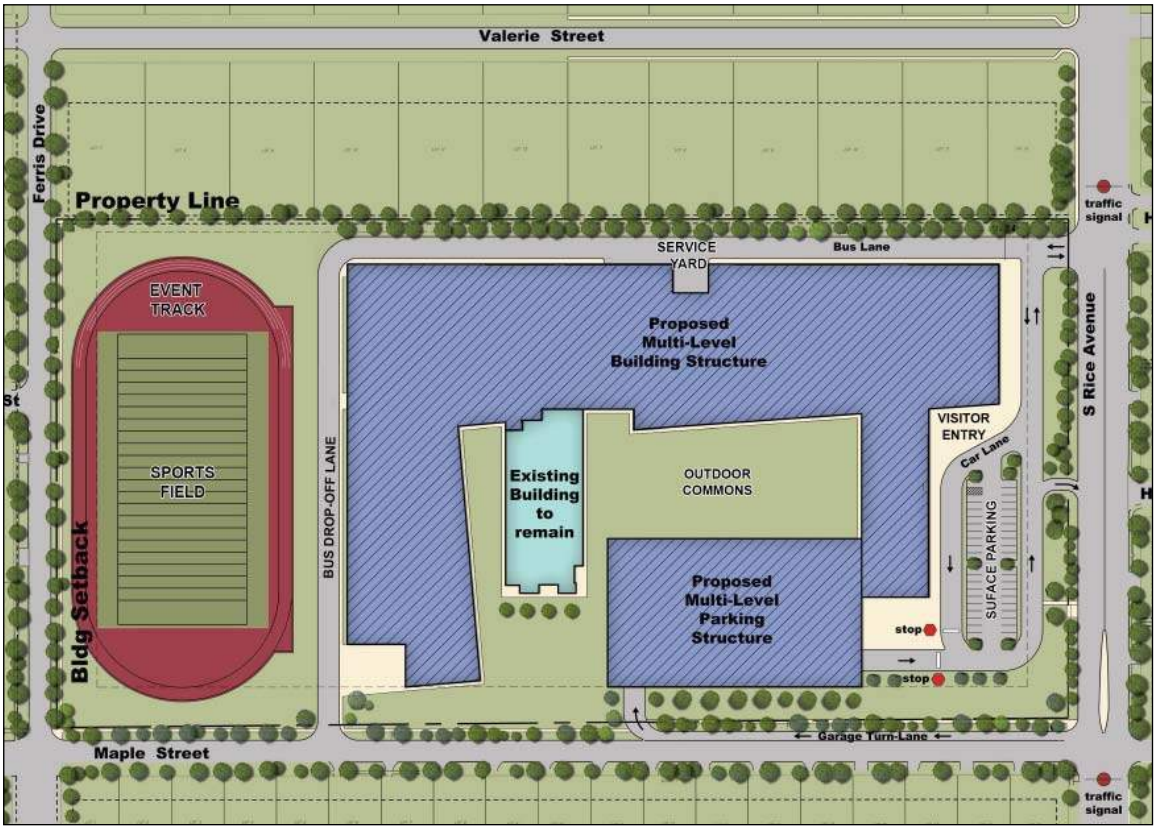



**Figure 1: Site Plan**

The enrollment at Bellaire High School as of October 28th, 2016, is 3,400 students. The enrollment at future Bellaire High School is planned to be 3,100 students. There is a net decrease in enrollment of 300 students with the proposed construction.

The Background Traffic Conditions Year 2017 volumes used in the study were obtained from a Draft Traffic Impact Analysis for Bellaire High School conducted by EHRA in February 2015. The background traffic volumes for the year 2017 were estimated by growing existing traffic volumes (collected in 2014, provided in **Appendix A**) by one percent per year with the exception of traffic volumes that are directly generated by the existing Bellaire High School (entering/exiting to/from the school).

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

## 2. Existing Conditions & Observations

Traffic Engineers, Inc.(TEI) observed dismissal and arrival conditions at Bellaire High School on the 26th and 30th of January 2017. **Figure 2** shows an aerial indicating the location of the observations.


**Figure 2: Aerial Map**

The observations and corresponding locations are listed below:


Pedestrians crossing the intersection of South Rice Avenue at Holly Street.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)


Parents double stacking on the left most lane at South Rice Avenue and buses stacked adjacent to the left most lane.


Majority of the student walkers from Bellaire High School use the sidewalk on South Rice Avenue. A portion of the existing sidewalk on South Rice Avenue adjacent the school parking lot has no buffer space from the roadway. NACTO's Urban Street Design Guide recommends that sidewalks should be delineated by a vertical and horizontal separation from moving traffic to provide adequate buffer space and a sense of safety for pedestrians.


A number of students bicyclists are present at Bellaire High School. There is a bike parking facility with bike racks installed near the baseball field on Maple Street. The figure shows bikes parked against the fence in the car parking lot facing South Rice Avenue.


A police officer stationed at the intersection of South Rice Avenue and Maple Street controls vehicular and pedestrian traffic during school dismissal period.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

## 3.0 Trip Generation

The Trip Generation and assumptions used in the study are shown in Table 1. The AM and PM school trips provided in the 9th Edition ITE Trip Generation Manual for an ultimate enrollment of 3,100 students is listed below.

**Table 1: Trip Generation Based on ITE Trip Generation Manual**

| Trips Generated (9th Edition ITE Trip Generation Manual) | AM Peak Hour Traffic | | PM Peak Hour Traffic | |
|---|---|---|---|---|
| | AM (in) | AM (out) | PM (in) | PM (out) |
| High School Trips (Land Use Code 530) | 906 | 427 | 189 | 214 |

However, the proposed site plan based on comments received from the City of Bellaire Planning and Zoning Commission public meeting has necessitated changes to the proposed trip generation, shown in detail in the table below.

**Table 2: Trip Generation Developed Based on Proposed Site Plan**

| Mode | Trip Generation | | AM Peak Hour Traffic | | PM Peak Hour Traffic | |
|---|---|---|---|---|---|---|
| | | | AM Ingress | AM Egress | PM Ingress | PM Egress |
| Vehicle | Student | Parking Garage | 435 | 0 | 0 | 218[1] |
| | Staff | Parking Garage | 270 | 0 | 0 | 135[1] |
| | Staff/Visitor | Surface Lot | 40 | 0 | 0 | 20[1] |
| | Parent | Drop-off/Pick-up Drwy | 827[2] | 827[2] | 827[2] | 827[2] |
| Bus | Students | Bus Zone | 22 | 22 | 22 | 22 |
| Total | | | 1594 | 849 | 849 | 1222 |

The following assumptions were utilized in developing the table above:

1. Assume 50% of the students and staff will exit the campus during the school PM peak hour.

2. Assume 40% of the students arrive to and depart from campus by parent vehicle at 1.5 students per vehicle.

The parking garage is currently planned for a maximum of 705 parking spaces, with 270 allotted to staff vehicles and the balance allotted to students. The surface parking lot is proposed to provide 40 parking spaces for staff and visitors. The proposed parking garage would be entered from a right-turn only lane on Maple Street, and would exit into the surface parking lot with access ultimately to South Rice Avenue.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

## 4.0 Trip Distribution

Trips were distributed in consideration of the Bellaire High School attendance zone. **Figure 3** illustrates the estimated trip distribution for Bellaire High School.

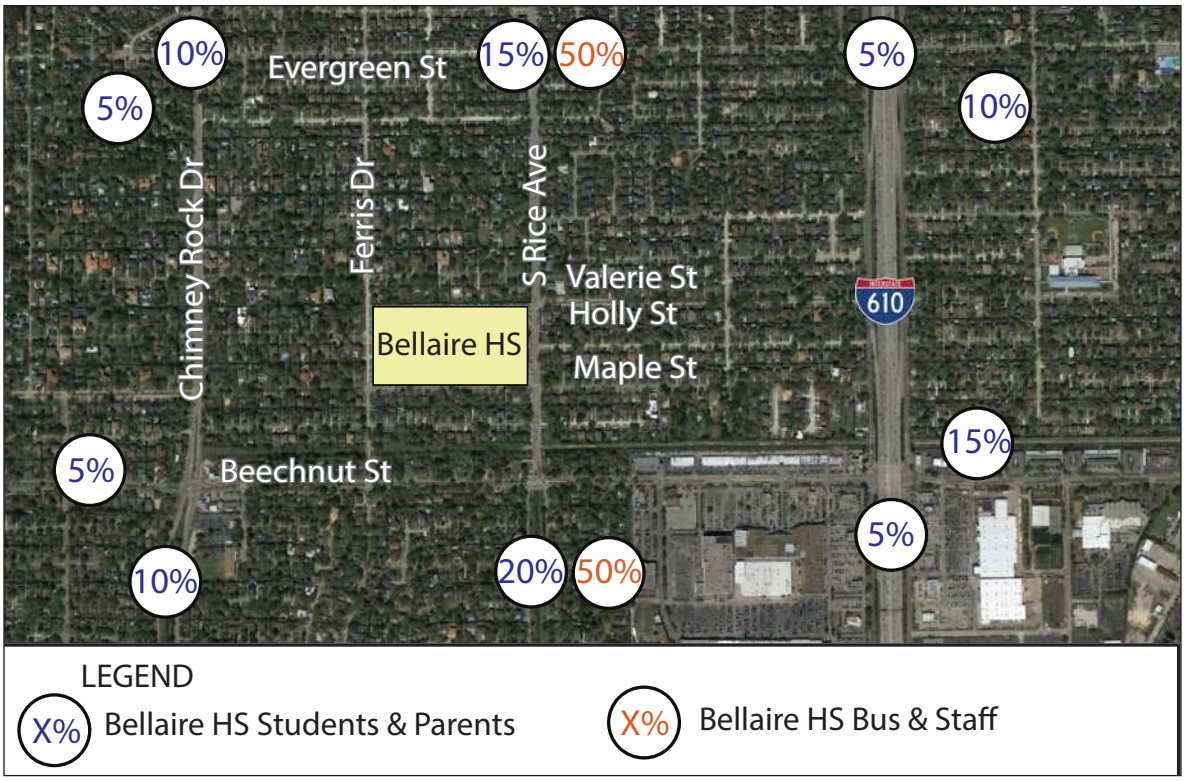



**Figure 3: Trip Distribution**

## 5.0 On-Site Storage

From the new site plan, the on-site stacking capacity for parent vehicles is approximately 760 linear feet; which can accommodate approximately 33 vehicles single and double-stacked on-site. The maximum parent vehicle queue length observed during the field visit at Bellaire High School at South Rice Avenue and the student pick-up/drop off driveway on Maple Street is 34 vehicles.

The bus stacking lane will provide up to 1150 linear feet of storage, or up to approximately 26 buses double-stacked. The total number of buses serving Bellaire High School is expected to be 22 buses.

The study recommends double-stacking of parent vehicles in the private car drop-off / pick-up lane, as well as double-stacking of buses along the bus lane, if needed. **Figure 4** shows the on-site stacking provided for parent vehicles and buses in the new site plan.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

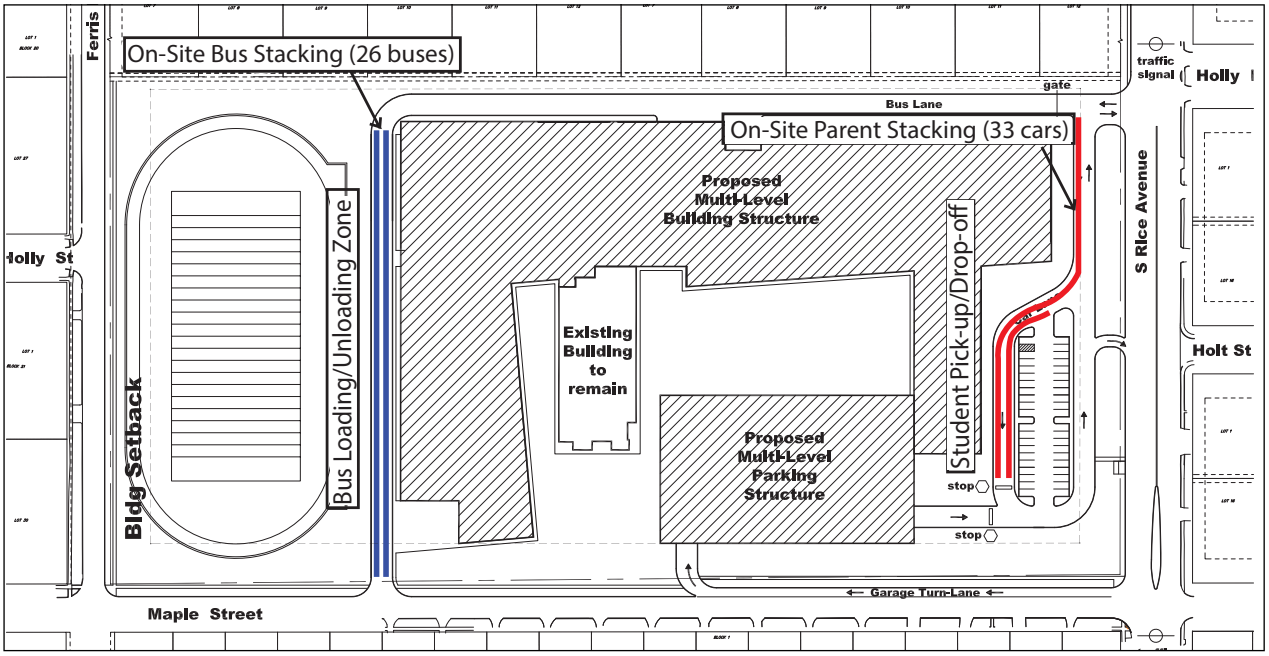



Figure 4: On-Site Stacking and Storage

## 6.0 Projected Site Turning Movement Counts

Traffic projections were developed for year 2021 site generated and year 2021 build-out volumes for both AM and school PM peak hour conditions. Description of the site generated and build-out conditions are provided below:

Year 2021 Site Generated Volumes: trips shown are generated from the proposed Bellaire High School. The trip generation used in the analysis is provided in **Table 1** and the trip distribution used is provided in **Figure 3.**

Year 2021 Build-Out Volumes: 2017 background volumes without school traffic (provided in **Appendix A**) grown 1% for 4 years were combined with school site generated volumes to obtain 2021 build-out volumes.

The existing lane assignments and traffic control at the study intersections is shown in **Figure 5**. Traffic projections for year 2021 site generated trips and year 2021 build-out volumes for the AM and school PM peak hour are provided in **Figures 6** through **9**. The AM peak hour analyzed in the study is 7:00 AM to 8:00 AM and the school PM peak hour analyzed is 3:15 PM to 4:15 PM.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

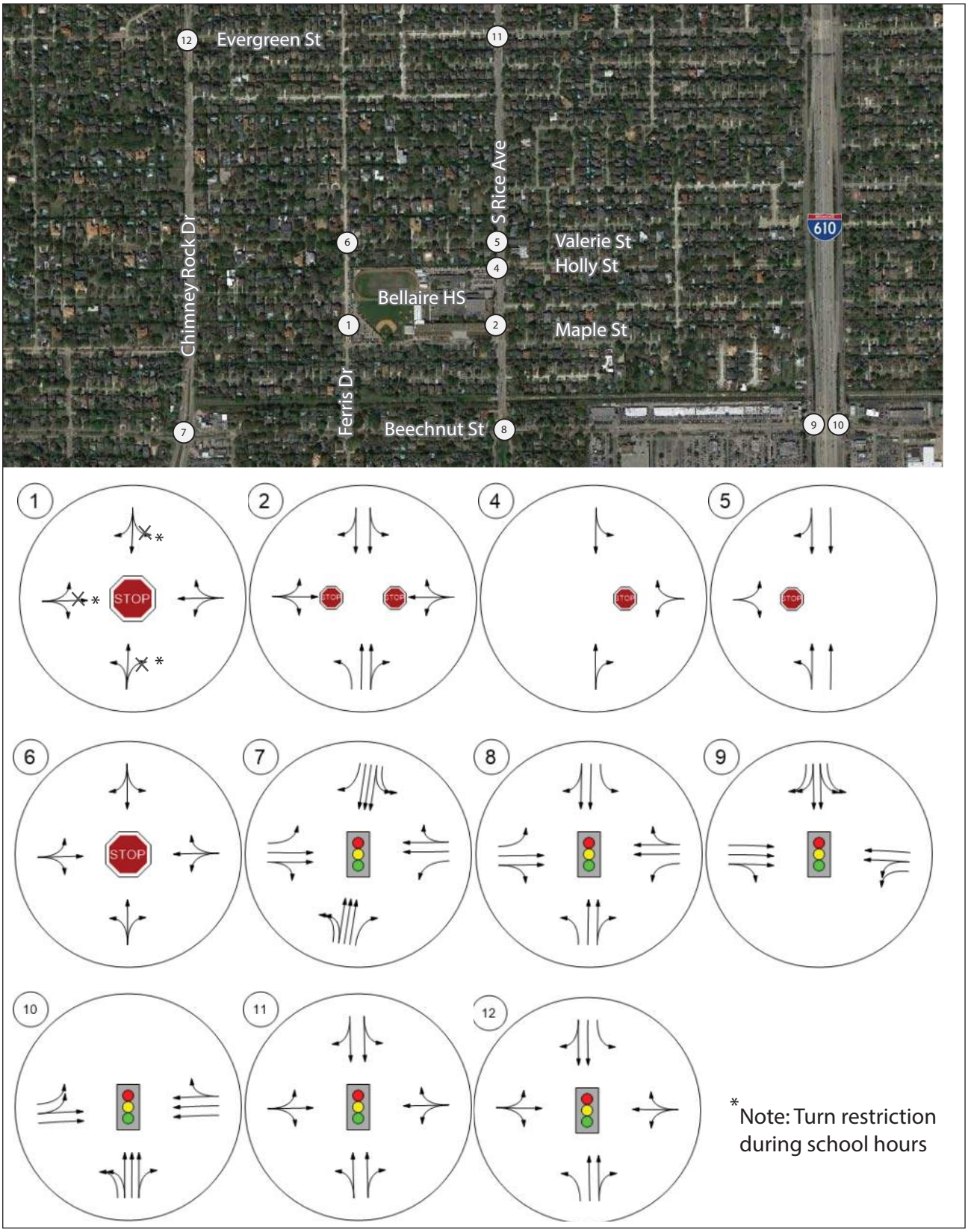
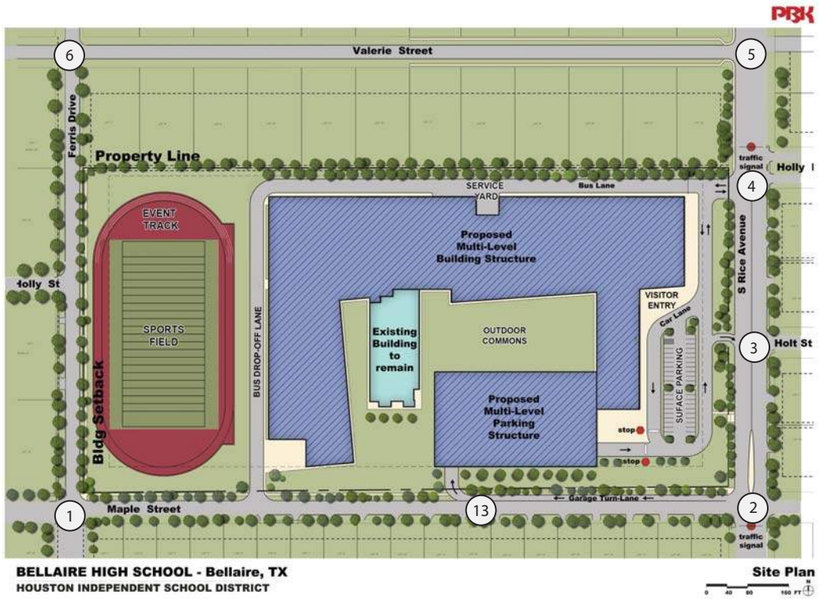


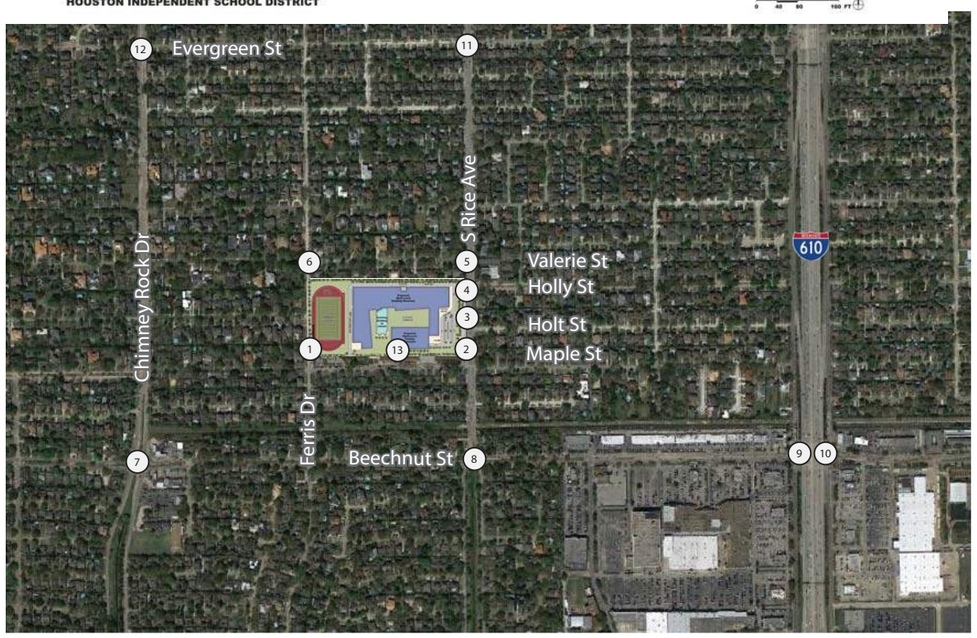

**Figure 5: Existing Conditions Lane Assignment and Traffic Control**

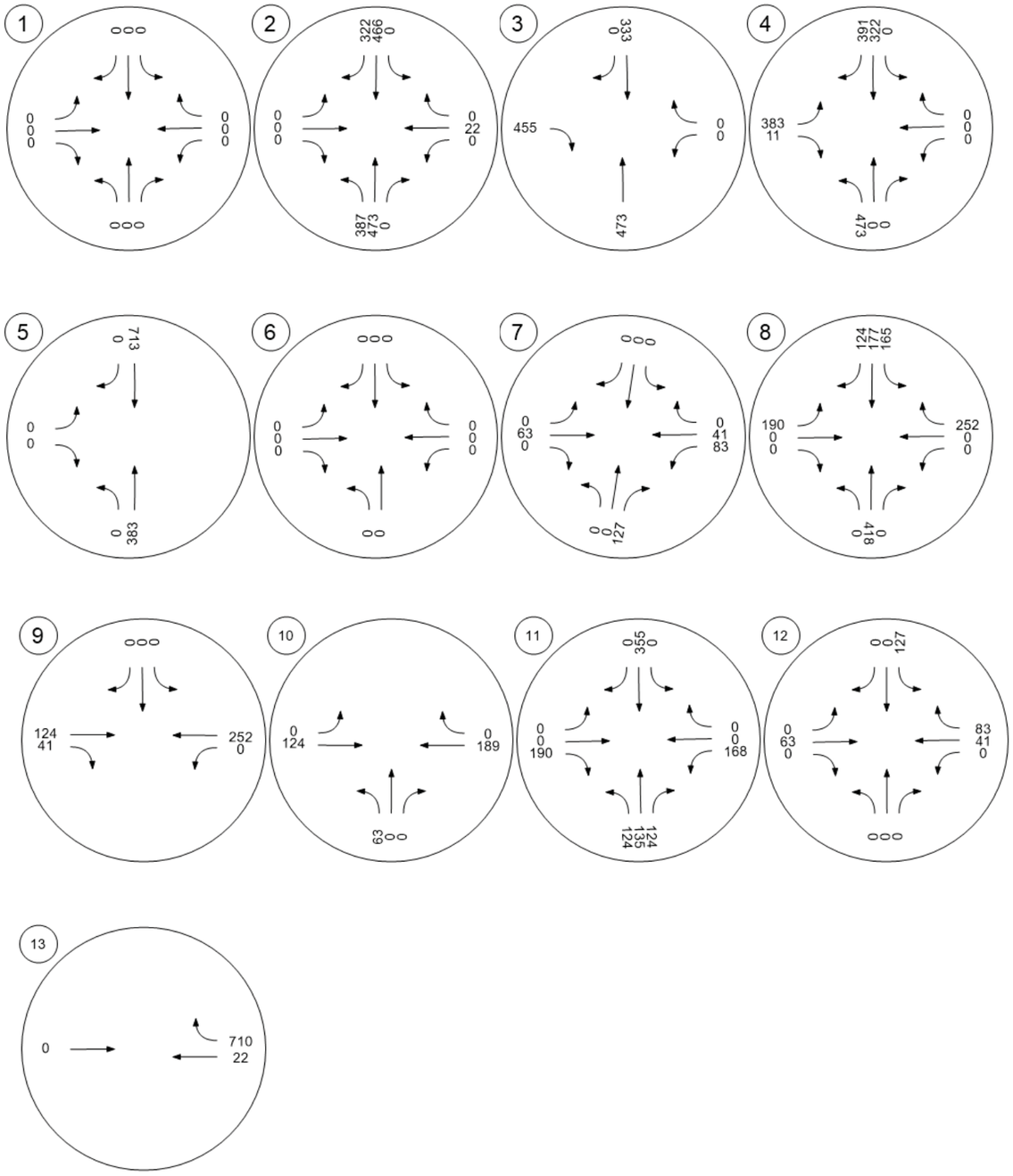
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# Figure 6: Site Generated AM Peak Hour Volumes (Year 2021)





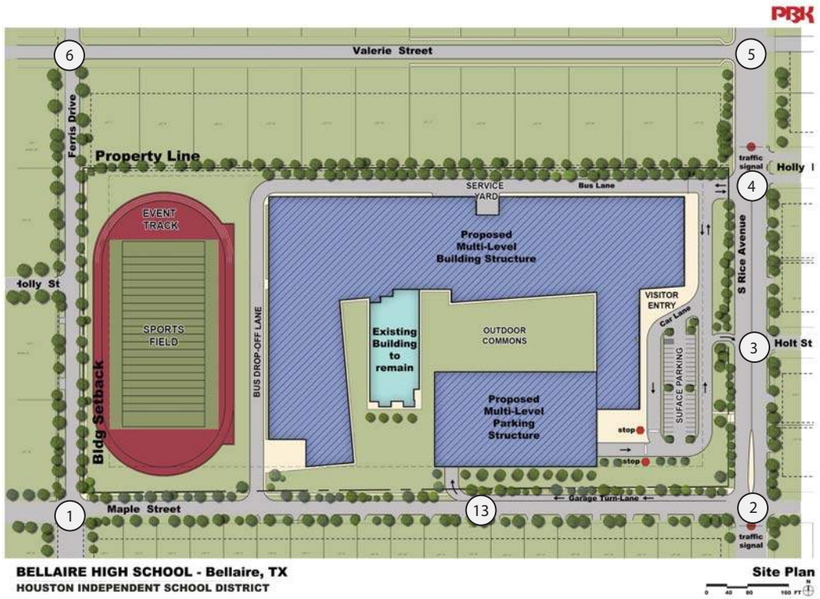



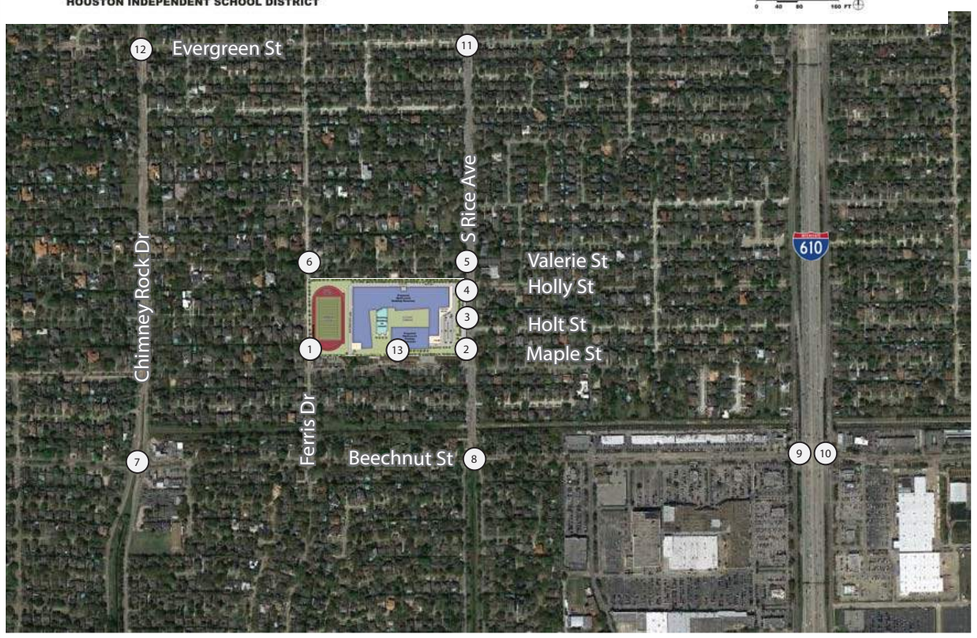



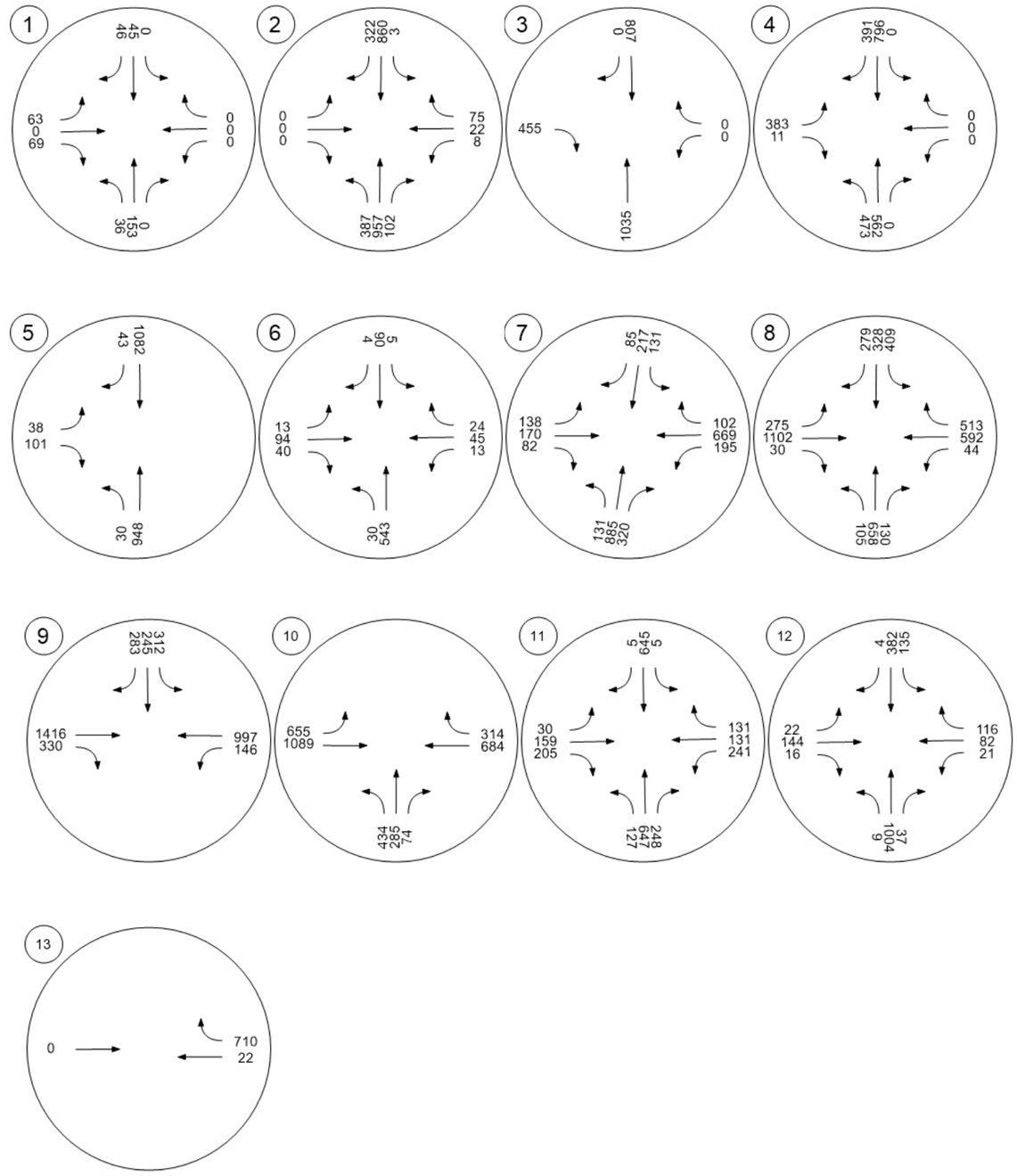

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# Figure 7: Build-out AM Peak Hour Volumes (Year 2021)





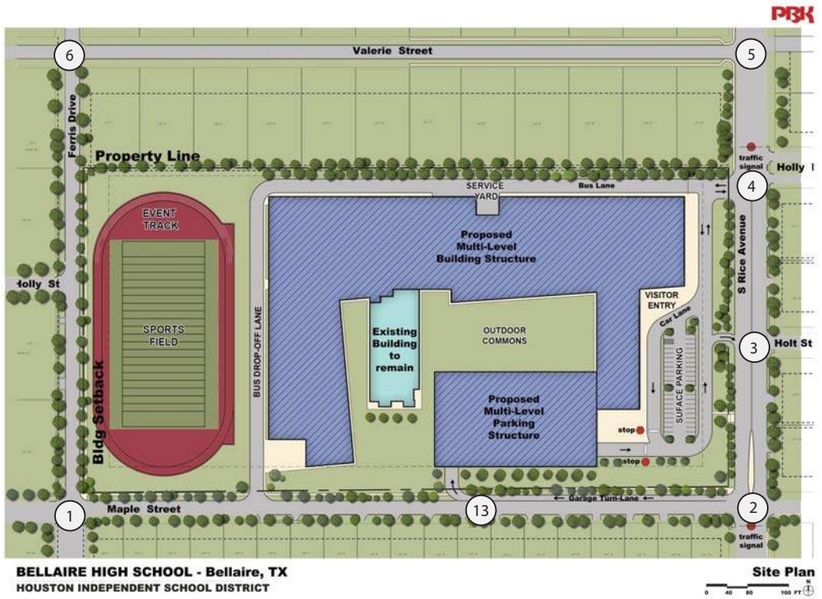



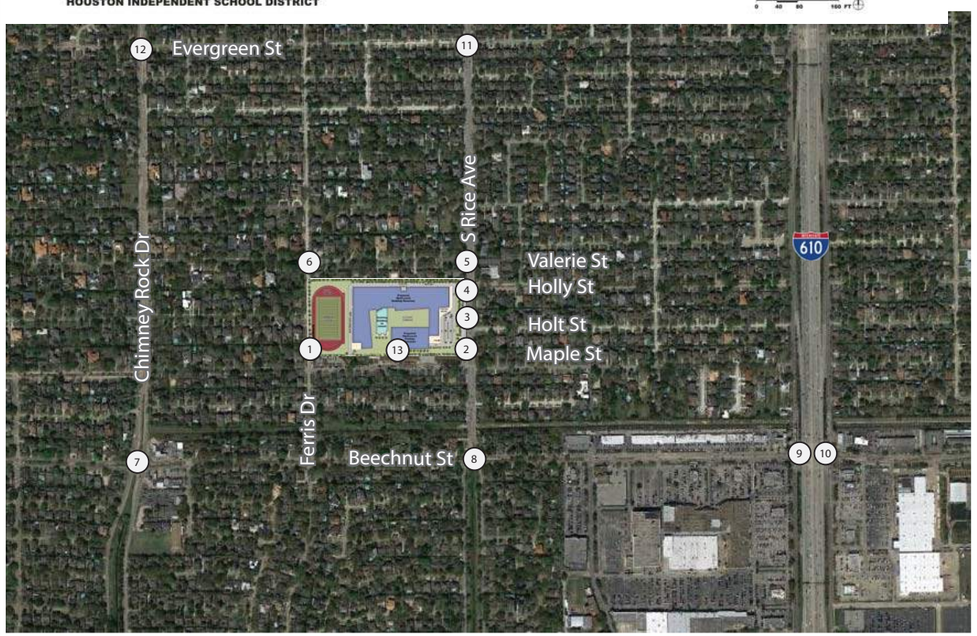



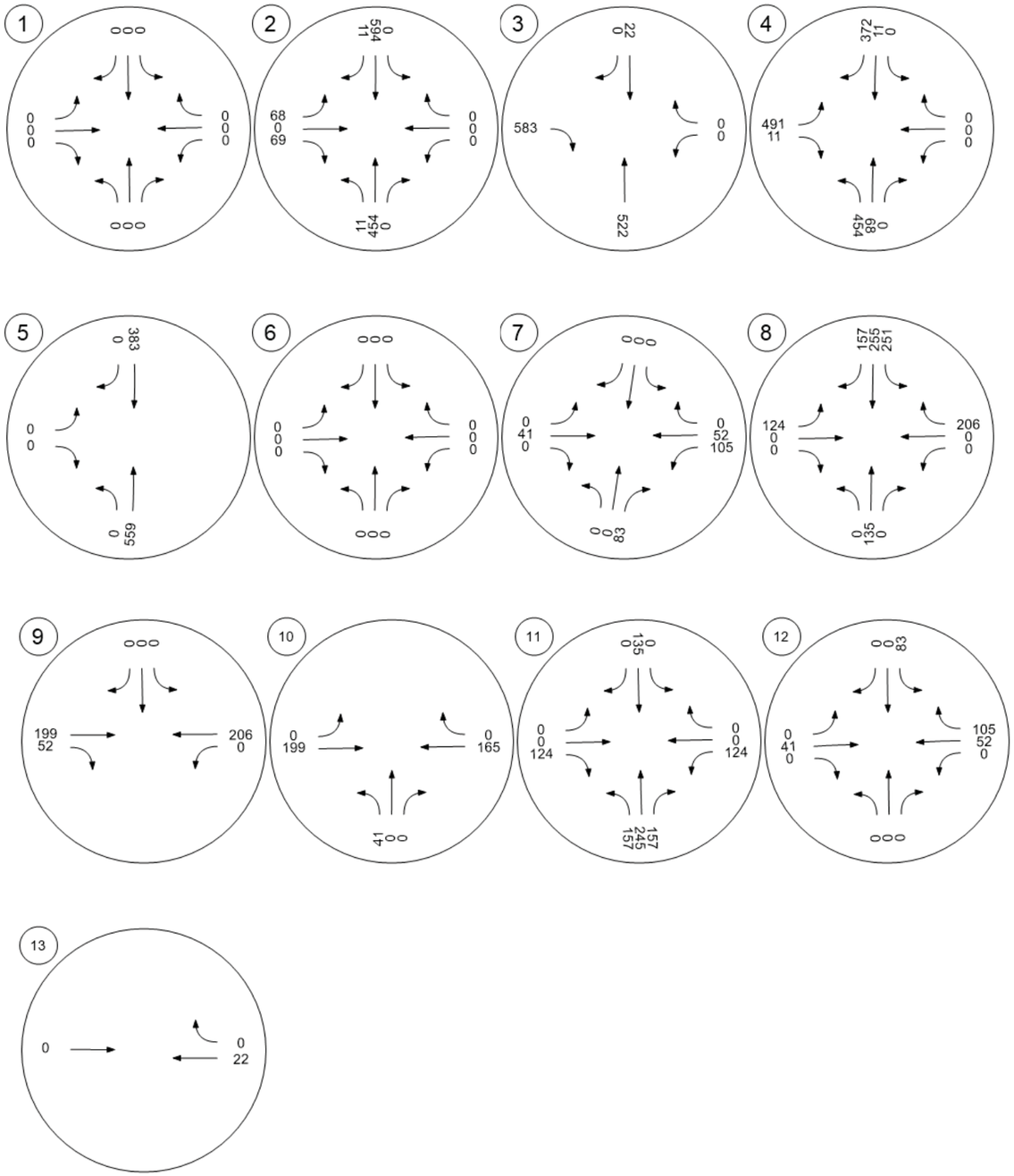

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# Figure 8: Site Generated PM School Peak Hour Volumes (Year 2021)





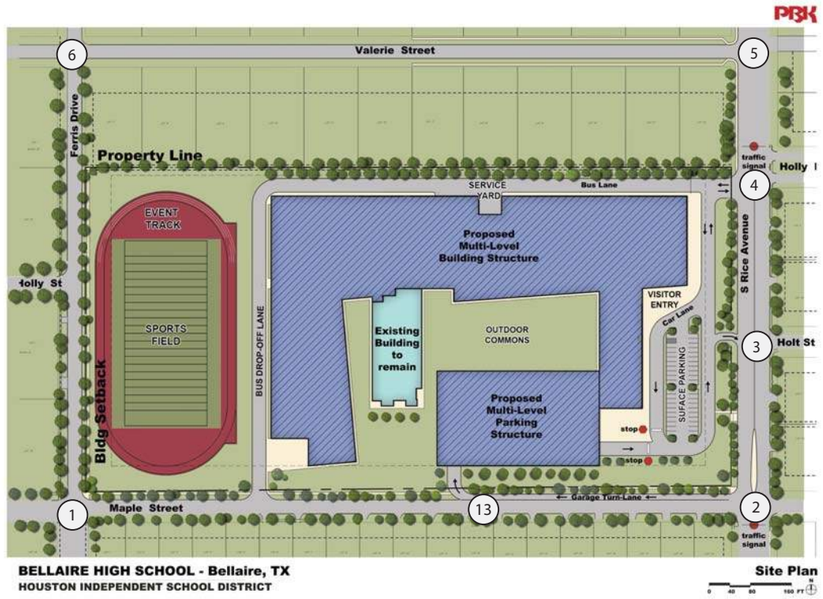



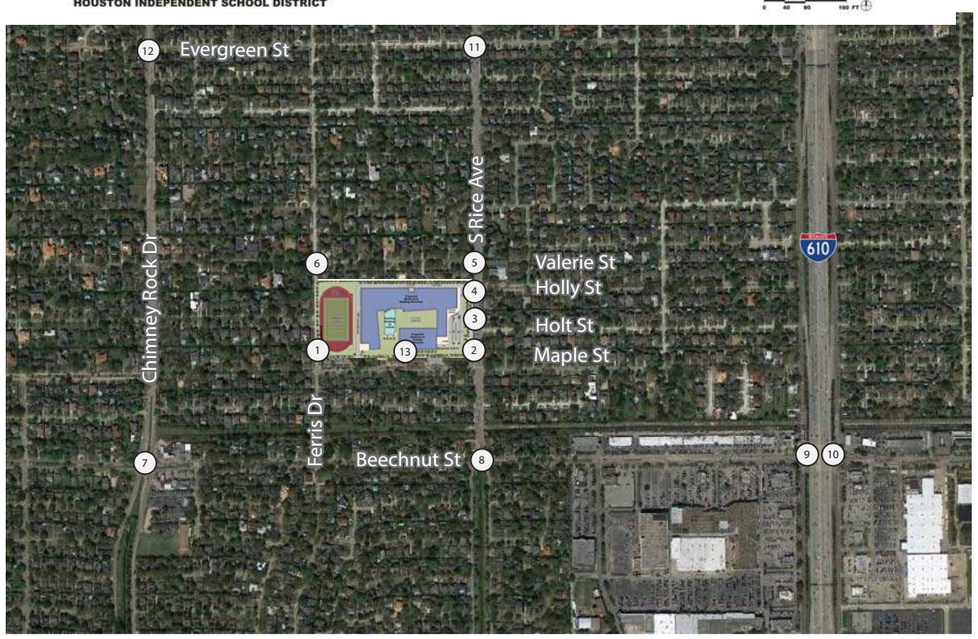



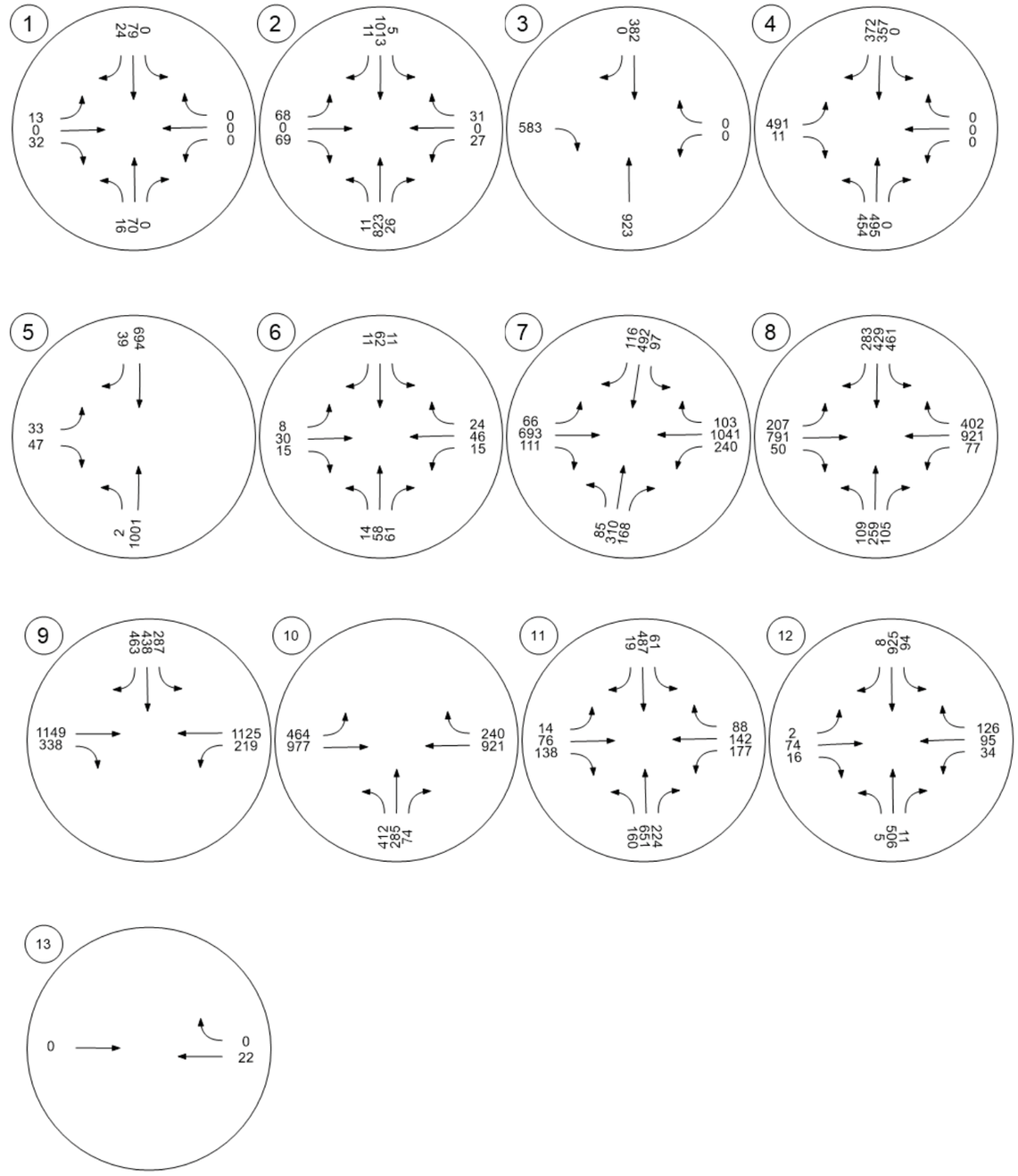

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# Figure 9: Build-out PM School Peak Hour Volumes (Year 2021)






Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# 7.0 Traffic Signal Warrant Analysis

A signal warrant analysis was conducted at the intersections of South Rice Avenue at Holly Street/Bus Driveway as well as South Rice Avenue at Maple Street in accordance with the 2009 Manual on Uniform Traffic Control Devices (MUTCD) guidelines.

For the intersection of South Rice Avenue at Holly Street, Warrant 3 (peak hour) was satisfied for Build-out conditions at the study intersection (analysis shown in **Figure 10**).

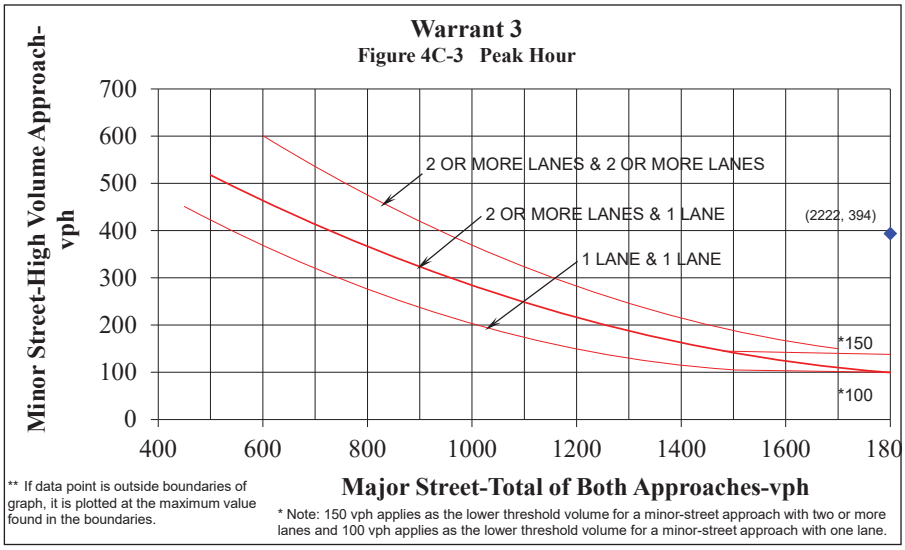



**Figure 10: Peak Hour Signal Warrant Analysis for South Rice Ave at Holly Street**

For the intersection of South Rice Avenue at Maple Street, Warrant 3 (peak hour) was satisfied for Build-out conditions at the study intersection (analysis shown in **Figure 11**).

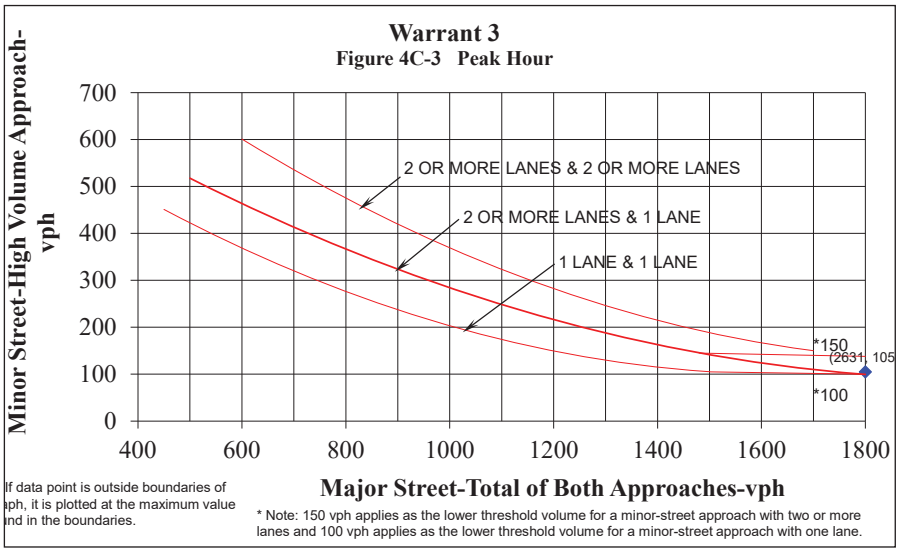



**Figure 11: Peak Hour Signal Warrant Analysis for South Rice Ave at Maple Street**

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

## 8.0 Turn Restriction Recommendations

The study recommends existing one-way operation of Maple Street during AM and school PM peak times to remain based on comments received from the City of Bellaire Planning and Zoning Commission public meeting. Recommendations for other turn lane restrictions in the vicinity of the school are illustrated in **Figure 12**. The study recommends access management on South Rice Avenue between the intersections of South Rice Avenue at Holly Street and South Rice Avenue at Maple Street. A raised curb is proposed to prevent left turns from South Rice Avenue, as well as left-turns onto South Rice Avenue between Maple Street and Holly Street.

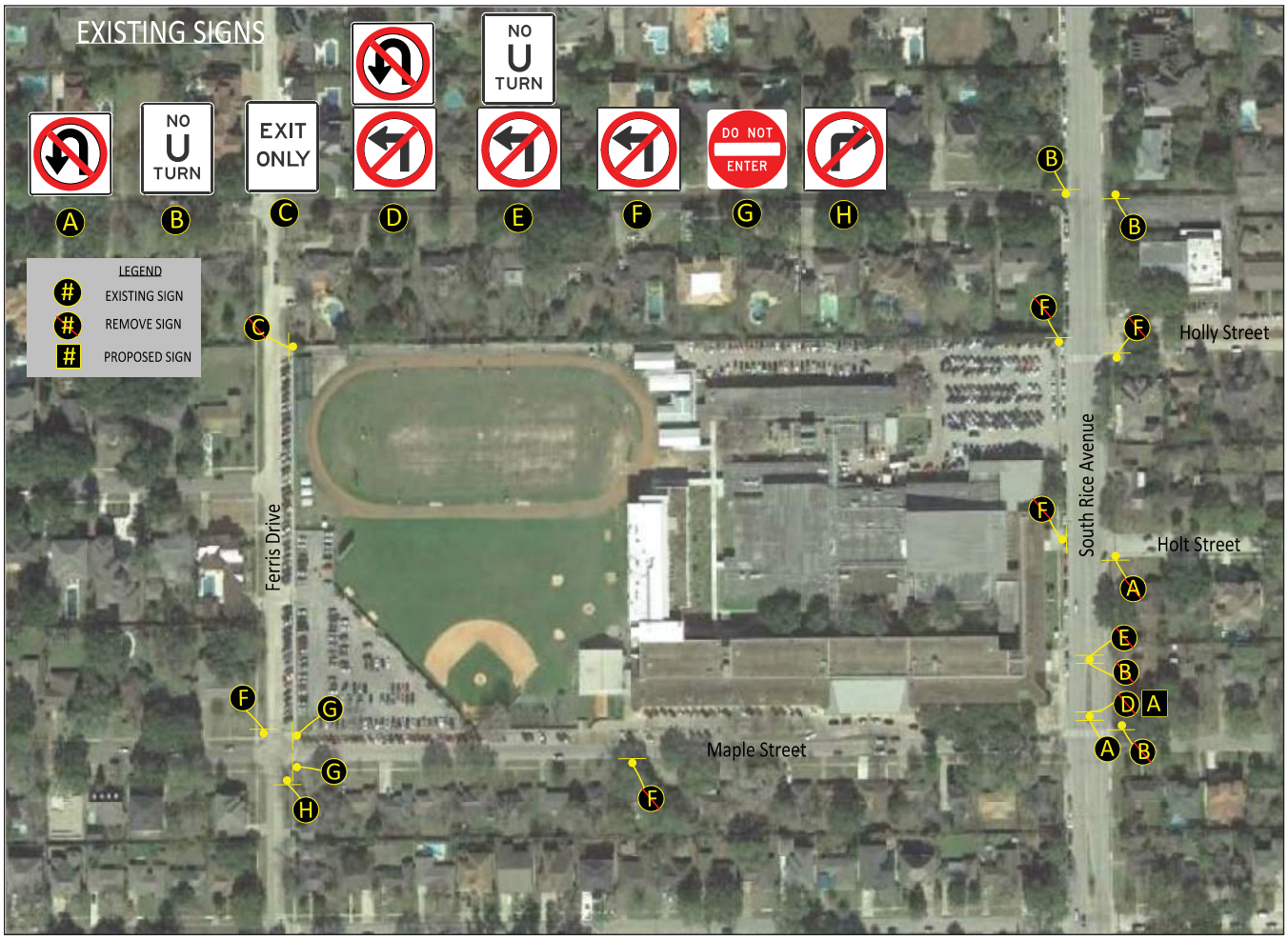



**Figure 12: Turn Restrictions and Recommendations in the Study Area**

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

## 9.0 Pedestrian and Bicycle Facility Recommendations

Pedestrian and bicycle facilities are intended to make walking and biking safer and convenient for users. The pedestrian and bicycle facilities recommended in the study are described below.

Pedestrian Facilities:

NACTO's Urban Street Design Guide recommends that sidewalks should be delineated by vertical and horizontal separation from moving traffic to provide adequate buffer space and a sense of safety for pedestrians. This study recommends providing adequate buffer space between the sidewalks and roadway for all sidewalks abutting the school site.

Bicycle Facilities:

Providing bicycle paths is associated with an increase in the share of bicyclists. The study recommends providing secure bicycle parking racks and bike paths that minimize the need for bicyclists to cross school driveways and parking lots. Bicycle lanes and paths should be designated through the use of signs or painted symbols. **Figure 13** shows an illustration of pavement marking for bicycle lane and bicycle crossing.

**Figure 13: Bicycle Facility, Vassar Street, Cambridge, MA**

## 10.0 Parking Demand Analysis

The parking demand analysis was conducted using the 4th Edition ITE Parking Generation Manual. The Parking Generation Manual segregates high schools at a suburban site and at an urban site due to variation in parking demand rates. According to the Parking Generation Manual, the average peak period parking demand for a high school at a suburban site is 0.23 vehicles per student and a range provided between 0.14 and 0.31 vehicles per student. Similarly, the average peak period parking demand for a high school at an urban site is 0.09 vehicles per student, with a range provided between 0.03 and 0.15 vehicles per student.

With the availability of good transit, walk and bike facilities, it is reasonable to assume that Bellaire High School would fall under the classification of a high school at an urban site. The upper value provided in the range for average peak period parking demand at a high school located in an urban site was used in the analysis due to climatic and local conditions in the Houston region. Based on this assumption, the number of parking spaces required for students is estimated to be 465 parking spaces (using a peak period parking demand of 0.15 vehicles per student and an ultimate enrollment of 3100 students). Houston Independent School District (HISD) has requested 270 parking spaces for accommodating staff parking requirement. Hence, it is estimated that a total of 735 parking spaces (combined in the parking garage and surface parking lot) is required to accommodate student and staff parking demand at Bellaire High School. It is recommended that parking spaces for students be authorized and alloted using a hang tag system. The most updated site plan provides 705 spaces in the parking garage and 40 spaces in the surface parking lot.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

## 11.0 Capacity Analysis

Capacity analysis provides information regarding traffic operations at an intersection and is expressed in terms of the level-of-service (LOS). The level-of-service indicates the average seconds of delay experienced by a motorist at a signalized intersection or at the stop controlled approaches of an unsignalized intersection. As a frame of reference, intersection levels-of-service range from A to F, with LOS A representing free flow conditions and LOS F representing highly congested conditions. In general, a signalized intersection operating at LOS D or better in an urban area is characterized by acceptable delays.

A comparison between year 2021 build-out scenario with no improvements and year 2021 build-out scenario with mitigation reflects the traffic impacts associated with and without mitigation. The build-out scenario with mitigation includes the following improvements to the study intersections:

- Re-stripe South Rice Avenue for left turn lanes at the intersection of:
  - South Rice Avenue at Maple Street, and
  - South Rice Avenue at Holly Street.
- Signalize the intersections of:
  - South Rice Avenue at Maple Street, and
  - South Rice Avenue at Holly Street.
- Provide a right-turn lane on Maple Street feeding onto the entrance of the parking garage.
- Provide access management on South Rice Avenue between the intersections of South Rice Avenue at Holly Street and South Rice Avenue at Maple Street. A raised curb is proposed to prevent left turns from South Rice Avenue, as well as left-turns onto South Rice Avenue between Maple Street and Holly Street.
- Provide improvements south of the intersection of South Rice Avenue at Maple Street to accommodate the north bound left-turning volume at the intersection.

The Build-out condition of study intersections without improvements to lane assignment/traffic control is shown in **Figure 14**. The Build-out condition of study intersections with mitigated lane assignment/traffic control is shown in **Figure 15**. It should be noted that the existing one-way operation during AM and school PM peak times on Maple Street will remain. The trip assignments in the study were performed based on the one-way operation on Maple Street during the AM and school PM peak events.

**Table 3** lists and compares the capacity analysis (delay and LOS) for year 2021 build-out scenario with no improvements and year 2021 build-out scenario with mitigation for the AM peak hour. **Table 4** lists and compares the capacity analysis (delay and LOS) for year 2021 build-out scenario with no improvements and year 2021 build-out scenario with mitigation for the school PM peak hour. Results of the capacity analyses are also provided in **Appendix B** (Build-out without improvements for AM and school PM peak hour) and **Appendix C** (Build-out with mitigation for AM and school PM peak hour).

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

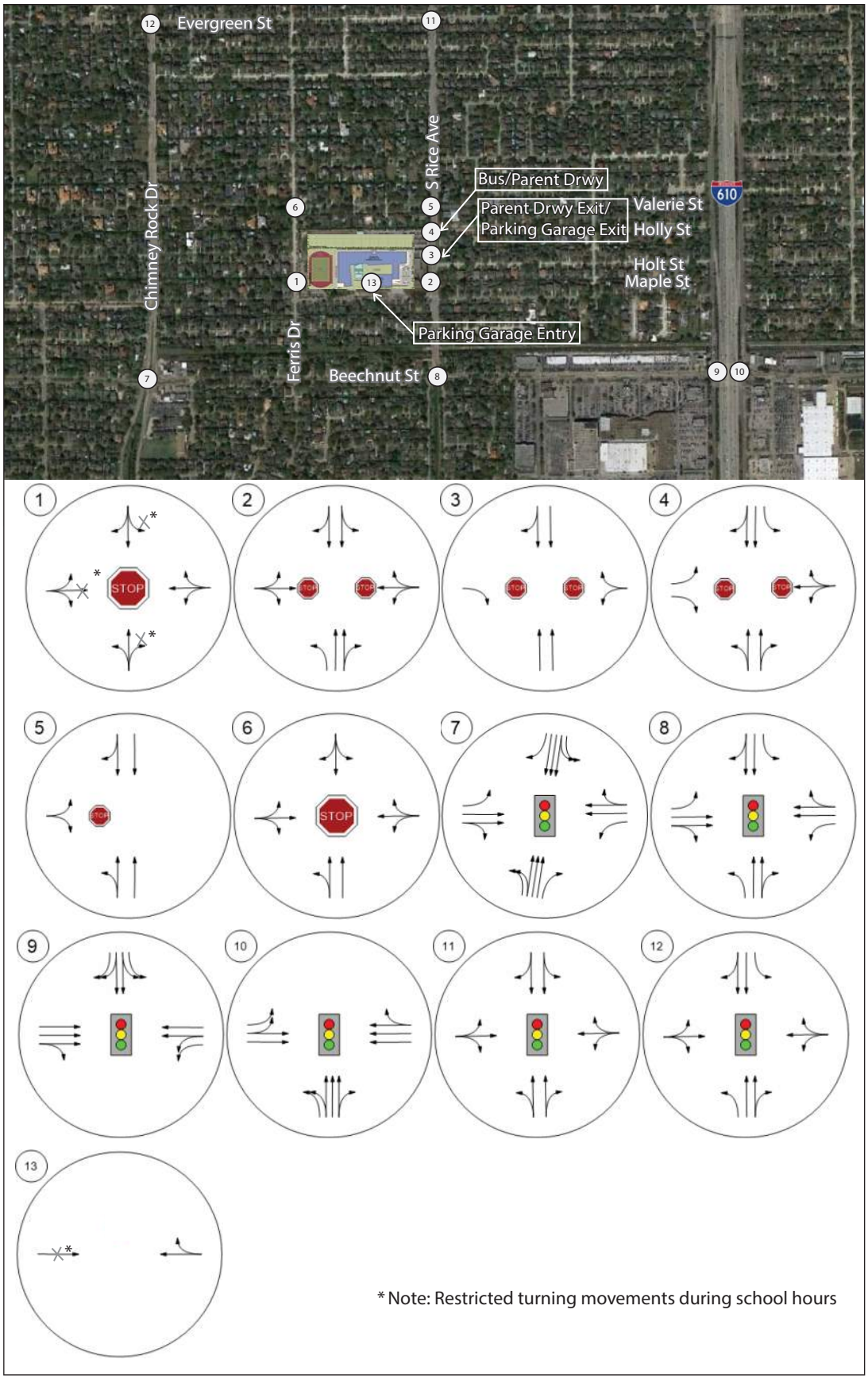



**Figure 14: Build-out Conditions Lane Assignment and Traffic Control Without Improvements**



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

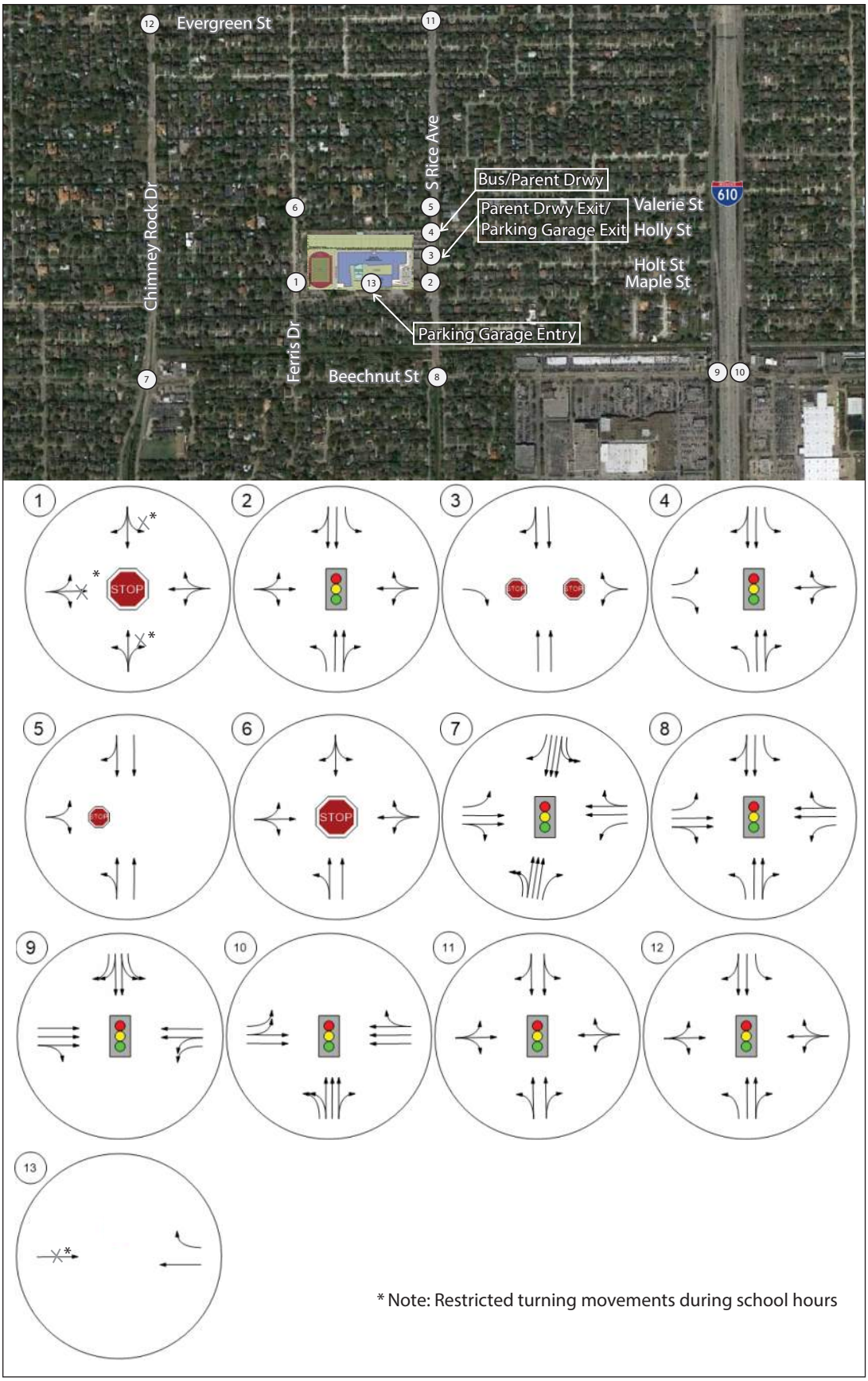



**Figure 15: Build-out Conditions Lane Assignment and Traffic Control With Mitigation**



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Table 3: AM Peak Hour Capacity Analysis and Comparison for Different Scenarios**

| # | Intersection | 2021 Build-out with no improvements | | | | | | 2021 Build-out with mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NB | SB | EB | WB | Intersection | | NB | SB | EB | WB | Intersection |
| | | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) |
| 1 | Maple St at Ferris Dr | STOP | A 9.6 | A 8.1 | A 8.8 | A 0 | A 9.06 | STOP | A 9.6 | A 8.1 | A 8.8 | A 0 | A 9.06 |
| 2 | S. Rice Ave at Maple St | STOP STOP | E 42.3 | A 0.1 | F >1000 | F >1000 | F 406 | | E 59.82 | F 122 | A 0.00 | D 42.2 | F 86 |
| 3 | S. Rice Ave at Student Drop-off/Pick-up Drwy | STOP STOP | A 0 | A 0 | F 152.2 | - | F 30.1 | STOP STOP | A 0 | A 0 | F 152.2 | - | F 30.1 |
| 4 | S. Rice Ave at Holly St | STOP STOP | F 126.3 | A 0 | F >1000 | - | F >1000 | | F 106 | A 310 | F 81 | - | F 195 |
| 5 | S. Rice Ave at Valerie St | STOP | A .43 | A 0.0 | F 512 | - | F 32.0 | STOP | A .43 | A 0.0 | F 512 | - | F 32.0 |
| 6 | Valerie St at Ferris Dr | STOP | B 14.8 | B 10.4 | B 11.6 | B 10.4 | B 13.4 | STOP | B 14.8 | B 10.4 | B 11.6 | B 10.4 | B 13.4 |
| 7 | Chimney Rock Rd at Beechnut St | | D 46.3 | C 25.6 | C 26.8 | C 28.2 | D 35.4 | | D 46.3 | C 25.6 | C 26.8 | C 28.2 | D 35.4 |
| 8 | Beechnut St at S Rice Ave | | F 113.2 | E 78.8 | E 68.1 | F 304 | F 140 | | F 113.2 | E 78.8 | E 68.1 | F 304 | F 140 |
| 9 | Beechnut at 610 SB Feeder | | - | F 215 | F 84 | F 73 | F 110 | | - | F 215 | F 84 | F 73 | F 110 |
| 10 | Beechnut at 610 NB Feeder | | F 158 | - | D 40.6 | C 28.5 | E 63.5 | | F 158 | - | D 40.6 | C 28.5 | E 63.5 |
| 11 | S. Rice at Evergreen St | | F 501 | D 40.9 | E 58.6 | F 102 | F 238 | | F 501 | D 40.9 | E 58.6 | F 102 | F 238 |
| 12 | Chimney Rock Rd at Evergreen St | | C 34.1 | B 19.4 | D 36.6 | D 35.5 | C 30.6 | | C 34.1 | B 19.4 | D 36.6 | D 35.5 | C 30.6 |
| 13 | Parking Garage at Maple Street | | | | A 0 | A 0 | A 0 | Right turn lane | | | A 0 | A 0 | A 0 |

**Table 4: PM Peak Hour Capacity Analysis and Comparison for Different Scenarios**

| # | Intersection | 2021 Build-out with no improvements | | | | | | 2021 Build-out with Mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NB | SB | EB | WB | Intersection | | NB | SB | EB | WB | Intersection |
| | | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) |
| 1 | Maple St at Ferris Dr | STOP | A 7.89 | A 7.78 | A 7.4 | A 0.0 | A 7.7 | STOP | A 7.89 | A 7.78 | A 7.4 | A 0.0 | A 7.7 |
| 2 | S. Rice Ave at Maple St | STOP STOP | A 0.1 | A 0.1 | F 161 | E 39.1 | F 11.7 | | B 16.1 | B 15.3 | C 24.8 | C 29.3 | B 16.7 |
| 3 | S. Rice Ave at Student Drop-off/Pick-up Drwy | STOP STOP | A 0 | A 0 | F 68.2 | - | F 21.0 | STOP STOP | A 0 | A 0 | F 68.2 | - | F 21.0 |
| 4 | S. Rice Ave at Holly St | STOP STOP | C 15.7 | A 0.0 | F >1000 | F >1000 | F >1000 | | F 98 | F 84 | F 186 | A 0 | F 113 |
| 5 | S. Rice Ave at Valerie St | STOP | A 0.0 | A 0.0 | F 50.8 | - | F 2.3 | STOP | A 0.0 | A 0.0 | F 50.8 | - | F 2.3 |
| 6 | Valerie St at Ferris Dr | STOP | A 8.4 | A 8.3 | A 8.1 | A 8.3 | A 8.3 | STOP | A 8.4 | A 8.3 | A 8.1 | A 8.3 | A 8.3 |
| 7 | Chimney Rock Rd at Beechnut St | | C 25.2 | C 25.0 | C 24.6 | B 20.0 | C 23.0 | | C 25.2 | C 25.0 | C 24.6 | B 20.0 | C 23.0 |
| 8 | Beechnut St at S Rice Ave | | F 116 | E 56.3 | D 37.8 | F 272 | F 132 | | F 116 | E 56.3 | D 37.8 | F 272 | F 132 |
| 9 | Beechnut at 610 SB Feeder | | - | F 498 | D 36.2 | E 56.4 | F 179 | | - | F 498 | D 36.2 | E 56.4 | F 179 |
| 10 | Beechnut at 610 NB Feeder | | F 160 | - | C 31 | C 27.6 | E 59.4 | | F 160 | - | C 31 | C 27.6 | E 59.4 |
| 11 | S. Rice at Evergreen St | | F 242 | E 64 | E 64 | F 109 | F 155 | | F 242 | E 64 | E 64 | F 109 | F 155 |
| 12 | Chimney Rock Rd at Evergreen St | | B 15.5 | B 17.1 | C 27.8 | C 21.3 | B 17.7 | | B 15.5 | B 17.1 | C 27.8 | C 21.3 | B 17.7 |
| 13 | Parking Garage at Maple Street | | - | | A 0.0 | A 0.0 | A 0.0 | Right turn lane | - | | A 0.0 | A 0.0 | A 0.0 |





Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

A summary of the capacity analysis for year 2021 Build-out scenario without improvements and year 2021 Build-out scenario with mitigation is provided below:

1. Year 2021 Build-out Scenario without Improvements:

   - During the AM and School PM peak hour, the following stop controlled intersections are expected to operate at LOS F:
     - South Rice Avenue at Maple Street,
     - South Rice Avenue at Student Pick-up/Drop-off Driveway,
     - South Rice Avenue at Holly Street, and
     - South Rice Avenue at Valerie Street.
   - During the AM and School PM peak hour, the following signalized intersections are expected to operate at LOS F:
     - Beechnut at Interstate Highway 610 Southbound Feeder,
     - Beechnut Street at South Rice Avenue, and
     - South Rice Avenue at Evergreen Street.

2. Year 2021 Build-out Scenario with Mitigation:

   - During the AM and School PM peak hour, the following intersections are expected to operate at LOS F:
     - South Rice Avenue at Student Pick-up/Drop-off Driveway (traffic will be metered by the traffic signal at the intersections of South Rice Avenue at Maple Street and South Rice Avenue at Holly Street and will operate at a LOS better than the limitations of the traffic model).
     - South Rice Avenue at Holly Street (the delay is lower compared to the Build-out scenario without improvements).
     - South Rice Avenue at Valerie Street (traffic will be metered by the traffic signal at the intersection of South Rice Avenue at Holly Street and will operate at a LOS better than the limitations of the traffic model).
   - During the AM peak hour, the signalized intersection of South Rice Avenue at Maple Street is expected to operate at LOS F (the delay is lower compared to the Build-out scenario without improvements).
   - During the AM and School PM peak hour, the following signalized intersections are expected to operate at LOS F:
     - Beechnut at Interstate Highway 610 Southbound Feeder,
     - Beechnut Street at South Rice Avenue and
     - South Rice Avenue at Evergreen Street.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

## 12.0 Conclusions and Recommendations

The following is a summary of conclusions and recommendations based on the traffic study for the proposed Bellaire High School rebuild:

1. Based on year 2021 build-out scenario with mitigation, it is recommended to
   - Re-stripe South Rice Avenue for left turn lanes at the intersection of:
     - South Rice Avenue at Maple Street, and
     - South Rice Avenue at Holly Street.
   - Signalize the intersections of:
     - South Rice Avenue at Maple Street, and
     - South Rice Avenue at Holly Street.
   - Provide a right-turn lane on Maple Street feeding onto the entrance of the parking garage.
   - Provide access management on South Rice Avenue between the intersections of South Rice Avenue at Holly Street and South Rice Avenue at Maple Street. A raised curb is proposed to prevent left turns from South Rice Avenue, as well as left-turns onto South Rice Avenue between Maple Street and Holly Street.
   - Provide improvements south of the intersection of South Rice Avenue at Maple Street to accommodate the north bound left-turning volume at the intersection.
2. It is recommended to provide bike paths and secure bike racks at each main approach to the school site to minimize bicyclists crossing school driveways.
3. It is recommended to delineate sidewalks along South Rice Avenue with landscaped buffers between sidewalks and through lanes of travel. This will provide adequate buffer space between pedestrians and vehicles to provide improved safety for pedestrians.
4. It is estimated that a total of 735 parking spaces (combined in the parking garage and surface parking lot) is required to accommodate student and staff parking demand at Bellaire High School. It is recommended that parking spaces for students be authorized and alloted using a hang tag system. The most updated site plan shows 705 spaces in the parking garage and 40 spaces in the surface parking lot.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# Appendix A
# Traffic Movement Counts

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

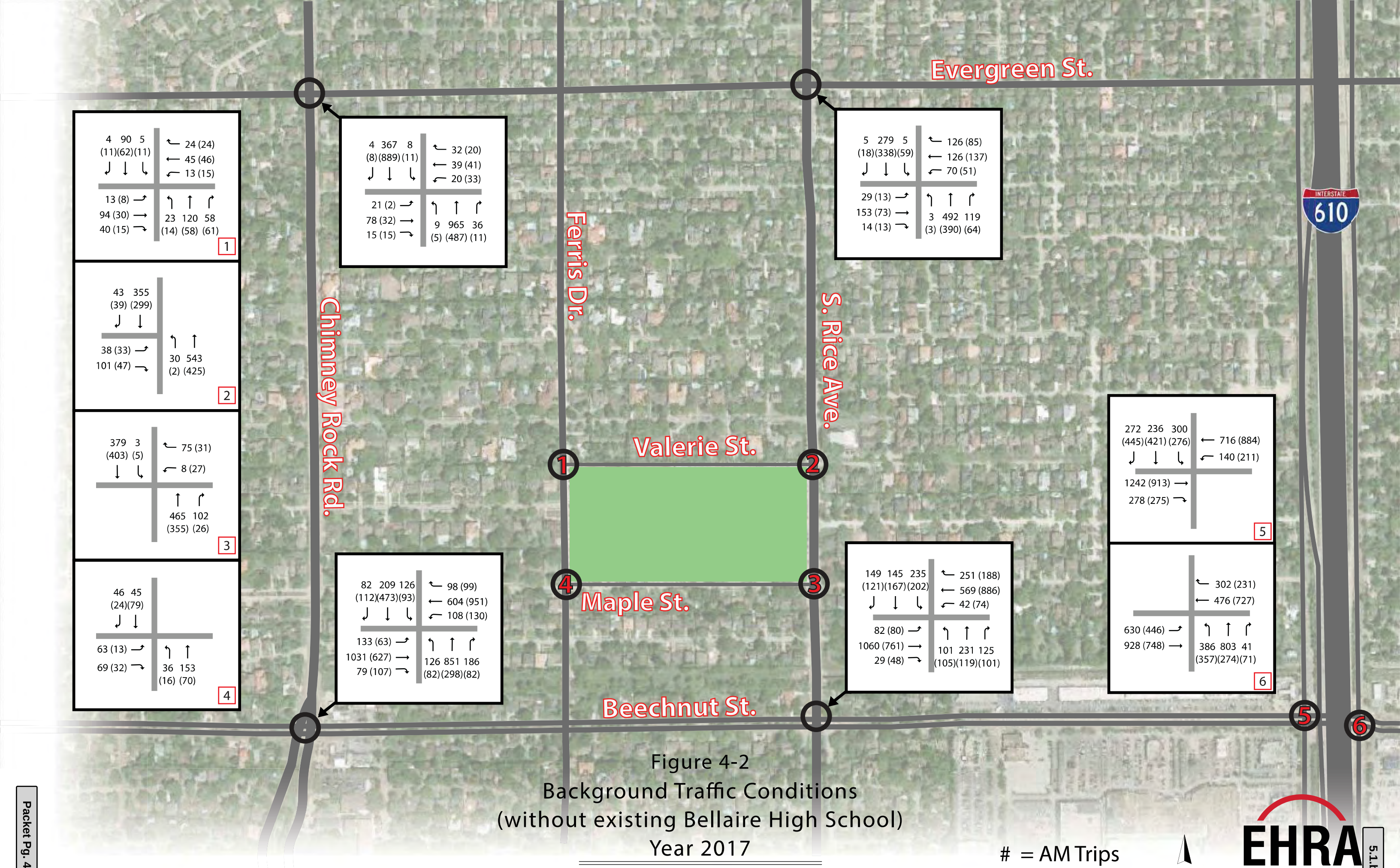



Figure 4-2
Background Traffic Conditions
(without existing Bellaire High School)
Year 2017

# Appendix B
# Build-out Condition without Improvements

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_AMv15.vistro
Report File: E:\...\AM_BHS_Build_out_no_improvements.pdf

Scenario 7 Build out_2021_Without Improvements
6/28/2017

**Intersection Analysis Summary**

| ID | Intersection Name | Control Type | Method | Worst Mvmt | V/C | Delay (s/veh) | LOS |
|---|---|---|---|---|---|---|---|
| 1 | Maple St at Ferris Dr | All-way stop | HCM 2010 | NB Thru | 0.318 | 9.1 | A |
| 2 | S. Rice Avenue at Maple St | Two-way stop | HCM 2010 | WB Right | 0.264 | 10,000.0 | F |
| 3 | Student Drop-off/Pick-up Drwy at S. Rice | Two-way stop | HCM 2010 | WB Left | 0.000 | 10,000.0 | F |
| 4 | S. Rice Ave at Bus Exit Drwy/Holly Street | Two-way stop | HCM 2010 | WB Left | 0.000 | 10,000.0 | F |
| 5 | Valerie St. at S. Rice Ave | Two-way stop | HCM 2010 | EB Left | 1.516 | 582.3 | F |
| 6 | Valerie St at Ferris Dr | All-way stop | HCM 2010 | NB Left | 0.571 | 13.4 | B |
| 7 | Chimney Rock Rd at Beechnut St | Signalized | HCM 2010 | NB Left | 0.693 | 35.4 | D |
| 8 | Beechnut St at S Rice Ave | Signalized | HCM 2010 | WB Right | 1.054 | 140.3 | F |
| 9 | Beechnut at 610 SB Feeder | Signalized | HCM 2010 | SB Left | 0.933 | 110.5 | F |
| 10 | Beechnut at 610 NB Feeder | Signalized | HCM 2010 | NB Left | 0.746 | 63.5 | E |
| 11 | S. Rice at Evergreen St | Signalized | HCM 2010 | NB Thru | 1.843 | 238.4 | F |
| 12 | Chimney Rock Rd at Evergreen St | Signalized | HCM 2010 | NB Left | 0.666 | 30.6 | C |
| 13 | Maple St at Parking Garage Entrance | Two-way stop | HCM 2010 | WB Right | 0.009 | 0.0 | A |

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 1: Maple St at Ferris Dr**

| | | | |
|---|---|---|---|
| Control Type: | All-way stop | Delay (sec / veh): | 9.1 |
| Analysis Method: | HCM 2010 | Level Of Service: | A |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.318 |

**Intersection Setup**

| Name | Ferris Dr | | | Ferris Dr | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Ferris Dr | | | Ferris Dr | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 36 | 153 | 0 | 0 | 45 | 46 | 63 | 0 | 69 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 36 | 153 | 0 | 0 | 45 | 46 | 63 | 0 | 69 | 0 | 0 | 0 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 12 | 51 | 0 | 0 | 15 | 15 | 21 | 0 | 23 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 48 | 204 | 0 | 0 | 60 | 61 | 84 | 0 | 92 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

**Lanes**

| | | | | |
|---|---|---|---|---|
| Capacity per Entry Lane [veh/h] | 792 | 826 | 788 | 715 |
| Degree of Utilization, x | 0.32 | 0.15 | 0.22 | 0.00 |

**Movement, Approach, & Intersection Results**

| | | | | |
|---|---|---|---|---|
| 95th-Percentile Queue Length [veh] | 1.37 | 0.51 | 0.85 | 0.00 |
| 95th-Percentile Queue Length [ft] | 34.28 | 12.80 | 21.36 | 0.00 |
| Approach Delay [s/veh] | 9.65 | 8.10 | 8.88 | 0.00 |
| Approach LOS | A | A | A | A |
| Intersection Delay [s/veh] | 9.06 | | | |
| Intersection LOS | A | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 2: S. Rice Avenue at Maple St**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 10,000.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.264 |

**Intersection Setup**

| Name | S Rice Ave | | | S. Rice Avenue | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S Rice Ave | | | S. Rice Avenue | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 465 | 102 | 3 | 379 | 0 | 0 | 0 | 0 | 8 | 0 | 75 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 387 | 473 | 0 | 0 | 466 | 322 | 0 | 0 | 0 | 0 | 22 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 387 | 957 | 102 | 3 | 860 | 322 | 0 | 0 | 0 | 8 | 22 | 75 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 129 | 319 | 34 | 1 | 287 | 107 | 0 | 0 | 0 | 3 | 7 | 25 |
| Total Analysis Volume [veh/h] | 516 | 1276 | 136 | 4 | 1147 | 429 | 0 | 0 | 0 | 11 | 29 | 100 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | | |
|---|---|---|---|---|
| Priority Scheme | Free | Free | Stop | Stop |
| Flared Lane | | | No | No |
| Storage Area [veh] | 0 | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | Yes | Yes |
| Number of Storage Spaces in Median | 0 | 0 | 1 | 1 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 1.25 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 |
| d_M, Delay for Movement [s/veh] | 158.40 | 0.00 | 0.00 | 12.58 | 0.00 | 0.00 | 10000.0 | 10000.0 | 15.78 | 10000.0 | 10000.0 | 10000.0 |
| Movement LOS | F | A | A | B | A | A | F | F | C | F | F | F |
| 95th-Percentile Queue Length [veh] | 21.68 | 0.00 | 0.00 | 45.42 | 22.71 | 0.00 | 0.00 | 0.00 | 0.00 | 20.11 | 20.11 | 20.11 |
| 95th-Percentile Queue Length [ft] | 542.10 | 0.00 | 0.00 | 1135.46 | 567.73 | 0.00 | 0.00 | 0.00 | 0.00 | 502.76 | 502.76 | 502.76 |
| d_A, Approach Delay [s/veh] | 42.39 | | | 0.03 | | | 6671.93 | | | 10000.00 | | |
| Approach LOS | E | | | A | | | F | | | F | | |
| d_I, Intersection Delay [s/veh] | 406.19 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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Version 5.00-00

Scenario 7: 7 Build out_2021_Without Improvements
Report File: E:\...\AM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 3: Student Drop-off/Pick-up Drwy at S. Rice**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 10,000.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | S. Rice Avenue | | | S. Rice Ave | | | Drwy | | | Holt St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | No | | | No | | | Yes | | | Yes | | |

**Volumes**

| Name | S. Rice Avenue | | | S. Rice Ave | | | Drwy | | | Holt St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 540 | 0 | 0 | 456 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 473 | 0 | 0 | 333 | 0 | 0 | 0 | 455 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 1035 | 0 | 0 | 807 | 0 | 0 | 0 | 455 | 0 | 0 | 0 |
| Peak Hour Factor | 1.0000 | 0.7500 | 1.0000 | 1.0000 | 0.7500 | 0.7500 | 1.0000 | 1.0000 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 345 | 0 | 0 | 269 | 0 | 0 | 0 | 152 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 0 | 1380 | 0 | 0 | 1076 | 0 | 0 | 0 | 607 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | | |
|---|---|---|---|---|
| Priority Scheme | Free | Free | Stop | Stop |
| Flared Lane | | | | No |
| Storage Area [veh] | 0 | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | No | No |
| Number of Storage Spaces in Median | 0 | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 1.24 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 152.20 | 10000.0 | 0.00 | 14.29 |
| Movement LOS | | A | | | A | A | | | F | F | | B |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 24.30 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 607.44 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 0.00 | | | 0.00 | | | 152.20 | | | 5007.14 | | |
| Approach LOS | A | | | A | | | F | | | F | | |
| d_I, Intersection Delay [s/veh] | 30.16 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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Version 5.00-00

Scenario 7: 7 Build out_2021_Without Improvements
Report File: E:\...\AM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 4: S. Rice Ave at Bus Exit Drwy/Holly Street**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 10,000.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | S. Rice Ave | | | S. Rice Ave | | | Bus Exit Drw | | | Holly Street | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S. Rice Ave | | | S. Rice Ave | | | Bus Exit Drw | | | Holly Street | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 540 | 0 | 0 | 456 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 473 | 0 | 0 | 0 | 322 | 391 | 383 | 0 | 11 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 473 | 562 | 0 | 0 | 796 | 391 | 383 | 0 | 11 | 0 | 0 | 0 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 158 | 187 | 0 | 0 | 265 | 130 | 128 | 0 | 4 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 631 | 749 | 0 | 0 | 1061 | 521 | 511 | 0 | 15 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | | |
|---|---|---|---|---|
| Priority Scheme | Free | Free | Stop | Stop |
| Flared Lane | | | | No |
| Storage Area [veh] | 0 | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | Yes | Yes |
| Number of Storage Spaces in Median | 0 | 0 | 1 | 1 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 1.53 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh] | 276.39 | 0.00 | 0.00 | 9.21 | 0.00 | 0.00 | 10000.0 | 0.00 | 16.34 | 10000.0 | 10000.0 | 10.78 |
| Movement LOS | F | A | A | A | A | A | F | | C | F | F | B |
| 95th-Percentile Queue Length [veh] | 41.08 | 20.54 | 0.00 | 0.00 | 0.00 | 0.00 | 66.75 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 1027.11 | 513.55 | 0.00 | 0.00 | 0.00 | 0.00 | 1668.65 | 0.00 | 3.53 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 126.38 | | | 0.00 | | | 9715.29 | | | 6670.26 | | |
| Approach LOS | F | | | A | | | F | | | F | | |
| d_I, Intersection Delay [s/veh] | 1515.09 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 5: Valerie St. at S. Rice Ave**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 582.3 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 1.516 |

**Intersection Setup**

| Name | S. Rice Ave | | S. Rice Ave | | Valerie St | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Eastbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Thru | Thru | Right | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | S. Rice Ave | | S. Rice Ave | | Valerie St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 30 | 543 | 355 | 43 | 38 | 101 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 383 | 713 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 30 | 948 | 1082 | 43 | 38 | 101 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 10 | 316 | 361 | 14 | 13 | 34 |
| Total Analysis Volume [veh/h] | 40 | 1264 | 1443 | 57 | 51 | 135 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Free | Free | Stop |
| Flared Lane | | | No |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | No |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.09 | 0.01 | 0.01 | 0.00 | 1.52 | 0.38 |
| d_M, Delay for Movement [s/veh] | 13.93 | 0.00 | 0.00 | 0.00 | 582.35 | 485.54 |
| Movement LOS | B | A | A | A | F | F |
| 95th-Percentile Queue Length [veh] | 33.45 | 16.73 | 0.00 | 0.00 | 15.50 | 15.50 |
| 95th-Percentile Queue Length [ft] | 836.26 | 418.13 | 0.00 | 0.00 | 387.40 | 387.40 |
| d_A, Approach Delay [s/veh] | 0.43 | | 0.00 | | 512.08 | |
| Approach LOS | A | | A | | F | |
| d_I, Intersection Delay [s/veh] | 32.04 | | | | | |
| Intersection LOS | F | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 6: Valerie St at Ferris Dr**

| | | | |
|---|---|---|---|
| Control Type: | All-way stop | Delay (sec / veh): | 13.4 |
| Analysis Method: | HCM 2010 | Level Of Service: | B |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.571 |

**Intersection Setup**

| Name | Ferris Dr | | | Ferris Dr | | | Valerie St | | | Valerie St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | No | | | No | | | No | | | No | | |

**Volumes**

| Name | Ferris Dr | | | Ferris Dr | | | Valerie St | | | Valerie St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 30 | 543 | 0 | 5 | 90 | 4 | 13 | 94 | 40 | 13 | 45 | 24 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 30 | 543 | 0 | 5 | 90 | 4 | 13 | 94 | 40 | 13 | 45 | 24 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 10 | 181 | 0 | 2 | 30 | 1 | 4 | 31 | 13 | 4 | 15 | 8 |
| Total Analysis Volume [veh/h] | 40 | 724 | 0 | 7 | 120 | 5 | 17 | 125 | 53 | 17 | 60 | 32 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

**Lanes**

| | | | | | |
|---|---|---|---|---|---|
| Capacity per Entry Lane [veh/h] | 670 | 676 | 616 | 613 | 592 |
| Degree of Utilization, x | 0.57 | 0.56 | 0.21 | 0.32 | 0.18 |

**Movement, Approach, & Intersection Results**

| | | | | | |
|---|---|---|---|---|---|
| 95th-Percentile Queue Length [veh] | 3.62 | 3.55 | 0.81 | 1.37 | 0.67 |
| 95th-Percentile Queue Length [ft] | 90.52 | 88.81 | 20.18 | 34.16 | 16.73 |
| Approach Delay [s/veh] | 14.84 | | 10.43 | 11.61 | 10.44 |
| Approach LOS | B | | B | B | B |
| Intersection Delay [s/veh] | 13.43 | | | | |
| Intersection LOS | B | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 7: 7 Build out_2021_Without Improvements
Report File: E:\...\AM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 7: Chimney Rock Rd at Beechnut St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 35.4 |
| Analysis Method: | HCM 2010 | Level Of Service: | D |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.693 |

**Intersection Setup**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration |  | | |  | | |  | | |  | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 126 | 851 | 186 | 126 | 209 | 82 | 133 | 103 | 79 | 108 | 604 | 98 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 127 | 0 | 0 | 0 | 0 | 63 | 0 | 83 | 41 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 131 | 885 | 320 | 131 | 217 | 85 | 138 | 170 | 82 | 195 | 669 | 102 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 37 | 251 | 91 | 37 | 62 | 24 | 39 | 48 | 23 | 55 | 190 | 29 |
| Total Analysis Volume [veh/h] | 149 | 1006 | 364 | 149 | 247 | 97 | 157 | 193 | 93 | 222 | 760 | 116 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 1 | 6 | 0 | 5 | 2 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 5 | 40 | 0 | 5 | 40 | 0 | 40 | 40 | 0 | 40 | 40 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 22 | 23 | 0 | 22 | 23 | 0 | 11 | 42 | 0 | 33 | 64 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | Yes | No | | No | No | | No | No | |
| Maximum Recall | No | No | | No | No | | No | No | | No | No | |
| Pedestrian Recall | No | No | | No | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | R | L | C | C | R | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 2.00 | 2.00 | 0.00 | 0.00 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 0.00 | 2.00 | 2.00 | 2.00 | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 5 | 29 | 20 | 20 | 5 | 29 | 20 | 20 | 8 | 17 | 17 | 11 | 20 | 20 |
| g / C, Green / Cycle | 0.07 | 0.42 | 0.29 | 0.29 | 0.07 | 0.42 | 0.29 | 0.29 | 0.11 | 0.25 | 0.25 | 0.16 | 0.29 | 0.29 |
| (v / s)_i Volume / Saturation Flow Rate | 0.13 | 0.23 | 0.19 | 0.23 | 0.13 | 0.19 | 0.08 | 0.06 | 0.09 | 0.08 | 0.08 | 0.13 | 0.24 | 0.24 |
| s, saturation flow rate [veh/h] | 1128 | 1736 | 3227 | 1583 | 558 | 399 | 3227 | 1583 | 1774 | 1863 | 1664 | 1774 | 1863 | 1778 |
| c, Capacity [veh/h] | 104 | 802 | 950 | 466 | 104 | 331 | 950 | 466 | 204 | 460 | 411 | 277 | 536 | 512 |
| d1, Uniform Delay [s] | 34.69 | 14.28 | 21.29 | 22.43 | 34.69 | 12.98 | 18.70 | 18.40 | 29.81 | 21.38 | 21.44 | 28.25 | 23.16 | 23.17 |
| k, delay calibration | 0.50 | 0.50 | 0.11 | 0.11 | 0.50 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 242.3 | 2.18 | 0.73 | 2.89 | 34.67 | 0.34 | 0.14 | 0.22 | 6.02 | 0.40 | 0.47 | 5.38 | 3.51 | 3.69 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.44 | 0.50 | 0.64 | 0.78 | 0.72 | 0.22 | 0.26 | 0.21 | 0.77 | 0.32 | 0.33 | 0.80 | 0.84 | 0.84 |
| d, Delay for Lane Group [s/veh] | 277.0 | 16.47 | 22.01 | 25.32 | 69.37 | 13.32 | 18.85 | 18.62 | 35.83 | 21.78 | 21.92 | 33.62 | 26.67 | 26.86 |
| Lane Group LOS | F | B | C | C | E | B | B | B | D | C | C | C | C | C |
| Critical Lane Group | No | No | No | Yes | Yes | No | No | No | Yes | No | No | No | No | Yes |
| 50th-Percentile Queue Length [veh] | 8.84 | 4.62 | 4.10 | 5.42 | 2.33 | 0.72 | 1.45 | 1.13 | 2.78 | 1.93 | 1.79 | 3.80 | 6.90 | 6.62 |
| 50th-Percentile Queue Length [ft] | 220.9 | 115.5 | 102.5 | 135.5 | 58.20 | 17.98 | 36.19 | 28.31 | 69.38 | 48.16 | 44.71 | 94.98 | 172.51 | 165.41 |
| 95th-Percentile Queue Length [veh] | 15.17 | 8.14 | 7.38 | 9.24 | 4.19 | 1.29 | 2.61 | 2.04 | 5.00 | 3.47 | 3.22 | 6.84 | 11.21 | 10.83 |
| 95th-Percentile Queue Length [ft] | 379.2 | 203.6 | 184.6 | 231.0 | 104.7 | 32.37 | 65.14 | 50.95 | 124.88 | 86.69 | 80.48 | 170.97 | 280.21 | 270.87 |

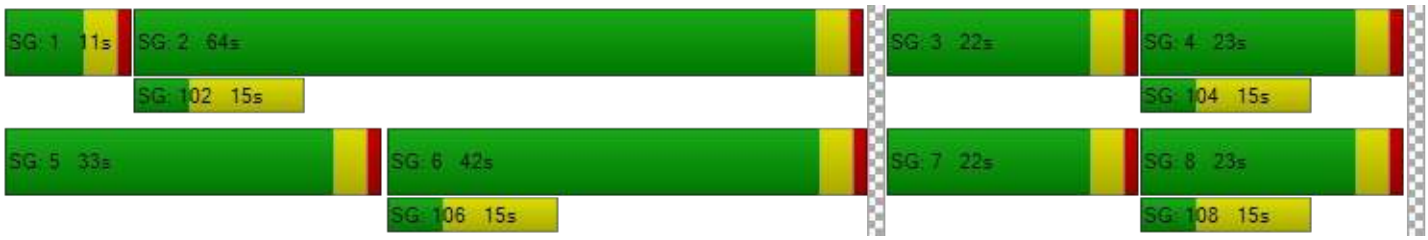
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 277.05 | 19.82 | 25.32 | 50.56 | 18.85 | 18.62 | 35.83 | 21.82 | 21.92 | 33.62 | 26.75 | 26.86 |
| Movement LOS | F | B | C | D | B | B | D | C | C | C | C | C |
| d_A, Approach Delay [s/veh] | 46.37 | | | 25.60 | | | 26.80 | | | 28.15 | | |
| Approach LOS | D | | | C | | | C | | | C | | |
| d_I, Intersection Delay [s/veh] | 35.42 | | | | | | | | | | | |
| Intersection LOS | D | | | | | | | | | | | |
| Intersection V/C | 0.693 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 8: Beechnut St at S Rice Ave**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 140.3 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 1.054 |

**Intersection Setup**

| Name | S Rice Ave | | | S Rice Ave | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 150.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S Rice Ave | | | S Rice Ave | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 101 | 231 | 125 | 235 | 145 | 149 | 82 | 1060 | 29 | 42 | 569 | 251 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 418 | 0 | 165 | 177 | 124 | 190 | 0 | 0 | 0 | 0 | 252 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 105 | 658 | 130 | 409 | 328 | 279 | 275 | 1102 | 30 | 44 | 592 | 513 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 30 | 187 | 37 | 116 | 93 | 79 | 78 | 313 | 9 | 13 | 168 | 146 |
| Total Analysis Volume [veh/h] | 119 | 748 | 148 | 465 | 373 | 317 | 313 | 1252 | 34 | 50 | 673 | 583 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 1 | 6 | 0 | 5 | 2 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 40 | 40 | 0 | 40 | 40 | 0 | 40 | 40 | 0 | 40 | 40 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 12 | 21 | 0 | 22 | 31 | 0 | 17 | 53 | 0 | 24 | 60 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | No | No | | No | No | | No | No | |
| Maximum Recall | No | No | | No | No | | No | No | | No | No | |
| Pedestrian Recall | No | No | | No | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 13 | 40 | 40 | 40 | 67 | 67 | 32 | 65 | 65 | 6 | 40 | 40 |
| g / C, Green / Cycle | 0.08 | 0.24 | 0.24 | 0.24 | 0.40 | 0.40 | 0.19 | 0.39 | 0.39 | 0.04 | 0.24 | 0.24 |
| (v / s)_i Volume / Saturation Flow Rate | 0.07 | 0.25 | 0.25 | 0.26 | 0.20 | 0.20 | 0.18 | 0.35 | 0.35 | 0.03 | 0.36 | 0.37 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1757 | 1774 | 1863 | 1584 | 1774 | 1863 | 1845 | 1774 | 1863 | 1583 |
| c, Capacity [veh/h] | 140 | 445 | 420 | 423 | 742 | 631 | 334 | 728 | 721 | 64 | 445 | 378 |
| d1, Uniform Delay [s] | 76.12 | 63.73 | 63.73 | 63.74 | 37.87 | 37.92 | 66.98 | 47.51 | 47.61 | 80.00 | 63.71 | 63.71 |
| k, delay calibration | 0.11 | 0.49 | 0.49 | 0.50 | 0.34 | 0.34 | 0.27 | 0.50 | 0.50 | 0.11 | 0.50 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 13.13 | 52.04 | 53.32 | 73.18 | 1.65 | 1.97 | 23.51 | 14.86 | 15.31 | 17.78 | 241.89 | 256.41 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 0.85 | 1.04 | 1.04 | 1.10 | 0.50 | 0.50 | 0.94 | 0.89 | 0.89 | 0.78 | 1.51 | 1.54 |
| d, Delay for Lane Group [s/veh] | 89.25 | 115.77 | 117.05 | 136.92 | 39.51 | 39.89 | 90.50 | 62.37 | 62.91 | 97.78 | 305.61 | 320.13 |
| Lane Group LOS | F | F | F | F | D | D | F | E | E | F | F | F |
| Critical Lane Group | No | No | Yes | Yes | No | No | Yes | No | No | No | No | Yes |
| 50th-Percentile Queue Length [veh] | 5.61 | 25.44 | 24.15 | 26.69 | 12.02 | 10.34 | 15.44 | 28.11 | 28.09 | 2.48 | 48.93 | 43.12 |
| 50th-Percentile Queue Length [ft] | 140.24 | 636.02 | 603.73 | 667.33 | 300.41 | 258.54 | 385.95 | 702.82 | 702.22 | 61.93 | 1223.26 | 1077.91 |
| 95th-Percentile Queue Length [veh] | 9.49 | 34.47 | 32.93 | 37.18 | 17.70 | 15.62 | 21.88 | 36.81 | 36.78 | 4.46 | 73.61 | 65.89 |
| 95th-Percentile Queue Length [ft] | 237.34 | 861.77 | 823.26 | 929.52 | 442.54 | 390.39 | 547.04 | 920.21 | 919.51 | 111.47 | 1840.31 | 1647.30 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 89.25 | 116.26 | 117.05 | 136.92 | 39.51 | 39.89 | 90.50 | 62.63 | 62.91 | 97.78 | 305.61 | 320.13 |
| Movement LOS | F | F | F | F | D | D | F | E | E | F | F | F |
| d_A, Approach Delay [s/veh] | 113.21 | | | 78.83 | | | 68.09 | | | 304.13 | | |
| Approach LOS | F | | | E | | | E | | | F | | |
| d_I, Intersection Delay [s/veh] | 140.30 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 1.054 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 7: 7 Build out_2021_Without Improvements
Report File: E:\...\AM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 9: Beechnut at 610 SB Feeder**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 110.5 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.933 |

**Intersection Setup**

| Name | 610 SB Feeder | | | 610 SB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | 610 SB Feeder | | | 610 SB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 0 | 300 | 236 | 272 | 0 | 1242 | 278 | 140 | 716 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.04 | 1.04 | 1.04 | 1.00 | 1.04 | 1.04 | 1.04 | 1.04 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 124 | 41 | 0 | 252 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 0 | 0 | 312 | 245 | 283 | 0 | 1416 | 330 | 146 | 997 | 0 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 0 | 0 | 78 | 61 | 71 | 0 | 354 | 83 | 37 | 249 | 0 |
| Total Analysis Volume [veh/h] | 0 | 0 | 0 | 312 | 245 | 283 | 0 | 1416 | 330 | 146 | 997 | 0 |
| Presence of On-Street Parking | | | | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Permiss | Permiss | Permiss | Protecte | Overlap | Permiss | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 0 | 0 | 3 | 4 | 0 | 0 | 2 | 0 | 3 | 1 | 0 |
| Auxiliary Signal Groups | | | | | 3,4 | | | | | | | |
| Lead / Lag | - | - | - | Lead | - | - | - | - | - | Lead | - | - |
| Minimum Green [s] | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 0 | 0 | 0 | 5 | 30 | 0 | 0 | 30 | 0 | 5 | 30 | 0 |
| Amber [s] | 0.0 | 0.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 0 | 0 | 0 | 31 | 21 | 0 | 0 | 49 | 0 | 31 | 19 | 0 |
| Vehicle Extension [s] | 0.0 | 0.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 0.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 0.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | | | | Yes | No | | | No | | | No | |
| Maximum Recall | | | | No | No | | | No | | | No | |
| Pedestrian Recall | | | | No | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | | L | C | C | R | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 |
| L, Total Lost Time per Cycle [s] | | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | | 2.00 | 0.00 | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | | 5 | 25 | 25 | 16 | 30 | 30 | 30 | 30 | 30 |
| g / C, Green / Cycle | | 0.05 | 0.26 | 0.26 | 0.16 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 |
| (v / s)_i Volume / Saturation Flow Rate | | 0.12 | 0.12 | 0.12 | 0.12 | 0.33 | 0.34 | 0.08 | 0.34 | 0.21 |
| s, saturation flow rate [veh/h] | | 1774 | 1826 | 1573 | 1583 | 3547 | 1693 | 1774 | 1863 | 1695 |
| c, Capacity [veh/h] | | 92 | 467 | 403 | 258 | 1099 | 525 | 551 | 578 | 526 |
| d1, Uniform Delay [s] | | 46.76 | 34.39 | 34.40 | 41.35 | 38.42 | 38.42 | 29.14 | 38.40 | 34.10 |
| k, delay calibration | | 0.50 | 0.11 | 0.11 | 0.11 | 0.11 | 0.50 | 0.11 | 0.50 | 0.22 |
| I, Upstream Filtering Factor | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | | 665.1 | 0.78 | 0.91 | 4.67 | 32.03 | 72.82 | 0.25 | 66.44 | 3.34 |
| d3, Initial Queue Delay [s] | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 |
| PF, progression factor | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | | 2.41 | 0.49 | 0.49 | 0.76 | 1.06 | 1.11 | 0.27 | 1.10 | 0.69 |
| d, Delay for Lane Group [s/veh] | | 711.9 | 35.17 | 35.31 | 46.02 | 70.45 | 111.24 | 29.39 | 104.85 | 37.44 |
| Lane Group LOS | | F | D | D | D | F | F | C | F | D |
| Critical Lane Group | | Yes | No | No | Yes | No | Yes | No | Yes | No |
| 50th-Percentile Queue Length [veh] | | 19.15 | 5.12 | 4.43 | 5.07 | 18.31 | 23.43 | 2.94 | 24.81 | 8.70 |
| 50th-Percentile Queue Length [ft] | | 478.7 | 128.1 | 110.8 | 126.8 | 457.87 | 585.80 | 73.53 | 620.13 | 217.62 |
| 95th-Percentile Queue Length [veh] | | 30.90 | 8.84 | 7.89 | 8.77 | 26.28 | 33.49 | 5.29 | 34.97 | 13.54 |
| 95th-Percentile Queue Length [ft] | | 772.4 | 220.9 | 197.2 | 219.1 | 656.90 | 837.17 | 132.35 | 874.22 | 338.59 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 486.44 | 35.23 | 43.27 | 0.00 | 77.71 | 111.24 | 29.39 | 80.29 | 0.00 |
| Movement LOS | | | | F | D | D | | E | F | C | F | |
| d_A, Approach Delay [s/veh] | 0.00 | | | 215.37 | | | 84.04 | | | 73.79 | | |
| Approach LOS | A | | | F | | | F | | | E | | |
| d_I, Intersection Delay [s/veh] | 110.48 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 0.933 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 4 | - | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 5 | - | 6 | 8 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 7: 7 Build out_2021_Without Improvements
Report File: E:\...\AM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 10: Beechnut at 610 NB Feeder**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 63.5 |
| Analysis Method: | HCM 2010 | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.746 |

**Intersection Setup**

| Name | 610 NB Feeder | | | 610 NB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | 610 NB Feeder | | | 610 NB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 357 | 274 | 71 | 0 | 0 | 0 | 630 | 928 | 0 | 0 | 476 | 302 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 63 | 0 | 0 | 0 | 0 | 0 | 0 | 124 | 0 | 0 | 189 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 434 | 285 | 74 | 0 | 0 | 0 | 655 | 1089 | 0 | 0 | 684 | 314 |
| Peak Hour Factor | 0.9100 | 0.9100 | 0.9100 | 1.0000 | 1.0000 | 1.0000 | 0.9100 | 0.9100 | 1.0000 | 1.0000 | 0.9100 | 0.9100 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 119 | 78 | 20 | 0 | 0 | 0 | 180 | 299 | 0 | 0 | 188 | 86 |
| Total Analysis Volume [veh/h] | 477 | 313 | 81 | 0 | 0 | 0 | 720 | 1197 | 0 | 0 | 752 | 345 |
| Presence of On-Street Parking | No | | No | | | | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Overlap | Permiss | Permiss | Permiss | Permiss | Split | Split | Permiss | Permiss | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 7 | 8 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | 7,8 | | | | | | | | | | |
| Lead / Lag | Lag | - | - | - | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 5 | 30 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 25 | 31 | 0 | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 19 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 10 | 10 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | | | | | No | | | No | |
| Maximum Recall | No | No | | | | | | No | | | No | |
| Pedestrian Recall | No | No | | | | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | C | | L | C | C | C | C |
|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 77 | 77 | 77 | 77 | | 77 | 77 | 77 | 77 | 77 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 0.00 | 0.00 | 0.00 | | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 5 | 39 | 39 | 39 | | 30 | 30 | 30 | 21 | 21 |
| g / C, Green / Cycle | 0.06 | 0.51 | 0.51 | 0.51 | | 0.39 | 0.39 | 0.39 | 0.28 | 0.28 |
| (v / s)_i Volume / Saturation Flow Rate | 0.13 | 0.13 | 0.12 | 0.12 | | 0.37 | 0.36 | 0.35 | 0.21 | 0.23 |
| s, saturation flow rate [veh/h] | 1774 | 1774 | 1695 | 1577 | | 1774 | 1854 | 1695 | 3547 | 1597 |
| c, Capacity [veh/h] | 115 | 903 | 863 | 803 | | 688 | 719 | 657 | 977 | 440 |
| d1, Uniform Delay [s] | 36.18 | 10.78 | 10.60 | 10.62 | | 23.05 | 22.51 | 22.46 | 25.58 | 26.33 |
| k, delay calibration | 0.50 | 0.50 | 0.50 | 0.50 | | 0.42 | 0.39 | 0.39 | 0.11 | 0.15 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 510.2 | 0.71 | 0.64 | 0.70 | | 22.37 | 15.34 | 15.87 | 1.17 | 5.62 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 2.07 | 0.26 | 0.24 | 0.24 | | 0.96 | 0.92 | 0.91 | 0.75 | 0.83 |
| d, Delay for Lane Group [s/veh] | 546.4 | 11.49 | 11.24 | 11.32 | | 45.42 | 37.85 | 38.32 | 26.75 | 31.96 |
| Lane Group LOS | F | B | B | B | | D | D | D | C | C |
| Critical Lane Group | Yes | Yes | No | No | | Yes | No | No | No | Yes |
| 50th-Percentile Queue Length [veh] | 18.44 | 2.29 | 1.92 | 1.82 | | 14.98 | 13.55 | 12.42 | 6.00 | 6.70 |
| 50th-Percentile Queue Length [ft] | 461.1 | 57.30 | 48.04 | 45.56 | | 374.62 | 338.81 | 310.52 | 149.95 | 167.47 |
| 95th-Percentile Queue Length [veh] | 29.95 | 4.13 | 3.46 | 3.28 | | 21.33 | 19.59 | 18.20 | 10.01 | 10.94 |
| 95th-Percentile Queue Length [ft] | 748.6 | 103.1 | 86.48 | 82.00 | | 533.34 | 489.75 | 455.02 | 250.36 | 273.58 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 278.95 | 11.27 | 11.32 | 0.00 | 0.00 | 0.00 | 44.56 | 38.09 | 0.00 | 0.00 | 26.89 | 31.96 |
| Movement LOS | F | B | B | | | | D | D | | | C | C |
| d_A, Approach Delay [s/veh] | 157.87 | | | 0.00 | | | 40.59 | | | 28.48 | | |
| Approach LOS | F | | | A | | | D | | | C | | |
| d_I, Intersection Delay [s/veh] | 63.47 | | | | | | | | | | | |
| Intersection LOS | E | | | | | | | | | | | |
| Intersection V/C | 0.746 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 4 | - | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 5 | - | 6 | 8 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 7: 7 Build out_2021_Without Improvements
Report File: E:\...\AM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 11: S. Rice at Evergreen St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 238.4 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 1.843 |

**Intersection Setup**

| Name | S. Rice Ave | | | S. Rice Ave | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S. Rice Ave | | | S. Rice Ave | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 3 | 492 | 119 | 5 | 279 | 5 | 29 | 153 | 14 | 70 | 126 | 126 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 124 | 135 | 124 | 0 | 355 | 0 | 0 | 0 | 190 | 168 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 127 | 647 | 248 | 5 | 645 | 5 | 30 | 159 | 205 | 241 | 131 | 131 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 36 | 184 | 70 | 1 | 183 | 1 | 9 | 45 | 58 | 68 | 37 | 37 |
| Total Analysis Volume [veh/h] | 144 | 735 | 282 | 6 | 733 | 6 | 34 | 181 | 233 | 274 | 149 | 149 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 8 | 0 | 0 | 4 | 0 | 0 | 2 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | - | - | - | - | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 0 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 0 | 23 | 0 | 0 | 23 | 0 | 0 | 23 | 0 | 0 | 74 | 0 |
| Vehicle Extension [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | | No | | | No | | | No | | | No | |
| Maximum Recall | | No | | | No | | | No | | | No | |
| Pedestrian Recall | | No | | | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | C | C | C | C | C | C |
|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 100 | 100 | 100 | 100 | 100 | 100 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 2.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 30 | 30 | 30 | 30 | 28 | 30 |
| g / C, Green / Cycle | 0.30 | 0.30 | 0.30 | 0.30 | 0.28 | 0.30 |
| (v / s)_i Volume / Saturation Flow Rate | 1.25 | 0.63 | 0.25 | 0.25 | 0.26 | 0.33 |
| s, saturation flow rate [veh/h] | 115 | 1616 | 1288 | 1691 | 1700 | 1741 |
| c, Capacity [veh/h] | 107 | 485 | 423 | 507 | 475 | 523 |
| d1, Uniform Delay [s] | 49.14 | 34.94 | 30.01 | 32.62 | 35.18 | 34.93 |
| k, delay calibration | 0.50 | 0.50 | 0.33 | 0.33 | 0.36 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 207.12 | 501.15 | 8.25 | 10.26 | 23.46 | 67.48 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| X, volume / capacity | 1.35 | 2.10 | 0.76 | 0.83 | 0.94 | 1.09 |
| d, Delay for Lane Group [s/veh] | 256.26 | 536.10 | 38.26 | 42.88 | 58.64 | 102.41 |
| Lane Group LOS | F | F | D | D | E | F |
| Critical Lane Group | Yes | No | No | No | Yes | Yes |
| 50th-Percentile Queue Length [veh] | 8.79 | 78.94 | 7.42 | 10.78 | 13.50 | 22.16 |
| 50th-Percentile Queue Length [ft] | 219.73 | 1973.48 | 185.45 | 269.47 | 337.57 | 554.10 |
| 95th-Percentile Queue Length [veh] | 15.66 | 125.37 | 11.88 | 16.16 | 19.53 | 31.61 |
| 95th-Percentile Queue Length [ft] | 391.53 | 3134.15 | 297.12 | 404.08 | 488.23 | 790.30 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 256.26 | 536.10 | 536.10 | 38.26 | 40.89 | 42.88 | 58.64 | 58.64 | 58.64 | 102.41 | 102.41 | 102.41 |
| Movement LOS | F | F | F | D | D | D | E | E | E | F | F | F |
| d_A, Approach Delay [s/veh] | 501.39 | | | 40.88 | | | 58.64 | | | 102.41 | | |
| Approach LOS | F | | | D | | | E | | | F | | |
| d_I, Intersection Delay [s/veh] | 238.35 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 1.843 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 6 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 12: Chimney Rock Rd at Evergreen St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 30.6 |
| Analysis Method: | HCM 2010 | Level Of Service: | C |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.666 |

**Intersection Setup**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 215.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 9 | 965 | 36 | 8 | 367 | 4 | 21 | 78 | 15 | 20 | 39 | 32 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 127 | 0 | 0 | 0 | 63 | 0 | 0 | 41 | 83 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 9 | 1004 | 37 | 135 | 382 | 4 | 22 | 144 | 16 | 21 | 82 | 116 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 3 | 285 | 11 | 38 | 109 | 1 | 6 | 41 | 5 | 6 | 23 | 33 |
| Total Analysis Volume [veh/h] | 10 | 1141 | 42 | 153 | 434 | 5 | 25 | 164 | 18 | 24 | 93 | 132 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 0 | 2 | 0 | 0 | 1 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 30 | 30 | 0 | 30 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 51 | 71 | 0 | 9 | 29 | 0 | 0 | 21 | 0 | 0 | 19 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | No | No | | No | No | | | No | | | No | |
| Maximum Recall | No | No | | No | No | | | No | | | No | |
| Pedestrian Recall | No | No | | No | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | C | C |
|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 1 | 26 | 26 | 8 | 34 | 34 | 10 | 13 |
| g / C, Green / Cycle | 0.01 | 0.36 | 0.36 | 0.11 | 0.45 | 0.45 | 0.14 | 0.18 |
| (v / s)_i Volume / Saturation Flow Rate | 0.01 | 0.32 | 0.32 | 0.09 | 0.12 | 0.12 | 0.11 | 0.15 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1840 | 1774 | 1863 | 1855 | 1824 | 1696 |
| c, Capacity [veh/h] | 22 | 663 | 655 | 196 | 846 | 843 | 258 | 299 |
| d1, Uniform Delay [s] | 36.34 | 22.59 | 22.59 | 32.08 | 12.52 | 12.52 | 30.84 | 29.49 |
| k, delay calibration | 0.11 | 0.30 | 0.30 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 13.26 | 11.27 | 11.45 | 6.53 | 0.16 | 0.16 | 5.79 | 6.04 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 0.45 | 0.90 | 0.90 | 0.78 | 0.26 | 0.26 | 0.80 | 0.83 |
| d, Delay for Lane Group [s/veh] | 49.60 | 33.86 | 34.05 | 38.61 | 12.68 | 12.68 | 36.62 | 35.54 |
| Lane Group LOS | D | C | C | D | B | B | D | D |
| Critical Lane Group | No | No | Yes | Yes | No | No | Yes | Yes |
| 50th-Percentile Queue Length [veh] | 0.26 | 11.13 | 11.03 | 2.93 | 2.12 | 2.11 | 3.86 | 4.60 |
| 50th-Percentile Queue Length [ft] | 6.44 | 278.20 | 275.76 | 73.36 | 52.91 | 52.74 | 96.56 | 115.06 |
| 95th-Percentile Queue Length [veh] | 0.46 | 16.60 | 16.48 | 5.28 | 3.81 | 3.80 | 6.95 | 8.12 |
| 95th-Percentile Queue Length [ft] | 11.59 | 414.97 | 411.93 | 132.04 | 95.24 | 94.93 | 173.81 | 203.02 |

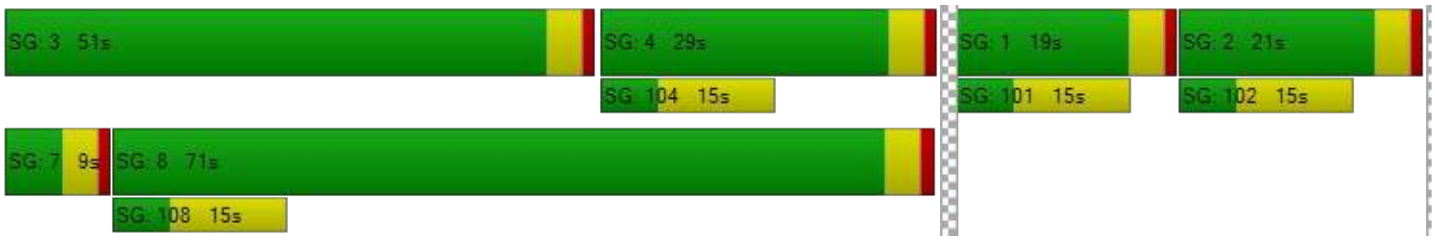
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 49.60 | 33.95 | 34.05 | 38.61 | 12.68 | 12.68 | 36.62 | 36.62 | 36.62 | 35.54 | 35.54 | 35.54 |
| Movement LOS | D | C | C | D | B | B | D | D | D | D | D | D |
| d_A, Approach Delay [s/veh] | 34.08 | | | 19.39 | | | 36.62 | | | 35.54 | | |
| Approach LOS | C | | | B | | | D | | | D | | |
| d_I, Intersection Delay [s/veh] | 30.60 | | | | | | | | | | | |
| Intersection LOS | C | | | | | | | | | | | |
| Intersection V/C | 0.666 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 3 | 4 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 8 | 7 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 7: 7 Build out_2021_Without Improvements
Report File: E:\...\AM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 13: Maple St at Parking Garage Entrance**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 0.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | A |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.009 |

**Intersection Setup**

| Name | Parking Garage Driveway | | Maple St | | Maple St | |
|---|---|---|---|---|---|---|
| Approach | Southbound | | Eastbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Right | Left | Thru | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | Yes | | Yes | | Yes | |

**Volumes**

| Name | Parking Garage Driveway | | Maple St | | Maple St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 22 | 710 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 0 | 0 | 0 | 22 | 710 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 0 | 0 | 0 | 7 | 237 |
| Total Analysis Volume [veh/h] | 0 | 0 | 0 | 0 | 29 | 947 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Stop | Free | Free |
| Flared Lane | | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS | | | | A | A | A |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.00 | | 0.00 | |
| Approach LOS | A | | A | | A | |
| d_I, Intersection Delay [s/veh] | 0.00 | | | | | |
| Intersection LOS | A | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_AMv15.vistro
Report File: E:\...\AM_BHS_Build_out_no_improvements.pdf

Scenario 7 Build out_2021_Without Improvements
6/28/2017

## Trip Generation summary

### Added Trips

| Zone ID: Name | Land Use variables | Code | Ind. Var. | Rate | Quantity | % In | % Out | Trips In | Trips Out | Total Trips | % of Total Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1: zone | Student | Parking Garage | | 1.000 | 0.000 | 50.00 | 50.00 | 435 | 0 | 435 | 17.81 |
| 2: zone | Parents | Student drop-off/pick-up driveway | | 1.000 | 0.000 | 50.00 | 50.00 | 827 | 827 | 1654 | 67.70 |
| 17: zone | buses | Bus Loop | | 1.000 | 0.000 | 50.00 | 50.00 | 22 | 22 | 44 | 1.80 |
| 22: zone | staff | Parking at Garage | | 1.000 | 0.000 | 50.00 | 50.00 | 310 | 0 | 310 | 12.69 |
| | | | | | **Added Trips Total** | | | **1594** | **849** | **2443** | **100.00** |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_AMv15.vistro
Report File: E:\...\AM_BHS_Build_out_no_improvements.pdf

Scenario 7 Build out_2021_Without Improvements
6/28/2017

## Trip Distribution summary

| Zone / Gate | Zone 1: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 22: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 15.00 | 65 | 15.00 | 0 |
| 5: Gate | 5.00 | 22 | 5.00 | 0 |
| 6: Gate | 5.00 | 22 | 5.00 | 0 |
| 7: Gate | 10.00 | 44 | 10.00 | 0 |
| 8: Gate | 5.00 | 22 | 5.00 | 0 |
| 9: Gate | 10.00 | 44 | 10.00 | 0 |
| 10: Gate | 5.00 | 22 | 5.00 | 0 |
| 11: Gate | 10.00 | 44 | 10.00 | 0 |
| 12: Gate | 20.00 | 87 | 20.00 | 0 |
| 14: Gate | 15.00 | 65 | 15.00 | 0 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 19: Gate | 0.00 | 0 | 0.00 | 0 |
| 20: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **437** | **100.00** | **0** |

| Zone / Gate | Zone 2: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 22: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 15.00 | 124 | 15.00 | 124 |
| 5: Gate | 5.00 | 41 | 5.00 | 41 |
| 6: Gate | 5.00 | 41 | 5.00 | 41 |
| 7: Gate | 10.00 | 83 | 10.00 | 83 |
| 8: Gate | 5.00 | 41 | 5.00 | 41 |
| 9: Gate | 10.00 | 83 | 10.00 | 83 |
| 10: Gate | 5.00 | 41 | 5.00 | 41 |
| 11: Gate | 10.00 | 83 | 10.00 | 83 |
| 12: Gate | 20.00 | 165 | 20.00 | 166 |
| 14: Gate | 15.00 | 124 | 15.00 | 124 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 19: Gate | 0.00 | 0 | 0.00 | 0 |
| 20: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **826** | **100.00** | **827** |

| Zone / Gate | Zone 17: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 22: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 0.00 | 0 | 0.00 | 0 |
| 5: Gate | 0.00 | 0 | 0.00 | 0 |
| 6: Gate | 0.00 | 0 | 0.00 | 0 |
| 7: Gate | 0.00 | 0 | 0.00 | 0 |
| 8: Gate | 0.00 | 0 | 0.00 | 0 |
| 9: Gate | 0.00 | 0 | 0.00 | 0 |
| 10: Gate | 0.00 | 0 | 0.00 | 0 |
| 11: Gate | 0.00 | 0 | 0.00 | 0 |
| 12: Gate | 50.00 | 11 | 50.00 | 11 |
| 14: Gate | 50.00 | 11 | 50.00 | 11 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 19: Gate | 0.00 | 0 | 50.00 | 11 |
| 20: Gate | 0.00 | 0 | 50.00 | 11 |
| **Total** | **100.00** | **22** | **200.00** | **44** |

| Zone / Gate | Zone 22: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 0.00 | 0 | 0.00 | 0 |
| 5: Gate | 0.00 | 0 | 0.00 | 0 |
| 6: Gate | 0.00 | 0 | 0.00 | 0 |
| 7: Gate | 0.00 | 0 | 0.00 | 0 |
| 8: Gate | 0.00 | 0 | 0.00 | 0 |
| 9: Gate | 0.00 | 0 | 0.00 | 0 |
| 10: Gate | 0.00 | 0 | 0.00 | 0 |
| 11: Gate | 0.00 | 0 | 0.00 | 0 |
| 12: Gate | 50.00 | 155 | 50.00 | 0 |
| 14: Gate | 50.00 | 155 | 50.00 | 0 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 19: Gate | 0.00 | 0 | 0.00 | 0 |
| 20: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **310** | **100.00** | **0** |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_PMv15.vistro
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

Scenario 6 Build_out_2021_Without_Improvements
6/28/2017

**Intersection Analysis Summary**

| ID | Intersection Name | Control Type | Method | Worst Mvmt | V/C | Delay (s/veh) | LOS |
|---|---|---|---|---|---|---|---|
| 1 | Maple St at Ferris Dr | All-way stop | HCM 2010 | NB Thru | 0.154 | 7.7 | A |
| 2 | S. Rice Avenue at Maple St | Two-way stop | HCM 2010 | EB Left | 0.880 | 173.8 | F |
| 3 | Student Pick-up/Drop-off Drwy | Two-way stop | HCM 2010 | WB Left | 0.000 | 10,000.0 | F |
| 4 | S. Rice Ave at Bus Exit Drwy/Holly Street | Two-way stop | HCM 2010 | WB Left | 0.000 | 10,000.0 | F |
| 5 | Valerie St. at S. Rice Ave | Two-way stop | HCM 2010 | EB Left | 0.475 | 69.7 | F |
| 6 | Valerie St at Ferris Dr | All-way stop | HCM 2010 | NB Right | 0.209 | 8.3 | A |
| 7 | Chimney Rock Rd at Beechnut St | Signalized | HCM 2010 | SB Left | 0.627 | 23.0 | C |
| 8 | Beechnut St at S Rice Ave | Signalized | HCM 2010 | NB Left | 0.980 | 132.1 | F |
| 9 | Beechnut at 610 SB Feeder | Signalized | HCM 2010 | SB Left | 1.012 | 179.3 | F |
| 10 | Beechnut at 610 NB Feeder | Signalized | HCM 2010 | NB Left | 0.805 | 59.4 | E |
| 11 | S. Rice at Evergreen St | Signalized | HCM 2010 | NB Right | 0.947 | 154.7 | F |
| 12 | Chimney Rock Rd at Evergreen St | Signalized | HCM 2010 | NB Left | 0.516 | 17.7 | B |
| 13 | Maple St at Parking Garage Entrance | Two-way stop | HCM 2010 | WB Thru | 0.000 | 0.0 | A |

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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Scenario 6: 6 Build_out_2021_Without_Improvements
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 1: Maple St at Ferris Dr**

| | | | |
|---|---|---|---|
| Control Type: | All-way stop | Delay (sec / veh): | 7.7 |
| Analysis Method: | HCM 2010 | Level Of Service: | A |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.154 |

**Intersection Setup**

| Name | Ferris Dr | | | Ferris Dr | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Ferris Dr | | | Ferris Dr | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 16 | 70 | 0 | 0 | 79 | 24 | 13 | 0 | 32 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 16 | 70 | 0 | 0 | 79 | 24 | 13 | 0 | 32 | 0 | 0 | 0 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 5 | 23 | 0 | 0 | 26 | 8 | 4 | 0 | 11 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 21 | 93 | 0 | 0 | 105 | 32 | 17 | 0 | 43 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

**Lanes**

| | | | | |
|---|---|---|---|---|
| Capacity per Entry Lane [veh/h] | 850 | 890 | 878 | 793 |
| Degree of Utilization, x | 0.13 | 0.15 | 0.07 | 0.00 |

**Movement, Approach, & Intersection Results**

| | | | | |
|---|---|---|---|---|
| 95th-Percentile Queue Length [veh] | 0.46 | 0.54 | 0.22 | 0.00 |
| 95th-Percentile Queue Length [ft] | 11.56 | 13.56 | 5.49 | 0.00 |
| Approach Delay [s/veh] | 7.89 | 7.78 | 7.40 | 0.00 |
| Approach LOS | A | A | A | A |
| Intersection Delay [s/veh] | 7.75 | | | |
| Intersection LOS | A | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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Version 5.00-00

Scenario 6: 6 Build_out_2021_Without_Improvements
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 2: S. Rice Avenue at Maple St**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 173.8 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.880 |

**Intersection Setup**

| Name | S Rice Ave | | | S. Rice Avenue | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S Rice Ave | | | S. Rice Avenue | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 355 | 26 | 5 | 403 | 0 | 0 | 0 | 0 | 27 | 0 | 31 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 11 | 454 | 0 | 0 | 594 | 11 | 68 | 0 | 69 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 11 | 823 | 26 | 5 | 1013 | 11 | 68 | 0 | 69 | 27 | 0 | 31 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 4 | 274 | 9 | 2 | 338 | 4 | 23 | 0 | 23 | 9 | 0 | 10 |
| Total Analysis Volume [veh/h] | 15 | 1097 | 35 | 7 | 1351 | 15 | 91 | 0 | 92 | 36 | 0 | 41 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | | |
|---|---|---|---|---|
| Priority Scheme | Free | Free | Stop | Stop |
| Flared Lane | | | No | No |
| Storage Area [veh] | 0 | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | Yes | Yes |
| Number of Storage Spaces in Median | 0 | 0 | 1 | 1 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.03 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.88 | 0.00 | 0.23 | 0.34 | 0.00 | 0.09 |
| d_M, Delay for Movement [s/veh] | 12.44 | 0.00 | 0.00 | 10.94 | 0.00 | 0.00 | 173.81 | 170.85 | 148.18 | 53.00 | 51.80 | 26.79 |
| Movement LOS | B | A | A | B | A | A | F | F | F | F | F | D |
| 95th-Percentile Queue Length [veh] | 0.09 | 0.00 | 0.00 | 21.29 | 10.65 | 0.00 | 9.55 | 9.55 | 9.55 | 1.94 | 1.94 | 1.94 |
| 95th-Percentile Queue Length [ft] | 2.32 | 0.00 | 0.00 | 532.29 | 266.15 | 0.00 | 238.73 | 238.73 | 238.73 | 48.55 | 48.55 | 48.55 |
| d_A, Approach Delay [s/veh] | 0.16 | | | 0.06 | | | 160.93 | | | 39.04 | | |
| Approach LOS | A | | | A | | | F | | | E | | |
| d_I, Intersection Delay [s/veh] | 11.77 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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Version 5.00-00

Scenario 6: 6 Build_out_2021_Without_Improvements
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 3: Student Pick-up/Drop-off Drwy**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 10,000.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | S. Rice Avenue | | | S. Rice Avenue | | | Drwy | | | Holt St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | No | | | No | | | Yes | | | Yes | | |

**Volumes**

| Name | S. Rice Avenue | | | S. Rice Avenue | | | Drwy | | | Holt St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 386 | 0 | 0 | 346 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 522 | 0 | 0 | 22 | 0 | 0 | 0 | 583 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 923 | 0 | 0 | 382 | 0 | 0 | 0 | 583 | 0 | 0 | 0 |
| Peak Hour Factor | 1.0000 | 0.7500 | 1.0000 | 1.0000 | 0.7500 | 0.7500 | 1.0000 | 1.0000 | 0.7500 | 0.7500 | 1.0000 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 308 | 0 | 0 | 127 | 0 | 0 | 0 | 194 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 0 | 1231 | 0 | 0 | 509 | 0 | 0 | 0 | 777 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | | |
|---|---|---|---|---|
| Priority Scheme | Free | Free | Stop | Stop |
| Flared Lane | | | | No |
| Storage Area [veh] | 0 | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | No | No |
| Number of Storage Spaces in Median | 0 | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 1.04 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 68.16 | 10000.0 | 0.00 | 13.30 |
| Movement LOS | | A | | | A | A | | | F | F | | B |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 19.20 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 479.95 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 0.00 | | | 0.00 | | | 68.16 | | | 5006.65 | | |
| Approach LOS | A | | | A | | | F | | | F | | |
| d_I, Intersection Delay [s/veh] | 21.04 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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Version 5.00-00

Scenario 6: 6 Build_out_2021_Without_Improvements
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 4: S. Rice Ave at Bus Exit Drwy/Holly Street**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 10,000.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | S. Rice Avenue | | | S. Rice Ave | | | Bus Exit Drwy | | | Holly Street | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | No | | | No | | | No | | |

**Volumes**

| Name | S. Rice Avenue | | | S. Rice Ave | | | Bus Exit Drwy | | | Holly Street | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 427 | 0 | 0 | 346 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 454 | 68 | 0 | 0 | 11 | 372 | 491 | 0 | 11 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 454 | 495 | 0 | 0 | 357 | 372 | 491 | 0 | 11 | 0 | 0 | 0 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 151 | 165 | 0 | 0 | 119 | 124 | 164 | 0 | 4 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 605 | 660 | 0 | 0 | 476 | 496 | 655 | 0 | 15 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| Priority Scheme | Free | Free | Stop | Stop |
|---|---|---|---|---|
| Flared Lane | | | | No |
| Storage Area [veh] | 0 | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | No | No |
| Number of Storage Spaces in Median | 0 | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.86 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh] | 32.88 | 0.00 | 0.00 | 8.90 | 0.00 | 0.00 | 10000.0 | 0.00 | 12.03 | 10000.0 | 10000.0 | 10.41 |
| Movement LOS | D | A | A | A | A | A | F | | B | F | F | B |
| 95th-Percentile Queue Length [veh] | 11.52 | 5.76 | 0.00 | 0.00 | 0.00 | 0.00 | 84.77 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 288.09 | 144.05 | 0.00 | 0.00 | 0.00 | 0.00 | 2119.31 | 0.00 | 2.19 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 15.73 | | | 0.00 | | | 9776.39 | | | 6670.14 | | |
| Approach LOS | C | | | A | | | F | | | F | | |
| d_I, Intersection Delay [s/veh] | 2260.09 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 6: 6 Build_out_2021_Without_Improvements
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 5: Valerie St. at S. Rice Ave**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 69.7 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.475 |

**Intersection Setup**

| Name | S. Rice Ave | | S. Rice Ave | | Valerie St | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Eastbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Thru | Thru | Right | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | S. Rice Ave | | S. Rice Ave | | Valerie St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 2 | 425 | 299 | 39 | 33 | 47 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 559 | 383 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 2 | 1001 | 694 | 39 | 33 | 47 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 1 | 334 | 231 | 13 | 11 | 16 |
| Total Analysis Volume [veh/h] | 3 | 1335 | 925 | 52 | 44 | 63 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Free | Free | Stop |
| Flared Lane | | | No |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | No |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.01 | 0.01 | 0.00 | 0.48 | 0.12 |
| d_M, Delay for Movement [s/veh] | 10.15 | 0.00 | 0.00 | 0.00 | 69.68 | 37.65 |
| Movement LOS | B | A | A | A | F | E |
| 95th-Percentile Queue Length [veh] | 13.92 | 6.96 | 0.00 | 0.00 | 3.25 | 3.25 |
| 95th-Percentile Queue Length [ft] | 347.89 | 173.94 | 0.00 | 0.00 | 81.25 | 81.25 |
| d_A, Approach Delay [s/veh] | 0.02 | | 0.00 | | 50.82 | |
| Approach LOS | A | | A | | F | |
| d_I, Intersection Delay [s/veh] | 2.26 | | | | | |
| Intersection LOS | F | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 6: 6 Build_out_2021_Without_Improvements
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 6: Valerie St at Ferris Dr**

| | | | |
|---|---|---|---|
| Control Type: | All-way stop | Delay (sec / veh): | 8.3 |
| Analysis Method: | HCM 2010 | Level Of Service: | A |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.209 |

**Intersection Setup**

| Name | Ferris Dr | | | Ferris Dr | | | Valerie St | | | Valerie St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | No | | | No | | | No | | | No | | |

**Volumes**

| Name | Ferris Dr | | | Ferris Dr | | | Valerie St | | | Valerie St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 14 | 58 | 61 | 11 | 62 | 11 | 8 | 30 | 15 | 15 | 46 | 24 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 14 | 58 | 61 | 11 | 62 | 11 | 8 | 30 | 15 | 15 | 46 | 24 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 5 | 19 | 20 | 4 | 21 | 4 | 3 | 10 | 5 | 5 | 15 | 8 |
| Total Analysis Volume [veh/h] | 19 | 77 | 81 | 15 | 83 | 15 | 11 | 40 | 20 | 20 | 61 | 32 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

**Lanes**

| | | | | |
|---|---|---|---|---|
| Capacity per Entry Lane [veh/h] | 847 | 797 | 783 | 792 |
| Degree of Utilization, x | 0.21 | 0.14 | 0.09 | 0.14 |

**Movement, Approach, & Intersection Results**

| | | | | |
|---|---|---|---|---|
| 95th-Percentile Queue Length [veh] | 0.79 | 0.49 | 0.30 | 0.50 |
| 95th-Percentile Queue Length [ft] | 19.65 | 12.32 | 7.45 | 12.41 |
| Approach Delay [s/veh] | 8.37 | 8.26 | 8.05 | 8.30 |
| Approach LOS | A | A | A | A |
| Intersection Delay [s/veh] | 8.28 | | | |
| Intersection LOS | A | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 6: 6 Build_out_2021_Without_Improvements
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 7: Chimney Rock Rd at Beechnut St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 23.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | C |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.627 |

**Intersection Setup**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration |  | | |  | | |  | | |  | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 82 | 298 | 82 | 93 | 473 | 112 | 63 | 627 | 107 | 130 | 951 | 99 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 83 | 0 | 0 | 0 | 0 | 41 | 0 | 105 | 52 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 85 | 310 | 168 | 97 | 492 | 116 | 66 | 693 | 111 | 240 | 1041 | 103 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 24 | 88 | 48 | 28 | 140 | 33 | 19 | 197 | 32 | 68 | 296 | 29 |
| Total Analysis Volume [veh/h] | 97 | 352 | 191 | 110 | 559 | 132 | 75 | 788 | 126 | 273 | 1183 | 117 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 1 | 6 | 0 | 5 | 2 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 5 | 40 | 0 | 5 | 40 | 0 | 40 | 40 | 0 | 40 | 40 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 22 | 23 | 0 | 22 | 23 | 0 | 11 | 42 | 0 | 33 | 64 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | Yes | No | | No | No | | No | No | |
| Maximum Recall | No | No | | No | No | | No | No | | No | No | |
| Pedestrian Recall | No | No | | No | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | R | L | C | C | R | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 2.00 | 2.00 | 0.00 | 0.00 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 0.00 | 2.00 | 2.00 | 2.00 | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 5 | 20 | 11 | 11 | 5 | 20 | 11 | 11 | 4 | 19 | 19 | 12 | 27 | 27 |
| g / C, Green / Cycle | 0.08 | 0.32 | 0.17 | 0.17 | 0.08 | 0.32 | 0.17 | 0.17 | 0.06 | 0.30 | 0.30 | 0.19 | 0.43 | 0.43 |
| (v / s)_i Volume / Saturation Flow Rate | 0.04 | 0.11 | 0.10 | 0.12 | 0.07 | 0.13 | 0.11 | 0.08 | 0.04 | 0.25 | 0.25 | 0.15 | 0.35 | 0.36 |
| s, saturation flow rate [veh/h] | 847 | 770 | 3227 | 1583 | 1025 | 1767 | 3227 | 1583 | 1774 | 1863 | 1774 | 1774 | 1863 | 1805 |
| c, Capacity [veh/h] | 115 | 388 | 556 | 273 | 115 | 690 | 556 | 273 | 104 | 566 | 539 | 336 | 810 | 784 |
| d1, Uniform Delay [s] | 31.36 | 15.58 | 23.94 | 24.44 | 31.36 | 16.69 | 24.27 | 23.45 | 29.03 | 20.30 | 20.30 | 24.37 | 15.48 | 15.58 |
| k, delay calibration | 0.11 | 0.46 | 0.11 | 0.11 | 0.24 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.13 | 0.13 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 1.57 | 1.14 | 1.02 | 3.26 | 14.08 | 0.27 | 1.38 | 1.33 | 9.14 | 3.15 | 3.31 | 4.79 | 2.38 | 2.71 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 0.32 | 0.21 | 0.60 | 0.70 | 0.67 | 0.32 | 0.66 | 0.48 | 0.72 | 0.83 | 0.83 | 0.81 | 0.81 | 0.82 |
| d, Delay for Lane Group [s/veh] | 32.93 | 16.72 | 24.97 | 27.70 | 45.44 | 16.96 | 25.64 | 24.78 | 38.17 | 23.45 | 23.60 | 29.16 | 17.86 | 18.29 |
| Lane Group LOS | C | B | C | C | D | B | C | C | D | C | C | C | B | B |
| Critical Lane Group | No | No | No | Yes | No | Yes | No | No | No | No | Yes | Yes | No | No |
| 50th-Percentile Queue Length [veh] | 0.60 | 0.91 | 2.20 | 2.75 | 1.65 | 2.33 | 2.51 | 1.76 | 1.32 | 6.26 | 5.99 | 4.07 | 7.59 | 7.55 |
| 50th-Percentile Queue Length [ft] | 15.09 | 22.71 | 54.99 | 68.68 | 41.35 | 58.30 | 62.67 | 43.96 | 32.99 | 156.59 | 149.72 | 101.65 | 189.66 | 188.72 |
| 95th-Percentile Queue Length [veh] | 1.09 | 1.64 | 3.96 | 4.95 | 2.98 | 4.20 | 4.51 | 3.17 | 2.38 | 10.37 | 10.00 | 7.32 | 12.10 | 12.05 |
| 95th-Percentile Queue Length [ft] | 27.16 | 40.88 | 98.98 | 123.6 | 74.42 | 104.9 | 112.8 | 79.14 | 59.38 | 259.20 | 250.05 | 182.98 | 302.59 | 301.37 |

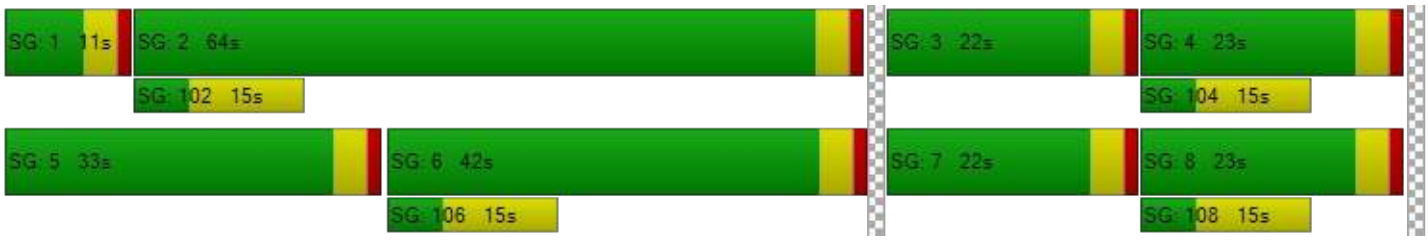
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 32.93 | 24.47 | 27.70 | 45.44 | 22.70 | 24.78 | 38.17 | 23.51 | 23.60 | 29.16 | 18.05 | 18.29 |
| Movement LOS | C | C | C | D | C | C | D | C | C | C | B | B |
| d_A, Approach Delay [s/veh] | 25.18 | | | 24.98 | | | 24.63 | | | 20.00 | | |
| Approach LOS | C | | | C | | | C | | | B | | |
| d_I, Intersection Delay [s/veh] | 22.97 | | | | | | | | | | | |
| Intersection LOS | C | | | | | | | | | | | |
| Intersection V/C | 0.627 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 8: Beechnut St at S Rice Ave**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 132.1 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.980 |

**Intersection Setup**

| Name | S Rice Ave | | | S Rice Ave | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 150.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S Rice Ave | | | S Rice Ave | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 105 | 119 | 101 | 202 | 167 | 121 | 80 | 761 | 48 | 74 | 886 | 188 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 135 | 0 | 251 | 255 | 157 | 124 | 0 | 0 | 0 | 0 | 206 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 109 | 259 | 105 | 461 | 429 | 283 | 207 | 791 | 50 | 77 | 921 | 402 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 31 | 74 | 30 | 131 | 122 | 80 | 59 | 225 | 14 | 22 | 262 | 114 |
| Total Analysis Volume [veh/h] | 124 | 294 | 119 | 524 | 488 | 322 | 235 | 899 | 57 | 88 | 1047 | 457 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 1 | 6 | 0 | 5 | 2 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 5 | 30 | 0 | 30 | 30 | 0 | 30 | 30 | 0 | 30 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 13 | 19 | 0 | 21 | 27 | 0 | 11 | 70 | 0 | 10 | 69 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | No | No | | No | No | | No | No | |
| Maximum Recall | No | No | | No | No | | No | No | | No | No | |
| Pedestrian Recall | No | No | | No | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 107 | 107 | 107 | 107 | 107 | 107 | 107 | 107 | 107 | 107 | 107 | 107 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 5 | 15 | 15 | 30 | 40 | 40 | 16 | 39 | 39 | 7 | 30 | 30 |
| g / C, Green / Cycle | 0.05 | 0.14 | 0.14 | 0.28 | 0.37 | 0.37 | 0.15 | 0.37 | 0.37 | 0.06 | 0.28 | 0.28 |
| (v / s)_i Volume / Saturation Flow Rate | 0.07 | 0.12 | 0.12 | 0.30 | 0.23 | 0.23 | 0.13 | 0.26 | 0.26 | 0.05 | 0.42 | 0.43 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1684 | 1774 | 1863 | 1621 | 1774 | 1863 | 1824 | 1774 | 1863 | 1677 |
| c, Capacity [veh/h] | 83 | 264 | 238 | 494 | 695 | 605 | 270 | 683 | 669 | 115 | 520 | 468 |
| d1, Uniform Delay [s] | 51.23 | 44.77 | 44.88 | 38.78 | 27.43 | 27.58 | 44.52 | 29.08 | 29.09 | 49.47 | 38.73 | 38.73 |
| k, delay calibration | 0.50 | 0.11 | 0.11 | 0.49 | 0.32 | 0.33 | 0.11 | 0.40 | 0.40 | 0.11 | 0.50 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 278.85 | 6.08 | 7.35 | 57.48 | 2.66 | 3.31 | 8.47 | 4.88 | 5.00 | 10.26 | 231.52 | 260.08 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.50 | 0.82 | 0.83 | 1.06 | 0.62 | 0.63 | 0.87 | 0.71 | 0.71 | 0.77 | 1.49 | 1.55 |
| d, Delay for Lane Group [s/veh] | 330.07 | 50.85 | 52.23 | 96.25 | 30.09 | 30.89 | 52.99 | 33.96 | 34.09 | 59.73 | 270.25 | 298.80 |
| Lane Group LOS | F | D | D | F | C | C | D | C | C | E | F | F |
| Critical Lane Group | No | No | Yes | Yes | No | No | Yes | No | No | No | No | Yes |
| 50th-Percentile Queue Length [veh] | 8.61 | 5.97 | 5.59 | 20.64 | 9.35 | 8.42 | 6.71 | 11.36 | 11.16 | 2.65 | 46.89 | 45.93 |
| 50th-Percentile Queue Length [ft] | 215.22 | 149.31 | 139.87 | 516.12 | 233.66 | 210.58 | 167.79 | 284.07 | 279.10 | 66.16 | 1172.32 | 1148.24 |
| 95th-Percentile Queue Length [veh] | 14.76 | 9.98 | 9.47 | 29.15 | 14.36 | 13.18 | 10.96 | 16.89 | 16.64 | 4.76 | 71.15 | 70.70 |
| 95th-Percentile Queue Length [ft] | 369.00 | 249.51 | 236.85 | 728.79 | 359.01 | 329.57 | 274.00 | 422.28 | 416.09 | 119.09 | 1778.67 | 1767.45 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 330.07 | 51.22 | 52.23 | 96.25 | 30.19 | 30.89 | 52.99 | 34.02 | 34.09 | 59.73 | 277.64 | 298.80 |
| Movement LOS | F | D | D | F | C | C | D | C | C | E | F | F |
| d_A, Approach Delay [s/veh] | 115.83 | | | 56.31 | | | 37.77 | | | 271.67 | | |
| Approach LOS | F | | | E | | | D | | | F | | |
| d_I, Intersection Delay [s/veh] | 132.10 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 0.980 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 6: 6 Build_out_2021_Without_Improvements
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 9: Beechnut at 610 SB Feeder**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 179.3 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 1.012 |

**Intersection Setup**

| Name | 610 SB Feeder | | | 610 SB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | 610 SB Feeder | | | 610 SB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 0 | 276 | 421 | 445 | 0 | 913 | 275 | 211 | 884 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.04 | 1.04 | 1.04 | 1.00 | 1.04 | 1.04 | 1.04 | 1.04 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 199 | 52 | 0 | 206 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 0 | 0 | 287 | 438 | 463 | 0 | 1149 | 338 | 219 | 1125 | 0 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 0 | 0 | 72 | 110 | 116 | 0 | 287 | 85 | 55 | 281 | 0 |
| Total Analysis Volume [veh/h] | 0 | 0 | 0 | 287 | 438 | 463 | 0 | 1149 | 338 | 219 | 1125 | 0 |
| Presence of On-Street Parking | | | | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Permiss | Permiss | Permiss | Protecte | Overlap | Permiss | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 0 | 0 | 3 | 4 | 0 | 0 | 2 | 0 | 0 | 1 | 0 |
| Auxiliary Signal Groups | | | | | 3,4 | | | | | | | |
| Lead / Lag | - | - | - | Lead | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 0.0 | 0.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 0 | 0 | 0 | 50 | 9 | 0 | 0 | 32 | 0 | 0 | 29 | 0 |
| Vehicle Extension [s] | 0.0 | 0.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 0.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 0.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | | | | Yes | Yes | | | No | | | No | |
| Maximum Recall | | | | No | No | | | No | | | No | |
| Pedestrian Recall | | | | No | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | | L | C | C | R | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | | 84 | 84 | 84 | 84 | 84 | 84 | 84 | 84 | 84 |
| L, Total Lost Time per Cycle [s] | | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | | 2.00 | 0.00 | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | | 5 | 14 | 14 | 5 | 28 | 28 | 30 | 30 | 30 |
| g / C, Green / Cycle | | 0.06 | 0.17 | 0.17 | 0.06 | 0.34 | 0.34 | 0.36 | 0.36 | 0.36 |
| (v / s)_i Volume / Saturation Flow Rate | | 0.16 | 0.19 | 0.18 | 0.18 | 0.28 | 0.30 | 0.12 | 0.38 | 0.25 |
| s, saturation flow rate [veh/h] | | 1774 | 1863 | 1513 | 1583 | 3547 | 1663 | 1774 | 1863 | 1695 |
| c, Capacity [veh/h] | | 105 | 309 | 251 | 94 | 1192 | 559 | 632 | 664 | 604 |
| d1, Uniform Delay [s] | | 40.57 | 37.57 | 37.57 | 40.57 | 30.50 | 31.23 | 24.04 | 32.21 | 28.15 |
| k, delay calibration | | 0.50 | 0.50 | 0.50 | 0.50 | 0.11 | 0.33 | 0.11 | 0.49 | 0.24 |
| I, Upstream Filtering Factor | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | | 806.0 | 96.03 | 75.53 | 924.5 | 1.58 | 13.37 | 0.33 | 49.44 | 3.30 |
| d3, Initial Queue Delay [s] | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 |
| PF, progression factor | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | | 2.73 | 1.14 | 1.07 | 2.99 | 0.83 | 0.89 | 0.35 | 1.05 | 0.71 |
| d, Delay for Lane Group [s/veh] | | 846.6 | 133.6 | 113.1 | 965.1 | 32.08 | 44.60 | 24.36 | 81.64 | 31.46 |
| Lane Group LOS | | F | F | F | F | C | D | C | F | C |
| Critical Lane Group | | Yes | No | No | Yes | No | Yes | No | Yes | No |
| 50th-Percentile Queue Length [veh] | | 25.70 | 14.90 | 10.67 | 26.02 | 10.17 | 12.14 | 3.76 | 22.99 | 8.72 |
| 50th-Percentile Queue Length [ft] | | 642.4 | 372.4 | 266.7 | 650.4 | 254.28 | 303.43 | 94.10 | 574.68 | 218.00 |
| 95th-Percentile Queue Length [veh] | | 40.63 | 22.62 | 16.52 | 41.18 | 15.40 | 17.85 | 6.78 | 31.96 | 13.56 |
| 95th-Percentile Queue Length [ft] | | 1015. | 565.4 | 413.0 | 1029. | 385.03 | 446.27 | 169.38 | 799.02 | 339.07 |

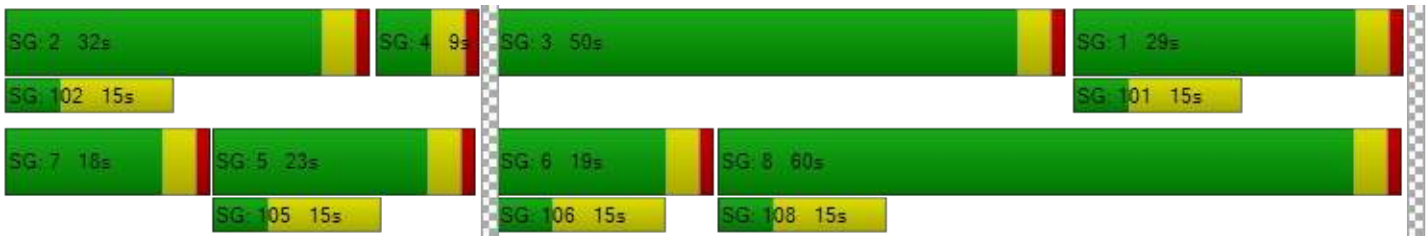
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 846.63 | 129.63 | 674.95 | 0.00 | 33.80 | 44.60 | 24.36 | 62.63 | 0.00 |
| Movement LOS | | | | F | F | F | | C | D | C | E | |
| d_A, Approach Delay [s/veh] | 0.00 | | | 497.53 | | | 36.25 | | | 56.39 | | |
| Approach LOS | A | | | F | | | D | | | E | | |
| d_I, Intersection Delay [s/veh] | 179.34 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 1.012 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 4 | - | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 5 | - | 6 | 8 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

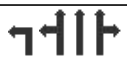
Generated with PTV VISTRO
Version 5.00-00

Scenario 6: 6 Build_out_2021_Without_Improvements
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 10: Beechnut at 610 NB Feeder**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 59.4 |
| Analysis Method: | HCM 2010 | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.805 |

**Intersection Setup**

| Name | 610 NB Feeder | | | 610 NB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration |  | | | | | |  | | |  | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | 610 NB Feeder | | | 610 NB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 357 | 274 | 71 | 0 | 0 | 0 | 446 | 748 | 0 | 0 | 727 | 231 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 199 | 0 | 0 | 165 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 412 | 285 | 74 | 0 | 0 | 0 | 464 | 977 | 0 | 0 | 921 | 240 |
| Peak Hour Factor | 0.9100 | 0.9100 | 0.9100 | 1.0000 | 1.0000 | 1.0000 | 0.9100 | 0.9100 | 1.0000 | 1.0000 | 0.9100 | 0.9100 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 113 | 78 | 20 | 0 | 0 | 0 | 127 | 268 | 0 | 0 | 253 | 66 |
| Total Analysis Volume [veh/h] | 453 | 313 | 81 | 0 | 0 | 0 | 510 | 1074 | 0 | 0 | 1012 | 264 |
| Presence of On-Street Parking | No | | No | | | | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Overlap | Permiss | Permiss | Permiss | Permiss | Split | Split | Permiss | Permiss | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 7 | 8 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | 7,8 | | | | | | | | | | |
| Lead / Lag | Lead | - | - | - | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 5 | 30 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 18 | 60 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 19 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | | | | | No | | | No | |
| Maximum Recall | No | No | | | | | | No | | | No | |
| Pedestrian Recall | No | No | | | | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | C | | L | C | C | C | C |
|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 76 | 76 | 76 | 76 | | 76 | 76 | 76 | 76 | 76 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 0.00 | 0.00 | 0.00 | | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 5 | 15 | 15 | 15 | | 27 | 27 | 27 | 23 | 23 |
| g / C, Green / Cycle | 0.07 | 0.19 | 0.19 | 0.19 | | 0.35 | 0.35 | 0.35 | 0.30 | 0.30 |
| (v / s)_i Volume / Saturation Flow Rate | 0.13 | 0.13 | 0.12 | 0.12 | | 0.29 | 0.31 | 0.30 | 0.24 | 0.25 |
| s, saturation flow rate [veh/h] | 1774 | 1774 | 1695 | 1577 | | 1774 | 1863 | 1695 | 3547 | 1679 |
| c, Capacity [veh/h] | 116 | 337 | 322 | 300 | | 622 | 653 | 594 | 1074 | 508 |
| d1, Uniform Delay [s] | 35.72 | 28.75 | 28.49 | 28.54 | | 22.64 | 23.31 | 22.89 | 24.45 | 24.89 |
| k, delay calibration | 0.50 | 0.50 | 0.50 | 0.50 | | 0.25 | 0.29 | 0.27 | 0.11 | 0.19 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 458.0 | 10.24 | 9.04 | 9.98 | | 6.25 | 9.91 | 7.85 | 1.36 | 6.37 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.95 | 0.67 | 0.63 | 0.64 | | 0.82 | 0.88 | 0.84 | 0.79 | 0.84 |
| d, Delay for Lane Group [s/veh] | 493.8 | 39.00 | 37.53 | 38.52 | | 28.89 | 33.22 | 30.74 | 25.81 | 31.26 |
| Lane Group LOS | F | D | D | D | | C | C | C | C | C |
| Critical Lane Group | Yes | Yes | No | No | | No | Yes | No | No | Yes |
| 50th-Percentile Queue Length [veh] | 16.87 | 4.66 | 4.10 | 3.93 | | 8.87 | 10.82 | 9.02 | 6.86 | 7.67 |
| 50th-Percentile Queue Length [ft] | 421.6 | 116.6 | 102.4 | 98.35 | | 221.74 | 270.45 | 225.56 | 171.46 | 191.87 |
| 95th-Percentile Queue Length [veh] | 27.55 | 8.21 | 7.38 | 7.08 | | 13.75 | 16.21 | 13.95 | 11.15 | 12.22 |
| 95th-Percentile Queue Length [ft] | 688.6 | 205.1 | 184.3 | 177.0 | | 343.84 | 405.30 | 348.71 | 278.83 | 305.46 |

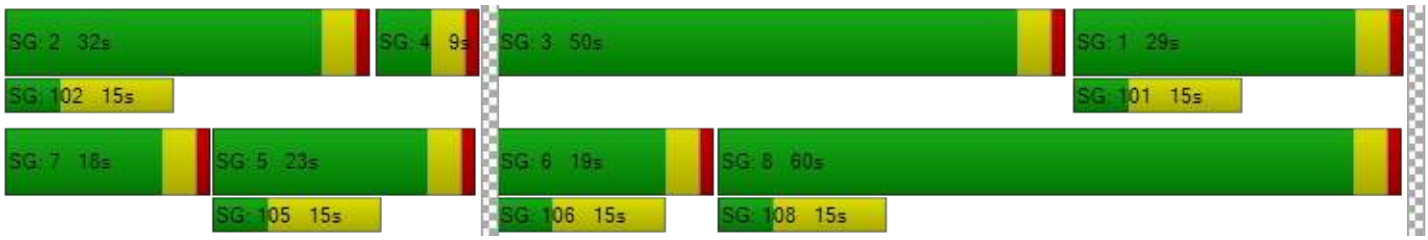
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 266.40 | 37.88 | 38.52 | 0.00 | 0.00 | 0.00 | 28.89 | 32.06 | 0.00 | 0.00 | 26.68 | 31.26 |
| Movement LOS | F | D | D | | | | C | C | | | C | C |
| d_A, Approach Delay [s/veh] | 160.16 | | | 0.00 | | | 31.04 | | | 27.63 | | |
| Approach LOS | F | | | A | | | C | | | C | | |
| d_I, Intersection Delay [s/veh] | 59.37 | | | | | | | | | | | |
| Intersection LOS | E | | | | | | | | | | | |
| Intersection V/C | 0.805 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 4 | - | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 5 | - | 6 | 8 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 11: S. Rice at Evergreen St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 154.7 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.947 |

**Intersection Setup**

| Name | S. Rice Ave | | | S. Rice Ave | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S. Rice Ave | | | S. Rice Ave | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 3 | 390 | 64 | 59 | 338 | 18 | 13 | 73 | 13 | 51 | 137 | 85 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 157 | 245 | 157 | 0 | 135 | 0 | 0 | 0 | 124 | 124 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 160 | 651 | 224 | 61 | 487 | 19 | 14 | 76 | 138 | 177 | 142 | 88 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 45 | 185 | 64 | 17 | 138 | 5 | 4 | 22 | 39 | 50 | 40 | 25 |
| Total Analysis Volume [veh/h] | 182 | 740 | 255 | 69 | 553 | 22 | 16 | 86 | 157 | 201 | 161 | 100 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 8 | 0 | 0 | 4 | 0 | 0 | 2 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | - | - | - | - | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 0 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 0 | 34 | 0 | 0 | 30 | 0 | 0 | 19 | 0 | 0 | 37 | 0 |
| Vehicle Extension [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | | No | | | No | | | No | | | No | |
| Maximum Recall | | No | | | No | | | No | | | No | |
| Pedestrian Recall | | No | | | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | C | C | C | C | C | C |
|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 122 | 122 | 122 | 122 | 122 | 122 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 30 | 30 | 25 | 25 | 21 | 30 |
| g / C, Green / Cycle | 0.25 | 0.25 | 0.20 | 0.20 | 0.17 | 0.25 |
| (v / s)_i Volume / Saturation Flow Rate | 0.35 | 0.35 | 0.18 | 0.18 | 0.15 | 0.26 |
| s, saturation flow rate [veh/h] | 1836 | 1565 | 1844 | 1674 | 1678 | 1757 |
| c, Capacity [veh/h] | 452 | 385 | 376 | 342 | 289 | 433 |
| d1, Uniform Delay [s] | 45.95 | 45.95 | 47.26 | 47.27 | 49.36 | 45.95 |
| k, delay calibration | 0.50 | 0.50 | 0.26 | 0.26 | 0.18 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 194.77 | 198.50 | 16.22 | 17.54 | 14.39 | 62.62 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| X, volume / capacity | 1.40 | 1.41 | 0.90 | 0.90 | 0.90 | 1.07 |
| d, Delay for Lane Group [s/veh] | 240.71 | 244.45 | 63.48 | 64.80 | 63.74 | 108.56 |
| Lane Group LOS | F | F | E | E | E | F |
| Critical Lane Group | No | Yes | No | Yes | Yes | Yes |
| 50th-Percentile Queue Length [veh] | 38.00 | 32.79 | 11.63 | 10.68 | 8.85 | 20.49 |
| 50th-Percentile Queue Length [ft] | 949.99 | 819.70 | 290.71 | 267.12 | 221.20 | 512.19 |
| 95th-Percentile Queue Length [veh] | 57.07 | 49.96 | 17.22 | 16.05 | 13.73 | 29.02 |
| 95th-Percentile Queue Length [ft] | 1426.85 | 1249.05 | 430.52 | 401.14 | 343.16 | 725.55 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 240.71 | 242.16 | 244.45 | 63.48 | 64.16 | 64.80 | 63.74 | 63.74 | 63.74 | 108.56 | 108.56 | 108.56 |
| Movement LOS | F | F | F | E | E | E | E | E | E | F | F | F |
| d_A, Approach Delay [s/veh] | 242.43 | | | 64.11 | | | 63.74 | | | 108.56 | | |
| Approach LOS | F | | | E | | | E | | | F | | |
| d_I, Intersection Delay [s/veh] | 154.72 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 0.947 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 6 | 4 | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 6: 6 Build_out_2021_Without_Improvements
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 12: Chimney Rock Rd at Evergreen St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 17.7 |
| Analysis Method: | HCM 2010 | Level Of Service: | B |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.516 |

**Intersection Setup**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 215.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 5 | 487 | 11 | 11 | 889 | 8 | 2 | 32 | 15 | 33 | 41 | 20 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 83 | 0 | 0 | 0 | 41 | 0 | 0 | 52 | 105 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 5 | 506 | 11 | 94 | 925 | 8 | 2 | 74 | 16 | 34 | 95 | 126 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 1 | 144 | 3 | 27 | 263 | 2 | 1 | 21 | 5 | 10 | 27 | 36 |
| Total Analysis Volume [veh/h] | 6 | 575 | 13 | 107 | 1051 | 9 | 2 | 84 | 18 | 39 | 108 | 143 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 0 | 2 | 0 | 0 | 1 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 30 | 30 | 0 | 30 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 18 | 70 | 0 | 9 | 61 | 0 | 0 | 19 | 0 | 0 | 22 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | No | No | | No | No | | | No | | | No | |
| Maximum Recall | No | No | | No | No | | | No | | | No | |
| Pedestrian Recall | No | No | | No | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | C | C |
|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 0 | 13 | 13 | 4 | 17 | 17 | 4 | 10 |
| g / C, Green / Cycle | 0.01 | 0.28 | 0.28 | 0.08 | 0.36 | 0.36 | 0.08 | 0.21 |
| (v / s)_i Volume / Saturation Flow Rate | 0.00 | 0.16 | 0.16 | 0.06 | 0.28 | 0.28 | 0.06 | 0.17 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1848 | 1774 | 1863 | 1857 | 1806 | 1703 |
| c, Capacity [veh/h] | 14 | 528 | 524 | 144 | 663 | 661 | 144 | 367 |
| d1, Uniform Delay [s] | 23.18 | 14.33 | 14.34 | 21.11 | 13.62 | 13.62 | 21.11 | 17.43 |
| k, delay calibration | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 17.86 | 0.93 | 0.94 | 7.42 | 2.29 | 2.30 | 6.69 | 3.84 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 0.41 | 0.56 | 0.56 | 0.74 | 0.80 | 0.80 | 0.72 | 0.79 |
| d, Delay for Lane Group [s/veh] | 41.05 | 15.26 | 15.28 | 28.53 | 15.90 | 15.91 | 27.80 | 21.27 |
| Lane Group LOS | D | B | B | C | B | B | C | C |
| Critical Lane Group | Yes | No | No | No | No | Yes | Yes | Yes |
| 50th-Percentile Queue Length [veh] | 0.13 | 2.39 | 2.38 | 1.33 | 4.50 | 4.49 | 1.27 | 2.95 |
| 50th-Percentile Queue Length [ft] | 3.30 | 59.86 | 59.50 | 33.23 | 112.55 | 112.26 | 31.76 | 73.83 |
| 95th-Percentile Queue Length [veh] | 0.24 | 4.31 | 4.28 | 2.39 | 7.98 | 7.97 | 2.29 | 5.32 |
| 95th-Percentile Queue Length [ft] | 5.94 | 107.74 | 107.11 | 59.82 | 199.54 | 199.15 | 57.16 | 132.89 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 41.05 | 15.27 | 15.28 | 28.53 | 15.91 | 15.91 | 27.80 | 27.80 | 27.80 | 21.27 | 21.27 | 21.27 |
| Movement LOS | D | B | B | C | B | B | C | C | C | C | C | C |
| d_A, Approach Delay [s/veh] | 15.53 | | | 17.07 | | | 27.80 | | | 21.27 | | |
| Approach LOS | B | | | B | | | C | | | C | | |
| d_I, Intersection Delay [s/veh] | 17.73 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |
| Intersection V/C | 0.516 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 3 | 4 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 8 | 7 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 6: 6 Build_out_2021_Without_Improvements
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

**Intersection Level Of Service Report**
**Intersection 13: Maple St at Parking Garage Entrance**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 0.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | A |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | Parking Garage Driveway | | Maple St | | Maple St | |
|---|---|---|---|---|---|---|
| Approach | Southbound | | Eastbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Right | Left | Thru | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | Parking Garage Driveway | | Maple St | | Maple St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 136 | 0 | 0 | 0 | 22 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 136 | 0 | 0 | 0 | 22 | 0 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 45 | 0 | 0 | 0 | 7 | 0 |
| Total Analysis Volume [veh/h] | 181 | 0 | 0 | 0 | 29 | 0 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Stop | Free | Free |
| Flared Lane | | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS | | | | A | A | A |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.00 | | 0.00 | |
| Approach LOS | A | | A | | A | |
| d_I, Intersection Delay [s/veh] | 0.00 | | | | | |
| Intersection LOS | A | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_PMv15.vistro
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

Scenario 6 Build_out_2021_Without_Improvements
6/28/2017

## Trip Generation summary

### Added Trips

| Zone ID: Name | Land Use variables | Code | Ind. Var. | Rate | Quantity | % In | % Out | Trips In | Trips Out | Total Trips | % of Total Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1: zone | Student | Parking Garage | | 1.000 | 0.000 | 50.00 | 50.00 | 0 | 218 | 218 | 10.53 |
| 2: zone | Parents Dropping/Picking up | Student pick-up/drop-off driveway | | 1.000 | 0.000 | 50.00 | 50.00 | 827 | 827 | 1654 | 79.86 |
| 17: zone | Bus | Bus Loop | | 1.000 | 0.000 | 50.00 | 50.00 | 22 | 22 | 44 | 2.12 |
| 21: zone | Staff | Parking Garage/Surface PArking Lot | | 1.000 | 0.000 | 50.00 | 50.00 | 0 | 155 | 155 | 7.48 |
| | | | | | **Added Trips Total** | | | **849** | **1222** | **2071** | **100.00** |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_PMv15.vistro
Report File: E:\...\PM_BHS_Build_out_no_improvements.pdf

Scenario 6 Build_out_2021_Without_Improvements
6/28/2017

## Trip Distribution summary

| Zone / Gate | Zone 1: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 21: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 15.00 | 0 | 15.00 | 33 |
| 5: Gate | 5.00 | 0 | 5.00 | 11 |
| 6: Gate | 5.00 | 0 | 5.00 | 11 |
| 7: Gate | 10.00 | 0 | 10.00 | 22 |
| 8: Gate | 5.00 | 0 | 5.00 | 11 |
| 9: Gate | 10.00 | 0 | 10.00 | 22 |
| 10: Gate | 5.00 | 0 | 5.00 | 11 |
| 11: Gate | 10.00 | 0 | 10.00 | 22 |
| 12: Gate | 20.00 | 0 | 20.00 | 42 |
| 13: Gate | 0.00 | 0 | 0.00 | 0 |
| 14: Gate | 15.00 | 0 | 15.00 | 33 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 18: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **0** | **100.00** | **218** |

| Zone / Gate | Zone 2: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 21: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 20.00 | 165 | 20.00 | 166 |
| 5: Gate | 5.00 | 41 | 5.00 | 41 |
| 6: Gate | 5.00 | 41 | 5.00 | 41 |
| 7: Gate | 10.00 | 83 | 10.00 | 83 |
| 8: Gate | 5.00 | 41 | 5.00 | 41 |
| 9: Gate | 10.00 | 83 | 10.00 | 83 |
| 10: Gate | 5.00 | 41 | 5.00 | 41 |
| 11: Gate | 10.00 | 83 | 10.00 | 83 |
| 12: Gate | 15.00 | 124 | 15.00 | 124 |
| 13: Gate | 0.00 | 0 | 0.00 | 0 |
| 14: Gate | 15.00 | 124 | 15.00 | 124 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 18: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **826** | **100.00** | **827** |

| Zone / Gate | Zone 17: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 21: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 0.00 | 0 | 0.00 | 0 |
| 5: Gate | 0.00 | 0 | 0.00 | 0 |
| 6: Gate | 0.00 | 0 | 0.00 | 0 |
| 7: Gate | 0.00 | 0 | 0.00 | 0 |
| 8: Gate | 0.00 | 0 | 0.00 | 0 |
| 9: Gate | 0.00 | 0 | 0.00 | 0 |
| 10: Gate | 0.00 | 0 | 0.00 | 0 |
| 11: Gate | 0.00 | 0 | 0.00 | 0 |
| 12: Gate | 50.00 | 11 | 50.00 | 11 |
| 13: Gate | 0.00 | 0 | 0.00 | 0 |
| 14: Gate | 50.00 | 11 | 50.00 | 11 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 18: Gate | 0.00 | 0 | 50.00 | 11 |
| **Total** | **100.00** | **22** | **150.00** | **33** |

| Zone / Gate | Zone 21: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 0.00 | 0 | 0.00 | 0 |
| 5: Gate | 0.00 | 0 | 0.00 | 0 |
| 6: Gate | 0.00 | 0 | 0.00 | 0 |
| 7: Gate | 0.00 | 0 | 0.00 | 0 |
| 8: Gate | 0.00 | 0 | 0.00 | 0 |
| 9: Gate | 0.00 | 0 | 0.00 | 0 |
| 10: Gate | 0.00 | 0 | 0.00 | 0 |
| 11: Gate | 0.00 | 0 | 0.00 | 0 |
| 12: Gate | 50.00 | 0 | 50.00 | 78 |
| 13: Gate | 0.00 | 0 | 0.00 | 0 |
| 14: Gate | 50.00 | 0 | 50.00 | 77 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 18: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **0** | **100.00** | **155** |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# Appendix C
# Build-out Condition with Mitigation

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_AMv15.vistro
Report File: E:\...\AM_BHS_Build_out.pdf

Scenario 8 Build out_2021
6/28/2017

**Intersection Analysis Summary**

| ID | Intersection Name | Control Type | Method | Worst Mvmt | V/C | Delay (s/veh) | LOS |
|---|---|---|---|---|---|---|---|
| 1 | Maple St at Ferris Dr | All-way stop | HCM 2010 | NB Thru | 0.318 | 9.1 | A |
| 2 | S. Rice Avenue at Maple St | Signalized | HCM 2010 | SB Right | 0.827 | 86.3 | F |
| 3 | Student Drop-off/Pick-up Drwy at S. Rice | Two-way stop | HCM 2010 | WB Left | 0.000 | 10,000.0 | F |
| 4 | S. Rice Ave at Bus Exit Drwy/Holly Street | Signalized | HCM 2010 | SB Right | 1.103 | 195.2 | F |
| 5 | Valerie St. at S. Rice Ave | Two-way stop | HCM 2010 | EB Left | 1.516 | 582.3 | F |
| 6 | Valerie St at Ferris Dr | All-way stop | HCM 2010 | NB Left | 0.571 | 13.4 | B |
| 7 | Chimney Rock Rd at Beechnut St | Signalized | HCM 2010 | NB Left | 0.693 | 35.4 | D |
| 8 | Beechnut St at S Rice Ave | Signalized | HCM 2010 | WB Right | 1.054 | 140.3 | F |
| 9 | Beechnut at 610 SB Feeder | Signalized | HCM 2010 | SB Left | 0.933 | 110.5 | F |
| 10 | Beechnut at 610 NB Feeder | Signalized | HCM 2010 | NB Left | 0.746 | 63.5 | E |
| 11 | S. Rice at Evergreen St | Signalized | HCM 2010 | NB Thru | 1.843 | 238.4 | F |
| 12 | Chimney Rock Rd at Evergreen St | Signalized | HCM 2010 | NB Left | 0.666 | 30.6 | C |
| 13 | Maple St at Parking Garage Entrance | Two-way stop | HCM 2010 | WB Right | 0.009 | 0.0 | A |

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 1: Maple St at Ferris Dr**

| | | | |
|---|---|---|---|
| Control Type: | All-way stop | Delay (sec / veh): | 9.1 |
| Analysis Method: | HCM 2010 | Level Of Service: | A |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.318 |

**Intersection Setup**

| Name | Ferris Dr | | | Ferris Dr | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Ferris Dr | | | Ferris Dr | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 36 | 153 | 0 | 0 | 45 | 46 | 63 | 0 | 69 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 36 | 153 | 0 | 0 | 45 | 46 | 63 | 0 | 69 | 0 | 0 | 0 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 12 | 51 | 0 | 0 | 15 | 15 | 21 | 0 | 23 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 48 | 204 | 0 | 0 | 60 | 61 | 84 | 0 | 92 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

**Lanes**

| | | | | |
|---|---|---|---|---|
| Capacity per Entry Lane [veh/h] | 792 | 826 | 788 | 715 |
| Degree of Utilization, x | 0.32 | 0.15 | 0.22 | 0.00 |

**Movement, Approach, & Intersection Results**

| | | | | |
|---|---|---|---|---|
| 95th-Percentile Queue Length [veh] | 1.37 | 0.51 | 0.85 | 0.00 |
| 95th-Percentile Queue Length [ft] | 34.28 | 12.80 | 21.36 | 0.00 |
| Approach Delay [s/veh] | 9.65 | 8.10 | 8.88 | 0.00 |
| Approach LOS | A | A | A | A |
| Intersection Delay [s/veh] | 9.06 | | | |
| Intersection LOS | A | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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Version 5.00-00

Scenario 8: 8 Build out_2021
Report File: E:\...\AM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 2: S. Rice Avenue at Maple St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 86.3 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.827 |

**Intersection Setup**

| Name | S Rice Ave | | | S. Rice Avenue | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S Rice Ave | | | S. Rice Avenue | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 465 | 102 | 3 | 379 | 0 | 0 | 0 | 0 | 8 | 0 | 75 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 387 | 473 | 0 | 0 | 466 | 322 | 0 | 0 | 0 | 0 | 22 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 387 | 957 | 102 | 3 | 860 | 322 | 0 | 0 | 0 | 8 | 22 | 75 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 129 | 319 | 34 | 1 | 287 | 107 | 0 | 0 | 0 | 3 | 7 | 25 |
| Total Analysis Volume [veh/h] | 516 | 1276 | 136 | 4 | 1147 | 429 | 0 | 0 | 0 | 11 | 29 | 100 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 0 | 2 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lag | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 30 | 30 | 0 | 30 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 9 | 73 | 0 | 9 | 73 | 0 | 0 | 19 | 0 | 0 | 19 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | No | No | | No | No | | | No | | | No | |
| Maximum Recall | No | No | | No | No | | | No | | | No | |
| Pedestrian Recall | No | No | | No | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | C | C |
|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 25 | 30 | 30 | 25 | 30 | 30 | 0 | 9 |
| g / C, Green / Cycle | 0.32 | 0.38 | 0.38 | 0.32 | 0.38 | 0.38 | 0.00 | 0.11 |
| (v / s)_i Volume / Saturation Flow Rate | 0.29 | 0.38 | 0.39 | 0.00 | 0.44 | 0.45 | 0.00 | 0.08 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1801 | 1774 | 1863 | 1695 | 1863 | 1648 |
| c, Capacity [veh/h] | 561 | 697 | 674 | 561 | 697 | 634 | 3 | 178 |
| d1, Uniform Delay [s] | 26.41 | 25.08 | 25.08 | 18.77 | 25.08 | 25.08 | 0.00 | 34.83 |
| k, delay calibration | 0.29 | 0.46 | 0.49 | 0.11 | 0.50 | 0.50 | 0.11 | 0.11 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 14.86 | 36.09 | 46.95 | 0.00 | 88.82 | 107.01 | 0.00 | 7.37 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 0.92 | 1.01 | 1.05 | 0.01 | 1.16 | 1.21 | 0.00 | 0.78 |
| d, Delay for Lane Group [s/veh] | 41.27 | 61.18 | 72.03 | 18.77 | 113.90 | 132.09 | 0.00 | 42.21 |
| Lane Group LOS | D | F | F | B | F | F | A | D |
| Critical Lane Group | Yes | No | No | No | No | Yes | No | Yes |
| 50th-Percentile Queue Length [veh] | 11.27 | 19.24 | 20.64 | 0.05 | 29.45 | 30.00 | 0.00 | 2.96 |
| 50th-Percentile Queue Length [ft] | 281.71 | 480.98 | 515.96 | 1.25 | 736.24 | 750.05 | 0.00 | 73.93 |
| 95th-Percentile Queue Length [veh] | 16.77 | 26.68 | 28.99 | 0.09 | 42.37 | 43.93 | 0.00 | 5.32 |
| 95th-Percentile Queue Length [ft] | 419.34 | 667.03 | 724.65 | 2.25 | 1059.15 | 1098.37 | 0.00 | 133.07 |

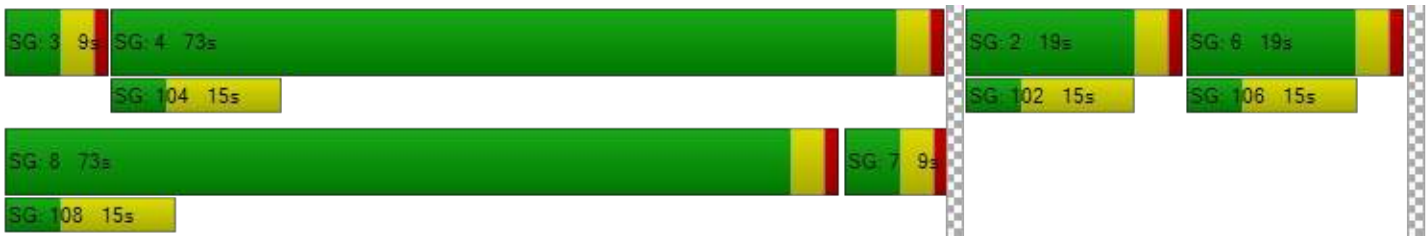
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 41.27 | 66.02 | 72.03 | 18.77 | 119.23 | 132.09 | 0.00 | 0.00 | 0.00 | 42.21 | 42.21 | 42.21 |
| Movement LOS | D | E | E | B | F | F | A | A | A | D | D | D |
| d_A, Approach Delay [s/veh] | 59.82 | | | 122.47 | | | 0.00 | | | 42.21 | | |
| Approach LOS | E | | | F | | | A | | | D | | |
| d_I, Intersection Delay [s/veh] | 86.28 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 0.827 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 3 | 4 | 2 | 6 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 8: 8 Build out_2021
Report File: E:\...\AM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 3: Student Drop-off/Pick-up Drwy at S. Rice**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 10,000.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | S. Rice Avenue | | | S. Rice Ave | | | Drwy | | | Holt St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | No | | | No | | | Yes | | | Yes | | |

**Volumes**

| Name | S. Rice Avenue | | | S. Rice Ave | | | Drwy | | | Holt St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 540 | 0 | 0 | 456 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 473 | 0 | 0 | 333 | 0 | 0 | 0 | 455 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 1035 | 0 | 0 | 807 | 0 | 0 | 0 | 455 | 0 | 0 | 0 |
| Peak Hour Factor | 1.0000 | 0.7500 | 1.0000 | 1.0000 | 0.7500 | 0.7500 | 1.0000 | 1.0000 | 0.7500 | 0.7500 | 1.0000 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 345 | 0 | 0 | 269 | 0 | 0 | 0 | 152 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 0 | 1380 | 0 | 0 | 1076 | 0 | 0 | 0 | 607 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | | |
|---|---|---|---|---|
| Priority Scheme | Free | Free | Stop | Stop |
| Flared Lane | | | | No |
| Storage Area [veh] | 0 | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | No | No |
| Number of Storage Spaces in Median | 0 | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 1.24 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 152.20 | 10000.0 | 0.00 | 14.29 |
| Movement LOS | | A | | | A | A | | | F | F | | B |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 24.30 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 607.44 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 0.00 | | | 0.00 | | | 152.20 | | | 5007.14 | | |
| Approach LOS | A | | | A | | | F | | | F | | |
| d_I, Intersection Delay [s/veh] | 30.16 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 8: 8 Build out_2021
Report File: E:\...\AM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 4: S. Rice Ave at Bus Exit Drwy/Holly Street**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 195.2 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 1.103 |

**Intersection Setup**

| Name | S. Rice Ave | | | S. Rice Ave | | | Bus Exit Drw | | | Holly Street | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S. Rice Ave | | | S. Rice Ave | | | Bus Exit Drw | | | Holly Street | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 540 | 0 | 0 | 456 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 473 | 0 | 0 | 0 | 322 | 391 | 383 | 0 | 11 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 473 | 562 | 0 | 0 | 796 | 391 | 383 | 0 | 11 | 0 | 0 | 0 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 158 | 187 | 0 | 0 | 265 | 130 | 128 | 0 | 4 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 631 | 749 | 0 | 0 | 1061 | 521 | 511 | 0 | 15 | 0 | 0 | 0 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Split | Permiss | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 2 | 2 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lag | - | - | Lead | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 30 | 30 | 0 | 30 | 30 | 0 | 30 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 24 | 27 | 0 | 55 | 58 | 0 | 19 | 19 | 0 | 0 | 19 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 5 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 10 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | No | | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | No | No | | No | No | | No | | | | No | |
| Maximum Recall | No | No | | No | No | | No | | | | No | |
| Pedestrian Recall | No | No | | No | No | | No | | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | L | R | C |
|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 30 | 24 | 24 | 36 | 30 | 30 | 30 | 30 | 0 |
| g / C, Green / Cycle | 0.28 | 0.23 | 0.23 | 0.34 | 0.28 | 0.28 | 0.28 | 0.28 | 0.00 |
| (v / s)_i Volume / Saturation Flow Rate | 0.36 | 0.20 | 0.20 | 0.00 | 0.44 | 0.46 | 0.29 | 0.01 | 0.00 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1863 | 1774 | 1863 | 1662 | 1774 | 1583 | 1863 |
| c, Capacity [veh/h] | 502 | 420 | 420 | 605 | 528 | 471 | 500 | 446 | 2 |
| d1, Uniform Delay [s] | 37.98 | 39.78 | 39.78 | 0.00 | 37.96 | 37.96 | 38.04 | 27.58 | 0.00 |
| k, delay calibration | 0.50 | 0.24 | 0.24 | 0.11 | 0.50 | 0.50 | 0.46 | 0.11 | 0.11 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 131.31 | 13.27 | 13.27 | 0.00 | 257.81 | 288.94 | 44.52 | 0.03 | 0.00 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.26 | 0.89 | 0.89 | 0.00 | 1.55 | 1.62 | 1.02 | 0.03 | 0.00 |
| d, Delay for Lane Group [s/veh] | 169.29 | 53.05 | 53.05 | 0.00 | 295.77 | 326.91 | 82.56 | 27.61 | 0.00 |
| Lane Group LOS | F | D | D | A | F | F | F | C | A |
| Critical Lane Group | Yes | No | No | No | No | Yes | Yes | No | No |
| 50th-Percentile Queue Length [veh] | 31.05 | 10.88 | 10.88 | 0.00 | 51.19 | 49.75 | 18.87 | 0.28 | 0.00 |
| 50th-Percentile Queue Length [ft] | 776.35 | 272.05 | 272.05 | 0.00 | 1279.70 | 1243.87 | 471.86 | 7.00 | 0.00 |
| 95th-Percentile Queue Length [veh] | 45.76 | 16.29 | 16.29 | 0.00 | 78.17 | 77.08 | 26.37 | 0.50 | 0.00 |
| 95th-Percentile Queue Length [ft] | 1143.99 | 407.31 | 407.31 | 0.00 | 1954.28 | 1927.08 | 659.13 | 12.60 | 0.00 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 169.29 | 53.05 | 53.05 | 0.00 | 302.88 | 326.91 | 82.56 | 0.00 | 27.61 | 0.00 | 0.00 | 0.00 |
| Movement LOS | F | D | D | A | F | F | F | | C | A | A | A |
| d_A, Approach Delay [s/veh] | 106.20 | | | 310.79 | | | 80.99 | | | 0.00 | | |
| Approach LOS | F | | | F | | | F | | | A | | |
| d_I, Intersection Delay [s/veh] | 195.19 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 1.103 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 3 | 4 | 2 | 6 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 8: 8 Build out_2021
Report File: E:\...\AM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 5: Valerie St. at S. Rice Ave**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 582.3 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 1.516 |

**Intersection Setup**

| Name | S. Rice Ave | | S. Rice Ave | | Valerie St | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Eastbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Thru | Thru | Right | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | S. Rice Ave | | S. Rice Ave | | Valerie St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 30 | 543 | 355 | 43 | 38 | 101 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 383 | 713 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 30 | 948 | 1082 | 43 | 38 | 101 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 10 | 316 | 361 | 14 | 13 | 34 |
| Total Analysis Volume [veh/h] | 40 | 1264 | 1443 | 57 | 51 | 135 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Free | Free | Stop |
| Flared Lane | | | No |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | No |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.09 | 0.01 | 0.01 | 0.00 | 1.52 | 0.38 |
| d_M, Delay for Movement [s/veh] | 13.93 | 0.00 | 0.00 | 0.00 | 582.35 | 485.54 |
| Movement LOS | B | A | A | A | F | F |
| 95th-Percentile Queue Length [veh] | 33.45 | 16.73 | 0.00 | 0.00 | 15.50 | 15.50 |
| 95th-Percentile Queue Length [ft] | 836.26 | 418.13 | 0.00 | 0.00 | 387.40 | 387.40 |
| d_A, Approach Delay [s/veh] | 0.43 | | 0.00 | | 512.08 | |
| Approach LOS | A | | A | | F | |
| d_I, Intersection Delay [s/veh] | 32.04 | | | | | |
| Intersection LOS | F | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 8: 8 Build out_2021
Report File: E:\...\AM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 6: Valerie St at Ferris Dr**

| | | | |
|---|---|---|---|
| Control Type: | All-way stop | Delay (sec / veh): | 13.4 |
| Analysis Method: | HCM 2010 | Level Of Service: | B |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.571 |

**Intersection Setup**

| Name | Ferris Dr | | | Ferris Dr | | | Valerie St | | | Valerie St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | No | | | No | | | No | | | No | | |

**Volumes**

| Name | Ferris Dr | | | Ferris Dr | | | Valerie St | | | Valerie St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 30 | 543 | 0 | 5 | 90 | 4 | 13 | 94 | 40 | 13 | 45 | 24 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 30 | 543 | 0 | 5 | 90 | 4 | 13 | 94 | 40 | 13 | 45 | 24 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 10 | 181 | 0 | 2 | 30 | 1 | 4 | 31 | 13 | 4 | 15 | 8 |
| Total Analysis Volume [veh/h] | 40 | 724 | 0 | 7 | 120 | 5 | 17 | 125 | 53 | 17 | 60 | 32 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

**Lanes**

| | | | | | |
|---|---|---|---|---|---|
| Capacity per Entry Lane [veh/h] | 670 | 676 | 616 | 613 | 592 |
| Degree of Utilization, x | 0.57 | 0.56 | 0.21 | 0.32 | 0.18 |

**Movement, Approach, & Intersection Results**

| | | | | | |
|---|---|---|---|---|---|
| 95th-Percentile Queue Length [veh] | 3.62 | 3.55 | 0.81 | 1.37 | 0.67 |
| 95th-Percentile Queue Length [ft] | 90.52 | 88.81 | 20.18 | 34.16 | 16.73 |
| Approach Delay [s/veh] | 14.84 | | 10.43 | 11.61 | 10.44 |
| Approach LOS | B | | B | B | B |
| Intersection Delay [s/veh] | 13.43 | | | | |
| Intersection LOS | B | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 8: 8 Build out_2021
Report File: E:\...\AM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 7: Chimney Rock Rd at Beechnut St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 35.4 |
| Analysis Method: | HCM 2010 | Level Of Service: | D |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.693 |

**Intersection Setup**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration |  | | |  | | |  | | |  | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 126 | 851 | 186 | 126 | 209 | 82 | 133 | 103 | 79 | 108 | 604 | 98 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 127 | 0 | 0 | 0 | 0 | 63 | 0 | 83 | 41 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 131 | 885 | 320 | 131 | 217 | 85 | 138 | 170 | 82 | 195 | 669 | 102 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 37 | 251 | 91 | 37 | 62 | 24 | 39 | 48 | 23 | 55 | 190 | 29 |
| Total Analysis Volume [veh/h] | 149 | 1006 | 364 | 149 | 247 | 97 | 157 | 193 | 93 | 222 | 760 | 116 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 1 | 6 | 0 | 5 | 2 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 5 | 40 | 0 | 5 | 40 | 0 | 40 | 40 | 0 | 40 | 40 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 22 | 23 | 0 | 22 | 23 | 0 | 11 | 42 | 0 | 33 | 64 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | Yes | No | | No | No | | No | No | |
| Maximum Recall | No | No | | No | No | | No | No | | No | No | |
| Pedestrian Recall | No | No | | No | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | R | L | C | C | R | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 2.00 | 2.00 | 0.00 | 0.00 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 0.00 | 2.00 | 2.00 | 2.00 | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 5 | 29 | 20 | 20 | 5 | 29 | 20 | 20 | 8 | 17 | 17 | 11 | 20 | 20 |
| g / C, Green / Cycle | 0.07 | 0.42 | 0.29 | 0.29 | 0.07 | 0.42 | 0.29 | 0.29 | 0.11 | 0.25 | 0.25 | 0.16 | 0.29 | 0.29 |
| (v / s)_i Volume / Saturation Flow Rate | 0.13 | 0.23 | 0.19 | 0.23 | 0.13 | 0.19 | 0.08 | 0.06 | 0.09 | 0.08 | 0.08 | 0.13 | 0.24 | 0.24 |
| s, saturation flow rate [veh/h] | 1128 | 1736 | 3227 | 1583 | 558 | 399 | 3227 | 1583 | 1774 | 1863 | 1664 | 1774 | 1863 | 1778 |
| c, Capacity [veh/h] | 104 | 802 | 950 | 466 | 104 | 331 | 950 | 466 | 204 | 460 | 411 | 277 | 536 | 512 |
| d1, Uniform Delay [s] | 34.69 | 14.28 | 21.29 | 22.43 | 34.69 | 12.98 | 18.70 | 18.40 | 29.81 | 21.38 | 21.44 | 28.25 | 23.16 | 23.17 |
| k, delay calibration | 0.50 | 0.50 | 0.11 | 0.11 | 0.50 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 242.3 | 2.18 | 0.73 | 2.89 | 34.67 | 0.34 | 0.14 | 0.22 | 6.02 | 0.40 | 0.47 | 5.38 | 3.51 | 3.69 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.44 | 0.50 | 0.64 | 0.78 | 0.72 | 0.22 | 0.26 | 0.21 | 0.77 | 0.32 | 0.33 | 0.80 | 0.84 | 0.84 |
| d, Delay for Lane Group [s/veh] | 277.0 | 16.47 | 22.01 | 25.32 | 69.37 | 13.32 | 18.85 | 18.62 | 35.83 | 21.78 | 21.92 | 33.62 | 26.67 | 26.86 |
| Lane Group LOS | F | B | C | C | E | B | B | B | D | C | C | C | C | C |
| Critical Lane Group | No | No | No | Yes | Yes | No | No | No | Yes | No | No | No | No | Yes |
| 50th-Percentile Queue Length [veh] | 8.84 | 4.62 | 4.10 | 5.42 | 2.33 | 0.72 | 1.45 | 1.13 | 2.78 | 1.93 | 1.79 | 3.80 | 6.90 | 6.62 |
| 50th-Percentile Queue Length [ft] | 220.9 | 115.5 | 102.5 | 135.5 | 58.20 | 17.98 | 36.19 | 28.31 | 69.38 | 48.16 | 44.71 | 94.98 | 172.51 | 165.41 |
| 95th-Percentile Queue Length [veh] | 15.17 | 8.14 | 7.38 | 9.24 | 4.19 | 1.29 | 2.61 | 2.04 | 5.00 | 3.47 | 3.22 | 6.84 | 11.21 | 10.83 |
| 95th-Percentile Queue Length [ft] | 379.2 | 203.6 | 184.6 | 231.0 | 104.7 | 32.37 | 65.14 | 50.95 | 124.88 | 86.69 | 80.48 | 170.97 | 280.21 | 270.87 |

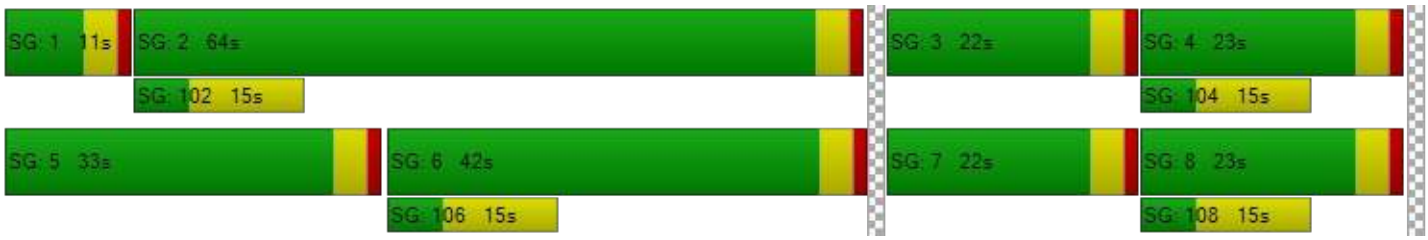
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 277.05 | 19.82 | 25.32 | 50.56 | 18.85 | 18.62 | 35.83 | 21.82 | 21.92 | 33.62 | 26.75 | 26.86 |
| Movement LOS | F | B | C | D | B | B | D | C | C | C | C | C |
| d_A, Approach Delay [s/veh] | 46.37 | | | 25.60 | | | 26.80 | | | 28.15 | | |
| Approach LOS | D | | | C | | | C | | | C | | |
| d_I, Intersection Delay [s/veh] | 35.42 | | | | | | | | | | | |
| Intersection LOS | D | | | | | | | | | | | |
| Intersection V/C | 0.693 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 8: Beechnut St at S Rice Ave**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 140.3 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 1.054 |

**Intersection Setup**

| Name | S Rice Ave | | | S Rice Ave | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 150.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S Rice Ave | | | S Rice Ave | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 101 | 231 | 125 | 235 | 145 | 149 | 82 | 1060 | 29 | 42 | 569 | 251 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 418 | 0 | 165 | 177 | 124 | 190 | 0 | 0 | 0 | 0 | 252 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 105 | 658 | 130 | 409 | 328 | 279 | 275 | 1102 | 30 | 44 | 592 | 513 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 30 | 187 | 37 | 116 | 93 | 79 | 78 | 313 | 9 | 13 | 168 | 146 |
| Total Analysis Volume [veh/h] | 119 | 748 | 148 | 465 | 373 | 317 | 313 | 1252 | 34 | 50 | 673 | 583 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 1 | 6 | 0 | 5 | 2 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 40 | 40 | 0 | 40 | 40 | 0 | 40 | 40 | 0 | 40 | 40 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 12 | 21 | 0 | 22 | 31 | 0 | 17 | 53 | 0 | 24 | 60 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | No | No | | No | No | | No | No | |
| Maximum Recall | No | No | | No | No | | No | No | | No | No | |
| Pedestrian Recall | No | No | | No | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 13 | 40 | 40 | 40 | 67 | 67 | 32 | 65 | 65 | 6 | 40 | 40 |
| g / C, Green / Cycle | 0.08 | 0.24 | 0.24 | 0.24 | 0.40 | 0.40 | 0.19 | 0.39 | 0.39 | 0.04 | 0.24 | 0.24 |
| (v / s)_i Volume / Saturation Flow Rate | 0.07 | 0.25 | 0.25 | 0.26 | 0.20 | 0.20 | 0.18 | 0.35 | 0.35 | 0.03 | 0.36 | 0.37 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1757 | 1774 | 1863 | 1584 | 1774 | 1863 | 1845 | 1774 | 1863 | 1583 |
| c, Capacity [veh/h] | 140 | 445 | 420 | 423 | 742 | 631 | 334 | 728 | 721 | 64 | 445 | 378 |
| d1, Uniform Delay [s] | 76.12 | 63.73 | 63.73 | 63.74 | 37.87 | 37.92 | 66.98 | 47.51 | 47.61 | 80.00 | 63.71 | 63.71 |
| k, delay calibration | 0.11 | 0.49 | 0.49 | 0.50 | 0.34 | 0.34 | 0.27 | 0.50 | 0.50 | 0.11 | 0.50 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 13.13 | 52.04 | 53.32 | 73.18 | 1.65 | 1.97 | 23.51 | 14.86 | 15.31 | 17.78 | 241.89 | 256.41 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 0.85 | 1.04 | 1.04 | 1.10 | 0.50 | 0.50 | 0.94 | 0.89 | 0.89 | 0.78 | 1.51 | 1.54 |
| d, Delay for Lane Group [s/veh] | 89.25 | 115.77 | 117.05 | 136.92 | 39.51 | 39.89 | 90.50 | 62.37 | 62.91 | 97.78 | 305.61 | 320.13 |
| Lane Group LOS | F | F | F | F | D | D | F | E | E | F | F | F |
| Critical Lane Group | No | No | Yes | Yes | No | No | Yes | No | No | No | No | Yes |
| 50th-Percentile Queue Length [veh] | 5.61 | 25.44 | 24.15 | 26.69 | 12.02 | 10.34 | 15.44 | 28.11 | 28.09 | 2.48 | 48.93 | 43.12 |
| 50th-Percentile Queue Length [ft] | 140.24 | 636.02 | 603.73 | 667.33 | 300.41 | 258.54 | 385.95 | 702.82 | 702.22 | 61.93 | 1223.26 | 1077.91 |
| 95th-Percentile Queue Length [veh] | 9.49 | 34.47 | 32.93 | 37.18 | 17.70 | 15.62 | 21.88 | 36.81 | 36.78 | 4.46 | 73.61 | 65.89 |
| 95th-Percentile Queue Length [ft] | 237.34 | 861.77 | 823.26 | 929.52 | 442.54 | 390.39 | 547.04 | 920.21 | 919.51 | 111.47 | 1840.31 | 1647.30 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 89.25 | 116.26 | 117.05 | 136.92 | 39.51 | 39.89 | 90.50 | 62.63 | 62.91 | 97.78 | 305.61 | 320.13 |
| Movement LOS | F | F | F | F | D | D | F | E | E | F | F | F |
| d_A, Approach Delay [s/veh] | 113.21 | | | 78.83 | | | 68.09 | | | 304.13 | | |
| Approach LOS | F | | | E | | | E | | | F | | |
| d_I, Intersection Delay [s/veh] | 140.30 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 1.054 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 8: 8 Build out_2021
Report File: E:\...\AM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 9: Beechnut at 610 SB Feeder**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 110.5 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.933 |

**Intersection Setup**

| Name | 610 SB Feeder | | | 610 SB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | 610 SB Feeder | | | 610 SB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 0 | 300 | 236 | 272 | 0 | 1242 | 278 | 140 | 716 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.04 | 1.04 | 1.04 | 1.00 | 1.04 | 1.04 | 1.04 | 1.04 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 124 | 41 | 0 | 252 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 0 | 0 | 312 | 245 | 283 | 0 | 1416 | 330 | 146 | 997 | 0 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 0 | 0 | 78 | 61 | 71 | 0 | 354 | 83 | 37 | 249 | 0 |
| Total Analysis Volume [veh/h] | 0 | 0 | 0 | 312 | 245 | 283 | 0 | 1416 | 330 | 146 | 997 | 0 |
| Presence of On-Street Parking | | | | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Permiss | Permiss | Permiss | Protecte | Overlap | Permiss | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 0 | 0 | 3 | 4 | 0 | 0 | 2 | 0 | 3 | 1 | 0 |
| Auxiliary Signal Groups | | | | | 3,4 | | | | | | | |
| Lead / Lag | - | - | - | Lead | - | - | - | - | - | Lead | - | - |
| Minimum Green [s] | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 0 | 0 | 0 | 5 | 30 | 0 | 0 | 30 | 0 | 5 | 30 | 0 |
| Amber [s] | 0.0 | 0.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 0 | 0 | 0 | 31 | 21 | 0 | 0 | 49 | 0 | 31 | 19 | 0 |
| Vehicle Extension [s] | 0.0 | 0.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 0.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 0.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | | | | Yes | No | | | No | | | No | |
| Maximum Recall | | | | No | No | | | No | | | No | |
| Pedestrian Recall | | | | No | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | | L | C | C | R | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 |
| L, Total Lost Time per Cycle [s] | | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | | 2.00 | 0.00 | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | | 5 | 25 | 25 | 16 | 30 | 30 | 30 | 30 | 30 |
| g / C, Green / Cycle | | 0.05 | 0.26 | 0.26 | 0.16 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 |
| (v / s)_i Volume / Saturation Flow Rate | | 0.12 | 0.12 | 0.12 | 0.12 | 0.33 | 0.34 | 0.08 | 0.34 | 0.21 |
| s, saturation flow rate [veh/h] | | 1774 | 1826 | 1573 | 1583 | 3547 | 1693 | 1774 | 1863 | 1695 |
| c, Capacity [veh/h] | | 92 | 467 | 403 | 258 | 1099 | 525 | 551 | 578 | 526 |
| d1, Uniform Delay [s] | | 46.76 | 34.39 | 34.40 | 41.35 | 38.42 | 38.42 | 29.14 | 38.40 | 34.10 |
| k, delay calibration | | 0.50 | 0.11 | 0.11 | 0.11 | 0.11 | 0.50 | 0.11 | 0.50 | 0.22 |
| I, Upstream Filtering Factor | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | | 665.1 | 0.78 | 0.91 | 4.67 | 32.03 | 72.82 | 0.25 | 66.44 | 3.34 |
| d3, Initial Queue Delay [s] | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 |
| PF, progression factor | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | | 2.41 | 0.49 | 0.49 | 0.76 | 1.06 | 1.11 | 0.27 | 1.10 | 0.69 |
| d, Delay for Lane Group [s/veh] | | 711.9 | 35.17 | 35.31 | 46.02 | 70.45 | 111.24 | 29.39 | 104.85 | 37.44 |
| Lane Group LOS | | F | D | D | D | F | F | C | F | D |
| Critical Lane Group | | Yes | No | No | Yes | No | Yes | No | Yes | No |
| 50th-Percentile Queue Length [veh] | | 19.15 | 5.12 | 4.43 | 5.07 | 18.31 | 23.43 | 2.94 | 24.81 | 8.70 |
| 50th-Percentile Queue Length [ft] | | 478.7 | 128.1 | 110.8 | 126.8 | 457.87 | 585.80 | 73.53 | 620.13 | 217.62 |
| 95th-Percentile Queue Length [veh] | | 30.90 | 8.84 | 7.89 | 8.77 | 26.28 | 33.49 | 5.29 | 34.97 | 13.54 |
| 95th-Percentile Queue Length [ft] | | 772.4 | 220.9 | 197.2 | 219.1 | 656.90 | 837.17 | 132.35 | 874.22 | 338.59 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 486.44 | 35.23 | 43.27 | 0.00 | 77.71 | 111.24 | 29.39 | 80.29 | 0.00 |
| Movement LOS | | | | F | D | D | | E | F | C | F | |
| d_A, Approach Delay [s/veh] | 0.00 | | | 215.37 | | | 84.04 | | | 73.79 | | |
| Approach LOS | A | | | F | | | F | | | E | | |
| d_I, Intersection Delay [s/veh] | 110.48 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 0.933 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 4 | - | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 5 | - | 6 | 8 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 8: 8 Build out_2021
Report File: E:\...\AM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 10: Beechnut at 610 NB Feeder**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 63.5 |
| Analysis Method: | HCM 2010 | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.746 |

**Intersection Setup**

| Name | 610 NB Feeder | | | 610 NB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | 610 NB Feeder | | | 610 NB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 357 | 274 | 71 | 0 | 0 | 0 | 630 | 928 | 0 | 0 | 476 | 302 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 63 | 0 | 0 | 0 | 0 | 0 | 0 | 124 | 0 | 0 | 189 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 434 | 285 | 74 | 0 | 0 | 0 | 655 | 1089 | 0 | 0 | 684 | 314 |
| Peak Hour Factor | 0.9100 | 0.9100 | 0.9100 | 1.0000 | 1.0000 | 1.0000 | 0.9100 | 0.9100 | 1.0000 | 1.0000 | 0.9100 | 0.9100 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 119 | 78 | 20 | 0 | 0 | 0 | 180 | 299 | 0 | 0 | 188 | 86 |
| Total Analysis Volume [veh/h] | 477 | 313 | 81 | 0 | 0 | 0 | 720 | 1197 | 0 | 0 | 752 | 345 |
| Presence of On-Street Parking | No | | No | | | | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Overlap | Permiss | Permiss | Permiss | Permiss | Split | Split | Permiss | Permiss | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 7 | 8 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | 7,8 | | | | | | | | | | |
| Lead / Lag | Lag | - | - | - | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 5 | 30 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 25 | 31 | 0 | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 19 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 10 | 10 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | | | | | No | | | No | |
| Maximum Recall | No | No | | | | | | No | | | No | |
| Pedestrian Recall | No | No | | | | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | C | | L | C | C | C | C |
|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 77 | 77 | 77 | 77 | | 77 | 77 | 77 | 77 | 77 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 0.00 | 0.00 | 0.00 | | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 5 | 39 | 39 | 39 | | 30 | 30 | 30 | 21 | 21 |
| g / C, Green / Cycle | 0.06 | 0.51 | 0.51 | 0.51 | | 0.39 | 0.39 | 0.39 | 0.28 | 0.28 |
| (v / s)_i Volume / Saturation Flow Rate | 0.13 | 0.13 | 0.12 | 0.12 | | 0.37 | 0.36 | 0.35 | 0.21 | 0.23 |
| s, saturation flow rate [veh/h] | 1774 | 1774 | 1695 | 1577 | | 1774 | 1854 | 1695 | 3547 | 1597 |
| c, Capacity [veh/h] | 115 | 903 | 863 | 803 | | 688 | 719 | 657 | 977 | 440 |
| d1, Uniform Delay [s] | 36.18 | 10.78 | 10.60 | 10.62 | | 23.05 | 22.51 | 22.46 | 25.58 | 26.33 |
| k, delay calibration | 0.50 | 0.50 | 0.50 | 0.50 | | 0.42 | 0.39 | 0.39 | 0.11 | 0.15 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 510.2 | 0.71 | 0.64 | 0.70 | | 22.37 | 15.34 | 15.87 | 1.17 | 5.62 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 2.07 | 0.26 | 0.24 | 0.24 | | 0.96 | 0.92 | 0.91 | 0.75 | 0.83 |
| d, Delay for Lane Group [s/veh] | 546.4 | 11.49 | 11.24 | 11.32 | | 45.42 | 37.85 | 38.32 | 26.75 | 31.96 |
| Lane Group LOS | F | B | B | B | | D | D | D | C | C |
| Critical Lane Group | Yes | Yes | No | No | | Yes | No | No | No | Yes |
| 50th-Percentile Queue Length [veh] | 18.44 | 2.29 | 1.92 | 1.82 | | 14.98 | 13.55 | 12.42 | 6.00 | 6.70 |
| 50th-Percentile Queue Length [ft] | 461.1 | 57.30 | 48.04 | 45.56 | | 374.62 | 338.81 | 310.52 | 149.95 | 167.47 |
| 95th-Percentile Queue Length [veh] | 29.95 | 4.13 | 3.46 | 3.28 | | 21.33 | 19.59 | 18.20 | 10.01 | 10.94 |
| 95th-Percentile Queue Length [ft] | 748.6 | 103.1 | 86.48 | 82.00 | | 533.34 | 489.75 | 455.02 | 250.36 | 273.58 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 278.95 | 11.27 | 11.32 | 0.00 | 0.00 | 0.00 | 44.56 | 38.09 | 0.00 | 0.00 | 26.89 | 31.96 |
| Movement LOS | F | B | B | | | | D | D | | | C | C |
| d_A, Approach Delay [s/veh] | 157.87 | | | 0.00 | | | 40.59 | | | 28.48 | | |
| Approach LOS | F | | | A | | | D | | | C | | |
| d_I, Intersection Delay [s/veh] | 63.47 | | | | | | | | | | | |
| Intersection LOS | E | | | | | | | | | | | |
| Intersection V/C | 0.746 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 4 | - | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 5 | - | 6 | 8 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 8: 8 Build out_2021
Report File: E:\...\AM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 11: S. Rice at Evergreen St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 238.4 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 1.843 |

**Intersection Setup**

| Name | S. Rice Ave | | | S. Rice Ave | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S. Rice Ave | | | S. Rice Ave | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 3 | 492 | 119 | 5 | 279 | 5 | 29 | 153 | 14 | 70 | 126 | 126 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 124 | 135 | 124 | 0 | 355 | 0 | 0 | 0 | 190 | 168 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 127 | 647 | 248 | 5 | 645 | 5 | 30 | 159 | 205 | 241 | 131 | 131 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 36 | 184 | 70 | 1 | 183 | 1 | 9 | 45 | 58 | 68 | 37 | 37 |
| Total Analysis Volume [veh/h] | 144 | 735 | 282 | 6 | 733 | 6 | 34 | 181 | 233 | 274 | 149 | 149 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 8 | 0 | 0 | 4 | 0 | 0 | 2 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | - | - | - | - | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 0 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 0 | 23 | 0 | 0 | 23 | 0 | 0 | 23 | 0 | 0 | 74 | 0 |
| Vehicle Extension [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | | No | | | No | | | No | | | No | |
| Maximum Recall | | No | | | No | | | No | | | No | |
| Pedestrian Recall | | No | | | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | C | C | C | C | C | C |
|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 100 | 100 | 100 | 100 | 100 | 100 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 2.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 30 | 30 | 30 | 30 | 28 | 30 |
| g / C, Green / Cycle | 0.30 | 0.30 | 0.30 | 0.30 | 0.28 | 0.30 |
| (v / s)_i Volume / Saturation Flow Rate | 1.25 | 0.63 | 0.25 | 0.25 | 0.26 | 0.33 |
| s, saturation flow rate [veh/h] | 115 | 1616 | 1288 | 1691 | 1700 | 1741 |
| c, Capacity [veh/h] | 107 | 485 | 423 | 507 | 475 | 523 |
| d1, Uniform Delay [s] | 49.14 | 34.94 | 30.01 | 32.62 | 35.18 | 34.93 |
| k, delay calibration | 0.50 | 0.50 | 0.33 | 0.33 | 0.36 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 207.12 | 501.15 | 8.25 | 10.26 | 23.46 | 67.48 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| X, volume / capacity | 1.35 | 2.10 | 0.76 | 0.83 | 0.94 | 1.09 |
| d, Delay for Lane Group [s/veh] | 256.26 | 536.10 | 38.26 | 42.88 | 58.64 | 102.41 |
| Lane Group LOS | F | F | D | D | E | F |
| Critical Lane Group | Yes | No | No | No | Yes | Yes |
| 50th-Percentile Queue Length [veh] | 8.79 | 78.94 | 7.42 | 10.78 | 13.50 | 22.16 |
| 50th-Percentile Queue Length [ft] | 219.73 | 1973.48 | 185.45 | 269.47 | 337.57 | 554.10 |
| 95th-Percentile Queue Length [veh] | 15.66 | 125.37 | 11.88 | 16.16 | 19.53 | 31.61 |
| 95th-Percentile Queue Length [ft] | 391.53 | 3134.15 | 297.12 | 404.08 | 488.23 | 790.30 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 256.26 | 536.10 | 536.10 | 38.26 | 40.89 | 42.88 | 58.64 | 58.64 | 58.64 | 102.41 | 102.41 | 102.41 |
| Movement LOS | F | F | F | D | D | D | E | E | E | F | F | F |
| d_A, Approach Delay [s/veh] | 501.39 | | | 40.88 | | | 58.64 | | | 102.41 | | |
| Approach LOS | F | | | D | | | E | | | F | | |
| d_I, Intersection Delay [s/veh] | 238.35 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 1.843 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 6 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 12: Chimney Rock Rd at Evergreen St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 30.6 |
| Analysis Method: | HCM 2010 | Level Of Service: | C |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.666 |

**Intersection Setup**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 215.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 9 | 965 | 36 | 8 | 367 | 4 | 21 | 78 | 15 | 20 | 39 | 32 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 127 | 0 | 0 | 0 | 63 | 0 | 0 | 41 | 83 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 9 | 1004 | 37 | 135 | 382 | 4 | 22 | 144 | 16 | 21 | 82 | 116 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 3 | 285 | 11 | 38 | 109 | 1 | 6 | 41 | 5 | 6 | 23 | 33 |
| Total Analysis Volume [veh/h] | 10 | 1141 | 42 | 153 | 434 | 5 | 25 | 164 | 18 | 24 | 93 | 132 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 0 | 2 | 0 | 0 | 1 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 30 | 30 | 0 | 30 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 51 | 71 | 0 | 9 | 29 | 0 | 0 | 21 | 0 | 0 | 19 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | No | No | | No | No | | | No | | | No | |
| Maximum Recall | No | No | | No | No | | | No | | | No | |
| Pedestrian Recall | No | No | | No | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | C | C |
|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 1 | 26 | 26 | 8 | 34 | 34 | 10 | 13 |
| g / C, Green / Cycle | 0.01 | 0.36 | 0.36 | 0.11 | 0.45 | 0.45 | 0.14 | 0.18 |
| (v / s)_i Volume / Saturation Flow Rate | 0.01 | 0.32 | 0.32 | 0.09 | 0.12 | 0.12 | 0.11 | 0.15 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1840 | 1774 | 1863 | 1855 | 1824 | 1696 |
| c, Capacity [veh/h] | 22 | 663 | 655 | 196 | 846 | 843 | 258 | 299 |
| d1, Uniform Delay [s] | 36.34 | 22.59 | 22.59 | 32.08 | 12.52 | 12.52 | 30.84 | 29.49 |
| k, delay calibration | 0.11 | 0.30 | 0.30 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 13.26 | 11.27 | 11.45 | 6.53 | 0.16 | 0.16 | 5.79 | 6.04 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 0.45 | 0.90 | 0.90 | 0.78 | 0.26 | 0.26 | 0.80 | 0.83 |
| d, Delay for Lane Group [s/veh] | 49.60 | 33.86 | 34.05 | 38.61 | 12.68 | 12.68 | 36.62 | 35.54 |
| Lane Group LOS | D | C | C | D | B | B | D | D |
| Critical Lane Group | No | No | Yes | Yes | No | No | Yes | Yes |
| 50th-Percentile Queue Length [veh] | 0.26 | 11.13 | 11.03 | 2.93 | 2.12 | 2.11 | 3.86 | 4.60 |
| 50th-Percentile Queue Length [ft] | 6.44 | 278.20 | 275.76 | 73.36 | 52.91 | 52.74 | 96.56 | 115.06 |
| 95th-Percentile Queue Length [veh] | 0.46 | 16.60 | 16.48 | 5.28 | 3.81 | 3.80 | 6.95 | 8.12 |
| 95th-Percentile Queue Length [ft] | 11.59 | 414.97 | 411.93 | 132.04 | 95.24 | 94.93 | 173.81 | 203.02 |

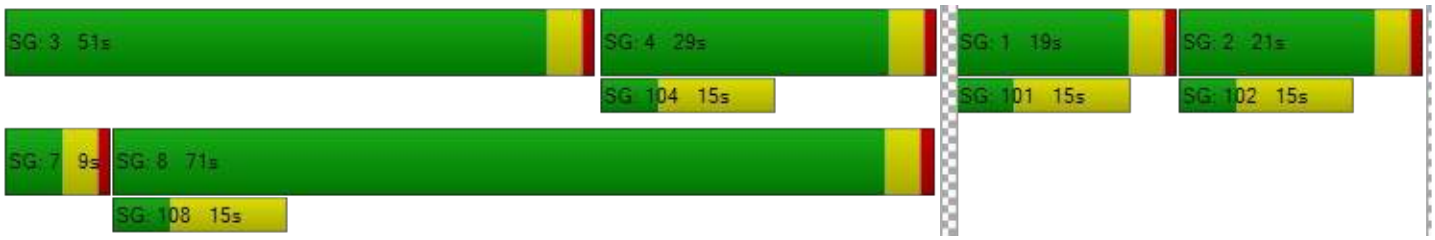
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 49.60 | 33.95 | 34.05 | 38.61 | 12.68 | 12.68 | 36.62 | 36.62 | 36.62 | 35.54 | 35.54 | 35.54 |
| Movement LOS | D | C | C | D | B | B | D | D | D | D | D | D |
| d_A, Approach Delay [s/veh] | 34.08 | | | 19.39 | | | 36.62 | | | 35.54 | | |
| Approach LOS | C | | | B | | | D | | | D | | |
| d_I, Intersection Delay [s/veh] | 30.60 | | | | | | | | | | | |
| Intersection LOS | C | | | | | | | | | | | |
| Intersection V/C | 0.666 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 3 | 4 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 8 | 7 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 8: 8 Build out_2021
Report File: E:\...\AM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 13: Maple St at Parking Garage Entrance**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 0.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | A |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.009 |

**Intersection Setup**

| Name | Parking Garage Driveway | | Maple St | | Maple St | |
|---|---|---|---|---|---|---|
| Approach | Southbound | | Eastbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Right | Left | Thru | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | Yes | | Yes | | Yes | |

**Volumes**

| Name | Parking Garage Driveway | | Maple St | | Maple St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 22 | 710 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 0 | 0 | 0 | 22 | 710 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 0 | 0 | 0 | 7 | 237 |
| Total Analysis Volume [veh/h] | 0 | 0 | 0 | 0 | 29 | 947 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Stop | Free | Free |
| Flared Lane | | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS | | | | A | A | A |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.00 | | 0.00 | |
| Approach LOS | A | | A | | A | |
| d_I, Intersection Delay [s/veh] | 0.00 | | | | | |
| Intersection LOS | A | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_AMv15.vistro
Report File: E:\...\AM_BHS_Build_out.pdf

Scenario 8 Build out_2021
6/28/2017

## Trip Generation summary

### Added Trips

| Zone ID: Name | Land Use variables | Code | Ind. Var. | Rate | Quantity | % In | % Out | Trips In | Trips Out | Total Trips | % of Total Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1: zone | Student | Parking Garage | | 1.000 | 0.000 | 50.00 | 50.00 | 435 | 0 | 435 | 17.81 |
| 2: zone | Parents | Student drop-off/pick-up driveway | | 1.000 | 0.000 | 50.00 | 50.00 | 827 | 827 | 1654 | 67.70 |
| 17: zone | buses | Bus Loop | | 1.000 | 0.000 | 50.00 | 50.00 | 22 | 22 | 44 | 1.80 |
| 22: zone | staff | Parking at Garage | | 1.000 | 0.000 | 50.00 | 50.00 | 310 | 0 | 310 | 12.69 |
| | | | | | **Added Trips Total** | | | **1594** | **849** | **2443** | **100.00** |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_AMv15.vistro
Report File: E:\...\AM_BHS_Build_out.pdf

Scenario 8 Build out_2021
6/28/2017

## Trip Distribution summary

| Zone / Gate | Zone 1: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 22: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 15.00 | 65 | 15.00 | 0 |
| 5: Gate | 5.00 | 22 | 5.00 | 0 |
| 6: Gate | 5.00 | 22 | 5.00 | 0 |
| 7: Gate | 10.00 | 44 | 10.00 | 0 |
| 8: Gate | 5.00 | 22 | 5.00 | 0 |
| 9: Gate | 10.00 | 44 | 10.00 | 0 |
| 10: Gate | 5.00 | 22 | 5.00 | 0 |
| 11: Gate | 10.00 | 44 | 10.00 | 0 |
| 12: Gate | 20.00 | 87 | 20.00 | 0 |
| 14: Gate | 15.00 | 65 | 15.00 | 0 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 19: Gate | 0.00 | 0 | 0.00 | 0 |
| 20: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **437** | **100.00** | **0** |

| Zone / Gate | Zone 2: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 22: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 15.00 | 124 | 15.00 | 124 |
| 5: Gate | 5.00 | 41 | 5.00 | 41 |
| 6: Gate | 5.00 | 41 | 5.00 | 41 |
| 7: Gate | 10.00 | 83 | 10.00 | 83 |
| 8: Gate | 5.00 | 41 | 5.00 | 41 |
| 9: Gate | 10.00 | 83 | 10.00 | 83 |
| 10: Gate | 5.00 | 41 | 5.00 | 41 |
| 11: Gate | 10.00 | 83 | 10.00 | 83 |
| 12: Gate | 20.00 | 165 | 20.00 | 166 |
| 14: Gate | 15.00 | 124 | 15.00 | 124 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 19: Gate | 0.00 | 0 | 0.00 | 0 |
| 20: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **826** | **100.00** | **827** |

| Zone / Gate | Zone 17: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 22: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 0.00 | 0 | 0.00 | 0 |
| 5: Gate | 0.00 | 0 | 0.00 | 0 |
| 6: Gate | 0.00 | 0 | 0.00 | 0 |
| 7: Gate | 0.00 | 0 | 0.00 | 0 |
| 8: Gate | 0.00 | 0 | 0.00 | 0 |
| 9: Gate | 0.00 | 0 | 0.00 | 0 |
| 10: Gate | 0.00 | 0 | 0.00 | 0 |
| 11: Gate | 0.00 | 0 | 0.00 | 0 |
| 12: Gate | 50.00 | 11 | 50.00 | 11 |
| 14: Gate | 50.00 | 11 | 50.00 | 11 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 19: Gate | 0.00 | 0 | 50.00 | 11 |
| 20: Gate | 0.00 | 0 | 50.00 | 11 |
| **Total** | **100.00** | **22** | **200.00** | **44** |

| Zone / Gate | Zone 22: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 0.00 | 0 | 0.00 | 0 |
| 5: Gate | 0.00 | 0 | 0.00 | 0 |
| 6: Gate | 0.00 | 0 | 0.00 | 0 |
| 7: Gate | 0.00 | 0 | 0.00 | 0 |
| 8: Gate | 0.00 | 0 | 0.00 | 0 |
| 9: Gate | 0.00 | 0 | 0.00 | 0 |
| 10: Gate | 0.00 | 0 | 0.00 | 0 |
| 11: Gate | 0.00 | 0 | 0.00 | 0 |
| 12: Gate | 50.00 | 155 | 50.00 | 0 |
| 14: Gate | 50.00 | 155 | 50.00 | 0 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 19: Gate | 0.00 | 0 | 0.00 | 0 |
| 20: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **310** | **100.00** | **0** |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_PMv15.vistro
Report File: E:\...\PM_BHS_Build_out.pdf

Scenario 5 Build_out_2021
6/28/2017

**Intersection Analysis Summary**

| ID | Intersection Name | Control Type | Method | Worst Mvmt | V/C | Delay (s/veh) | LOS |
|---|---|---|---|---|---|---|---|
| 1 | Maple St at Ferris Dr | All-way stop | HCM 2010 | NB Thru | 0.154 | 7.7 | A |
| 2 | S. Rice Avenue at Maple St | Signalized | HCM 2010 | NB Left | 0.532 | 16.7 | B |
| 3 | Student Pick-up/Drop-off Drwy | Two-way stop | HCM 2010 | WB Left | 0.000 | 10,000.0 | F |
| 4 | S. Rice Ave at Bus Exit Drwy/Holly Street | Signalized | HCM 2010 | EB Left | 1.024 | 113.5 | F |
| 5 | Valerie St. at S. Rice Ave | Two-way stop | HCM 2010 | EB Left | 0.475 | 69.7 | F |
| 6 | Valerie St at Ferris Dr | All-way stop | HCM 2010 | NB Right | 0.209 | 8.3 | A |
| 7 | Chimney Rock Rd at Beechnut St | Signalized | HCM 2010 | SB Left | 0.627 | 23.0 | C |
| 8 | Beechnut St at S Rice Ave | Signalized | HCM 2010 | NB Left | 0.980 | 132.1 | F |
| 9 | Beechnut at 610 SB Feeder | Signalized | HCM 2010 | SB Left | 1.012 | 179.3 | F |
| 10 | Beechnut at 610 NB Feeder | Signalized | HCM 2010 | NB Left | 0.805 | 59.4 | E |
| 11 | S. Rice at Evergreen St | Signalized | HCM 2010 | NB Right | 0.947 | 154.7 | F |
| 12 | Chimney Rock Rd at Evergreen St | Signalized | HCM 2010 | NB Left | 0.516 | 17.7 | B |
| 13 | Maple St at Parking Garage Entrance | Two-way stop | HCM 2010 | WB Thru | 0.000 | 0.0 | A |

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 1: Maple St at Ferris Dr**

| | | | |
|---|---|---|---|
| Control Type: | All-way stop | Delay (sec / veh): | 7.7 |
| Analysis Method: | HCM 2010 | Level Of Service: | A |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.154 |

**Intersection Setup**

| Name | Ferris Dr | | | Ferris Dr | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Ferris Dr | | | Ferris Dr | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 16 | 70 | 0 | 0 | 79 | 24 | 13 | 0 | 32 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 16 | 70 | 0 | 0 | 79 | 24 | 13 | 0 | 32 | 0 | 0 | 0 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 5 | 23 | 0 | 0 | 26 | 8 | 4 | 0 | 11 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 21 | 93 | 0 | 0 | 105 | 32 | 17 | 0 | 43 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

**Lanes**

| | | | | |
|---|---|---|---|---|
| Capacity per Entry Lane [veh/h] | 850 | 890 | 878 | 793 |
| Degree of Utilization, x | 0.13 | 0.15 | 0.07 | 0.00 |

**Movement, Approach, & Intersection Results**

| | | | | |
|---|---|---|---|---|
| 95th-Percentile Queue Length [veh] | 0.46 | 0.54 | 0.22 | 0.00 |
| 95th-Percentile Queue Length [ft] | 11.56 | 13.56 | 5.49 | 0.00 |
| Approach Delay [s/veh] | 7.89 | 7.78 | 7.40 | 0.00 |
| Approach LOS | A | A | A | A |
| Intersection Delay [s/veh] | 7.75 | | | |
| Intersection LOS | A | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 5: 5 Build_out_2021
Report File: E:\...\PM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 2: S. Rice Avenue at Maple St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 16.7 |
| Analysis Method: | HCM 2010 | Level Of Service: | B |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.532 |

**Intersection Setup**

| Name | S Rice Ave | | | S. Rice Avenue | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S Rice Ave | | | S. Rice Avenue | | | Maple St | | | Maple St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 355 | 26 | 5 | 403 | 0 | 0 | 0 | 0 | 27 | 0 | 31 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 11 | 454 | 0 | 0 | 594 | 11 | 68 | 0 | 69 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 11 | 823 | 26 | 5 | 1013 | 11 | 68 | 0 | 69 | 27 | 0 | 31 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 4 | 274 | 9 | 2 | 338 | 4 | 23 | 0 | 23 | 9 | 0 | 10 |
| Total Analysis Volume [veh/h] | 15 | 1097 | 35 | 7 | 1351 | 15 | 91 | 0 | 92 | 36 | 0 | 41 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 0 | 2 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lag | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 30 | 30 | 0 | 30 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 45 | 26 | 0 | 51 | 32 | 0 | 0 | 24 | 0 | 0 | 19 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | No | No | | No | No | | | No | | | No | |
| Maximum Recall | No | No | | No | No | | | No | | | No | |
| Pedestrian Recall | No | No | | No | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | C | C |
|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 1 | 18 | 18 | 4 | 21 | 21 | 7 | 3 |
| g / C, Green / Cycle | 0.02 | 0.38 | 0.38 | 0.08 | 0.44 | 0.44 | 0.14 | 0.07 |
| (v / s)_i Volume / Saturation Flow Rate | 0.01 | 0.31 | 0.31 | 0.00 | 0.37 | 0.37 | 0.11 | 0.05 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1843 | 1774 | 1863 | 1856 | 1673 | 1667 |
| c, Capacity [veh/h] | 34 | 700 | 692 | 146 | 818 | 814 | 240 | 112 |
| d1, Uniform Delay [s] | 23.46 | 13.57 | 13.57 | 20.44 | 12.03 | 12.03 | 19.91 | 22.05 |
| k, delay calibration | 0.11 | 0.11 | 0.11 | 0.11 | 0.15 | 0.15 | 0.11 | 0.11 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 8.71 | 2.35 | 2.38 | 0.13 | 3.26 | 3.29 | 4.93 | 7.22 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 0.44 | 0.81 | 0.81 | 0.05 | 0.84 | 0.84 | 0.76 | 0.69 |
| d, Delay for Lane Group [s/veh] | 32.17 | 15.92 | 15.95 | 20.57 | 15.29 | 15.33 | 24.83 | 29.28 |
| Lane Group LOS | C | B | B | C | B | B | C | C |
| Critical Lane Group | Yes | No | No | No | No | Yes | Yes | Yes |
| 50th-Percentile Queue Length [veh] | 0.24 | 4.95 | 4.90 | 0.07 | 5.75 | 5.74 | 2.09 | 1.00 |
| 50th-Percentile Queue Length [ft] | 5.93 | 123.66 | 122.52 | 1.79 | 143.78 | 143.53 | 52.34 | 25.01 |
| 95th-Percentile Queue Length [veh] | 0.43 | 8.59 | 8.53 | 0.13 | 9.68 | 9.67 | 3.77 | 1.80 |
| 95th-Percentile Queue Length [ft] | 10.68 | 214.85 | 213.28 | 3.22 | 242.11 | 241.76 | 94.20 | 45.02 |

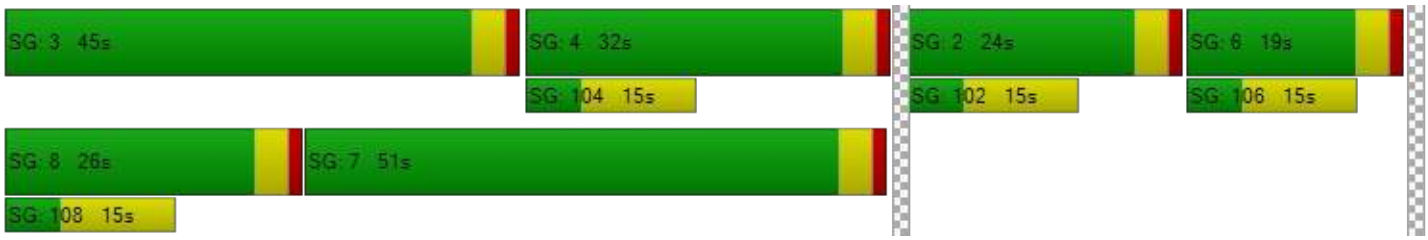
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 32.17 | 15.93 | 15.95 | 20.57 | 15.31 | 15.33 | 24.83 | 24.83 | 24.83 | 29.28 | 29.28 | 29.28 |
| Movement LOS | C | B | B | C | B | B | C | C | C | C | C | C |
| d_A, Approach Delay [s/veh] | 16.14 | | | 15.34 | | | 24.83 | | | 29.28 | | |
| Approach LOS | B | | | B | | | C | | | C | | |
| d_I, Intersection Delay [s/veh] | 16.68 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |
| Intersection V/C | 0.532 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 3 | 4 | 2 | 6 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 5: 5 Build_out_2021
Report File: E:\...\PM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 3: Student Pick-up/Drop-off Drwy**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 10,000.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | S. Rice Avenue | | | S. Rice Avenue | | | Drwy | | | Holt St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | No | | | No | | | Yes | | | Yes | | |

**Volumes**

| Name | S. Rice Avenue | | | S. Rice Avenue | | | Drwy | | | Holt St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 386 | 0 | 0 | 346 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 522 | 0 | 0 | 22 | 0 | 0 | 0 | 583 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 923 | 0 | 0 | 382 | 0 | 0 | 0 | 583 | 0 | 0 | 0 |
| Peak Hour Factor | 1.0000 | 0.7500 | 1.0000 | 1.0000 | 0.7500 | 0.7500 | 1.0000 | 1.0000 | 0.7500 | 0.7500 | 1.0000 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 308 | 0 | 0 | 127 | 0 | 0 | 0 | 194 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 0 | 1231 | 0 | 0 | 509 | 0 | 0 | 0 | 777 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | | |
|---|---|---|---|---|
| Priority Scheme | Free | Free | Stop | Stop |
| Flared Lane | | | | No |
| Storage Area [veh] | 0 | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | No | No |
| Number of Storage Spaces in Median | 0 | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 1.04 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 68.16 | 10000.0 | 0.00 | 13.30 |
| Movement LOS | | A | | | A | A | | | F | F | | B |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 19.20 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 479.95 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 0.00 | | | 0.00 | | | 68.16 | | | 5006.65 | | |
| Approach LOS | A | | | A | | | F | | | F | | |
| d_I, Intersection Delay [s/veh] | 21.04 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 5: 5 Build_out_2021
Report File: E:\...\PM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 4: S. Rice Ave at Bus Exit Drwy/Holly Street**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 113.5 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 1.024 |

**Intersection Setup**

| Name | S. Rice Avenue | | | S. Rice Ave | | | Bus Exit Drwy | | | Holly Street | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | No | | | No | | | No | | |

**Volumes**

| Name | S. Rice Avenue | | | S. Rice Ave | | | Bus Exit Drwy | | | Holly Street | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 427 | 0 | 0 | 346 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 454 | 68 | 0 | 0 | 11 | 372 | 491 | 0 | 11 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 454 | 495 | 0 | 0 | 357 | 372 | 491 | 0 | 11 | 0 | 0 | 0 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 151 | 165 | 0 | 0 | 119 | 124 | 164 | 0 | 4 | 0 | 0 | 0 |
| Total Analysis Volume [veh/h] | 605 | 660 | 0 | 0 | 476 | 496 | 655 | 0 | 15 | 0 | 0 | 0 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Split | Permiss | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 2 | 2 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lag | - | - | Lead | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 30 | 30 | 0 | 30 | 30 | 0 | 30 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 34 | 26 | 0 | 40 | 32 | 0 | 45 | 45 | 0 | 0 | 9 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 5 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 10 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | No | | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | No | No | | No | No | | No | | | | No | |
| Maximum Recall | No | No | | No | No | | No | | | | No | |
| Pedestrian Recall | No | No | | No | No | | No | | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | L | R | C |
|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 30 | 21 | 21 | 39 | 30 | 30 | 30 | 30 | 0 |
| g / C, Green / Cycle | 0.28 | 0.20 | 0.20 | 0.36 | 0.28 | 0.28 | 0.28 | 0.28 | 0.00 |
| (v / s)_i Volume / Saturation Flow Rate | 0.34 | 0.18 | 0.18 | 0.00 | 0.26 | 0.31 | 0.37 | 0.01 | 0.00 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1863 | 1774 | 1863 | 1583 | 1774 | 1583 | 1863 |
| c, Capacity [veh/h] | 502 | 378 | 378 | 643 | 527 | 448 | 502 | 448 | 2 |
| d1, Uniform Delay [s] | 38.06 | 40.97 | 40.97 | 0.00 | 36.67 | 38.06 | 38.06 | 27.56 | 0.00 |
| k, delay calibration | 0.50 | 0.18 | 0.18 | 0.11 | 0.38 | 0.50 | 0.50 | 0.11 | 0.11 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 110.47 | 9.86 | 9.86 | 0.00 | 17.43 | 75.28 | 151.61 | 0.03 | 0.00 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.21 | 0.87 | 0.87 | 0.00 | 0.90 | 1.11 | 1.31 | 0.03 | 0.00 |
| d, Delay for Lane Group [s/veh] | 148.53 | 50.83 | 50.83 | 0.00 | 54.10 | 113.34 | 189.67 | 27.59 | 0.00 |
| Lane Group LOS | F | D | D | A | D | F | F | C | A |
| Critical Lane Group | Yes | No | No | No | No | Yes | Yes | No | No |
| 50th-Percentile Queue Length [veh] | 28.15 | 9.30 | 9.30 | 0.00 | 14.21 | 20.74 | 33.88 | 0.28 | 0.00 |
| 50th-Percentile Queue Length [ft] | 703.65 | 232.52 | 232.52 | 0.00 | 355.36 | 518.61 | 846.93 | 7.00 | 0.00 |
| 95th-Percentile Queue Length [veh] | 41.08 | 14.30 | 14.30 | 0.00 | 20.40 | 30.01 | 50.33 | 0.50 | 0.00 |
| 95th-Percentile Queue Length [ft] | 1027.12 | 357.55 | 357.55 | 0.00 | 509.93 | 750.25 | 1258.23 | 12.60 | 0.00 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 148.53 | 50.83 | 50.83 | 0.00 | 54.10 | 113.34 | 189.67 | 0.00 | 27.59 | 0.00 | 0.00 | 0.00 |
| Movement LOS | F | D | D | A | D | F | F | | C | A | A | A |
| d_A, Approach Delay [s/veh] | 97.56 | | | 84.33 | | | 186.04 | | | 0.00 | | |
| Approach LOS | F | | | F | | | F | | | A | | |
| d_I, Intersection Delay [s/veh] | 113.53 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 1.024 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 3 | 4 | 2 | 6 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 5: 5 Build_out_2021
Report File: E:\...\PM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 5: Valerie St. at S. Rice Ave**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 69.7 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.475 |

**Intersection Setup**

| Name | S. Rice Ave | | S. Rice Ave | | Valerie St | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Eastbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Thru | Thru | Right | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | S. Rice Ave | | S. Rice Ave | | Valerie St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 2 | 425 | 299 | 39 | 33 | 47 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 559 | 383 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 2 | 1001 | 694 | 39 | 33 | 47 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 1 | 334 | 231 | 13 | 11 | 16 |
| Total Analysis Volume [veh/h] | 3 | 1335 | 925 | 52 | 44 | 63 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Free | Free | Stop |
| Flared Lane | | | No |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | No |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.01 | 0.01 | 0.00 | 0.48 | 0.12 |
| d_M, Delay for Movement [s/veh] | 10.15 | 0.00 | 0.00 | 0.00 | 69.68 | 37.65 |
| Movement LOS | B | A | A | A | F | E |
| 95th-Percentile Queue Length [veh] | 13.92 | 6.96 | 0.00 | 0.00 | 3.25 | 3.25 |
| 95th-Percentile Queue Length [ft] | 347.89 | 173.94 | 0.00 | 0.00 | 81.25 | 81.25 |
| d_A, Approach Delay [s/veh] | 0.02 | | 0.00 | | 50.82 | |
| Approach LOS | A | | A | | F | |
| d_I, Intersection Delay [s/veh] | 2.26 | | | | | |
| Intersection LOS | F | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 5: 5 Build_out_2021
Report File: E:\...\PM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 6: Valerie St at Ferris Dr**

| | | | |
|---|---|---|---|
| Control Type: | All-way stop | Delay (sec / veh): | 8.3 |
| Analysis Method: | HCM 2010 | Level Of Service: | A |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.209 |

**Intersection Setup**

| Name | Ferris Dr | | | Ferris Dr | | | Valerie St | | | Valerie St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | No | | | No | | | No | | | No | | |

**Volumes**

| Name | Ferris Dr | | | Ferris Dr | | | Valerie St | | | Valerie St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 14 | 58 | 61 | 11 | 62 | 11 | 8 | 30 | 15 | 15 | 46 | 24 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 14 | 58 | 61 | 11 | 62 | 11 | 8 | 30 | 15 | 15 | 46 | 24 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 5 | 19 | 20 | 4 | 21 | 4 | 3 | 10 | 5 | 5 | 15 | 8 |
| Total Analysis Volume [veh/h] | 19 | 77 | 81 | 15 | 83 | 15 | 11 | 40 | 20 | 20 | 61 | 32 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

**Lanes**

| | | | | |
|---|---|---|---|---|
| Capacity per Entry Lane [veh/h] | 847 | 797 | 783 | 792 |
| Degree of Utilization, x | 0.21 | 0.14 | 0.09 | 0.14 |

**Movement, Approach, & Intersection Results**

| | | | | |
|---|---|---|---|---|
| 95th-Percentile Queue Length [veh] | 0.79 | 0.49 | 0.30 | 0.50 |
| 95th-Percentile Queue Length [ft] | 19.65 | 12.32 | 7.45 | 12.41 |
| Approach Delay [s/veh] | 8.37 | 8.26 | 8.05 | 8.30 |
| Approach LOS | A | A | A | A |
| Intersection Delay [s/veh] | 8.28 | | | |
| Intersection LOS | A | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Level Of Service Report**
**Intersection 7: Chimney Rock Rd at Beechnut St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 23.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | C |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.627 |

**Intersection Setup**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration |  | | |  | | |  | | |  | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 82 | 298 | 82 | 93 | 473 | 112 | 63 | 627 | 107 | 130 | 951 | 99 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 83 | 0 | 0 | 0 | 0 | 41 | 0 | 105 | 52 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 85 | 310 | 168 | 97 | 492 | 116 | 66 | 693 | 111 | 240 | 1041 | 103 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 24 | 88 | 48 | 28 | 140 | 33 | 19 | 197 | 32 | 68 | 296 | 29 |
| Total Analysis Volume [veh/h] | 97 | 352 | 191 | 110 | 559 | 132 | 75 | 788 | 126 | 273 | 1183 | 117 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 1 | 6 | 0 | 5 | 2 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 5 | 40 | 0 | 5 | 40 | 0 | 40 | 40 | 0 | 40 | 40 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 22 | 23 | 0 | 22 | 23 | 0 | 11 | 42 | 0 | 33 | 64 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | Yes | No | | No | No | | No | No | |
| Maximum Recall | No | No | | No | No | | No | No | | No | No | |
| Pedestrian Recall | No | No | | No | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | R | L | C | C | R | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 2.00 | 2.00 | 0.00 | 0.00 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 0.00 | 2.00 | 2.00 | 2.00 | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 5 | 20 | 11 | 11 | 5 | 20 | 11 | 11 | 4 | 19 | 19 | 12 | 27 | 27 |
| g / C, Green / Cycle | 0.08 | 0.32 | 0.17 | 0.17 | 0.08 | 0.32 | 0.17 | 0.17 | 0.06 | 0.30 | 0.30 | 0.19 | 0.43 | 0.43 |
| (v / s)_i Volume / Saturation Flow Rate | 0.04 | 0.11 | 0.10 | 0.12 | 0.07 | 0.13 | 0.11 | 0.08 | 0.04 | 0.25 | 0.25 | 0.15 | 0.35 | 0.36 |
| s, saturation flow rate [veh/h] | 847 | 770 | 3227 | 1583 | 1025 | 1767 | 3227 | 1583 | 1774 | 1863 | 1774 | 1774 | 1863 | 1805 |
| c, Capacity [veh/h] | 115 | 388 | 556 | 273 | 115 | 690 | 556 | 273 | 104 | 566 | 539 | 336 | 810 | 784 |
| d1, Uniform Delay [s] | 31.36 | 15.58 | 23.94 | 24.44 | 31.36 | 16.69 | 24.27 | 23.45 | 29.03 | 20.30 | 20.30 | 24.37 | 15.48 | 15.58 |
| k, delay calibration | 0.11 | 0.46 | 0.11 | 0.11 | 0.24 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.13 | 0.13 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 1.57 | 1.14 | 1.02 | 3.26 | 14.08 | 0.27 | 1.38 | 1.33 | 9.14 | 3.15 | 3.31 | 4.79 | 2.38 | 2.71 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 0.32 | 0.21 | 0.60 | 0.70 | 0.67 | 0.32 | 0.66 | 0.48 | 0.72 | 0.83 | 0.83 | 0.81 | 0.81 | 0.82 |
| d, Delay for Lane Group [s/veh] | 32.93 | 16.72 | 24.97 | 27.70 | 45.44 | 16.96 | 25.64 | 24.78 | 38.17 | 23.45 | 23.60 | 29.16 | 17.86 | 18.29 |
| Lane Group LOS | C | B | C | C | D | B | C | C | D | C | C | C | B | B |
| Critical Lane Group | No | No | No | Yes | No | Yes | No | No | No | No | Yes | Yes | No | No |
| 50th-Percentile Queue Length [veh] | 0.60 | 0.91 | 2.20 | 2.75 | 1.65 | 2.33 | 2.51 | 1.76 | 1.32 | 6.26 | 5.99 | 4.07 | 7.59 | 7.55 |
| 50th-Percentile Queue Length [ft] | 15.09 | 22.71 | 54.99 | 68.68 | 41.35 | 58.30 | 62.67 | 43.96 | 32.99 | 156.59 | 149.72 | 101.65 | 189.66 | 188.72 |
| 95th-Percentile Queue Length [veh] | 1.09 | 1.64 | 3.96 | 4.95 | 2.98 | 4.20 | 4.51 | 3.17 | 2.38 | 10.37 | 10.00 | 7.32 | 12.10 | 12.05 |
| 95th-Percentile Queue Length [ft] | 27.16 | 40.88 | 98.98 | 123.6 | 74.42 | 104.9 | 112.8 | 79.14 | 59.38 | 259.20 | 250.05 | 182.98 | 302.59 | 301.37 |

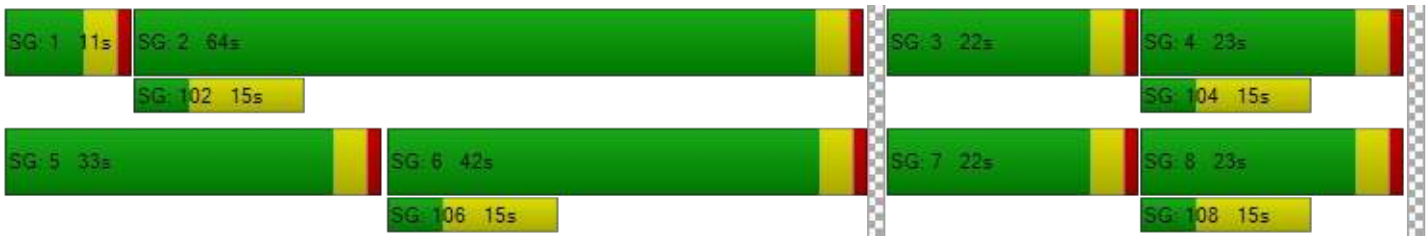
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 32.93 | 24.47 | 27.70 | 45.44 | 22.70 | 24.78 | 38.17 | 23.51 | 23.60 | 29.16 | 18.05 | 18.29 |
| Movement LOS | C | C | C | D | C | C | D | C | C | C | B | B |
| d_A, Approach Delay [s/veh] | 25.18 | | | 24.98 | | | 24.63 | | | 20.00 | | |
| Approach LOS | C | | | C | | | C | | | B | | |
| d_I, Intersection Delay [s/veh] | 22.97 | | | | | | | | | | | |
| Intersection LOS | C | | | | | | | | | | | |
| Intersection V/C | 0.627 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 5: 5 Build_out_2021
Report File: E:\...\PM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 8: Beechnut St at S Rice Ave**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 132.1 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.980 |

**Intersection Setup**

| Name | S Rice Ave | | | S Rice Ave | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 150.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S Rice Ave | | | S Rice Ave | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 105 | 119 | 101 | 202 | 167 | 121 | 80 | 761 | 48 | 74 | 886 | 188 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 135 | 0 | 251 | 255 | 157 | 124 | 0 | 0 | 0 | 0 | 206 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 109 | 259 | 105 | 461 | 429 | 283 | 207 | 791 | 50 | 77 | 921 | 402 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 31 | 74 | 30 | 131 | 122 | 80 | 59 | 225 | 14 | 22 | 262 | 114 |
| Total Analysis Volume [veh/h] | 124 | 294 | 119 | 524 | 488 | 322 | 235 | 899 | 57 | 88 | 1047 | 457 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 1 | 6 | 0 | 5 | 2 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 5 | 30 | 0 | 30 | 30 | 0 | 30 | 30 | 0 | 30 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 13 | 19 | 0 | 21 | 27 | 0 | 11 | 70 | 0 | 10 | 69 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | No | No | | No | No | | No | No | |
| Maximum Recall | No | No | | No | No | | No | No | | No | No | |
| Pedestrian Recall | No | No | | No | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 107 | 107 | 107 | 107 | 107 | 107 | 107 | 107 | 107 | 107 | 107 | 107 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 5 | 15 | 15 | 30 | 40 | 40 | 16 | 39 | 39 | 7 | 30 | 30 |
| g / C, Green / Cycle | 0.05 | 0.14 | 0.14 | 0.28 | 0.37 | 0.37 | 0.15 | 0.37 | 0.37 | 0.06 | 0.28 | 0.28 |
| (v / s)_i Volume / Saturation Flow Rate | 0.07 | 0.12 | 0.12 | 0.30 | 0.23 | 0.23 | 0.13 | 0.26 | 0.26 | 0.05 | 0.42 | 0.43 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1684 | 1774 | 1863 | 1621 | 1774 | 1863 | 1824 | 1774 | 1863 | 1677 |
| c, Capacity [veh/h] | 83 | 264 | 238 | 494 | 695 | 605 | 270 | 683 | 669 | 115 | 520 | 468 |
| d1, Uniform Delay [s] | 51.23 | 44.77 | 44.88 | 38.78 | 27.43 | 27.58 | 44.52 | 29.08 | 29.09 | 49.47 | 38.73 | 38.73 |
| k, delay calibration | 0.50 | 0.11 | 0.11 | 0.49 | 0.32 | 0.33 | 0.11 | 0.40 | 0.40 | 0.11 | 0.50 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 278.85 | 6.08 | 7.35 | 57.48 | 2.66 | 3.31 | 8.47 | 4.88 | 5.00 | 10.26 | 231.52 | 260.08 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.50 | 0.82 | 0.83 | 1.06 | 0.62 | 0.63 | 0.87 | 0.71 | 0.71 | 0.77 | 1.49 | 1.55 |
| d, Delay for Lane Group [s/veh] | 330.07 | 50.85 | 52.23 | 96.25 | 30.09 | 30.89 | 52.99 | 33.96 | 34.09 | 59.73 | 270.25 | 298.80 |
| Lane Group LOS | F | D | D | F | C | C | D | C | C | E | F | F |
| Critical Lane Group | No | No | Yes | Yes | No | No | Yes | No | No | No | No | Yes |
| 50th-Percentile Queue Length [veh] | 8.61 | 5.97 | 5.59 | 20.64 | 9.35 | 8.42 | 6.71 | 11.36 | 11.16 | 2.65 | 46.89 | 45.93 |
| 50th-Percentile Queue Length [ft] | 215.22 | 149.31 | 139.87 | 516.12 | 233.66 | 210.58 | 167.79 | 284.07 | 279.10 | 66.16 | 1172.32 | 1148.24 |
| 95th-Percentile Queue Length [veh] | 14.76 | 9.98 | 9.47 | 29.15 | 14.36 | 13.18 | 10.96 | 16.89 | 16.64 | 4.76 | 71.15 | 70.70 |
| 95th-Percentile Queue Length [ft] | 369.00 | 249.51 | 236.85 | 728.79 | 359.01 | 329.57 | 274.00 | 422.28 | 416.09 | 119.09 | 1778.67 | 1767.45 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 330.07 | 51.22 | 52.23 | 96.25 | 30.19 | 30.89 | 52.99 | 34.02 | 34.09 | 59.73 | 277.64 | 298.80 |
| Movement LOS | F | D | D | F | C | C | D | C | C | E | F | F |
| d_A, Approach Delay [s/veh] | 115.83 | | | 56.31 | | | 37.77 | | | 271.67 | | |
| Approach LOS | F | | | E | | | D | | | F | | |
| d_I, Intersection Delay [s/veh] | 132.10 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 0.980 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 1 | 2 | 3 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | 7 | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 5: 5 Build_out_2021
Report File: E:\...\PM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 9: Beechnut at 610 SB Feeder**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 179.3 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 1.012 |

**Intersection Setup**

| Name | 610 SB Feeder | | | 610 SB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | 610 SB Feeder | | | 610 SB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 0 | 276 | 421 | 445 | 0 | 913 | 275 | 211 | 884 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.04 | 1.04 | 1.04 | 1.00 | 1.04 | 1.04 | 1.04 | 1.04 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 199 | 52 | 0 | 206 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 0 | 0 | 287 | 438 | 463 | 0 | 1149 | 338 | 219 | 1125 | 0 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 0 | 0 | 72 | 110 | 116 | 0 | 287 | 85 | 55 | 281 | 0 |
| Total Analysis Volume [veh/h] | 0 | 0 | 0 | 287 | 438 | 463 | 0 | 1149 | 338 | 219 | 1125 | 0 |
| Presence of On-Street Parking | | | | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Permiss | Permiss | Permiss | Protecte | Overlap | Permiss | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 0 | 0 | 3 | 4 | 0 | 0 | 2 | 0 | 0 | 1 | 0 |
| Auxiliary Signal Groups | | | | | 3,4 | | | | | | | |
| Lead / Lag | - | - | - | Lead | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 0.0 | 0.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 0 | 0 | 0 | 50 | 9 | 0 | 0 | 32 | 0 | 0 | 29 | 0 |
| Vehicle Extension [s] | 0.0 | 0.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 0.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 0.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | | | | Yes | Yes | | | No | | | No | |
| Maximum Recall | | | | No | No | | | No | | | No | |
| Pedestrian Recall | | | | No | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | | L | C | C | R | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | | 84 | 84 | 84 | 84 | 84 | 84 | 84 | 84 | 84 |
| L, Total Lost Time per Cycle [s] | | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | | 2.00 | 0.00 | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | | 5 | 14 | 14 | 5 | 28 | 28 | 30 | 30 | 30 |
| g / C, Green / Cycle | | 0.06 | 0.17 | 0.17 | 0.06 | 0.34 | 0.34 | 0.36 | 0.36 | 0.36 |
| (v / s)_i Volume / Saturation Flow Rate | | 0.16 | 0.19 | 0.18 | 0.18 | 0.28 | 0.30 | 0.12 | 0.38 | 0.25 |
| s, saturation flow rate [veh/h] | | 1774 | 1863 | 1513 | 1583 | 3547 | 1663 | 1774 | 1863 | 1695 |
| c, Capacity [veh/h] | | 105 | 309 | 251 | 94 | 1192 | 559 | 632 | 664 | 604 |
| d1, Uniform Delay [s] | | 40.57 | 37.57 | 37.57 | 40.57 | 30.50 | 31.23 | 24.04 | 32.21 | 28.15 |
| k, delay calibration | | 0.50 | 0.50 | 0.50 | 0.50 | 0.11 | 0.33 | 0.11 | 0.49 | 0.24 |
| I, Upstream Filtering Factor | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | | 806.0 | 96.03 | 75.53 | 924.5 | 1.58 | 13.37 | 0.33 | 49.44 | 3.30 |
| d3, Initial Queue Delay [s] | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 | 0.67 |
| PF, progression factor | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | | 2.73 | 1.14 | 1.07 | 2.99 | 0.83 | 0.89 | 0.35 | 1.05 | 0.71 |
| d, Delay for Lane Group [s/veh] | | 846.6 | 133.6 | 113.1 | 965.1 | 32.08 | 44.60 | 24.36 | 81.64 | 31.46 |
| Lane Group LOS | | F | F | F | F | C | D | C | F | C |
| Critical Lane Group | | Yes | No | No | Yes | No | Yes | No | Yes | No |
| 50th-Percentile Queue Length [veh] | | 25.70 | 14.90 | 10.67 | 26.02 | 10.17 | 12.14 | 3.76 | 22.99 | 8.72 |
| 50th-Percentile Queue Length [ft] | | 642.4 | 372.4 | 266.7 | 650.4 | 254.28 | 303.43 | 94.10 | 574.68 | 218.00 |
| 95th-Percentile Queue Length [veh] | | 40.63 | 22.62 | 16.52 | 41.18 | 15.40 | 17.85 | 6.78 | 31.96 | 13.56 |
| 95th-Percentile Queue Length [ft] | | 1015. | 565.4 | 413.0 | 1029. | 385.03 | 446.27 | 169.38 | 799.02 | 339.07 |

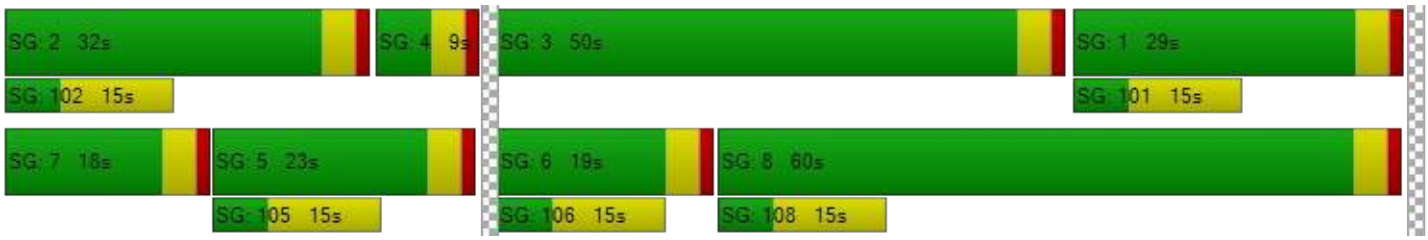
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 846.63 | 129.63 | 674.95 | 0.00 | 33.80 | 44.60 | 24.36 | 62.63 | 0.00 |
| Movement LOS | | | | F | F | F | | C | D | C | E | |
| d_A, Approach Delay [s/veh] | 0.00 | | | 497.53 | | | 36.25 | | | 56.39 | | |
| Approach LOS | A | | | F | | | D | | | E | | |
| d_I, Intersection Delay [s/veh] | 179.34 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 1.012 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 4 | - | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 5 | - | 6 | 8 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 5: 5 Build_out_2021
Report File: E:\...\PM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 10: Beechnut at 610 NB Feeder**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 59.4 |
| Analysis Method: | HCM 2010 | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.805 |

**Intersection Setup**

| Name | 610 NB Feeder | | | 610 NB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | 610 NB Feeder | | | 610 NB Feeder | | | Beechnut St | | | Beechnut St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 357 | 274 | 71 | 0 | 0 | 0 | 446 | 748 | 0 | 0 | 727 | 231 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 199 | 0 | 0 | 165 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 412 | 285 | 74 | 0 | 0 | 0 | 464 | 977 | 0 | 0 | 921 | 240 |
| Peak Hour Factor | 0.9100 | 0.9100 | 0.9100 | 1.0000 | 1.0000 | 1.0000 | 0.9100 | 0.9100 | 1.0000 | 1.0000 | 0.9100 | 0.9100 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 113 | 78 | 20 | 0 | 0 | 0 | 127 | 268 | 0 | 0 | 253 | 66 |
| Total Analysis Volume [veh/h] | 453 | 313 | 81 | 0 | 0 | 0 | 510 | 1074 | 0 | 0 | 1012 | 264 |
| Presence of On-Street Parking | No | | No | | | | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Overlap | Permiss | Permiss | Permiss | Permiss | Split | Split | Permiss | Permiss | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 7 | 8 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | 7,8 | | | | | | | | | | |
| Lead / Lag | Lead | - | - | - | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 5 | 30 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 18 | 60 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 19 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | Yes | No | | | | | | No | | | No | |
| Maximum Recall | No | No | | | | | | No | | | No | |
| Pedestrian Recall | No | No | | | | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | C | | L | C | C | C | C |
|---|---|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 76 | 76 | 76 | 76 | | 76 | 76 | 76 | 76 | 76 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 0.00 | 0.00 | 0.00 | | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 5 | 15 | 15 | 15 | | 27 | 27 | 27 | 23 | 23 |
| g / C, Green / Cycle | 0.07 | 0.19 | 0.19 | 0.19 | | 0.35 | 0.35 | 0.35 | 0.30 | 0.30 |
| (v / s)_i Volume / Saturation Flow Rate | 0.13 | 0.13 | 0.12 | 0.12 | | 0.29 | 0.31 | 0.30 | 0.24 | 0.25 |
| s, saturation flow rate [veh/h] | 1774 | 1774 | 1695 | 1577 | | 1774 | 1863 | 1695 | 3547 | 1679 |
| c, Capacity [veh/h] | 116 | 337 | 322 | 300 | | 622 | 653 | 594 | 1074 | 508 |
| d1, Uniform Delay [s] | 35.72 | 28.75 | 28.49 | 28.54 | | 22.64 | 23.31 | 22.89 | 24.45 | 24.89 |
| k, delay calibration | 0.50 | 0.50 | 0.50 | 0.50 | | 0.25 | 0.29 | 0.27 | 0.11 | 0.19 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 458.0 | 10.24 | 9.04 | 9.98 | | 6.25 | 9.91 | 7.85 | 1.36 | 6.37 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.95 | 0.67 | 0.63 | 0.64 | | 0.82 | 0.88 | 0.84 | 0.79 | 0.84 |
| d, Delay for Lane Group [s/veh] | 493.8 | 39.00 | 37.53 | 38.52 | | 28.89 | 33.22 | 30.74 | 25.81 | 31.26 |
| Lane Group LOS | F | D | D | D | | C | C | C | C | C |
| Critical Lane Group | Yes | Yes | No | No | | No | Yes | No | No | Yes |
| 50th-Percentile Queue Length [veh] | 16.87 | 4.66 | 4.10 | 3.93 | | 8.87 | 10.82 | 9.02 | 6.86 | 7.67 |
| 50th-Percentile Queue Length [ft] | 421.6 | 116.6 | 102.4 | 98.35 | | 221.74 | 270.45 | 225.56 | 171.46 | 191.87 |
| 95th-Percentile Queue Length [veh] | 27.55 | 8.21 | 7.38 | 7.08 | | 13.75 | 16.21 | 13.95 | 11.15 | 12.22 |
| 95th-Percentile Queue Length [ft] | 688.6 | 205.1 | 184.3 | 177.0 | | 343.84 | 405.30 | 348.71 | 278.83 | 305.46 |

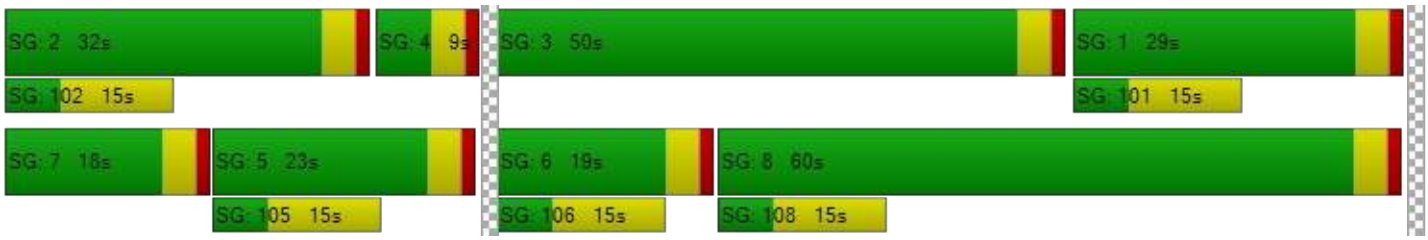
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 266.40 | 37.88 | 38.52 | 0.00 | 0.00 | 0.00 | 28.89 | 32.06 | 0.00 | 0.00 | 26.68 | 31.26 |
| Movement LOS | F | D | D | | | | C | C | | | C | C |
| d_A, Approach Delay [s/veh] | 160.16 | | | 0.00 | | | 31.04 | | | 27.63 | | |
| Approach LOS | F | | | A | | | C | | | C | | |
| d_I, Intersection Delay [s/veh] | 59.37 | | | | | | | | | | | |
| Intersection LOS | E | | | | | | | | | | | |
| Intersection V/C | 0.805 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 4 | - | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 7 | 5 | - | 6 | 8 | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |




Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 5: 5 Build_out_2021
Report File: E:\...\PM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 11: S. Rice at Evergreen St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 154.7 |
| Analysis Method: | HCM 2010 | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.947 |

**Intersection Setup**

| Name | S. Rice Ave | | | S. Rice Ave | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | S. Rice Ave | | | S. Rice Ave | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 3 | 390 | 64 | 59 | 338 | 18 | 13 | 73 | 13 | 51 | 137 | 85 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 157 | 245 | 157 | 0 | 135 | 0 | 0 | 0 | 124 | 124 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 160 | 651 | 224 | 61 | 487 | 19 | 14 | 76 | 138 | 177 | 142 | 88 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 45 | 185 | 64 | 17 | 138 | 5 | 4 | 22 | 39 | 50 | 40 | 25 |
| Total Analysis Volume [veh/h] | 182 | 740 | 255 | 69 | 553 | 22 | 16 | 86 | 157 | 201 | 161 | 100 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 8 | 0 | 0 | 4 | 0 | 0 | 2 | 0 | 0 | 6 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | - | - | - | - | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 0 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 0 | 34 | 0 | 0 | 30 | 0 | 0 | 19 | 0 | 0 | 37 | 0 |
| Vehicle Extension [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | | No | | | No | | | No | | | No | |
| Maximum Recall | | No | | | No | | | No | | | No | |
| Pedestrian Recall | | No | | | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | C | C | C | C | C | C |
|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 122 | 122 | 122 | 122 | 122 | 122 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 30 | 30 | 25 | 25 | 21 | 30 |
| g / C, Green / Cycle | 0.25 | 0.25 | 0.20 | 0.20 | 0.17 | 0.25 |
| (v / s)_i Volume / Saturation Flow Rate | 0.35 | 0.35 | 0.18 | 0.18 | 0.15 | 0.26 |
| s, saturation flow rate [veh/h] | 1836 | 1565 | 1844 | 1674 | 1678 | 1757 |
| c, Capacity [veh/h] | 452 | 385 | 376 | 342 | 289 | 433 |
| d1, Uniform Delay [s] | 45.95 | 45.95 | 47.26 | 47.27 | 49.36 | 45.95 |
| k, delay calibration | 0.50 | 0.50 | 0.26 | 0.26 | 0.18 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 194.77 | 198.50 | 16.22 | 17.54 | 14.39 | 62.62 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| X, volume / capacity | 1.40 | 1.41 | 0.90 | 0.90 | 0.90 | 1.07 |
| d, Delay for Lane Group [s/veh] | 240.71 | 244.45 | 63.48 | 64.80 | 63.74 | 108.56 |
| Lane Group LOS | F | F | E | E | E | F |
| Critical Lane Group | No | Yes | No | Yes | Yes | Yes |
| 50th-Percentile Queue Length [veh] | 38.00 | 32.79 | 11.63 | 10.68 | 8.85 | 20.49 |
| 50th-Percentile Queue Length [ft] | 949.99 | 819.70 | 290.71 | 267.12 | 221.20 | 512.19 |
| 95th-Percentile Queue Length [veh] | 57.07 | 49.96 | 17.22 | 16.05 | 13.73 | 29.02 |
| 95th-Percentile Queue Length [ft] | 1426.85 | 1249.05 | 430.52 | 401.14 | 343.16 | 725.55 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 240.71 | 242.16 | 244.45 | 63.48 | 64.16 | 64.80 | 63.74 | 63.74 | 63.74 | 108.56 | 108.56 | 108.56 |
| Movement LOS | F | F | F | E | E | E | E | E | E | F | F | F |
| d_A, Approach Delay [s/veh] | 242.43 | | | 64.11 | | | 63.74 | | | 108.56 | | |
| Approach LOS | F | | | E | | | E | | | F | | |
| d_I, Intersection Delay [s/veh] | 154.72 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |
| Intersection V/C | 0.947 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 2 | 6 | 4 | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 5: 5 Build_out_2021
Report File: E:\...\PM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 12: Chimney Rock Rd at Evergreen St**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 17.7 |
| Analysis Method: | HCM 2010 | Level Of Service: | B |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.516 |

**Intersection Setup**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 215.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Chimney Rock Rd | | | Chimney Rock Rd | | | Evergreen St | | | Evergreen St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 5 | 487 | 11 | 11 | 889 | 8 | 2 | 32 | 15 | 33 | 41 | 20 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 83 | 0 | 0 | 0 | 41 | 0 | 0 | 52 | 105 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 5 | 506 | 11 | 94 | 925 | 8 | 2 | 74 | 16 | 34 | 95 | 126 |
| Peak Hour Factor | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 | 0.8800 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 1 | 144 | 3 | 27 | 263 | 2 | 1 | 21 | 5 | 10 | 27 | 36 |
| Total Analysis Volume [veh/h] | 6 | 575 | 13 | 107 | 1051 | 9 | 2 | 84 | 18 | 39 | 108 | 143 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | |
|---|---|
| Located in CBD | No |
| Signal Coordination Group | - |
| Cycle Length [s] | 120 |
| Coordination Type | Time of Day Pattern Coordinated |
| Actuation Type | Fully actuated |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss | Split | Split | Split | Split | Split | Split |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 3 | 8 | 0 | 7 | 4 | 0 | 0 | 2 | 0 | 0 | 1 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | Lead | - | - | Lead | - | - | - | - | - | - | - | - |
| Minimum Green [s] | 5 | 5 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Maximum Green [s] | 30 | 30 | 0 | 30 | 30 | 0 | 0 | 30 | 0 | 0 | 30 | 0 |
| Amber [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| All red [s] | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 |
| Split [s] | 18 | 70 | 0 | 9 | 61 | 0 | 0 | 19 | 0 | 0 | 22 | 0 |
| Vehicle Extension [s] | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| Minimum Recall | No | No | | No | No | | | No | | | No | |
| Maximum Recall | No | No | | No | No | | | No | | | No | |
| Pedestrian Recall | No | No | | No | No | | | No | | | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Lane Group Calculations**

| Lane Group | L | C | C | L | C | C | C | C |
|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 |
| L, Total Lost Time per Cycle [s] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| g_i, Effective Green Time [s] | 0 | 13 | 13 | 4 | 17 | 17 | 4 | 10 |
| g / C, Green / Cycle | 0.01 | 0.28 | 0.28 | 0.08 | 0.36 | 0.36 | 0.08 | 0.21 |
| (v / s)_i Volume / Saturation Flow Rate | 0.00 | 0.16 | 0.16 | 0.06 | 0.28 | 0.28 | 0.06 | 0.17 |
| s, saturation flow rate [veh/h] | 1774 | 1863 | 1848 | 1774 | 1863 | 1857 | 1806 | 1703 |
| c, Capacity [veh/h] | 14 | 528 | 524 | 144 | 663 | 661 | 144 | 367 |
| d1, Uniform Delay [s] | 23.18 | 14.33 | 14.34 | 21.11 | 13.62 | 13.62 | 21.11 | 17.43 |
| k, delay calibration | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 17.86 | 0.93 | 0.94 | 7.42 | 2.29 | 2.30 | 6.69 | 3.84 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 0.41 | 0.56 | 0.56 | 0.74 | 0.80 | 0.80 | 0.72 | 0.79 |
| d, Delay for Lane Group [s/veh] | 41.05 | 15.26 | 15.28 | 28.53 | 15.90 | 15.91 | 27.80 | 21.27 |
| Lane Group LOS | D | B | B | C | B | B | C | C |
| Critical Lane Group | Yes | No | No | No | No | Yes | Yes | Yes |
| 50th-Percentile Queue Length [veh] | 0.13 | 2.39 | 2.38 | 1.33 | 4.50 | 4.49 | 1.27 | 2.95 |
| 50th-Percentile Queue Length [ft] | 3.30 | 59.86 | 59.50 | 33.23 | 112.55 | 112.26 | 31.76 | 73.83 |
| 95th-Percentile Queue Length [veh] | 0.24 | 4.31 | 4.28 | 2.39 | 7.98 | 7.97 | 2.29 | 5.32 |
| 95th-Percentile Queue Length [ft] | 5.94 | 107.74 | 107.11 | 59.82 | 199.54 | 199.15 | 57.16 | 132.89 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 41.05 | 15.27 | 15.28 | 28.53 | 15.91 | 15.91 | 27.80 | 27.80 | 27.80 | 21.27 | 21.27 | 21.27 |
| Movement LOS | D | B | B | C | B | B | C | C | C | C | C | C |
| d_A, Approach Delay [s/veh] | 15.53 | | | 17.07 | | | 27.80 | | | 21.27 | | |
| Approach LOS | B | | | B | | | C | | | C | | |
| d_I, Intersection Delay [s/veh] | 17.73 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |
| Intersection V/C | 0.516 | | | | | | | | | | | |

## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | 3 | 4 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 8 | 7 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Scenario 5: 5 Build_out_2021
Report File: E:\...\PM_BHS_Build_out.pdf

**Intersection Level Of Service Report**
**Intersection 13: Maple St at Parking Garage Entrance**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 0.0 |
| Analysis Method: | HCM 2010 | Level Of Service: | A |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | Parking Garage Driveway | | Maple St | | Maple St | |
|---|---|---|---|---|---|---|
| Approach | Southbound | | Eastbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Right | Left | Thru | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | Parking Garage Driveway | | Maple St | | Maple St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 136 | 0 | 0 | 0 | 22 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 136 | 0 | 0 | 0 | 22 | 0 |
| Peak Hour Factor | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 | 0.7500 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 45 | 0 | 0 | 0 | 7 | 0 |
| Total Analysis Volume [veh/h] | 181 | 0 | 0 | 0 | 29 | 0 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Stop | Free | Free |
| Flared Lane | | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Movement LOS | | | | A | A | A |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.00 | | 0.00 | |
| Approach LOS | A | | A | | A | |
| d_I, Intersection Delay [s/veh] | 0.00 | | | | | |
| Intersection LOS | A | | | | | |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_PMv15.vistro
Report File: E:\...\PM_BHS_Build_out.pdf

Scenario 5 Build_out_2021
6/28/2017

## Trip Generation summary

### Added Trips

| Zone ID: Name | Land Use variables | Code | Ind. Var. | Rate | Quantity | % In | % Out | Trips In | Trips Out | Total Trips | % of Total Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1: zone | Student | Parking Garage | | 1.000 | 0.000 | 50.00 | 50.00 | 0 | 218 | 218 | 10.53 |
| 2: zone | Parents Dropping/Picking up | Student pick-up/drop-off driveway | | 1.000 | 0.000 | 50.00 | 50.00 | 827 | 827 | 1654 | 79.86 |
| 17: zone | Bus | Bus Loop | | 1.000 | 0.000 | 50.00 | 50.00 | 22 | 22 | 44 | 2.12 |
| 21: zone | Staff | Parking Garage/Surface PArking Lot | | 1.000 | 0.000 | 50.00 | 50.00 | 0 | 155 | 155 | 7.48 |
| | | | | | **Added Trips Total** | | | **849** | **1222** | **2071** | **100.00** |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\BellaireHighSchool_PMv15.vistro
Report File: E:\...\PM_BHS_Build_out.pdf

Scenario 5 Build_out_2021
6/28/2017

## Trip Distribution summary

| Zone / Gate | Zone 1: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 21: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 15.00 | 0 | 15.00 | 33 |
| 5: Gate | 5.00 | 0 | 5.00 | 11 |
| 6: Gate | 5.00 | 0 | 5.00 | 11 |
| 7: Gate | 10.00 | 0 | 10.00 | 22 |
| 8: Gate | 5.00 | 0 | 5.00 | 11 |
| 9: Gate | 10.00 | 0 | 10.00 | 22 |
| 10: Gate | 5.00 | 0 | 5.00 | 11 |
| 11: Gate | 10.00 | 0 | 10.00 | 22 |
| 12: Gate | 20.00 | 0 | 20.00 | 42 |
| 13: Gate | 0.00 | 0 | 0.00 | 0 |
| 14: Gate | 15.00 | 0 | 15.00 | 33 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 18: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **0** | **100.00** | **218** |

| Zone / Gate | Zone 2: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 21: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 20.00 | 165 | 20.00 | 166 |
| 5: Gate | 5.00 | 41 | 5.00 | 41 |
| 6: Gate | 5.00 | 41 | 5.00 | 41 |
| 7: Gate | 10.00 | 83 | 10.00 | 83 |
| 8: Gate | 5.00 | 41 | 5.00 | 41 |
| 9: Gate | 10.00 | 83 | 10.00 | 83 |
| 10: Gate | 5.00 | 41 | 5.00 | 41 |
| 11: Gate | 10.00 | 83 | 10.00 | 83 |
| 12: Gate | 15.00 | 124 | 15.00 | 124 |
| 13: Gate | 0.00 | 0 | 0.00 | 0 |
| 14: Gate | 15.00 | 124 | 15.00 | 124 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 18: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **826** | **100.00** | **827** |

| Zone / Gate | Zone 17: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 21: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 0.00 | 0 | 0.00 | 0 |
| 5: Gate | 0.00 | 0 | 0.00 | 0 |
| 6: Gate | 0.00 | 0 | 0.00 | 0 |
| 7: Gate | 0.00 | 0 | 0.00 | 0 |
| 8: Gate | 0.00 | 0 | 0.00 | 0 |
| 9: Gate | 0.00 | 0 | 0.00 | 0 |
| 10: Gate | 0.00 | 0 | 0.00 | 0 |
| 11: Gate | 0.00 | 0 | 0.00 | 0 |
| 12: Gate | 50.00 | 11 | 50.00 | 11 |
| 13: Gate | 0.00 | 0 | 0.00 | 0 |
| 14: Gate | 50.00 | 11 | 50.00 | 11 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 18: Gate | 0.00 | 0 | 50.00 | 11 |
| **Total** | **100.00** | **22** | **150.00** | **33** |

| Zone / Gate | Zone 21: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 1: zone | 0.00 | 0 | 0.00 | 0 |
| 2: zone | 0.00 | 0 | 0.00 | 0 |
| 17: zone | 0.00 | 0 | 0.00 | 0 |
| 4: Gate | 0.00 | 0 | 0.00 | 0 |
| 5: Gate | 0.00 | 0 | 0.00 | 0 |
| 6: Gate | 0.00 | 0 | 0.00 | 0 |
| 7: Gate | 0.00 | 0 | 0.00 | 0 |
| 8: Gate | 0.00 | 0 | 0.00 | 0 |
| 9: Gate | 0.00 | 0 | 0.00 | 0 |
| 10: Gate | 0.00 | 0 | 0.00 | 0 |
| 11: Gate | 0.00 | 0 | 0.00 | 0 |
| 12: Gate | 50.00 | 0 | 50.00 | 78 |
| 13: Gate | 0.00 | 0 | 0.00 | 0 |
| 14: Gate | 50.00 | 0 | 50.00 | 77 |
| 15: Gate | 0.00 | 0 | 0.00 | 0 |
| 16: Gate | 0.00 | 0 | 0.00 | 0 |
| 18: Gate | 0.00 | 0 | 0.00 | 0 |
| **Total** | **100.00** | **0** | **100.00** | **155** |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# Bellaire High School Rebuild

# Gordon Baseball Field Traffic Study

Prepared for

Prepared by
**Traffic Engineers, Inc.**
*Texas Registration #F-3158*

*July 7, 2017*

STATE OF TEXAS
DUSTIN W. QUALLS
97337
LICENSED
PROFESSIONAL ENGINEER

Dustin W. Qualls, PE, PTOE

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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## LIST OF TABLES



## LIST OF FIGURES



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# INTRODUCTION

## TRAFFIC IMPACT ANALYSIS

This report presents the Traffic Impact Analysis (TIA) for a proposed high school baseball and softball field located on the southwest corner of Bissonnet Street and North Avenue B in Bellaire, Texas, as shown in **Figure 1**.

The tract is currently developed as a school but is not being used. Immediate plans to develop the tract include a baseball and softball field for use by Bellaire High School and Houston Independent School District. Driveway is proposed to be located on Bissonnet Street. The purpose of this study is to determine the traffic impacts associated with the expected trip generation on the roadways and critical intersections within the study area.


**FIGURE 1: SITE LOCATION**

# A. SCOPE OF TIA

## STUDY AREA

The study area is localized to the proposed tract and the adjacent major roadways, traffic signal and site driveway. The tract is bound by Bissonnet Street to the north, North Avenue B to the east, a residential area to the west and a City of Bellaire owned public park to the south. The two roadways being analyzed in this report are Bissonnet Street and North Avenue B. The tract is currently a disused school building.



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

## EXISTING ROADWAY CONDITIONS

**Bissonnet Street**

The posted speed limit on Bissonnet Street is 35 mph, and the primary direction in the study area is most nearly east-west. Adjacent to the site, the roadway is undivided with two through lanes in each direction, with a two-way left-turn lane in the center and at each intersection. Bissonnet is a concrete roadway with curb and gutter.

**North Avenue B**

North Avenue B is located east of the site and is most nearly a north-south roadway. North Avenue B is a two-lane roadway with curb and gutter. The posted speed limit on North Avenue B is 30 mph. Monday through Friday, the section of North Avenue B north of Bissonnet becomes a one-way southbound street between the hours of 7:45 to 9:00 AM and 4:00 to 5:00 PM.

**Intersection of Bissonnet Street and North Avenue B**

Northbound approach – Single lane with both left and right turning movements permitted. Through traffic is not permitted during restricted times.

Southbound approach – Single lane with both left and right turning movements permitted.

Eastbound approach – One left-turn lane, one through lane and one through/right-turn lane. Left turns are not permitted during restricted times.

Westbound approach – One left-turn lane, one through lane and one through/right-turn lane. Right turns are not permitted during restricted times.

The intersection is signalized with standard NEMA signal phasing. The peak hour cycle length is 90 seconds.

## EXISTING SITE TURNING MOVEMENT COUNTS

Field observations were performed and turning movement counts (TMCs) were collected at the critical intersection of Bissonnet Street and North Avenue B. The observations were conducted during a typical weekday peak afternoon timeframe of 4:00-6:00 PM in May of 2017. The morning peak timeframe was not counted as this site will only generate traffic during a typical PM peak hour. The TMC raw data can be found in **Appendix A**.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

## SITE PLAN

As shown in **Figure 2**, the proposed site plan includes one access point on Bissonnet Street.

Driveways/roadways shown herein are conceptual and planning level in nature; precise driveway/roadway locations will be determined during the platting and/or site planning stage of development based on conditions in the field as well as future plans for the area.


**FIGURE 2: SITE PLAN**

## B. TRIP GENERATION

Trip generation for the proposed baseball and softball field is based on the number of parking spots in the new parking lot on site as well as a real world trip generation development.

The site plan proposes 85 parking spots being constructed while **Table 1** summarizes the approximation of trips generated by the development. The number of parking spots is utilized for our analysis due the larger estimation of trips estimated. This should represent the worst case scenario of trips being generated because it is unlikely that all 85 parking spots would be used and that all users of the field would enter and leave within the same peak hour.

**TABLE 1: TRIP GENERATION COMPARISON**

| Category | Number | Methodology | Trips Generated |
|---|---|---|---|
| Coaches | 10 | 1 trip each | 10 |
| Players | 30 | .5 trips each | 15 |
| Spectators (2 for each player | 60 | .75 trips each | 45 |
| | | Total | 70 |
| | | | |
| **Parking Spaces** | **85** | **1 trip each** | **85** |

## C. TRIP DISTRIBUTION

The global trip distribution is anticipated to be:

- 5 percent to/from the north on North Avenue B
- 5 percent to/from the south on North Avenue B
- 60 percent to/from the west on Bissonnet Street
- 30 percent to/from the east on Bissonnet Street

The percentages for trip distribution are shown in **Figure 3.** Estimated percentages were developed based on an aerial look at surrounding land uses and the characteristics of the site plan itself. Surrounding neighborhoods and highways were taken into consideration as was the location of Bellaire High School, a primary generator of traffic for the field.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)


**FIGURE 3: TRIP DISTRIBUTION PERCENTAGE**

## D. TRAFFIC ASSIGNMENT

Trips were generated and distributed to the critical intersection of Bissonnet Street and North Avenue B as well as the driveway accessing the site.

## E. TRAFFIC FORECAST

Field observations were performed and turning movement counts (TMCs) were collected at the critical intersection of Bissonnet Street and North Avenue B. The observations were conducted during a typical weekday peak afternoon timeframe of 4:00-6:00 PM in May of 2017. The morning peak timeframe was not counted as this site will only generate traffic during a typical PM peak hour. The TMC raw data can be found in **Appendix A**.

A summary of the existing PM peak hour turning movement counts can be found in **Figure 4.**

The trip generation values were then routed through the model and added to the existing volumes. The total build out volumes for the PM peak hour can be found in **Figure 5**.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

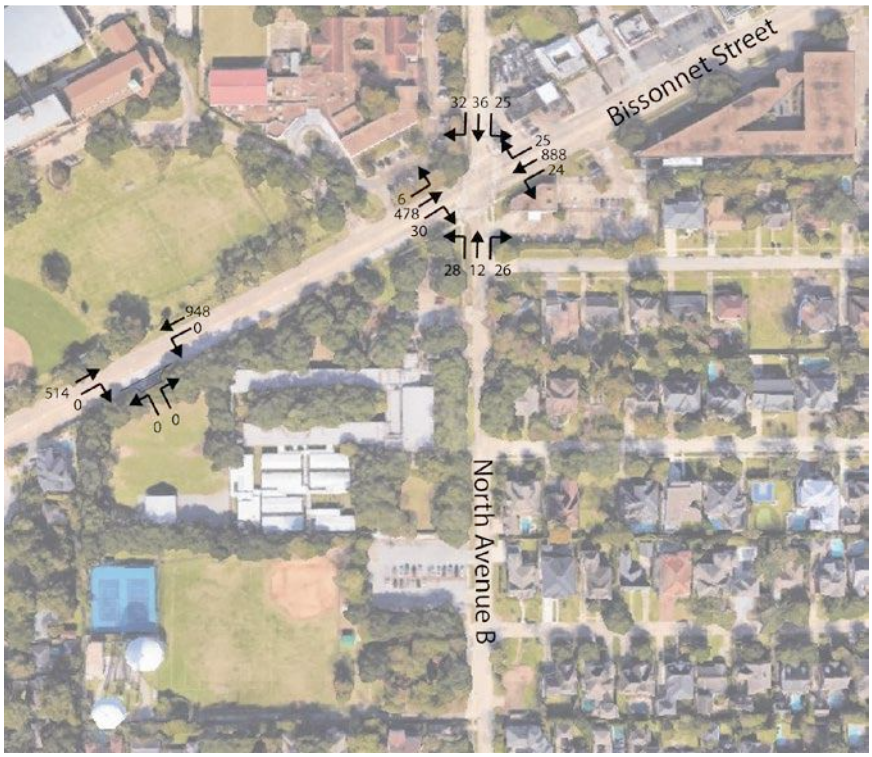



**FIGURE 4: EXISTING TRAFFIC VOLUMES DURING PM PEAK HOUR**

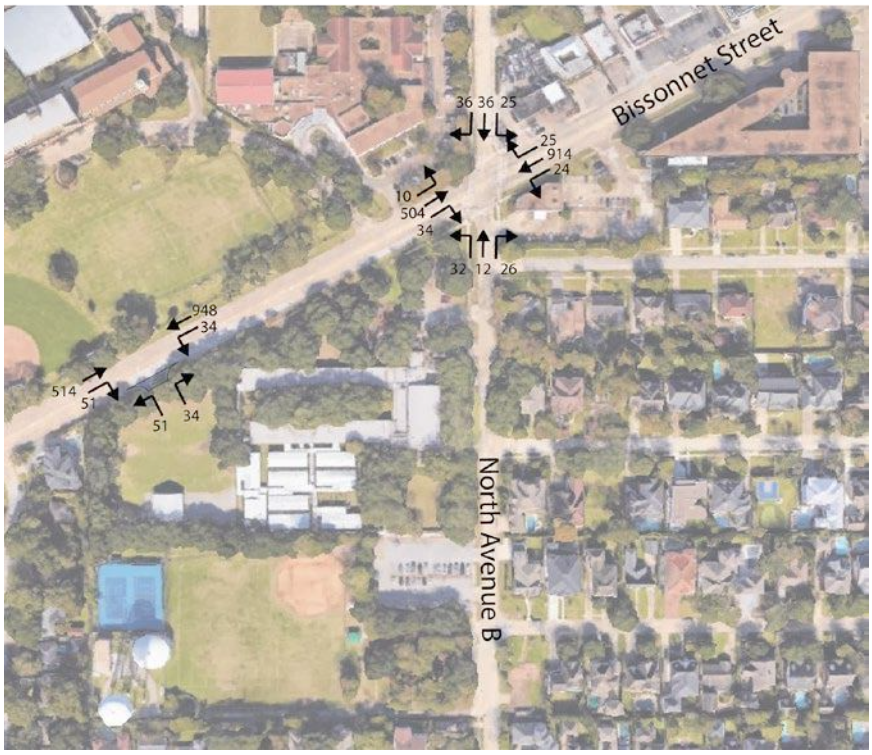



**FIGURE 5: BUILD OUT TRAFFIC VOLUMES DURING PM PEAK HOUR**



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

## F. CAPACITY ANALYSES FOR STREET INTERSECTIONS AND DRIVEWAYS

Capacity analyses were conducted for Background and Build-Out conditions at the study area intersections using Vistro 5 which is based on the *Highway Capacity Manual*. Capacity analysis provides information regarding traffic operations at an intersection and is expressed in terms of the level-of-service (LOS). The level-of-service indicates the average seconds of delay experienced by a motorist at a signalized intersection or at the stop controlled approaches of an unsignalized intersection. As a frame of reference, intersection levels-of-service range from A to F, with LOS A representing free flow conditions and LOS F representing highly congested conditions. In general, a signalized intersection or stop controlled approaches at an unsignalized intersection operating at LOS D or better in an urban area is characterized by acceptable delays.

Results of the capacity analyses are provided in **Appendix B** and a summary is presented in **Table 2.**

**TABLE 2: PM PEAK INTERSECTION LEVEL OF SERVICE**

| PM Peak | LOS/Delay (sec.) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Existing | | | | | Built-out | | | | |
| Intersection | Intersection | Approach | | | | Intersection | Approach | | | |
| | | NB | SB | EB | WB | | NB | SB | EB | WB |
| Bissonnet Street at North Avenue B | D/37.8 | F | F | A | A | D/41.0 | F | F | A | A |

## G. TRAFFIC IMPACT ASSESSMENT

During the PM peak hour, the intersection of Bissonnet Street and North Avenue B is expected to continue to operate at LOS D for both the 2018 Background and Build-Out conditions

The traffic impacts would not warrant major mitigation above and beyond the existing infrastructure.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

## H. RECOMMENDATIONS

This report presents the Traffic Impact Analysis (TIA) for a proposed baseball and softball field located at the southwest corner of the Bissonnet Street and North Avenue B in the City of Bellaire, Texas.

The following observations and recommendations are made according to the results of the TIA:

- The trips generated by the proposed development as distributed will result in an acceptable level of impacts upon the background traffic operations at the critical intersections.
- The developer will not need to provide additional turn lanes to access the site driveway.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# Appendices

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# Appendix A
# Turning Movement Counts

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

CJ Hensch & Associates, Inc.

TEI
5215 Sycamore Avenue

Pasadena, Texas, United States 77503
281-487-5417 susan@trafficengineers.com

Count Name: N Avenue B at Bissonnet St
Site Code:
Start Date: 05/23/2017
Page No: 1

# Turning Movement Data

| Start Time | N Avenue B Southbound | | | | | | Bissonnet St Westbound | | | | | | N Avenue B Northbound | | | | | | Bissonnet St Eastbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Int. Total |
| 2:00 PM | 4 | 8 | 4 | 0 | 0 | 16 | 7 | 143 | 0 | 0 | 0 | 150 | 10 | 0 | 9 | 0 | 0 | 19 | 2 | 110 | 5 | 0 | 0 | 117 | 302 |
| 2:15 PM | 1 | 3 | 4 | 0 | 1 | 8 | 6 | 168 | 2 | 0 | 1 | 176 | 4 | 0 | 7 | 0 | 1 | 11 | 3 | 102 | 6 | 0 | 4 | 111 | 306 |
| 2:30 PM | 4 | 6 | 7 | 0 | 5 | 17 | 3 | 133 | 2 | 0 | 1 | 138 | 8 | 0 | 1 | 0 | 0 | 9 | 2 | 114 | 6 | 0 | 0 | 122 | 286 |
| 2:45 PM | 2 | 7 | 4 | 0 | 2 | 13 | 7 | 167 | 2 | 0 | 0 | 176 | 8 | 2 | 3 | 0 | 1 | 13 | 3 | 80 | 6 | 0 | 3 | 89 | 291 |
| Hourly Total | 11 | 24 | 19 | 0 | 8 | 54 | 23 | 611 | 6 | 0 | 2 | 640 | 30 | 2 | 20 | 0 | 2 | 52 | 10 | 406 | 23 | 0 | 7 | 439 | 1185 |
| 3:00 PM | 4 | 3 | 6 | 0 | 5 | 13 | 5 | 141 | 2 | 0 | 1 | 148 | 5 | 0 | 12 | 0 | 0 | 17 | 0 | 93 | 8 | 0 | 3 | 101 | 279 |
| 3:15 PM | 9 | 5 | 17 | 0 | 2 | 31 | 3 | 132 | 1 | 0 | 1 | 136 | 10 | 1 | 10 | 0 | 0 | 21 | 0 | 119 | 6 | 0 | 7 | 125 | 313 |
| 3:30 PM | 15 | 24 | 23 | 0 | 4 | 62 | 6 | 189 | 0 | 0 | 0 | 195 | 9 | 0 | 13 | 0 | 0 | 22 | 0 | 132 | 9 | 0 | 14 | 141 | 420 |
| 3:45 PM | 8 | 14 | 9 | 0 | 1 | 31 | 9 | 169 | 3 | 0 | 0 | 181 | 6 | 2 | 14 | 0 | 0 | 22 | 0 | 120 | 11 | 0 | 3 | 131 | 365 |
| Hourly Total | 36 | 46 | 55 | 0 | 12 | 137 | 23 | 631 | 6 | 0 | 2 | 660 | 30 | 3 | 49 | 0 | 0 | 82 | 0 | 464 | 34 | 0 | 27 | 498 | 1377 |
| 4:00 PM | 8 | 15 | 8 | 0 | 0 | 31 | 6 | 204 | 7 | 0 | 1 | 217 | 8 | 5 | 8 | 0 | 0 | 21 | 2 | 90 | 6 | 0 | 2 | 98 | 367 |
| 4:15 PM | 5 | 7 | 12 | 0 | 3 | 24 | 9 | 191 | 5 | 0 | 0 | 205 | 5 | 2 | 4 | 0 | 0 | 11 | 4 | 112 | 9 | 0 | 0 | 125 | 365 |
| 4:30 PM | 10 | 7 | 7 | 0 | 3 | 24 | 5 | 185 | 6 | 0 | 6 | 196 | 5 | 1 | 6 | 0 | 0 | 12 | 1 | 122 | 7 | 0 | 1 | 130 | 362 |
| 4:45 PM | 6 | 8 | 4 | 0 | 1 | 18 | 3 | 218 | 3 | 0 | 1 | 224 | 2 | 5 | 5 | 0 | 1 | 12 | 2 | 119 | 10 | 0 | 1 | 131 | 385 |
| Hourly Total | 29 | 37 | 31 | 0 | 7 | 97 | 23 | 798 | 21 | 0 | 8 | 842 | 20 | 13 | 23 | 0 | 1 | 56 | 9 | 443 | 32 | 0 | 4 | 484 | 1479 |
| 5:00 PM | 11 | 12 | 8 | 0 | 1 | 31 | 7 | 236 | 9 | 0 | 2 | 252 | 12 | 3 | 7 | 0 | 0 | 22 | 0 | 103 | 6 | 0 | 3 | 109 | 414 |
| 5:15 PM | 4 | 12 | 15 | 0 | 0 | 31 | 8 | 208 | 7 | 0 | 2 | 223 | 8 | 4 | 6 | 1 | 1 | 19 | 3 | 144 | 4 | 0 | 7 | 151 | 424 |
| 5:30 PM | 4 | 4 | 5 | 0 | 0 | 13 | 6 | 226 | 6 | 0 | 0 | 238 | 5 | 0 | 8 | 0 | 0 | 13 | 1 | 112 | 10 | 0 | 7 | 123 | 387 |
| 5:45 PM | 5 | 9 | 4 | 0 | 0 | 18 | 8 | 187 | 5 | 0 | 0 | 200 | 7 | 3 | 12 | 0 | 2 | 22 | 1 | 106 | 5 | 0 | 1 | 112 | 352 |
| Hourly Total | 24 | 37 | 32 | 0 | 1 | 93 | 29 | 857 | 27 | 0 | 4 | 913 | 32 | 10 | 33 | 1 | 3 | 76 | 5 | 465 | 25 | 0 | 18 | 495 | 1577 |
| Grand Total | 100 | 144 | 137 | 0 | 28 | 381 | 98 | 2897 | 60 | 0 | 16 | 3055 | 112 | 28 | 125 | 1 | 6 | 266 | 24 | 1778 | 114 | 0 | 56 | 1916 | 5618 |
| Approach % | 26.2 | 37.8 | 36.0 | 0.0 | - | - | 3.2 | 94.8 | 2.0 | 0.0 | - | - | 42.1 | 10.5 | 47.0 | 0.4 | - | - | 1.3 | 92.8 | 5.9 | 0.0 | - | - | - |
| Total % | 1.8 | 2.6 | 2.4 | 0.0 | - | 6.8 | 1.7 | 51.6 | 1.1 | 0.0 | - | 54.4 | 2.0 | 0.5 | 2.2 | 0.0 | - | 4.7 | 0.4 | 31.6 | 2.0 | 0.0 | - | 34.1 | - |
| All Vehicles (no classification) | 100 | 144 | 137 | 0 | - | 381 | 98 | 2897 | 60 | 0 | - | 3055 | 112 | 28 | 125 | 1 | - | 266 | 24 | 1778 | 114 | 0 | - | 1916 | 5618 |
| % All Vehicles (no classification) | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | - | 100.0 | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 |
| Pedestrians | - | - | - | - | 28 | - | - | - | - | - | 16 | - | - | - | - | - | 6 | - | - | - | - | - | 56 | - | - |
| % Pedestrians | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - |

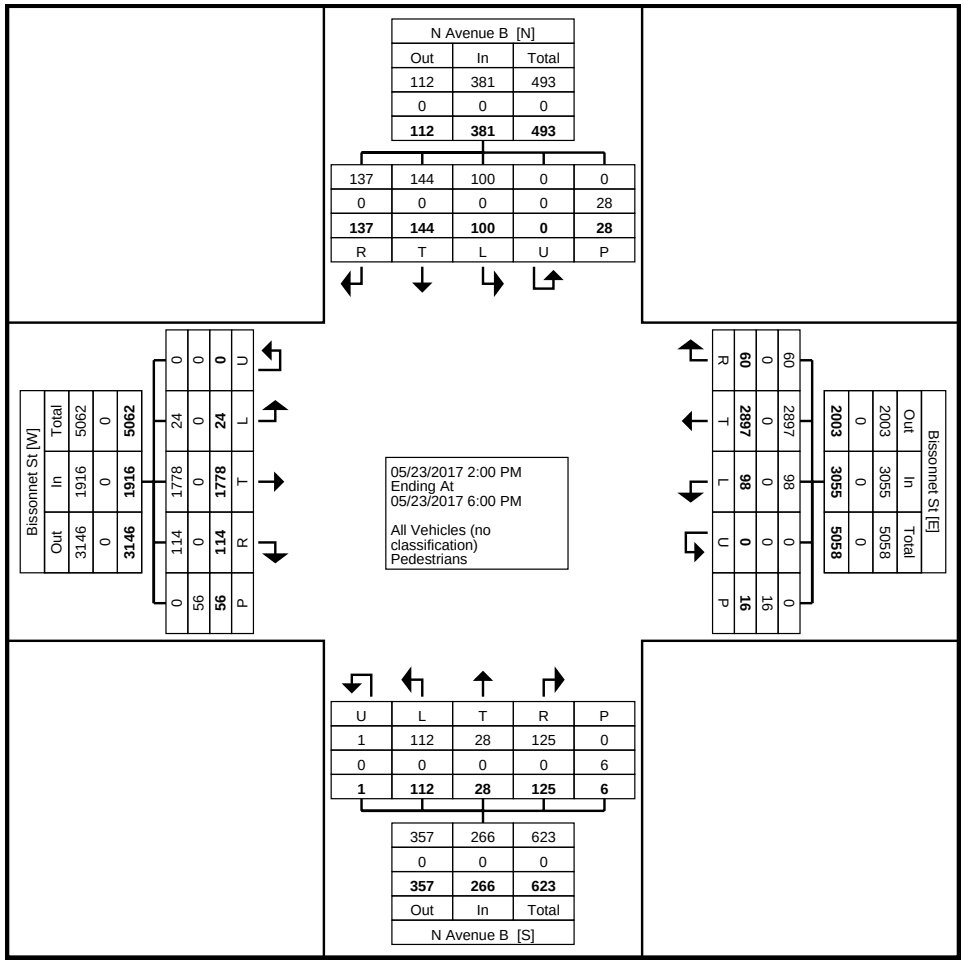
Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

CJ Hensch & Associates, Inc.

TEI
5215 Sycamore Avenue

Pasadena, Texas, United States 77503
281-487-5417 susan@trafficengineers.com

Count Name: N Avenue B at Bissonnet St
Site Code:
Start Date: 05/23/2017
Page No: 2




Turning Movement Data Plot

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

CJ Hensch & Associates, Inc.
TEI
5215 Sycamore Avenue

Pasadena, Texas, United States 77503
281-487-5417 susan@trafficengineers.com

Count Name: N Avenue B at Bissonnet St
Site Code:
Start Date: 05/23/2017
Page No: 3

# Turning Movement Peak Hour Data (4:45 PM)

| Start Time | N Avenue B Southbound | | | | | | Bissonnet St Westbound | | | | | | N Avenue B Northbound | | | | | | Bissonnet St Eastbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Int. Total |
| 4:45 PM | 6 | 8 | 4 | 0 | 1 | 18 | 3 | 218 | 3 | 0 | 1 | 224 | 2 | 5 | 5 | 0 | 1 | 12 | 2 | 119 | 10 | 0 | 1 | 131 | 385 |
| 5:00 PM | 11 | 12 | 8 | 0 | 1 | 31 | 7 | 236 | 9 | 0 | 2 | 252 | 12 | 3 | 7 | 0 | 0 | 22 | 0 | 103 | 6 | 0 | 3 | 109 | 414 |
| 5:15 PM | 4 | 12 | 15 | 0 | 0 | 31 | 8 | 208 | 7 | 0 | 2 | 223 | 8 | 4 | 6 | 1 | 1 | 19 | 3 | 144 | 4 | 0 | 7 | 151 | 424 |
| 5:30 PM | 4 | 4 | 5 | 0 | 0 | 13 | 6 | 226 | 6 | 0 | 0 | 238 | 5 | 0 | 8 | 0 | 0 | 13 | 1 | 112 | 10 | 0 | 7 | 123 | 387 |
| Total | 25 | 36 | 32 | 0 | 2 | 93 | 24 | 888 | 25 | 0 | 5 | 937 | 27 | 12 | 26 | 1 | 2 | 66 | 6 | 478 | 30 | 0 | 18 | 514 | 1610 |
| Approach % | 26.9 | 38.7 | 34.4 | 0.0 | - | - | 2.6 | 94.8 | 2.7 | 0.0 | - | - | 40.9 | 18.2 | 39.4 | 1.5 | - | - | 1.2 | 93.0 | 5.8 | 0.0 | - | - | - |
| Total % | 1.6 | 2.2 | 2.0 | 0.0 | - | 5.8 | 1.5 | 55.2 | 1.6 | 0.0 | - | 58.2 | 1.7 | 0.7 | 1.6 | 0.1 | - | 4.1 | 0.4 | 29.7 | 1.9 | 0.0 | - | 31.9 | - |
| PHF | 0.568 | 0.750 | 0.533 | 0.000 | - | 0.750 | 0.750 | 0.941 | 0.694 | 0.000 | - | 0.930 | 0.563 | 0.600 | 0.813 | 0.250 | - | 0.750 | 0.500 | 0.830 | 0.750 | 0.000 | - | 0.851 | 0.949 |
| All Vehicles (no classification) | 25 | 36 | 32 | 0 | - | 93 | 24 | 888 | 25 | 0 | - | 937 | 27 | 12 | 26 | 1 | - | 66 | 6 | 478 | 30 | 0 | - | 514 | 1610 |
| % All Vehicles (no classification) | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | - | 100.0 | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 |
| Pedestrians | - | - | - | - | 2 | - | - | - | - | - | 5 | - | - | - | - | - | 2 | - | - | - | - | - | 18 | - | - |
| % Pedestrians | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

CJ Hensch & Associates, Inc.

TEI
5215 Sycamore Avenue

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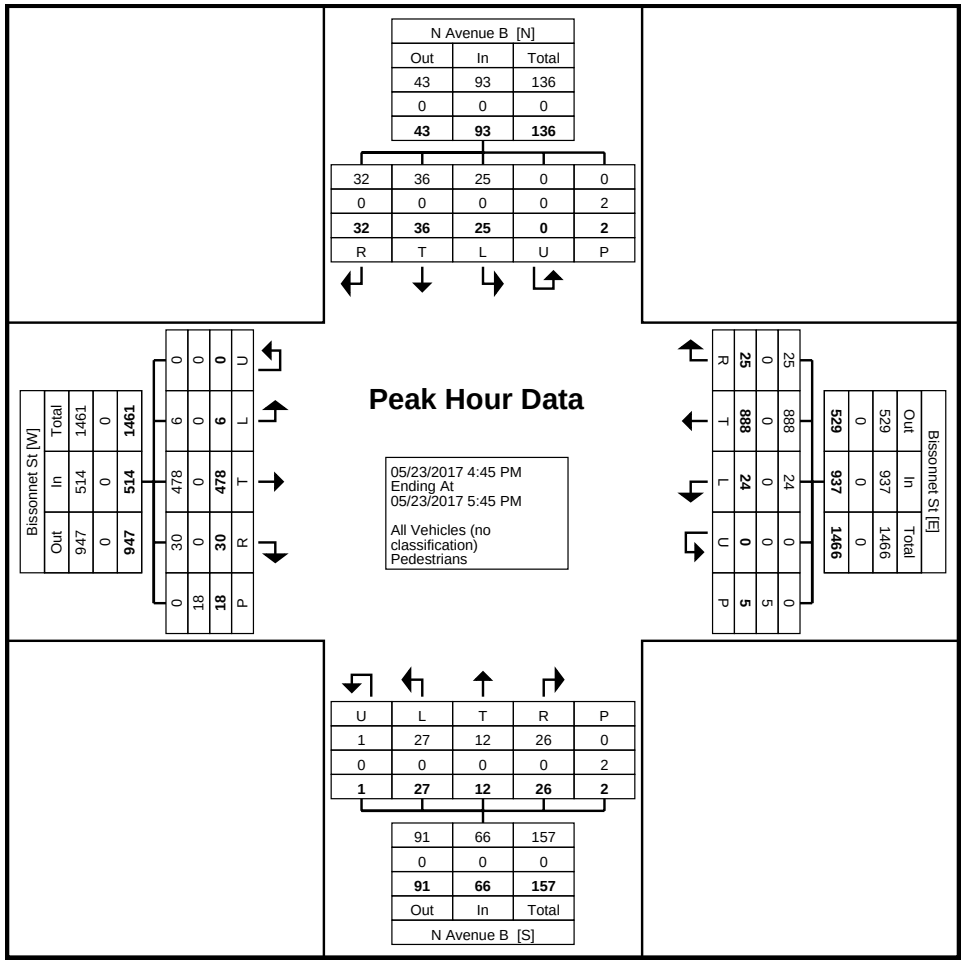
Count Name: N Avenue B at Bissonnet St
Site Code:
Start Date: 05/23/2017
Page No: 4




Turning Movement Peak Hour Data Plot (4:45 PM)

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# Appendix B
# Background and Build-out Traffic Operations

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

Vistro File: E:\...\Bissonett at Avenue B.vistro
Report File: E:\...\Existing.pdf

Scenario 1 Existing
7/6/2017

**Intersection Analysis Summary**

| ID | Intersection Name | Control Type | Method | Worst Mvmt | V/C | Delay (s/veh) | LOS |
|---|---|---|---|---|---|---|---|
| 1 | Bissonet Sreet at Avenue B | Signalized | HCM 6th Edition | SB Thru | 0.000 | 37.8 | D |
| 2 | Bissonnet Street at Driveway | Two-way stop | HCM 6th Edition | NB Left | 0.000 | 19.7 | C |

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

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**Intersection Level Of Service Report**
**Intersection 1: Bissonet Sreet at Avenue B**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 37.8 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | D |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | Avenue B | | | Avenue B | | | Bissonnet St | | | Bissonet St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 250.00 | 100.00 | 100.00 | 250.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Curb Present | No | | | No | | | No | | | No | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Avenue B | | | Avenue B | | | Bissonnet St | | | Bissonet St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 7 | 3 | 7 | 6 | 9 | 8 | 2 | 120 | 8 | 6 | 222 | 6 |
| Total Analysis Volume [veh/h] | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| v_do, Outbound Pedestrian Volume crossing | 0 | | | 0 | | | 0 | | | 0 | | |
| v_di, Inbound Pedestrian Volume crossing m | 0 | | | 0 | | | 0 | | | 0 | | |
| v_co, Outbound Pedestrian Volume crossing | 0 | | | 0 | | | 0 | | | 0 | | |
| v_ci, Inbound Pedestrian Volume crossing mi | 0 | | | 0 | | | 0 | | | 0 | | |
| v_ab, Corner Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

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**Intersection Settings**

| | |
|---|---|
| Located in CBD | Yes |
| Signal Coordination Group | - |
| Cycle Length [s] | 90 |
| Coordination Type | Time of Day Pattern Isolated |
| Actuation Type | Fixed time |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 2 | 0 | 0 | 6 | 0 | 7 | 4 | 0 | 3 | 8 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | - | - | - | - | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 0 | 5 | 0 | 0 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 0 | 20 | 0 | 0 | 20 | 0 | 15 | 55 | 0 | 15 | 55 | 0 |
| Amber [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 0 | 68 | 0 | 0 | 94 | 0 | 10 | 94 | 0 | 28 | 31 | 0 |
| Vehicle Extension [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | | No | | | No | | No | No | | No | No | |
| Maximum Recall | | No | | | No | | No | No | | No | No | |
| Pedestrian Recall | | No | | | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

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**Lane Group Calculations**

| Lane Group | C | C | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| L, Total Lost Time per Cycle [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| g_i, Effective Green Time [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| g / C, Green / Cycle | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| (v / s)_i Volume / Saturation Flow Rate | 0.00 | 0.00 | 0.01 | 0.15 | 0.15 | 0.03 | 0.27 | 0.27 |
| s, saturation flow rate [veh/h] | 0 | 0 | 498 | 1683 | 1648 | 727 | 1683 | 1667 |
| c, Capacity [veh/h] | 57 | 51 | 80 | 0 | 0 | 80 | 0 | 0 |
| d1, Uniform Delay [s] | 45.00 | 45.00 | 45.00 | 0.00 | 0.00 | 45.00 | 0.00 | 0.00 |
| k, delay calibration | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 168.87 | 440.91 | 1.82 | 0.00 | 0.00 | 9.36 | 0.00 | 0.00 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.16 | 1.83 | 0.08 | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 |
| d, Delay for Lane Group [s/veh] | 213.87 | 485.91 | 46.82 | 0.00 | 0.00 | 54.36 | 0.00 | 0.00 |
| Lane Group LOS | F | F | D | A | A | D | A | A |
| Critical Lane Group | No | No | No | No | No | No | No | No |
| 50th-Percentile Queue Length [veh] | 4.07 | 7.42 | 0.17 | 0.00 | 0.00 | 0.76 | 0.00 | 0.00 |
| 50th-Percentile Queue Length [ft] | 101.72 | 185.43 | 4.37 | 0.00 | 0.00 | 18.92 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [veh] | 7.32 | 11.88 | 0.31 | 0.00 | 0.00 | 1.36 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 183.10 | 297.09 | 7.86 | 0.00 | 0.00 | 34.06 | 0.00 | 0.00 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 213.87 | 213.87 | 213.87 | 485.91 | 485.91 | 485.91 | 46.82 | 0.00 | 0.00 | 54.36 | 0.00 | 0.00 |
| Movement LOS | F | F | F | F | F | F | D | A | A | D | A | A |
| d_A, Approach Delay [s/veh] | 213.87 | | | 485.91 | | | 0.55 | | | 1.39 | | |
| Approach LOS | F | | | F | | | A | | | A | | |
| d_I, Intersection Delay [s/veh] | 37.82 | | | | | | | | | | | |
| Intersection LOS | D | | | | | | | | | | | |
| Intersection V/C | 0.000 | | | | | | | | | | | |

**Other Modes**

| | | | | |
|---|---|---|---|---|
| g_Walk,mi, Effective Walk Time [s] | 9.0 | 9.0 | 9.0 | 9.0 |
| M_corner, Corner Circulation Area [ft²/ped] | 0.00 | 0.00 | 0.00 | 0.00 |
| M_CW, Crosswalk Circulation Area [ft²/ped] | 0.00 | 0.00 | 0.00 | 0.00 |
| d_p, Pedestrian Delay [s] | 36.45 | 36.45 | 36.45 | 36.45 |
| I_p,int, Pedestrian LOS Score for Intersection | 1.792 | 1.783 | 2.626 | 2.623 |
| Crosswalk LOS | A | A | B | B |
| s_b, Saturation Flow Rate of the bicycle lane | 2000 | 2000 | 2000 | 2000 |
| c_b, Capacity of the bicycle lane [bicycles/h] | 0 | 0 | 0 | 0 |
| d_b, Bicycle Delay [s] | 45.00 | 45.00 | 45.00 | 45.00 |
| I_b,int, Bicycle LOS Score for Intersection | 1.669 | 1.713 | 1.984 | 2.333 |

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| | | | | |
|---|---|---|---|---|
| Bicycle LOS | A | A | A | B |

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**Intersection Level Of Service Report**
**Intersection 2: Bissonnet Street at Driveway**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 19.7 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | C |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | Dwy | | Bissonnet St | | Bissonnet St | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Northeastbound | | Southwestbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Right | Thru | Right | Left | Thru |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 1 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 250.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | Yes | | Yes | | Yes | |

**Volumes**

| Name | Dwy | | Bissonnet St | | Bissonnet St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 514 | 0 | 0 | 948 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 0 | 514 | 0 | 0 | 948 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 0 | 129 | 0 | 0 | 237 |
| Total Analysis Volume [veh/h] | 0 | 0 | 514 | 0 | 0 | 948 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

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**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Stop | Free | Free |
| Flared Lane | No | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | No | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 |
| d_M, Delay for Movement [s/veh] | 19.75 | 9.85 | 0.00 | 0.00 | 8.44 | 0.00 |
| Movement LOS | C | A | A | A | A | A |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 14.80 | | 0.00 | | 0.00 | |
| Approach LOS | B | | A | | A | |
| d_I, Intersection Delay [s/veh] | 0.00 | | | | | |
| Intersection LOS | C | | | | | |

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Report File: E:\...\Existing.pdf

Scenario 1 Existing
7/6/2017

## Turning Movement Volume: Summary

| ID | Intersection Name | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 1 | Bissonet Sreet at Avenue B | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 | 1610 |

| ID | Intersection Name | Northbound | | Northeastbound | | Southwestbound | | Total Volume |
|---|---|---|---|---|---|---|---|---|
| | | Left | Right | Thru | Right | Left | Thru | |
| 2 | Bissonnet Street at Driveway | 0 | 0 | 514 | 0 | 0 | 948 | 1462 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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Vistro File: E:\...\Bissonett at Avenue B.vistro
Report File: E:\...\Existing.pdf

Scenario 1 Existing
7/6/2017

## Turning Movement Volume: Detail

| ID | Intersection Name | Volume Type | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 1 | Bissonet Sreet at Avenue B | Final Base | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 | 1610 |
| | | Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - |
| | | In Process | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Net New Trips | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | **Future Total** | **28** | **12** | **26** | **25** | **36** | **32** | **6** | **478** | **30** | **24** | **888** | **25** | **1610** |

| ID | Intersection Name | Volume Type | Northbound | | Northeastbound | | Southwestbound | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|
| | | | Left | Right | Thru | Right | Left | Thru | |
| 2 | Bissonnet Street at Driveway | Final Base | 0 | 0 | 514 | 0 | 0 | 948 | 1462 |
| | | Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - |
| | | In Process | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Net New Trips | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | **Future Total** | **0** | **0** | **514** | **0** | **0** | **948** | **1462** |

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Signal Warrants Report For Intersection 2: Bissonnet Street at Driveway

## Warrants Summary

| Warrant | Name | Met? |
|---|---|---|
| #1 | Eight Hour Vehicular Volume | No |
| #2 | Four Hour Vehicular Volume | No |
| #3 | Peak Hour | No |

## Intersection Warrants Parameters

| | |
|---|---|
| Major Approaches | NE, SW |
| Minor Approaches | S |
| Speed > 40mph | No |
| Population < 10,000 | No |
| Warrant Factor | 100% |

## Warrant Analysis Traffic Volumes

| Hour | Major Streets | | Minor Streets |
|---|---|---|---|
| | NE | SW | S |
| 1 | 948 | 514 | 0 |
| 2 | 910 | 493 | 0 |
| 3 | 891 | 483 | 0 |
| 4 | 758 | 411 | 0 |
| 5 | 720 | 391 | 0 |
| 6 | 645 | 350 | 0 |
| 7 | 597 | 324 | 0 |
| 8 | 569 | 308 | 0 |
| 9 | 455 | 247 | 0 |
| 10 | 427 | 231 | 0 |
| 11 | 427 | 231 | 0 |
| 12 | 408 | 221 | 0 |
| 13 | 370 | 200 | 0 |
| 14 | 341 | 185 | 0 |
| 15 | 341 | 185 | 0 |
| 16 | 332 | 180 | 0 |
| 17 | 190 | 103 | 0 |
| 18 | 104 | 57 | 0 |
| 19 | 95 | 51 | 0 |
| 20 | 38 | 21 | 0 |
| 21 | 28 | 15 | 0 |
| 22 | 28 | 15 | 0 |
| 23 | 19 | 10 | 0 |
| 24 | 19 | 10 | 0 |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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## Warrant Analysis by Hour

| Hour | Major Lanes | | Minor Lanes | | Warrant 1 Condition A | | | | Warrant 1 Condition B | | | | Warrant 2 | Warrant 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Volume | Number | Volume | 100% | 80% | 70% | 56% | 100% | 80% | 70% | 56% | | Condition B |
| 1 | 5 | 1462 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 2 | 5 | 1403 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 3 | 5 | 1374 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 4 | 5 | 1169 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 5 | 5 | 1111 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 6 | 5 | 995 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 7 | 5 | 921 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 8 | 5 | 877 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 9 | 5 | 702 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 10 | 5 | 658 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 11 | 5 | 658 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 12 | 5 | 629 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 13 | 5 | 570 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 14 | 5 | 526 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 15 | 5 | 526 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 16 | 5 | 512 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 17 | 5 | 293 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 18 | 5 | 161 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 19 | 5 | 146 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 20 | 5 | 59 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 21 | 5 | 43 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 22 | 5 | 43 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 23 | 5 | 29 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 24 | 5 | 29 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| Hours Met | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## Warrant 3 Condition A

| | |
|---|---|
| Orientation | S |
| Total Stopped Delay Per Vehicle on Minor Approach (s) | 14.8 |
| Number of Lanes on Minor Street Approach | 1 |
| VehicleHours of Stopped Delay on Minor Approach ([h]h:mm) | 0:00 |
| Delay Condition Met | No |
| Volume on Minor Street Approach During Same Hour | 0 |
| High Minor Volume Condition Met | No |
| Total Entering Volume on All Approaches During Same Hour | 1462 |
| Number of Approaches on Intersection | 3 |
| Total Volume Condition Met | Yes |
| Warrant Met for Approach | No |
| **Warrant Met for Intersection** | **No** |

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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Study Intersections


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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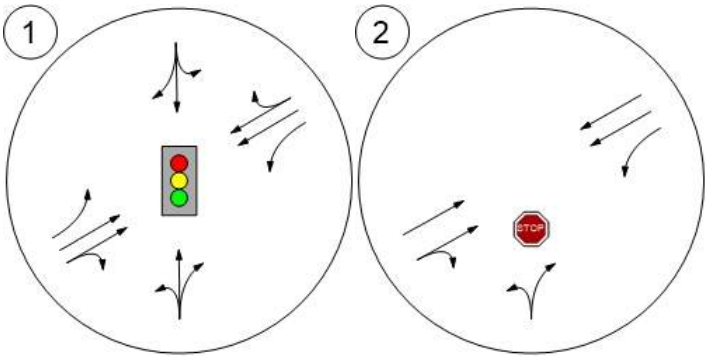
Lane Configuration and Traffic Control


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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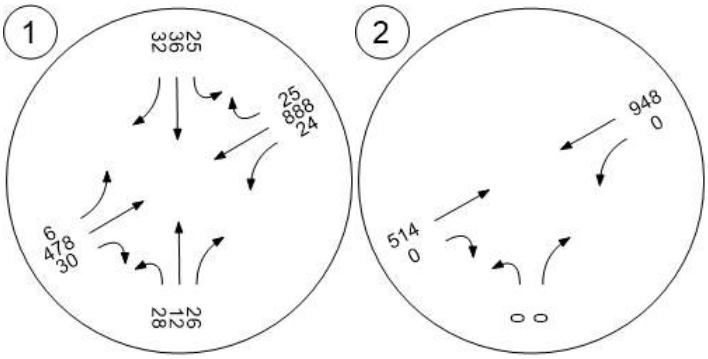
Traffic Volume - Base Volume


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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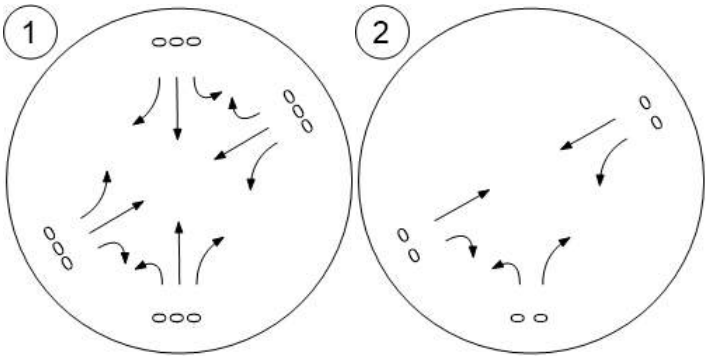
Traffic Volume - In-Process Volume


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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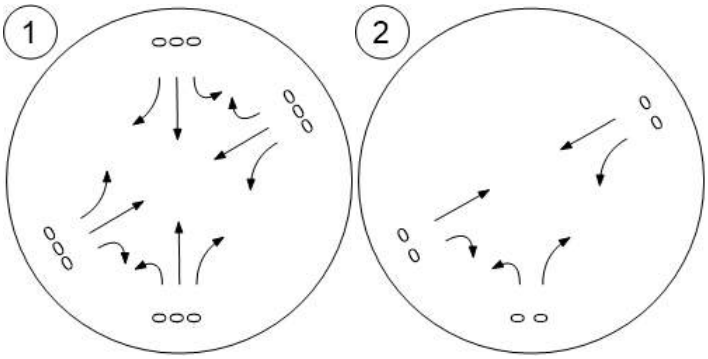
Traffic Volume - Net New Site Trips


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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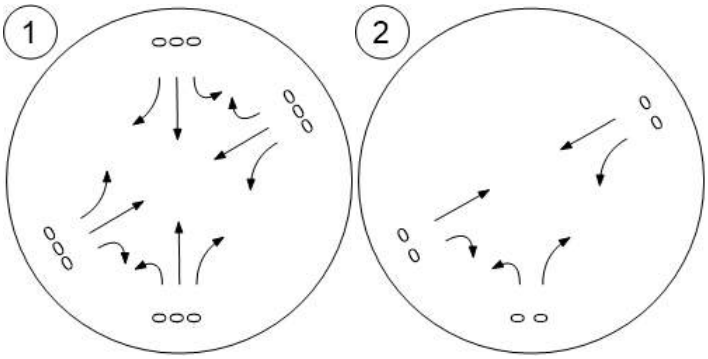
Traffic Volume - Other Volume


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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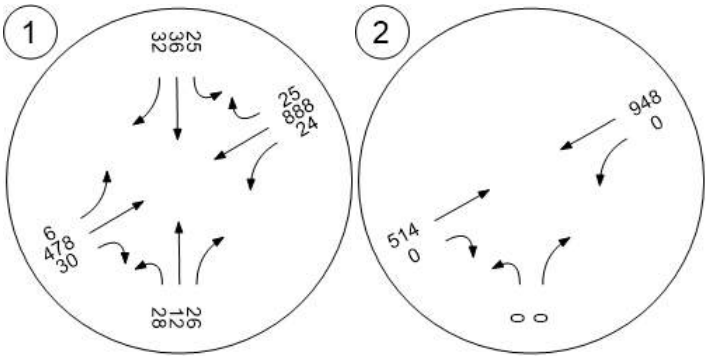
Traffic Volume - Future Total Volume


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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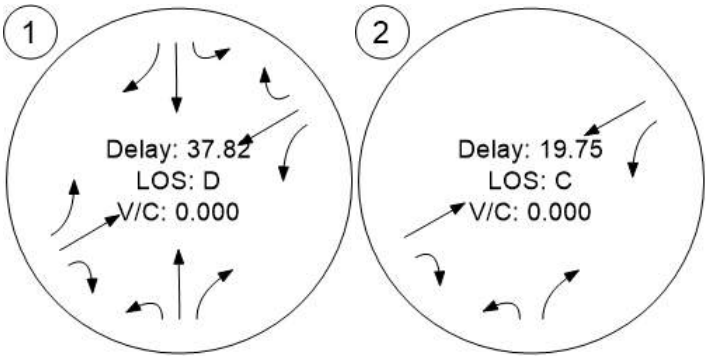
Traffic Conditions


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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Vistro File: E:\...\Bissonett at Avenue B.vistro
Report File: E:\...\Build Out.pdf

Scenario 2 Build Ou
7/6/2017

**Intersection Analysis Summary**

| ID | Intersection Name | Control Type | Method | Worst Mvmt | V/C | Delay (s/veh) | LOS |
|---|---|---|---|---|---|---|---|
| 1 | Bissonet at Avenue B | Signalized | HCM 6th Edition | SB Thru | 0.000 | 41.0 | D |
| 2 | Bissonnet Street at Driveway | Two-way stop | HCM 6th Edition | NB Left | 0.249 | 27.8 | D |

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

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**Intersection Level Of Service Report**
**Intersection 1: Bissonet at Avenue B**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 41.0 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | D |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | Avenue B | | | Avenue B | | | Bissonnett St | | | Bissonet St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 250.00 | 100.00 | 100.00 | 250.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Curb Present | No | | | No | | | No | | | No | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Avenue B | | | Avenue B | | | Bissonnett St | | | Bissonet St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 4 | 0 | 0 | 0 | 0 | 4 | 4 | 26 | 4 | 0 | 26 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 32 | 12 | 26 | 25 | 36 | 36 | 10 | 504 | 34 | 24 | 914 | 25 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 8 | 3 | 7 | 6 | 9 | 9 | 3 | 126 | 9 | 6 | 229 | 6 |
| Total Analysis Volume [veh/h] | 32 | 12 | 26 | 25 | 36 | 36 | 10 | 504 | 34 | 24 | 914 | 25 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| v_do, Outbound Pedestrian Volume crossing | 0 | | | 0 | | | 0 | | | 0 | | |
| v_di, Inbound Pedestrian Volume crossing m | 0 | | | 0 | | | 0 | | | 0 | | |
| v_co, Outbound Pedestrian Volume crossing | 0 | | | 0 | | | 0 | | | 0 | | |
| v_ci, Inbound Pedestrian Volume crossing mi | 0 | | | 0 | | | 0 | | | 0 | | |
| v_ab, Corner Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

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**Intersection Settings**

| | |
|---|---|
| Located in CBD | Yes |
| Signal Coordination Group | - |
| Cycle Length [s] | 90 |
| Coordination Type | Time of Day Pattern Isolated |
| Actuation Type | Fixed time |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 2 | 0 | 0 | 6 | 0 | 7 | 4 | 0 | 3 | 8 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | - | - | - | - | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 0 | 5 | 0 | 0 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 0 | 20 | 0 | 0 | 20 | 0 | 15 | 55 | 0 | 15 | 55 | 0 |
| Amber [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vehicle Extension [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | | No | | | No | | No | No | | No | No | |
| Maximum Recall | | No | | | No | | No | No | | No | No | |
| Pedestrian Recall | | No | | | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

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**Lane Group Calculations**

| Lane Group | C | C | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| L, Total Lost Time per Cycle [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| g_i, Effective Green Time [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| g / C, Green / Cycle | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| (v / s)_i Volume / Saturation Flow Rate | 0.00 | 0.00 | 0.02 | 0.16 | 0.16 | 0.03 | 0.28 | 0.28 |
| s, saturation flow rate [veh/h] | 0 | 0 | 484 | 1683 | 1646 | 705 | 1683 | 1667 |
| c, Capacity [veh/h] | 58 | 50 | 80 | 0 | 0 | 80 | 0 | 0 |
| d1, Uniform Delay [s] | 45.00 | 45.00 | 45.00 | 0.00 | 0.00 | 45.00 | 0.00 | 0.00 |
| k, delay calibration | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 182.10 | 482.03 | 3.19 | 0.00 | 0.00 | 9.36 | 0.00 | 0.00 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.20 | 1.93 | 0.13 | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 |
| d, Delay for Lane Group [s/veh] | 227.10 | 527.03 | 48.19 | 0.00 | 0.00 | 54.36 | 0.00 | 0.00 |
| Lane Group LOS | F | F | D | A | A | D | A | A |
| Critical Lane Group | No | No | No | No | No | No | No | No |
| 50th-Percentile Queue Length [veh] | 4.40 | 7.93 | 0.30 | 0.00 | 0.00 | 0.76 | 0.00 | 0.00 |
| 50th-Percentile Queue Length [ft] | 109.91 | 198.19 | 7.42 | 0.00 | 0.00 | 18.94 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [veh] | 7.83 | 12.55 | 0.53 | 0.00 | 0.00 | 1.36 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 195.87 | 313.63 | 13.35 | 0.00 | 0.00 | 34.09 | 0.00 | 0.00 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 227.10 | 227.10 | 227.10 | 527.03 | 527.03 | 527.03 | 48.19 | 0.00 | 0.00 | 54.36 | 0.00 | 0.00 |
| Movement LOS | F | F | F | F | F | F | D | A | A | D | A | A |
| d_A, Approach Delay [s/veh] | 227.10 | | | 527.03 | | | 0.88 | | | 1.35 | | |
| Approach LOS | F | | | F | | | A | | | A | | |
| d_I, Intersection Delay [s/veh] | 41.00 | | | | | | | | | | | |
| Intersection LOS | D | | | | | | | | | | | |
| Intersection V/C | 0.000 | | | | | | | | | | | |

**Other Modes**

| | | | | |
|---|---|---|---|---|
| g_Walk,mi, Effective Walk Time [s] | 9.0 | 9.0 | 9.0 | 9.0 |
| M_corner, Corner Circulation Area [ft²/ped] | 0.00 | 0.00 | 0.00 | 0.00 |
| M_CW, Crosswalk Circulation Area [ft²/ped] | 0.00 | 0.00 | 0.00 | 0.00 |
| d_p, Pedestrian Delay [s] | 36.45 | 36.45 | 36.45 | 36.45 |
| I_p,int, Pedestrian LOS Score for Intersection | 1.796 | 1.787 | 2.645 | 2.633 |
| Crosswalk LOS | A | A | B | B |
| s_b, Saturation Flow Rate of the bicycle lane | 2000 | 2000 | 2000 | 2000 |
| c_b, Capacity of the bicycle lane [bicycles/h] | 0 | 0 | 0 | 0 |
| d_b, Bicycle Delay [s] | 45.00 | 45.00 | 45.00 | 45.00 |
| I_b,int, Bicycle LOS Score for Intersection | 1.675 | 1.720 | 2.012 | 2.354 |

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| | | | | |
|---|---|---|---|---|
| Bicycle LOS | A | A | B | B |

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**Intersection Level Of Service Report**
**Intersection 2: Bissonnet Street at Driveway**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 27.8 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | D |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.249 |

**Intersection Setup**

| Name | Dwy | | Bissonnet St | | Bissonnett St | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Northeastbound | | Southwestbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Right | Thru | Right | Left | Thru |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 1 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 250.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | Yes | | Yes | | Yes | |

**Volumes**

| Name | Dwy | | Bissonnet St | | Bissonnett St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 514 | 0 | 0 | 948 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 51 | 34 | 0 | 51 | 34 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 51 | 34 | 514 | 51 | 34 | 948 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 13 | 9 | 129 | 13 | 9 | 237 |
| Total Analysis Volume [veh/h] | 51 | 34 | 514 | 51 | 34 | 948 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

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**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Stop | Free | Free |
| Flared Lane | No | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | No | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.25 | 0.05 | 0.01 | 0.00 | 0.03 | 0.01 |
| d_M, Delay for Movement [s/veh] | 27.75 | 15.24 | 0.00 | 0.00 | 8.72 | 0.00 |
| Movement LOS | D | C | A | A | A | A |
| 95th-Percentile Queue Length [veh] | 1.21 | 1.21 | 0.00 | 0.00 | 0.11 | 0.00 |
| 95th-Percentile Queue Length [ft] | 30.13 | 30.13 | 0.00 | 0.00 | 2.63 | 0.00 |
| d_A, Approach Delay [s/veh] | 22.74 | | 0.00 | | 0.30 | |
| Approach LOS | C | | A | | A | |
| d_I, Intersection Delay [s/veh] | 1.37 | | | | | |
| Intersection LOS | D | | | | | |

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Scenario 2 Build Out
7/6/2017

## Turning Movement Volume: Summary

| ID | Intersection Name | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 1 | Bissonet at Avenue B | 32 | 12 | 26 | 25 | 36 | 36 | 10 | 504 | 34 | 24 | 914 | 25 | 1678 |

| ID | Intersection Name | Northbound | | Northeastbound | | Southwestbound | | Total Volume |
|---|---|---|---|---|---|---|---|---|
| | | Left | Right | Thru | Right | Left | Thru | |
| 2 | Bissonnet Street at Driveway | 51 | 34 | 514 | 51 | 34 | 948 | 1632 |

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Scenario 2 Build Out
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## Turning Movement Volume: Detail

| ID | Intersection Name | Volume Type | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 1 | Bissonet at Avenue B | Final Base | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 | 1610 |
| | | Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - |
| | | In Process | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Net New Trips | 4 | 0 | 0 | 0 | 0 | 4 | 4 | 26 | 4 | 0 | 26 | 0 | 68 |
| | | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | **Future Total** | **32** | **12** | **26** | **25** | **36** | **36** | **10** | **504** | **34** | **24** | **914** | **25** | **1678** |

| ID | Intersection Name | Volume Type | Northbound | | Northeastbound | | Southwestbound | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|
| | | | Left | Right | Thru | Right | Left | Thru | |
| 2 | Bissonnet Street at Driveway | Final Base | 0 | 0 | 514 | 0 | 0 | 948 | 1462 |
| | | Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - |
| | | In Process | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Net New Trips | 51 | 34 | 0 | 51 | 34 | 0 | 170 |
| | | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | **Future Total** | **51** | **34** | **514** | **51** | **34** | **948** | **1632** |

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## Fair Share Volumes

| Intersection 1: Bissonet at Avenue B | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total |
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 6: zone | 4 | 0 | 0 | 0 | 0 | 4 | 4 | 26 | 4 | 0 | 26 | 0 | 68 |
| Site-Generated Trips | 4 | 0 | 0 | 0 | 0 | 4 | 4 | 26 | 4 | 0 | 26 | 0 | |
| Future Total Volume | 32 | 12 | 26 | 25 | 36 | 36 | 10 | 504 | 34 | 24 | 914 | 25 | |

| Intersection 2: Bissonnet Street at Driveway | | | | | | | |
|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | Northeastbound | | Southwestbound | | Total |
| | Left | Right | Thru | Right | Left | Thru | |
| 6: zone | 51 | 34 | 0 | 51 | 34 | 0 | 170 |
| Site-Generated Trips | 51 | 34 | 0 | 51 | 34 | 0 | |
| Future Total Volume | 51 | 34 | 514 | 51 | 34 | 948 | |

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## Fair Share % of Net New Site

| Intersection 1: Bissonet at Avenue B | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total |
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 6: zone | 100% | 0% | 0% | 0% | 0% | 100% | 100% | 100% | 100% | 0% | 100% | 0% | 100% |
| Total | 100% | 0% | 0% | 0% | 0% | 100% | 100% | 100% | 100% | 0% | 100% | 0% | |

| Intersection 2: Bissonnet Street at Driveway | | | | | | | |
|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | Northeastbound | | Southwestbound | | Total |
| | Left | Right | Thru | Right | Left | Thru | |
| 6: zone | 100% | 100% | 0% | 100% | 100% | 0% | 100% |
| Total | 100% | 100% | 0% | 100% | 100% | 0% | |

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## Fair Share % of Future Total

| Intersection 1: Bissonet at Avenue B | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total |
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 6: zone | 12.5% | 0% | 0% | 0% | 0% | 11.11% | 40% | 5.16% | 11.76% | 0% | 2.84% | 0% | 4.05% |
| Total | 12.5% | 0% | 0% | 0% | 0% | 11.11% | 40% | 5.16% | 11.76% | 0% | 2.84% | 0% | |

| Intersection 2: Bissonnet Street at Driveway | | | | | | | |
|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | Northeastbound | | Southwestbound | | Total |
| | Left | Right | Thru | Right | Left | Thru | |
| 6: zone | 100% | 100% | 0% | 100% | 100% | 0% | 10.42% |
| Total | 100% | 100% | 0% | 100% | 100% | 0% | |

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Signal Warrants Report For Intersection 2: Bissonnet Street at Driveway

## Warrants Summary

| Warrant | Name | Met? |
|---|---|---|
| #1 | Eight Hour Vehicular Volume | No |
| #2 | Four Hour Vehicular Volume | No |
| #3 | Peak Hour | No |

## Intersection Warrants Parameters

| | |
|---|---|
| Major Approaches | NE, SW |
| Minor Approaches | S |
| Speed > 40mph | No |
| Population < 10,000 | No |
| Warrant Factor | 100% |

## Warrant Analysis Traffic Volumes

| Hour | Major Streets | | Minor Streets |
|---|---|---|---|
| | NE | SW | S |
| 1 | 982 | 565 | 85 |
| 2 | 943 | 542 | 82 |
| 3 | 923 | 531 | 80 |
| 4 | 786 | 452 | 68 |
| 5 | 746 | 429 | 65 |
| 6 | 668 | 384 | 58 |
| 7 | 619 | 356 | 54 |
| 8 | 589 | 339 | 51 |
| 9 | 471 | 271 | 41 |
| 10 | 442 | 254 | 38 |
| 11 | 442 | 254 | 38 |
| 12 | 422 | 243 | 37 |
| 13 | 383 | 220 | 33 |
| 14 | 354 | 203 | 31 |
| 15 | 354 | 203 | 31 |
| 16 | 344 | 198 | 30 |
| 17 | 196 | 113 | 17 |
| 18 | 108 | 62 | 9 |
| 19 | 98 | 57 | 9 |
| 20 | 39 | 23 | 3 |
| 21 | 29 | 17 | 3 |
| 22 | 29 | 17 | 3 |
| 23 | 20 | 11 | 2 |
| 24 | 20 | 11 | 2 |

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## Warrant Analysis by Hour

| Hour | Major Lanes | | Minor Lanes | | Warrant 1 Condition A | | | | Warrant 1 Condition B | | | | Warrant 2 | Warrant 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Volume | Number | Volume | 100% | 80% | 70% | 56% | 100% | 80% | 70% | 56% | | Condition B |
| 1 | 5 | 1547 | 1 | 85 | No | No | No | Yes | Yes | Yes | Yes | Yes | Yes | No |
| 2 | 5 | 1485 | 1 | 82 | No | No | No | No | Yes | Yes | Yes | Yes | Yes | No |
| 3 | 5 | 1454 | 1 | 80 | No | No | No | No | Yes | Yes | Yes | Yes | No | No |
| 4 | 5 | 1238 | 1 | 68 | No | No | No | No | No | Yes | Yes | Yes | No | No |
| 5 | 5 | 1175 | 1 | 65 | No | No | No | No | No | Yes | Yes | Yes | No | No |
| 6 | 5 | 1052 | 1 | 58 | No | No | No | No | No | No | Yes | Yes | No | No |
| 7 | 5 | 975 | 1 | 54 | No | No | No | No | No | No | Yes | Yes | No | No |
| 8 | 5 | 928 | 1 | 51 | No | No | No | No | No | No | No | Yes | No | No |
| 9 | 5 | 742 | 1 | 41 | No | No | No | No | No | No | No | No | No | No |
| 10 | 5 | 696 | 1 | 38 | No | No | No | No | No | No | No | No | No | No |
| 11 | 5 | 696 | 1 | 38 | No | No | No | No | No | No | No | No | No | No |
| 12 | 5 | 665 | 1 | 37 | No | No | No | No | No | No | No | No | No | No |
| 13 | 5 | 603 | 1 | 33 | No | No | No | No | No | No | No | No | No | No |
| 14 | 5 | 557 | 1 | 31 | No | No | No | No | No | No | No | No | No | No |
| 15 | 5 | 557 | 1 | 31 | No | No | No | No | No | No | No | No | No | No |
| 16 | 5 | 542 | 1 | 30 | No | No | No | No | No | No | No | No | No | No |
| 17 | 5 | 309 | 1 | 17 | No | No | No | No | No | No | No | No | No | No |
| 18 | 5 | 170 | 1 | 9 | No | No | No | No | No | No | No | No | No | No |
| 19 | 5 | 155 | 1 | 9 | No | No | No | No | No | No | No | No | No | No |
| 20 | 5 | 62 | 1 | 3 | No | No | No | No | No | No | No | No | No | No |
| 21 | 5 | 46 | 1 | 3 | No | No | No | No | No | No | No | No | No | No |
| 22 | 5 | 46 | 1 | 3 | No | No | No | No | No | No | No | No | No | No |
| 23 | 5 | 31 | 1 | 2 | No | No | No | No | No | No | No | No | No | No |
| 24 | 5 | 31 | 1 | 2 | No | No | No | No | No | No | No | No | No | No |
| Hours Met | | | | | 0 | 0 | 0 | 1 | 3 | 5 | 7 | 8 | 2 | 0 |

## Warrant 3 Condition A

| | |
|---|---|
| Orientation | S |
| Total Stopped Delay Per Vehicle on Minor Approach (s) | 22.7 |
| Number of Lanes on Minor Street Approach | 1 |
| VehicleHours of Stopped Delay on Minor Approach ([h]h:mm) | 0:32 |
| Delay Condition Met | No |
| Volume on Minor Street Approach During Same Hour | 85 |
| High Minor Volume Condition Met | No |
| Total Entering Volume on All Approaches During Same Hour | 1632 |
| Number of Approaches on Intersection | 3 |
| Total Volume Condition Met | Yes |
| Warrant Met for Approach | No |
| **Warrant Met for Intersection** | **No** |

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## Trip Generation summary

### Added Trips

| Zone ID: Name | Land Use variables | Code | Ind. Var. | Rate | Quantity | % In | % Out | Trips In | Trips Out | Total Trips | % of Total Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6: zone | | | | 1.000 | 0.000 | 50.00 | 50.00 | 85 | 85 | 170 | 100.00 |
| | | | | | **Added Trips Total** | | | **85** | **85** | **170** | **100.00** |

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Scenario 2 Build Out
7/6/2017

## Trip Distribution summary

| Zone / Gate | Zone 6: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 7: Gate | 60.00 | 51 | 60.00 | 51 |
| 8: Gate | 5.00 | 4 | 5.00 | 4 |
| 9: Gate | 30.00 | 26 | 30.00 | 26 |
| 10: Gate | 5.00 | 4 | 5.00 | 4 |
| **Total** | **100.00** | **85** | **100.00** | **85** |

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Study Intersections


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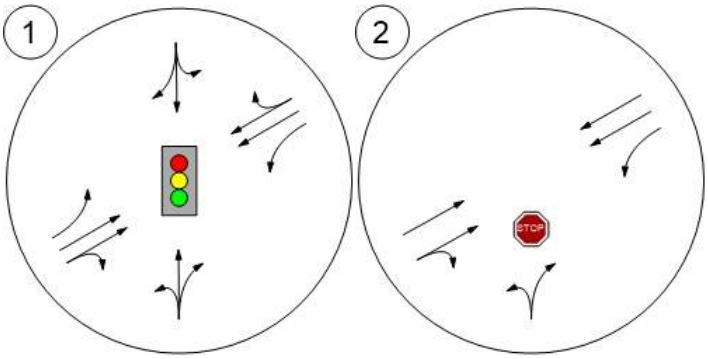
Lane Configuration and Traffic Control


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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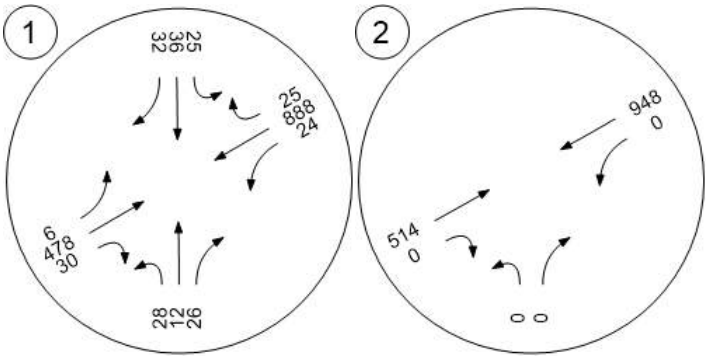
Traffic Volume - Base Volume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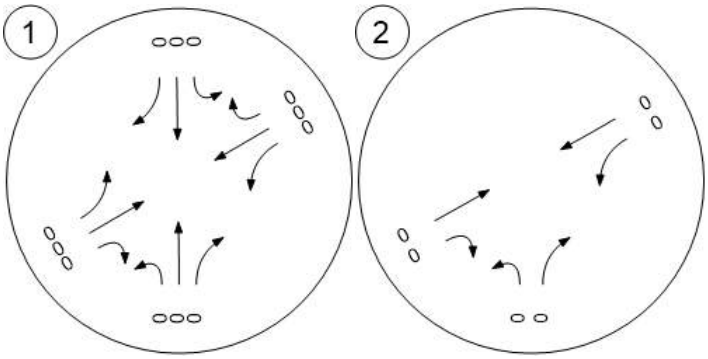
Traffic Volume - In-Process Volume


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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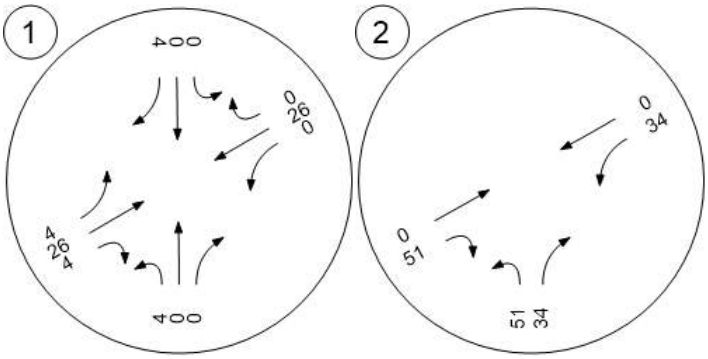
Traffic Volume - Net New Site Trips


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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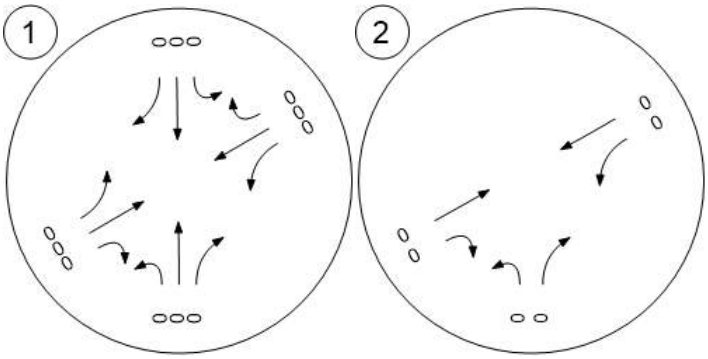
Traffic Volume - Other Volume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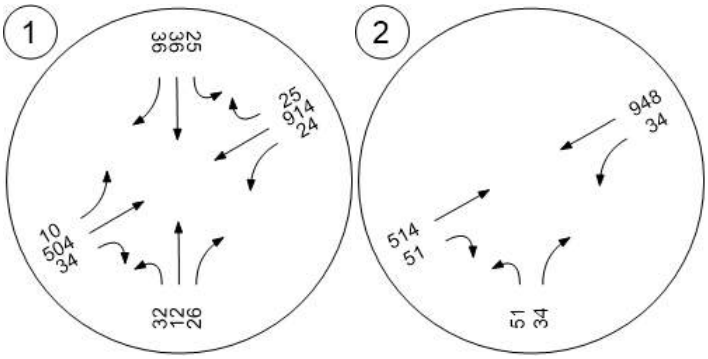
Traffic Volume - Future Total Volume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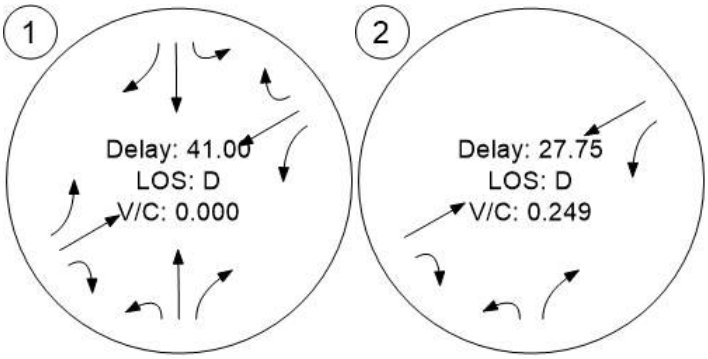
Traffic Conditions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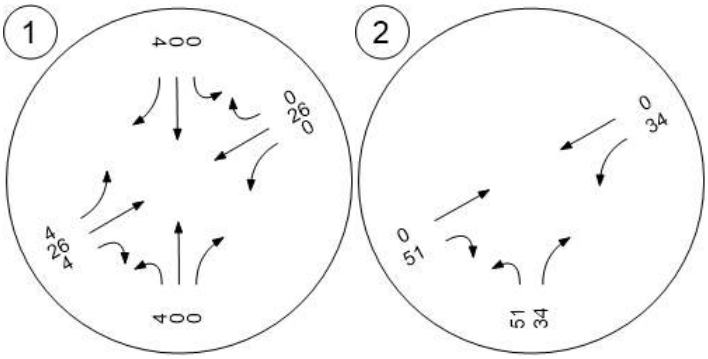
Fair Share - Fair Share Volumes - Zone 6: zone


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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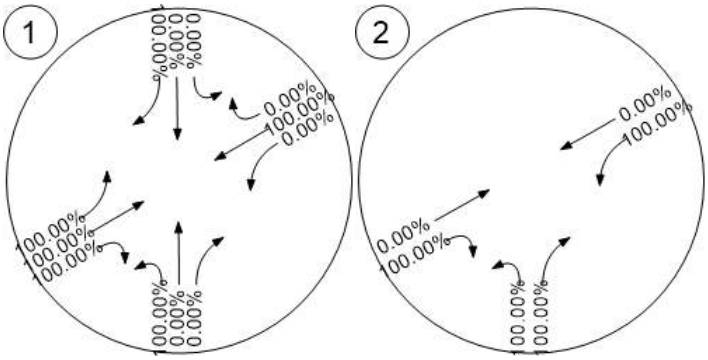
Fair Share - Fair Share % of Net New Site - Zone 6: zone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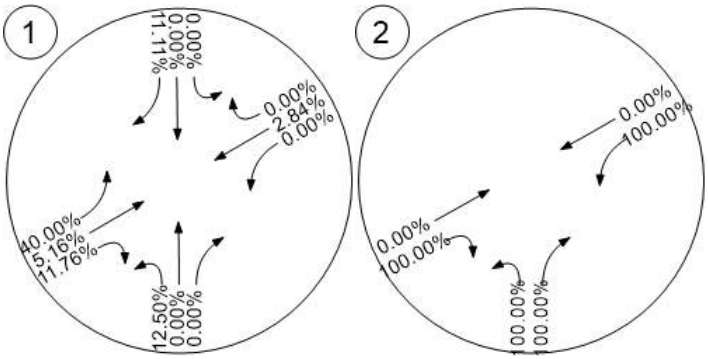
Fair Share - Fair Share % of Future Total - Zone 6: zone


Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

# TRAFFIC ENGINEERS, INC.

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June 29, 2017

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Traffic Division Manager,
Jones & Carter, Inc.
6330 West Loop South, Suite 150
Bellaire, Texas 77401
Tel. 713.777.5337
Fax. 713.777.5976

Re: Bellaire High School - Traffic Impact Analysis

Dear Mr. Wright:

The following comments made by Jones & Carter, Inc., and responses by Traffic Engineers, Inc. are in reference to the draft Bellaire High School Traffic Impact Analysis. Comments received below are addressed in this response memo, and references are made to the attached revised traffic study dated June 2017.

Comments received are as follows:

1. Existing Conditions and Observations

   a. **State existing enrollment of high school and if there is a net increase or decrease with proposed construction.**

      Response: The enrollment at Bellaire High School as of October 28th, 2016, is 3,400 students. The enrollment at future Bellaire High School is planned to be 3,100 students. There is a net decrease in enrollment of 300 students with the proposed construction.

   b. **No existing traffic counts provided. Please explain how the Figure 3-1 Background Traffic Conditions Year 2017 volumes included in the appendix were determined.**

      Response: The Background Traffic Conditions Year 2017 volumes used in the study were obtained from a Draft Traffic Impact Analysis for Bellaire High School conducted by EHRA in February 2015. The background traffic volumes for the year 2017 were estimated by growing existing traffic volumes (collected in 2014, provided in **Appendix A of the attached traffic study**) by one percent per year with the exception of traffic volumes that are directly generated by the existing Bellaire High School (entering/exiting to/from the school).

   c. **Provide existing conditions lane assignment/traffic control figure at the analysis intersections.**

      Response: The existing lane assignments and traffic control at the study intersections are shown in the following figure and included in the report.



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

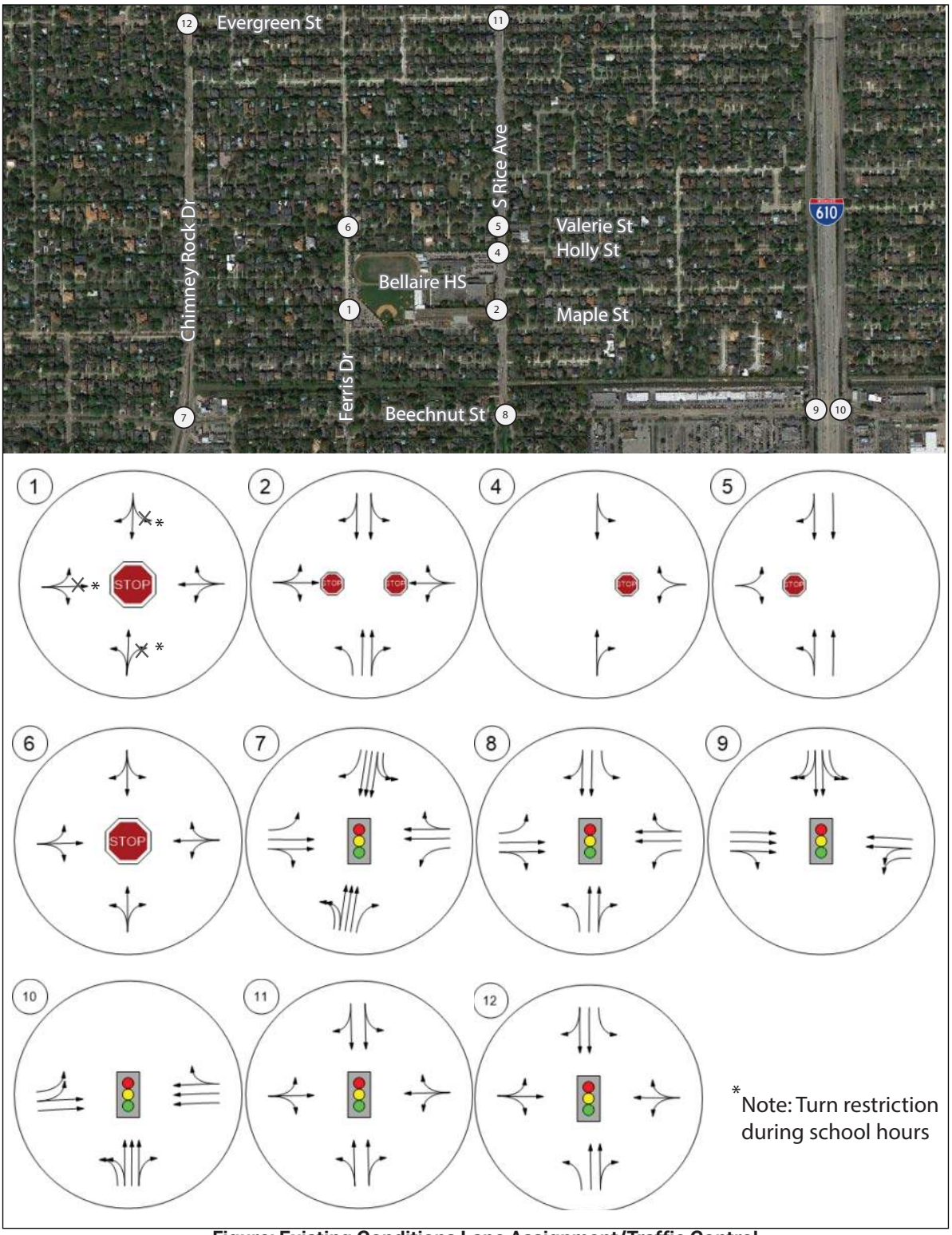


Figure: Existing Conditions Lane Assignment/Traffic Control

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

2. Trip Generation

**a. State the hour analyzed for the AM and PM peak hours.**

Response: The AM peak hour analyzed is 7:00 AM to 8:00 AM and the school PM peak hour analyzed is 3:15 PM to 4:15 PM.

**b. Please review/confirm that only 25 student drivers are expected to exit during the PM peak hour.**

Response: The AM and PM student trips provided in the 9th Edition ITE Trip Generation Manual for an ultimate enrollment of 3,100 students is listed below.

| Trips Generated (9th Edition ITE Trip Generation Manual) | AM Peak Hour Traffic | | PM Peak Hour Traffic | |
|---|---|---|---|---|
| | AM (in) | AM (out) | PM (in) | PM (out) |
| High School Trips (from ITE Trip Generation Manual, Land Use Code 530) | 906 | 427 | 189 | 214 |

However, the proposed site plan based on comments received from the City of Bellaire Planning and Zoning Commission public meeting has necessitated changes to the proposed trip generation, shown in detail in the table below.

| Mode | Trip Generation | | AM Peak Hour Traffic | | PM Peak Hour Traffic | |
|---|---|---|---|---|---|---|
| | | | AM Ingress | AM Egress | PM Ingress | PM Egress |
| Vehicle | Student | Parking Garage | 435 | 0 | 0 | 218[1] |
| | Staff | Parking Garage | 270 | 0 | 0 | 135[1] |
| | Staff/Visitor | Surface Lot | 40 | 0 | 0 | 20[1] |
| | Parent | Drop-off/Pick-up Drwy | 827[2] | 827[2] | 827[2] | 827[2] |
| Bus | Students | Bus Zone | 22 | 22 | 22 | 22 |
| Total | | | 1594 | 849 | 849 | 1222 |

The following assumptions are utilized in developing the table above:

1. Assume 50% of the students and staff will exit the campus during the PM peak hour.

2. Assume 40% of the students arrive to and depart from campus by parent vehicle at 1.5 students per vehicle.

The parking garage is currently planned for a maximum of 705 parking spaces, with 270 allotted to staff vehicles and the balance allotted to students. The surface parking lot is proposed to provide 40 parking spaces for staff and visitors. The proposed parking garage would be entered from a right-turn only lane on Maple Street, and would exit into the surface parking lot with access ultimately to S. Rice Avenue.

Revised turning movement counts at the study intersections are provided in the attached report.

3. On-Site Storage

**a. Clarify if double stacking of parents and buses is a recommendation.**

Response: Double-stacking of parent vehicles in the private car drop-off / pick-up lane is recommended, as well as double-stacking of buses along the bus lane, if needed.



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**b. Provide summary of on-site storage of parents and buses that is provided verses what is required.**

Response: From the new site plan, the on-site stacking capacity for parent vehicles is approximately 760 linear feet; which can accommodate approximately 33 vehicles single and double-stacked on-site. The maximum parent vehicle queue length observed during the field visit at Bellaire High School at South Rice Avenue and the student pick-up/drop off driveway on Maple Street is 34 vehicles. The bus stacking lane will provide up to 1150 linear feet of storage, or up to approximately 26 buses double-stacked. The total number of buses serving Bellaire High School is expected to be 22 buses.

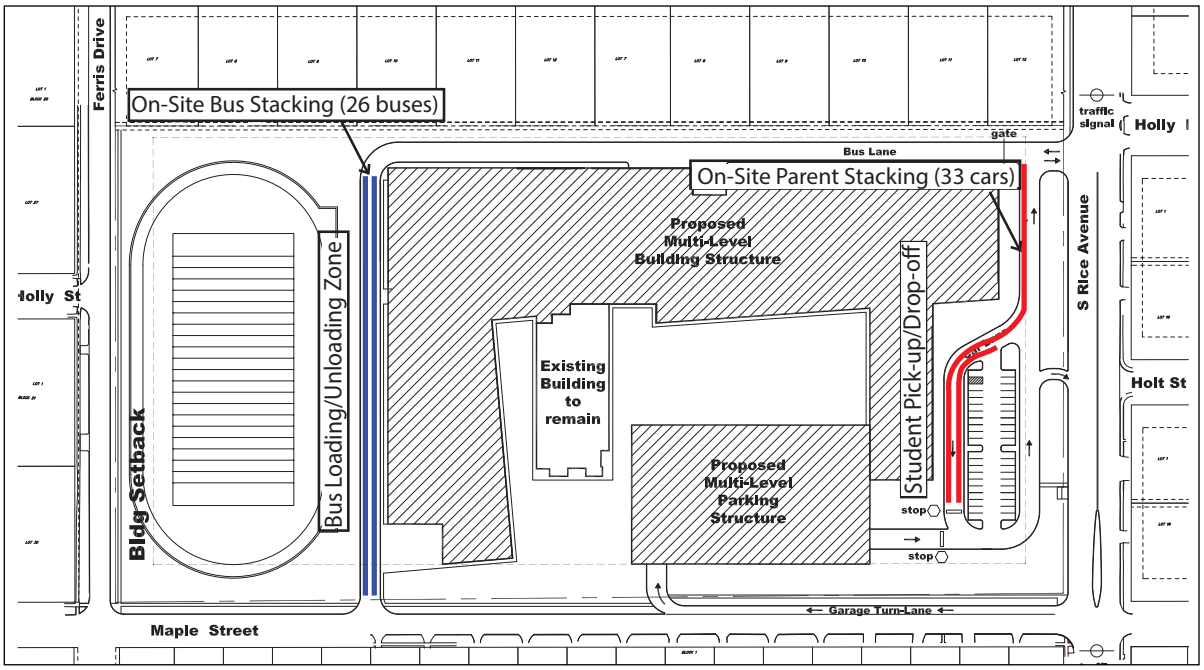


**Figure: On-site Stacking**

4. Projected Site Turning Movement Counts

**a. Provide 2021 Build-out and Mitigated lane assignment/traffic control figure at analysis intersections.**

Response: The Build-out without improvements lane assignment/traffic control figure is provided on the next page and also included in the report.

The Build-out with mitigated lane assignment/traffic control figure is also provided after the figure referenced above and is also included in the report.

**b. Provide clarification on if existing one-way operation on Maple Street will be removed.**

Response: The existing one-way operation on Maple Street will remain. The trip assignments in the study have been modified based on the one-way operation during the AM and school PM peak events.

**c. If existing one-way operation on Maple Street is to be removed then review site generated volumes at intersection 1 to account for traffic that may utilize Ferris Drive to access the new parking garage.**

Response: The one-way operation is proposed to remain.



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

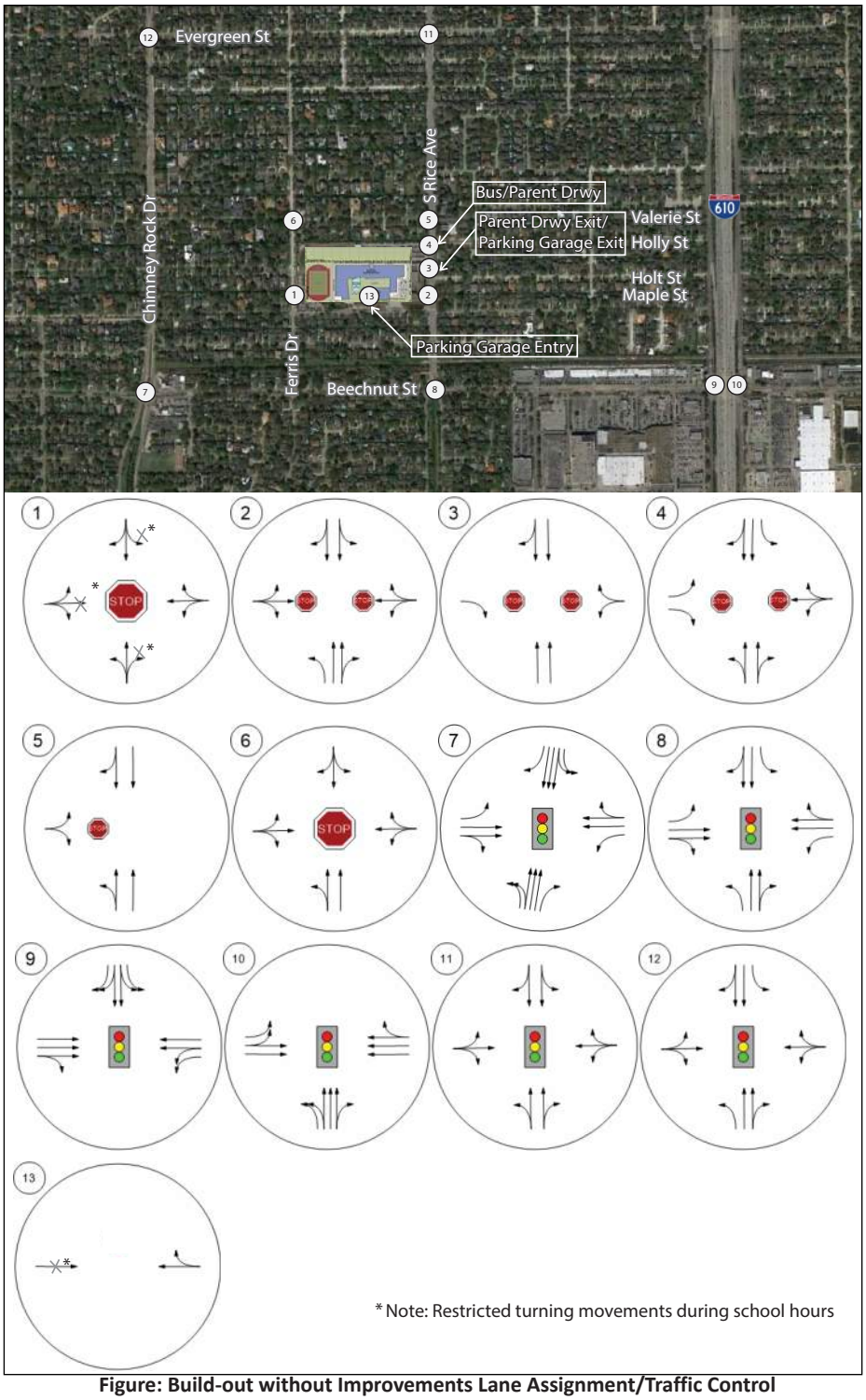


**Figure: Build-out without Improvements Lane Assignment/Traffic Control**

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

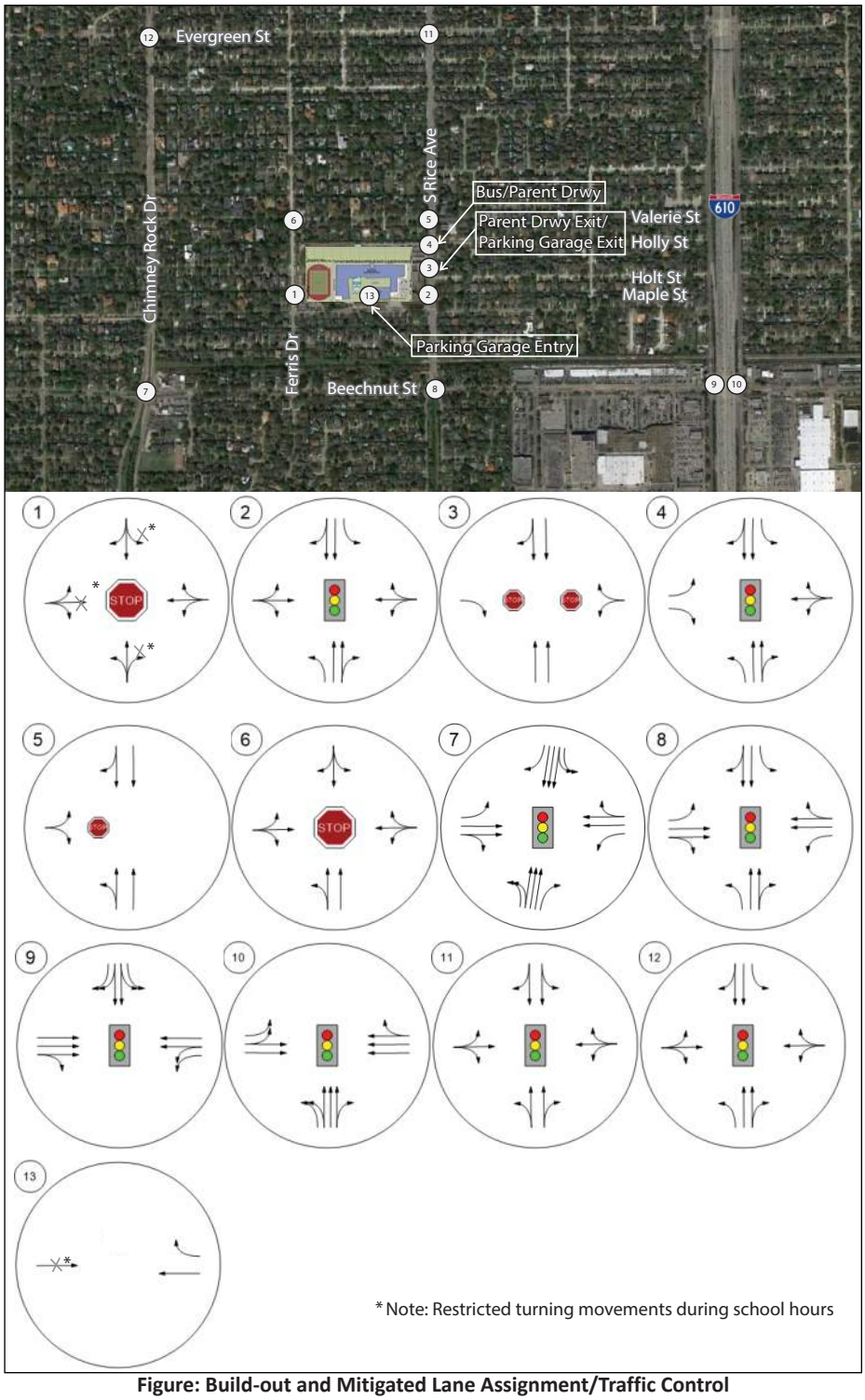


**Figure: Build-out and Mitigated Lane Assignment/Traffic Control**

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

d. **Review exiting volumes from the school driveway at intersection 3 in the AM and PM peak hour. There are zero exiting trips shown on the figures.**

   Response: The proposed turning movement volumes have been revised based on the new site plan.

e. **Update volumes if necessary based on confirmation of only 25 student drivers exiting during the PM peak hour.**

   Response: The proposed turning movement volumes have been revised based on the new site plan.

5. Parking Demand Analysis

a. **Provide existing number of parking spots and net increase or decrease with proposed construction.**

   Response: There are currently 450 total parking spots on campus for faculty, staff & students. The parking demand study recommends a total of 735 parking spaces to accommodate student and staff parking demand at Bellaire High School. The most updated site plan shows 705 spaces in the parking garage and 40 spaces in the surface parking lot.

6. Capacity Analysis

a. **Provide summary table for AM and PM with delay and LOS for all approaches and intersection at the analysis intersections.**

   Response: The summary table for AM and PM with delay and LOS for all approaches and intersection at the analysis intersections is provided on the next pages and updated in the report.

b. **Update capacity analysis based on other review comments.**

   Response: The capacity analyses based on the latest site plan and review comments has been revised and is included in the revised report.

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

**Table: AM Peak Hour Capacity Analysis and Comparison for Different Scenarios**

| # | Intersection | 2021 Build-out with no improvements | | | | | | 2021 Build-out with mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NB | SB | EB | WB | Intersection | | NB | SB | EB | WB | Intersection |
| | | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) |
| 1 | Maple St at Ferris Dr | STOP | A 9.6 | A 8.1 | A 8.8 | A 0 | A 9.06 | STOP | A 9.6 | A 8.1 | A 8.8 | A 0 | A 9.06 |
| 2 | S. Rice Ave at Maple St | STOP STOP | E 42.3 | A 0.1 | F >1000 | F >1000 | F 406 | | E 59.82 | F 122 | A 0.00 | D 42.2 | F 86 |
| 3 | S. Rice Ave at Student Drop-off/Pick-up Drwy | STOP STOP | A 0 | A 0 | F 152.2 | - | F 30.1 | STOP STOP | A 0 | A 0 | F 152.2 | - | F 30.1 |
| 4 | S. Rice Ave at Bus Exit Drwy/Holly St | STOP STOP | F 126.3 | A 0 | F >1000 | - | F >1000 | | F 106 | A 310 | F 81 | - | F 195 |
| 5 | S. Rice Ave at Valerie St | STOP | A .43 | A 0.0 | F 512 | - | F 32.0 | STOP | A .43 | A 0.0 | F 512 | - | F 32.0 |
| 6 | Valerie St at Ferris Dr | STOP | B 14.8 | B 10.4 | B 11.6 | B 10.4 | B 13.4 | STOP | B 14.8 | B 10.4 | B 11.6 | B 10.4 | B 13.4 |
| 7 | Chimney Rock Rd at Beechnut St | | D 46.3 | C 25.6 | C 26.8 | C 28.2 | D 35.4 | | D 46.3 | C 25.6 | C 26.8 | C 28.2 | D 35.4 |
| 8 | Beechnut St at S Rice Ave | | F 113.2 | E 78.8 | E 68.1 | F 304 | F 140 | | F 113.2 | E 78.8 | E 68.1 | F 304 | F 140 |
| 9 | Beechnut at 610 SB Feeder | | - | F 215 | F 84 | F 73 | F 110 | | - | F 215 | F 84 | F 73 | F 110 |
| 10 | Beechnut at 610 NB Feeder | | F 158 | - | D 40.6 | C 28.5 | E 63.5 | | F 158 | - | D 40.6 | C 28.5 | E 63.5 |
| 11 | S. Rice at Evergreen St | | F 501 | D 40.9 | E 58.6 | F 102 | F 238 | | F 501 | D 40.9 | E 58.6 | F 102 | F 238 |
| 12 | Chimney Rock Rd at Evergreen St | | C 34.1 | B 19.4 | D 36.6 | D 35.5 | C 30.6 | | C 34.1 | B 19.4 | D 36.6 | D 35.5 | C 30.6 |
| 13 | Parking Garage at Maple Street | | | | A 0 | A 0 | A 0 | Right turn lane | | | A 0 | A 0 | A 0 |

**Table: PM Peak Hour Capacity Analysis and Comparison for Different Scenarios**

| # | Intersection | 2021 Build-out with no improvements | | | | | | 2021 Build-out with Mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NB | SB | EB | WB | Intersection | | NB | SB | EB | WB | Intersection |
| | | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) |
| 1 | Maple St at Ferris Dr | STOP | A 7.89 | A 7.78 | A 7.4 | A 0.0 | A 7.7 | STOP | A 7.89 | A 7.78 | A 7.4 | A 0.0 | A 7.7 |
| 2 | S. Rice Ave at Maple St | STOP STOP | A 0.1 | A 0.1 | F 161 | E 39.1 | F 11.7 | | B 16.1 | B 15.3 | C 24.8 | C 29.3 | B 16.7 |
| 3 | S. Rice Ave at Student Drop-off/Pick-up Drwy | STOP STOP | A 0 | A 0 | F 68.2 | - | F 21.0 | STOP STOP | A 0 | A 0 | F 68.2 | - | F 21.0 |
| 4 | S. Rice Ave at Bus Exit Drwy/Holly St | STOP STOP | C 15.7 | A 0.0 | F >1000 | F >1000 | F >1000 | | F 98 | F 84 | F 186 | A 0 | F 113 |
| 5 | S. Rice Ave at Valerie St | STOP | A 0.0 | A 0.0 | F 50.8 | - | F 2.3 | STOP | A 0.0 | A 0.0 | F 50.8 | - | F 2.3 |
| 6 | Valerie St at Ferris Dr | STOP | A 8.4 | A 8.3 | A 8.1 | A 8.3 | A 8.3 | STOP | A 8.4 | A 8.3 | A 8.1 | A 8.3 | A 8.3 |
| 7 | Chimney Rock Rd at Beechnut St | | C 25.2 | C 25.0 | C 24.6 | B 20.0 | C 23.0 | | C 25.2 | C 25.0 | C 24.6 | B 20.0 | C 23.0 |
| 8 | Beechnut St at S Rice Ave | | F 116 | E 56.3 | D 37.8 | F 272 | F 132 | | F 116 | E 56.3 | D 37.8 | F 272 | F 132 |
| 9 | Beechnut at 610 SB Feeder | | - | F 498 | D 36.2 | E 56.4 | F 179 | | - | F 498 | D 36.2 | E 56.4 | F 179 |
| 10 | Beechnut at 610 NB Feeder | | F 160 | - | C 31 | C 27.6 | E 59.4 | | F 160 | - | C 31 | C 27.6 | E 59.4 |
| 11 | S. Rice at Evergreen St | | F 242 | E 64 | E 64 | F 109 | F 155 | | F 242 | E 64 | E 64 | F 109 | F 155 |
| 12 | Chimney Rock Rd at Evergreen St | | B 15.5 | B 17.1 | C 27.8 | C 21.3 | B 17.7 | | B 15.5 | B 17.1 | C 27.8 | C 21.3 | B 17.7 |
| 13 | Parking Garage at Maple Street | | - | | A 0.0 | A 0.0 | A 0.0 | Right turn lane | - | | A 0.0 | A 0.0 | A 0.0 |

7. Draft Conclusions and Recommendations

**a. Provide schematic of recommend restriping on South Rice Avenue to provide left turn lanes and if existing on-street parking will remain.**

Response: The schematic of the recommended access management measures on South Rice Avenue is shown below and provided in the revised report.


Figure: Recommend Re-striping on South Rice Avenue

**b. Provide recommendation on what will happen to existing one-way operation of Maple Street and various existing turn restrictions around the school.**

Response: The existing one-way operation of Maple Street will remain. Recommendations for other turn lane restrictions in the vicinity of the school are illustrated in the figure below and also updated in the report.



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

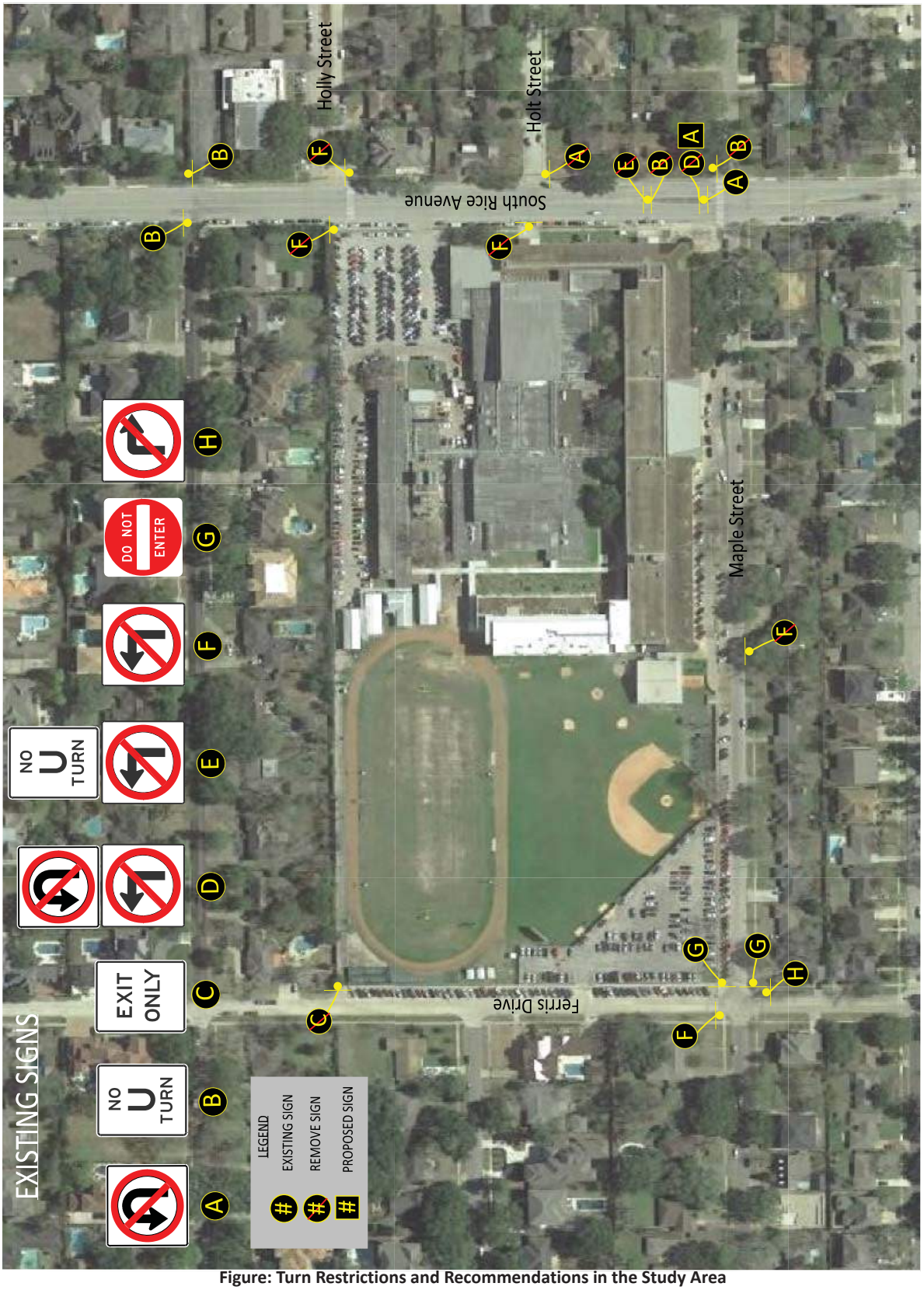


Figure: Turn Restrictions and Recommendations in the Study Area

**c. Provide Traffic Signal Warrants where traffic signals are recommended.**

Response: A signal warrant analysis was conducted at the intersections of South Rice Avenue at Holly Street/Bus Driveway as well as South Rice Avenue at Maple Street in accordance with the 2009 Manual on Uniform Traffic Control Devices (MUTCD) guidelines.

For the intersection of South Rice Avenue at Holly Street, Warrant 3 (peak hour) was satisfied for Build-out conditions at the study intersection.

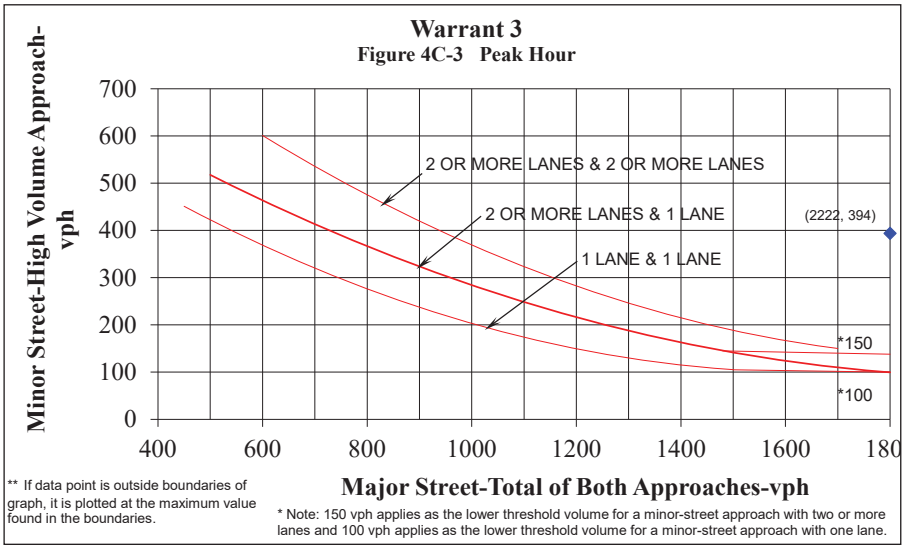


**Figure: Peak Hour Signal Warrant Analysis for South Rice Ave at Holly Street**

For the intersection of South Rice Avenue at Maple Street, Warrant 3 (peak hour) was satisfied for Build-out conditions at the study intersection.

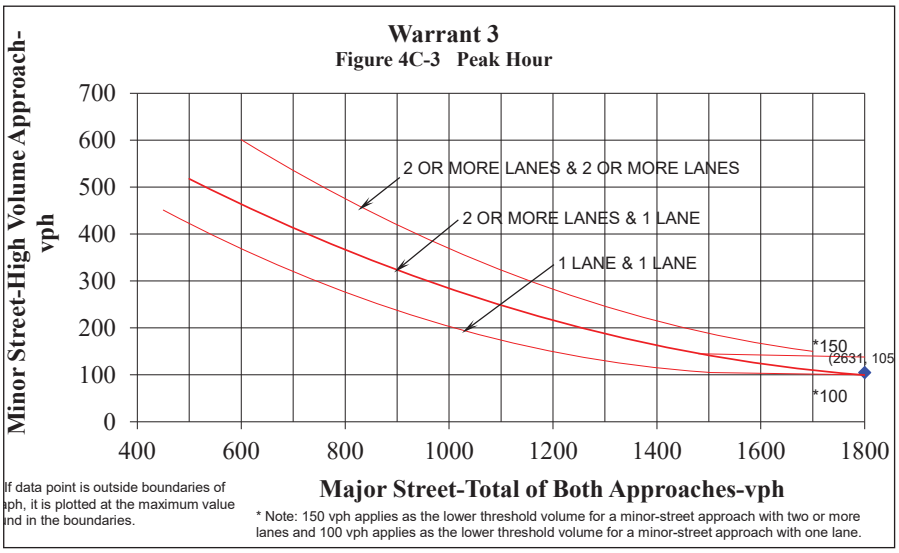


**Figure: Peak Hour Signal Warrant Analysis for South Rice Ave at Maple Street**



Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

8. **Please provide updated report based on the above comments for furth**er review.

Response: The report has been revised based on the review comments and updated site plan.

If you have any questions about the methodologies or assumptions in this response letter, please do not hesitate to contact me at 713-398-7461 or dustin@trafficengineers.com.

Sincerely,

Dustin Qualls, PE, PTOE, RAS

Principal

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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July 24, 2017

ChaVonne Sampson, MPA
Development Services Manager
City of Bellaire
7008 S. Rice Avenue
Bellaire, Texas 77401
Office: 713-662-8243
Email: csampson@bellairetx.gov

RE: **Bellaire High School Traffic Study – Responses to Comments**

Ms. Sampson,

The following includes comments made by the City of Bellaire and responses by Traffic Engineers, Inc. Comments received below are addressed in this response memo, and references may be made to the revised traffic study dated July 2017.

Comments are as follows:

1. At the proposed signalized intersection of South Rice at Maple Street they project a LOS of F in the AM Peak Hour for 2021 Conditions.
    a. The projected northbound left turn volume in the AM Peak hour is 387 vehicles which results in a projected 95th percentile queue length of 419 feet for the northbound left turn lane. The existing storage for the northbound left turn lane is 100 feet. The TIA includes a recommendation to "Provide improvements south of the intersection of South Rice Avenue at Maple Street to accommodate the northbound left turning volume at the intersection", but does not recommend specific improvements.

        Response: The northbound left-turn lane on South Rice Avenue at Maple Street will need to be extended to and through Mimosa Drive to the south. The two raised landscaped medians will need to be removed in order to provide a full-length northbound left-turn lane from just north of the bridge over the drainage channel to Maple Street.

    b. The projected southbound right turn volume in the AM Peak Hour is 322 vehicles which results in a projected 95th percentile queue length of more than 1000 feet for the two southbound lanes. There is only 600 feet

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

between Holly and Maple on South Rice. Has consideration been given to a southbound right turn lane?

Response: A southbound right-turn lane on South Rice Avenue at Maple Street would be beneficial and would decrease the projected southbound queue length.

2. At the proposed signalized intersection of South Rice at Bus Driveway/Holly they project a LOS of F in the AM and PM Peak Hours for 2021 Conditions.
   a. The projected northbound left turn volume in the AM Peak hour is 473 vehicles which results in a projected 95th percentile queue length of more than 1000 feet for the northbound left turn lane. The projected northbound left turn volume in the PM peak hour is 454 vehicles with results in a projected 95th percentile queue length of more than 1000 feet for the northbound left turn lane. There is only 600 feet between Holly and Maple on South Rice. The TIA includes a recommendation to provide a northbound left turn lane and access management on South Rice. Has consideration been given to a double northbound left turn lane?

      Response: Dual northbound left-turn lanes on South Rice Avenue at Holly Street have not been considered due to parent and visitor vehicles having to make an immediate turn into the stacking lane that enters the surface parking lot. With dual northbound left-turn lanes, signage and channelization becomes very difficult in order to get parents and visitors to the surface lot. Traffic signal timings can be designed such that the northbound left-turn queue is metered by the upstream traffic signal at Maple Street which would help reduce the queue length as reported in the study.

   b. The projected southbound right turn volume in the AM Peak Hour is 391 vehicles which results in a projected 95th percentile queue length of more than 1900 feet for the two southbound lanes. The projected southbound right turn volume in the PM Peak Hour is 372 vehicles which results in a projected 95th percentile queue length of more than 750 feet for the two southbound lanes. Has consideration been given to a southbound right turn lane?

      Response: A southbound right-turn lane on South Rice Avenue at Holly Street would be beneficial and would decrease the projected southbound queue length.

   c. The projected eastbound left turn volume in the AM Peak Hour is 383 vehicles which results in a projected 95th percentile queue length of more than 650 feet for the eastbound left turn lane. The projected eastbound left

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

turn volume in the PM Peak Hour is 491 vehicles which results in a projected 95th percentile queue length of more than 1200 feet for the eastbound left turn lane. There is approximately 700 feet on the site between the garage exit in the parking lot to the bus driveway at the signal on South Rice. Has consideration been given to an eastbound double left-turn from the bus driveway onto northbound South Rice?

Response: An eastbound dual left-lane configuration may have merit and warrants further consideration and modeling. As long as there is space to provide a three-lane eastbound approach, this should be given consideration.

Should you have any questions about the recommendations or methodologies, please do not hesitate to contact me.

Thank you,

Dustin W. Qualls, PE, PTOE

Principal

Attachment: P&Z_081017_PACKETS_Bellaire HS Rebuild (2333 : BHS SUP)

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August 2, 2017

ChaVonne Sampson, MPA
Development Services Manager
City of Bellaire
7008 S. Rice Avenue
Bellaire, Texas 77401
Office: 713-662-8243
Email: csampson@bellairetx.gov

RE: **Bellaire High School Traffic Study – Summarized Traffic Mitigation & Improvements**

Ms. Sampson,

As a follow-up to the response memo and revised Traffic Impact Analysis, a written summary of infrastructure improvements was requested by the City of Bellaire. The improvements below are committed to by the Houston Independent School District (HISD), and are expected to be constructed and in place prior to the opening of the ultimate Bellaire High School rebuild.

The summary of infrastructure improvements by corridor includes:

***South Rice Avenue:***

1. Construct a traffic signal at the intersection of South Rice Avenue at Maple Street.
2. Construct a traffic signal at the intersection of South Rice Avenue at Holly Street.
3. 70' of existing pavement width on South Rice Avenue between Maple Street and Holly Street can provide a typical section of six lanes, each 11' in width, with a raised 4' wide median the full length of the block. A southbound right-turn lane for Maple Street would be full-length back to the intersection of Holly Street. A 375' northbound left-turn lane at Holly Street would be developed with 100' taper, and a 100' southbound left-turn lane at Maple Street with 100' taper would share the

same 11' of pavement by using a reverse-curve in the raised 4' median (the two left-turn lanes would share the same 100' taper).

4. Construct an extension of the northbound left-turn lane on South Rice Avenue at Maple Street. The northbound left-turn lane would have full-length stacking capabilities back to Mimosa Drive. The raised median between Maple Street and Mimosa Drive would be removed to provide the left-turn lane extension.
5. Provide a southbound right-turn lane at the intersection of South Rice Avenue at Holly Street by modifying the pavement markings on the existing pavement. The parking lane on the west side of South Rice Avenue could be utilized for the right-turn lane.
6. Please see **Figure 1** on the next page for a schematic of the South Rice Avenue improvements between Maple Street and Mimosa Drive. The schematic only shows improvements to existing South Rice Avenue in schematic form (pavement markings and raised median) and does not show the proposed site plan for Bellaire High School.

***Maple Street:***

1. Construct a westbound right-turn lane from South Rice Avenue to the entrance of the Bellaire High School proposed parking garage. The proposed right-turn lane would be constructed by HISD on the northern side of existing Maple Street.

***Internal Circulation:***

1. Provide a two-lane exit for the proposed parking garage with signage that directs egress traffic for northbound South Rice Avenue into the left lane, and egress traffic for southbound South Rice Avenue into the right lane.
2. The two egress lanes for the parking garage will split after making the east-to-north curve; the left lane will continue up to the proposed signal at Holly Street and the right lane will exit onto southbound South Rice Avenue at a right-turn egress lane only.
3. Provide a two-lane stacking lane that provides curb-side queueing for drop-off and pick-up. A one-lane approach at the intersection with the garage exit will allow for an efficient merging of the two lines of egress vehicles.
4. The only ingress to the proposed parking garage will be from Maple Street, with the only egress from the garage being onto the onsite circulating roadway which then provides access to northbound and southbound South Rice Avenue.

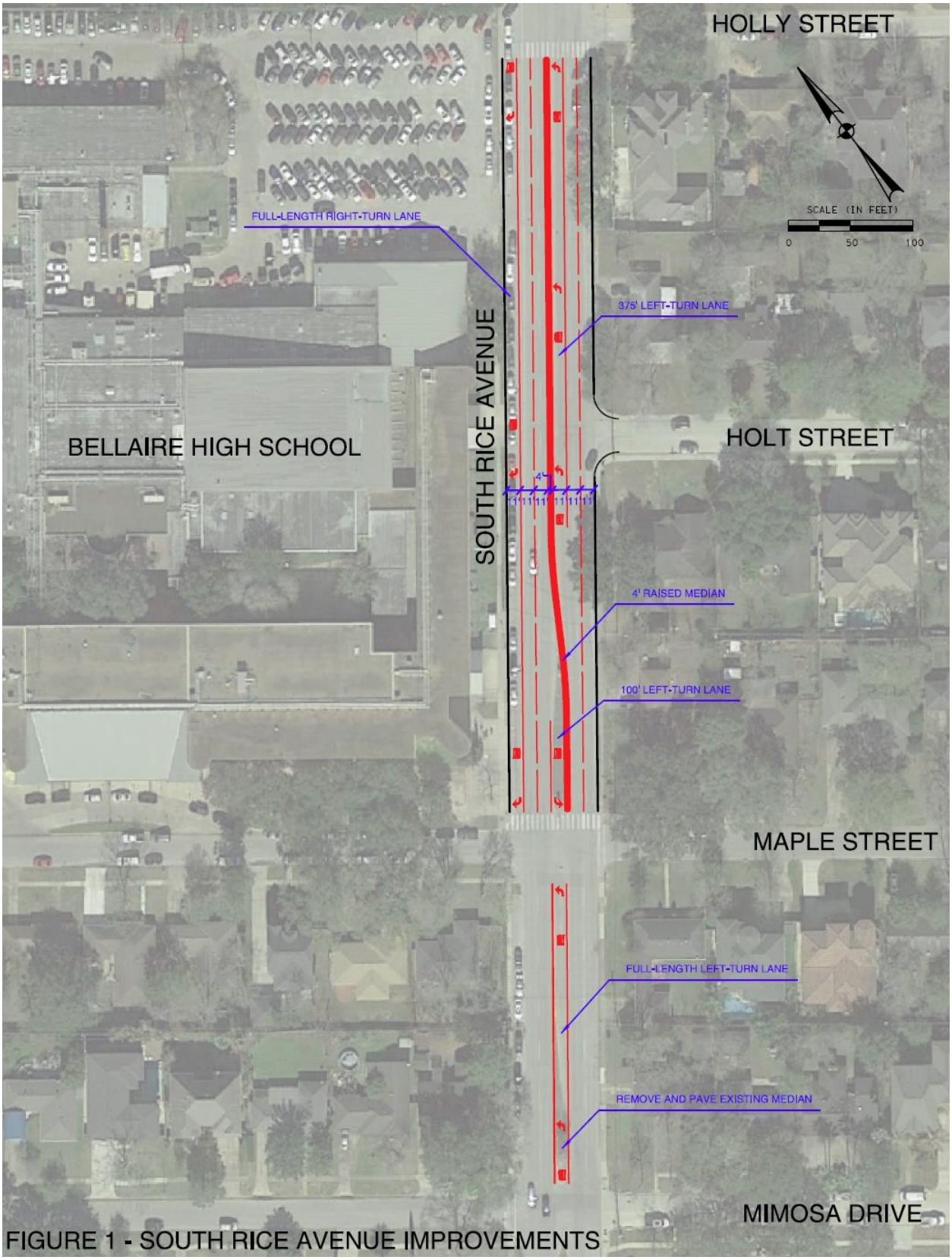


FIGURE 1 - SOUTH RICE AVENUE IMPROVEMENTS

Should you have any questions about the recommendations or methodologies, please do not hesitate to contact me at dustin@trafficengineers.com or at 713-398-7461.

Thank you,

Dustin W. Qualls, PE, PTOE
Principal

Attachment: Summary of Bellaire High School Traffic Infrastructure Improvements (2333 : BHS SUP)

# TRAFFIC ENGINEERS, INC.

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June 29, 2017

Colby W. Wright, P.E., PTOE
Traffic Division Manager,
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Tel. 713.777.5337
Fax. 713.777.5976

Re: Bellaire High School - Traffic Impact Analysis

Dear Mr. Wright:

The following comments made by Jones & Carter, Inc., and responses by Traffic Engineers, Inc. are in reference to the draft Bellaire High School Traffic Impact Analysis. Comments received below are addressed in this response memo, and references are made to the attached revised traffic study dated June 2017.

Comments received are as follows:

1. Existing Conditions and Observations

   a. **State existing enrollment of high school and if there is a net increase or decrease with proposed construction.**

      Response: The enrollment at Bellaire High School as of October 28th, 2016, is 3,400 students. The enrollment at future Bellaire High School is planned to be 3,100 students. There is a net decrease in enrollment of 300 students with the proposed construction.

   b. **No existing traffic counts provided. Please explain how the Figure 3-1 Background Traffic Conditions Year 2017 volumes included in the appendix were determined.**

      Response: The Background Traffic Conditions Year 2017 volumes used in the study were obtained from a Draft Traffic Impact Analysis for Bellaire High School conducted by EHRA in February 2015. The background traffic volumes for the year 2017 were estimated by growing existing traffic volumes (collected in 2014, provided in **Appendix A of the attached traffic study**) by one percent per year with the exception of traffic volumes that are directly generated by the existing Bellaire High School (entering/exiting to/from the school).

   c. **Provide existing conditions lane assignment/traffic control figure at the analysis intersections.**

      Response: The existing lane assignments and traffic control at the study intersections are shown in the following figure and included in the report.



Attachment: Bellaire High School - Traffic Study Comments + Responses (2333 : BHS SUP)

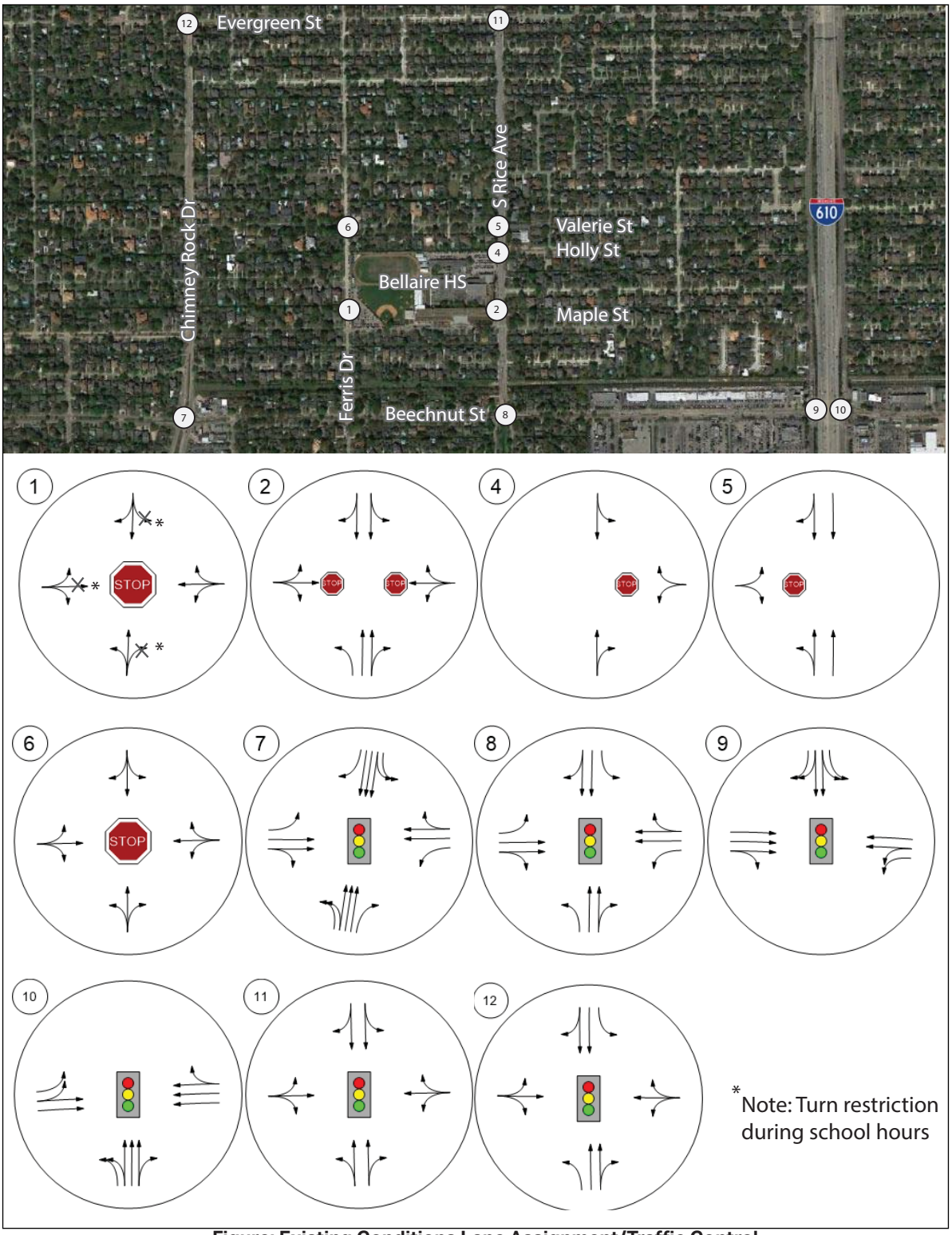


Figure: Existing Conditions Lane Assignment/Traffic Control

2. Trip Generation

**a. State the hour analyzed for the AM and PM peak hours.**

Response: The AM peak hour analyzed is 7:00 AM to 8:00 AM and the school PM peak hour analyzed is 3:15 PM to 4:15 PM.

**b. Please review/confirm that only 25 student drivers are expected to exit during the PM peak hour.**

Response: The AM and PM student trips provided in the 9th Edition ITE Trip Generation Manual for an ultimate enrollment of 3,100 students is listed below.

| Trips Generated (9th Edition ITE Trip Generation Manual) | AM Peak Hour Traffic | | PM Peak Hour Traffic | |
|---|---|---|---|---|
| | AM (in) | AM (out) | PM (in) | PM (out) |
| High School Trips (from ITE Trip Generation Manual, Land Use Code 530) | 906 | 427 | 189 | 214 |

However, the proposed site plan based on comments received from the City of Bellaire Planning and Zoning Commission public meeting has necessitated changes to the proposed trip generation, shown in detail in the table below.

| Mode | Trip Generation | | AM Peak Hour Traffic | | PM Peak Hour Traffic | |
|---|---|---|---|---|---|---|
| | | | AM Ingress | AM Egress | PM Ingress | PM Egress |
| Vehicle | Student | Parking Garage | 435 | 0 | 0 | 218[1] |
| | Staff | Parking Garage | 270 | 0 | 0 | 135[1] |
| | Staff/Visitor | Surface Lot | 40 | 0 | 0 | 20[1] |
| | Parent | Drop-off/Pick-up Drwy | 827[2] | 827[2] | 827[2] | 827[2] |
| Bus | Students | Bus Zone | 22 | 22 | 22 | 22 |
| Total | | | 1594 | 849 | 849 | 1222 |

The following assumptions are utilized in developing the table above:

1. Assume 50% of the students and staff will exit the campus during the PM peak hour.

2. Assume 40% of the students arrive to and depart from campus by parent vehicle at 1.5 students per vehicle.

The parking garage is currently planned for a maximum of 705 parking spaces, with 270 allotted to staff vehicles and the balance allotted to students. The surface parking lot is proposed to provide 40 parking spaces for staff and visitors. The proposed parking garage would be entered from a right-turn only lane on Maple Street, and would exit into the surface parking lot with access ultimately to S. Rice Avenue.

Revised turning movement counts at the study intersections are provided in the attached report.

3. On-Site Storage

**a. Clarify if double stacking of parents and buses is a recommendation.**

Response: Double-stacking of parent vehicles in the private car drop-off / pick-up lane is recommended, as well as double-stacking of buses along the bus lane, if needed.

**b. Provide summary of on-site storage of parents and buses that is provided verses what is required.**

Response: From the new site plan, the on-site stacking capacity for parent vehicles is approximately 760 linear feet; which can accommodate approximately 33 vehicles single and double-stacked on-site. The maximum parent vehicle queue length observed during the field visit at Bellaire High School at South Rice Avenue and the student pick-up/drop off driveway on Maple Street is 34 vehicles. The bus stacking lane will provide up to 1150 linear feet of storage, or up to approximately 26 buses double-stacked. The total number of buses serving Bellaire High School is expected to be 22 buses.

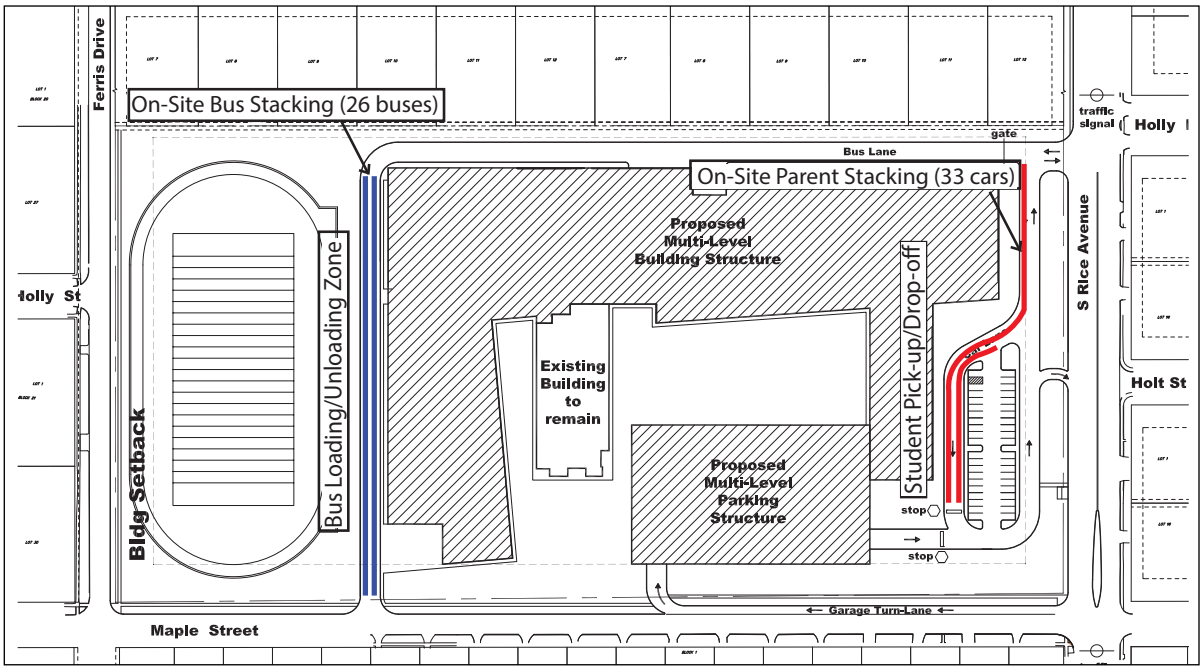


**Figure: On-site Stacking**

4. Projected Site Turning Movement Counts

**a. Provide 2021 Build-out and Mitigated lane assignment/traffic control figure at analysis intersections.**

Response: The Build-out without improvements lane assignment/traffic control figure is provided on the next page and also included in the report.

The Build-out with mitigated lane assignment/traffic control figure is also provided after the figure referenced above and is also included in the report.

**b. Provide clarification on if existing one-way operation on Maple Street will be removed.**

Response: The existing one-way operation on Maple Street will remain. The trip assignments in the study have been modified based on the one-way operation during the AM and school PM peak events.

**c. If existing one-way operation on Maple Street is to be removed then review site generated volumes at intersection 1 to account for traffic that may utilize Ferris Drive to access the new parking garage.**

Response: The one-way operation is proposed to remain.

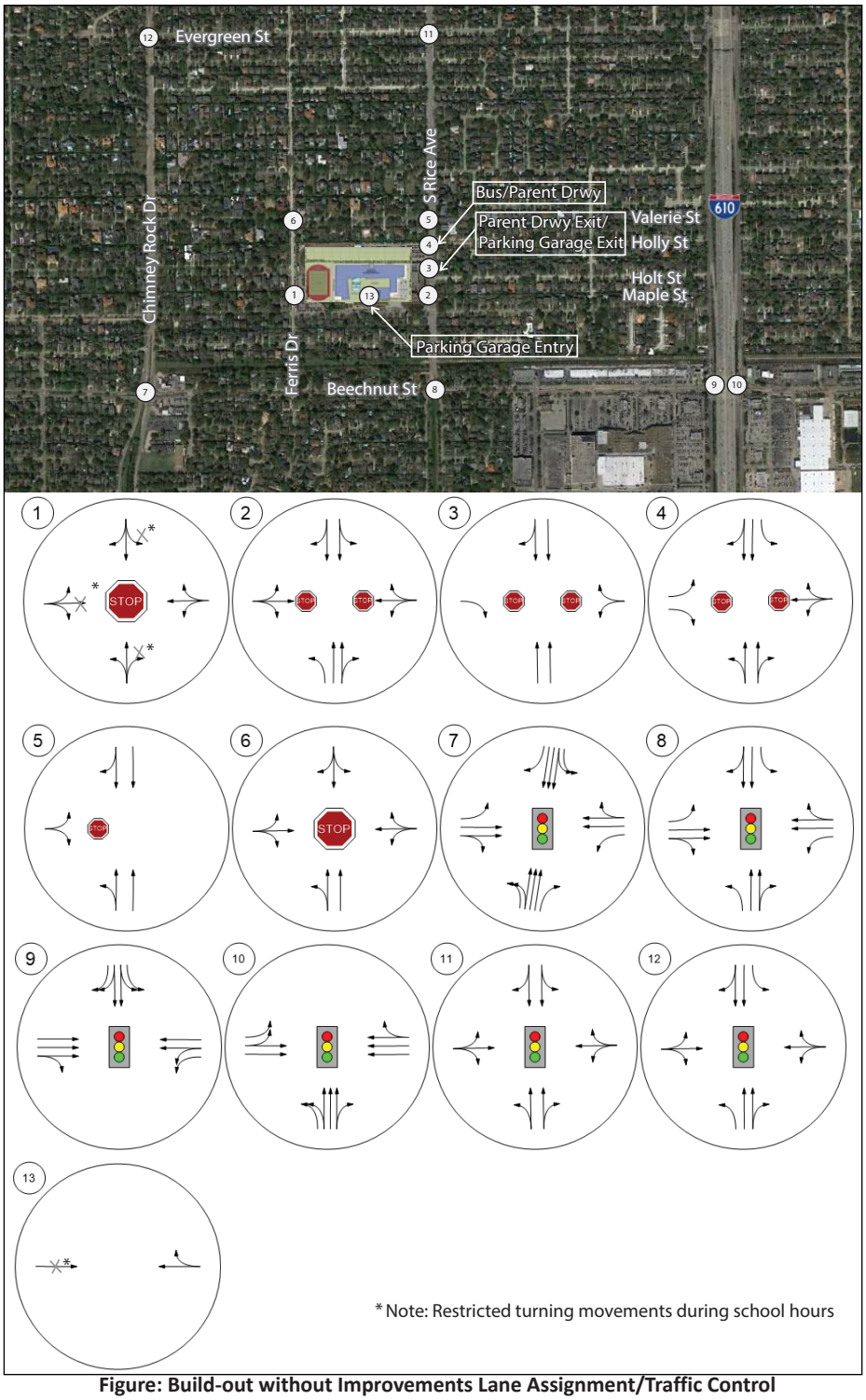


**Figure: Build-out without Improvements Lane Assignment/Traffic Control**

Attachment: Bellaire High School - Traffic Study Comments + Responses (2333 : BHS SUP)

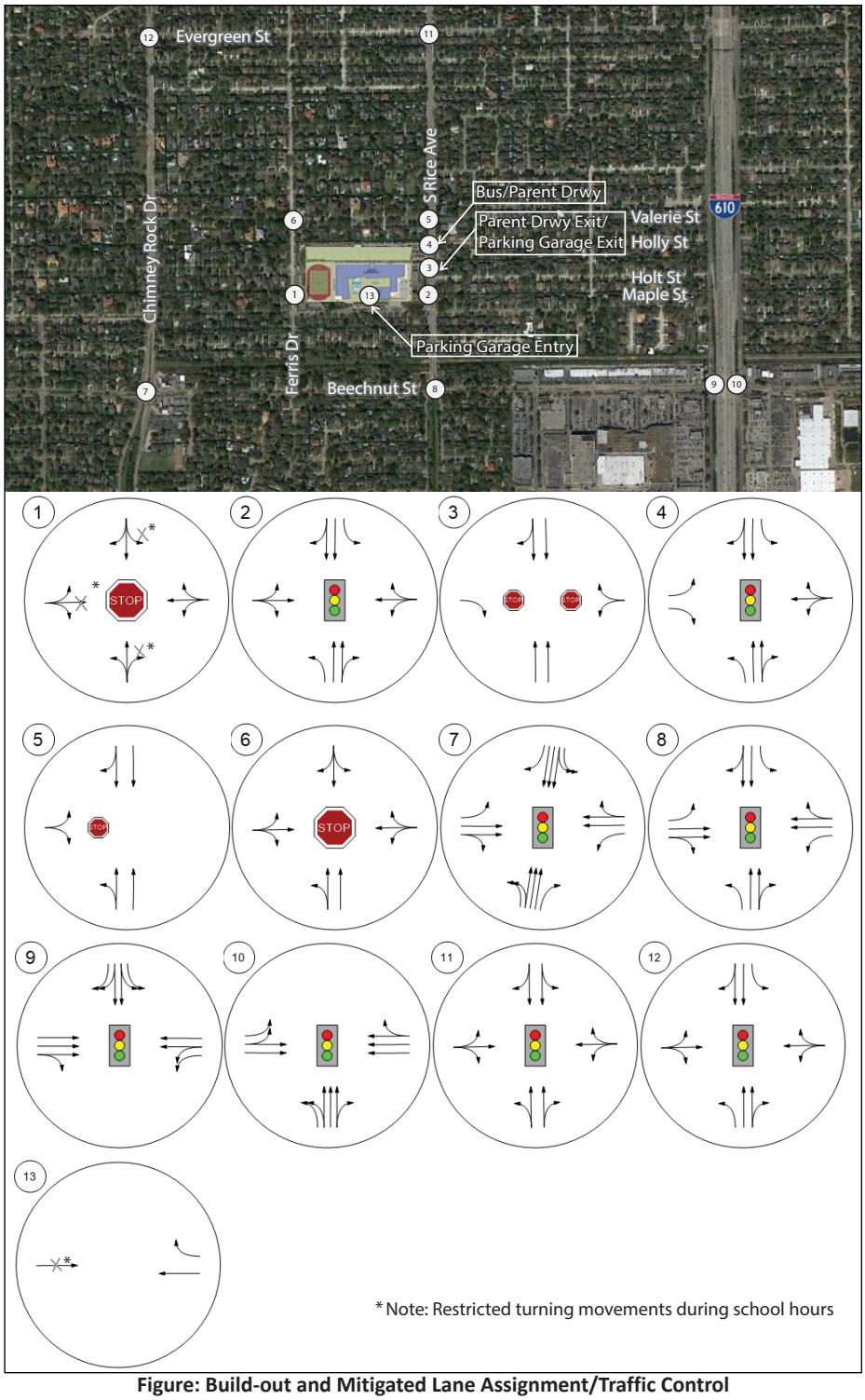


**Figure: Build-out and Mitigated Lane Assignment/Traffic Control**

Attachment: Bellaire High School - Traffic Study Comments + Responses (2333 : BHS SUP)

d. **Review exiting volumes from the school driveway at intersection 3 in the AM and PM peak hour. There are zero exiting trips shown on the figures.**

   Response: The proposed turning movement volumes have been revised based on the new site plan.

e. **Update volumes if necessary based on confirmation of only 25 student drivers exiting during the PM peak hour.**

   Response: The proposed turning movement volumes have been revised based on the new site plan.

5. Parking Demand Analysis

a. **Provide existing number of parking spots and net increase or decrease with proposed construction.**

   Response: There are currently 450 total parking spots on campus for faculty, staff & students. The parking demand study recommends a total of 735 parking spaces to accommodate student and staff parking demand at Bellaire High School. The most updated site plan shows 705 spaces in the parking garage and 40 spaces in the surface parking lot.

6. Capacity Analysis

a. **Provide summary table for AM and PM with delay and LOS for all approaches and intersection at the analysis intersections.**

   Response: The summary table for AM and PM with delay and LOS for all approaches and intersection at the analysis intersections is provided on the next pages and updated in the report.

b. **Update capacity analysis based on other review comments.**

   Response: The capacity analyses based on the latest site plan and review comments has been revised and is included in the revised report.

Attachment: Bellaire High School - Traffic Study Comments + Responses (2333 : BHS SUP)

**Table: AM Peak Hour Capacity Analysis and Comparison for Different Scenarios**

| # | Intersection | 2021 Build-out with no improvements | | | | | | 2021 Build-out with mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NB | SB | EB | WB | Intersection | | NB | SB | EB | WB | Intersection |
| | | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) |
| 1 | Maple St at Ferris Dr | STOP | A 9.6 | A 8.1 | A 8.8 | A 0 | A 9.06 | STOP | A 9.6 | A 8.1 | A 8.8 | A 0 | A 9.06 |
| 2 | S. Rice Ave at Maple St | STOP STOP | E 42.3 | A 0.1 | F >1000 | F >1000 | F 406 | | E 59.82 | F 122 | A 0.00 | D 42.2 | F 86 |
| 3 | S. Rice Ave at Student Drop-off/Pick-up Drwy | STOP STOP | A 0 | A 0 | F 152.2 | - | F 30.1 | STOP STOP | A 0 | A 0 | F 152.2 | - | F 30.1 |
| 4 | S. Rice Ave at Bus Exit Drwy/Holly St | STOP STOP | F 126.3 | A 0 | F >1000 | - | F >1000 | | F 106 | A 310 | F 81 | - | F 195 |
| 5 | S. Rice Ave at Valerie St | STOP | A .43 | A 0.0 | F 512 | - | F 32.0 | STOP | A .43 | A 0.0 | F 512 | - | F 32.0 |
| 6 | Valerie St at Ferris Dr | STOP | B 14.8 | B 10.4 | B 11.6 | B 10.4 | B 13.4 | STOP | B 14.8 | B 10.4 | B 11.6 | B 10.4 | B 13.4 |
| 7 | Chimney Rock Rd at Beechnut St | | D 46.3 | C 25.6 | C 26.8 | C 28.2 | D 35.4 | | D 46.3 | C 25.6 | C 26.8 | C 28.2 | D 35.4 |
| 8 | Beechnut St at S Rice Ave | | F 113.2 | E 78.8 | E 68.1 | F 304 | F 140 | | F 113.2 | E 78.8 | E 68.1 | F 304 | F 140 |
| 9 | Beechnut at 610 SB Feeder | | - | F 215 | F 84 | F 73 | F 110 | | - | F 215 | F 84 | F 73 | F 110 |
| 10 | Beechnut at 610 NB Feeder | | F 158 | - | D 40.6 | C 28.5 | E 63.5 | | F 158 | - | D 40.6 | C 28.5 | E 63.5 |
| 11 | S. Rice at Evergreen St | | F 501 | D 40.9 | E 58.6 | F 102 | F 238 | | F 501 | D 40.9 | E 58.6 | F 102 | F 238 |
| 12 | Chimney Rock Rd at Evergreen St | | C 34.1 | B 19.4 | D 36.6 | D 35.5 | C 30.6 | | C 34.1 | B 19.4 | D 36.6 | D 35.5 | C 30.6 |
| 13 | Parking Garage at Maple Street | | | | A 0 | A 0 | A 0 | Right turn lane | | | A 0 | A 0 | A 0 |

**Table: PM Peak Hour Capacity Analysis and Comparison for Different Scenarios**

| # | Intersection | 2021 Build-out with no improvements | | | | | | 2021 Build-out with Mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NB | SB | EB | WB | Intersection | | NB | SB | EB | WB | Intersection |
| | | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | Control Type | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) | LOS Delay (s/veh) |
| 1 | Maple St at Ferris Dr | STOP | A 7.89 | A 7.78 | A 7.4 | A 0.0 | A 7.7 | STOP | A 7.89 | A 7.78 | A 7.4 | A 0.0 | A 7.7 |
| 2 | S. Rice Ave at Maple St | STOP STOP | A 0.1 | A 0.1 | F 161 | E 39.1 | F 11.7 | | B 16.1 | B 15.3 | C 24.8 | C 29.3 | B 16.7 |
| 3 | S. Rice Ave at Student Drop-off/Pick-up Drwy | STOP STOP | A 0 | A 0 | F 68.2 | - | F 21.0 | STOP STOP | A 0 | A 0 | F 68.2 | - | F 21.0 |
| 4 | S. Rice Ave at Bus Exit Drwy/Holly St | STOP STOP | C 15.7 | A 0.0 | F >1000 | F >1000 | F >1000 | | F 98 | F 84 | F 186 | A 0 | F 113 |
| 5 | S. Rice Ave at Valerie St | STOP | A 0.0 | A 0.0 | F 50.8 | - | F 2.3 | STOP | A 0.0 | A 0.0 | F 50.8 | - | F 2.3 |
| 6 | Valerie St at Ferris Dr | STOP | A 8.4 | A 8.3 | A 8.1 | A 8.3 | A 8.3 | STOP | A 8.4 | A 8.3 | A 8.1 | A 8.3 | A 8.3 |
| 7 | Chimney Rock Rd at Beechnut St | | C 25.2 | C 25.0 | C 24.6 | B 20.0 | C 23.0 | | C 25.2 | C 25.0 | C 24.6 | B 20.0 | C 23.0 |
| 8 | Beechnut St at S Rice Ave | | F 116 | E 56.3 | D 37.8 | F 272 | F 132 | | F 116 | E 56.3 | D 37.8 | F 272 | F 132 |
| 9 | Beechnut at 610 SB Feeder | | - | F 498 | D 36.2 | E 56.4 | F 179 | | - | F 498 | D 36.2 | E 56.4 | F 179 |
| 10 | Beechnut at 610 NB Feeder | | F 160 | - | C 31 | C 27.6 | E 59.4 | | F 160 | - | C 31 | C 27.6 | E 59.4 |
| 11 | S. Rice at Evergreen St | | F 242 | E 64 | E 64 | F 109 | F 155 | | F 242 | E 64 | E 64 | F 109 | F 155 |
| 12 | Chimney Rock Rd at Evergreen St | | B 15.5 | B 17.1 | C 27.8 | C 21.3 | B 17.7 | | B 15.5 | B 17.1 | C 27.8 | C 21.3 | B 17.7 |
| 13 | Parking Garage at Maple Street | | - | | A 0.0 | A 0.0 | A 0.0 | Right turn lane | - | | A 0.0 | A 0.0 | A 0.0 |

7. Draft Conclusions and Recommendations

**a. Provide schematic of recommend restriping on South Rice Avenue to provide left turn lanes and if existing on-street parking will remain.**

Response: The schematic of the recommended access management measures on South Rice Avenue is shown below and provided in the revised report.

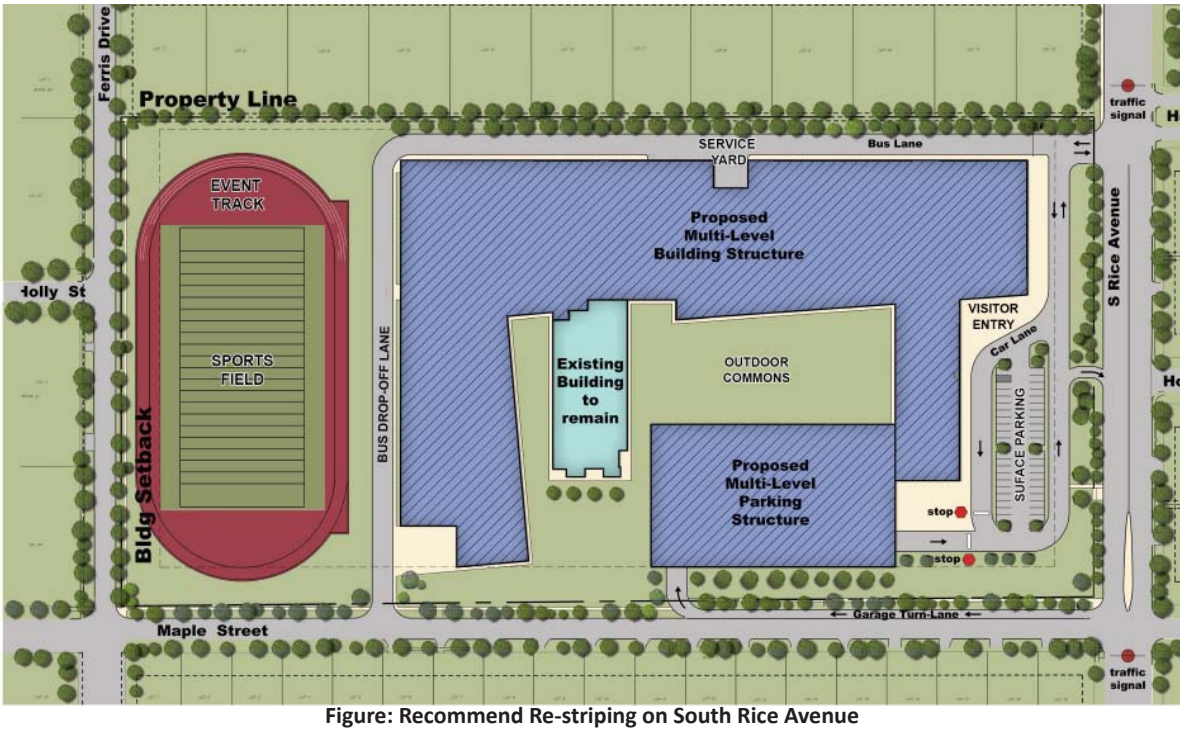


Figure: Recommend Re-striping on South Rice Avenue

**b. Provide recommendation on what will happen to existing one-way operation of Maple Street and various existing turn restrictions around the school.**

Response: The existing one-way operation of Maple Street will remain. Recommendations for other turn lane restrictions in the vicinity of the school are illustrated in the figure below and also updated in the report.



Attachment: Bellaire High School - Traffic Study Comments + Responses (2333 : BHS SUP)

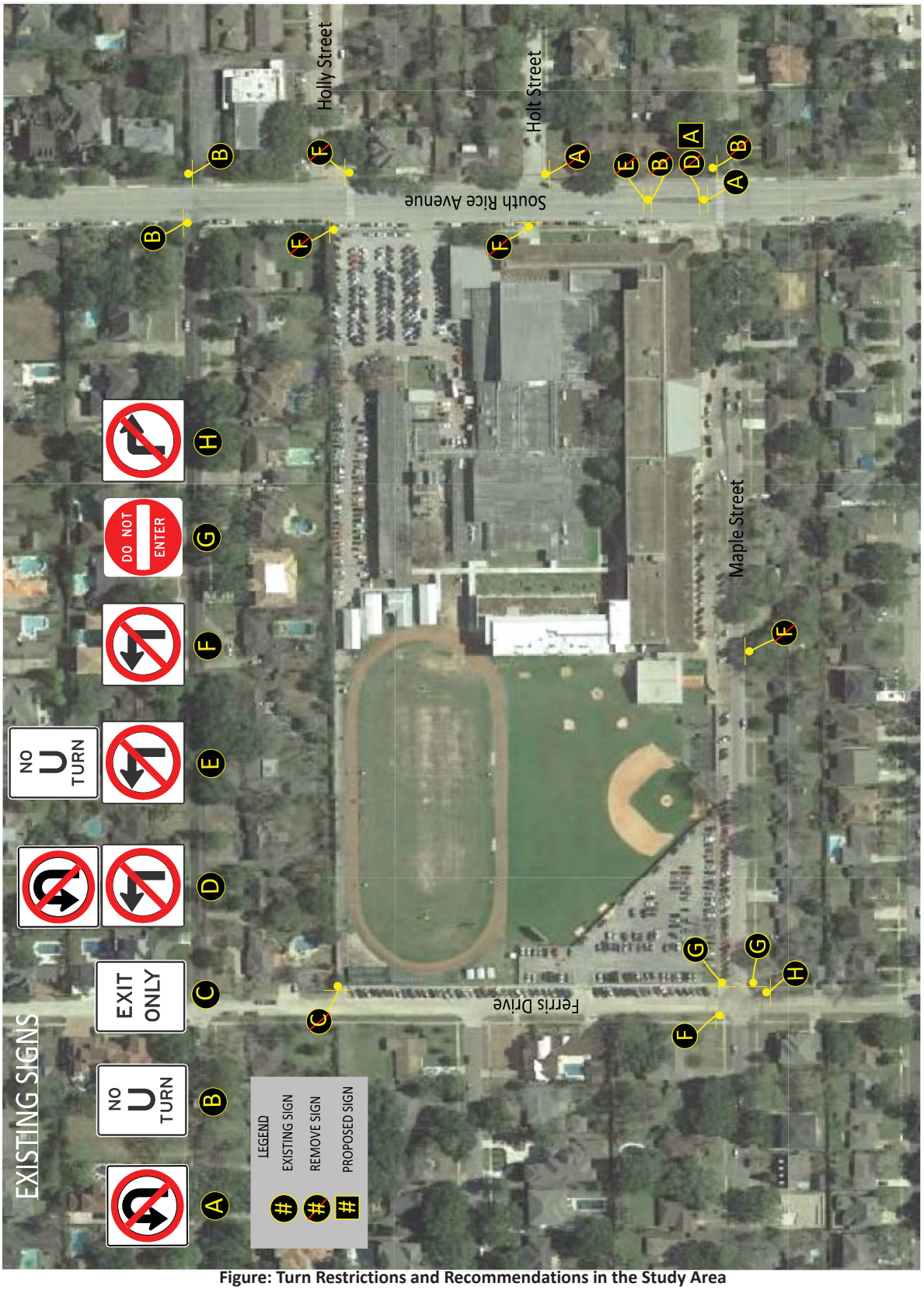


Figure: Turn Restrictions and Recommendations in the Study Area

**c. Provide Traffic Signal Warrants where traffic signals are recommended.**

Response: A signal warrant analysis was conducted at the intersections of South Rice Avenue at Holly Street/Bus Driveway as well as South Rice Avenue at Maple Street in accordance with the 2009 Manual on Uniform Traffic Control Devices (MUTCD) guidelines.

For the intersection of South Rice Avenue at Holly Street, Warrant 3 (peak hour) was satisfied for Build-out conditions at the study intersection.

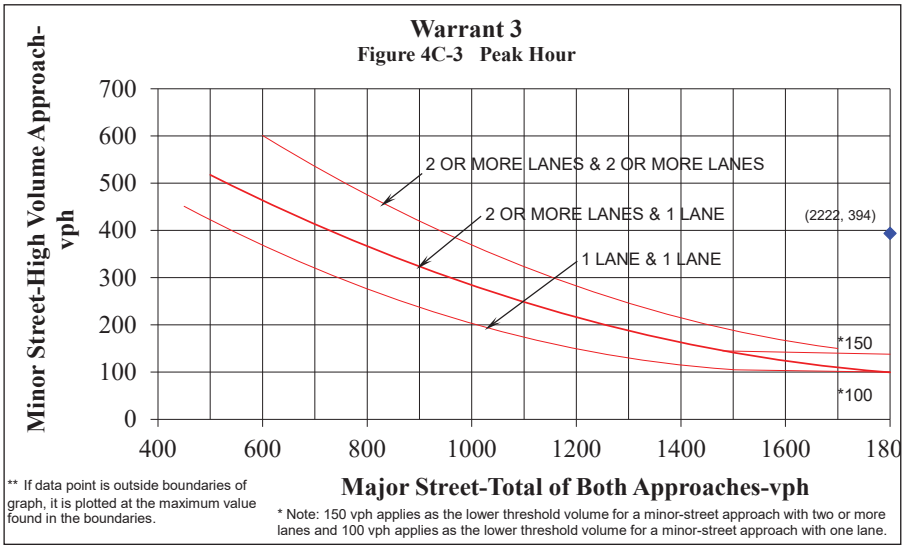


**Figure: Peak Hour Signal Warrant Analysis for South Rice Ave at Holly Street**

For the intersection of South Rice Avenue at Maple Street, Warrant 3 (peak hour) was satisfied for Build-out conditions at the study intersection.

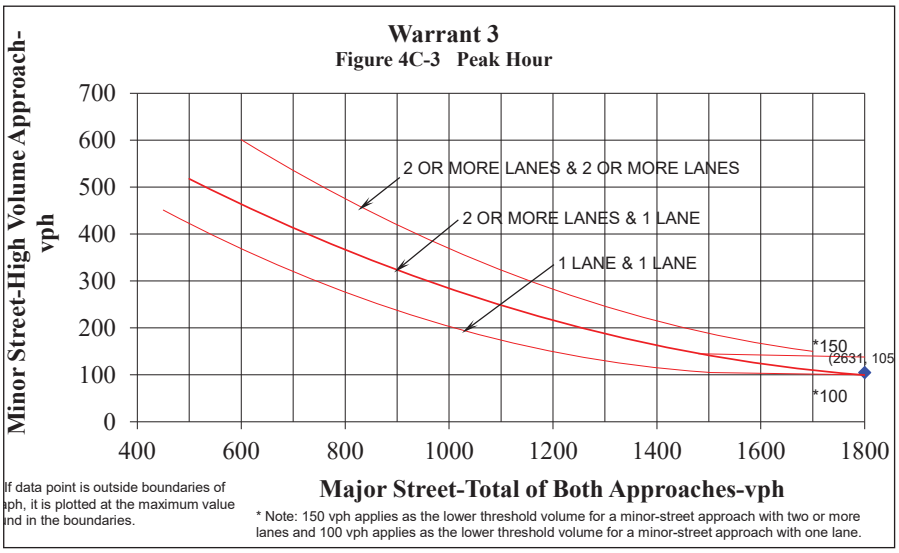


**Figure: Peak Hour Signal Warrant Analysis for South Rice Ave at Maple Street**

8. **Please provide updated report based on the above comments for furth**er review.

Response: The report has been revised based on the review comments and updated site plan.

If you have any questions about the methodologies or assumptions in this response letter, please do not hesitate to contact me at 713-398-7461 or dustin@trafficengineers.com.

Sincerely,

Dustin W Qualls, PE, PTOE

Dustin Qualls, PE, PTOE, RAS

Principal

TEI
TRAFFIC ENGINEERS, INC.

# Bellaire High School Rebuild

# Gordon Baseball Field Traffic Study

Prepared for

PBK

Prepared by
**Traffic Engineers, Inc.**
*Texas Registration #F-3158*

*July 7, 2017*

STATE OF TEXAS
DUSTIN W. QUALLS
97337
LICENSED
PROFESSIONAL ENGINEER

Dustin W. Qualls, PE, PTOE

Attachment: Gordon TIA (2333 : BHS SUP)

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## LIST OF TABLES



## LIST OF FIGURES



Attachment: Gordon TIA (2333 : BHS SUP)

# INTRODUCTION

## TRAFFIC IMPACT ANALYSIS

This report presents the Traffic Impact Analysis (TIA) for a proposed high school baseball and softball field located on the southwest corner of Bissonnet Street and North Avenue B in Bellaire, Texas, as shown in **Figure 1**.

The tract is currently developed as a school but is not being used. Immediate plans to develop the tract include a baseball and softball field for use by Bellaire High School and Houston Independent School District. Driveway is proposed to be located on Bissonnet Street. The purpose of this study is to determine the traffic impacts associated with the expected trip generation on the roadways and critical intersections within the study area.


**FIGURE 1: SITE LOCATION**

# A. SCOPE OF TIA

## STUDY AREA

The study area is localized to the proposed tract and the adjacent major roadways, traffic signal and site driveway. The tract is bound by Bissonnet Street to the north, North Avenue B to the east, a residential area to the west and a City of Bellaire owned public park to the south. The two roadways being analyzed in this report are Bissonnet Street and North Avenue B. The tract is currently a disused school building.



Attachment: Gordon TIA (2333 : BHS SUP)

## EXISTING ROADWAY CONDITIONS

**Bissonnet Street**

The posted speed limit on Bissonnet Street is 35 mph, and the primary direction in the study area is most nearly east-west. Adjacent to the site, the roadway is undivided with two through lanes in each direction, with a two-way left-turn lane in the center and at each intersection. Bissonnet is a concrete roadway with curb and gutter.

**North Avenue B**

North Avenue B is located east of the site and is most nearly a north-south roadway. North Avenue B is a two-lane roadway with curb and gutter. The posted speed limit on North Avenue B is 30 mph. Monday through Friday, the section of North Avenue B north of Bissonnet becomes a one-way southbound street between the hours of 7:45 to 9:00 AM and 4:00 to 5:00 PM.

**Intersection of Bissonnet Street and North Avenue B**

Northbound approach – Single lane with both left and right turning movements permitted. Through traffic is not permitted during restricted times.

Southbound approach – Single lane with both left and right turning movements permitted.

Eastbound approach – One left-turn lane, one through lane and one through/right-turn lane. Left turns are not permitted during restricted times.

Westbound approach – One left-turn lane, one through lane and one through/right-turn lane. Right turns are not permitted during restricted times.

The intersection is signalized with standard NEMA signal phasing. The peak hour cycle length is 90 seconds.

## EXISTING SITE TURNING MOVEMENT COUNTS

Field observations were performed and turning movement counts (TMCs) were collected at the critical intersection of Bissonnet Street and North Avenue B. The observations were conducted during a typical weekday peak afternoon timeframe of 4:00-6:00 PM in May of 2017. The morning peak timeframe was not counted as this site will only generate traffic during a typical PM peak hour. The TMC raw data can be found in **Appendix A**.

Attachment: Gordon TIA (2333 : BHS SUP)

## SITE PLAN

As shown in **Figure 2**, the proposed site plan includes one access point on Bissonnet Street.

Driveways/roadways shown herein are conceptual and planning level in nature; precise driveway/roadway locations will be determined during the platting and/or site planning stage of development based on conditions in the field as well as future plans for the area.


**FIGURE 2: SITE PLAN**

## B. TRIP GENERATION

Trip generation for the proposed baseball and softball field is based on the number of parking spots in the new parking lot on site as well as a real world trip generation development.

The site plan proposes 85 parking spots being constructed while **Table 1** summarizes the approximation of trips generated by the development. The number of parking spots is utilized for our analysis due the larger estimation of trips estimated. This should represent the worst case scenario of trips being generated because it is unlikely that all 85 parking spots would be used and that all users of the field would enter and leave within the same peak hour.

**TABLE 1: TRIP GENERATION COMPARISON**

| Category | Number | Methodology | Trips Generated |
|---|---|---|---|
| Coaches | 10 | 1 trip each | 10 |
| Players | 30 | .5 trips each | 15 |
| Spectators (2 for each player | 60 | .75 trips each | 45 |
| | | Total | 70 |
| **Parking Spaces** | **85** | **1 trip each** | **85** |

## C. TRIP DISTRIBUTION

The global trip distribution is anticipated to be:

- 5 percent to/from the north on North Avenue B
- 5 percent to/from the south on North Avenue B
- 60 percent to/from the west on Bissonnet Street
- 30 percent to/from the east on Bissonnet Street

The percentages for trip distribution are shown in **Figure 3.** Estimated percentages were developed based on an aerial look at surrounding land uses and the characteristics of the site plan itself. Surrounding neighborhoods and highways were taken into consideration as was the location of Bellaire High School, a primary generator of traffic for the field.

Attachment: Gordon TIA (2333 : BHS SUP)


**FIGURE 3: TRIP DISTRIBUTION PERCENTAGE**

## D. TRAFFIC ASSIGNMENT

Trips were generated and distributed to the critical intersection of Bissonnet Street and North Avenue B as well as the driveway accessing the site.

## E. TRAFFIC FORECAST

Field observations were performed and turning movement counts (TMCs) were collected at the critical intersection of Bissonnet Street and North Avenue B. The observations were conducted during a typical weekday peak afternoon timeframe of 4:00-6:00 PM in May of 2017. The morning peak timeframe was not counted as this site will only generate traffic during a typical PM peak hour. The TMC raw data can be found in **Appendix A**.

A summary of the existing PM peak hour turning movement counts can be found in **Figure 4.**

The trip generation values were then routed through the model and added to the existing volumes. The total build out volumes for the PM peak hour can be found in **Figure 5**.


**FIGURE 4: EXISTING TRAFFIC VOLUMES DURING PM PEAK HOUR**

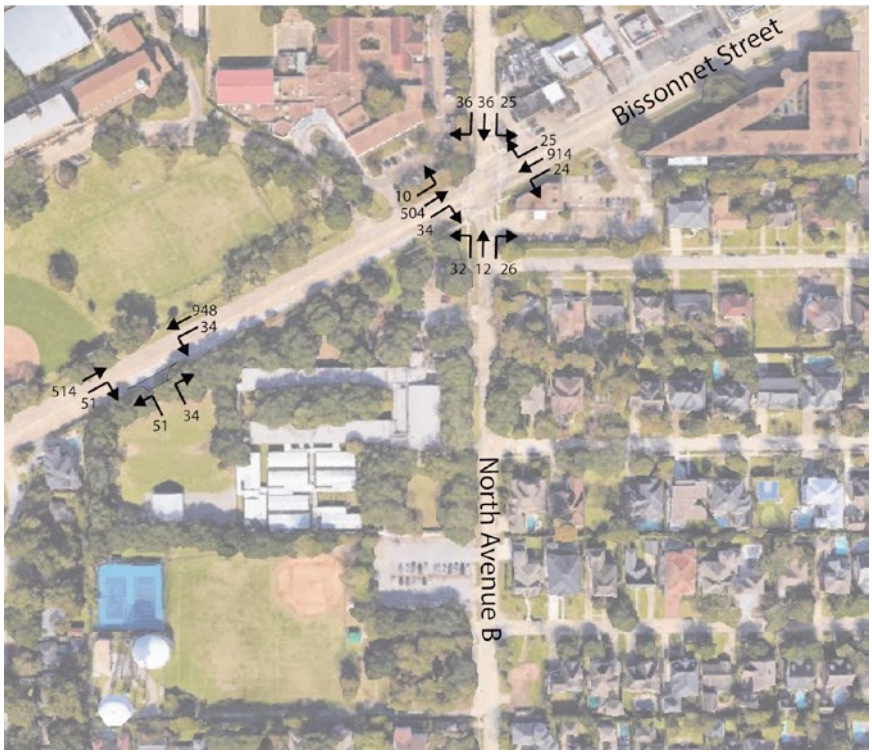



**FIGURE 5: BUILD OUT TRAFFIC VOLUMES DURING PM PEAK HOUR**

Attachment: Gordon TIA (2333 : BHS SUP)

## F. CAPACITY ANALYSES FOR STREET INTERSECTIONS AND DRIVEWAYS

Capacity analyses were conducted for Background and Build-Out conditions at the study area intersections using Vistro 5 which is based on the *Highway Capacity Manual*. Capacity analysis provides information regarding traffic operations at an intersection and is expressed in terms of the level-of-service (LOS). The level-of-service indicates the average seconds of delay experienced by a motorist at a signalized intersection or at the stop controlled approaches of an unsignalized intersection. As a frame of reference, intersection levels-of-service range from A to F, with LOS A representing free flow conditions and LOS F representing highly congested conditions. In general, a signalized intersection or stop controlled approaches at an unsignalized intersection operating at LOS D or better in an urban area is characterized by acceptable delays.

Results of the capacity analyses are provided in **Appendix B** and a summary is presented in **Table 2.**

**TABLE 2: PM PEAK INTERSECTION LEVEL OF SERVICE**

| PM Peak | LOS/Delay (sec.) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Existing | | | | | Built-out | | | | |
| Intersection | Intersection | Approach | | | | Intersection | Approach | | | |
| | | NB | SB | EB | WB | | NB | SB | EB | WB |
| Bissonnet Street at North Avenue B | D/37.8 | F | F | A | A | D/41.0 | F | F | A | A |

## G. TRAFFIC IMPACT ASSESSMENT

During the PM peak hour, the intersection of Bissonnet Street and North Avenue B is expected to continue to operate at LOS D for both the 2018 Background and Build-Out conditions

The traffic impacts would not warrant major mitigation above and beyond the existing infrastructure.

Attachment: Gordon TIA (2333 : BHS SUP)

## H. RECOMMENDATIONS

This report presents the Traffic Impact Analysis (TIA) for a proposed baseball and softball field located at the southwest corner of the Bissonnet Street and North Avenue B in the City of Bellaire, Texas.

The following observations and recommendations are made according to the results of the TIA:

- The trips generated by the proposed development as distributed will result in an acceptable level of impacts upon the background traffic operations at the critical intersections.
- The developer will not need to provide additional turn lanes to access the site driveway.

Attachment: Gordon TIA (2333 : BHS SUP)

# Appendices

Attachment: Gordon TIA (2333 : BHS SUP)

# Appendix A
# Turning Movement Counts

Attachment: Gordon TIA (2333 : BHS SUP)

CJ Hensch & Associates, Inc.

TEI
5215 Sycamore Avenue

Pasadena, Texas, United States 77503
281-487-5417 susan@trafficengineers.com

Count Name: N Avenue B at Bissonnet St
Site Code:
Start Date: 05/23/2017
Page No: 1

# Turning Movement Data

| Start Time | N Avenue B Southbound | | | | | | Bissonnet St Westbound | | | | | | N Avenue B Northbound | | | | | | Bissonnet St Eastbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Int. Total |
| 2:00 PM | 4 | 8 | 4 | 0 | 0 | 16 | 7 | 143 | 0 | 0 | 0 | 150 | 10 | 0 | 9 | 0 | 0 | 19 | 2 | 110 | 5 | 0 | 0 | 117 | 302 |
| 2:15 PM | 1 | 3 | 4 | 0 | 1 | 8 | 6 | 168 | 2 | 0 | 1 | 176 | 4 | 0 | 7 | 0 | 1 | 11 | 3 | 102 | 6 | 0 | 4 | 111 | 306 |
| 2:30 PM | 4 | 6 | 7 | 0 | 5 | 17 | 3 | 133 | 2 | 0 | 1 | 138 | 8 | 0 | 1 | 0 | 0 | 9 | 2 | 114 | 6 | 0 | 0 | 122 | 286 |
| 2:45 PM | 2 | 7 | 4 | 0 | 2 | 13 | 7 | 167 | 2 | 0 | 0 | 176 | 8 | 2 | 3 | 0 | 1 | 13 | 3 | 80 | 6 | 0 | 3 | 89 | 291 |
| Hourly Total | 11 | 24 | 19 | 0 | 8 | 54 | 23 | 611 | 6 | 0 | 2 | 640 | 30 | 2 | 20 | 0 | 2 | 52 | 10 | 406 | 23 | 0 | 7 | 439 | 1185 |
| 3:00 PM | 4 | 3 | 6 | 0 | 5 | 13 | 5 | 141 | 2 | 0 | 1 | 148 | 5 | 0 | 12 | 0 | 0 | 17 | 0 | 93 | 8 | 0 | 3 | 101 | 279 |
| 3:15 PM | 9 | 5 | 17 | 0 | 2 | 31 | 3 | 132 | 1 | 0 | 1 | 136 | 10 | 1 | 10 | 0 | 0 | 21 | 0 | 119 | 6 | 0 | 7 | 125 | 313 |
| 3:30 PM | 15 | 24 | 23 | 0 | 4 | 62 | 6 | 189 | 0 | 0 | 0 | 195 | 9 | 0 | 13 | 0 | 0 | 22 | 0 | 132 | 9 | 0 | 14 | 141 | 420 |
| 3:45 PM | 8 | 14 | 9 | 0 | 1 | 31 | 9 | 169 | 3 | 0 | 0 | 181 | 6 | 2 | 14 | 0 | 0 | 22 | 0 | 120 | 11 | 0 | 3 | 131 | 365 |
| Hourly Total | 36 | 46 | 55 | 0 | 12 | 137 | 23 | 631 | 6 | 0 | 2 | 660 | 30 | 3 | 49 | 0 | 0 | 82 | 0 | 464 | 34 | 0 | 27 | 498 | 1377 |
| 4:00 PM | 8 | 15 | 8 | 0 | 0 | 31 | 6 | 204 | 7 | 0 | 1 | 217 | 8 | 5 | 8 | 0 | 0 | 21 | 2 | 90 | 6 | 0 | 2 | 98 | 367 |
| 4:15 PM | 5 | 7 | 12 | 0 | 3 | 24 | 9 | 191 | 5 | 0 | 0 | 205 | 5 | 2 | 4 | 0 | 0 | 11 | 4 | 112 | 9 | 0 | 0 | 125 | 365 |
| 4:30 PM | 10 | 7 | 7 | 0 | 3 | 24 | 5 | 185 | 6 | 0 | 6 | 196 | 5 | 1 | 6 | 0 | 0 | 12 | 1 | 122 | 7 | 0 | 1 | 130 | 362 |
| 4:45 PM | 6 | 8 | 4 | 0 | 1 | 18 | 3 | 218 | 3 | 0 | 1 | 224 | 2 | 5 | 5 | 0 | 1 | 12 | 2 | 119 | 10 | 0 | 1 | 131 | 385 |
| Hourly Total | 29 | 37 | 31 | 0 | 7 | 97 | 23 | 798 | 21 | 0 | 8 | 842 | 20 | 13 | 23 | 0 | 1 | 56 | 9 | 443 | 32 | 0 | 4 | 484 | 1479 |
| 5:00 PM | 11 | 12 | 8 | 0 | 1 | 31 | 7 | 236 | 9 | 0 | 2 | 252 | 12 | 3 | 7 | 0 | 0 | 22 | 0 | 103 | 6 | 0 | 3 | 109 | 414 |
| 5:15 PM | 4 | 12 | 15 | 0 | 0 | 31 | 8 | 208 | 7 | 0 | 2 | 223 | 8 | 4 | 6 | 1 | 1 | 19 | 3 | 144 | 4 | 0 | 7 | 151 | 424 |
| 5:30 PM | 4 | 4 | 5 | 0 | 0 | 13 | 6 | 226 | 6 | 0 | 0 | 238 | 5 | 0 | 8 | 0 | 0 | 13 | 1 | 112 | 10 | 0 | 7 | 123 | 387 |
| 5:45 PM | 5 | 9 | 4 | 0 | 0 | 18 | 8 | 187 | 5 | 0 | 0 | 200 | 7 | 3 | 12 | 0 | 2 | 22 | 1 | 106 | 5 | 0 | 1 | 112 | 352 |
| Hourly Total | 24 | 37 | 32 | 0 | 1 | 93 | 29 | 857 | 27 | 0 | 4 | 913 | 32 | 10 | 33 | 1 | 3 | 76 | 5 | 465 | 25 | 0 | 18 | 495 | 1577 |
| Grand Total | 100 | 144 | 137 | 0 | 28 | 381 | 98 | 2897 | 60 | 0 | 16 | 3055 | 112 | 28 | 125 | 1 | 6 | 266 | 24 | 1778 | 114 | 0 | 56 | 1916 | 5618 |
| Approach % | 26.2 | 37.8 | 36.0 | 0.0 | - | - | 3.2 | 94.8 | 2.0 | 0.0 | - | - | 42.1 | 10.5 | 47.0 | 0.4 | - | - | 1.3 | 92.8 | 5.9 | 0.0 | - | - | - |
| Total % | 1.8 | 2.6 | 2.4 | 0.0 | - | 6.8 | 1.7 | 51.6 | 1.1 | 0.0 | - | 54.4 | 2.0 | 0.5 | 2.2 | 0.0 | - | 4.7 | 0.4 | 31.6 | 2.0 | 0.0 | - | 34.1 | - |
| All Vehicles (no classification) | 100 | 144 | 137 | 0 | - | 381 | 98 | 2897 | 60 | 0 | - | 3055 | 112 | 28 | 125 | 1 | - | 266 | 24 | 1778 | 114 | 0 | - | 1916 | 5618 |
| % All Vehicles (no classification) | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | - | 100.0 | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 |
| Pedestrians | - | - | - | - | 28 | - | - | - | - | - | 16 | - | - | - | - | - | 6 | - | - | - | - | - | 56 | - | - |
| % Pedestrians | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - |

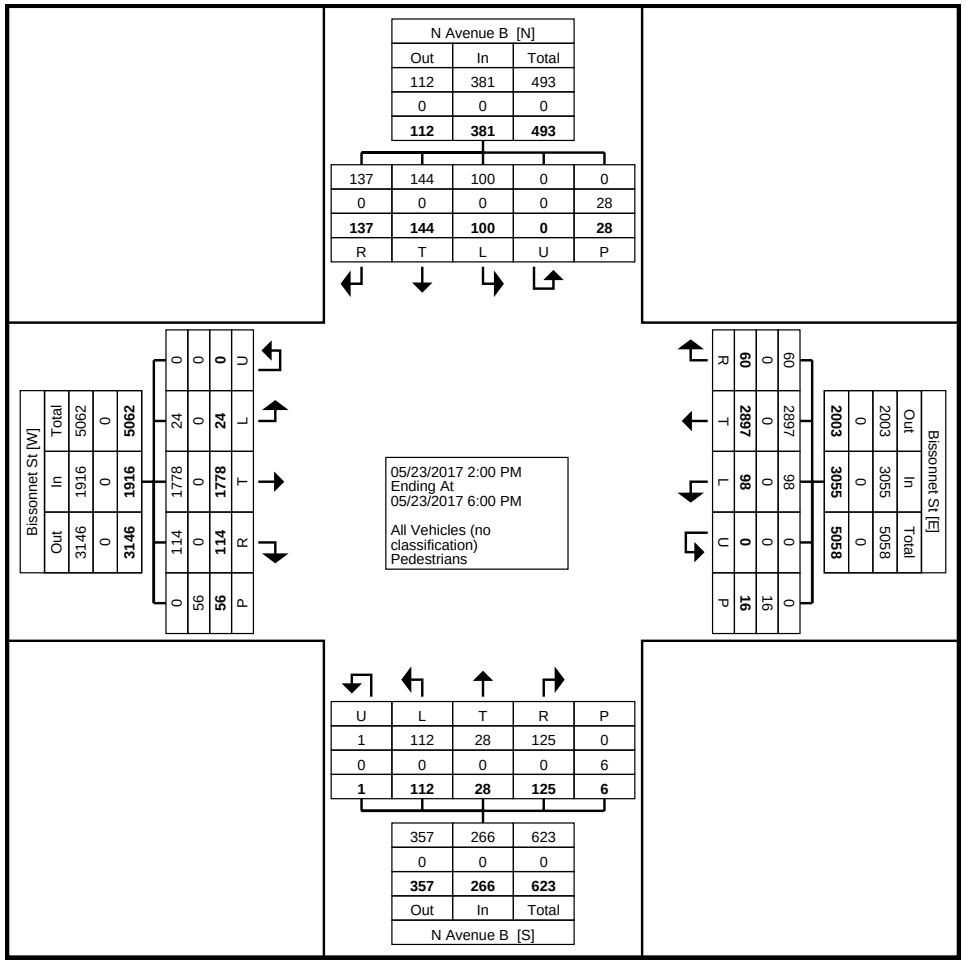
Attachment: Gordon TIA (2333 : BHS SUP)

CJ Hensch & Associates, Inc.

TEI
5215 Sycamore Avenue

Pasadena, Texas, United States 77503
281-487-5417 susan@trafficengineers.com

Count Name: N Avenue B at Bissonnet St
Site Code:
Start Date: 05/23/2017
Page No: 2




Turning Movement Data Plot

Attachment: Gordon TIA (2333 : BHS SUP)

CJ Hensch & Associates, Inc.
TEI
5215 Sycamore Avenue

Pasadena, Texas, United States 77503
281-487-5417 susan@trafficengineers.com

Count Name: N Avenue B at Bissonnet St
Site Code:
Start Date: 05/23/2017
Page No: 3

# Turning Movement Peak Hour Data (4:45 PM)

| Start Time | N Avenue B Southbound | | | | | | Bissonnet St Westbound | | | | | | N Avenue B Northbound | | | | | | Bissonnet St Eastbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Left | Thru | Right | U-Turn | Peds | App. Total | Int. Total |
| 4:45 PM | 6 | 8 | 4 | 0 | 1 | 18 | 3 | 218 | 3 | 0 | 1 | 224 | 2 | 5 | 5 | 0 | 1 | 12 | 2 | 119 | 10 | 0 | 1 | 131 | 385 |
| 5:00 PM | 11 | 12 | 8 | 0 | 1 | 31 | 7 | 236 | 9 | 0 | 2 | 252 | 12 | 3 | 7 | 0 | 0 | 22 | 0 | 103 | 6 | 0 | 3 | 109 | 414 |
| 5:15 PM | 4 | 12 | 15 | 0 | 0 | 31 | 8 | 208 | 7 | 0 | 2 | 223 | 8 | 4 | 6 | 1 | 1 | 19 | 3 | 144 | 4 | 0 | 7 | 151 | 424 |
| 5:30 PM | 4 | 4 | 5 | 0 | 0 | 13 | 6 | 226 | 6 | 0 | 0 | 238 | 5 | 0 | 8 | 0 | 0 | 13 | 1 | 112 | 10 | 0 | 7 | 123 | 387 |
| Total | 25 | 36 | 32 | 0 | 2 | 93 | 24 | 888 | 25 | 0 | 5 | 937 | 27 | 12 | 26 | 1 | 2 | 66 | 6 | 478 | 30 | 0 | 18 | 514 | 1610 |
| Approach % | 26.9 | 38.7 | 34.4 | 0.0 | - | - | 2.6 | 94.8 | 2.7 | 0.0 | - | - | 40.9 | 18.2 | 39.4 | 1.5 | - | - | 1.2 | 93.0 | 5.8 | 0.0 | - | - | - |
| Total % | 1.6 | 2.2 | 2.0 | 0.0 | - | 5.8 | 1.5 | 55.2 | 1.6 | 0.0 | - | 58.2 | 1.7 | 0.7 | 1.6 | 0.1 | - | 4.1 | 0.4 | 29.7 | 1.9 | 0.0 | - | 31.9 | - |
| PHF | 0.568 | 0.750 | 0.533 | 0.000 | - | 0.750 | 0.750 | 0.941 | 0.694 | 0.000 | - | 0.930 | 0.563 | 0.600 | 0.813 | 0.250 | - | 0.750 | 0.500 | 0.830 | 0.750 | 0.000 | - | 0.851 | 0.949 |
| All Vehicles (no classification) | 25 | 36 | 32 | 0 | - | 93 | 24 | 888 | 25 | 0 | - | 937 | 27 | 12 | 26 | 1 | - | 66 | 6 | 478 | 30 | 0 | - | 514 | 1610 |
| % All Vehicles (no classification) | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | - | 100.0 | 100.0 | 100.0 | 100.0 | - | - | 100.0 | 100.0 |
| Pedestrians | - | - | - | - | 2 | - | - | - | - | - | 5 | - | - | - | - | - | 2 | - | - | - | - | - | 18 | - | - |
| % Pedestrians | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - | - | - | - | 100.0 | - | - |

Attachment: Gordon TIA (2333 : BHS SUP)

CJ Hensch & Associates, Inc.

TEI
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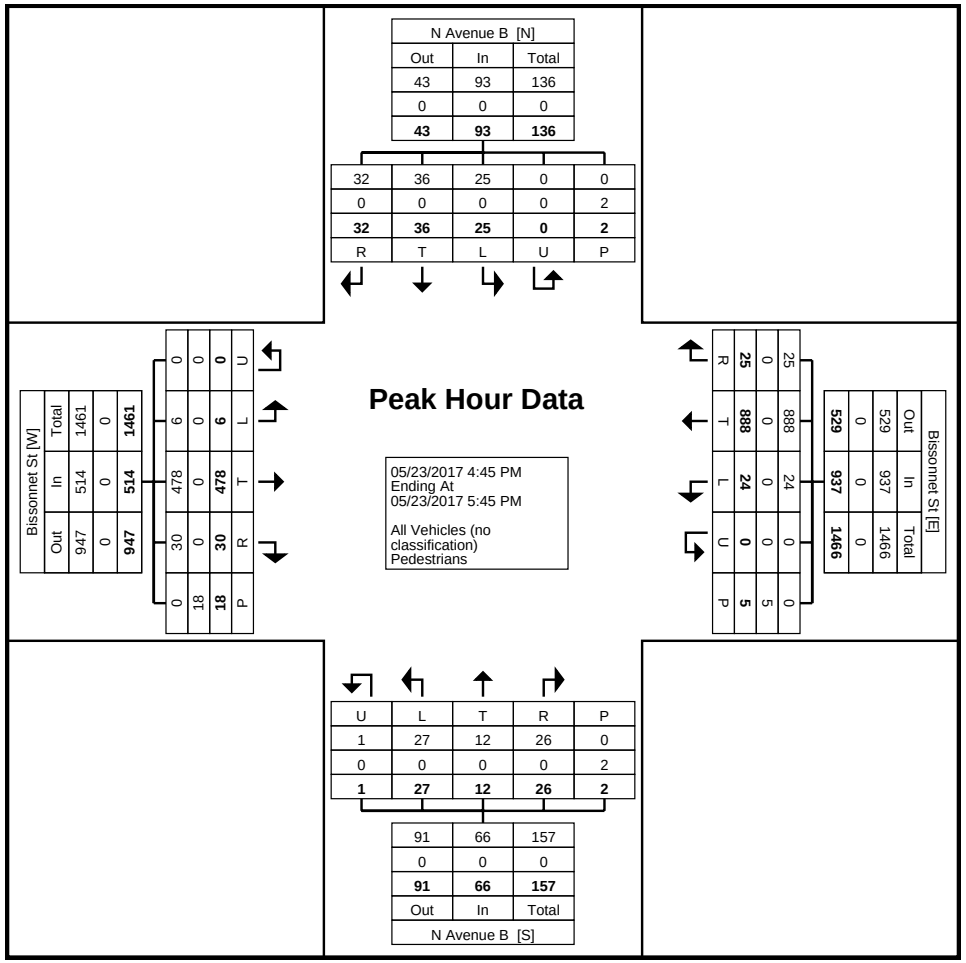
Count Name: N Avenue B at Bissonnet St
Site Code:
Start Date: 05/23/2017
Page No: 4




Turning Movement Peak Hour Data Plot (4:45 PM)

Attachment: Gordon TIA (2333 : BHS SUP)

# Appendix B
# Background and Build-out Traffic Operations

Attachment: Gordon TIA (2333 : BHS SUP)

Generated with PTV VISTRO
Version 5.00-00

Vistro File: E:\...\Bissonett at Avenue B.vistro
Report File: E:\...\Existing.pdf

Scenario 1 Existing
7/6/2017

**Intersection Analysis Summary**

| ID | Intersection Name | Control Type | Method | Worst Mvmt | V/C | Delay (s/veh) | LOS |
|---|---|---|---|---|---|---|---|
| 1 | Bissonet Sreet at Avenue B | Signalized | HCM 6th Edition | SB Thru | 0.000 | 37.8 | D |
| 2 | Bissonnet Street at Driveway | Two-way stop | HCM 6th Edition | NB Left | 0.000 | 19.7 | C |

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Attachment: Gordon TIA (2333 : BHS SUP)

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**Intersection Level Of Service Report**
**Intersection 1: Bissonet Sreet at Avenue B**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 37.8 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | D |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | Avenue B | | | Avenue B | | | Bissonnet St | | | Bissonet St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 250.00 | 100.00 | 100.00 | 250.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Curb Present | No | | | No | | | No | | | No | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Avenue B | | | Avenue B | | | Bissonnet St | | | Bissonet St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 7 | 3 | 7 | 6 | 9 | 8 | 2 | 120 | 8 | 6 | 222 | 6 |
| Total Analysis Volume [veh/h] | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| v_do, Outbound Pedestrian Volume crossing | 0 | | | 0 | | | 0 | | | 0 | | |
| v_di, Inbound Pedestrian Volume crossing m | 0 | | | 0 | | | 0 | | | 0 | | |
| v_co, Outbound Pedestrian Volume crossing | 0 | | | 0 | | | 0 | | | 0 | | |
| v_ci, Inbound Pedestrian Volume crossing mi | 0 | | | 0 | | | 0 | | | 0 | | |
| v_ab, Corner Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

Attachment: Gordon TIA (2333 : BHS SUP)

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**Intersection Settings**

| | |
|---|---|
| Located in CBD | Yes |
| Signal Coordination Group | - |
| Cycle Length [s] | 90 |
| Coordination Type | Time of Day Pattern Isolated |
| Actuation Type | Fixed time |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 2 | 0 | 0 | 6 | 0 | 7 | 4 | 0 | 3 | 8 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | - | - | - | - | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 0 | 5 | 0 | 0 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 0 | 20 | 0 | 0 | 20 | 0 | 15 | 55 | 0 | 15 | 55 | 0 |
| Amber [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 0 | 68 | 0 | 0 | 94 | 0 | 10 | 94 | 0 | 28 | 31 | 0 |
| Vehicle Extension [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | | No | | | No | | No | No | | No | No | |
| Maximum Recall | | No | | | No | | No | No | | No | No | |
| Pedestrian Recall | | No | | | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

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**Lane Group Calculations**

| Lane Group | C | C | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| L, Total Lost Time per Cycle [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| g_i, Effective Green Time [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| g / C, Green / Cycle | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| (v / s)_i Volume / Saturation Flow Rate | 0.00 | 0.00 | 0.01 | 0.15 | 0.15 | 0.03 | 0.27 | 0.27 |
| s, saturation flow rate [veh/h] | 0 | 0 | 498 | 1683 | 1648 | 727 | 1683 | 1667 |
| c, Capacity [veh/h] | 57 | 51 | 80 | 0 | 0 | 80 | 0 | 0 |
| d1, Uniform Delay [s] | 45.00 | 45.00 | 45.00 | 0.00 | 0.00 | 45.00 | 0.00 | 0.00 |
| k, delay calibration | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 168.87 | 440.91 | 1.82 | 0.00 | 0.00 | 9.36 | 0.00 | 0.00 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.16 | 1.83 | 0.08 | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 |
| d, Delay for Lane Group [s/veh] | 213.87 | 485.91 | 46.82 | 0.00 | 0.00 | 54.36 | 0.00 | 0.00 |
| Lane Group LOS | F | F | D | A | A | D | A | A |
| Critical Lane Group | No | No | No | No | No | No | No | No |
| 50th-Percentile Queue Length [veh] | 4.07 | 7.42 | 0.17 | 0.00 | 0.00 | 0.76 | 0.00 | 0.00 |
| 50th-Percentile Queue Length [ft] | 101.72 | 185.43 | 4.37 | 0.00 | 0.00 | 18.92 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [veh] | 7.32 | 11.88 | 0.31 | 0.00 | 0.00 | 1.36 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 183.10 | 297.09 | 7.86 | 0.00 | 0.00 | 34.06 | 0.00 | 0.00 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 213.87 | 213.87 | 213.87 | 485.91 | 485.91 | 485.91 | 46.82 | 0.00 | 0.00 | 54.36 | 0.00 | 0.00 |
| Movement LOS | F | F | F | F | F | F | D | A | A | D | A | A |
| d_A, Approach Delay [s/veh] | 213.87 | | | 485.91 | | | 0.55 | | | 1.39 | | |
| Approach LOS | F | | | F | | | A | | | A | | |
| d_I, Intersection Delay [s/veh] | 37.82 | | | | | | | | | | | |
| Intersection LOS | D | | | | | | | | | | | |
| Intersection V/C | 0.000 | | | | | | | | | | | |

**Other Modes**

| | | | | |
|---|---|---|---|---|
| g_Walk,mi, Effective Walk Time [s] | 9.0 | 9.0 | 9.0 | 9.0 |
| M_corner, Corner Circulation Area [ft²/ped] | 0.00 | 0.00 | 0.00 | 0.00 |
| M_CW, Crosswalk Circulation Area [ft²/ped] | 0.00 | 0.00 | 0.00 | 0.00 |
| d_p, Pedestrian Delay [s] | 36.45 | 36.45 | 36.45 | 36.45 |
| I_p,int, Pedestrian LOS Score for Intersection | 1.792 | 1.783 | 2.626 | 2.623 |
| Crosswalk LOS | A | A | B | B |
| s_b, Saturation Flow Rate of the bicycle lane | 2000 | 2000 | 2000 | 2000 |
| c_b, Capacity of the bicycle lane [bicycles/h] | 0 | 0 | 0 | 0 |
| d_b, Bicycle Delay [s] | 45.00 | 45.00 | 45.00 | 45.00 |
| I_b,int, Bicycle LOS Score for Intersection | 1.669 | 1.713 | 1.984 | 2.333 |

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| | | | | |
|---|---|---|---|---|
| Bicycle LOS | A | A | A | B |

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Version 5.00-00

**Intersection Level Of Service Report**
**Intersection 2: Bissonnet Street at Driveway**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 19.7 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | C |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | Dwy | | Bissonnet St | | Bissonnet St | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Northeastbound | | Southwestbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Right | Thru | Right | Left | Thru |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 1 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 250.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | Yes | | Yes | | Yes | |

**Volumes**

| Name | Dwy | | Bissonnet St | | Bissonnet St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 514 | 0 | 0 | 948 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 0 | 0 | 514 | 0 | 0 | 948 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 0 | 0 | 129 | 0 | 0 | 237 |
| Total Analysis Volume [veh/h] | 0 | 0 | 514 | 0 | 0 | 948 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

Attachment: Gordon TIA (2333 : BHS SUP)

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Version 5.00-00

**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Stop | Free | Free |
| Flared Lane | No | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | No | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 |
| d_M, Delay for Movement [s/veh] | 19.75 | 9.85 | 0.00 | 0.00 | 8.44 | 0.00 |
| Movement LOS | C | A | A | A | A | A |
| 95th-Percentile Queue Length [veh] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| d_A, Approach Delay [s/veh] | 14.80 | | 0.00 | | 0.00 | |
| Approach LOS | B | | A | | A | |
| d_I, Intersection Delay [s/veh] | 0.00 | | | | | |
| Intersection LOS | C | | | | | |

Attachment: Gordon TIA (2333 : BHS SUP)

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Version 5.00-00

Vistro File: E:\...\Bissonett at Avenue B.vistro
Report File: E:\...\Existing.pdf

Scenario 1 Existing
7/6/2017

## Turning Movement Volume: Summary

| ID | Intersection Name | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 1 | Bissonet Sreet at Avenue B | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 | 1610 |

| ID | Intersection Name | Northbound | | Northeastbound | | Southwestbound | | Total Volume |
|---|---|---|---|---|---|---|---|---|
| | | Left | Right | Thru | Right | Left | Thru | |
| 2 | Bissonnet Street at Driveway | 0 | 0 | 514 | 0 | 0 | 948 | 1462 |

Attachment: Gordon TIA (2333 : BHS SUP)

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Vistro File: E:\...\Bissonett at Avenue B.vistro
Report File: E:\...\Existing.pdf

Scenario 1 Existing
7/6/2017

## Turning Movement Volume: Detail

| ID | Intersection Name | Volume Type | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 1 | Bissonet Sreet at Avenue B | Final Base | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 | 1610 |
| | | Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - |
| | | In Process | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Net New Trips | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | **Future Total** | **28** | **12** | **26** | **25** | **36** | **32** | **6** | **478** | **30** | **24** | **888** | **25** | **1610** |

| ID | Intersection Name | Volume Type | Northbound | | Northeastbound | | Southwestbound | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|
| | | | Left | Right | Thru | Right | Left | Thru | |
| 2 | Bissonnet Street at Driveway | Final Base | 0 | 0 | 514 | 0 | 0 | 948 | 1462 |
| | | Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - |
| | | In Process | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Net New Trips | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | **Future Total** | **0** | **0** | **514** | **0** | **0** | **948** | **1462** |

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Signal Warrants Report For Intersection 2: Bissonnet Street at Driveway

## Warrants Summary

| Warrant | Name | Met? |
|---|---|---|
| #1 | Eight Hour Vehicular Volume | No |
| #2 | Four Hour Vehicular Volume | No |
| #3 | Peak Hour | No |

## Intersection Warrants Parameters

| | |
|---|---|
| Major Approaches | NE, SW |
| Minor Approaches | S |
| Speed > 40mph | No |
| Population < 10,000 | No |
| Warrant Factor | 100% |

## Warrant Analysis Traffic Volumes

| Hour | Major Streets | | Minor Streets |
|---|---|---|---|
| | NE | SW | S |
| 1 | 948 | 514 | 0 |
| 2 | 910 | 493 | 0 |
| 3 | 891 | 483 | 0 |
| 4 | 758 | 411 | 0 |
| 5 | 720 | 391 | 0 |
| 6 | 645 | 350 | 0 |
| 7 | 597 | 324 | 0 |
| 8 | 569 | 308 | 0 |
| 9 | 455 | 247 | 0 |
| 10 | 427 | 231 | 0 |
| 11 | 427 | 231 | 0 |
| 12 | 408 | 221 | 0 |
| 13 | 370 | 200 | 0 |
| 14 | 341 | 185 | 0 |
| 15 | 341 | 185 | 0 |
| 16 | 332 | 180 | 0 |
| 17 | 190 | 103 | 0 |
| 18 | 104 | 57 | 0 |
| 19 | 95 | 51 | 0 |
| 20 | 38 | 21 | 0 |
| 21 | 28 | 15 | 0 |
| 22 | 28 | 15 | 0 |
| 23 | 19 | 10 | 0 |
| 24 | 19 | 10 | 0 |

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## Warrant Analysis by Hour

| Hour | Major Lanes | | Minor Lanes | | Warrant 1 Condition A | | | | Warrant 1 Condition B | | | | Warrant 2 | Warrant 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Volume | Number | Volume | 100% | 80% | 70% | 56% | 100% | 80% | 70% | 56% | | Condition B |
| 1 | 5 | 1462 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 2 | 5 | 1403 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 3 | 5 | 1374 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 4 | 5 | 1169 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 5 | 5 | 1111 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 6 | 5 | 995 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 7 | 5 | 921 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 8 | 5 | 877 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 9 | 5 | 702 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 10 | 5 | 658 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 11 | 5 | 658 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 12 | 5 | 629 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 13 | 5 | 570 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 14 | 5 | 526 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 15 | 5 | 526 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 16 | 5 | 512 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 17 | 5 | 293 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 18 | 5 | 161 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 19 | 5 | 146 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 20 | 5 | 59 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 21 | 5 | 43 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 22 | 5 | 43 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 23 | 5 | 29 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| 24 | 5 | 29 | 1 | 0 | No | No | No | No | No | No | No | No | No | No |
| Hours Met | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## Warrant 3 Condition A

| | |
|---|---|
| Orientation | S |
| Total Stopped Delay Per Vehicle on Minor Approach (s) | 14.8 |
| Number of Lanes on Minor Street Approach | 1 |
| VehicleHours of Stopped Delay on Minor Approach ([h]h:mm) | 0:00 |
| Delay Condition Met | No |
| Volume on Minor Street Approach During Same Hour | 0 |
| High Minor Volume Condition Met | No |
| Total Entering Volume on All Approaches During Same Hour | 1462 |
| Number of Approaches on Intersection | 3 |
| Total Volume Condition Met | Yes |
| Warrant Met for Approach | No |
| **Warrant Met for Intersection** | **No** |

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Study Intersections


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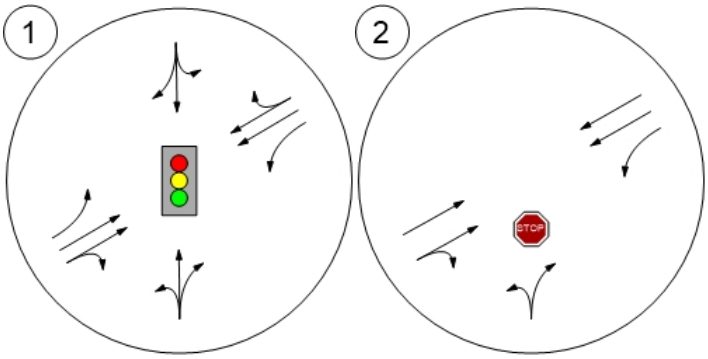
Lane Configuration and Traffic Control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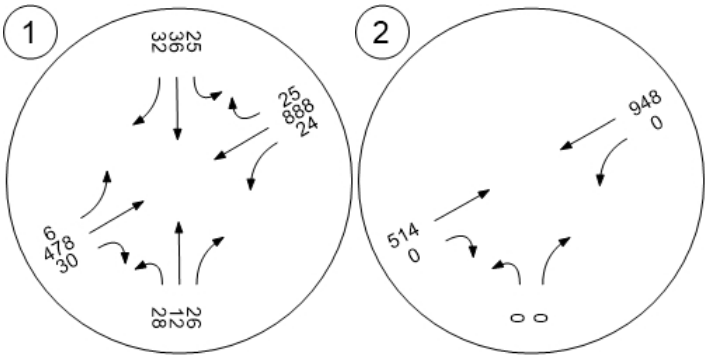
Traffic Volume - Base Volume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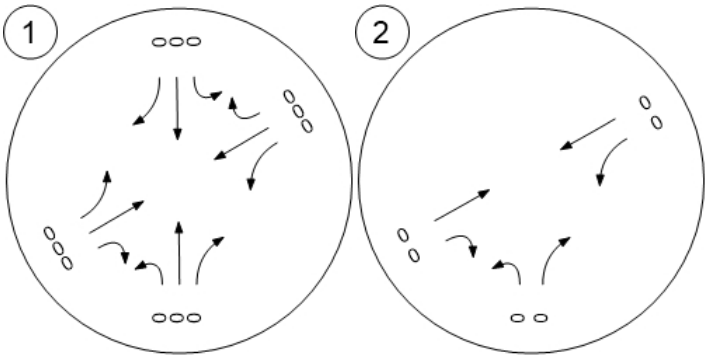
Traffic Volume - In-Process Volume


Attachment: Gordon TIA (2333 : BHS SUP)

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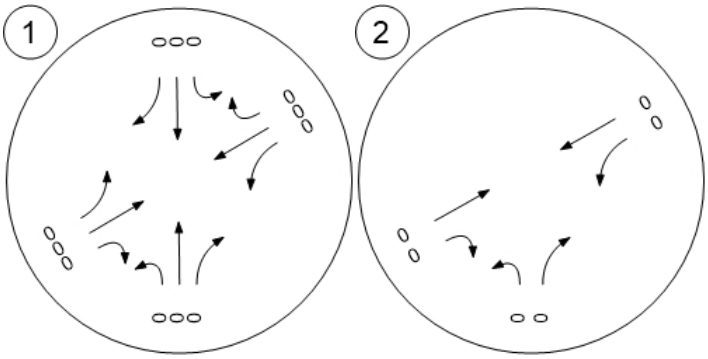
Traffic Volume - Net New Site Trips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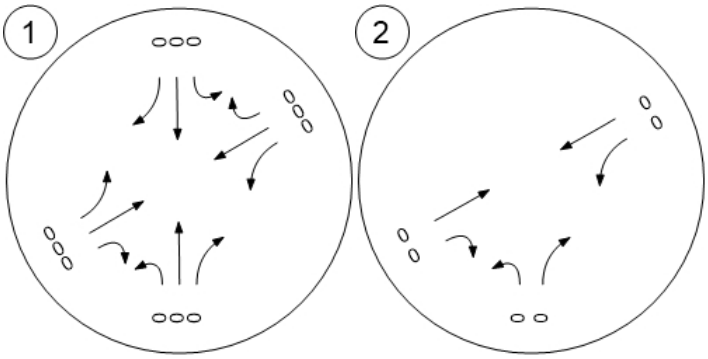
Traffic Volume - Other Volume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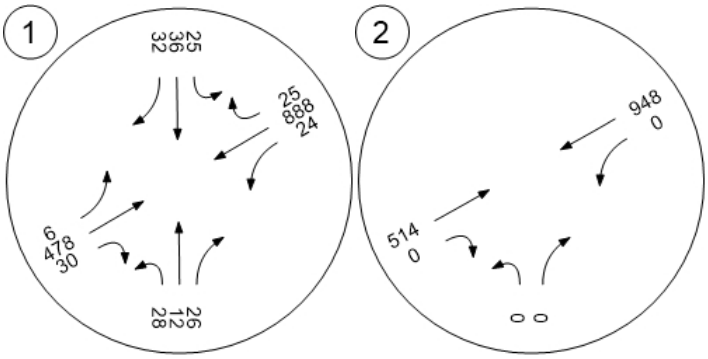
Traffic Volume - Future Total Volume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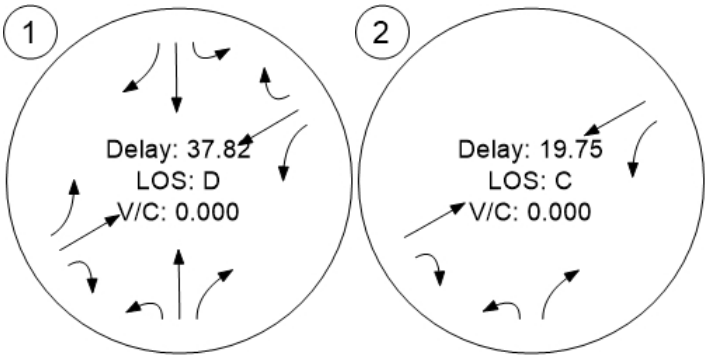
Traffic Conditions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Vistro File: E:\...\Bissonett at Avenue B.vistro
Report File: E:\...\Build Out.pdf

Scenario 2 Build Ou
7/6/2017

**Intersection Analysis Summary**

| ID | Intersection Name | Control Type | Method | Worst Mvmt | V/C | Delay (s/veh) | LOS |
|---|---|---|---|---|---|---|---|
| 1 | Bissonet at Avenue B | Signalized | HCM 6th Edition | SB Thru | 0.000 | 41.0 | D |
| 2 | Bissonnet Street at Driveway | Two-way stop | HCM 6th Edition | NB Left | 0.249 | 27.8 | D |

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Attachment: Gordon TIA (2333 : BHS SUP)

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**Intersection Level Of Service Report**
**Intersection 1: Bissonet at Avenue B**

| | | | |
|---|---|---|---|
| Control Type: | Signalized | Delay (sec / veh): | 41.0 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | D |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.000 |

**Intersection Setup**

| Name | Avenue B | | | Avenue B | | | Bissonnett St | | | Bissonet St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | |
| Lane Configuration | | | | | | | | | | | | |
| Turning Movement | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 250.00 | 100.00 | 100.00 | 250.00 | 100.00 | 100.00 |
| Speed [mph] | 30.00 | | | 30.00 | | | 30.00 | | | 30.00 | | |
| Grade [%] | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | | |
| Curb Present | No | | | No | | | No | | | No | | |
| Crosswalk | Yes | | | Yes | | | Yes | | | Yes | | |

**Volumes**

| Name | Avenue B | | | Avenue B | | | Bissonnett St | | | Bissonet St | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 4 | 0 | 0 | 0 | 0 | 4 | 4 | 26 | 4 | 0 | 26 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Right-Turn on Red Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 32 | 12 | 26 | 25 | 36 | 36 | 10 | 504 | 34 | 24 | 914 | 25 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 8 | 3 | 7 | 6 | 9 | 9 | 3 | 126 | 9 | 6 | 229 | 6 |
| Total Analysis Volume [veh/h] | 32 | 12 | 26 | 25 | 36 | 36 | 10 | 504 | 34 | 24 | 914 | 25 |
| Presence of On-Street Parking | No | | No | No | | No | No | | No | No | | No |
| On-Street Parking Maneuver Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Local Bus Stopping Rate [/h] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| v_do, Outbound Pedestrian Volume crossing | 0 | | | 0 | | | 0 | | | 0 | | |
| v_di, Inbound Pedestrian Volume crossing m | 0 | | | 0 | | | 0 | | | 0 | | |
| v_co, Outbound Pedestrian Volume crossing | 0 | | | 0 | | | 0 | | | 0 | | |
| v_ci, Inbound Pedestrian Volume crossing mi | 0 | | | 0 | | | 0 | | | 0 | | |
| v_ab, Corner Pedestrian Volume [ped/h] | 0 | | | 0 | | | 0 | | | 0 | | |
| Bicycle Volume [bicycles/h] | 0 | | | 0 | | | 0 | | | 0 | | |

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**Intersection Settings**

| | |
|---|---|
| Located in CBD | Yes |
| Signal Coordination Group | - |
| Cycle Length [s] | 90 |
| Coordination Type | Time of Day Pattern Isolated |
| Actuation Type | Fixed time |
| Offset [s] | 0.0 |
| Offset Reference | LeadGreen |
| Permissive Mode | SingleBand |
| Lost time [s] | 0.00 |

**Phasing & Timing**

| Control Type | Permiss | Permiss | Permiss | Permiss | Permiss | Permiss | Protecte | Permiss | Permiss | Protecte | Permiss | Permiss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal group | 0 | 2 | 0 | 0 | 6 | 0 | 7 | 4 | 0 | 3 | 8 | 0 |
| Auxiliary Signal Groups | | | | | | | | | | | | |
| Lead / Lag | - | - | - | - | - | - | Lead | - | - | Lead | - | - |
| Minimum Green [s] | 0 | 5 | 0 | 0 | 5 | 0 | 5 | 5 | 0 | 5 | 5 | 0 |
| Maximum Green [s] | 0 | 20 | 0 | 0 | 20 | 0 | 15 | 55 | 0 | 15 | 55 | 0 |
| Amber [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| All red [s] | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 |
| Split [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vehicle Extension [s] | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 | 3.0 | 3.0 | 0.0 |
| Walk [s] | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Pedestrian Clearance [s] | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| Rest In Walk | | No | | | No | | | No | | | No | |
| I1, Start-Up Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| I2, Clearance Lost Time [s] | 0.0 | 2.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 |
| Minimum Recall | | No | | | No | | No | No | | No | No | |
| Maximum Recall | | No | | | No | | No | No | | No | No | |
| Pedestrian Recall | | No | | | No | | No | No | | No | No | |
| Detector Location [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector Length [ft] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Exclusive Pedestrian Phase**

| | |
|---|---|
| Pedestrian Signal Group | 0 |
| Pedestrian Walk [s] | 0 |
| Pedestrian Clearance [s] | 0 |

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**Lane Group Calculations**

| Lane Group | C | C | L | C | C | L | C | C |
|---|---|---|---|---|---|---|---|---|
| C, Cycle Length [s] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| L, Total Lost Time per Cycle [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l1_p, Permitted Start-Up Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| l2, Clearance Lost Time [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| g_i, Effective Green Time [s] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| g / C, Green / Cycle | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| (v / s)_i Volume / Saturation Flow Rate | 0.00 | 0.00 | 0.02 | 0.16 | 0.16 | 0.03 | 0.28 | 0.28 |
| s, saturation flow rate [veh/h] | 0 | 0 | 484 | 1683 | 1646 | 705 | 1683 | 1667 |
| c, Capacity [veh/h] | 58 | 50 | 80 | 0 | 0 | 80 | 0 | 0 |
| d1, Uniform Delay [s] | 45.00 | 45.00 | 45.00 | 0.00 | 0.00 | 45.00 | 0.00 | 0.00 |
| k, delay calibration | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| I, Upstream Filtering Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| d2, Incremental Delay [s] | 182.10 | 482.03 | 3.19 | 0.00 | 0.00 | 9.36 | 0.00 | 0.00 |
| d3, Initial Queue Delay [s] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rp, platoon ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PF, progression factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Lane Group Results**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X, volume / capacity | 1.20 | 1.93 | 0.13 | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 |
| d, Delay for Lane Group [s/veh] | 227.10 | 527.03 | 48.19 | 0.00 | 0.00 | 54.36 | 0.00 | 0.00 |
| Lane Group LOS | F | F | D | A | A | D | A | A |
| Critical Lane Group | No | No | No | No | No | No | No | No |
| 50th-Percentile Queue Length [veh] | 4.40 | 7.93 | 0.30 | 0.00 | 0.00 | 0.76 | 0.00 | 0.00 |
| 50th-Percentile Queue Length [ft] | 109.91 | 198.19 | 7.42 | 0.00 | 0.00 | 18.94 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [veh] | 7.83 | 12.55 | 0.53 | 0.00 | 0.00 | 1.36 | 0.00 | 0.00 |
| 95th-Percentile Queue Length [ft] | 195.87 | 313.63 | 13.35 | 0.00 | 0.00 | 34.09 | 0.00 | 0.00 |

**Movement, Approach, & Intersection Results**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 227.10 | 227.10 | 227.10 | 527.03 | 527.03 | 527.03 | 48.19 | 0.00 | 0.00 | 54.36 | 0.00 | 0.00 |
| Movement LOS | F | F | F | F | F | F | D | A | A | D | A | A |
| d_A, Approach Delay [s/veh] | 227.10 | | | 527.03 | | | 0.88 | | | 1.35 | | |
| Approach LOS | F | | | F | | | A | | | A | | |
| d_I, Intersection Delay [s/veh] | 41.00 | | | | | | | | | | | |
| Intersection LOS | D | | | | | | | | | | | |
| Intersection V/C | 0.000 | | | | | | | | | | | |

**Other Modes**

| | | | | |
|---|---|---|---|---|
| g_Walk,mi, Effective Walk Time [s] | 9.0 | 9.0 | 9.0 | 9.0 |
| M_corner, Corner Circulation Area [ft²/ped] | 0.00 | 0.00 | 0.00 | 0.00 |
| M_CW, Crosswalk Circulation Area [ft²/ped] | 0.00 | 0.00 | 0.00 | 0.00 |
| d_p, Pedestrian Delay [s] | 36.45 | 36.45 | 36.45 | 36.45 |
| I_p,int, Pedestrian LOS Score for Intersection | 1.796 | 1.787 | 2.645 | 2.633 |
| Crosswalk LOS | A | A | B | B |
| s_b, Saturation Flow Rate of the bicycle lane | 2000 | 2000 | 2000 | 2000 |
| c_b, Capacity of the bicycle lane [bicycles/h] | 0 | 0 | 0 | 0 |
| d_b, Bicycle Delay [s] | 45.00 | 45.00 | 45.00 | 45.00 |
| I_b,int, Bicycle LOS Score for Intersection | 1.675 | 1.720 | 2.012 | 2.354 |

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| | | | | |
|---|---|---|---|---|
| Bicycle LOS | A | A | B | B |

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**Intersection Level Of Service Report**
**Intersection 2: Bissonnet Street at Driveway**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 27.8 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | D |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.249 |

**Intersection Setup**

| Name | Dwy | | Bissonnet St | | Bissonnett St | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Northeastbound | | Southwestbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Left | Right | Thru | Right | Left | Thru |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 1 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 250.00 | 100.00 |
| Speed [mph] | 30.00 | | 30.00 | | 30.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | Yes | | Yes | | Yes | |

**Volumes**

| Name | Dwy | | Bissonnet St | | Bissonnett St | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 0 | 0 | 514 | 0 | 0 | 948 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 51 | 34 | 0 | 51 | 34 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 51 | 34 | 514 | 51 | 34 | 948 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 13 | 9 | 129 | 13 | 9 | 237 |
| Total Analysis Volume [veh/h] | 51 | 34 | 514 | 51 | 34 | 948 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |

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**Intersection Settings**

| | | | |
|---|---|---|---|
| Priority Scheme | Stop | Free | Free |
| Flared Lane | No | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | No | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**Movement, Approach, & Intersection Results**

| | | | | | | |
|---|---|---|---|---|---|---|
| V/C, Movement V/C Ratio | 0.25 | 0.05 | 0.01 | 0.00 | 0.03 | 0.01 |
| d_M, Delay for Movement [s/veh] | 27.75 | 15.24 | 0.00 | 0.00 | 8.72 | 0.00 |
| Movement LOS | D | C | A | A | A | A |
| 95th-Percentile Queue Length [veh] | 1.21 | 1.21 | 0.00 | 0.00 | 0.11 | 0.00 |
| 95th-Percentile Queue Length [ft] | 30.13 | 30.13 | 0.00 | 0.00 | 2.63 | 0.00 |
| d_A, Approach Delay [s/veh] | 22.74 | | 0.00 | | 0.30 | |
| Approach LOS | C | | A | | A | |
| d_I, Intersection Delay [s/veh] | 1.37 | | | | | |
| Intersection LOS | D | | | | | |

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Report File: E:\...\Build Out.pdf

Scenario 2 Build Ou
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## Turning Movement Volume: Summary

| ID | Intersection Name | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 1 | Bissonet at Avenue B | 32 | 12 | 26 | 25 | 36 | 36 | 10 | 504 | 34 | 24 | 914 | 25 | 1678 |

| ID | Intersection Name | Northbound | | Northeastbound | | Southwestbound | | Total Volume |
|---|---|---|---|---|---|---|---|---|
| | | Left | Right | Thru | Right | Left | Thru | |
| 2 | Bissonnet Street at Driveway | 51 | 34 | 514 | 51 | 34 | 948 | 1632 |

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## Turning Movement Volume: Detail

| ID | Intersection Name | Volume Type | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 1 | Bissonet at Avenue B | Final Base | 28 | 12 | 26 | 25 | 36 | 32 | 6 | 478 | 30 | 24 | 888 | 25 | 1610 |
| | | Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - |
| | | In Process | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Net New Trips | 4 | 0 | 0 | 0 | 0 | 4 | 4 | 26 | 4 | 0 | 26 | 0 | 68 |
| | | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | **Future Total** | **32** | **12** | **26** | **25** | **36** | **36** | **10** | **504** | **34** | **24** | **914** | **25** | **1678** |

| ID | Intersection Name | Volume Type | Northbound | | Northeastbound | | Southwestbound | | Total Volume |
|---|---|---|---|---|---|---|---|---|---|
| | | | Left | Right | Thru | Right | Left | Thru | |
| 2 | Bissonnet Street at Driveway | Final Base | 0 | 0 | 514 | 0 | 0 | 948 | 1462 |
| | | Growth Rate | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - |
| | | In Process | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Net New Trips | 51 | 34 | 0 | 51 | 34 | 0 | 170 |
| | | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | **Future Total** | **51** | **34** | **514** | **51** | **34** | **948** | **1632** |

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## Fair Share Volumes

| Intersection 1: Bissonet at Avenue B | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total |
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 6: zone | 4 | 0 | 0 | 0 | 0 | 4 | 4 | 26 | 4 | 0 | 26 | 0 | 68 |
| Site-Generated Trips | 4 | 0 | 0 | 0 | 0 | 4 | 4 | 26 | 4 | 0 | 26 | 0 | |
| Future Total Volume | 32 | 12 | 26 | 25 | 36 | 36 | 10 | 504 | 34 | 24 | 914 | 25 | |

| Intersection 2: Bissonnet Street at Driveway | | | | | | | |
|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | Northeastbound | | Southwestbound | | Total |
| | Left | Right | Thru | Right | Left | Thru | |
| 6: zone | 51 | 34 | 0 | 51 | 34 | 0 | 170 |
| Site-Generated Trips | 51 | 34 | 0 | 51 | 34 | 0 | |
| Future Total Volume | 51 | 34 | 514 | 51 | 34 | 948 | |

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## Fair Share % of Net New Site

| Intersection 1: Bissonet at Avenue B | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total |
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 6: zone | 100% | 0% | 0% | 0% | 0% | 100% | 100% | 100% | 100% | 0% | 100% | 0% | 100% |
| Total | 100% | 0% | 0% | 0% | 0% | 100% | 100% | 100% | 100% | 0% | 100% | 0% | |

| Intersection 2: Bissonnet Street at Driveway | | | | | | | |
|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | Northeastbound | | Southwestbound | | Total |
| | Left | Right | Thru | Right | Left | Thru | |
| 6: zone | 100% | 100% | 0% | 100% | 100% | 0% | 100% |
| Total | 100% | 100% | 0% | 100% | 100% | 0% | |

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## Fair Share % of Future Total

| Intersection 1: Bissonet at Avenue B | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | | Southbound | | | Northeastbound | | | Southwestbound | | | Total |
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | |
| 6: zone | 12.5% | 0% | 0% | 0% | 0% | 11.11% | 40% | 5.16% | 11.76% | 0% | 2.84% | 0% | 4.05% |
| Total | 12.5% | 0% | 0% | 0% | 0% | 11.11% | 40% | 5.16% | 11.76% | 0% | 2.84% | 0% | |

| Intersection 2: Bissonnet Street at Driveway | | | | | | | |
|---|---|---|---|---|---|---|---|
| Zone ID: Name | Northbound | | Northeastbound | | Southwestbound | | Total |
| | Left | Right | Thru | Right | Left | Thru | |
| 6: zone | 100% | 100% | 0% | 100% | 100% | 0% | 10.42% |
| Total | 100% | 100% | 0% | 100% | 100% | 0% | |

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Signal Warrants Report For Intersection 2: Bissonnet Street at Driveway

## Warrants Summary

| Warrant | Name | Met? |
|---|---|---|
| #1 | Eight Hour Vehicular Volume | No |
| #2 | Four Hour Vehicular Volume | No |
| #3 | Peak Hour | No |

## Intersection Warrants Parameters

| | |
|---|---|
| Major Approaches | NE, SW |
| Minor Approaches | S |
| Speed > 40mph | No |
| Population < 10,000 | No |
| Warrant Factor | 100% |

## Warrant Analysis Traffic Volumes

| Hour | Major Streets | | Minor Streets |
|---|---|---|---|
| | NE | SW | S |
| 1 | 982 | 565 | 85 |
| 2 | 943 | 542 | 82 |
| 3 | 923 | 531 | 80 |
| 4 | 786 | 452 | 68 |
| 5 | 746 | 429 | 65 |
| 6 | 668 | 384 | 58 |
| 7 | 619 | 356 | 54 |
| 8 | 589 | 339 | 51 |
| 9 | 471 | 271 | 41 |
| 10 | 442 | 254 | 38 |
| 11 | 442 | 254 | 38 |
| 12 | 422 | 243 | 37 |
| 13 | 383 | 220 | 33 |
| 14 | 354 | 203 | 31 |
| 15 | 354 | 203 | 31 |
| 16 | 344 | 198 | 30 |
| 17 | 196 | 113 | 17 |
| 18 | 108 | 62 | 9 |
| 19 | 98 | 57 | 9 |
| 20 | 39 | 23 | 3 |
| 21 | 29 | 17 | 3 |
| 22 | 29 | 17 | 3 |
| 23 | 20 | 11 | 2 |
| 24 | 20 | 11 | 2 |

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## Warrant Analysis by Hour

| Hour | Major Lanes | | Minor Lanes | | Warrant 1 Condition A | | | | Warrant 1 Condition B | | | | Warrant 2 | Warrant 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Volume | Number | Volume | 100% | 80% | 70% | 56% | 100% | 80% | 70% | 56% | | Condition B |
| 1 | 5 | 1547 | 1 | 85 | No | No | No | Yes | Yes | Yes | Yes | Yes | Yes | No |
| 2 | 5 | 1485 | 1 | 82 | No | No | No | No | Yes | Yes | Yes | Yes | Yes | No |
| 3 | 5 | 1454 | 1 | 80 | No | No | No | No | Yes | Yes | Yes | Yes | No | No |
| 4 | 5 | 1238 | 1 | 68 | No | No | No | No | No | Yes | Yes | Yes | No | No |
| 5 | 5 | 1175 | 1 | 65 | No | No | No | No | No | Yes | Yes | Yes | No | No |
| 6 | 5 | 1052 | 1 | 58 | No | No | No | No | No | No | Yes | Yes | No | No |
| 7 | 5 | 975 | 1 | 54 | No | No | No | No | No | No | Yes | Yes | No | No |
| 8 | 5 | 928 | 1 | 51 | No | No | No | No | No | No | No | Yes | No | No |
| 9 | 5 | 742 | 1 | 41 | No | No | No | No | No | No | No | No | No | No |
| 10 | 5 | 696 | 1 | 38 | No | No | No | No | No | No | No | No | No | No |
| 11 | 5 | 696 | 1 | 38 | No | No | No | No | No | No | No | No | No | No |
| 12 | 5 | 665 | 1 | 37 | No | No | No | No | No | No | No | No | No | No |
| 13 | 5 | 603 | 1 | 33 | No | No | No | No | No | No | No | No | No | No |
| 14 | 5 | 557 | 1 | 31 | No | No | No | No | No | No | No | No | No | No |
| 15 | 5 | 557 | 1 | 31 | No | No | No | No | No | No | No | No | No | No |
| 16 | 5 | 542 | 1 | 30 | No | No | No | No | No | No | No | No | No | No |
| 17 | 5 | 309 | 1 | 17 | No | No | No | No | No | No | No | No | No | No |
| 18 | 5 | 170 | 1 | 9 | No | No | No | No | No | No | No | No | No | No |
| 19 | 5 | 155 | 1 | 9 | No | No | No | No | No | No | No | No | No | No |
| 20 | 5 | 62 | 1 | 3 | No | No | No | No | No | No | No | No | No | No |
| 21 | 5 | 46 | 1 | 3 | No | No | No | No | No | No | No | No | No | No |
| 22 | 5 | 46 | 1 | 3 | No | No | No | No | No | No | No | No | No | No |
| 23 | 5 | 31 | 1 | 2 | No | No | No | No | No | No | No | No | No | No |
| 24 | 5 | 31 | 1 | 2 | No | No | No | No | No | No | No | No | No | No |
| Hours Met | | | | | 0 | 0 | 0 | 1 | 3 | 5 | 7 | 8 | 2 | 0 |

## Warrant 3 Condition A

| | |
|---|---|
| Orientation | S |
| Total Stopped Delay Per Vehicle on Minor Approach (s) | 22.7 |
| Number of Lanes on Minor Street Approach | 1 |
| VehicleHours of Stopped Delay on Minor Approach ([h]h:mm) | 0:32 |
| Delay Condition Met | No |
| Volume on Minor Street Approach During Same Hour | 85 |
| High Minor Volume Condition Met | No |
| Total Entering Volume on All Approaches During Same Hour | 1632 |
| Number of Approaches on Intersection | 3 |
| Total Volume Condition Met | Yes |
| Warrant Met for Approach | No |
| **Warrant Met for Intersection** | **No** |

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7/6/2017

## Trip Generation summary

### Added Trips

| Zone ID: Name | Land Use variables | Code | Ind. Var. | Rate | Quantity | % In | % Out | Trips In | Trips Out | Total Trips | % of Total Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6: zone | | | | 1.000 | 0.000 | 50.00 | 50.00 | 85 | 85 | 170 | 100.00 |
| | | | | | **Added Trips Total** | | | **85** | **85** | **170** | **100.00** |

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Report File: E:\...\Build Out.pdf

Scenario 2 Build Out
7/6/2017

## Trip Distribution summary

| Zone / Gate | Zone 6: zone | | | |
|---|---|---|---|---|
| | To zone: | | From zone: | |
| | Share % | Trips | Share % | Trips |
| 7: Gate | 60.00 | 51 | 60.00 | 51 |
| 8: Gate | 5.00 | 4 | 5.00 | 4 |
| 9: Gate | 30.00 | 26 | 30.00 | 26 |
| 10: Gate | 5.00 | 4 | 5.00 | 4 |
| **Total** | **100.00** | **85** | **100.00** | **85** |

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Study Intersections


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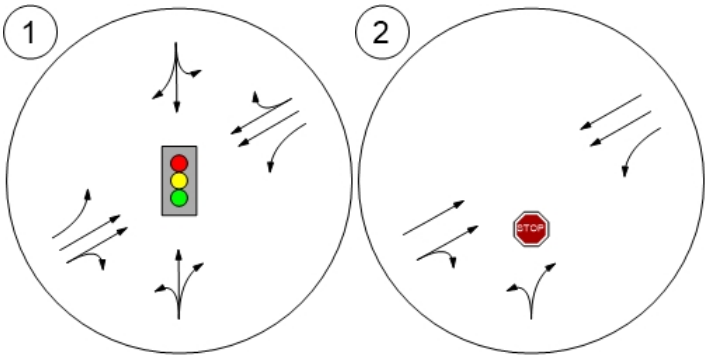
Lane Configuration and Traffic Control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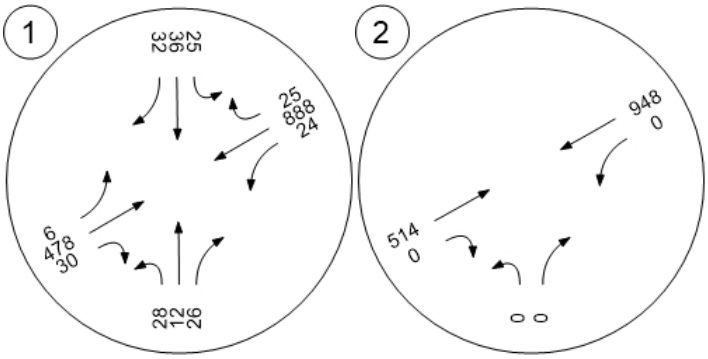
Traffic Volume - Base Volume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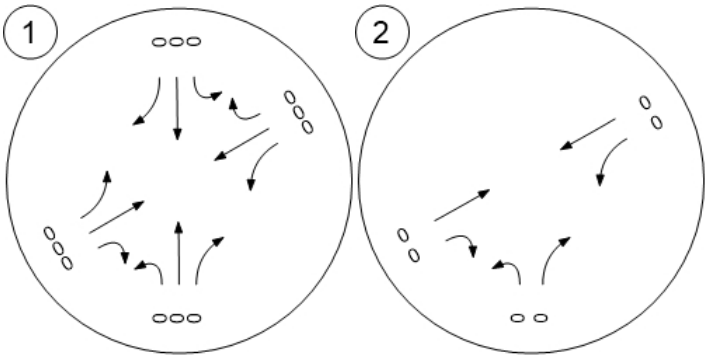
Traffic Volume - In-Process Volume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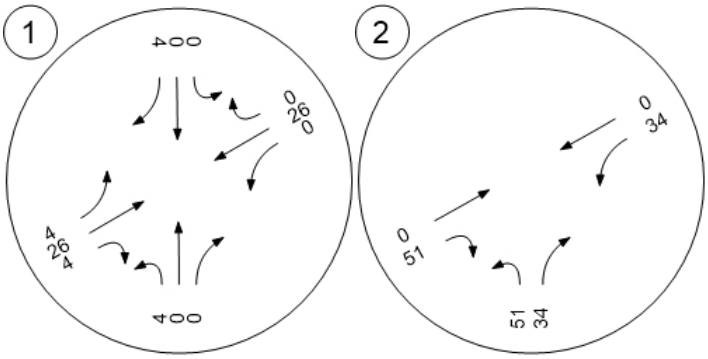
Traffic Volume - Net New Site Trips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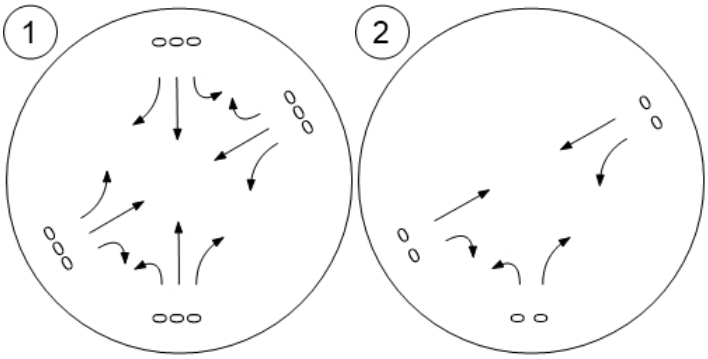
Traffic Volume - Other Volume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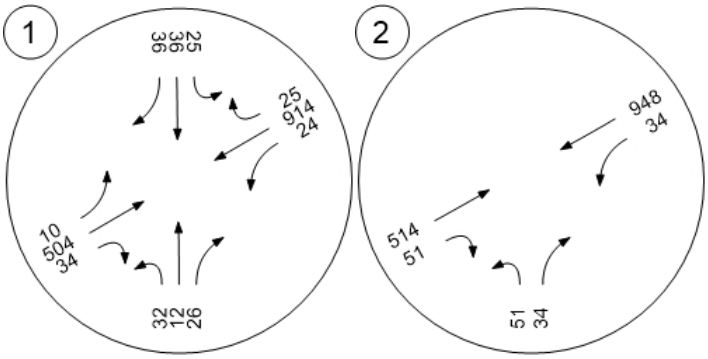
Traffic Volume - Future Total Volume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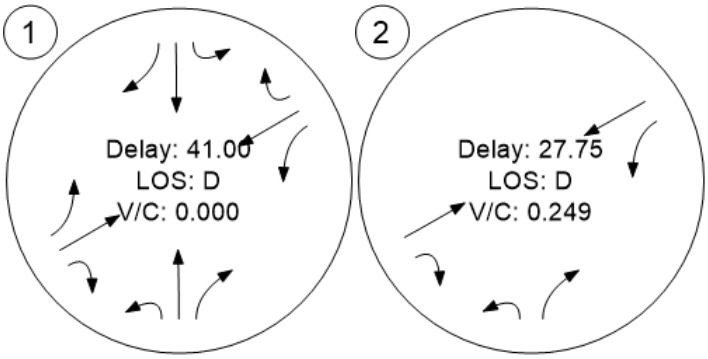
Traffic Conditions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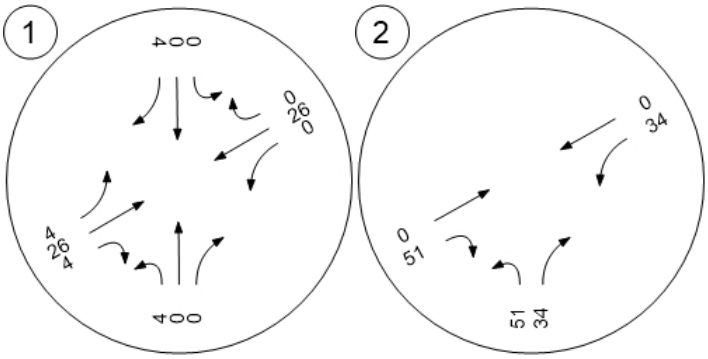
Fair Share - Fair Share Volumes - Zone 6: zone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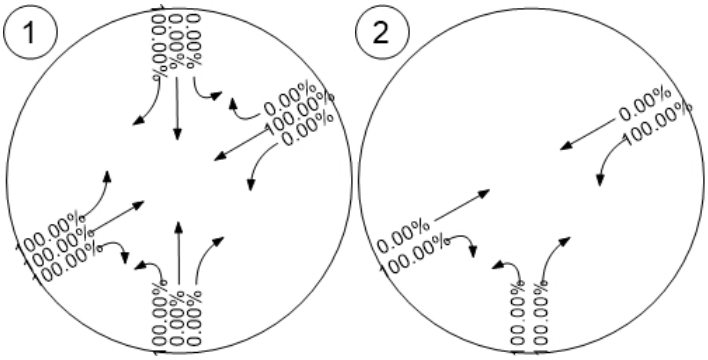
Fair Share - Fair Share % of Net New Site - Zone 6: zone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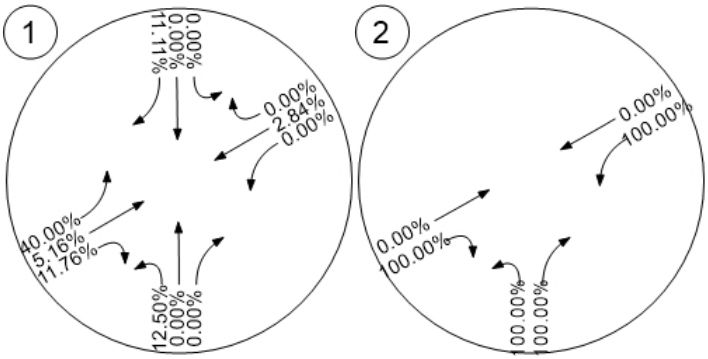
Fair Share - Fair Share % of Future Total - Zone 6: zone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stewart title

**Stan Baugh**
Title Examiner

Stewart Title Company
10720 West Sam Houston Pkwy North
Suite 200
Houston, TX 77064
(713) 625-8743 Phone
Fax
stan.baugh@stewart.com

June 14, 2017

City Planning Commission
City Hall
900 Bagby
Houston, TX 77002

File No.: 1790300CPL

To Whom It May Concern:

This company certifies that a diligent search of the Real Property Records of Stewart Title Company's abstract plant has been made, as to the herein described property, and as of 8:00 A.M. on the 5th day of June, 2017, the last Deed that we find, of record, reflects the record owner to be:
HOUSTON INDEPENDENT SCHOOL DISTRICT

Legal Description:

All of BELLAIRE HIGH SCHOOL SUBDIVISION, a subdivision in Harris County, Texas according to the map or plat thereof recorded under Film Code No. 637244 of the Map Records of Harris County, Texas.

Subject to the following:

1. Restrictions:

Restrictive Covenants as set out in Film Code No. 637244 of the Map Records of Harris County, Texas.

2. Easements/Other Exceptions:

An easement 10 feet wide along the rear property line, and an aerial easement 10 feet wide from a plane 16 feet above the ground upward, located adjacent thereto for the use of public utilities as reflected by instrument recorded under Clerk's File No. 20110147374 of the Real Property Records of Harris County, Texas.

Easements in favor of Houston Lighting and Power Comapny as set forth under Clerk's File Number N-552634 of the Real Property Records of Harris County, Texas.

Subject to 50 foot set back line as shown on the recorded plat.

Any and all Zoning Ordinances or proposed ordinances including those by the City of Bellaire Texas.

3. Liens/Misc:

No liens of record

For information only; The vesting deeds are recorded in Volume 2101 Page 688 and Volume 2086 Page 490

Attachment: City Planning Letter-BHS (2333 : BHS SUP)

of the Deed Records of Harris County, Texas.

City of Houston Ordinance 1999-262, relating to rules, regulations and design standards for development and platting and providing for the establishment of building setback lines. (For Information Only)

No examination has been made as to Abstracts of Judgments, State or Federal Tax Liens, the status of taxes, tax suits or paving assessments.

This letter is issued for platting purposes only. Liability of Stewart Title Company for mistakes or errors in this letter is hereby limited to the cost of said letter.

The letter is issued with the express understanding, evidenced by the acceptance thereof, that Stewart Title Company does not undertake to give or express any opinion as to the validity or effect of the instruments listed, and this letter is neither a guaranty or warranty of title.

Liability hereunder is limited to the amount paid for same. This report is furnished solely as an accommodation to the party requesting same and should not be relied upon, as a warranty or representation as to the title to the property described herein and may not be given to or used by any third party. Stewart Title Company assumes no liability whatsoever for the accuracy of this report, nor for any omission or error with respect hereto. **You agree to release, indemnify and hold harmless Stewart Title Company because of any negligence by Stewart Title Company (whether sole, joint or otherwise) for any claim, loss, liability or damages arising out of this report.** This report is not title insurance. If a policy of title insurance is purchased, any liability thereunder shall be determined solely by the terms of such policy.

Sincerely,
Stewart Title Company

Attachment: City Planning Letter-BHS (2333 : BHS SUP)

stewart title

**Stan Baugh**
Title Examiner

Stewart Title Company
10720 West Sam Houston Pkwy North
Suite 200
Houston, TX 77064
(713) 625-8743 Phone
Fax
stan.baugh@stewart.com

June 21, 2017

File No.: 1790317CPL

To Whom It May Concern:

This company certifies that a diligent search of the Real Property Records of Stewart Title Company's abstract plant has been made, as to the herein described property, and as of 8:00 A.M. on the 10th day of June, 2017, the last Deed that we find, of record, reflects the record owner to be:
HOUSTON INDEPENDENT SCHOOL DISTRICT

Legal Description:

3.188 and 2.754 acre of land, more or less out of and part of Lots 2 in Block 4 of WESTMORELAND FARMS AMENDED FIRST SUBDIVISION, An addition in Harris County, Texas according to the Map or Plat as recorded in Volume 3 Page 60 of the Map Records and and being all the same tract of land as described in deeds recorded in Volume 2399 Page 737 and in Volume 2416 Page 97 of the Deed Records of Harris County, Texas.

Subject to the following:

1. Restrictions:

None of Record

2. Easements/Other Exceptions:

A Sanitary Sewer easement as reflected by instrument recorded in Volume 2469 Page 608 of the Deed Records of Harris County, Texas.

Any and all Zoning Ordinances or proposed ordinances including those by the City of Bellaire Texas.

3. Liens/Misc:

No liens of record

City of Houston Ordinance 1999-262, relating to rules, regulations and design standards for development and platting and providing for the establishment of building setback lines. (For Information Only)

No examination has been made as to Abstracts of Judgments, State or Federal Tax Liens, the status of taxes, tax suits or paving assessments.

Attachment: City Planning Letter-6300 Ave B (2333 : BHS SUP)

This letter is issued for platting purposes only. Liability of Stewart Title Company for mistakes or errors in this letter is hereby limited to the cost of said letter.

The letter is issued with the express understanding, evidenced by the acceptance thereof, that Stewart Title Company does not undertake to give or express any opinion as to the validity or effect of the instruments listed, and this letter is neither a guaranty or warranty of title.

Liability hereunder is limited to the amount paid for same. This report is furnished solely as an accommodation to the party requesting same and should not be relied upon, as a warranty or representation as to the title to the property described herein and may not be given to or used by any third party. Stewart Title Company assumes no liability whatsoever for the accuracy of this report, nor for any omission or error with respect hereto. **You agree to release, indemnify and hold harmless Stewart Title Company because of any negligence by Stewart Title Company (whether sole, joint or otherwise) for any claim, loss, liability or damages arising out of this report.** This report is not title insurance. If a policy of title insurance is purchased, any liability thereunder shall be determined solely by the terms of such policy.

Sincerely,
Stewart Title Company

Attachment: City Planning Letter-6300 Ave B (2333 : BHS SUP)

**Planning and Zoning Commission**
Council Chamber, First Floor of City Hall
Bellaire, TX 77401-4411

Meeting: 08/10/17 06:00 PM
Department: Development Services
Category: Report
Department Head: ChaVonne Sampson
DOC ID: 2351

**SCHEDULED**
**ACTION ITEM (ID # 2351)**

## Item Title:

Approval of the Commission's Report and Recommendation to City Council regarding the request for Specific Use Permits at 5100 Maple Street and 6300 Avenue B.

## Background/Summary:

Attached is a draft report as a starting point for the Commission to finalize its recommendations to City Council on a request for the granting of specific use permits at 5100 Maple Street and 6300 Avenue B.

**ATTACHMENTS:**

- Report & Recommendation-BHS (PDF)

# CITY OF BELLAIRE
## Planning and Zoning Commission

August 11, 2017

To: Mayor and City Council
From: Dirk Stiggins, Chairman, Planning & Zoning Commission
CC: ChaVonne Sampson, Interim Director of Development Services
Subject: Report and Recommendation on an application for two (2) Specific Use Permits for Houston Independent School District/Bellaire High School

On Tuesday, June 13, 2017, the Planning & Zoning Commission held a public hearing for the purpose of reviewing an application filed by Steven Gee, Project Manager, Houston Independent School District (HISD), for a Specific Use Permit, as required by Chapter 24, Planning and Zoning, Section 24-531 C. (2) a), for the re-construction and operation of Bellaire High School, at 5100 Maple Street, within the R-1 Residential Zoning District; and for a second Specific Use Permit, as required by Section 24-532 B. (2) a), for the re-purposing of Gordon Elementary School/Mandarin Chinese Language Immersion Magnet School as Bellaire High School's baseball practice facility, at 6300 Avenue B, within the R-3 Residential Zoning District.

Notifications regarding the public hearing were mailed out to all properties within 500 feet of the two properties in question. Any and all persons desiring to be heard in connection with the Specific Use Permit application were invited to speak before the Commission.

Twenty six (26) members of the public spoke, and one (1) written comment was submitted during the public hearing. Additionally, six (6) written comments had been provided prior to the public hearing, and were included in the Commission's agenda packet.

Concerns raised by the public included:

- The location of the parking garage's ingress and egress points/increase in traffic through the residential neighborhood
- The height allowance for the buildings that are in close proximity to residential properties
- Emergency vehicle access during the peak morning and afternoon hours/safety & security of surrounding residents
- The increase of students enrolled at the high school
- Increase in drainage issues
- Loss of mature trees and other vegetation at former Gordon Elementary site/impact of the baseball field on Russ Pitman Park
- Demolition of the former Gordon Elementary School, when there is a need for more schools in the area.
- Frequency of use of the baseball field/lighting/speakers

Attachment: Report & Recommendation-BHS (2351 : Report & Recommendation-BHS)

Questions from the Commission included:

- Can the parking garage's egress point be re-located to South Rice Avenue?
- Will any traffic signals be installed surrounding the site?
- How will the school promote parking in the parking garage in order to control/avoid the continuation of on-street parking?
- How does HISD plan to reduce the number of students enrolled in Bellaire High School?
- Is a baseball field an efficient use for the property at 6300 Avenue B, when there is a demand for more schools in the area?
- How often will the baseball field be in use, and will there be lighting installed?
- What type of detention system will be installed, and will it be adequate for the area?

In an effort to address the comments/concerns made during the public hearing, HISD and PBK Architects advised that the site plan would most likely need to be modified. Specifically, more research would be done to determine whether the egress of the parking garage could be re-located to South Rice Avenue without negatively impacting the traffic pattern. In addition, the applicant also addressed many other concerns to the best of their ability, including the installation of traffic signals around the site, drainage, student enrollment, the demand for more schools in the area, and the frequency of use of the baseball field. HISD also advised that there are currently no plans to install lighting at 6300 Avenue B. City staff reiterated that the Fire Marshal has no concerns regarding the access of emergency vehicles on or around the property.

**CONSIDERATION**

Due to the revisions made to the site plans, which also required an updated Traffic Impact Analysis, consideration of the application was pushed to the Commission's August 10, 2017 meeting.

_____
_____
_____
_____
_____
_____

**RECOMMENDATION**

The Commission found that the application was _____ with the criteria and standards set forth in Section 24-531 and Section 24-532 of the City of Bellaire Code of Ordinances, and voted _____ to recommend _____ of the Specific Use Permits to City Council, with the following conditions:

1.
2.
3.
4.

Attachment: Report & Recommendation-BHS (2351 : Report & Recommendation-BHS)

**VOTE OF THE COMMISSION**

**Members present and voting FOR this recommendation to City Council:**

**Members present and voting AGAINST this recommendation to City Council:**

**Members absent:**

Attachment: Report & Recommendation-BHS (2351 : Report & Recommendation-BHS)

**Planning and Zoning Commission**
Council Chamber, First Floor of City Hall
Bellaire, TX 77401-4411

Meeting: 08/10/17 06:00 PM
Department: Development Services
Category: Policy
Department Head: ChaVonne Sampson
DOC ID: 2352

**SCHEDULED**
**ACTION ITEM (ID # 2352)**

## Item Title:

Amendment to the Planning and Zoning Commission's 2017-2018 Rules of Procedure to reflect the temporary change in the Regular Meeting schedule.

## Background/Summary:

Due to construction of the new City facilities, Regular Meetings of the Planning and Zoning Commission have been rescheduled for the second Thursday of each month. Therefore, the Rules of Procedure need to be temporarily amended to reflect this change.

A redline of the newly adopted Rules of Procedure is attached.

**ATTACHMENTS:**

- 2017-2018 Rules of Procedure (PDF)

# Rules of Procedure

# Planning and Zoning Commission

# City of Bellaire, Texas

# 2017-2018 Term

**Adopted: July 2017**
**Amended: ~~October 2015~~August 2017**

Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

# Table of Contents



Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

# Article I Purpose and Enabling Authority

## Section A General

The Planning and Zoning Commission of the City of Bellaire, Texas (the"Commission") is an advisory body to the City Council regarding Zoning and subdivision regulations. The Commission is also responsible for the review and approval/rejection of Plats and for making recommendations to the City Council regarding plans for the physical development of the City.

The existence of the Commission is governed by state and local laws. These include, but are not limited to:

- Texas Local Government Code, Chapter 171, *Regulation of Conflicts of Interest of Officers of Municipalities, Counties and Certain Other Governments*
- Texas Local Government Code, Chapter 211, *Municipal Zoning Authority*
- Texas Local Government Code, Chapter 212, *Municipal Regulation of Subdivisions and Property Development*
- Texas Government Code, Chapter 551, *Open Meetings Law*
- Texas Government Code, Chapter 552, *Public Information*
- Bellaire Code of Ordinances, Chapter 2, Article VI, *Code of Ethics*
- Bellaire Code of Ordinances, Chapter 2, Article VII, *Boards, Commissions and Committees*
- Bellaire Code of Ordinances, Chapter 23.5, *Land Subdivision Regulations*
- Bellaire Code of Ordinances, Chapter 24, *Planning and Zoning*

## Section B Advisory Role

Actions taken by the Commission in its advisory role are in the form of recommendations to the City Council. Such actions include, but are not limited to:

- Responding to requests from the City Council, the Staff Liaison, or City Manager.
- Reviewing the Comprehensive Plan and reporting on such review to the City Council.
- Recommending amendments to the Code of Ordinances concerning matters involving land use regulations and the future growth and regulation of the City.
- Considering Applications brought before the Commission for planned developments, Specific Uses, permitted uses, or other amendments to Zoning regulations or the official Zoning District Map as provided by the Code of Ordinances.
- To identify and explore community needs for such things as, commercial re-development, city beautification projects, and other





Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

planning and development ideas that build on the goals of the Comprehensive Plan, and bring such ideas to the attention of City Council.

- Annually reporting to the City Council the Commission's needs, accomplishments, and recommendations.

In its advisory role, the Commission communicates with the City Council by requesting that the City Manager, Mayor, or any Council Member place an appropriate item on a City Council meeting Agenda and, if warranted, in writing. When appropriate, the Commission should request an opportunity to present information at a regular meeting of the City Council or other appropriate venue. Successive applications by the same party on the same subject matter shall be governed by the Code of Ordinances.

**Section C Administrative Role**

The City Council has specifically delegated exclusive authority to the Commission for the review and approval/rejection of Plats. Actions by the Commission regarding Plats are final and cannot be appealed to the City Council, but may be appealed to other judicial authorities. The authority delegated to the Commission includes, but is not limited to:

- Applications for a preliminary Plat
- Applications for a final Plat
- Applications for a preliminary Replat
- Applications for a final Replat
- Applications for an Amending Plat

The City Council has specifically delegated review and advisory authority to the Commission for Specific Use Permits (SUP), however, final approval of the SUP lies with City Council.

No formal requests for advice or moot questions will be considered by the Commission. Any advice, opinion or information given by any Commissioner or by the Secretary or any other official or employee of the City of Bellaire shall not be binding on the Commission.

# Article II Definitions

**Agenda**

A document listing and describing items of business and other matters to be addressed at a meeting of the Commission, duly established and published in accordance with the Open Meetings Act, Chapter 551 of the Texas Government Code.

**Amending Plat**

A modification of an existing Plat that is controlling over the preceding plat without vacating that plat, pursuant to Texas Local Government Code, Chapter 212. In the case of an Amending Plat governed by Texas Local Government Code, subsections





Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

212.016(a)(7, 9, 10 or 11), such Amending Plat may not amend or remove existing covenants or Deed Restrictions. Notice, a hearing, and the approval of other lot owners are not required for the approval and issuance of an Amending Plat. See also Replat and Plat.

**Applicant**

A person or entity (or the duly appointed agent or representative of a person or entity), that presents to the Commission an Application for action or decision within the authority of the Commission.

**Application**

A request made to the Commission for action or decision within the authority of the Commission that is presented in compliance with the Code of Ordinances and the requirements of the Development Services Department of the City.

**City**

The City of Bellaire, Texas.

**Commissioner**

A person duly appointed by the City Council to serve on the Commission in accordance with Section 24-302 of the Code of Ordinances.

**Committee**

A group appointed by the Chair to address a specific issue of interest to the Commission. Committees may be composed of Commissioners and/or other persons with helpful knowledge or expertise. Committees shall not include any number of Commissioners that would constitute a Quorum of the Commission.

**Comprehensive Plan**

A present statement of policy and a guide for future land use decisions, adopted as an ordinance by the City. See Section 24-401 of the Code of Ordinances; 24-403 (Official Zoning District Map).

**Council Liaison**

A member of City Council, appointed by City Council, to act as a facilitator between the Commission and City Council.

**Current Business**

Any matter that is on the Agenda to be addressed at a Regular Meeting or Special Meeting of the Commission, for consideration and possible action at such meeting.

**Deed Restrictions**

An existing and valid recorded covenant or restriction affecting the use of a property. The Commission may not approve a Replat, or an Amending Plat governed by Texas





Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

Local Government Code, Section 212.016(a)(10), if such approval would result in the amendment or removal of a Deed Restriction.

**Easement**

The lawful right that one person or entity has to use the property of another person or entity, for a specific or general purpose, for a definite or indefinite term, as further defined in Chapter 24 of the Code of Ordinances.

**New Business**

Any matter to be considered for inclusion as Current Business on the Agenda of a future Regular Meeting or Special Meeting of the Commission. No action may be taken on New Business, other than to designate it as Current Business on the Agenda of a future Regular Meeting or Special Meeting of the Commission, to be properly noticed in accordance with the Open Meetings Act, Chapter 551 of the Texas Government Code. New Business may also be designated as the subject of a future Commission Workshop.

**Plat**

A document, which may include a graphic description of a tract of land by metes and bounds, giving the dimensions of all Easements, setbacks, subdivision names, streets, alleys, squares, parks and other public areas, and giving the dimensions of all lots or tracts contained therein, pursuant to Texas Local Government Code, Chapter 212 and the Code of Ordinances. The Commission is not permitted to consider existing covenants or Deed Restrictions when considering a request for approval of a Plat. See also Amending Plat and Replat.

**Public Hearing**

A meeting or an Agenda item on a meeting of the Commission to receive comments of any interested person or entity concerning the following: (i) any amendment to the Code of Ordinances prior to formal recommendation by the Commission to the City Council in the Commission's advisory role; (ii) certain Replats; (iii) any other item of business requiring the use of a Public Hearing; or (iv) any item of business that the Commission deems in its sole discretion to be conducive to the conduct of a Public Hearing.

**Quorum**

A Quorum of the Commission is any four or more Commissioners.

**Regular Meeting**

A meeting of the Commission held pursuant to an Agenda. Regular Meetings of the Commission are held on the second ~~Tuesday~~ Thursday of each month in the Council Chambers of the City, 7008 South Rice Avenue, Bellaire, Texas or at such other location as designated by the Agenda.

If it should be necessary because of the workload that any Regular Meeting be continued to the following day, such a meeting will reconvene on the day following, and this second meeting shall be considered as part of the same session. The Planning and Zoning

Commission shall state the time and location of the second meeting prior to the conclusion of the first meeting.

**Replat**

A proposed modification of an existing Plat pursuant to Texas Local Government Code Chapter 212 and the Code of Ordinances. A Replat may not amend or remove existing covenants or Deed Restrictions. See also Amending Plat and Plat.

**Rules**

These Rules of Procedure of the Commission of the City.

**Special Meeting**

A meeting of the Commission, other than a Regular Meeting, held pursuant to an Agenda.

**Specific Use**

A certain use of land that, because of its nature and existing location, is not a use permitted by right.

**Staff Liaison**

A City staff person appointed by the City Manager of the City in accordance with Section 24-304 of the Code of Ordinances. The Staff Liaison provides assistance to the Commission and is also known as the Zoning Official.

**Workshop**

A meeting of the Commission called for the purpose of discussing a specific issue of interest to the Commission. No Business may be voted upon at a Workshop.

**Zoning**

A power over division of land and its use granted to a City pursuant to Chapter 211, Texas Local Government Code, for the purpose of promoting the public health, safety, morals, and/or general welfare, and protecting and preserving places and areas of historical, cultural, or architectural importance and significance.

**Zoning District**

A geographic division of land by means of land use.

**Zoning Official**

See Staff Liaison.

# Article III Membership / Structure

## Section A Appointment and Removal of Commissioners; Conflicts of Interest

Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

Membership on the Commission is by appointment made by the City Council of the City, pursuant to the Code of Ordinances.

The Commission consists of seven (7) Commissioners. Each Commissioner shall serve for two (2) years. Three (3) Commissioners are appointed in odd numbered years and four (4) in even numbered years. No Commissioner shall be appointed to serve more than three (3) consecutive full terms; any part of a term shall not constitute a full term.

Commissioners may be removed by City Council for cause after being provided with written charges and the opportunity to provide a defense at a City Council meeting in a closed session or, at the option of the Commissioner in question, at a Public Hearing. Vacancies shall be filled by a vote of the City Council, as necessary.

No Commissioner shall vote or participate as a Commissioner in any proceeding before the Commission that involves any matter regarding a business entity or real property in which that Commissioner has a substantial interest. If a substantial interest exists, the affected Commissioner shall disclose the nature and extent to the Commission by affidavit and remove him or herself from any participation in the discussion, deliberations, or action on the matter. The specific rules for determining when a substantial interest exists, and how it must be handled are defined by the following:

- §171.002 and §171.004 of the Texas Local Government Code,
- The Code of Ordinances, Chapter 2, Article VI, Code of Ethics, and
- Code of Ordinances, Chapter 2, Article VII, Division 2, §2-104.

**Section B Officers of the Commission**

The officers of the Commission are the Chair and Vice Chair.

At the first or second Regular Meeting of each year following the regular appointment of Commissioners, a Chair and Vice-Chair shall be elected from among the Commissioners pursuant to the Code of Ordinances. The previous year's Chair shall preside over the election of the Chair, who shall immediately assume his or her duties and preside over the election of the Vice-Chair. .

In the event that either officer shall fail to complete his or her term of service for any reason, a new officer shall be elected to the vacated position at the next Regular Meeting.

**Section C Chair's Duties**

The Chair shall preside over each meeting of the Commission. To this affect the Chair:

- Shall conduct meetings in an orderly, fair, and open manner.
- Shall oversee preparation of the Agenda for each meeting of the Commission as provided in Article IV Section A.

Pursuant to authorizations given by the Commission, the Chair shall:

- Sign Plats





Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

- Submit findings and recommendations of the Commission to be forwarded to the City Council
- Prepare certifications of reasons for approval or denial of Plats requested by interested persons, in accordance with state law
- Correspond with the City Manager, Staff Liaison, Council Liaison, City Council, City Departments, or other boards or commissions as directed by the Commission
- At his or her discretion, request investigation by City staff regarding comments or questions brought by or to the attention of the Commission

**Section D Vice Chair's Duties**

The Vice Chair shall preside in the absence of the Chair. In the event of the absence or disability of the both the Chair and Vice Chair, the Commissioners shall elect an Acting Chair to preside during such absence. The Vice Chair or Acting Chair shall perform all of the acts required of the Chair until his or her return or replacement.

# Article IV Agendas and Meetings

Meetings of the Commission shall be conducted in such a manner as to allow for a fair and orderly examination of the issues before the Commission.

Meetings shall generally be conducted in accordance with parliamentary procedure as set out in the latest edition of Robert's Rules of Order unless otherwise specified by these Rules. However, breach of Robert's Rules of Order, in and of itself, shall not render any action by the Commission invalid.

The order of business for specific types of meetings is established in this Article. At any meeting, the order in which Agenda items are addressed may be altered by the Chair.

**Section A Establishment of the Agenda**

Items for consideration and/or action by the Commission may be placed on a meeting Agenda as follows:

- By the Chair;
- At the direction of the City Council or the request of the City Manager, Council Liaison, or the Staff Liaison;
- By written request from any other board or commission of the City delivered to the Chair or the Staff Liaison; or
- As required by state law or the Code of Ordinances.

No item may be submitted for inclusion on a meeting Agenda after noon of the seventh day preceding the date of such meeting.

**Section B Types of Meetings**

The types of meetings addressed by these Rules are as follows:





Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

- Regular Meetings
- Special Meetings
- Public Hearings
- Commission Workshops
- Committee Meetings
- First Meeting of a New Commission

**Section C Regular Meetings**

The Agenda and conduct for a Regular Meeting of the Commission shall be as follows:

I. Call to Order and Announcement of Quorum

After confirming that everyone necessary to conduct business is ready, the Chair shall call the meeting to order, noting for the record the time and date that the meeting is called to order.

The Chair shall determine and announce the presence of a Quorum. The Chair should announce and the minutes should reflect the names of Commissioners present and absent.

II. Approval of minutes from Past Meeting(s)

Minutes from the previous meeting(s) shall be reviewed and may either be approved (i) as submitted; (ii) approved with corrections; or (iii) deferred to a future meeting to allow time for staff corrections and revisions.

III. Reminder To Persons Desiring To Address Commission

Persons desiring to be heard on a particular Agenda item and/or on any matter of general interest to the Commission shall be afforded the opportunity to speak in accordance with these Rules. The Commission shall make available at the entrance to the meeting place the "Personal/Audience Comments Form" by which persons shall indicate their desire to be heard.

The Chair shall remind persons desiring to address the Commission that each person who wishes to speak, other than in presenting an Application or other matter on the Agenda to the Commission or if invited by the Commission to offer expertise on a particular matter, must submit the "Personal/Audience Comments Form." To accommodate all speakers, citizen comments are limited to three (3) minutes. If another speaker wishes to yield their time to you, a total of six (6) minutes will be allotted for your comments. Please make sure that the speaker's form indicates to whom they are yielding their time. If additional time is not yielded to the speaker, their time limit may be extended to five (5) minutes at the discretion of the Chair. Generally, written requests to speak will be accepted before completion of any docket item under consideration. However, in the event that the Commission is considering an Application, written requests to speak must be submitted before the Chair calls for the response of the Applicant.

IV. General Public Comments

Persons at the meeting who have indicated their desire to be heard on matters of general interest to the Commission, by submitting the form provided, shall have three (3) minutes each to present their comments in an order determined by the Chair. If another speaker





Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

wishes to yield their time to you, a total of six (6) minutes will be allotted for your comments. Please make sure that the speaker's form indicates to whom they are yielding their time. If additional time is not yielded to the speaker, their time limit may be extended to five (5) minutes at the discretion of the Chair. . Media presentations are subject to the availability of the City's electronic equipment, and must be submitted to the Development Services Director for review in advance of the meeting. Questions presented to the Commission may be referred to staff.

V. Current Business

The procedure for considering Applications that do not require a Public Hearing is as follows:

- **Presentation of the Application by the Applicant.** The Applicant or agent(s) may make a presentation not to exceed fifteen (15) minutes in length.
- **Presentation of the Application by City Staff**. Staff shall provide a presentation on the Application providing pertinent information and findings.
- **Response or Additional Comments from the Applicant**. The Applicant may respond to the presentation by staff, public comments or make additional comments regarding the Application. Such response or additional comments shall be limited to five (5) minutes.
- **Discussion and Consideration by the Commission**. The Commissioners shall each have an opportunity to question the Applicant at the close of his or her Response or Additional Comments (if any). Then each Commissioner shall have the opportunity for questions to staff, public speakers, and/or general discussion concerning the Application. Following discussion, the Application shall be considered for approval upon motion of any Commissioner, duly seconded.
- **Voting.** Each Commissioner, including the Chair, is entitled to a vote on an Application. A motion to approve an Application passes upon votes in favor of the motion by a minimum of four Commissioners. In the event of a protest petition pursuant to Section 212.015 (c) of the Texas Local Government Code (regarding a proposed Replat requiring a variance), the vote required for approval shall be not less than 75% of the Commissioners present. Plats and Replats are approved unless denied.

Other items of Current Business for consideration and possible action by the Commission shall proceed similarly. In general, motions for action should be made in the affirmative.

VI. Committee Reports

A member of a Committee may present a report to the Commission concerning any issue such Committee has been designated to address. All Committee reports shall be in writing and provided to the Commission prior to any oral report.

VII. Correspondence

Staff shall report on correspondence received and/or other City business relevant and of interest to the Commission. Commissioners may also report on correspondence or other communications received concerning matters of interest to the Commission. All written correspondence that is discussed shall be provided for distribution to the Commission.

Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

VIII. Requests for New Business, Announcements and Comments

Staff, the Chair, and/or Commissioners shall announce Committee schedules, the need for Public Hearings, discussions before or by the City Council relative to Commission matters, the need for Commission participation in Council meetings or Public Hearings, or any other matter of interest to the Commission. The Chair shall recognize any Commissioner who wishes to bring New Business to the attention of the Commission for future Agenda or staff action.

IX. Adjournment

The Chair shall entertain or call for a motion to adjourn. The meeting is adjourned upon motion of any Commissioner, duly seconded, and a majority vote of the Commissioners present.

**Section D Special Meetings**

Special Meetings may be called by the Staff Liaison, the Chair or any two Commissioners, to occur at a time other than a Regular Meeting. Notice of a Special Meeting shall be given in conformity with the Texas Open Meetings Law and with the procedures of the City.

**Section E Public Hearings**

Staff shall promptly bring to the Chair's attention any matters that require a Public Hearing. The Chair shall announce the need for such a hearing to the Commission, which shall set a time and place for such hearing. A Public Hearing may be held during a Regular Meeting or a Special Meeting.

In the event of a joint Public Hearing called by the City Council, the time, venue, Agenda, and procedure for conduct of the meeting is determined by the City Council.

The conduct of a Public Hearing shall be as follows:

I. Presentation of the Public Hearing Process

The City Attorney or the Staff Liaison shall present the Public Hearing process to be followed.

II. Presentation by the Applicant

The Applicant or his or her representative(s) shall have fifteen (15) minutes to present his or her request to the Commission.

III. Staff Findings

City staff shall present findings and conclusions of each City department and/or consultant that reviewed the Application.

IV. Public Comments

Persons at the meeting who have indicated their desire to address the Commission by submitting the form provided shall have three (3) minutes each to present comments concerning the Application. If another speaker wishes to yield their time to you, a total of six (6) minutes will be allotted for your comments. Please make sure that the speaker's

form indicates to whom they are yielding their time. If additional time is not yielded to the speaker, their time limit may be extended to five (5) minutes at the discretion of the Chair, with the consent of the Commission. Media Presentations are subject to the availability of the City's electronic equipment and must be submitted to the Development Services Director for review in advance of the meeting.

V. Response of Applicant

The Applicant may respond to staff findings, public comments or make additional comments regarding the request. Such response or comments shall be limited to five (5) minutes.

VI. Questions from the Commission

Each Commissioner shall have the opportunity to make inquiries of the Applicant, speakers or staff.

VII. Invitation for Written Comments, if applicable

The Chair shall announce that further evidence or comments from the public or from the Applicant shall not be received except in writing submitted to the Commission no later than a date certain (to be announced).

VIII. Closure of the Public Hearing

The Chair shall entertain or call for a motion to close the Public Hearing. The Public Hearing is closed upon motion of any Commissioner, duly seconded, and a majority vote of the Commissioners present.

**Section F Commission Workshops**

The Agenda and conduct for a Commission Workshop shall be established by the Chair and Staff Liaison. Current Business may not be voted upon at a Workshop.

**Section G Committee Meetings**

The order of business at a Committee meeting is wholly at the discretion of the Committee Chair.

**Section H First Meeting of a New Commission**

The first meeting of a new Commission shall be a joint meeting of the outgoing Commission and the incoming Commission. The Chair of the outgoing Commission shall call the meeting to order and shall preside until the Chair of the incoming Commission is elected. The meeting will be conducted in two parts according to the Agendas and conduct established by the Chair and Staff Liaison and shall include but not be limited to the following:

**(1) Meeting of the Outgoing Commission**

I. Unfinished Business, Minutes, Communications and Reports

II. Swearing In of New Commissioners (incoming Commission assumes duties and outgoing Commission retires)

**(2) Meeting of the Incoming Commission**





Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

The meeting of the incoming Commission shall proceed as a Regular Meeting, with Current Business to include (1) Introduction of Incoming Commissioners, (2) Election of Chair and Vice Chair, and (3) Adoption of Rules of Procedure.

# Article V Docket Items

### Section A Numbering Docket Items

Docketing procedures may be established by City staff in accordance with its needs and procedures, or as directed by the Commission.

### Section B Minutes of Meetings

The City Manager shall provide staff to serve as Secretary for the Commission. The Secretary shall maintain a record of minutes of each Commission meeting. The Secretary shall indicate in the minutes which Commissioners were present and which were absent during all, or part of, each meeting. The minutes shall include a report of the proceedings and any action taken at each meeting, including the vote of each Commissioner on each motion before the Commission.

# Article VI Administration of Rules of Procedure

### Section A Adoption by Incoming Commission

The incoming Commission shall by majority vote adopt temporary or permanent Rules, which shall take effect immediately and remain in effect until amended.

### Section B Amendments by Existing Commission

These Rules may be amended by a majority vote of the entire Commission as an item of Current Business.

### Section C Review

These Rules shall be reviewed not less frequently than every two years. The adoption of these Rules by a new Commission shall not constitute such review.

### Section D Committee on Rules

The Chair may appoint a Committee on Rules to conduct the required annual review of these Rules and to make recommendations to the Commission concerning the adoption and amendment of these Rules.

# Article VII Hierarchy of Authority

If there is a conflict among various legal instruments, referenced documents, and these Rules of Procedure, the following hierarchy shall apply:

1. The Constitution and statutes of the United States of America
2. The Constitution and statutes of the State of Texas





Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

3. The Charter of the City
4. The Code of Ordinances of the City

## Adoption of Rules of Procedure

These Rules are adopted by the Planning and Zoning Commission of the City of Bellaire, Texas, on this, the 13th day of July, 2017.

**Attest:**

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**Chairman**

Attachment: 2017-2018 Rules of Procedure (2352 : Rules of Procedure)

**History:**

2017-2018 Term
Adopted by Commission July 13, 2017
Amended by Commission August 10, 2017

2016-2017 Term
Adopted by Commission July 12, 2016

2015-2016 Term
Adopted by Commission July 14, 2015
Amended by Commission October 13, 2015

2013-2014 Term
Adopted by Commission July 8, 2014

2012-2013 Term
Adopted by Commission July 9, 2013

2011-2012 Term
Adopted by Commission July 10, 2012

2010-2011 Term
Amended November 8, 2011

2009-2010 Term
Adopted by Incoming Commission July 14, 2009

2008-2009 Term
Adopted by Incoming Commission July 8, 2008

2007-2008 Term
Adopted January 8, 2008
Amended March 11, 2008
Amended July 14, 2009