AGENDA
CITY OF CEDAR FALLS, IOWA
PLANNING AND ZONING COMMISSION
WEDNESDAY, JANUARY 10, 2018
5:30 PM AT CITY HALL - COUNCIL CHAMBERS

1. Call to Order and Roll Call

2. Approval of Minutes

3. Public Comments

4. Old Business

A. College Hill Neighborhood District Site Plan Review – 2119 College Street

Location:	2119 College Street, 925 and 1003 W. 22nd Street
Applicant:	CV Commercial, LLC
Previous Discussion:	November 21, 2017
Staff Recommendation:	*Introduction and discussion.*
P&Z Action Needed:	*Provide direction, comments and continue the discussion at the January 24, 2018 P&Z meeting.*

B. MU District Site Plan Review – Kwik Star Convenience Store

Location:	Southwest corner of Greenhill Road and Coneflower Parkway
Applicant:	Kwik Trip, Inc.
Previous Discussion:	September 13, 2017 & December 13, 2017
Staff Recommendation:	*Approval with conditions.*
P&Z Action Needed:	*Recommend approval and forward to City Council.*

C. MU District Site Plan Review – Fareway Grocery Store

Location:	Southwest corner of Greenhill Road and Coneflower Parkway
Applicant:	Fareway Stores, Inc.
Previous Discussion:	December 13, 2017
Staff Recommendation:	*Approval with conditions.*
P&Z Action Needed:	*Recommend approval and forward to City Council.*

D. Central Business District Site Plan Review – River Place Development (MU2 Building)

Location:	100 E 2nd Street
Applicant:	River Place Properties, LC
Previous Discussion:	December 13, 2017
Staff Recommendation:	*Approval.*
P&Z Action Needed:	*Recommend approval and forward to City Council.*

5. New Business

A. Gateway Business Park at Cedar Falls – Preliminary Plat

Location:	Northeast corner of Hudson Road and W. Ridgeway Avenue
Applicant:	CF Gateway Park, Inc.; Russell Construction; Shive-Hattery.
Previous Discussion:	None.
Staff Recommendation:	*Introduction and initial discussion.*
P&Z Action Needed:	*Provide direction, comments and continue the discussion at the January 24, 2018 P&Z Meeting.*

B. College Hill Neighborhood Site Plan Review – 2128 College Street

Location:	2128 College Street
Applicant:	Rabbani Wahidy
Previous Discussion:	None.
Staff Recommendation:	*Approval.*
P&Z Action Needed:	*Recommend approval and forward to City Council.*

C. Central Business District Facade Review – 115 E 4th Street

Location:	115 E 4th Street Suite 102
Applicant:	MMC Properties
Previous Discussion:	None.
Staff Recommendation:	*Approval.*
P&Z Action Needed:	*Recommend approval and forward to City Council.*

6. Nominating Committee

7. Adjournment

Reminders:

- January 15th Joint City Council and Planning & Zoning Commission meeting
- January 24th and February 14th Planning & Zoning Commission Meeting
- January 15th and February 5th City Council meetings

Cedar Falls Planning and Zoning Commission
Regular Meeting
December 13, 2017
City Hall Council Chambers
220 Clay Street, Cedar Falls, Iowa

MINUTES

The Cedar Falls Planning and Zoning Commission met in regular session on Wednesday, December 13, 2017 at 5:30 p.m. in the City Hall Council Chambers, 220 Clay Street, Cedar Falls, Iowa. The following Commission members were present: Adkins, Arntson, Giarusso, Hartley, Holst, Leeper, Oberle, Saul and Wingert. Stephanie Houk Sheetz, Director of Community Development, David Sturch, Planner III, Shane Graham, Planner II, Iris Lehmann, Planner I, and Jon Resler, City Engineer, were also present.

1.) Chair Oberle noted the Minutes from the November 21, 2017 regular meeting are presented. Mr. Holst made a motion to approve the Minutes as presented. Mr. Hartley seconded the motion. The motion was approved unanimously with 9 ayes (Adkins, Arntson, Giarusso, Hartley, Holst, Leeper, Oberle, Saul and Wingert) and 0 nays.

2.) The first item of business was an MU District Site Plan for Kwik Star. Ms. Oberle introduced the item and Mr. Sturch provided background information. He explained that there is a proposal to add a Kwik Star Convenience store at the corner of Bluebell Road and Coneflower Parkway. The item was introduced at a September meeting and staff has been working with the developer to make updates to the plan since that time. He provided a rendering of a site plan showing all elements related to the building, including the car wash, dumpster, sidewalk connections, etc. He spoke about items that were discussed at the last meeting and showed renderings of the landscaping plan changes, as well as building design, fuel canopy and signage plans. He briefly discussed the Stormwater Management Plan, showing where it will be connected and released. Mr. Sturch also commented on the lighting design, noting that they are trying to find an option that will keep the light from being a nuisance to neighbors. He discussed roadway improvements including the addition of a right turn lane from Greenhill Road to Coneflower Parkway, painting left turn lanes on Greenhill Road, and installation of improvements during the construction of the store. The City has entered into a development agreement with Lockard to ensure those improvements are completed. Staff recommends approval of the site plan and building design for the proposed Kwik Star subject to a list of items presented.

Mr. Holst asked about the lighting on the site in terms of light pollution from the site being an issue for the surrounding houses. Mr. Sturch explained that the proposed light is designed to provide much softer lighting that will direct the lights toward a certain direction. Mr. Holst also noted that he isn't comfortable with solving the issue with the dryer in the carwash by creating set times for its use.

Wade Dumont, Kwik Star, stated that the lighting is full cutoff down lighting that will minimize any dark sky impact. The same applies to the canopy, as that lighting is recessed and contained to a specific area. He also explained that the carwash doors are locked up between certain times to ensure the carwash is not being used. He did ask that the times be adjusted to being open from 6:00 a.m. to 10:00 p.m. as these are found to be prime times when people like to wash their cars (before and after work). With the amount of traffic going by on Greenhill, he feels that the noise will not be louder than the traffic. They looked at changing direction, but that will not work. Mr. Wingert stated that he feels that the lights on most streets and

intersections are pretty concentrated to a specific area and urged Kwik Star to look at those kinds of lights to help reduce the light issues. Mr. Holst suggested that the height be limited to 15 feet.

Mr. Arntson asked about the timeframe for the Greenhill Road Improvements, particularly the cutout. Mr. Sturch stated that the improvements on Greenhill will be completed in conjunction with the constriction of the Kwik Star store. Ms. Saul asked about the left turn lane on Greenhill Road and if that will be narrowed down to one lane. Jon Resler, City Engineer, clarified that they would have to use that option or they would have to widen the road. The traffic volumes indicate that this will function in the near term. He stated that the reality of the situation is that most communities don't build four lane roads anymore. They either build three or five with a turn lane. As Greenhill Road was built several years ago, this is the best option at this time. In the future it will be addressed. He also noted that traffic reports were done for Kwik Star and Fareway and were considered when making the decisions on the changes.

Mr. Leeper asked about the long-term improvements for Greenhill and Main Street. Mr. Resler stated that he did his own traffic counts and agreed with the report. The intersection currently functions at a "B" service level, which is generally a good level. With the projected traffic, it would continue to function at that level, but staff has plans for more major construction down the road. Staff is also looking at other options for improving things in the short term. Mr. Leeper clarified that it appears that the biggest issue is during the peak times of day and Mr. Resler agreed.

Penny Popp, 4805 S. Main Street, came forward with copies of a petition signed in opposition of the plan and stated that she is speaking on everyone's behalf. She stated that they believe the proposal should be denied based on issues with air pollution, environmental and traffic concerns. They feel there is a threat to ground and surface water due to runoff from fuel storage tank leakage, as well as incidental leakage at the pumps. They also feel that Dry Run Creek is an already impaired waterway and watershed, which will become more affected and contaminated if the Kwik Star Store is approved. Ms. Popp noted that the traffic issues are also a concern to the neighbors and gave examples of specific issues. She feels that property values will decrease because a gas station is nearby, crime will increase, and will create noise impacts.

Rosemary Beach, 5018 Sage Road, stated that she feels that this will create a shopping center and that she would like the Committee to consider the feelings of the neighbors like they did with Walmart. She also stated concerns with the trash involved with gas stations.

Steve Ephraim, 327 Balboa Avenue, stated that it's difficult to consider the Kwik Star without discussing the Fareway project, as the traffic issues will be tied together. He noted that he had sent a letter to staff regarding his comments. The traffic study was originally done for Kwik Star and was followed with a study that included Fareway, but there was a significant change that he feels was lost in the discussion. According to the study that includes Fareway, improvements are made to the intersection that adds lanes to Greenhill Road and Main Street and states that direction was provided to implement the improvements. The first study says that Kwik Star would congest traffic and the second that the addition of Fareway will reduce the congestion. The improvements are counted on to fix the congestion issue. He also discussed the issues with Balboa Avenue, noting the current turning issues and then discussing the addition of longer turn time if the new businesses are added. He stated that he feels that staff's comment about reasonable traffic flow, which stated that it is reasonable to sit through two light cycles, will cause people to start using back roads to avoid the lights.

Lynn Barnes, 118 Cordoba Avenue, talked about the growth that Cedar Falls has experienced, noting the City's requirements to improve infrastructure. He discussed the number of

residential units and vehicles that use the streets in the area and the increase in traffic if these businesses are added. He feels that safety and quality of life will be jeopardized by the new developments being proposed. He stated that he opposes building the Kwik Star and suggests that the Fareway be built at that site. He also asked that the obstruction by proposed landscaping be considered prior to any construction.

Nino Costarella, 401 Heritage Road, stated that he had a petition that was previously given to staff that includes 107 signatures from the neighbors in the Heritage Hills Addition who oppose the Kwik Star. He also presented photographs showing how close the homes are to the Kwik Star site and photos of gas spills at other locations. He believes all gas stations are dirty and there will be contamination from spills. He feels that the property values for the homes in the area will decrease.

Redgie Blanco, 318 Alvarado Avenue, asked that the Commission table the item and give consideration to the comments made by the residents. He feels there are holes in the information provided by staff. Traffic studies are done by the investor and the city approves them without a third party bringing in an unbiased study. The 2014 study is outdated and he feels new, more extensive data should be collected.

Curt Olson, 3707 S. Main Street, stated his concerns with additional traffic and reduction in home values.

Dave Nedrow, 4201 Stewart Lane, recommends that the City help them acquire land on Viking Road and make it part of a shopping development in that area, or further south off Ridgeway and Hudson Road. He also doesn't see a need for a car wash at this location as there is one at the Ridgeway location, and he feels the canopy should be lowered if the Kwik Star is allowed to build.

Ms. Popp came forward to note that a Kwik Star in Davenport was not allowed to have a car wash due to resident complaints to the Planning and Zoning.

Mr. Costarella feels that the Greenhill Road area currently does not have any retail stores and they don't belong in these areas. It is currently a beautiful area and he feels the gas station will make it less visually appealing and it will depreciate the value of homes nearby.

Dave Wilson, Executive Vice President of Lockard Development, stated that their company has many projects across the country similar to this and they have worked because there is a master plan in place. They have spent significant time and money working with Merrill Oster to create the Pinnacle Prairie project. All standards are met in the plan and will work with the surrounding uses within the Pinnacle Prairie guidelines. He believes it should be up to the company to locate where they want to be, and Lockard has worked within the MU District rules to create the proposed plans.

Mr. Dumont, Kwik Star, stated that according to staff that they are a permitted use. Their traffic engineer has been working with the city staff and is present for questions. They do have the additional lane for traffic is included in their grading plan. He stated that any information with regard to leaking fuel storage tanks is public information. They have been putting in double walled tanks since 1998 with liquid sensors. No leaks that have escaped since that time. He noted that there are leaks at gas stations from time to time, as sometimes people don't always watch the pumps. They are typically very small and trained staff on site to deal with any leaks. The fire department is always contacted, no matter the size of the leak. They typically are cleaned up before they even reach the stormwater system. If it does happen to reach the stormwater, there is a large storm structure that has a fuel water separator that protects the downstream stormwater. It is set up to deal with any issues properly. Mr. Dumont stated that

crime is typically less when they come in to an area as they have several cameras that tend to help with problems beyond the store. He also pointed out that the traffic is the largest noise issue, and cars will already be on the road, so a car wash should not be a problem. He also spoke regarding the staff recommendations.

Gary McCormick, 123 Spruce Hills Drive, thanked the Commission for their attentiveness to the comments. He brought up a comment made by Mr. Wilson of Lockard, where he stated that Kwik Star should be able to be wherever they want to be. He noted that the other side to that is that there are people that have come to the meeting to show that they don't want the same things. He asked the Commission to consider other places as the neighbors haven't asked for a Kwik Star to be built.

Jerry Dixon, 218 Spruce Hills Drive, asked about the LED lights and their intensity. He also noted the differences between the Casey's Convenience Store down the street and the proposed Kwik Star and asked about the sound decibels and the standards used by Kwik Star.

Mr. Barnes, 118 Cordoba Avenue, asked if the Commission would leave their votes on the screen long enough for people to see which votes came from each individual.

Ms. Oberle asked staff to address some of the additional traffic study questions, including the inclusion of Cordoba and Balboa. Mr. Resler discussed the queue lengths and their peak times. He noted that there are alternative routes to use if needed and people will need to adjust their driving patterns and habits. He discussed different possibilities that staff is considering to help alleviate traffic issues. Mr. Ephraim commented on the queue length fluctuations on Main Street which make it difficult for leaving Balboa Avenue.

Mr. Leeper noted that there appear to be a lot of issues, in particular parking. He also noted that there appears to be a question as to whether a gas station should be allowed here. Mr. Holst noted that it is allowable under the ordinance and feels that he isn't comfortable voting no. He feels that the applicant will be held to high standards. He noted that the Commission can vote on the matter and it can still go to City Council and be overruled. Mr. Sturch verified the different options of what could be done at this time. Mr. Leeper also asked about the noise issues. Mr. Wingert also asked if there is a projected number of customers that would be added to the area. Mr. Dumont stated that they typically don't have a projection for the customers. They do have noise information on the blowers that can be submitted that meet City requirements.

Mr. Costarella brought up a study of average gas station use. He also stated that the Commission has the authority to deny the project.

Mr. McCormick asked who the project is geared toward, whether it be transient customers or someone specific. Mr. Wingert stated that it was more for transient customers and noted that this is a very difficult spot the Commission is because they can see both sides

Mr. Blanco asked if there are any additional items that the Commission is concerned with or if there will be any changes to the Master Plan. Ms. Oberle stated that it is not the Commission's job to change the Master Plan. Mr. Wingert clarified that any changes to the Master Plan will have to come through the Commission.

Ms. Saul noted that the decision that is made on this project will affect another project that is being proposed in this area. The Master Plan approved in 2015 allows for this kind of use so the projects coming are part of the plan. She also stated that she does understand the feelings of the neighbors.

Mr. Nedrow, 4201 Stewart Lane, asked if Kwik Star has looked at any other options. He also noted his concern with increased traffic on Main Street and a safety issue with the crosswalk. He would like to see the Planning and Zoning Commission consider flashing lights for pedestrians crossing there. Ms. Oberle asked City staff to make a note of this problem.

Mr. Wilson, Lockard Development, came forward to explain the difference between the issues with the Walmart project and the Kwik Star project. Ms. Oberle asked Mr. Wilson about the philosophy of how this MU area was created. He explained that it's visible and retail goes where there is visibility. He noted that they go above and beyond the requirements in that area to blend in and fit.

Mr. Costarella, Heritage Road, discussed rezoning history and reiterated his disagreement with the project.

Ron Flory, 301 Spruce Hills Drive, stated that they built their home in 2008 and received no notification that there was a rezoning in 2015. He voiced his concerns with regard to quality of life.

Ms. Popp came forward again to ask that the item be tabled.

Stephanie Houk Sheetz, Director of Community Development, came forward to discuss the history of zoning changes in the area, as well as master plan updates. She clarified that in 2015 there was no rezoning, and does not require letters to be mailed to residents. She also noted that the City has recently started to go above and beyond by sending notifications for site plans as well.

Mr. Wingert believes that a decrease in home value is just a speculation at this time and he cannot vote based on that. However, he is concerned with the traffic issues. Mr. Leeper agreed and feels that he believes that there is some conflicting information and he is relying on the traffic engineers to give more information. He feels the staff and engineers are taking steps and measures to address the issues at that intersection over time.

Mr. Holst noted he is not comfortable voting against the project, as the use is allowed. He did state his concern with the lighting and noise issues being addressed, and feels that reorienting the car wash for a southern exit is the best way to handle the noise.

Mr. Arntson said that the Commission will almost need to consider Kwik Star and Fareway together, as vetoing one would potentially veto the other.

Mr. Holst made a motion to table the item until the Commission receives more information regarding the lighting plan, noise issue and car wash exit. Mr. Arntson seconded the motion. The motion was approved unanimously with 8 ayes (Adkins, Arntson, Giarusso, Hartley, Holst, Leeper, Saul), 1 nay (Wingert).

3.) The next item for consideration by the Commission was an MU District Site Plan for Fareway. Chair Oberle introduced the item and Mr. Sturch provided background information. He explained that it is proposed at the corner of Main Street and Bluebell Road and showed a rendering of the proposed site plan. He discussed the landscaping plan, building design, stormwater management plan, lighting design, utility easement vacation/dedication and roadway improvements. Staff recommends continuing the discussion at a future meeting after additional information has been requested and provided.

Garrett Piklapp from Fareway gave background information on Fareway stores and explained that their hours are 7:00 a.m. to 9:00 p.m. Monday through Saturday and they are closed

Sundays. He noted that they have made changes and adjustments to the look of the store and that it has more of a neighborhood feel. They are open to changes to satisfy the neighbors and the Commission/staff.

Mr. Arntson asked if the lights will be on after hours. Mr. Piklapp explained that the lights have a little bleed past the parking lot and there is a single light on by the front door after hours for safety measures for staff. Mr. Holst asked about lights from signage and Mr. Piklapp explained that the shields on the front entryway are lit until employees are all gone. Photometrics will be provided showing lighting times.

Ms. Saul asked about the driveway location on South Main Street and how that will impact the traffic pattern. Mr. Resler explained that the driveway is about 10 feet short of the recommended distance from Greenhill and staff feels that based on the distances they've seen it is reasonable. Mr. Piklapp stated that their main concern is safety so they are willing to move the driveway if staff recommends it as long as it is safe.

Ms. Oberle asked about delivery days and times. Mr. Piklapp explained that deliveries are made three times a week either 5:15 – 6:30 a.m. or after 7:00 p.m. The trucks do not idle and create added noise. He also noted that the store will not be open until early 2019. Mr. Wingert asked if there are other stores being opened in the middle of neighborhoods in other locations. Mr. Piklapp stated that they typically do.

Mr. Wingert also asked if there is room for a right turn lane to be carved out at the southeast corner of Main and Greenhill allowing people to get out to the east. Mr. Resler stated that at this would be an option if it was absolutely needed to accommodate traffic.

Ms. Oberle asked about the dumpster plan. Mr. Piklapp stated that there will be a brick enclosure to match the exterior of the building. Mr. Arntson stated that he feels it was a nice building.

Steve Ephraim, 327 Balboa Avenue, stated his concern with intersection congestion and traffic issues, as well as the driveway location. Mr. Resler addressed the issues Mr. Ephraim asked about.

Rosemary Beach, 5018 Sage Road, asked how many parking spaces are proposed. Mr. Piklapp stated 119. She also asked about bicycle access and parking for those who prefer biking from one place to another. She commended Fareway on the nice building. (3:27)

Penny Popp, 4805 S. Main Street, asked that the City get the traffic issues right the first time. She also made the suggestion that, should Kwik Star be denied, Fareway consider the adjoining lots as an alternative location and move off the corner completely.

Redgie Blanco, 318 Alvarado Avenue, again asked that the Commission consider the traffic issues the store will create. He asked staff to bring alternatives to the traffic plans.

Mr. Piklapp commented that Fareway explored the option of shared access between sites and given the change in grade this would not work. He also clarified that they will do what they can to make trail connections. Mr. Arntson asked about building heights and whether the Fareway building being higher than Kwik Star would help shield some of the light issues as well. Staff will look into the heights.

Ms. Popp asked if it would be an option to move the driveway off of Main Street. Mr. Piklapp said he would take it back to their engineers to look at other access options. Mr. Sturch clarified any change would need to be reviewed by staff again to be sure it accommodates

emergency vehicles.

Mr. Leeper commented that the request for a bike rack may be a bad idea to take bikes through the parking lot.

The item will be continued at a future meeting.

4.) The Commission then considered a Central Business District Facade Review for 401 Main Street. Chair Oberle introduced the item and Ms. Lehmann provided background information. She stated that the owner is proposing a new projecting sign to advertise a new business moving into a second floor office in the building. Community Main Street has reviewed the project and recommended approval with no comments. Staff also recommends approval.

Mr. Hartley made a motion to approve. Mr. Holst seconded the motion. The motion was approved unanimously with 9 ayes (Adkins, Arntson, Giarusso, Hartley, Holst, Leeper, Oberle, Saul and Wingert) and 0 nays.

5.) The next item of business was the Francis Street Minor Plat. Chair Oberle introduced the item and noted that Mr. Wingert would be abstaining on this item. Ms. Lehmann provided background information, explaining that the owner of 222 N. Francis Street is proposing to split the property in two to create a new lot for development. The new lot would allow for a new single-family home or duplex. The proposal meets all zoning requirements and all technical comments have been addressed. Staff recommends approval.

Mr. Leeper made a motion to approve. Mr. Arntson seconded the motion. The motion was approved unanimously with 8 ayes (Adkins, Arntson, Giarusso, Hartley, Holst, Leeper, Oberle and Saul), 1 abstention (Wingert) and 0 nays.

6.) The next item for consideration by the Commission was the Viking Road First Addition preliminary and final plats. Chair Oberle introduced the item and Mr. Graham provided background information. He showed a location map that described the different areas being discussed and showed the different access points proposed. Staff recommends approval.

Mr. Holst made a motion to approve. Ms. Giarusso seconded the motion. The motion was approved unanimously with 9 ayes (Adkins, Arntson, Giarusso, Hartley, Holst, Leeper, Oberle, Saul and Wingert), and 0 nays.

7.) The Commission then considered a Central Business District site plan review for the River Place MU2 building. Chair Oberle introduced the item and Mr. Graham provided background information. He explained that it is a site plan amendment to add approximately 8 feet of building height to add a second floor office space. He displayed a rendering of the Master Plan, the existing and proposed elevations, and an approved site and landscaping plan. He noted an email was received from a neighbor who had concerns with regard to parking. Mr. Graham noted that the parking and landscaping are unchanged with the new site plan.

At this time staff would like to introduce the item for discussion and continue at the next Commission meeting. Mr. Arntson clarified that the principal use for the additional floor is commercial use. Mr. Holst stated that he has had several people reach out to him with concerns regarding parking. Ms. Saul also noted that people have reached out to her with regard to the height and has concerns about the parking as well.

Mr. Wingert asked if there had ever been a proposal for an event center and if this was in this building. Steve Long, Eagle View Partners, stated that this is the building that was proposed, but it was switched to office space because Millrace is 100% occupied and businesses are

asking for more Class A office space. They have also gotten requests from businesses outside the area looking to move here. They may keep part of the mezzanine level, but the banquet facility is no longer being considered. All tenants of the office space will have parking passes and be required to use the parking lot behind Millrace where there is excess capacity. The residents will have reserved space on private lots.

Alan Dailey, 3115 Apollo Street, owner of Chocolaterie Stam, noted that parking is a concern.

Dawn Wilson, 3620 Rownd Street, owner of Cup of Joe, asked about what will be done for future developments. She stated that the parking study that was done by volunteers is already obsolete as new developments have come in. She asked for more consideration of parking lots provided by the City.

Julie Shimek, 104 Main Street, stated her parking concerns as an area business owner. She noted that property owners were also concerned with leaseability and that many businesses struggled this summer while the parking lot was being repaired. She also pointed out that there is more of a parking issue in the evenings than during the day.

Carol Lilly, Community Main Street (206 Main Street), said that several businesses have reached out to her with regard to building height, parking and lease rates. The Board has discussed the issues presented and they will continue to share information with staff and the Commission.

The item will be continued at a future meeting.

8.) The next item of business was an update of future planning and zoning agenda items. Mr. Sturch showed the schedule change with regard to application submittal deadlines to allow for adequate time for tech review and preparation for staff reports.

At this time he also stated that there will be no meeting on December 27, 2017. There will also be a joint Planning and Zoning/City Council Committee meeting on January 15, 2018.

Ms. Oberle welcomed the newest Commission member, Rochelle Adkins, as well as recognizing the new City Engineer, Jon Resler.

9.) As there were no further comments, Mr. Arntson made a motion to adjourn. Mr. Wingert seconded the motion. The motion was approved unanimously with 9 ayes (Adkins, Arntson, Giarusso, Hartley, Holst, Leeper, Oberle, Saul and Wingert) and 0 nays.

The meeting adjourned at 9:45 p.m.

Respectfully submitted,

David Sturch
Planner III

Joanne Goodrich
Administrative Assistant

DEPARTMENT OF COMMUNITY DEVELOPMENT

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MEMORANDUM

Planning & Community Services Division

TO: Planning & Zoning Commission

FROM: Shane Graham, Planner II

DATE: January 5, 2018

SUBJECT: College Hill Neighborhood Site Plan Review – 2119 College Street

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REQUEST: Request to approve a College Hill Neighborhood District Site Plan Review for a new multi-use building at 2119 College Street.

PETITIONER: Slingshot Architecture

LOCATION: 2119 College Street, 925 W 22nd Street, and 1003 W 22nd Street

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PROPOSAL

It is proposed to demolish the existing multi-family dwellings currently located at 2119 College Street and 1003 W 22nd Street, and the existing commercial building located at 925 W 22nd Street, in order to construct a new 5-story multi-use building, which will include two commercial retail spaces on the first floor and 82 residential rental units on the second through fifth floors. The original plan submittal called for a total of 63 residential units, but the developer has provided an updated plan, which now shows a total of 80 residential units (see tables below for differences between original and revised submittal).

Unit Type	Original Submittal	Revised Submittal
Studio	24	60
2 Bedroom	16	16
3 Bedroom	16	None
4 Bedroom	7	7
Total Units	**63**	**83**
Total Beds	**132**	**120**

Ground Floor	Original Submittal	Revised Submittal
Commercial Area	3,060 SF	10,765 SF
Commercial %	13%	64%

Building view from corner of College Street and W 22nd Street.

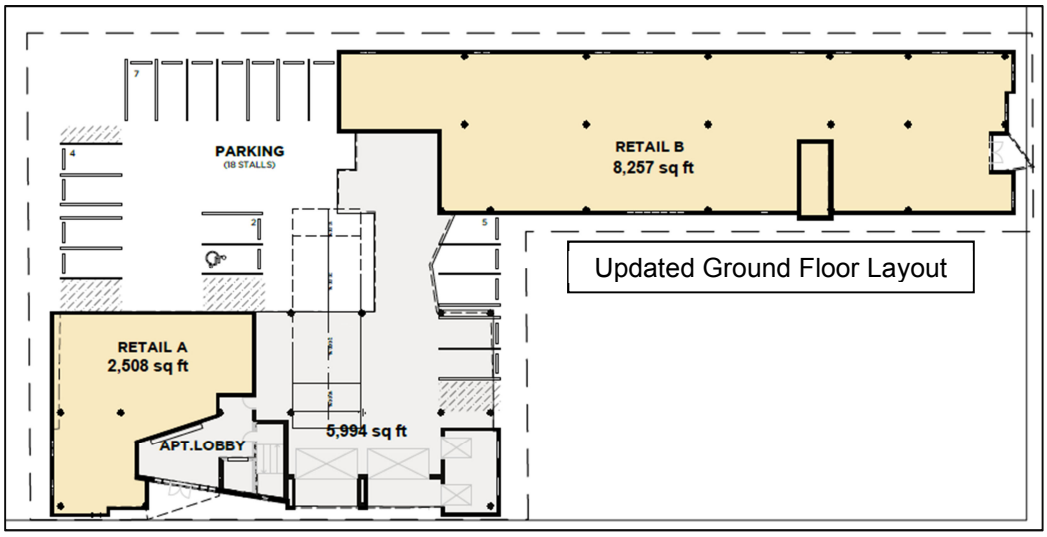
BACKGROUND

The two multi-family dwellings on the property were constructed in 1900, while the commercial building was constructed in 1972. The developer has owned the multi-family dwellings since 2016, and the commercial building since 2012. All three of the buildings will be demolished and a new 5-story multi-use building will be constructed in its place. An application for this site plan was originally submitted on January 25, 2017, with a resubmittal on February 13, 2017. The Planning & Zoning Commission introduced the item at its November 21, 2017 meeting.

ANALYSIS

The property is zoned C-3, High Density Commercial District and is located within the College Hill Neighborhood Overlay District. Projects within this district require a site plan review by the Planning & Zoning Commission and City Council, based on the following elements:

1) Proposed Use: The building is proposed to be 5 stories in height, with the ground floor consisting of two retail commercial spaces, a residential lobby area, and partial parking for the residential use. This includes approximately 10,765 square feet of commercial retail space, and 5,994 square feet of residential lobby area and residential parking. That equates to 64% of the ground floor area dedicated for commercial use, while 36% of the ground floor is dedicated for residential use. The initial submittal showed approximately 87% of the ground floor area being dedicated for residential use, while approximately 13% of the ground floor area was dedicated for commercial use.



The building as a whole will have approximately 10,765 square feet of commercial retail space located on the first floor and approximately 50,897 square feet of residential space located on the 2nd through 5th floors. This would equate to an overall ratio of 17% commercial space and 83% residential space.

When the developer submitted the initial site plan, staff deemed the use primarily residential based on the fact that a majority (over 50%) of the ground floor was dedicated to a residential use. However, the revised site plan does show a majority of the ground floor area dedicated to commercial use (64%). Past interpretations on site plans located at 2024 College Street (2014), 2215 College Street (2014), 917 W 23rd Street (2016), 200 W 1st Street (2017), and the River Place Development along State Street (2014) have determined their principal use based by the first floor area. Therefore, staff deems this to be a principal commercial use.

A principal commercial use with a residential use located on the upper floors is allowed in the C-3 District and College Hill Neighborhood Overlay District, subject to site plan approval by the Planning & Zoning Commission and City Council. **Principal commercial use with accessory residential uses on upper floors is allowed.**

2) Building Setbacks: The property is zoned C-3 Commercial District. Principal commercial uses within this district are allowed to have 0 foot setbacks. The site plan shows the building having a 5 foot building setback from College Street and a 2 foot building setback from W 22nd Street. A 6 foot building setback is shown along the west and north lot lines. **Building setbacks are satisfied.**

3) Density: Typically, the density requirement for a residential use that is part of a property redevelopment would call for a minimum lot area of 37,350 SF (based on 83 proposed units). The total lot size of this particular property is 30,018 SF, so the density requirement would appear to fall short. However, this is not a principal residential use but rather a principal commercial use, and there are no density requirements for the accessory residential component. **No density limit.**

4) Parking: On-site parking would not be required for the commercial component of the project, as it is not a requirement in the C-3 District. Also, the College Hill Neighborhood Overlay District states that on-site parking is not required for secondary, accessory residential uses that are located on upper floors of a principal permitted commercial use. As indicated in item 1 above, past interpretations on previously approved site plans have

determined their principal use based on the first floor area. Even though parking is not required, the developer has shown a total of 65 on-site parking spaces. 47 of the parking spaces would be located underground, and 18 parking spaces would be located on the ground level. **Parking is not required for this use within the C-3 District, but the developer is providing 65 on-site parking spaces.**

5) Open Green Space: The C-3 District does not have any open green space area requirements.

The provided site plan does show some open space along the west and north property line, where grass and landscape plantings will be provided. **No open green space requirement.**

6) Landscaping: The College Hill Neighborhood Overlay District does require landscaping along the periphery of the parking area.

A landscaping plan has been submitted, showing plantings along W 22nd Street and along a portion of the periphery of the parking lot. It would appear that additional plantings would need to be installed adjacent to the parking lot along the north property line, as no landscaping is shown in that location. **Landscaping plan has been submitted, but modifications are needed.**

7) Building Design: The College Hill Neighborhood Overlay District states that the architectural character, materials, and textures of all buildings shall be compatible with those primary design elements on structures located on adjoining properties and also in consideration of said design elements commonly utilized on other nearby properties on the same block or within the immediate neighborhood. Comparable scale and character in relation to adjoining properties and other nearby properties in the immediate neighborhood shall be maintained by reviewing several design elements. These are noted below with a review on how each element is addressed.

Maintaining Similar Roof Pitch:

Flat roofs are used in this area. The proposed building also uses a flat roof.

Maintaining Similar Building Height, Building Scale and Building Proportion:

Most of the buildings in this immediate area are either one-story or two-story in height. The proposed building will be 5 stories in height, which would replace two existing two-story structures and one existing single story building that are currently on the property. There would appear to be no other structures in the immediate vicinity that approach the same height as the proposed building, except for the residence halls found on the campus of UNI approximately 3 blocks away, which are not in the same zoning district or in the College Hill Neighborhood Overlay Zoning District.

The property is zoned C-3 Commercial District, which has a building height limitation of 165 feet or three times the width of the

road that the building faces. In this case College Street is 40 feet in width, meaning that the maximum building height allowed would be 120 feet (40 feet x 3). As this structure would be 63 feet 8 inches in height, it would meet the height requirement of the Zoning Ordinance. This property is also located within the College Hill Neighborhood Overlay Zoning District. This overlay district does not have a specific height limitation for buildings, but it does call for reviewing the scale of a proposed building in relation to adjacent buildings, such as similar roof pitch, building height and building scale.

Use of Materials Comparable and Similar to Other Buildings on Nearby Properties in the Immediate Neighborhood:

Most of the buildings in this immediate neighborhood are constructed with brick materials. University Book and Supply, which is located to the south of this property, is constructed mainly with limestone tiles.

The proposed building will have a more modern look, as it will be constructed with a mix of metal paneling, sandblasted concrete, brick and perforated metal screens. Each of the four sides of the building will have a slightly different design in relation to the amount and type of materials used. Please see the table below which breaks down the use of materials by building side.

Side of Building	Brick	Metal Paneling	Concrete	Openings
North	50.2%	35.9%	0%	13.9%
South (W 22nd St)	36.7%	27.5%	18.3%	17.5%
East (College St)	54.5%	23.9%	0%	21.6%
West	31.5%	54.6%	0%	13.9%

East (College Street) Elevation

South (W 22nd Street) Elevation

In addition to the design of the building, the overlay district looks at building scale, in that the maximum width of the front façade shall not be wider than 40 feet. If a building were to have a larger width than 40 feet, the façade of the building must be broken into modules that give the appearance of smaller, individual buildings.

Each individual module should adhere to the following guidelines, in order to give the appearance of separate, individual buildings:

1. Each module shall be no greater than 40 feet and no less than 10 feet in width.
2. Each module should have a corresponding change in roof line for the purpose of architectural identity.
3. Each module should be distinguished from the adjacent module by at least one of the following means:
    a. Variation in material colors, types and textures
    b. Variation in the building and/or parapet height
    c. Variation in the architectural details such as decorative banding, reveals, stones or tile accent
    d. Variation in window pattern
    e. Variation in the use of balconies and recesses

The building has a width of 50 feet, however it would appear that the building scale requirements for this building would meet the above requirements, as there would appear to be individual modules, colors, varying materials, textures, and recesses.

8) Trash Dumpster Site: The site plan shows a dumpster enclosure contained within the parking area at the entrance along W 22nd Street. No details have been submitted as to the design of the enclosure, however. **Additional details needed on the design of the dumpster enclosure.**

9) Lighting: The C-3 District and College Hill Neighborhood Overlay District regulations do not have specific lighting design guidelines. No lighting plan has been submitted. **Clarification on a lighting plan from the applicant is needed**.

10) Signage: Wall signs are illustrated on the building renderings along the south side and east side of the building (facing College Street and W 22nd Street). These signs will indicate the name of the development. The proposed wall signs appear to be well within the District limitations of no larger than 1/3rd of the surface area of the single wall area to which the wall sign is attached, however this will be reviewed in detail at the time a sign permit is requested. **Signage is acceptable, subject to detailed review with a sign permit.**

11) Sidewalks: A minimum 5 foot paved sidewalk exists in front of the property along both College Street and W 22nd Street. The site plan shows additional decorative paving located near the entrance along W 22nd Street. **Sidewalk requirements are met.**

12) Storm Water Management: Storm water will be collected on site via an underground detention area underneath the parking lot and piped to the storm sewer along College Street. City Engineering Staff has indicated that they will need to see the final details on the system once they are designed by the developer's engineer. This request will not move forward to the City Council until all stormwater management items have been

approved by the Engineering Department. **Stormwater requirements will need to be reviewed and approved once final design is completed.**

TECHNICAL COMMENTS

City technical staff, including Cedar Falls Utilities (CFU) personnel, have few comments on the proposed item. The developer will be responsible to extend all utilities to the site.

STAFF RECOMMENDATION

Continued discussion on this site plan will occur at the January 24, 2018 Planning & Zoning Commission Meeting. The Community Development Department has reviewed this plan and provides the following comments:

1) Show additional landscape plantings along the north property line adjacent to the ground level parking area.
2) Provide trash enclosure details.
3) Provide location and type of external lighting.
4) Provide information related to the scale (height) of the building compared to surrounding properties.
5) Any comments or direction specified by the Planning & Zoning Commission.

PLANNING & ZONING COMMISSION

Discussion 11/21/2017

Ms. Oberle introduced the item and Mr. Graham provided background information. Staff has determined it to be a principal residential use. Based on the zoning ordinance, the on-site parking requirements are not met and there are potential height and setback issues. Staff is recommending that the applicant address comments from the staff report and the Commission to bring back for further discussion and review at a future meeting.

Mr. Graham noted that a letter was received from an attorney representing the concerned citizens of College Hill that addresses three concerns. Brent Dahlstrom, developer (5016 Samantha Circle), came forward and discussed issues with zoning and parking and asked questions with regard to requirements. Mr. Sturch provided explanation to the questions Mr. Dahlstrom presented with regard to buildings on State Street. There was discussion regarding the amount of commercial use in the building. Mr. Dahlstrom asked for recommendations from the staff so he can proceed.

Mr. Holst stated that while he appreciates that Mr. Dahlstrom wants to do the project, he cannot support it as it is. He feels that it fundamentally violates the C-3 zoning. He feels that when residential units are put in, the parking has to come with it. Mr. Dahlstrom argued that there is no parking required and that his last project at 917 W. 23rd Street has no parking stalls. Mr. Graham clarified that an agreement was made to provide parking in the UNI parking lots in the lease at that property. The Planning and Zoning Commission discussed the parking issue at length, noting that the 917 W. 23rd Street project was approved based on the agreement to provide offsite parking. Staff has assumed that those specifications are being enforced as was agreed upon.

Cara Bigelow Baker (1826 Quail Run Lane), works at 2211 College Hill and

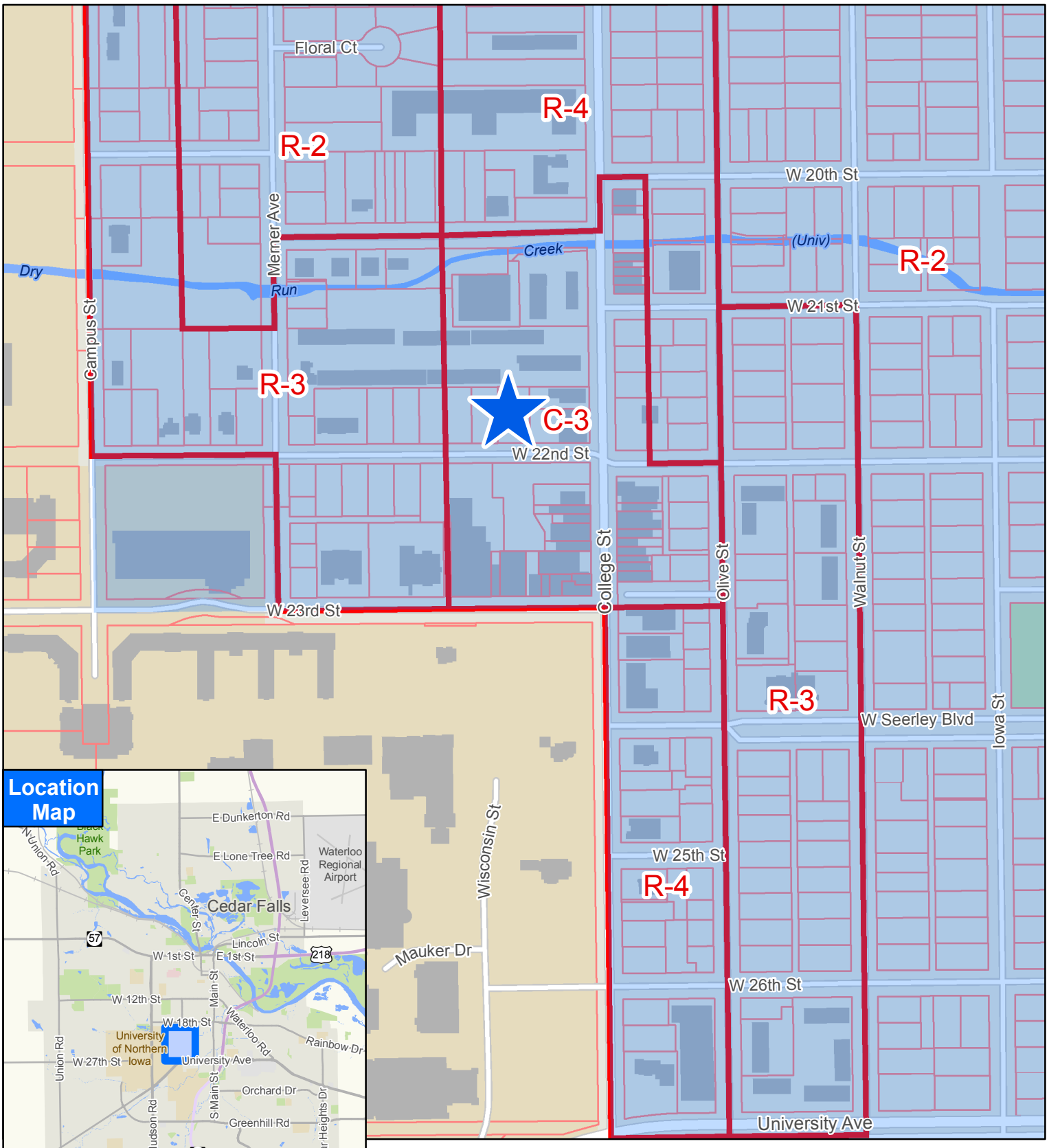
stated her concern with parking on College Hill. She feels there is not enough parking to support the residents of the building at 917 W. 23rd and there will be even more parking issues if the new building comes without designated parking.

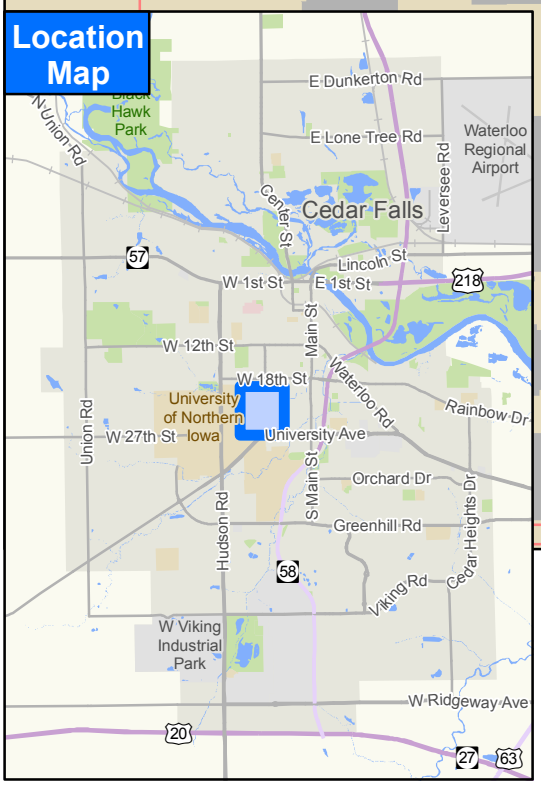
Chris Wernimont, 415½ Washington Street, has rental properties in the area and is concerned about the parking issues that would be created by having that volume of residents with no parking. In his experience, 90% of his student tenants have vehicles and there will be nowhere for people to park.

Andy Fuchtman (422 N. Ellen Street), owner of Sidecar Coffee, stated that he would like to find a way to move toward more progress and would like to see the project move ahead.

Kyle Dehmlow (2113 Vera Way), owns businesses on College Hill. He feels that parking has been less of an issue recently. He has his employees park further away to allow for customer parking. He would like to see more focus on College Hill and would like to see more development.

Cedar Falls Planning & Zoning Commission
January 10, 2018





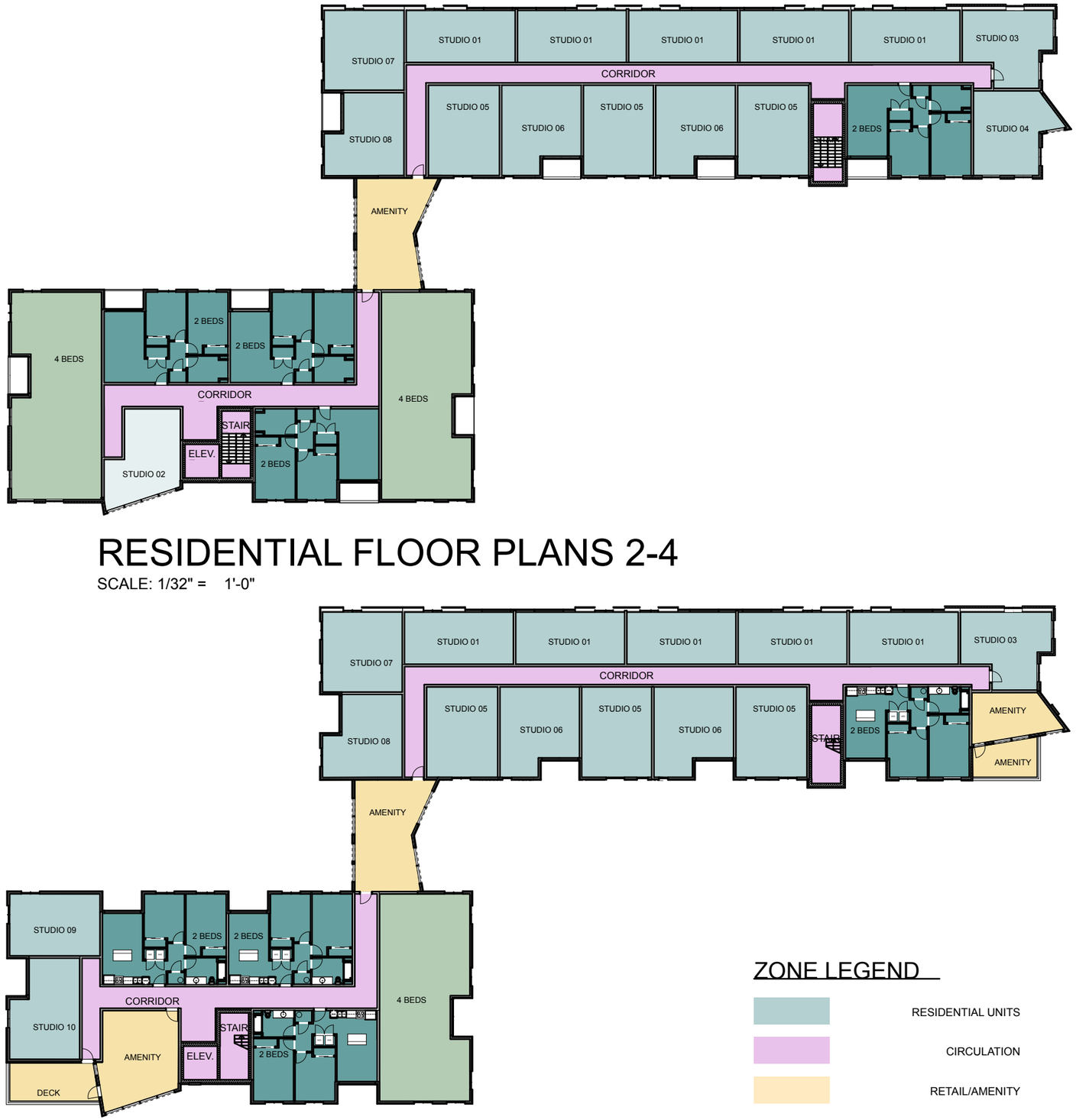
College Hill Neighborhood Overlay District Site Plan Review

COLLEGE HILL

FLOOR PLATES & MASSING

APARTMENT RENTABLE SQUARE FOOTAGE			
UNIT TYPE	QTY.	UNIT SQ FT.	TOTAL SQ. FT.
2 BEDS	16	802	13,165
4 BEDS	7	1370	9,590
STUDIO 01	20	433	8,860
STUDIO 02	3	450	1,350
STUDIO 03	4	446	1,784
STUDIO 04	3	470	1,410
STUDIO 05	12	500	6,000
STUDIO 06	8	502	4,021
STUDIO 07	4	499	1,996
STUDIO 08	4	451	1,804
STUDIO 09	1	430	430
STUDIO 10	1	487	487
TOTAL	83		50,897 sq. ft
TOTAL BEDS	120		
PARKING PROVIDED	65 (1 ACCESSIBLE STALL)		

BUILDING GROSS AREA		
BASEMENT	UNDERGROUND PARKING	24,350 sq ft
LEVEL 1	COVERED PARKING	5,994 sq ft
LEVEL 1	RETAIL	11,603 sq ft
LEVEL 1	LOBBY	735 sq ft
LEVEL 2-5	RESIDENTIAL	66,752 sq ft
TOTAL		109,434 sq ft
ADDITIONAL SURFACE PARKING		7,131 sq ft



RESIDENTIAL FLOOR PLANS 2-4

SCALE: 1/32" = 1'-0"

TOP FLOOR PLAN

SCALE: 1/32" = 1'-0"

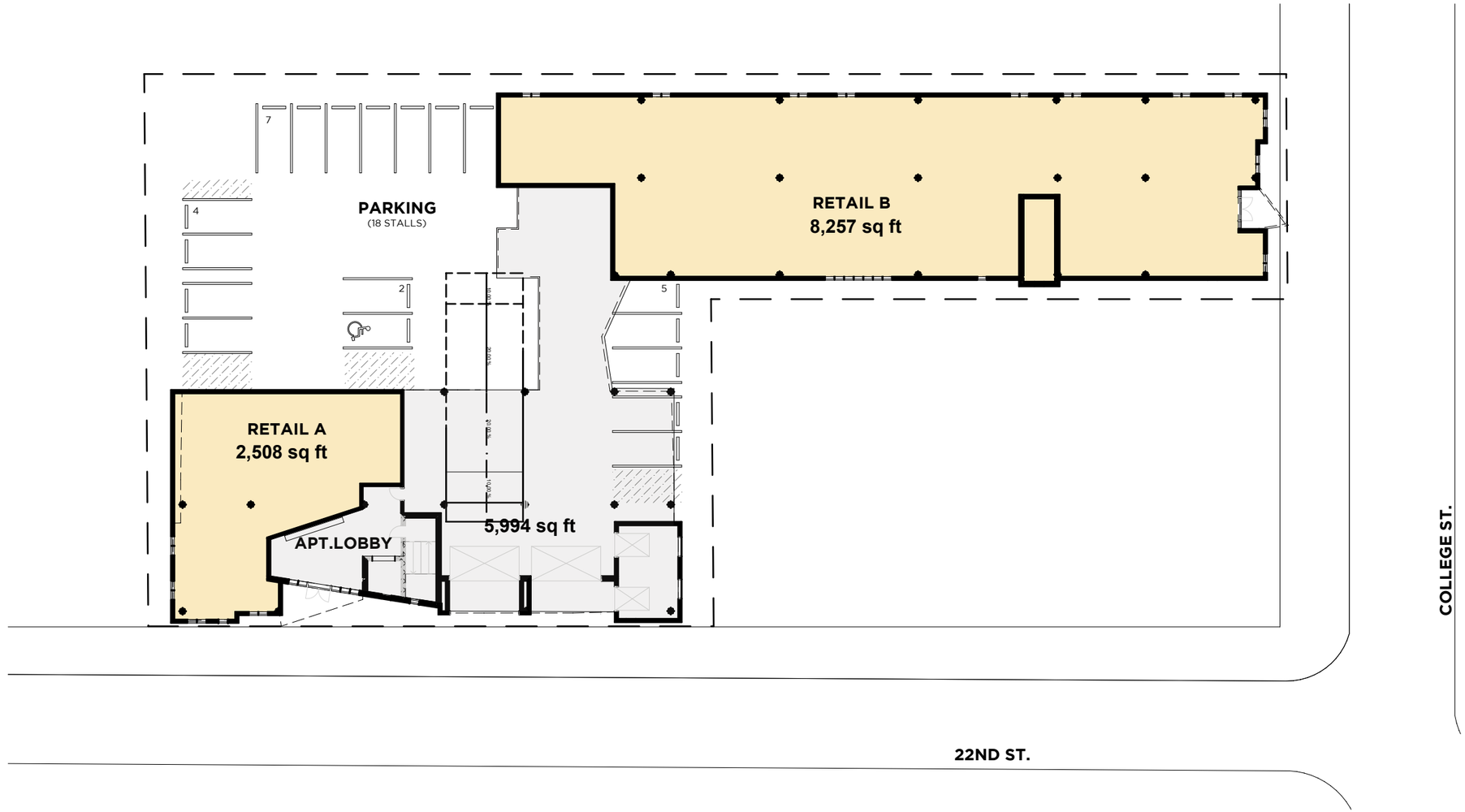
ZONE LEGEND

- RESIDENTIAL UNITS
- CIRCULATION
- RETAIL/AMENITY

ENGLISHOT
ARCHITECTURE

COLLEGE HILL

GROUND FLOOR



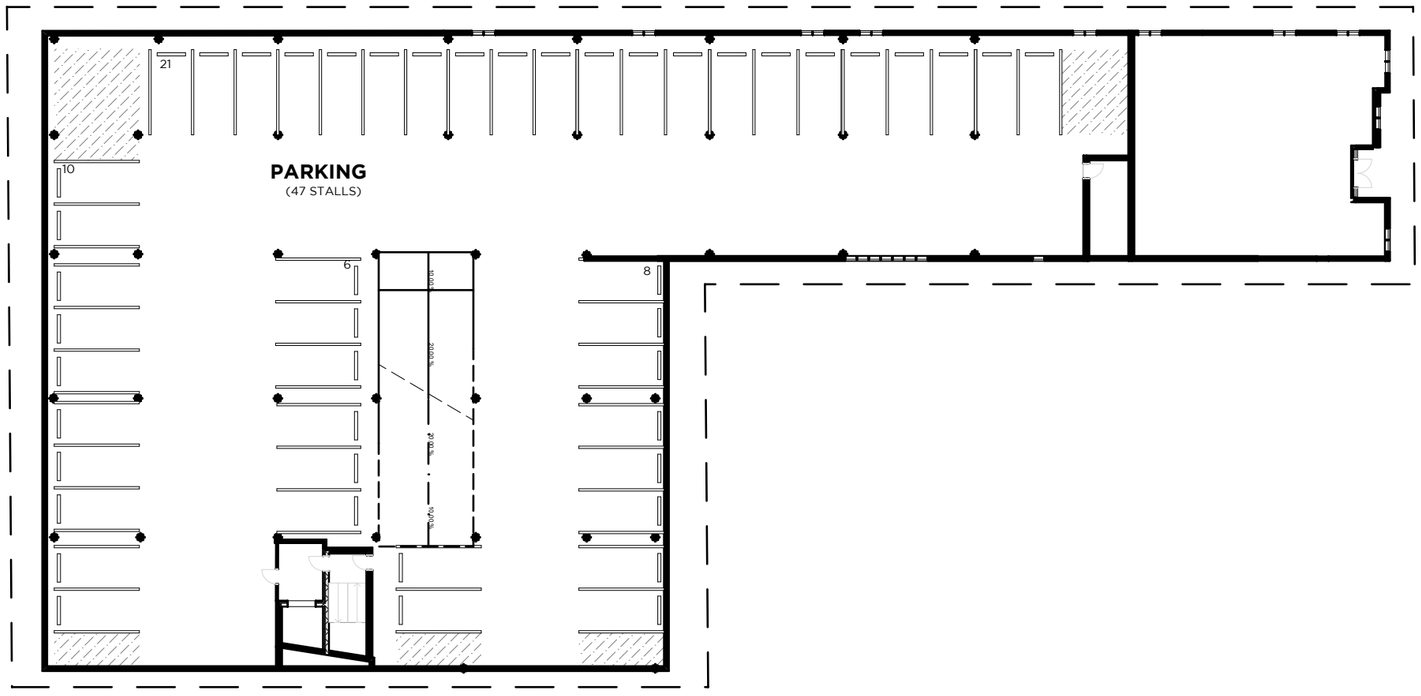
TOTAL RENTABLE RETAIL = 10,765 sq ft (64%)

LEVEL 1 - RETAIL + PARKING

SCALE: 1/32" = 1'-0"

COLLEGE HILL

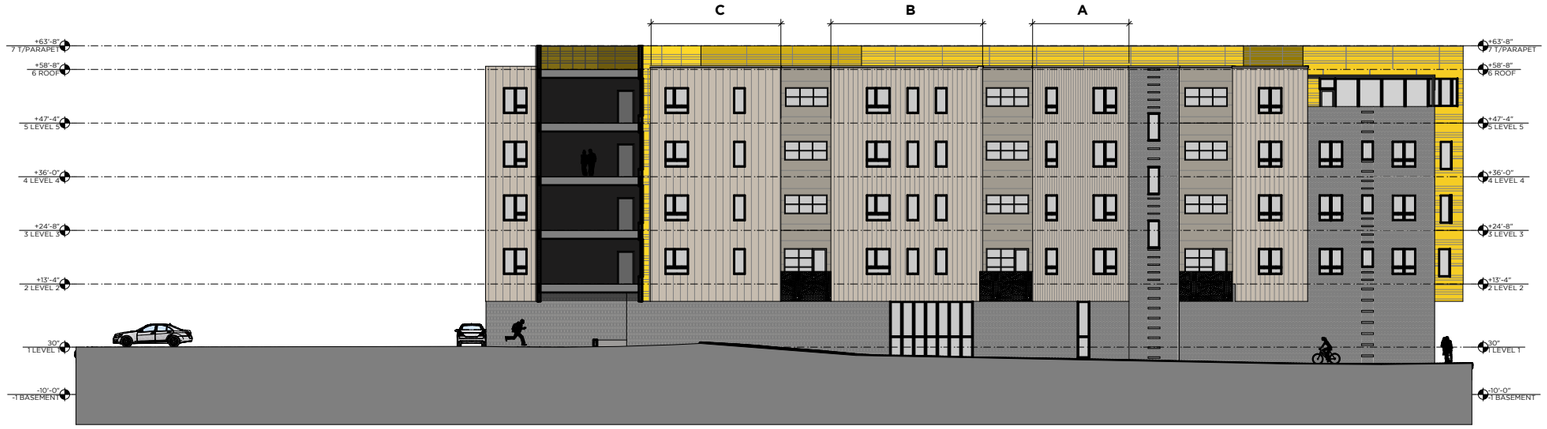
BASEMENT



UNDERGROUND PARKING

SCALE: 1/32" = 1'-0"

COLLEGE HILL
ELEVATIONS



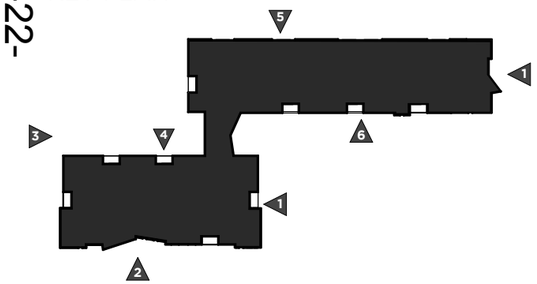
(6) SOUTH ELEVATION

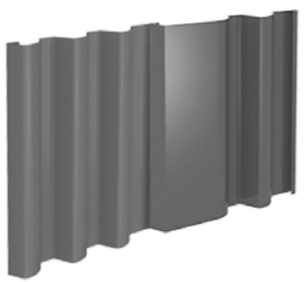
METAL PANEL @ FRONT FACE = 48.3%
BRICK @ FRONT FACE = 38.1%
OPENINGS @ FRONT FACE = 13.6%

(5) NORTH ELEVATION

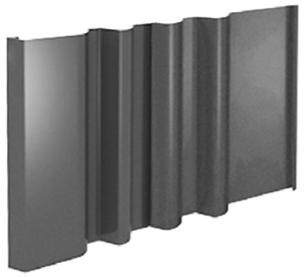
METAL PANEL @ FRONT FACE = 35.9%
BRICK @ FRONT FACE = 50.2%
OPENINGS @ FRONT FACE = 13.9%

KEY PLAN

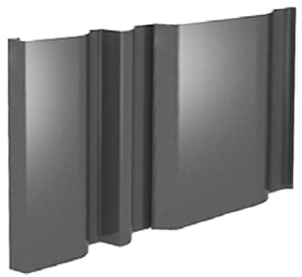




(A) METAL PANEL



(B) METAL PANEL



(C) METAL PANEL

METAL PANEL

BRICK

PERFORATED METAL SCREEN

COLLEGE HILL
ELEVATIONS

(4) NORTH ELEVATION - SOUTH BAR

METAL PANEL @ FRONT FACE = 75.3%
BRICK @ FRONT FACE = 13.6%
OPENINGS @ FRONT FACE = 11.1%

(3) WEST ELEVATION

METAL PANEL @ FRONT FACE = 54.6%
BRICK @ FRONT FACE = 31.5%
OPENINGS @ FRONT FACE = 13.9%

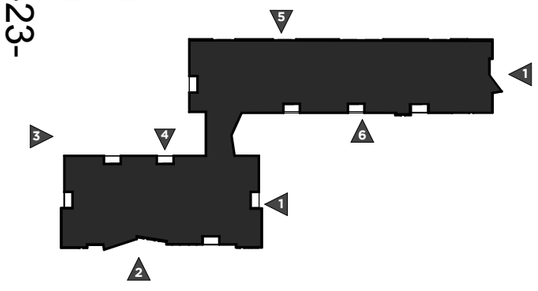
(2) SOUTH ELEVATION - SOUTH BAR

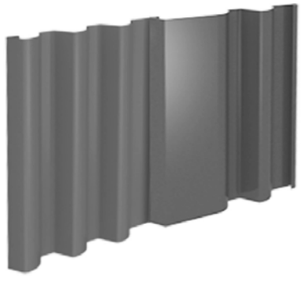
METAL PANEL @ FRONT FACE = 27.5%
BRICK @ FRONT FACE = 36.7%
OPENINGS @ FRONT FACE = 17.5%
CONCRETE @ FRONT FACE = 18.3%

(1) EAST ELEVATION

METAL PANEL @ FRONT FACE = 23.9%
BRICK @ FRONT FACE = 54.5%
OPENINGS @ FRONT FACE = 21.6%

KEY PLAN





(A) METAL PANEL

(B) METAL PANEL

(C) METAL PANEL

METAL PANEL

BRICK
COLLEGE BRICK: 71%
22ND STREET BRICK: 43%

PERFORATED METAL SCR

GNILSHOT
ARCHITECTURE

COLLEGE HILL

22ND STREET

COLLEGE HILL

COLLEGE STREET

COLLEGE HILL

CORNER VIEW

TOASTLING
ARCHITECTURE

COLLEGE HILL

VIEW THROUGH PARKING LOT

COLLEGE HILL

VIEW AT NORTH SIDE

OWNER OF RECORD:

CV COMMERCIAL, LLC

DATE OF PREPARATION:

1-18-2017

APPLICANT INFORMATION

SLINGSHOT ARCHITECTURE
305 EAST COURT AVE.
DES MOINES, IOWA 50309

DEVELOPER INFORMATION

604 CLAY ST.
CEDAR FALLS, IOWA 50613
CONTACT: CORY HENKE (319-640-0182)

ZONE INFORMATION:

DISTRICT: C3 (COLLEGE HILL OVERLAY)

BUILDING SETBACKS

	REQUIRED	PROVIDED (MIN)
FRONT YARD:	0 '	0 '
SIDE YARDS:	5 '	5 '
REAR YARD:	5 '	5 '

LOT AREA: 0.69 AC (29,914 SF)
IMPERVIOUS: 0.56 AC (24,316 SF)

PARKING INFORMATION:

	PROVIDED
ABOVE GROUND:	46
HANDICAP ACCESSIBLE	2

FLOODPLAIN INFORMATION:

NO FLOODPLAIN PRESENT PER FIRM PANEL #19013C0164F

LEGEND

Ⓐ PCC

Ⓑ LANDSCAPING

STORMWATER MANAGEMENT

STORMWATER MANAGEMENT TO BE PROVIDED BY UNDERGROUND DETENTION

PROPERTY USE

MULTIFAMILY HOUSING AND RETAIL

SIGHT TRIANGLES

SIGHT TRIANGLE DIMENSIONS ARE BASED ON A 30 MPH DESIGN SPEED

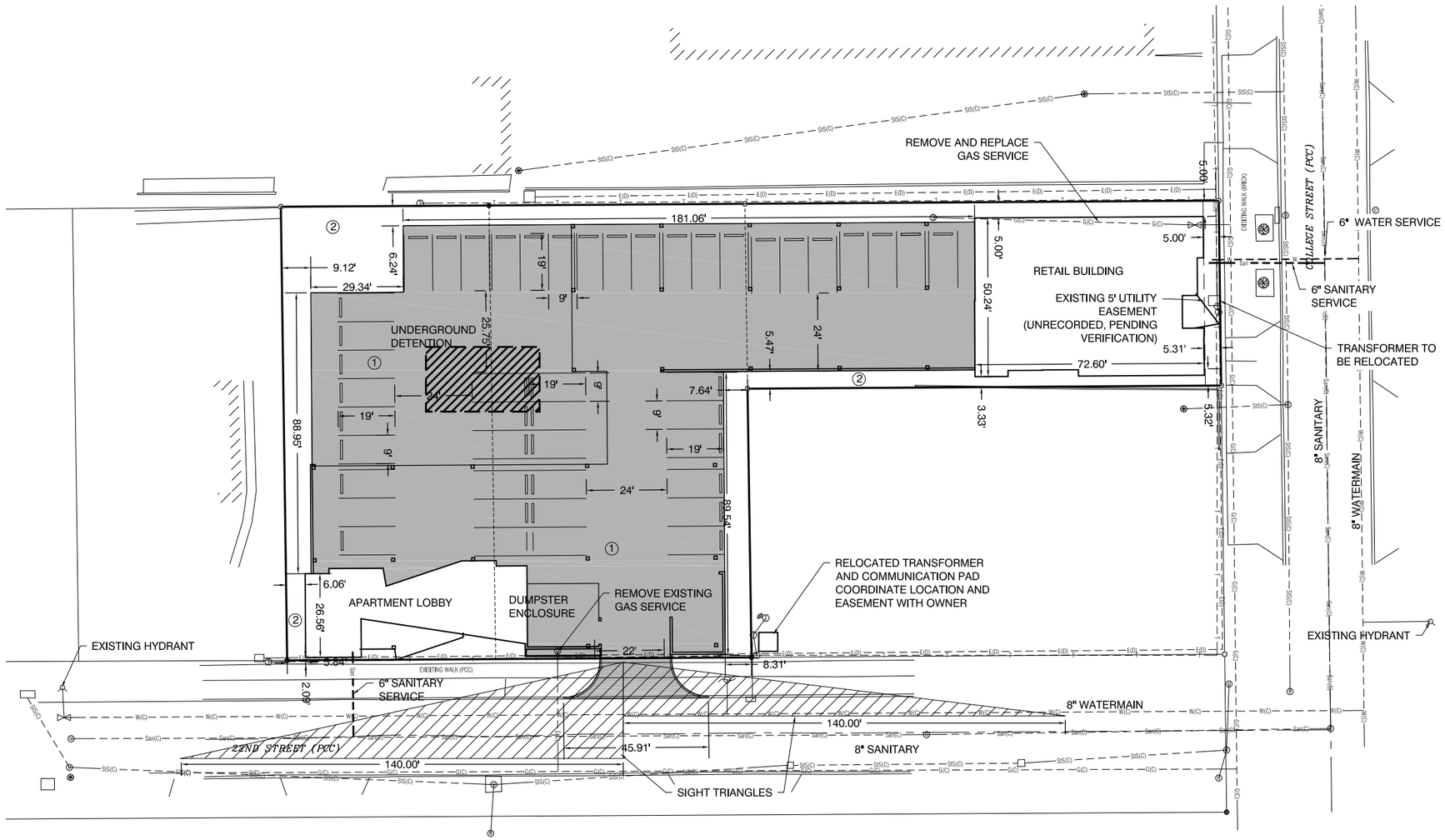
UTILITY INFORMATION

CENTURY LINK UTILITIES ARE PRESENT ON SITE. TO BE REMOVED DURING CONSTRUCTION.

EASEMENTS

NO EXISTING RECORDED EASEMENTS ARE PRESENT ON SITE.

PROVIDE 6'X6' EASEMENT FOR RELOCATED TRANSFORMER AND COMMUNICATIONS PAD. COORDINATE LOCATION WITH OWNER OF LOT.



GRAPHIC SCALE
0 20' 40' 60'

NO.	REVISION	BY	DATE	NO.	REVISION	BY	DATE

CGA
Clapsaddle-Garber Associates, Inc
16 East Main Street
Marshalltown, Iowa 50158
Ph 641-752-6701
www.cgaconsultants.com

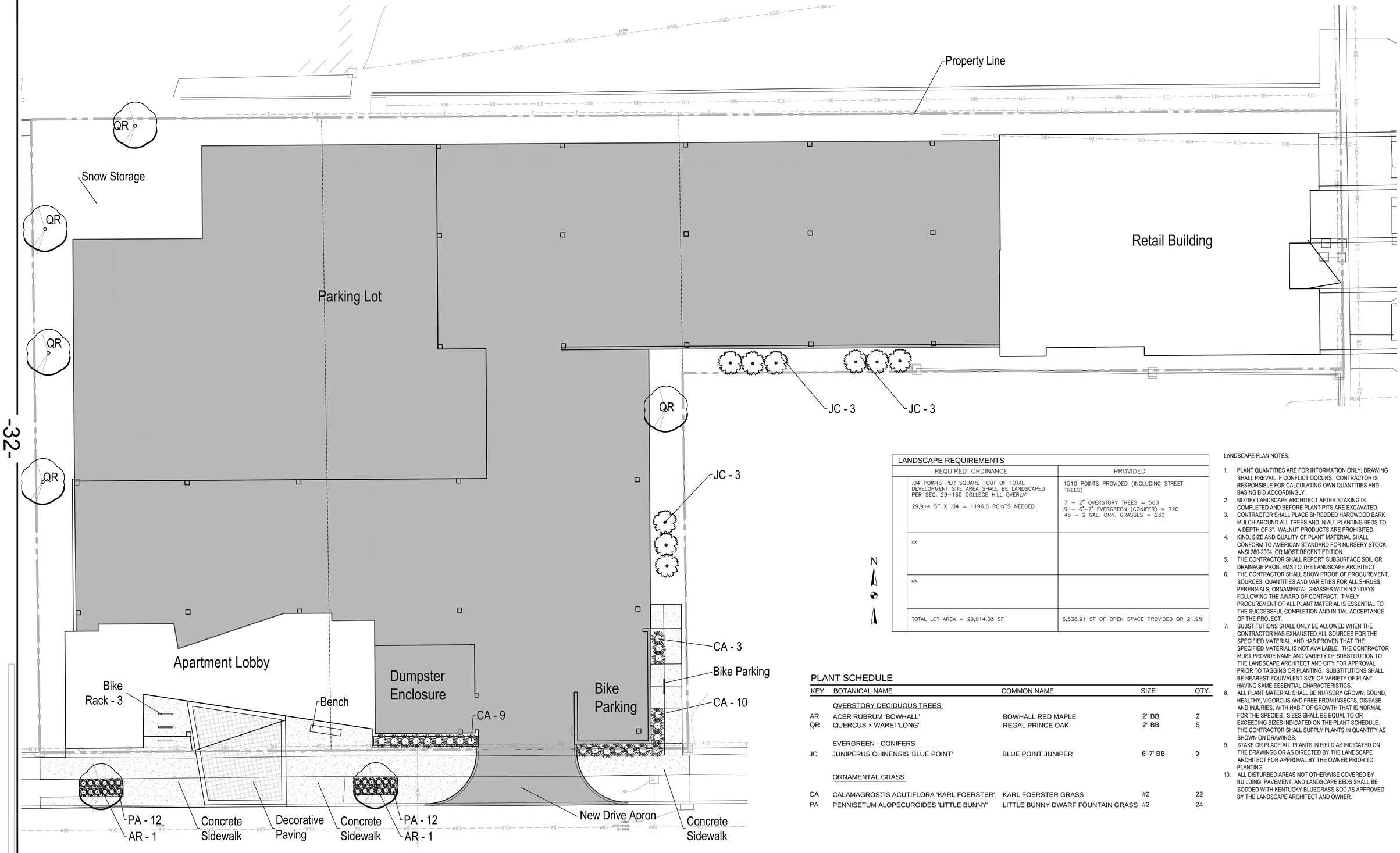
DESIGNED: _____ DATE: _____
DRAWN: _____ DATE: _____
CHECKED: _____ DATE: _____
APPROVED: _____ DATE: _____

COLLEGE HILL
CEDAR FALLS, IOWA

LAYOUT PLAN

PROJECT NO. 5627.04
SHEET NO. C.200

J:\5627\dwg\Sheets\5627 - Layout.dwg - CGA Plan - 02-13-17 - 10:43am - bjg293



LANDSCAPE REQUIREMENTS	
REQUIRED ORDINANCE	PROVIDED
.04 POINTS PER SQUARE FOOT OF TOTAL DEVELOPMENT SITE AREA SHALL BE LANDSCAPED PER SEC. 29-160 COLLEGE HILL OVERLAY 29,914 SF X .04 = 1196.6 POINTS NEEDED	1510 POINTS PROVIDED (INCLUDING STREET TREES) 7 – 2" OVERSTORY TREES = 560 9 – 6'-7' EVERGREEN (CONIFER) = 720 46 – 2 GAL. ORN. GRASSES = 230
xx	
xx	
TOTAL LOT AREA = 29,914.03 SF	6,538.91 SF OF OPEN SPACE PROVIDED OR 21.9%

PLANT SCHEDULE

KEY	BOTANICAL NAME	COMMON NAME	SIZE	QTY.
	OVERSTORY DECIDUOUS TREES			
AR	ACER RUBRUM 'BOWHALL'	BOWHALL RED MAPLE	2" BB	2
QR	QUERCUS × WAREI 'LONG'	REGAL PRINCE OAK	2" BB	5
	EVERGREEN - CONIFERS			
JC	JUNIPERUS CHINENSIS 'BLUE POINT'	BLUE POINT JUNIPER	6'-7' BB	9
	ORNAMENTAL GRASS			
CA	CALAMAGROSTIS ACUTIFLORA 'KARL FOERSTER'	KARL FOERSTER GRASS	#2	22
PA	PENNISETUM ALOPECUROIDES 'LITTLE BUNNY'	LITTLE BUNNY DWARF FOUNTAIN GRASS	#2	24

LANDSCAPE PLAN NOTES:

1. PLANT QUANTITIES ARE FOR INFORMATION ONLY; DRAWING SHALL PREVAIL IF CONFLICT OCCURS. CONTRACTOR IS RESPONSIBLE FOR CALCULATING OWN QUANTITIES AND BASING BID ACCORDINGLY.
2. NOTIFY LANDSCAPE ARCHITECT AFTER STAKING IS COMPLETED AND BEFORE PLANT PITS ARE EXCAVATED.
3. CONTRACTOR SHALL PLACE SHREDDED HARDWOOD BARK MULCH AROUND ALL TREES AND IN ALL PLANTING BEDS TO A DEPTH OF 3". WALNUT PRODUCTS ARE PROHIBITED.
4. KIND, SIZE AND QUALITY OF PLANT MATERIAL SHALL CONFORM TO AMERICAN STANDARD FOR NURSERY STOCK, ANSI 260-2004, OR MOST RECENT EDITION.
5. THE CONTRACTOR SHALL REPORT SUBSURFACE SOIL OR DRAINAGE PROBLEMS TO THE LANDSCAPE ARCHITECT.
6. THE CONTRACTOR SHALL SHOW PROOF OF PROCUREMENT, SOURCES, QUANTITIES AND VARIETIES FOR ALL SHRUBS, PERENNIALS, ORNAMENTAL GRASSES WITHIN 21 DAYS FOLLOWING THE AWARD OF CONTRACT. TIMELY PROCUREMENT OF ALL PLANT MATERIAL IS ESSENTIAL TO THE SUCCESSFUL COMPLETION AND INITIAL ACCEPTANCE OF THE PROJECT.
7. SUBSTITUTIONS SHALL ONLY BE ALLOWED WHEN THE CONTRACTOR HAS EXHAUSTED ALL SOURCES FOR THE SPECIFIED MATERIAL, AND HAS PROVEN THAT THE SPECIFIED MATERIAL IS NOT AVAILABLE. THE CONTRACTOR MUST PROVIDE NAME AND VARIETY OF SUBSTITUTION TO THE LANDSCAPE ARCHITECT AND CITY FOR APPROVAL PRIOR TO TAGGING OR PLANTING. SUBSTITUTIONS SHALL BE NEAREST EQUIVALENT SIZE OF VARIETY OF PLANT HAVING SAME ESSENTIAL CHARACTERISTICS.
8. ALL PLANT MATERIAL SHALL BE NURSERY GROWN, SOUND, HEALTHY, VIGOROUS AND FREE FROM INSECTS, DISEASE AND INJURIES, WITH HABIT OF GROWTH THAT IS NORMAL FOR THE SPECIES. SIZES SHALL BE EQUAL TO OR EXCEEDING SIZES INDICATED ON THE PLANT SCHEDULE. THE CONTRACTOR SHALL SUPPLY PLANTS IN QUANTITY AS SHOWN ON DRAWINGS.
9. STAKE OR PLACE ALL PLANTS IN FIELD AS INDICATED ON THE DRAWINGS OR AS DIRECTED BY THE LANDSCAPE ARCHITECT FOR APPROVAL BY THE OWNER PRIOR TO PLANTING.
10. ALL DISTURBED AREAS NOT OTHERWISE COVERED BY BUILDING, PAVEMENT, AND LANDSCAPE BEDS SHALL BE SODDED WITH KENTUCKY BLUEGRASS SOD AS APPROVED BY THE LANDSCAPE ARCHITECT AND OWNER.

GRAPHIC SCALE
0 10' 20' 30'

NO.	REVISION	BY	DATE	NO.	REVISION	BY	DATE

CGA
Clapsaddle-Garber Associates, Inc
5106 Nordic Drive
Cedar Falls, Iowa 50613
Ph 319-266-0258
www.cgaconsultants.com

DESIGNED: ZKH DATE: 02-13-2017
DRAWN: DATE:
CHECKED: DATE:
APPROVED: DATE:

COLLEGE HILL
CEDAR FALLS, IOWA

LANDSCAPE PLAN

PROJECT NO. 5627.04
SHEET NO. L.100

Shane Graham

To: David Sturch
Subject: RE: Notice: 22nd Street Apartment Project

From: Jon Taiber <jtaiber@live.com>
Sent: Thursday, January 4, 2018 1:42 PM
To: College Hill Partnership; Brian.Sires@wfhc.org; cfhistory@cfu.net; dave.amend@regions.com; DJBKDK@cfu.net; dvchristopherson@gmail.com; iowaskip@hotmail.com; jcutler@cfu.net; jhanish@cfu.net; jmccarty@cfu.net; john@rentfromjohn.com; jreppas@cfu.net; ksam@uni.edu; lkgeisler@mchsi.com; mail4darla@aol.com; mary.fain@uni.edu; sigepuni@gmail.com; Alex and Hillery Oberle; Alpha Xi Delta Sorority; Amy Mohr; Arleen Cook; Art Store and More; Barry and Jane Wilson; Becky and Aaron Hawbaker; Becky Hawbaker; Ben Allen; Ben and Dawn Jacobson; Ben/Liz Gerdes; Bettina Fabos; Beverly Owen; Bill and Beryl Waack; Bob Kressig; Carole Yates; Cary Darrah; Cheryl and Jim McCullagh; Chris Martin; Christopher Wernimont; Clohesy Consulting; College Hill Arts Festival; College Hill Luthern Church; Copyworks; Darin Beck; Darrell Wiens; Daryl Andersen; Daryl Kruse; Doug Johnson; Elizabeth Sutton; Frank Darrah; Gale Bonsall; Helen Rutkowski; Jan Andersen; Janelle Darst; Jean Simmet; Jeanette Geisler; Jeff and Jill Bergman; Jeff Sitzmann; Jill Lankford; Jim and Mary Stichter; Joel and Linda Haack; Joel Anderson; John and Mary Cross; John Johnson; John McCarty; Jolene Carolan; Jonathan Taiber; Kamyar Enshayan; Karin Leonard; Kevin and Kim Engels; Kevin Shannon; Kyle Dehmlow; Len and Gail Froyen; Lynn and Mary Nielsen; Lynn Nielsen; Mara Beth Soneson; MaraBeth Soneson; Mary Brammer; Mary-Sue Bartlett; Matt and Sarah Hansen; Melanie Drake; Nick Taiber; nisg@uni.edu; Patricia Geadelmann; Randy Chapman; Russell Campbell; Stan and Rose Lorenz; Sub City; Sue Doody; Sue Hummel; Suzanne Freedman; Tim Hoekstra; Todd Dietz; Todd Munnik; Tony and Luann McAdams; Tony T; Vaughn Griffith; Wes Owen; Wesley Foundation; Wesley Foundation; William Clohesy; Zachary Simonson
Subject: Re: Notice: 22nd Street Apartment Project

All,

I am writing to express my support for this "hallmark" project on the Hill both as a neighbor resident and a frequent visitor to the Hill commercial establishments.

First, this project is a huge vote of confidence in the College Hill neighborhood and mixed use projects in general. It's not often a project of this level quality and financial commitment is sourced. This is an appropriate amount of density and connectivity given the location which should provide College Hill commercial businesses another 120+ customers within walking distance as well as campus which should reduce parking demands. Ames and Iowa City are great examples of communities have building vertically in their commercial areas adjacent to campus, Cedar Falls should consider the same approach.

Second, as a community, we should embrace the blue zone objectives by encouraging high density developments in a very walkable location thereby reducing the need for parking. There are no parking problems in Cedar Falls, people just need to be more creative and change the pre-existing mindsets. The lot behind Banni's a half a block away almost always sits empty. If consumers want a strip mall experience with curb side parking, there are plenty of options for the type of experience in Cedar Falls. People are driving far less with biking, uber and other car share services readily available in and around campus. Having to design unnecessary parking increases the cost of the development and adversely impacts the quality of life and experiences in our neighborhood. The market is perfectly positioned to address parking demand. Free parking simply should no longer be the norm. We can't let parking wag the dog which seems to be the concern.

Third, this project reduces the demand on less desirable apartment options as the increase in supply reduces the demand on single family home conversions. I believe there is a desire for the community urban core to have more owner occupied homes. Quality apartment developments relieve the pressure to convert older housing stock to apartments providing owner occupied opportunities in the core neighborhood.

Finally, this development represents a significant taxable value increase in the College Hill area with both residential and commercial.

Unfortunately, I am unable to make the meeting on January 10th due to an out of town commitment. I hope you will consider supporting this project.

Best,
Jon Taiber
16th Street Resident

From: College Hill Partnership <collegehillpartnership@gmail.com>
Sent: Wednesday, January 3, 2018 6:04 PM
To: Brian.Sires@wfhc.org; cfhistory@cfu.net; dave.amend@regions.com; DJBKDK@cfu.net; dvchristopherson@gmail.com; iowaskip@hotmail.com; jcutler@cfu.net; jhanish@cfu.net; jmccarty@cfu.net; john@rentfromjohn.com; jreppas@cfu.net; ksam@uni.edu; lkgeisler@mchsi.com; mail4darla@aol.com; mary.fain@uni.edu; sigepuni@gmail.com; Alex and Hillery Oberle; Alpha Xi Delta Sorority; Amy Mohr; Arleen Cook; Art Store and More; Barry and Jane Wilson; Becky and Aaron Hawbaker; Becky Hawbaker; Ben Allen; Ben and Dawn Jacobson; Ben/Liz Gerdes; Bettina Fabos; Beverly Owen; Bill and Beryl Waack; Bob Kressig; Carole Yates; Cary Darrah; Cheryl and Jim McCullagh; Chris Martin; Christopher Wernimont; Clohesy Consulting; College Hill Arts Festival; College Hill Luthern Church; Copyworks; Darin Beck; Darrell Wiens; Daryl Andersen; Daryl Kruse; Doug Johnson; Elizabeth Sutton; Frank Darrah; Gale Bonsall; Helen Rutkowski; Jan Andersen; Janelle Darst; Jean Simmet; Jeanette Geisler; Jeff and Jill Bergman; Jeff Sitzmann; Jill Lankford; Jim and Mary Stichter; Joel and Linda Haack; Joel Anderson; John and Mary Cross; John Johnson; John McCarty; Jolene Carolan; Jonathan Taiber; Kamyar Enshayan; Karin Leonard; Kevin and Kim Engels; Kevin Shannon; Kyle Dehmlow; Len and Gail Froyen; Lynn and Mary Nielsen; Lynn Nielsen; Mara Beth Soneson; MaraBeth Soneson; Mary Brammer; Mary-Sue Bartlett; Matt and Sarah Hansen; Melanie Drake; Nick Taiber; nisg@uni.edu; Patricia Geadelmann; Randy Chapman; Russell Campbell; Stan and Rose Lorenz; Sub City; Sue Doody; Sue Hummel; Suzanne Freedman; Tim Hoekstra; Todd Dietz; Todd Munnik; Tony and Luann McAdams; Tony T; Vaughn Griffith; Wes Owen; Wesley Foundation; Wesley Foundation; William Clohesy; Zachary Simonson
Subject: Fwd: Notice: 22nd Street Apartment Project

College Hill Members

As promised I wanted to make sure you were made aware when this project is going to go in front of the P & Z Commission. I will be sending this out to the CHP Board and College Hill Businesses as well.

Please let me know if you have any questions.
Kathryn Sogard
College Hill Partnership
Executive Director

Shane Graham

To: David Sturch
Subject: RE: 22nd and College multi use aparment

-----Original Message-----
From: Russ Campbell [mailto:campbell@math.uni.edu]
Sent: Thursday, January 04, 2018 8:48 AM
To: David Sturch
Subject: 22nd and College multi use aparment

This is input invited by your e-mail to the College Hill Partnership.

1) Truth in the description: The description refers to level 1 covered parking, but it looks like only 2 of the level one parking slots will be covered. The square footage listed for covered parking refers primarily to access to the level 1 parking.

2) If there is retail space, there should be parking for customers. I do not think there is enough parking for residents and customers (I do not think there is enough parking for residents, but you have your guidelines on parking slots per bed.)

3) There should be more handicapped accessible parking slots. It would be nice if there were a couple underground. (I assume the elevator goes to the basement.)

4) The area (neighborhood) will be crowded, but the city code specifies how close to property lines you can build.

R. B. Campbell
1934 campus St.

DEPARTMENT OF COMMUNITY DEVELOPMENT

City of Cedar Falls
220 Clay Street
Cedar Falls, Iowa 50613
Phone: 319-273-8600
Fax: 319-273-8610
www.cedarfalls.com

MEMORANDUM

Planning & Community Services Division

TO: Planning and Zoning Commission

FROM: David Sturch, Planner III

DATE: January 5, 2018

SUBJECT: MU District Site Plan Review - Kwik Star Convenience Store

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REQUEST: Site plan review and approval for a new Kwik Star Convenience Store/Gas Station

PETITIONER: Kwik Trip, Inc.

LOCATION: A part of Lot 33 and all of Lot 34 of the Pinnacle Prairie Business Center North.

PROPOSAL

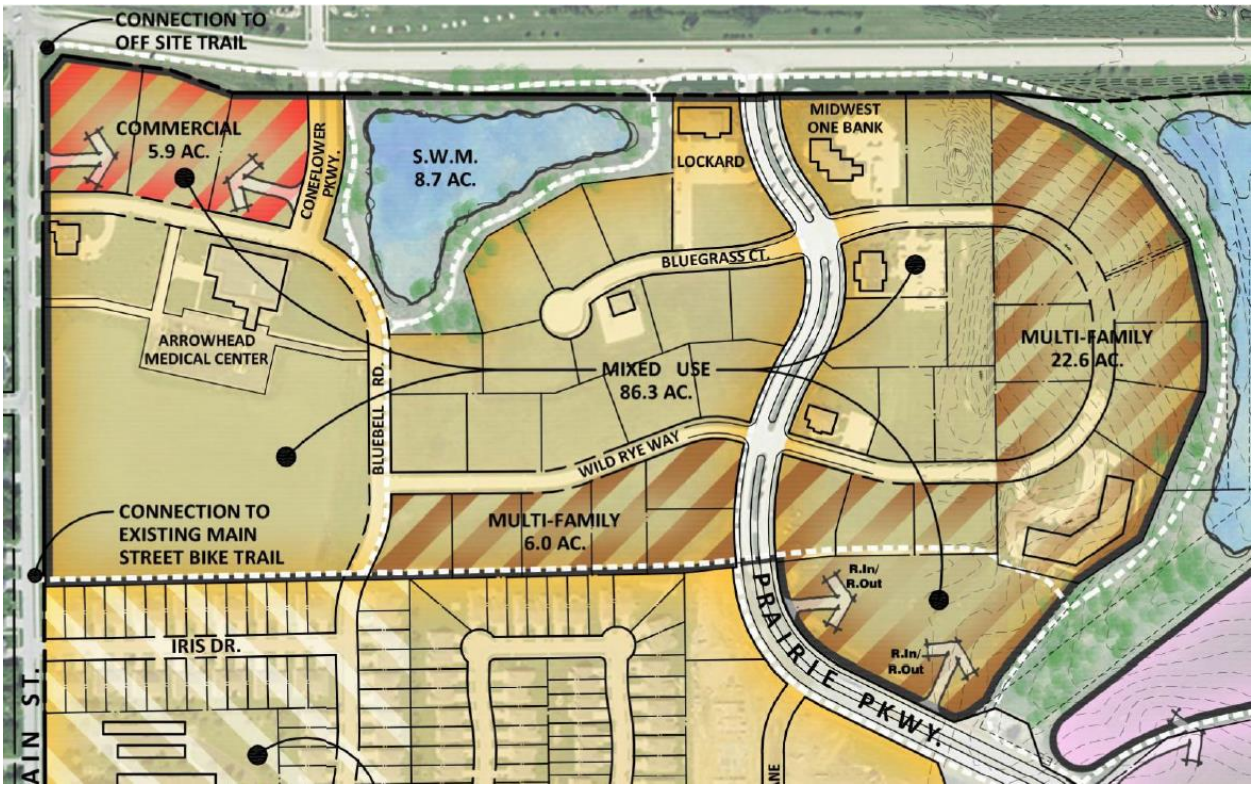
The petitioner is proposing a single story 7,000 square foot convenience store/gas station with a 2,800 square foot detached two-bay carwash and a 40' by 120' fueling canopy for the gasoline pumps. The original site plan showed an attached carwash off the west side of the building with a north exit. The revised plan with a detached carwash has a south exit. The property is 2.84 acres with two driveways onto Bluebell Road and a right in/right out onto Coneflower Parkway.

BACKGROUND

The Pinnacle Prairie Master Plan was approved in the summer of 2004 for the Pinnacle Prairie area, when the property was rezoned to MU, Mixed Use Residential District. This property is included in the Pinnacle Prairie Business Center North subdivision. The preliminary plat and final plat was approved by the Planning and Zoning Commission and the City Council in the spring of 2005.

In August 2014, staff met with the developer to discuss changes that have occurred since the rezoning and the importance of updating the Master Plan (see below). The Master Plan was formally adopted by the Planning and Zoning Commission and the City Council in the spring of 2015. Even though a convenience store is a permitted use under the MU zoning district, this plan classified the land uses for the area in the northwest portion of the development for commercial uses while the remaining area of the subdivision is mixed use with office, medical and residential.

The MU District is established for the purpose of accommodating integrated residential and neighborhood commercial uses. Appropriate uses would include: grocery, drug store, restaurant, retail shops, gasoline station, bookstore, theatre, household appliance store, etc.



Pinnacle Prairie Master Plan

ANALYSIS

This property is located in the MU, Mixed Use Residential, District which is intended to integrate residential and neighborhood commercial land uses for the purpose of creating viable, self-supporting neighborhood districts. A detailed site plan review is required to ensure that the development site satisfies a number of standards. Attention to details such as parking, open green space, landscaping, signage, building design and other similar factors help to ensure orderly development in the entire area.

Following is a review of the zoning ordinance requirements:

1) Use: This site plan includes a 7,000 square foot single story convenience store with a detached two bay carwash and fuel canopy. A Master Plan was developed and recently revisited considering the mix of uses, of which this site was identified for neighborhood commercial uses. **Use is allowed and consistent with the Master Plan.**

2) Building Location: The setbacks for this district are 20-feet along the south and east, 50 feet along the north (50' utility and landscape easement) and 10 feet on the west (10' utility easement). These setbacks must be free and clear of all buildings, parking areas and signage. The proposed building and canopy is surrounded by the parking lot and driveways. The detached car wash building is approximately 15 feet from the west lot line. All driveways, parking areas, buildings and signs are located outside the aforementioned setback areas. **Building setbacks are satisfied.**

3) Parking: The parking requirement for convenience stores is one space for every 100 square foot of retail floor space plus one stall for every two employees. The retail floor space in the proposed Kwik Star is 3,344 square feet. This yields to 33 parking stalls plus parking for the employees. The plan has a total of 42 stalls around the building. Since fuel dispensing pumps are included in the plan with a car wash, the site has the adequate stacking space for each gas pump and car wash bay that will not prohibit ingress or egress in the driveway, parking stall or access aisle.

   According to the Pinnacle Prairie Design Guidelines parking for all commercial uses should be behind the building. The Design Guidelines are part of the Development Agreement; therefore the city should consider the extent to which they are met in a site plan review. The point of having parking in the back of a commercial development is that parking will not be the focal point of the development. The Kwik Star site plan has their parking in front and on the side of the building. The Design Guidelines state that if the parking is in front of the building, enhanced landscaping will be required around the parking lot. There is enhanced landscaping with a continuous line of evergreen trees along the north side of the parking lot and planting beds along Bluebell and Coneflower. This plan also satisfies the perimeter parking lot landscaping requirements. **The parking plan is satisfied.**

4) Open Green Space/Landscaping: The MU District requires that open green space be provided at the rate of 10% of the total development site area excluding the required setbacks. The development site is 2.84 acres or 123,872 square feet. The proposed plan offers 1.1 acres or 47,940 square feet (38%) of open space. When deducting the setbacks for this property, the minimum required open space area is 12,370 square feet and the open space provided for this site (excluding setbacks) is 19,260 square feet. Since this property is adjacent to Greenhill Road, the property is located in the Highway Corridor and Greenbelt Overlay District (HCG). This overlay requires all commercial lots exceeding one acre in area to have a minimum of 25% open space for the entire property. Again, the site plan shows approximately 39% of the total site reserved for open space.

   The required landscape plantings in the HCG is 0.03 points per square foot of lot area and the MU district equals 0.02 points per square foot of lot is required. Below is a table listing the planting requirements and what is being provided:

Landscaping			
Type	HCG Points	MU Points	Points Provided
Development site	3,511	2,474	3,645
Street Trees	765	765	825
Parking trees	3	3	3

   The table above summarizes the landscaping requirements for the HCG and MU districts. The total development site exceeds the MU district standards and the HCG requirements. The focus of the landscaping is two-fold: along roadways, for buffering and around the building/parking lot. The landscaping is well distributed. In addition to the required landscape plantings, the site includes a mixture of overstory trees, understory trees,

evergreen trees, shrubs and ornamental grasses. The Design Guidelines require additional plantings 10%-15% greater than what is outlined in the MU district. These guidelines will be satisfied since the HCG district requires more plantings. **Open green space and landscaping requirements are satisfied.**

5) Building Design: The MU District requires a design review of various elements to ensure architectural compatibility to surrounding structures. These are noted below with a review on how each element is addressed. While the proposed building is in the Business Center North development, there are multiple medical and office buildings in this area from which to relate the design. These buildings were designed to meet the Pinnacle Prairie Design Guidelines. As the Pinnacle Prairie Design Guidelines are part of the Development Agreement and all commercial buildings currently in the MU district meet these design requirements; staff review will not only cover how the Zoning Ordinance is met but also the Pinnacle Prairie Design Guidelines.

Below are examples of existing commercial buildings Business Center North district:

226 Bluebell Road (Covenant Medical Center)

715 Bluegrass (Thomas J. Strub, DDS)

a) ***Proportion:*** *The relationship between the width and height of the front elevations of adjacent buildings shall be considered in the construction or alteration of a building; the relationship of width to height of windows and doors of adjacent buildings shall be considered in the construction or alteration of a building.*

The scale and height of this commercial building is comparable to the other office and medical buildings in the Business Center North development. The overall height of the

Kwik Star store is approximately 22 feet. The finish floor of the proposed building will be at 943' as compared to the Fareway Star store at 949' and the Public Safety building at 952'.

The design of the store includes windows on the front (east) and north side. The window design includes a sash bar that separates the transom on the top third of the windows. The detached car wash building mimics the store with windows on the west and east side, entry doors on the north and exit doors on the south. The building faces east with the main entrance off of Coneflower Parkway. These proportional features are found on other buildings in this MU district.

b) ***Roof shape, pitch, and direction****: The similarity or compatibility of the shape, pitch, and direction of roofs in the immediate area shall be considered in the construction or alteration of a building.*

The proposed Kwik Star store includes a hip roof with asphalt shingles that is similar in design to the other buildings in the immediate area. The hip roof will conceal the heating and cooling units and other features on top of the building. This roof feature is included on the car wash with an asphalt roof brow on the north and south side of the building. The canopy island includes a hip roof with asphalt shingles. The canopy support posts will be wrapped in stone and brick columns to match the building.

Fueling Canopy

c) ***Pattern:*** *Alternating solids and openings (wall to windows and doors) in the front facade and sides and rear of a building create a rhythm observable to viewers. This pattern of solids and openings shall be considered in the construction or alteration of a building.*

Front Entry Detail

Overall the design of the store is an attractive building that is similar to the other Kwik Star stores in the area. The only difference with the proposed store and other stores is the asphalt roof as opposed to a steel standing seam roof. Staff felt that this roof should match the materials of the other buildings in the development. The pattern includes long horizontal lines repeated around the building with a brick soldier course treatment at the top of the windows. The entry extends outward from the front of the building. This

entry includes brick corner columns topped with an arching soldier course brick work over the doorway. The gable ends include wall signage over a stucco finish. The fascia continues the horizontal treatment around the building with multi-color elements. The detached carwash building includes the aforementioned design elements. These design features are found on other buildings in this MU District.

d) ***Materials and texture****: The similarity or compatibility of existing materials and textures on the exterior walls and roofs of buildings in the immediate area shall be considered in the construction or alteration of a building. A building or alteration shall be considered compatible if the materials and texture used are appropriate in the context of other buildings in the immediate area.*

The primary materials used on the building and car wash are brick, stone and glass. The building has a strong base formed by stone wainscot along the bottom third of the facade topped with a stone soldier course design. The upper two-thirds of the facade are covered with red brick and windows. One would find these materials on other buildings in this MU District.

The Pinnacle Prairie Design Guidelines outline the design for the buildings to be prairie style architecture, with naturally occurring stone and large overhangs. The materials commonly used are brick and Anamosa limestone. The windows shall be bronze or champagne color to blend with the color choice of the brick. All MU commercial buildings have met these requirements. More details on the cultured stone material and window frames are needed to support the design guidelines.

e) ***Color****: The similarity or compatibility of existing colors of exterior walls and roofs of buildings in the area shall be considered in the construction or alteration of a building.*

The building design includes a typical red brick face color with tan accent brick colors. Earth tones are the common color in this MU District. The plan includes a tan stone base to match the horizontal stone banding, window trim and brick walls. The overhangs are covered in almond and red fascia to complement the color of the brick and stone on the rest of the building. These details are found on other buildings in this MU District.

f) ***Architectural features****: Architectural features, including but not limited to, cornices, entablatures, doors, windows, shutters, and fanlights, prevailing in the immediate area, shall be considered in the construction or alteration of a building. It is not intended that the details of existing buildings be duplicated precisely, but those features should be regarded as suggestive of the extent, nature, and scale of details that would be appropriate on new buildings or alterations.*

The proposed Kwik Star building's design matches that of others in this MU District utilizing the prairie style architecture with vertical window openings, horizontal lines in the brick design and brick columns to support the covered entries. This is not only a modern type of design but also replicates the design elements found on other commercial buildings in the MU District. **Overall, the design of the building fits the**

intent of this MU District. It should be noted that the developer approved the design of this new Kwik Star building.

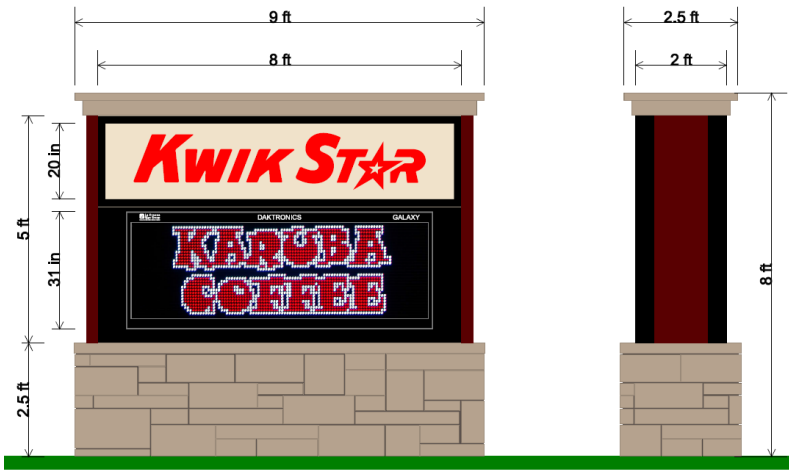
6) Trash Dumpster Site: The site plan shows a trash dumpster area connected to the southwest corner of the building. A brick wall encloses the dumpster area. This brick wall matches the design on the rest of the building. The dumpster is accessed by a wood screen fence. **The dumpster area provides adequate screening from the public views.**

7) Lighting: The intent of the the MU District encourages innovative designs with a common theme for all properties in the district. This includes the type and style of lights distributed throughout each site. The lighting style on the existing properties in the Business Center North Development includes antique style lanterns fixed to a 12'-15' tall pole. The applicant submitted a plan for a flat LED fixture on a 15-foot pole that is commonly found in the Prairie Business Park along the east side of Prairie Parkway. This lighting change is a diversion from the standard lantern style lights found on other nearby properties. The developer indicated that these LED light fixtures are acceptable for the commercial properties on Greenhill Road. **The Planning and Zoning Commission should consider if this style of light fixture is appropriate in this area.**

Proposed Light Fixtures

It is proposed to install a 15-foot tall light pole on a 3-foot base. The plan includes a total of nine poles and recessed light fixtures around the building and under the canopy. See attached design sheets. The pole near the easterly driveway is for a camera fixture. The other eight poles around the parking lot and in-between the building and carwash are LED light fixtures. A photometric lighting design was submitted and attached to this staff report. This plan shows the LED lights poles to cast a downward light just beyond the paved portion of the site.

8) Signage: The site plan indicates a monument sign and directional signs. A monument sign is located at the northeast corner of the site outside the required setbacks. This sign will be 8 feet in height and 34 square feet in area. Monument signs are allowed in the MU district not to exceed 8 feet in height and 40 square feet in area. Wall signs are identified on the east (Kwik Star) and west (Carwash) side of the building. Each sign is approximately 30 square feet in area. There are four directional signs located near the



Monument Sign

driveways approximately 5 feet in height and 4.5 square feet in area. Lastly, the fuel canopy will have the Kwik Star sign on the north and east side of the canopy. **Staff recommends that the Kwik Star signs be located on the east and west side of the canopy. A submitted signage plan conforms to this district's requirements. All signs will require a separate permit prior to installation.**

Directional Signs

9) Sidewalks: A public sidewalk will be installed along Bluebell Road and Coneflower Parkway. The sidewalk along Coneflower will connect into the existing recreational trail on Greenhill Road. A service walk will connect the store to the proposed sidewalk on Bluebell Road next to the east driveway. The sidewalk plans include a ramp at the northwest corner of Coneflower Parkway and Bluebell Road. This ramp must line up with the end of the median on Coneflower Parkway for a future crossing and connection to the existing sidewalk on the east side of Coneflower Parkway. **Sidewalk requirements are met.**

10) Storm water management: This lot is located in the Pinnacle Prairie Business Center North drainage plan. The plan is to collect the on-site runoff in a detention basin north of the parking lot. Kwik Star will grade this area and create a new 100-year basin on their property and in the Greenhill Road right of way. From here, the storm water will be released under Coneflower Parkway to the area wide detention basin. A maintenance and repair agreement between the Kwik Star and Fareway stores will be required for this detention basin. **Submit a stormwater maintenance and repair agreement prior to City Council approval.**

11) Easement Vacation and Dedication: The petitioner is purchasing the east half of Lot 33 to merge it with Lot 34 for this development. The plat includes a 10-foot utility easement on the original lot line. Those easements will be vacated as part of this project. A new 10' wide utility easement will be dedicated along the westerly property line of this site. Attached is the Utility Easement dedication plat. **The easement vacation and dedication is accepted by staff and CFU personnel.**

12) Other Site Plan Details: The site plan includes bike racks located near the northeast corner of the building. The plan also includes a picnic table area along the north side of the parking lot.

As previously mentioned, there will be a two-bay detached carwash building on the west side of the store. The vehicles will enter the carwash on the north side of the building and exit on the south side. Staff is concerned with the noise produced by the dryers in the carwash and the impacts to the nearby residential properties along Greenhill Road. During the previous discussion on this project, the representative from Kwik Star indicated that the car wash operations can be closed during the evening and early morning hours in order to eliminate the noise from the car wash dryers.

During the discussion at the December 13, 2017 meeting, a noise analysis of the carwash was requested by the Commission. The applicant submitted noise decibel readings of the

car wash dryers from a new Kwik Star store. The attached drawing shows the decibel readings from 50 feet to 300 feet away from the car wash entry. The decibels with the doors closed at 300 feet are 46.6 dB and 50.8 dB with the doors open. The Cedar Falls Code provides a noise limit of 55 dBs in a residential zoning district as measured from the nearest property line of the residential dwelling, which is across Greenhill Road. The decibel readings for the proposed car wash are with the limits of the City Code and the exit is situated on the south side of the building away from the closest residential dwelling.

13) Traffic Impact Study: Kwik Star submitted a Traffic Impact Study (TIS) for this proposed store. The four intersections surrounding this site were evaluated for current traffic volumes, projected traffic volumes, crash rates and growth rates. Based on the TIS and the close proximity of Coneflower Parkway to S. Main Street, a traffic signal is not warranted. This leads to other types of intersection improvements on Greenhill Road that includes the following:

- A right turn lane for the eastbound traffic on Greenhill Road.
- Paint center left turn lanes on Greenhill Road for both directions of traffic.
- Relocate the recreational trail on the south side of the new right turn lane.

A Development Agreement is under review between the City and Lockard Development for the roadway and trail improvements at the Greenhill Road and Coneflower Parkway intersection. The intent is to install these improvements prior to the opening of the proposed Kwik Star store.

This area has experienced development and growth over the past five years with the expansion of the Western Home campus, residential development, and commercial projects in the Viking Road corridor. The City realizes that this intersection at Greenhill and S. Main will need to be upgraded in the future and this is the reason that this project has been placed in the Capital Improvements Program for construction in 2021. Short term, the City will develop a traffic model to analyze the turning movements at this intersection to determine the near and long term improvement options. After evaluation, staff will make a recommendation to City Council for consideration. This is anticipated to occur in February 2018.

14) Fuel Tanks: Kwik Star installs double wall fuel tanks with water tight containment pumps and dispenser units. All containment casings are monitored with electronic sensors for leaks and spills.

15) Petitions: Attached to this staff report are a number of letters and comments from the adjoining neighborhood. The corresponding map identifies those individuals who signed the original petitions last fall. Also attached are additional comments, documents and photos that were presented at the last Commission meeting on December 13, 2017.

TECHNICAL COMMENTS:
All basic utility services are available to the property. The property owner/contractor is responsible to extend all utility services to the building. These utility extensions will be reviewed by CFU personnel as part of the building plan review. An 8" water service stub has been installed to both lots 33 and 34 off of Bluebell Rd. Both of the water services will be in the new proposed lot. One water service will be required to be abandoned at the owners cost. The owner/contractor must coordinate all utility accommodations with CFU personnel.

The site plan review fee has been submitted. A notice of this meeting was mailed to the adjacent neighborhoods on January 2, 2018.

STAFF RECOMMENDATION
The Community Development Department recommends approval of the Kwik Star site plan and utility easement vacation/dedication subject to the following conditions:

1) Any additional comments or direction specified by the Planning and Zoning Commission.
2) Conformance with the technical comments identified in the staff report.
3) Submit a storm water maintenance and repair agreement prior to City Council approval.
4) Lockard Development will design and construct the improvements at the Greenhill Road and Coneflower Parkway intersection.
5) The Developmental Agreement between the City and Lockard Development will be presented to the City Council in conjunction with the site plan.

PLANNING & ZONING COMMISSION

Discussion 9/13/2017	Chair Oberle introduced the item and Mr. Sturch provided background information, noting that this item will just be for discussion at this time. It is proposed to create a Kwik Star Convenience Store off of Greenhill Road at the corner of Coneflower Parkway and Bluebell Drive located in an MU Zoning District. He summarized the site plan details and recommendations listed in the staff report. There were some additional comments from the Commission members. Chair Oberle reiterated that this item is simply up for discussion at this time and opened the meeting for questions and public comments. There were several neighbors to speak against this with concerns on the additional traffic, noise, lights, crime, safety, storm water runoff and general use of the property not consistent with the neighborhood character. A full summary of these comments are found in the attached minutes from the September 13, 2017 Commission meeting. Wade Dumond, Kwik Trip/Star from LaCrosse, Wisconsin, came forward to address the questions and concerns that were presented by the Commission and nearby neighbors.

The discussion ended and Chair Oberle reminded everyone that this item will be back on the agenda in the coming weeks for additional discussion.

Discussion 12/13/2017

Chair Oberle introduced the item and Mr. Sturch provided background information. He discussed the comments from the previous discussion on September 13, 2017 and noted that staff has been working with the applicant on their traffic study, roadway capacity improvements and site plan changes. He summarized the site plan details and recommendations listed in the staff report. There were some additional comments from the Commission members.

There were several neighbors to speak against this with concerns on the additional traffic, noise, lights, crime, safety, storm water runoff and general use of the property not consistent with the neighborhood character. A full summary of these comments are found in the attached minutes.

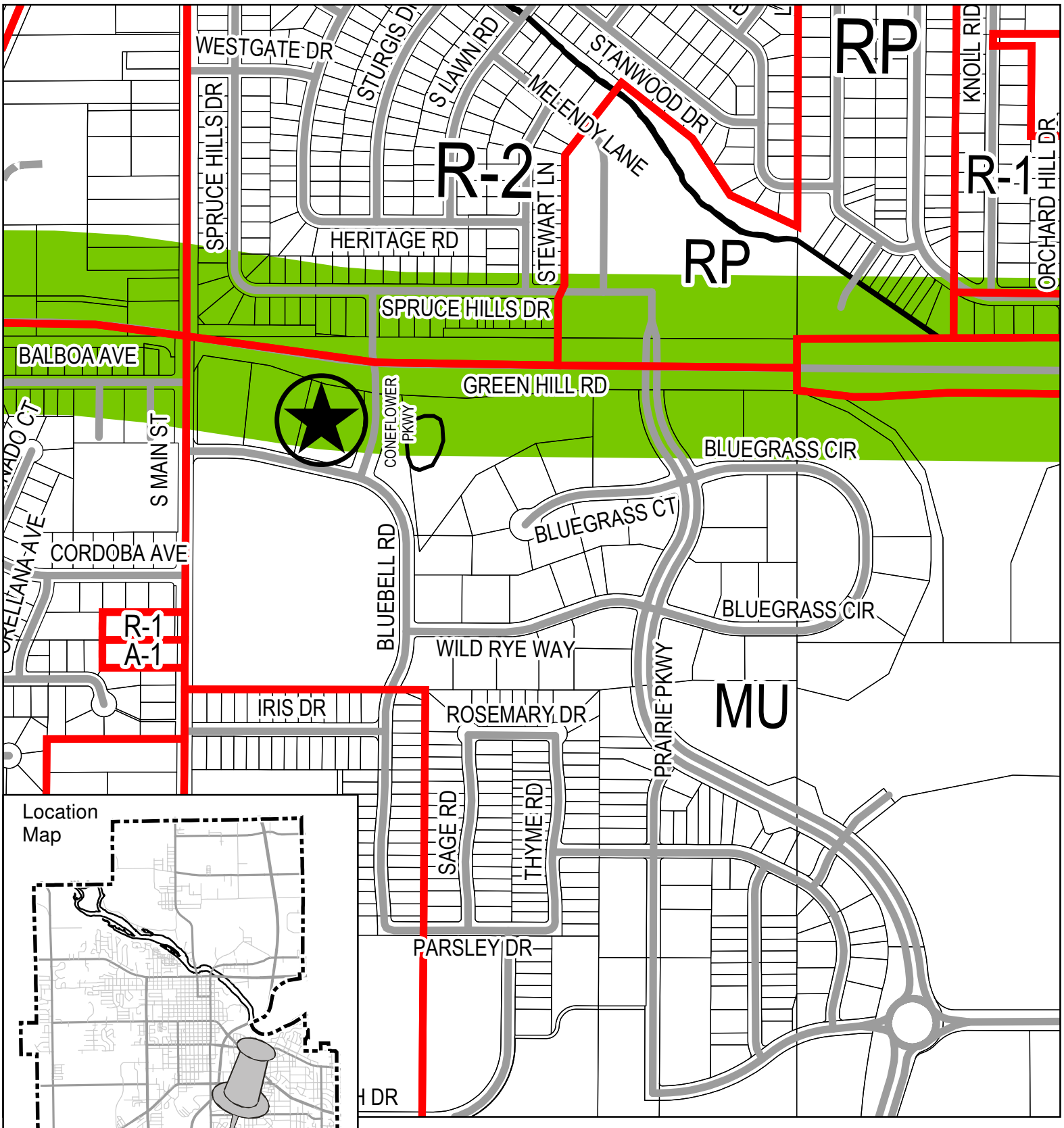
Wade Dumond, Kwik Trip/Star from LaCrosse, Wisconsin, came forward to address the questions and concerns that were presented by the Commission and nearby neighbors.

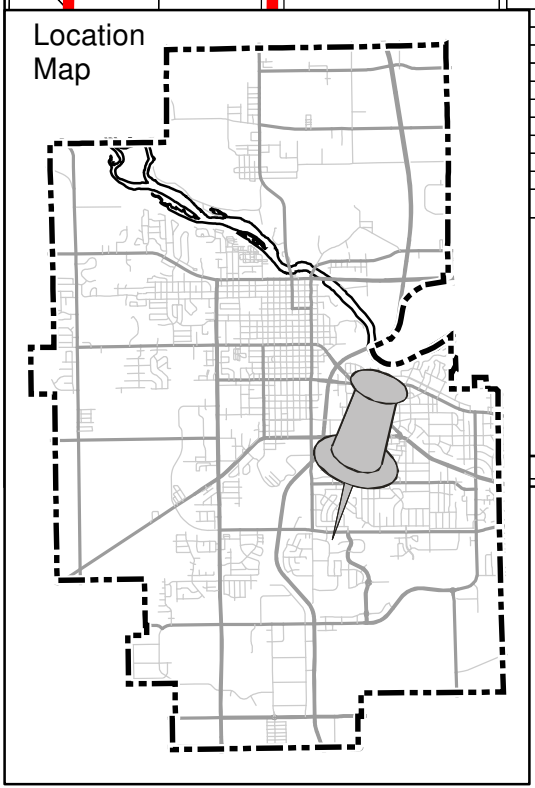
The commission members wanted more information on the lighting plan and noise concerns with the car wash exit. It was encouraged to orientate the car wash exit to the south side of the building away from the neighbors. A motion was made to table this request for more information. The motion was unanimously approved.

Attachments:
Location Map
Application Letter
Site Plan
Landscaping Plan
Architectural renderings
Utility Easement Vacation/Dedication Plat
Lighting Specifications
Noise Map
Petition Map
Petition Letters
Traffic Impact Study

Item 4.B.

Cedar Falls Planning and Zoning Commission
January 10, 2018





CEDAR FALLS Iowa

MU District Site Plan Review -
New Kwik Star Convenience Store

KWIK TRIP INC.

Store Engineering

FAX 608-793-6237

1626 Oak St., P.O. Box 2107
La Crosse, WI 54602

www.kwiktrip.com

City of Cedar Falls
David Sturch
220 Clay Street
Cedar Falls, Iowa 50613

Letter of Intent

December 29, 2017

Mr. Sturch,

This letter is intended to accompany our submittal for City of Cedar Falls Site Plan review and easement vacation for our proposed project at the North West corner of Bluebell Road and Coneflower Pkwy. This site is located in the Mixed Use Zoning District.

Kwik Trip, Inc. is proposing the construction of a 7000 s.f. convenience store with a 2800 s.f. detached two-bay carwash and a 40x120' fueling canopy. Included in the submittal is 1 copy (11"x17") of all documents requested. Cut sheets of the proposed lights that will be used on the site have also been attached and Kwik Trip's procedure for spill response. Kwik Trip went to a new store in Holmen WI and took decibel readings of the carwash dryers. The document labeled Noise Levels 2017 are those findings mapped on the Holmen map and then also what they would be on the Cedar Falls map.

The proposed method of operation for this development will be consistent with that of our existing convenience stores within the area. The requested hours of operation will be 24 hours for all uses. The type of products that will be sold will be similar to that of our existing stores: gasoline, groceries, bakery and dairy, hot and cold food and beverages, tobacco products, beer, lotto, convenience store merchandise, ice, and propane. The outside merchandising of products is being requested next to the store (ice and propane) and miscellaneous merchandising under the gas canopy. The proposed store is projected to have between 15-20 full and part time employees, with 2-8 on staff at any given time.

The proposed architectural plan will consist of a brick and stone facade with an asphalt roof on the building and car wash. The fueling canopy will consist of brick and stone façade that goes up 9' on the columns and an asphalt roof. The building and canopy fascia will tie in with franchise colors. The window details can be found in the site plan set on page A500. The stone that will be used for the bottom portion of the building and canopy columns has not been chosen at this time. We will work with developer to get information on what suppliers where used on other buildings in the area. The total estimated project costs is $3,200,000.

Kwik Trip would be happy to provide any additional information or answer any questions or concerns you may have with our submission. Please feel free to call me with any questions.

Sincerely,

Emily Kronebusch
Kwik Trip, Inc - Store Engineering
Development/Project Manager
608-791-7443
ekronebusch@kwiktrip.com

KWIK TRIP, Inc.
P.O. BOX 2107
1626 OAK STREET
LA CROSSE, WI 54602-2107
PH. (608) 781-8988
FAX (608) 781-8960

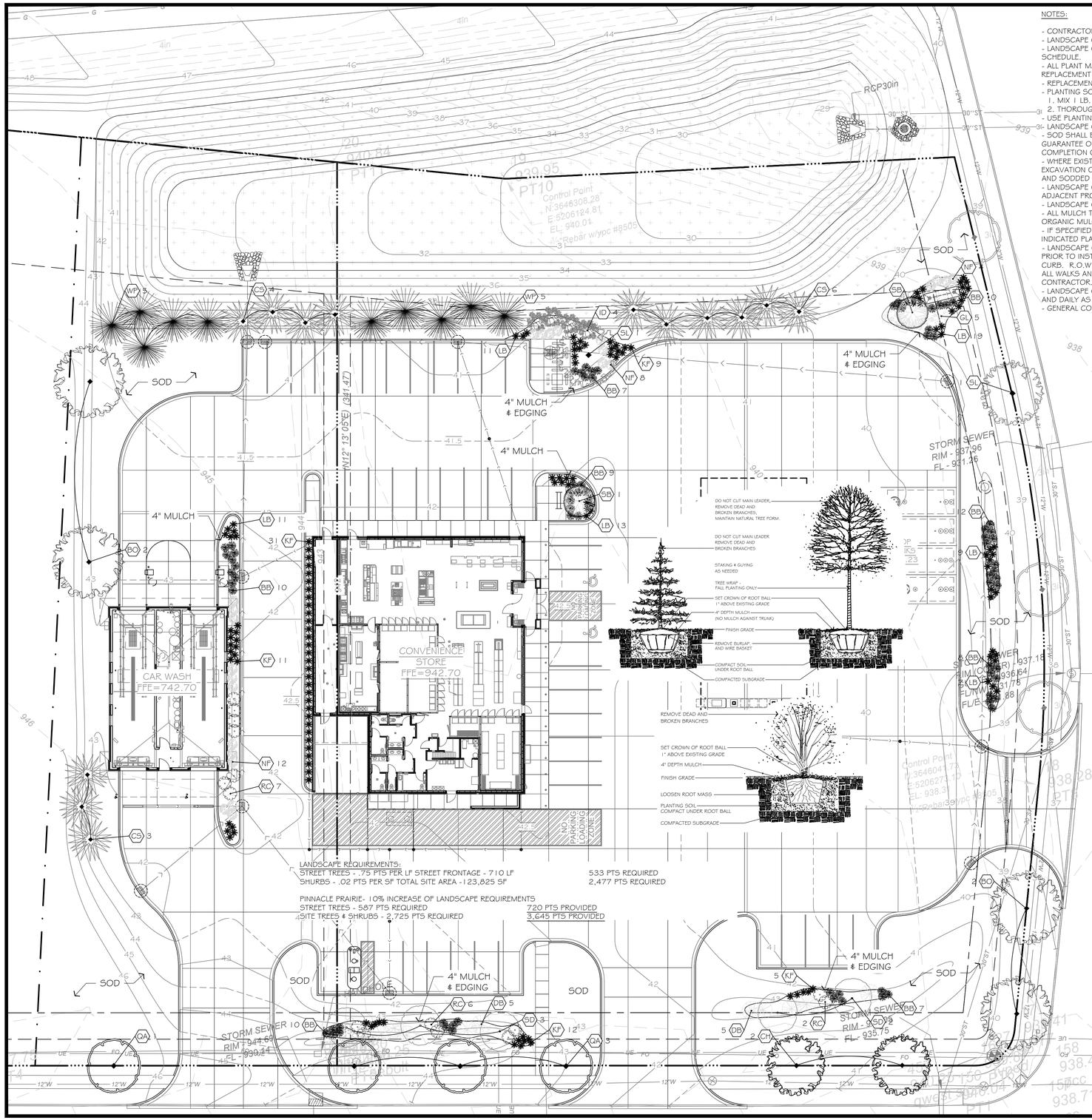
SITE PLAN

CONVENIENCE STORE #934
WITH DETACHED CW

CEDAR FALLS, IA

#	DATE	DESCRIPTION

DRAWN BY	EJK
SCALE	1" = 50'-0"
PROJ. NO.	0001
DATE	2017-12-15
SHEET	SP1



LANDSCAPE REQUIREMENTS:
STREET TREES - 75 PTS PER LF STREET FRONTAGE - 710 LF — 533 PTS REQUIRED
SHRUBS - .02 PTS PER SF TOTAL SITE AREA - 123,825 SF — 2,477 PTS REQUIRED

PINNACLE PRAIRIE- 10% INCREASE OF LANDSCAPE REQUIREMENTS
STREET TREES - 587 PTS REQUIRED
SITE TREES & SHRUBS - 2,725 PTS REQUIRED — 720 PTS PROVIDED, 3,645 PTS PROVIDED

NOTES:

- CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR PLANTING IN ALL R.O.W.
- LANDSCAPE CONTRACTOR SHALL VERIFY ALL UTILITIES WHICH MAY EFFECT HIS WORK.
- LANDSCAPE CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHERS AT SITE AND COMPLETE HIS WORK PER OWNERS CONSTRUCTION SCHEDULE.
- ALL PLANT MATERIALS SHALL BE GUARANTEED ONE (1) FULL YEAR UPON TOTAL COMPLETION AND ACCEPTANCE BY OWNER, WITH ONE TIME REPLACEMENT AT APPROPRIATE TIME OR UPON REQUEST OF OWNER.
- REPLACEMENT TOPSOIL SHALL BE CLEAN, FREE OF STONES, WEEDS, AND OTHER UNDESIRABLE DEBRIS.
- PLANTING SOIL MIX (INCIDENTAL COST ITEM)
  1. MIX 1 LB. 5-20-20 COMMERCIAL FERTILIZER PER CU. YD. TOPSOIL
  2. THOROUGHLY MIX 1-PART SAND AND 1-PART PEAT MOSS WITH 5-PARTS FERTILIZER AND TOP SOIL.
- USE PLANTING SOIL AT ALL LOCATIONS PER DETAILS THIS SHEET.
- LANDSCAPE CONTRACTOR SHALL VERIFY TOPSOIL DEPTH AND NOTIFY OWNER OF ANY DEFICIENCY.
- SOD SHALL BE CULTURED WITH PREDOMINATELY KENTUCKY BLUEGRASS SEED OF RECENT DISEASE RESISTANT INTRODUCTIONS. NO GUARANTEE ON SOD EXCEPT ANY SOD NOT SATISFACTORY AT TIME OF COMPLETION INSPECTION SHALL BE PROMPTLY REPLACED PRIOR TO COMPLETION OF JOB. STAKE SOD ON SLOPES 3:1 AND GREATER.
- WHERE EXISTING CONCRETE/ ASPHALT AREAS ARE TO BE REPLACED WITH LANDSCAPING, PROVISIONS SHOULD BE TAKEN TO COORDINATE EXCAVATION OF SUBSOIL TO A DEPTH OF 2' WITH GRADING CONTRACTOR. REPLACE WITH COMPACTED TOPSOIL. ALL AREAS TO BE LANDSCAPED AND SODDED SHALL BE GRADED SMOOTH AND EVEN.
- LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR SODDING ALL AREAS WHICH ARE DISTURBED BY CONSTRUCTION INCLUDING ALL R.O.W. AND ADJACENT PROPERTIES.
- LANDSCAPE CONTRACTOR TO INSTALL 'VALLEY VIEW', "BLACK DIAMOND" EDGING AROUND ALL PLANTING BEDS AS SHOWN ON THIS PLAN.
- ALL MULCH TO BE FINELY SHREDDED HARDWOOD ORGANIC BARK MULCH. NO DYED MULCHES. INSTALL 4" DEPTH. NO FILTER FABRIC BENEATH ORGANIC MULCHES. NO EDGING AROUND ALL TREES OUTSIDE SHRUB BEDS.
- IF SPECIFIED; ALL GRAVEL MULCH SHALL BE 1"+ DIA. WASHED "RIVER ROCK". INSTALL 4" DEPTH WITH APPROVED WEED FABRIC BARRIER IF INDICATED PLAN.
- LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR IRRIGATION SYSTEM INSTALLATION PER SHEET 11. DESIGN SHALL BE APPROVED BY OWNER PRIOR TO INSTALLATION. IRRIGATION DESIGN SHOULD ENCOMPASS ALL LANDSCAPE AREAS WITH SOD AND/ OR PLANTINGS, FROM CURB TO CURB. R.O.W. SHOULD BE IRRIGATED FROM SPRINKLER HEADS LOCATED WITHIN PROPERTY BOUNDARY. CARE SHOULD BE TAKEN IN VICINITY OF ALL WALKS AND DRIVES TO MINIMIZE OVER SPRAY. COORDINATE INSTALLATION OF ALL PVC SLEEVE UNDER DRIVE AREAS WITH GENERAL CONTRACTOR.
- LANDSCAPE CONTRACTOR SHALL CLEAN ALL PAVEMENT AREAS AFTER ALL LANDSCAPE INSTALLATION IS COMPLETE AND ACCEPTED BY OWNER AND DAILY AS DEEMED NECESSARY BY THE CITY.
- GENERAL CONTRACTOR TO SWEEP PAVEMENT AREAS PRIOR TO TURN OVER TO OWNER.

PLANT MATERIAL

	QUANTITY	SIZE	ROOT TYPE	COMMON NAME / BOTANICAL NAME	HEIGHT' X WIDTH'
OVERSTORY TREES					
BO	4	2.5" CAL.	B&B	BUR OAK *Quercus macrocarpa*	60' x 60'
CH	2	2.5" CAL.	B&B	COMMON HACKBERRY *Celtis occidentalis*	60' x 50'
SL	2	2.5" CAL.	B&B	SKYLINE HONEYLOCUST *Gleditsia tricanthos var. inermis 'Skycole'*	50' x 30'
QA	4	10' HT	B&B	QUAKING ASPEN *Populus tremuloides*	50' x 25'
UNDERSTORY TREES					
SD	5	2" CAL.	B&B	SNOWDRIFT CRAB *Malus 'Snowdrift'*	20' x 20'
SB	2	2" CAL.	B&B	AUTUMN BRILLIANCE SERVICEBERRY *Amelanchier x grandiflora 'Autumn Brilliance'*	20' x 15'
EVERGREEN TREES					
WP	10	6' HT	B&B	WHITE PINE *Pinus strobus*	65' x 35'
CS	13	6' HT	B&B	COLORADO SPRUCE *Picea pungens*	40' x 30'
SHRUBS					
DB	10	#5 CONT	pot	DWARF BURNING BUSH *Euonymus alatus 'Compactus'*	7' x 7'
ID	4	#5 CONT	pot	ISANTI DOGWOOD *Cornus sencea 'Isanti'*	5' X 7'
RC	13	#5 CONT	pot	BRILLIANTISSIMA RED CHOKEBERRY *Aronia arbutifolia 'Brilliantissima'*	5' x 5'
NF	24	#3 CONT	pot	NEON FLASH SPIREA *Spiraea japponica 'Neon Flash'*	3' x 4'
GL	5	#3 CONT	pot	GRO-LOW FRAGRANT SUMAC *Rhus aromatica 'Gro-Low'*	2' x 7'
GRASSES					
BB	73	#2 CONT	pot	BIG BLUESTEM *Andropogon gerardii*	5' x 6'
LB	70	#2 CONT	pot	LITTLE BLUE STEM *Schizachynum scopanum*	4' x 3'
KF	68	#2 CONT	pot	KARL FORESTER FEATHER REED GRASS *Calamagrotis x acutiflora 'Karl Forester'*	4' x 30"

SEED SPEC: NATIVE SPECIES SEED MIXES ARE FROM PRAIRIE NURSERY (WWW.PRAIRIENURSERY.COM, 1-800-GRO-WILD). CONTACT PRAIRIE NURSERY FOR SPECIFIC PLANTING INSTRUCTIONS. FALL SEEDING IS PREFERABLE (AUG. 20 TO OCT. 20). SPRING SEEDING SHOULD BE BETWEEN MARCH 15- MAY 15. NO SUMMER SEEDING.

	1,523 SY	IADOT , WETLAND GRASS SEED MIXTURE (OR APPROVED EQUAL). PROVIDE EROSION CONTROL BLANKET ON SIDE SLOPES.
	1,989 SY	IADOT, NATIVE GRASS AND WILDFLOWER SEED MIXTURE (OR APPROVED EQUAL). PROVIDE EROSION CONTROL BLANKET ON SIDE SLOPES.

EDGING - 540 LF
MULCH - 36 CY
SOD - 3,363 SY

Know what's below. Call before you dig.

NORTH
SCALE: 1" = 20'
20 10 0 20 40

PLOTTING NOTE: PLANS PLOTTED TO 11x17 SHEET SIZE ARE ½ SCALE- 1"=40'.

KWIK TRIP
KWIK STAR

KWIK TRIP, Inc.
P.O. BOX 2107
1626 OAK STREET
LACROSSE, WI 54602-2107
PH. (608) 781-8988
FAX (608) 781-8960

INSITES
SITE PLANNING LANDSCAPE ARCHITECTURE
3030 Harbor Lane North, STE 131
Plymouth Minnesota 55447
763.383.8400
fax 763.383.8440

LICENSED LANDSCAPE ARCHITECT Robert J. Mueller 00377 IOWA
22DEC17

LANDSCAPE PLAN

CONVENIENCE STORE 934

CEDAR FALLS, IOWA

NO.	DATE	DESCRIPTION
-	12MAY17	SIDEWALK
-	05JUN17	PARKING
-	15JUN17	COMMENTS AND ADJUSTMENTS
-	24JUL17	DITCH/POND
-	13NOV17	COMMENTS
-	22DEC17	SITE- CARWASH

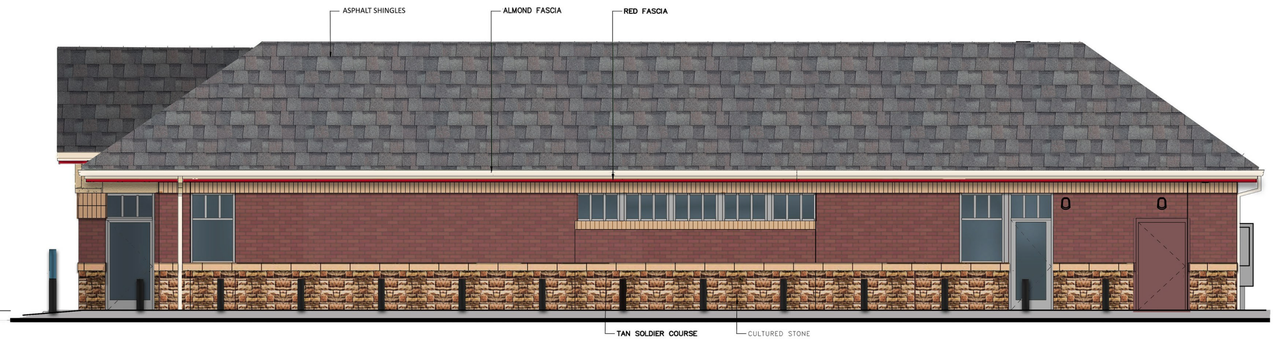
DRAWN BY

SCALE: GRAPHIC
PROJ. NO.: 17934
DATE: 20APRIL2017
SHEET: L1

1 **FRONT ELEVATION**
1/4" = 1'-0"

2 **LEFT ELEVATION**
3/16" = 1'-0"

3 **REAR ELEVATION**
3/16" = 1'-0"

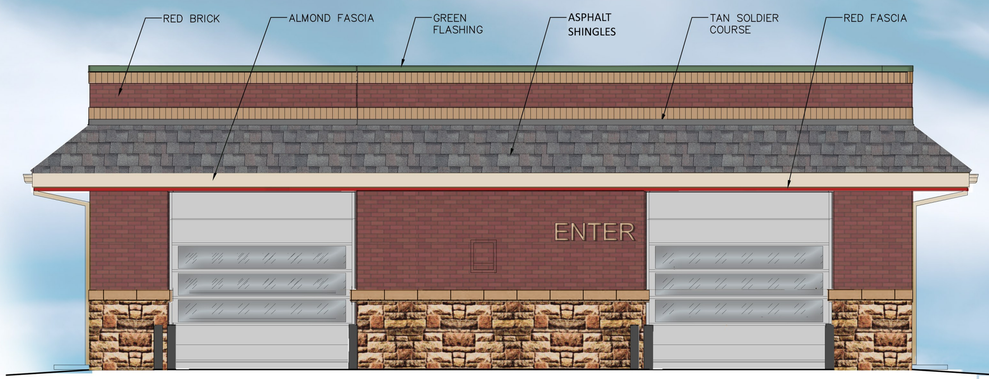


4 **RIGHT ELEVATION**
3/16" = 1'-0"

VANTAGE ARCHITECTS INC
750 N. Third Street ▼ La Crosse, WI 54601
Ph (

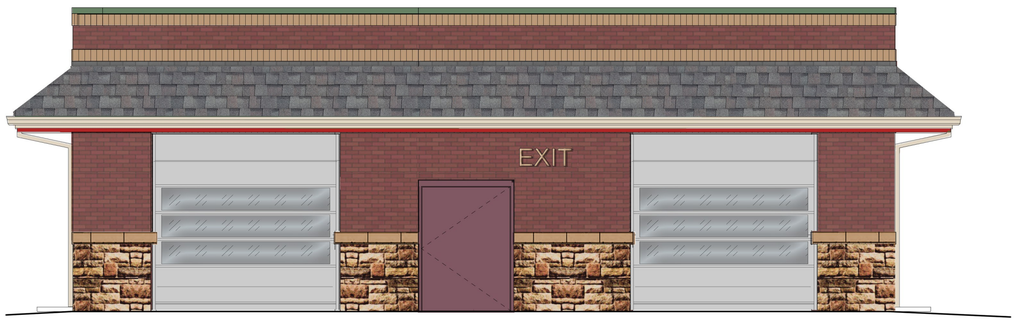
KWIK TRIP
KWIK STAR

KWIK TRIP, Inc.
P.O. BOX 2107
1626 OAK STREET
LA CROSSE, WI 54602-2107
PH. (608) 781-8988
FAX (608) 781-8960

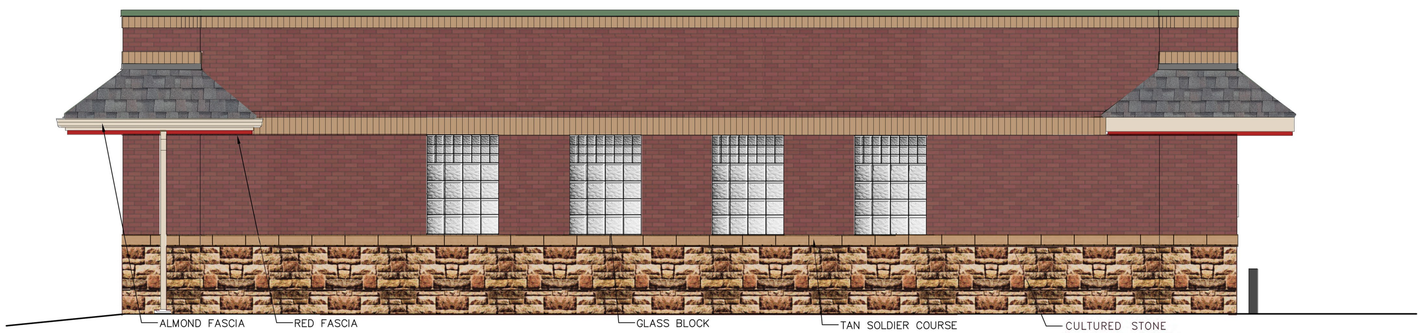


1 **FRONT ELEVATION**
1/4" = 1'-0"

2 **LEFT ELEVATION**
1/4" = 1'-0"



3 **REAR ELEVATION**
1/4" = 1'-0"



4 **RIGHT ELEVATION**
1/4" = 1'-0"

VANTAGE ARCHITECTS INC
750 N. Third Street
La Crosse, WI 54601
Ph (608) 784-2729
Fax (608) 784-2826

KWIK TRIP

KWIK STAR

KWIK TRIP, Inc.
P.O. BOX 2107
1626 OAK STREET
LA CROSSE, WI 54602-2107
PH. (608) 781-8988
FAX (608) 781-8960

FRONT ELEVATION
3/16" = 1'-0"

SIDE ELEVATION
3/16" = 1'-0"

LARSON
ARCHITECT

KWIK TRIP™
STORES

KWIK STAR™
STORES

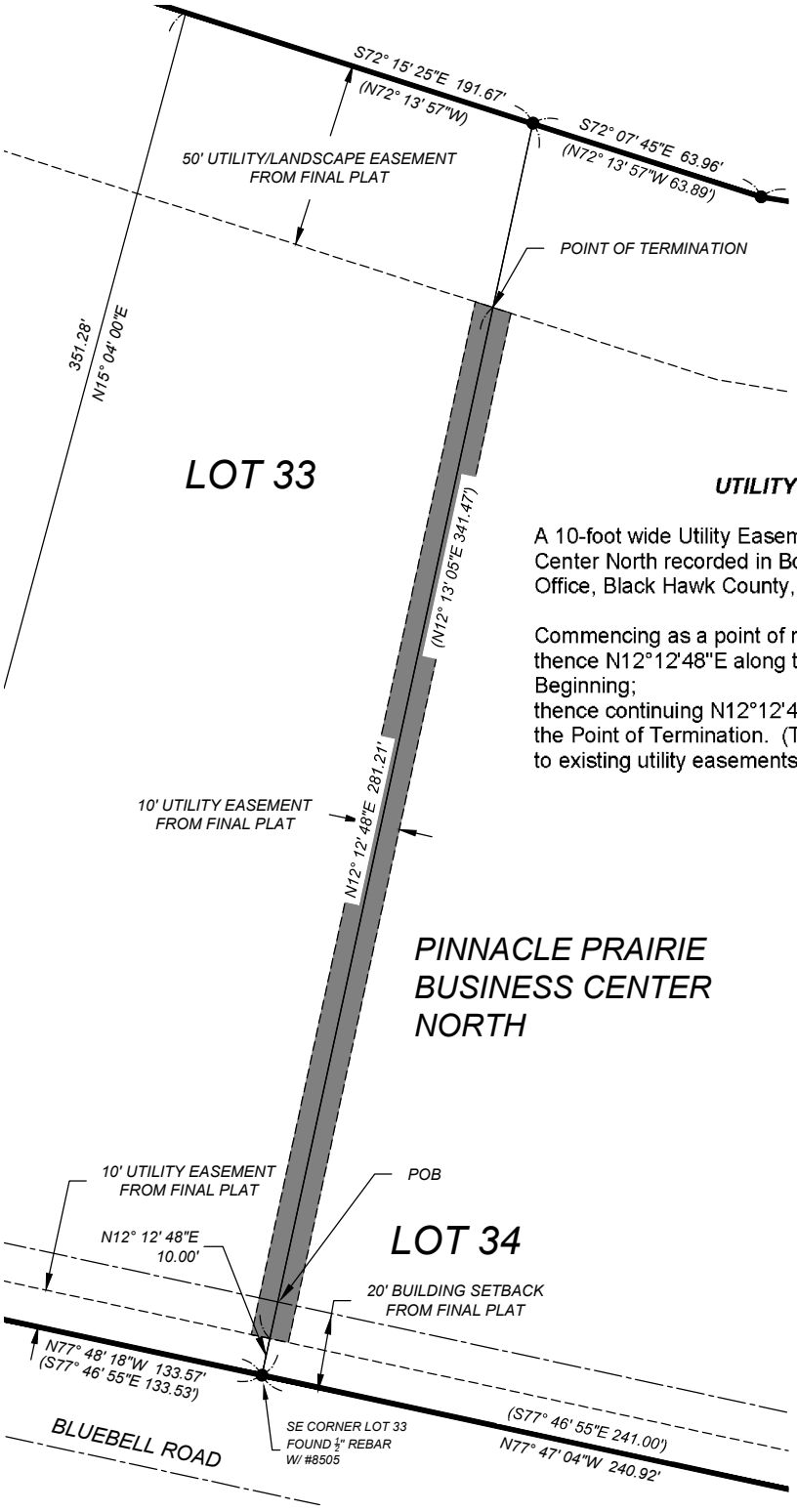
Hip Canopy
w/ Brick

10 MPD

A200

EXHIBIT A

10-FOOT WIDE UTILITY EASEMENT - TO BE VACATED



OWNER: GREENHILL ESTATES, INC.

LEGAL DESCRIPTION

EXHIBIT A
UTILITY EASEMENT – TO BE VACATED

A 10-foot wide Utility Easement in Lots 33 and 34, Pinnacle Prairie Business Center North recorded in Book 27 Page 207, Black Hawk County Recorder's Office, Black Hawk County, Iowa, whose centerline is described as follows:

Commencing as a point of reference at the SE corner of said Lot 33;
thence N12°12'48"E along the east line of said Lot 33, 10.00 feet to the Point of Beginning;
thence continuing N12°12'48"E along the east line of said Lot 33, 281.21 feet to the Point of Termination. (The sides of the 10-foot easement extend or retract to existing utility easements.)

0 25 50 100

N

●	FOUND 1/2" REBAR W/ #8505 OR AS LABELED
POB	POINT OF BEGINNING
()	RECORDED AS
UE	UTILITY EASEMENT
UDE	UTILITY & DRAINAGE EASEMENT
YPC	YELLOW PLASTIC CAP

DATE OF SURVEY 01/11/17

PAGE 1

Project No. 507117-10

BRAIN ENGINEERING, INC.
CIVIL • LAND DEVELOPMENT • SURVEYING • TRANSPORTATION

Drawing Title:

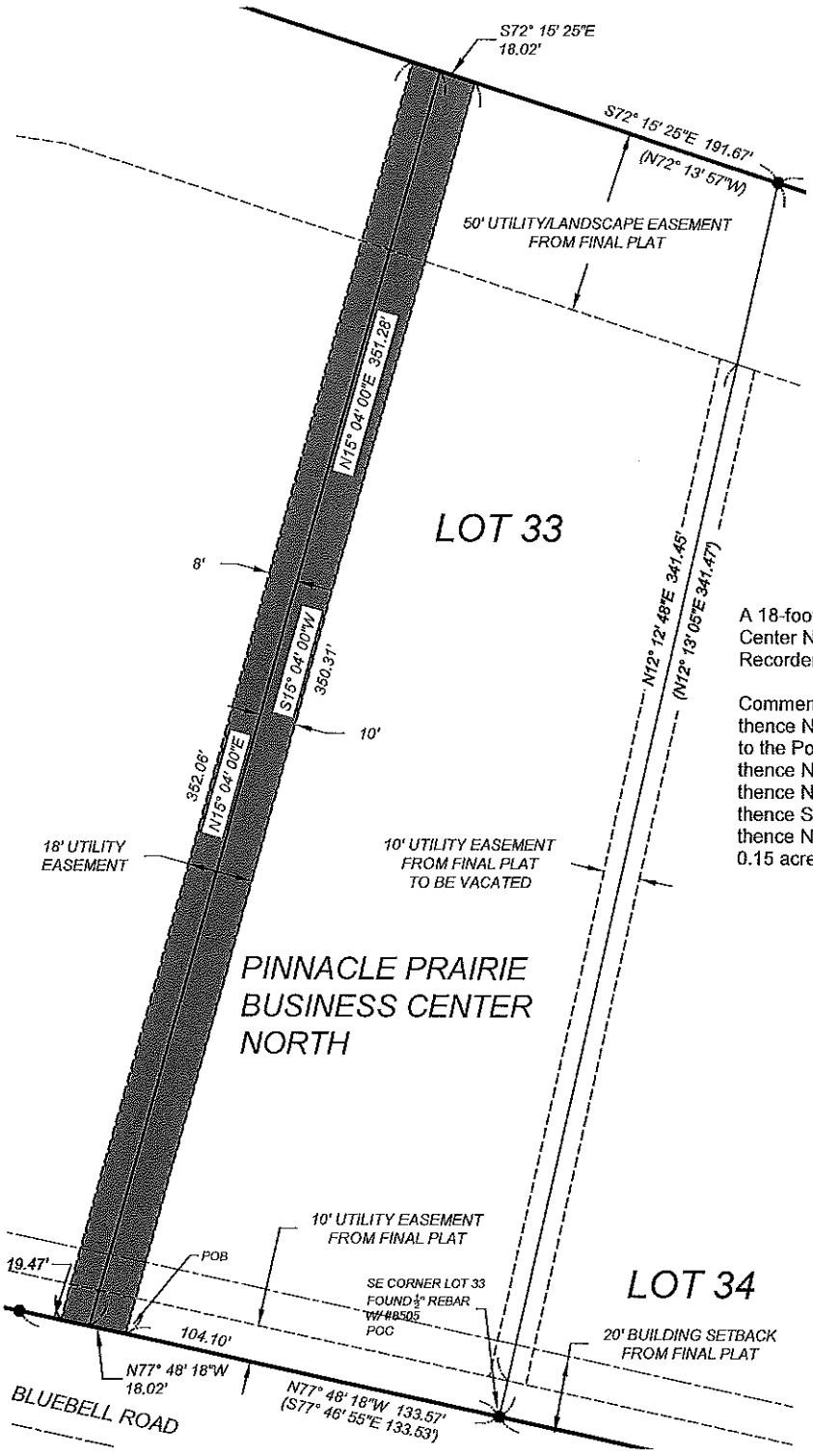
EXHIBIT A

UTILITY EASEMENT - TO BE VACATED

K:\Proj\507117-10 Cedar Falls\507117-10 Vacated Easement.dwg, 5/23/2017 10:35:55 AM, DWG To PDF.pc3

EXHIBIT B

18-FOOT WIDE UTILITY EASEMENT



OWNER: GREENHILL ESTATES, INC.

LEGAL DESCRIPTION

EXHIBIT B
18 – FOOT WIDE UTILITY EASEMENT

A 18-foot wide Utility Easement in Lot 33, Pinnacle Prairie Business Center North recorded in Book 27 Page 207, Black Hawk County Recorder's Office, Black Hawk County, Iowa is described as follows:

Commencing as a point of reference at the SE corner of said Lot 33;
thence N77°48'18"W along the south line of said Lot 33, 104.10 feet to the Point of Beginning;
thence N77°48'18"W along said south line, 18.02 feet;
thence N15°04'00"E, 352.06 feet to the north line of said Lot 33;
thence S72°15'25"E along said north line, 18.02 feet;
thence N15°04'00"E, 350.31 feet to the Point of Beginning containing 0.15 acres.

0 25 50 100

N

●	FOUND 1/2" REBAR W/ #8505 OR AS LABELED
POB	POINT OF BEGINNING
()	RECORDED AS
UE	UTILITY EASEMENT
UDE	UTILITY & DRAINAGE EASEMENT
YPC	YELLOW PLASTIC CAP

DATE OF SURVEY 01/11/17

PAGE 2

Project No. 507117-10

BRAIN ENGINEERING, INC.
CIVIL • LAND DEVELOPMENT • SURVEYING • TRANSPORTATION

Drawing Title:

EXHIBIT B

18 - FOOT WIDE UTILITY EASEMENT

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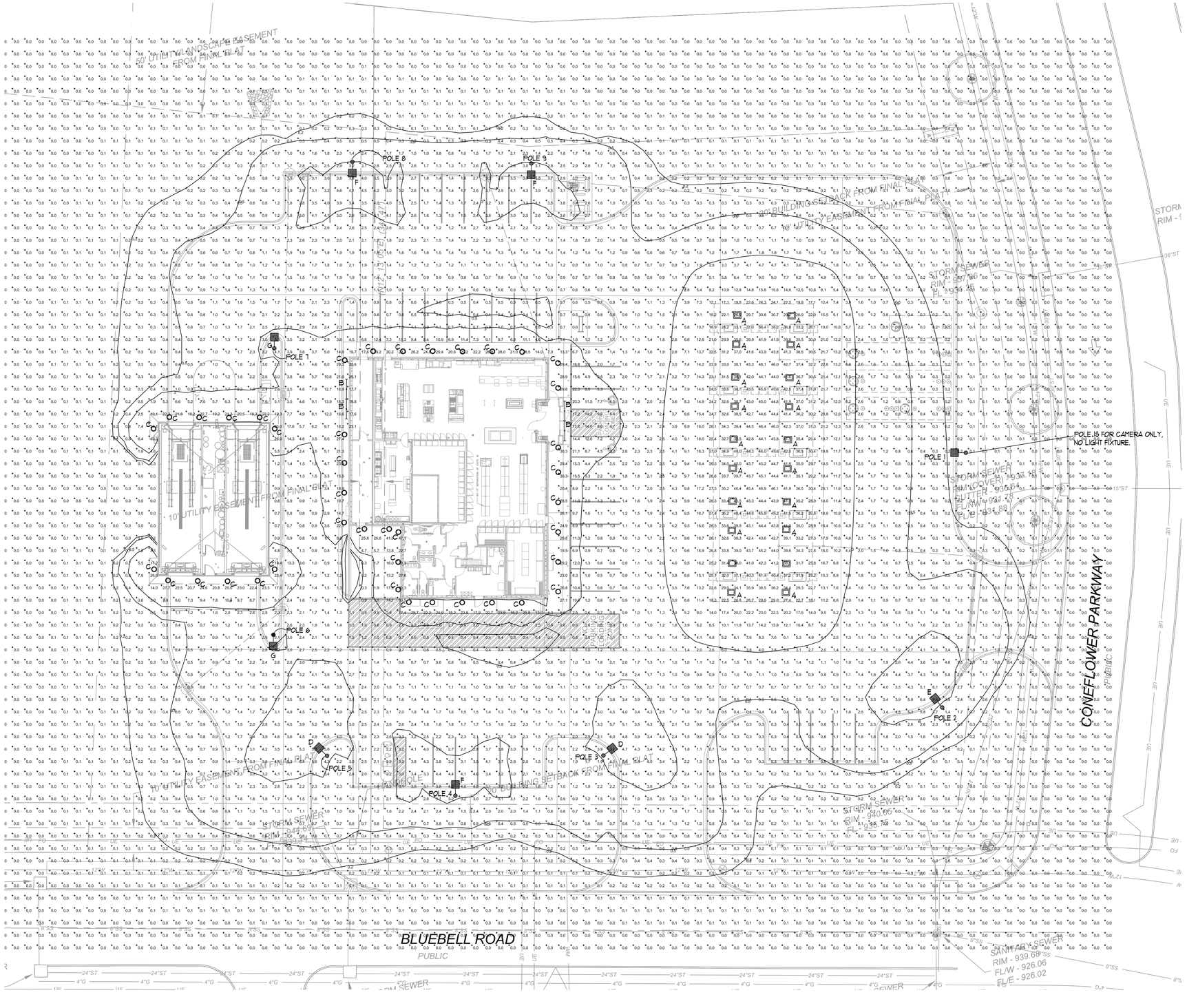


FIXTURE QUANTITIES

A - 20
B - 4
C - 41
D - 2
E - 1
F - 3
G - 2

PROVIDE (9) 15' POLES.

CALCULATION STATISTICS

AVERAGE: 2.8fc
MAXIMUM: 47.1fc
MINIMUM: 0.0fc

FIXTURE SYMBOLS:

A — LED UNDER FUEL CANOPY

B — LED STRIP LIGHT MOUNTED IN GABLE

C — RECESSED LED DOWNLIGHT

D, E, F & G — POLE MOUNTED LED FIXTURE

FIXTURE TYPES:

A - CREE LIGHTING: CAN-304-9L-RS-06-E-UL-WH-700
MOUNTED UNDER GAS CANOPY

B - LED STRIP LIGHT
LITHONIA - ZL1-L96-LB840
STRIP LIGHTS MOUNTED IN GABLE

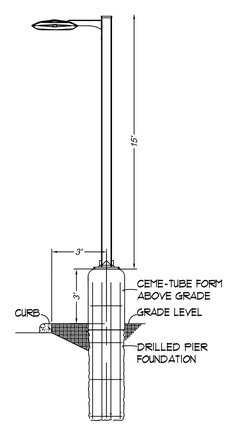
C - RECESSED LED DOWNLIGHT
GOTHAM EVO 4I/29-8AR-I20-TRW

D - CREE LIGHTING: MOUNT: OSQ-DA-WH
LUMINAIRE: OSQ-A-NM-3ME-B-5TK-UL-COLOR AS SELECTED

E - CREE LIGHTING: MOUNT: OSQ-DA-WH
LUMINAIRE: OSQ-A-NM-3ME-BLSMF-B-5TK-UL-COLOR AS SELECTED

F - CREE LIGHTING: MOUNT: OSQ-DA-WH
LUMINAIRE: OSQ-A-NM-4ME-BLSMF-B-5TK-UL-COLOR AS SELECTED

G - CREE LIGHTING: MOUNT: OSQ-DA-WH
LUMINAIRE: OSQ-A-NM-5ME-B-5TK-UL-COLOR AS SELECTED



LOT LIGHT ELEVATION DETAIL

NOT TO SCALE
POLE #1 IS FOR CAMERA ONLY, NO LIGHT FIXTURE.

PHOTOMETRIC SITE PLAN

SCALE: 1" = 20'-0"

CZARNECKI ENGINEERING INCORPORATED
121 MARLIN COURT, SUITE B - WAUKESHA, WI 53186
VOICE: (262) 513-0200 FAX: (262) 513-2023
WEB PAGE: www.czeng.com

KWIK TRIP

KWIK STAR

KWIK TRIP, Inc.
P.O. BOX 2107
1626 OAK STREET
LACROSSE, WI 54602-2107
PH. (608) 781-8988
FAX (608) 781-8960

INSITES
SITE PLANNING LANDSCAPE ARCHITECTURE
3030 Harbor Lane North, Suite 131
Plymouth, Minnesota 55447
763.383.8400

LICENSED LANDSCAPE ARCHITECT
Robert J. Mueller
00377
IOWA
22DEC17

PHOTOMETRIC SITE PLAN

CONVENIENCE STORE 934
CEDAR FALLS, IOWA

NO.	DATE	DESCRIPTION
-	12MAY17	SIDEWALK
-	05JUN17	PARKING
-	15JUN17	COMMENTS AND ADJUSTMENTS
-	24JUL17	DITCH/POND
-	13NOV17	COMMENTS
-	22DEC17	SITE - CARWASH

DRAWN BY	CZE
SCALE	GRAPHIC
PROJ. NO.	17934
DATE	20APRIL2017
SHEET	E1

Item 4.B.

OSQ Series

OSQ™ LED Area/Flood Luminaire – Medium

Product Description

The OSQ™ Area/Flood luminaire blends extreme optical control, advanced thermal management and modern, clean aesthetics. Built to last, the housing is rugged cast aluminum with an integral, weathertight LED driver compartment. Versatile mounting configurations offer simple installation. Its slim, low-profile design minimizes wind load requirements and blends seamlessly into the site providing even, quality illumination. The 'B' Input power designator is a suitable upgrade for HID applications up to 250 Watt, and the 'K' Input power designator is a suitable upgrade for HID applications up to 400 Watt.

Applications: Parking lots, walkways, campuses, car dealerships, office complexes, and internal roadways

Performance Summary

NanoOptic® Precision Delivery Grid™ optic

Assembled in the U.S.A. of U.S. and imported parts

Initial Delivered Lumens: Up to 17,291

Efficacy: Up to 136 LPW

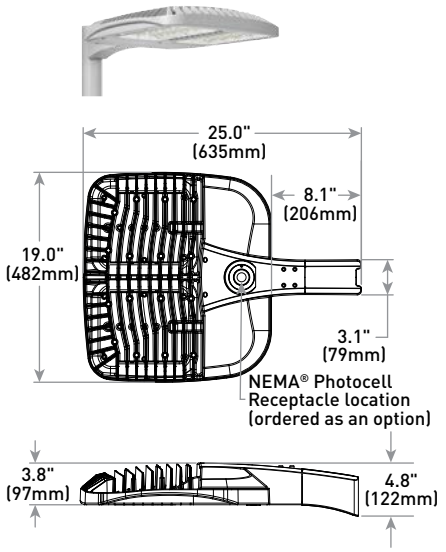
CRI: Minimum 70 CRI (4000K & 5700K; 3000K asymmetric optics); 80 CRI (3000K symmetric optics)

CCT: 3000K (+/- 300K), 4000K (+/- 300K), 5700K (+/- 500K)

Limited Warranty†: 10 years on luminaire/10 years on Colorfast DeltaGuard® finish

† See http://lighting.cree.com/warranty for warranty terms

DA Mount



Weight
26.5 lbs. (12kg)

Accessories

Field-Installed	
Backlight Shield OSQ-BLSMF – Front facing optics OSQ-BLSMR – Rotated optics	**Hand-Held Remote** XA-SENSREM - For successful implementation of the programmable multi-level option, a minimum of one hand-held remote is required

Ordering Information

Fully assembled luminaire is composed of two components that must be ordered separately:
Example: **Mount:** OSQ-AASV + **Luminaire:** OSQ-A-NM-2ME-B-40K-UL-SV

Mount (Luminaire must be ordered separately)*			
OSQ-			
OSQ-AA Adjustable Arm **OSQ-DA** Direct Arm	**Color Options:**	**SV** Silver **BK** Black	**BZ** Bronze **WH** White

* Reference EPA and pole configuration suitability data beginning on page 7

Luminaire (Mount must be ordered separately)

OSQ	A	NM						
Product	**Version**	**Mounting**	**Optic**	**Input Power Designator**	**CCT**	**Voltage**	**Color Options**	**Options**
OSQ	**A**	**NM** No Mount	**Asymmetric** **2ME*** Type II Medium **4ME*** Type IV Medium **3ME*** Type III Medium **Symmetric** **5ME** Type V Medium **25D** 25° Flood **5SH** Type V Short **40D** 40° Flood **WSN** Wide Sign **60D** 60° Flood **15D** 15° Flood	**B** 86W **K** 130W	**30K** 3000K **40K** 4000K **57K** 5700K	**UL** Universal 120-277V **UH** Universal 347-480V	**BK** Black **BZ** Bronze **SV** Silver **WH** White	**DIM** 0-10V Dimming - Control by others - Refer to Dimming spec sheet for details - Can't exceed wattage of specified input power designator **F** Fuse - When code dictates fusing, use time delay fuse - Available for U.S. applications only **ML** Multi-Level - Refer to ML spec sheet for details - Available with UL voltage only - Intended for downlight applications at 0° tilt **PML** Programmable Multi-Level, up to 40' Mounting Height - Refer to PML spec sheet for details - Intended for downlight applications at 0° tilt **PML2** Programmable Multi-Level, 10-30' Mounting Height - Refer to PML spec sheet for details - Intended for downlight applications at 0° tilt **Q9** Field Adjustable Output - Refer to Field Adjustable Output spec sheet for details **R** NEMA® Photocell Receptacle - Intended for downlight applications with maximum 45° tilt - 3-pin receptacle per ANSI C136.10 - Photocell and shorting cap by others **RL** Rotate Left - LED and optic are rotated to the left **RR** Rotate Right - LED and optic are rotated to the right

* Available with Backlight Shield when ordered with field-installed accessory (see table above)

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile design minimizes wind load requirements
- Luminaire housing is rugged die cast aluminum with an integral, weathertight LED driver compartment and high performance heat sink
- Convenient interlocking mounting method on direct arm mount. Mounting adaptor is rugged die cast aluminum and mounts to 3-6" (76-152mm) square or round pole, secured by two 5/16-18 UNC bolts spaced on 2" (51mm) centers
- Mounting for the adjustable arm mount adaptor is rugged die cast aluminum and mounts to 2" (51mm) IP, 2.375" (60mm) O.D. tenon
- Adjustable arm mount can be adjusted 180˚ in 2.5˚ increments
- Designed for uplight and downlight applications
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Silver, bronze, black, and white are available
- **Weight:** 26.5 lbs. (12kg)

ELECTRICAL SYSTEM

- **Input Voltage:** 120-277V or 347-480V, 50/60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- When code dictates fusing, a slow blow fuse or type C/D breaker should be used to address inrush current
- **10V Source Current:** 0.15mA

REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without R option
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Meets FCC Part 15 , Subpart B, Class A standards for conducted and radiated emissions
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Meets Buy American requirements within ARRA
- DLC and DLC Premium qualified versions available. Some exceptions apply. Please refer to https://www.designlights.org/search/ for most current information
- RoHS compliant. Consult factory for additional details
- Dark Sky Friendly, IDA Approved when ordered with 30K CCT. Please refer to http://darksky.org/fsa/fsa-products/ for most current information

Electrical Data*

Input Power Designator	System Watts 120-480V	Total Current (A)					
		120V	208V	240V	277V	347V	480V
B	86	0.73	0.43	0.37	0.32	0.25	0.19
K	130	1.09	0.65	0.56	0.49	0.38	0.28

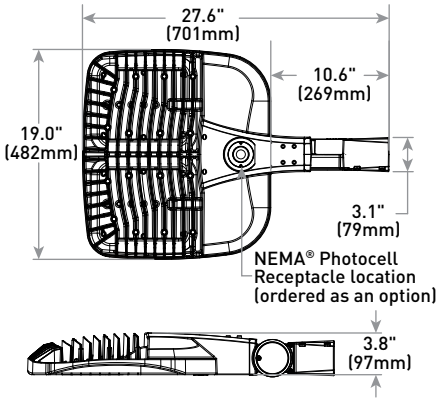
* Electrical data at 25˚C (77˚F). Actual wattage may differ by +/- 10% when operating between 120-480V +/-10%

Recommended OSQ Series Lumen Maintenance Factors (LMF)[1]

Ambient	Optic	Initial LMF	25K hr Projected[2] LMF	50K hr Projected[2] LMF	75K hr Projected[2]/ Calculated[3] LMF	100K hr Calculated[3] LMF
5˚C (41˚F)	Asymmetric	1.04	1.00	0.95	0.91[3]	0.87
	Symmetric	1.05	1.04	1.04	1.04[2]	1.04
10˚C (50˚F)	Asymmetric	1.03	0.99	0.94	0.90[3]	0.86
	Symmetric	1.04	1.03	1.03	1.03[2]	1.03
15˚C (59˚F)	Asymmetric	1.02	0.98	0.93	0.89[3]	0.86
	Symmetric	1.02	1.02	1.02	1.02[2]	1.02
20˚C (68˚F)	Asymmetric	1.01	0.97	0.93	0.89[3]	0.85
	Symmetric	1.01	1.00	1.00	1.00[2]	1.00
25˚C (77˚F)	Asymmetric	1.00	0.96	0.92	0.88[3]	0.84
	Symmetric	1.00	0.99	0.99	0.99[2]	0.99

[1] Lumen maintenance values at 25˚C (77˚F) are calculated per TM-21 based on LM-80 data and in-situ luminaire testing
[2] In accordance with IESNA TM-21-11, Projected Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ([DUT] i.e. the packaged LED chip)
[3] In accordance with IESNA TM-21-11, Calculated Values represent time durations that exceed six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ([DUT] i.e. the packaged LED chip)

AA Mount

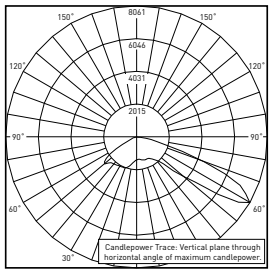


Weight
26.5 lbs. (12kg)

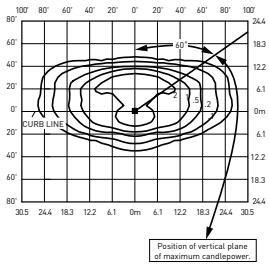
Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP accredited laboratory. To obtain an IES file specific to your project consult: http://lighting.cree.com/products/outdoor/area/osq-series

2ME



RESTL Test Report #: PL08877-001
OSQ-A-**-2ME-B-30K-UL
Initial Delivered Lumens: 10,381

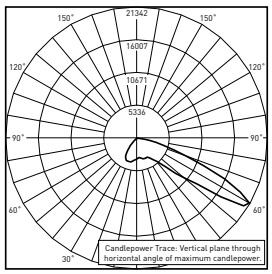


OSQ-A-**-2ME-B-40K-UL
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 11,424
Initial FC at grade

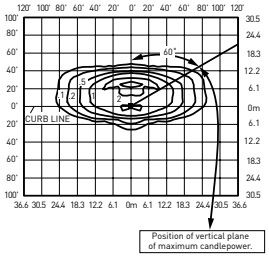
Type II Medium Distribution

Input Power Designator	3000K		4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
B	10,738	B2 U0 G2	11,424	B2 U0 G2	11,648	B2 U0 G2
K	16,022	B3 U0 G3	16,959	B3 U0 G3	17,291	B3 U0 G3

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: whttps://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf. Valid with no tilt



CESTL Test Report #: PL07700-001A
OSQ-A-**-2ME-U-57K-UL w/OSQ-BLSLF
Initial Delivered Lumens: 22,822



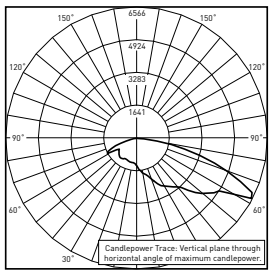
OSQ-A-**-2ME-B-40K-UL w/OSQ-BLSMF
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 8,779
Initial FC at grade

Type II Medium w/BLS Distribution

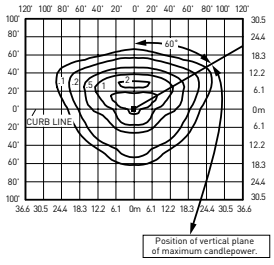
Input Power Designator	3000K		4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11
B	8,251	B2 U0 G2	8,779	B2 U0 G2	8,950	B2 U0 G2
K	12,312	B2 U0 G2	13,032	B2 U0 G2	13,286	B2 U0 G2

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf. Valid with no tilt

3ME



RESTL Test Report #: PL08876-001A
OSQ-A-**-3ME-B-30K-UL
Initial Delivered Lumens: 10,421

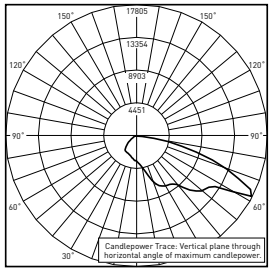


OSQ-A-**-3ME-B-40K-UL
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 11,424
Initial FC at grade

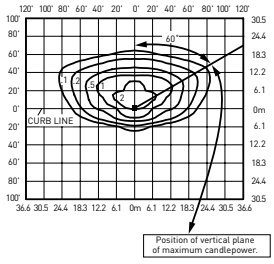
Type III Medium Distribution

Input Power Designator	3000K		4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11
B	10,738	B3 U0 G3	11,424	B3 U0 G3	11,648	B3 U0 G3
K	16,022	B3 U0 G3	16,959	B3 U0 G3	17,291	B3 U0 G3

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf. Valid with no tilt



CESTL Test Report #: PL07699-001A
OSQ-A-**-3ME-U-57K-UL w/OSQ-BLSLF
Initial Delivered Lumens: 23,601



OSQ-A-**-3ME-B-40K-UL w/OSQ-BLSMF
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 9,019
Initial FC at grade

Type III Medium w/BLS Distribution

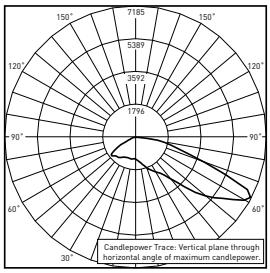
Input Power Designator	3000K		4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
B	8,477	B1 U0 G2	9,019	B1 U0 G2	9,196	B1 U0 G2
K	12,649	B2 U0 G2	13,389	B2 U0 G2	13,650	B2 U0 G2

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf. Valid with no tilt

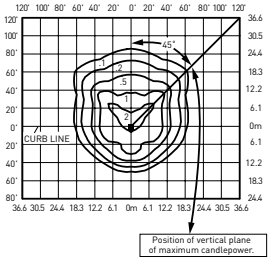
Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP accredited laboratory. To obtain an IES file specific to your project consult: http://lighting.cree.com/products/outdoor/area/osq-series

4ME



RESTL Test Report #: PL08878-001A
OSQ-A-**-4ME-B-30K-UL
Initial Delivered Lumens: 10,230

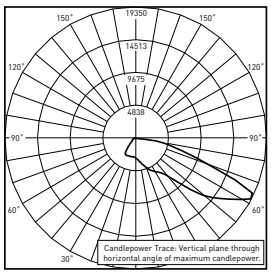


OSQ-A-**-4ME-B-40K-UL
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 11,424
Initial FC at grade

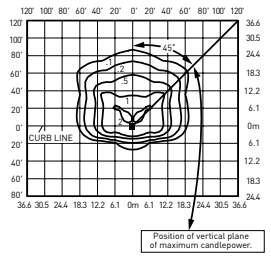
Type IV Medium Distribution

Input Power Designator	3000K		4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
B	10,738	B2 U0 G2	11,424	B2 U0 G2	11,648	B2 U0 G2
K	16,022	B3 U0 G3	16,959	B3 U0 G3	17,291	B3 U0 G3

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf. Valid with no tiltt



CESTL Test Report #: PL07692-001A
OSQ-A-**-4ME-U-57K-UL w/OSQ-BLSLF
Initial Delivered Lumens: 22,793



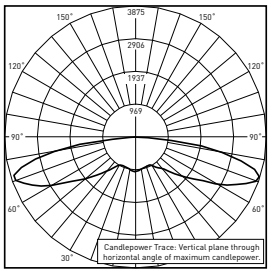
OSQ-A-**-4ME-B-40K-UL w/OSQ-BLSMF
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 8,779
Initial FC at grade

Type IV Medium w/BLS Distribution

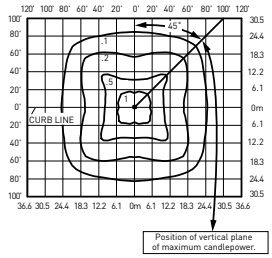
Input Power Designator	3000K		4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11
B	8,251	B1 U0 G2	8,779	B1 U0 G2	8,950	B1 U0 G2
K	12,312	B2 U0 G2	13,032	B2 U0 G2	13,286	B2 U0 G2

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf. Valid with no tilt

5ME



CESTL Test Report #: PL08101-001C
OSQ-A-**-5ME-B-30K-UL
Initial Delivered Lumens: 9,304



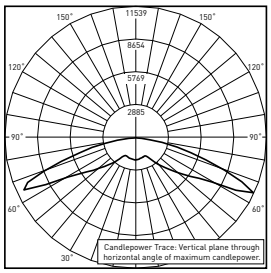
OSQ-A-**-5ME-B-40K-UL
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 10,867
Initial FC at grade

Type V Medium Distribution

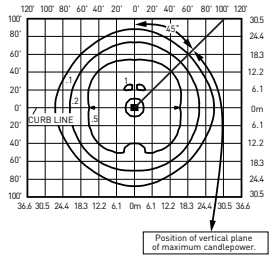
Input Power Designator	3000K		4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
B	9,387	B3 U0 G3	10,867	B4 U0 G4	11,056	B4 U0 G4
K	13,819	B4 U0 G4	15,999	B4 U0 G5	16,277	B4 U0 G5

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf. Valid with no tilt

5SH



CESTL Test Report #: PL0754-001A
OSQ-A-**-5SH-U-40K-UL
Initial Delivered Lumens: 25,679



OSQ-A-**-5SH-B-40K-UL
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens:11,478
Initial FC at grade

Type V Short Distribution

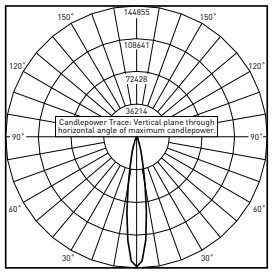
Input Power Designator	3000K		4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11	Initial Delivered Lumens*	BUG Ratings** Per TM 15 11
B	9,914	B4 U0 G2	11,478	B4 U0 G2	11,678	B4 U0 G2
K	14,595	B4 U0 G3	16,897	B4 U0 G3	17,191	B4 U0 G3

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf. Valid with no tilt

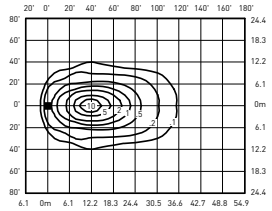
Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP accredited laboratory. To obtain an IES file specific to your project consult: http://lighting.cree.com/products/outdoor/area/osq-series

15D



CESTL Test Report #: PL07689-001A
OSQ-A-**-15D-U-30K-UL
Initial Delivered Lumens: 23,254

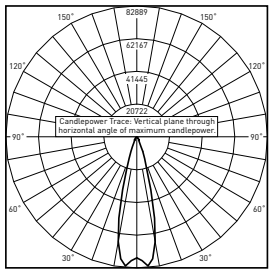


OSQ-A-**-15D-B-40K-UL
Mounting Height: 25' (7.6m) A.F.G., 60° Tilt
Initial Delivered Lumens: 11,478
Initial FC at grade

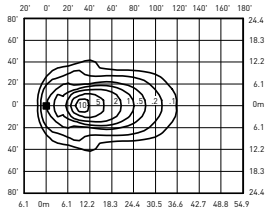
15° Flood Distribution			
Input Power Designator	3000K	4000K	5700K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
B	9,914	11,478	11,678
K	14,595	16,897	17,191

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens

25D



CESTL Test Report #: PL07687-001A
OSQ-A-**-25D-U-30K-UL
Initial Delivered Lumens: 23,265

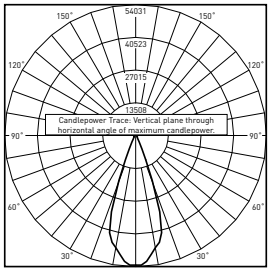


OSQ-A-**-25D-B-40K-UL
Mounting Height: 25' (7.6m) A.F.G., 60° Tilt
Initial Delivered Lumens: 11,478
Initial FC at grade

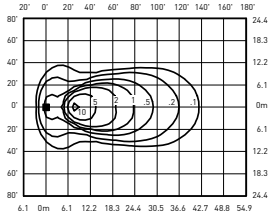
25° Flood Distribution			
Input Power Designator	3000K	4000K	5700K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
B	9,914	11,478	11,678
K	14,595	16,897	17,191

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens

40D



CESTL Test Report #: PL07697-001A
OSQ-A-**-40D-U-30K-UL
Initial Delivered Lumens: 22,943



OSQ-A-**-40D-B-40K-UL
Mounting Height: 25' (7.6m) A.F.G., 60° Tilt
Initial Delivered Lumens: 11,478
Initial FC at grade

40° Flood Distribution			
Input Power Designator	3000K	4000K	5700K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
B	9,914	11,478	11,678
K	14,595	16,897	17,191

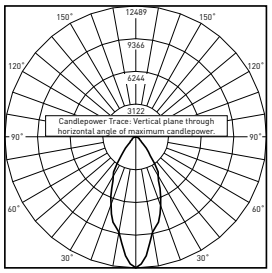
* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens

OSQ™ LED Area/Flood Luminaire – Medium

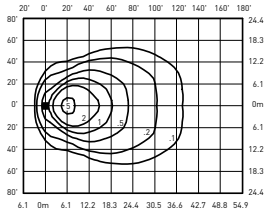
Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP accredited laboratory. To obtain an IES file specific to your project consult: http://lighting.cree.com/products/outdoor/area/osq-series

60D



CESTL Test Report #: PL08100-001B
OSQ-A-**-60D-B-30K-UL
Initial Delivered Lumens: 10,079

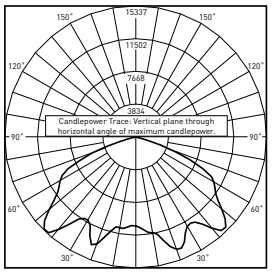


OSQ-A-**-60D-B-40K-UL
Mounting Height: 25' (7.6m) A.F.G., 60° Tilt
Initial Delivered Lumens: 11,478
Initial FC at grade

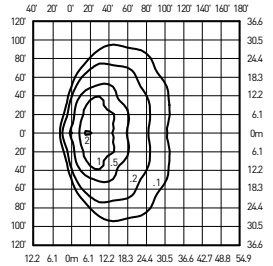
60° Flood Distribution			
Input Power Designator	3000K	4000K	5700K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
B	9,914	11,478	11,678
K	14,595	16,897	17,191

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens

WSN



CESTL Test Report #: PL07695-001A
OSQ-A-**-WSN-U-30K-UL
Initial Delivered Lumens: 23,116



OSQ-A-**-WSN-B-40K-UL
Mounting Height: 25' (7.6m) A.F.G., 60° Tilt
Initial Delivered Lumens: 11,478
Initial FC at grade

Wide Sign Distribution			
Input Power Designator	3000K	4000K	5700K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
B	9,914	11,478	11,678
K	14,595	16,897	17,191

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens

Luminaire EPA

Fixed Arm Mount – OSQ-DA Weight: 26.5 lbs. (12kg)					
Single	2 @ 180˚	2 @ 90˚	3 @ 90˚	3 @ 120˚	4 @ 90˚
					
0.74	1.48	1.19	1.93	1.63	2.38

Adjustable Arm Mount – OSQ-AA Weight: 26.5 lbs. (12kg)							
Single	2 @ 180˚	2 @ 90˚	3 @ 90˚	3 @ 120˚	3 @ 180˚	4 @ 180˚	4 @ 90˚
Tenon Configuration (0˚-80˚ Tilt); If used with Cree tenons, please add tenon EPA with Luminaire EPA							
 PB-1A*; PT-1; PW-1A3**	 PB-2A*; PB-2R2.375; PD-2A4(180); PT-2(180); PW-2A3**	 PB-2A*; PD-2A4(90); PT-2(90)	 PB-3A*; PD-3A4(90); PT-3(90)	 PB-3A*; PT-3(120)	 PB-3A*; PB-3R2.375	 PB-4A*(180)	 PB-4A*(90); PB-4R2.375; PD-4A4(90); PT-4(90)
0˚ Tilt							
0.74	1.48	1.19	1.93	1.63	3.33	4.66	2.38
10˚ Tilt							
0.75	1.48	1.49	2.23	2.15	4.22	5.84	2.98
20˚ Tilt							
1.12	1.48	1.86	2.60	2.85	5.31	7.32	3.72
30˚ Tilt							
1.46	1.48	2.20	2.94	3.56	6.34	8.68	4.40
45˚ Tilt							
1.96	1.96	2.69	3.43	4.54	7.83	10.68	5.38
60˚ Tilt							
2.33	2.33	3.07	3.81	5.11	8.94	12.16	6.14
70˚ Tilt							
2.49	2.49	3.23	3.97	5.11	9.43	12.80	6.46
80˚ Tilt							
2.58	2.58	3.32	4.06	5.11	9.71	13.16	6.64
Tenon Configuration (90˚ Tilt); If used with Cree tenons, please add tenon EPA with Luminaire EPA							
PB-1A*; PT-1; PW-1A3**	PB-2A*; PB-2R2.375; PD-2A4(180); PT-2(180); PW-2A3**	PB-2A*	PB-3A*	PB-3A*; PT-3(120)	PB-3A*; PB-3R2.375	PB-4A*(180)	PB-4A*(90); PB-4R2.375
90˚ Tilt							
2.61	2.61	4.44	6.05	5.11	9.79	13.28	10.39

* Specify pole size: 3 (3"), 4 (4"), 5 (5"), or 6 (6") for single, double or triple luminaire orientation or 4 (4"), 5 (5"), or 6 (6") for quad luminaire orientation
** These EPA values must be multiplied by the following ratio: Fixture Mounting Height/Total Pole Height. Specify pole size: 3 (3"), 4 (4"), 5 (5"), or 6 (6")

Tenon EPA

Part Number	EPA
PB-1A*	None
PB-2A*	0.82
PB-3A*	1.52
PB-4A*(180)	2.22
PB-4A*(90)	1.11
PB-2R2.375	0.92
PB-3R2.375	1.62
PB-4R2.375	2.32
PD Series Tenons	0.09
PT Series Tenons	0.10
PW-1A3**	0.47
PW-2A3**	0.94
WM-2	0.08
WM-4	0.25
WM-DM	None

* Specify pole size: 3 (3"), 4 (4"), 5 (5"), or 6 (6") for single, double or triple luminaire orientation or 4 (4"), 5 (5"), or 6 (6") for quad luminaire orientation
** These EPA values must be multiplied by the following ratio: Fixture Mounting Height/Total Pole Height. Specify pole size: 3 (3"), 4 (4"), 5 (5"), or 6 (6")

Tenons and Brackets‡ (must specify color)

Square Internal Mount Vertical Tenons (Steel)
- Mounts to 3-6" (76-152mm) square aluminum or steel poles

PB-1A* – Single
PB-2A* – 180˚ Twin
PB-3A* – 180˚ Triple
PB-4A*(90) – 90˚ Quad
PB-4A*(180) – 180˚ Quad

Square Internal Mount Horizontal Tenons (Aluminum)
- Mounts to 4" (102mm) square aluminum or steel poles

PD-2A4(90) – 90˚ Twin
PD-2A4(180) – 180˚ Twin
PD-3A4(90) – 90˚ Triple
PD-4A4(90) – 90˚ Quad

Wall Mount Brackets
- Mounts to wall or roof

WM-2 – Horizontal for OSQ-AA mount
WM-4 – L-Shape for OSQ-AA mount
WM-DM – Plate for OSQ-DA mount

Round External Mount Vertical Tenons (Steel)
- Mounts to 2.375" (60mm) O.D. round aluminum or steel poles or tenons

PB-2R2.375 – Twin
PB-3R2.375 – Triple
PB-4R2.375 – Quad

Round External Mount Horizontal Tenons (Aluminum)
- Mounts to 2.375" (60mm) O.D. round aluminum or steel poles or tenons
- Mounts to square pole with PB-1A* tenon

PT-1 – Single (Vertical)
PT-2(90) – 90˚ Twin
PT-2(180) – 180˚ Twin
PT-3(90) – 90˚ Triple
PT-4(90) – 90˚ Quad

Mid-Pole Bracket
- Mounts to square pole

PW-1A3** – Single
PW-2A3** – Double

Ground Mount Post
- For ground mounted flood luminaires

PGM-1 - for OSQ-AA mount

‡ Refer to the Bracket and Tenons spec sheet for more details

Direct Mount Configurations

Compatibility with OSQ-DA Direct Mount Bracket					
Input Power Designator	2 @ 90˚	2 @ 180˚	3 @ 90˚	3 @ 120˚	4 @ 90˚
3" Square					
B & K	N/A	✓	N/A	N/A	N/A
3" Round					
B & K	N/A	✓	N/A	N/A	N/A
4" Square					
B & K	✓	✓	✓	N/A	✓
4" Round					
B & K	✓	✓	✓	✓	✓
5" Square					
B & K	✓	✓	✓	N/A	✓
5" Round					
B & K	✓	✓	✓	✓	✓
6" Square					
B & K	✓	✓	✓	N/A	✓
6" Round					
B & K	✓	✓	✓	✓	✓

304 Series™

LED Recessed Canopy Luminaire

Product Description

Luminaire housing is constructed from rugged die cast aluminum components (RS Mount) or die cast and extruded aluminum components (RD Mount). LED driver is mounted in a sealed weathertight center chamber that allows for access from below the fixture. Luminaire mounts directly to the canopy deck and is secured in place with die cast aluminum trim frame. Luminaire housing is provided with factory applied foam gasket that provides a watertight seal between luminaire housing and canopy deck. Suitable for use in single or double skin canopies with 16" (406 mm) wide panels. Designed for canopies of 19-22 gauge (maximum 0.040" [1 mm] thickness).
Applications: Petroleum stations, convenience stores, drive-thru banks and restaurants, retail and grocery

Performance Summary

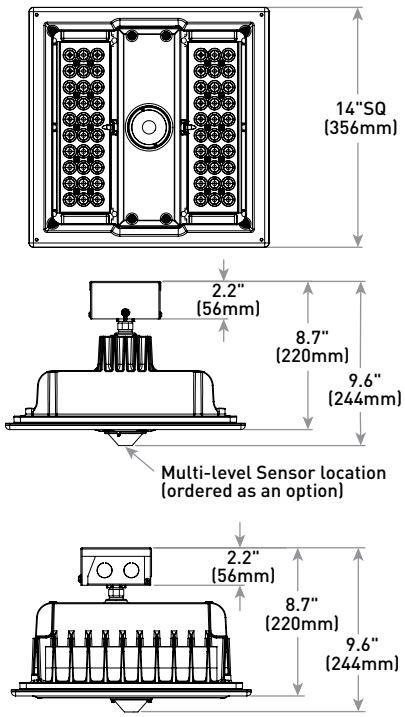
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 4000K (+/- 300K), 5700K (+/- 500K) standard
- **Limited Warranty†:** 10 years on luminaire/10 years on Colorfast DeltaGuard® finish

† See http://lighting.cree.com/warranty for warranty terms

Accessories

Field-Installed
Hand-Held Remote XA-SENSREM - For successful implementation of the programmable multi-level option, a minimum of one hand-held remote is required

RS Mount



Weight
22.0 lbs. (9.9kg)

Ordering Information

Example: CAN-304-5M-RS-04-E-UL-SV-350

CAN-304				E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
CAN-304	**5M** Type V Medium **5S** Type V Short **PS** Petroleum Symmetric **SL** Sparkle Petroleum	**RS** Recessed Single Skin **RD** Recessed Double Skin	**04** **06**	**E**	**UL** Universal 120-277V **UH** Universal 347-480V	**BK** Black **BZ** Bronze **SV** Silver **WH** White	**350** 350mA **525** 525mA **700*** 700mA	**DIM 0-10V Dimming** - Control by others - Refer to Dimming spec sheet for details - Can't exceed specified drive current **F Fuse** - When code dictates fusing use time delay fuse - Refer to ML spec sheet for availability with ML options **ML Multi-Level** - Refer to ML spec sheet for details **PML** Programmable Multi-Level - Refer to PML spec sheet for details **40K 4000K Color Temperature** - Minimum 70 CRI - Color temperature per luminaire

* 60 LED luminaire requires marked spacing: 48" x 24" x 6" (1,219mm x 610mm x 152mm); 48" (1,219mm) center-to-center of adjacent luminaires, 24" (610mm) luminaire center to side building member, 6" (152mm) top of luminaire to overhead building member

Product Specifications

CONSTRUCTION & MATERIALS

- RS Mount luminaire housing is constructed from rugged die cast aluminum and incorporates integral, high performance heatsink fins specifically designed for LED canopy applications
- RD Mount luminaire housing is constructed from rugged die cast aluminum and features high performance extruded aluminum heatsinks specifically designed for LED canopy applications
- LED driver is mounted in a sealed weathertight center chamber that allows for access from below the luminaire
- Field adjustable drive current between 350mA, 525mA and 700mA on Non-IC rated luminaires
- Luminaire housing provided with factory applied foam gasket and provides for a watertight seal between luminaire housing and canopy deck
- Mounts directly to the canopy deck and is secured in place with a die cast aluminum trim frame
- RS mount includes integral junction box which allows ease of installation without need to open luminaire
- Suitable for use in single (RS Mount) or double (RD Mount) skin canopies with 16" (406mm) wide panels
- Designed for canopies of 19-22 gauge (maximum 0.040" [1mm] thickness)
- See 228 Series™ canopy luminaires for canopies using 12" (305mm) deck sections
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Black, bronze, silver, and white are available

ELECTRICAL SYSTEM

- **Input Voltage:** 120-277V or 347-480V, 50/60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral weathertight electrical box with terminal strips (12Ga-20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C/D breaker should be used
- **10V Source Current:** 0.15mA

REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Meets FCC Part 15 standards for conducted and radiated emissions
- Enclosure rated IP66 per IEC 60529
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- DLC qualified when ordered with PS or SL optics and 525 or 700mA drive current. Please refer to www.designlights.org/QPL for most current information
- RoHS Compliant. Consult factory for additional details
- Meets Buy American requirements within ARRA

Electrical Data*

LED Count (x10)	System Watts 120-480V	Total Current					
		120V	208V	240V	277V	347V	480V
350mA							
04	46	0.39	0.24	0.22	0.21	0.15	0.12
06	69	0.57	0.34	0.30	0.27	0.21	0.16
525mA							
04	71	0.59	0.35	0.31	0.28	0.21	0.16
06	101	0.84	0.49	0.43	0.38	0.30	0.22
700mA							
04	94	0.79	0.46	0.40	0.36	0.28	0.21
06	135	1.14	0.65	0.57	0.50	0.40	0.29

* Electrical data at 25°C (77°F)

Recommended 304 Series™ Lumen Maintenance Factors (LMF)[1]

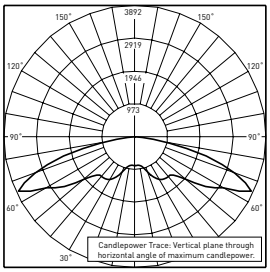
Ambient	Initial LMF	25K hr Projected[2] LMF	50K hr Projected[2] LMF	75K hr Calculated[3] LMF	100K hr Calculated[3] LMF
5°C (41°F)	1.04	0.99	0.97	0.95	0.93
10°C (50°F)	1.03	0.98	0.96	0.94	0.92
15°C (59°F)	1.02	0.97	0.95	0.93	0.91
20°C (68°F)	1.01	0.96	0.94	0.92	0.90
25°C (77°F)	1.00	0.95	0.93	0.91	0.89

[1] Lumen maintenance values at 25°C are calculated per TM-21 based on LM-80 data and in-situ luminaire testing
[2] In accordance with IESNA TM-21-11, Projected Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ([DUT) i.e. the packaged LED chip)
[3] In accordance with IESNA TM-21-11, Calculated Values represent time durations that exceed six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ([DUT) i.e. the packaged LED chip)

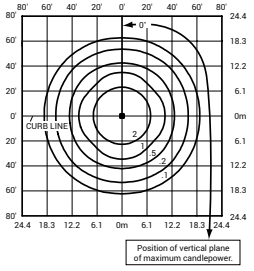
Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP accredited laboratory. To obtain an IES file specific to your project consult: http://lighting.cree.com/products/outdoor/canopy-and-soffit/304-series-1#

5M



ITL Test Report #: 77285
PKG-304-5M-**-06-E-UL-700-40K
Initial Delivered Lumens: 11,681

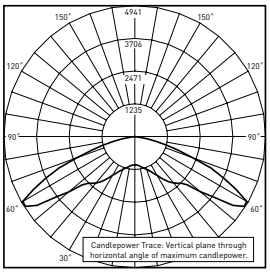


CAN-304-5M-**-06-E-UL-700-40K
Mounting Height: 15' (4.6m)
Initial Delivered Lumens: 11,613
Initial FC at grade

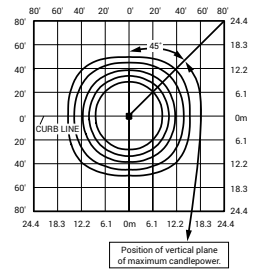
Type V Medium Distribution				
LED Count (x10)	4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
350mA				
04	4,600	B3 U1 G1	4,777	B3 U1 G1
06	6,831	B3 U1 G1	7,094	B3 U1 G2
525mA				
04	6,441	B3 U1 G1	6,688	B3 U1 G1
06	9,563	B3 U1 G2	9,931	B3 U1 G2
700mA				
04	7,821	B3 U1 G2	8,122	B3 U1 G2
06	11,613	B4 U1 G2	12,059	B4 U1 G2

* Initial delivered lumens at 25°C (77°F)
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: www.ies.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf

5S



ITL Test Report #: 77876
PKG-304-5S-**-06-E-UL-700-40K
Initial Delivered Lumens: 12,738



CAN-304-5S-**-06-E-UL-700-40K
Mounting Height: 15' (4.6m)
Initial Delivered Lumens: 12,903
Initial FC at grade

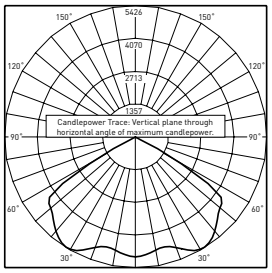
Type V Short Distribution				
LED Count (x10)	4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
350mA				
04	5,112	B2 U1 G1	5,308	B2 U1 G1
06	7,590	B3 U1 G1	7,882	B3 U1 G1
525mA				
04	7,156	B3 U1 G1	7,432	B3 U1 G1
06	10,626	B3 U1 G2	11,035	B3 U1 G2
700mA				
04	8,690	B3 U1 G1	9,024	B3 U1 G1
06	12,903	B3 U1 G2	13,399	B4 U1 G2

* Initial delivered lumens at 25°C (77°F)
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: www.ies.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf

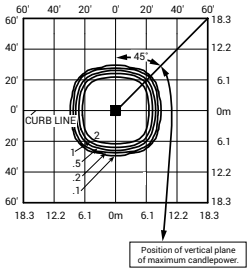
Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP accredited laboratory. To obtain an IES file specific to your project consult: http://lighting.cree.com/products/outdoor/canopy-and-soffit/304-series-1#

PS



ITL Test Report #: 76940
CAN-304-PS-**-06-E-UL-700-40K
Initial Delivered Lumens: 13,581

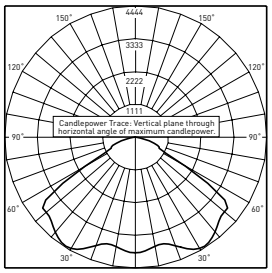


CAN-304-PS-**-06-E-UL-700-40K
Mounting Height: 15' (4.6m)
Initial Delivered Lumens: 13,190
Initial FC at grade

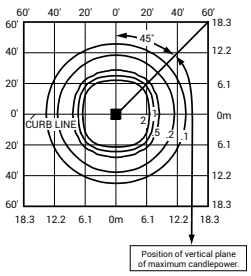
Petroleum Symmetric Distribution				
LED Count (x10)	4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
350mA				
04	5,225	B2 U0 G0	5,426	B2 U0 G0
06	7,759	B3 U0 G0	8,057	B3 U0 G0
525mA				
04	7,315	B3 U0 G0	7,597	B3 U0 G0
06	10,862	B3 U0 G0	11,280	B3 U0 G0
700mA				
04	8,883	B3 U0 G0	9,225	B3 U0 G0
06	13,190	B3 U0 G0	13,697	B3 U0 G0

* Initial delivered lumens at 25°C (77°F)
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: www.ies.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf

SL



ITL Test Report #: 77415
CAN-304-SL-**-06-E-UL-700-40K
Initial Delivered Lumens: 12,707



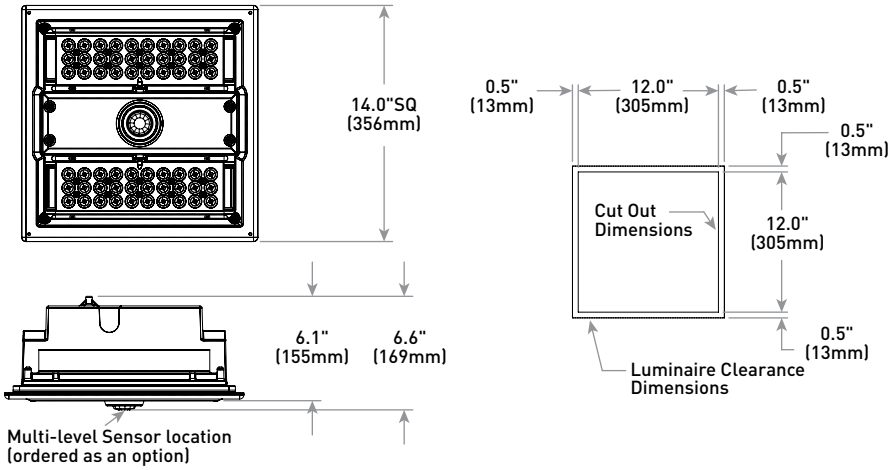
CAN-304-SL-**-06-E-UL-700-40K
Mounting Height: 15' (4.6m)
Initial Delivered Lumens: 12,760
Initial FC at grade

Sparkle Petroleum Distribution				
LED Count (x10)	4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
350mA				
04	5,055	B2 U0 G1	5,249	B2 U0 G1
06	7,506	B2 U0 G1	7,794	B3 U0 G1
525mA				
04	7,077	B2 U0 G1	7,349	B2 U0 G1
06	10,508	B3 U0 G1	10,912	B3 U0 G1
700mA				
04	8,593	B3 U0 G1	8,924	B3 U0 G1
06	12,760	B3 U0 G1	13,250	B3 U0 G1

* Initial delivered lumens at 25°C (77°F)
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: www.ies.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf

304 Series™ LED Recessed Canopy Luminaire

RD Mount



Weight
22.0 lbs. (9.9kg)

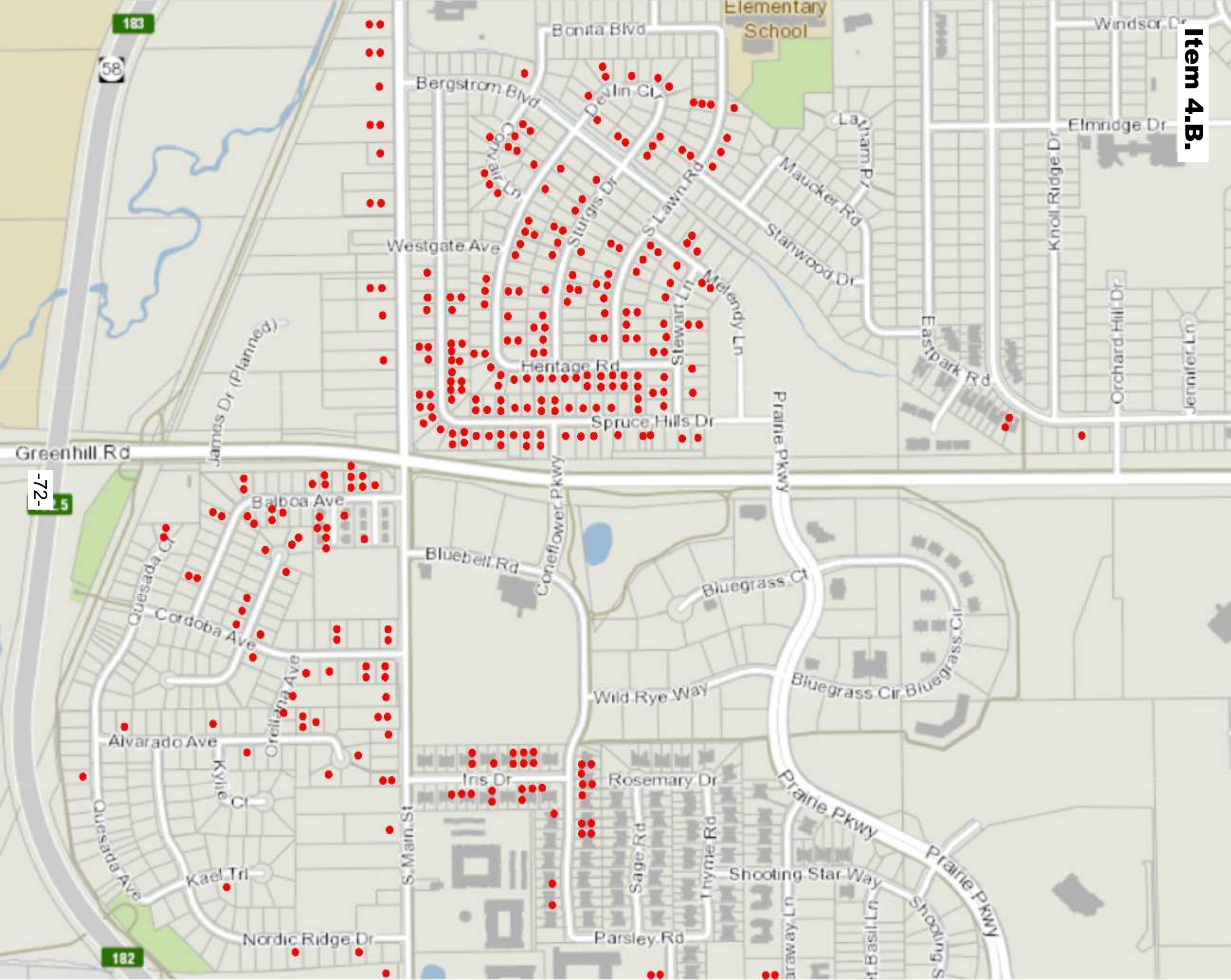
KWIK TRIP, Inc.
P.O. BOX 2107
1626 OAK STREET
LA CROSSE, WI 54602-2107
PH. (608) 781-8988
FAX (608) 781-8960

CARWASH NOISE LEVELS

#	DATE	DESCRIPTION

DRAWN BY
SCALE
PROJ. NO.
DATE
SHEET

FALLS, IA


183
58
Bonita Blvd
Elementary School
Windsor Dr
Bergstrom Blvd
Devlin Ct
Elmridge Dr
Latham Pl
Maucker Rd
Knoll Ridge Dr
Sturgis Dr
S Lawn Rd
Stanwood Dr
Westgate Ave
Melendy Ln
Stewart Ln
Eastpark Rd
Orchard Hill Dr
Jennifer Ln
James Dr (Planned)
Heritage Rd
Spruce Hills Dr
Prairie Pkwy
Greenhill Rd
Balboa Ave
Quesada Ct
Cordoba Ave
Bluebell Rd
Coneflower Pkwy
Bluegrass Ct
Bluegrass Cir
Wild Rye Way
Alvarado Ave
Orellana Ave
Kyle Ct
Iris Dr
Rosemary Dr
Quesada Ave
Kael Trl
S Main St
Sage Rd
Thyme Rd
Shooting Star Way
Nordic Ridge Dr
Parsley Rd
182

September 8, 2017

Department of Community Development
City of Cedar Falls
220 Clay Street
Cedar Falls, IA 50613

Attn: Mr. David Sturch

Please, please do NOT approve the Kwik Star store at the corner of Greenhil Road and Coneflower Parkway. Greenhill already is just like a racetrack. When you try to turn onto Greenhill from either Coneflower Parkway or Estate Drive, there are times you have to wait 5 or 6 minutes or even longer because of the traffic. Adding a station will only make it worse. There have been several accidents at the corner of South Main and Greenhill within the past month and those will also increase with a station added to the corner. There is a new Casey's being built about a mile to the west on Greenhill. How many stations do we need in this area?

We have been property owners in this area for almost 25 years. Do our concerns mean anything at all? This is a big concern for us and we are hoping you will not approve this.

Thank you,

Mike & Coleen Wagner

Mike and Coleen Wagner
217 Spruce Hills Dr.
Cedar Falls, IA 50613

9-11-17

Dear Members of the Planning and Zoning Commission;

Re: Proposed Kwik Trip / Kwik Star gas station at Greenhill Rd and Coneflower

I write this letter as a concerned neighbor of this site. I live at 301 Spruce Hills Dr. My backyard is directly across Greenhill from the proposed site.

First, why were only people whose backyard faced Greenhill informed of this meeting? Our neighbors across the street were dismayed by the lack of notice as they are equally impacted by the increased traffic, the increased noise contribution and the increased light pollution from this type of business located on Greenhill Rd between South Main and Coneflower that operates 24 hours each and every day.

In 2011, Casey's attempted to build a gas station at the corner of So. Main and Greenhill. Fortunately, that attempt was unsuccessful, related to traffic flow problems, safety concerns, poor fit with the established use of the area, and non-support by the neighbors.

I share those concerns with the Kwik Trip plan. Traffic on Greenhill Rd, designed as a minor arterial, has increased greatly over the last few years with growth in area housing, business developments in the industrial park and Viking Corridor, increased Western Home developments, and increased numbers of health care offices. The City of Cedar Falls plans to build a new City Hall in the area by the fire station. What was a traffic problem for the Casey's plan has increased even more by the time of this Kwik Trip plan.

Please review the P&Z meetings (Feb 2011) related to Casey's and its impact on South Main traffic. While Kwik Trip integrated some of the recommendations of the committee at that time, the traffic patterns will be very similar regarding South Main and will impact El Dorado Heights as well as those using Estate Drive on the Coneflower side of the site. Greenhill lanes funnel from 4 to 3 lanes between Coneflower and South Main.

Light pollution, increased noise contribution and fuel odors are a concern. My backyard is directly across from the gas pumps location and where tanker trucks will deliver fuel. Kwik Trip is a 24 hour business, 7 days a week. The Greenhill "barrier" proposed from Kwik Trip is not adequate to protect my home from the light, the noise and the smells 24 hours a day, 7 days a week. This all will negatively impact my family's quality of life and the lives of my neighbors.

Drainage of surface water on this site and contaminated runoff into the pond is a concern. After a heavy rain, I have seen water standing on this ground.

Pinnacle Prairie was mixed use when we purchased our home 9 years ago. The use map changed in 2016 designating the corner of South Main and Greenhill as commercial. These lots are now appropriate for small offices or establishments serving the immediate residential community. Yes a gas station is included in the list. Development of that site for a gas station is just not appropriate against a residential area. There are already 4 gas station/ convenience stores within 0.5 to 2 miles of South Main and Greenhill. Surely there is a site available to build another gas station that is not in a neighborhood's back yard.

Sincerely,

Denise Flory

Denise Flory

12 September 2017

Planning and Zone Commissioners
Cedar Falls, IA 50613

MU DISTRICT SITE PLAN REVIEW – KWIK STAR CONVENIENCE STORE

As 37-year residents of Balboa Avenue in Cedar Falls, Janice and I are requesting that you address concerns regarding the proposed Kwik Star in the Pinnacle Prairie development. After reviewing the P & Z packet and the Shive-Hattery traffic study, it has become clear that the additional traffic will adversely impact residents of the South Main community. This impact will be especially significant on property owners of Balboa Avenue. We also have concerns with the potential visual impact of this facility on our neighborhood.

It is important to note that the proximity of Balboa Avenue to the Greenhill-Main intersection presents a special situation that is not accounted for in traffic studies. Contrary to federal and state guidelines, Balboa has been absorbed into the functional intersection of Greenhill-Main. It lies a mere 140 feet south of Greenhill and intersects with the northbound left-turn lane of South Main. The additional queueing of northbound traffic at the Greenhill-Main stoplight makes it difficult to safely turn onto northbound Main from Balboa.

Kwik Star's traffic study estimates that the northbound backup for a red light (in the through/right-turn lane) will range from 62 to 113 feet. With queues beyond 70 feet a driver does not have sufficient room to turn north onto Main from Balboa, meaning that this will frequently extend wait times. This access is further complicated by conflict points with southbound Main traffic and the northbound left-turn lane. Failure to mitigate traffic impacts from Kwik Star and future Pinnacle Prairie developments will create an untenable situation for our community. Please refer to the attached Figure 1 which illustrates the queue issue.

To mitigate the projected traffic impacts, we are asking that commissioners include four requirements in any approval for the Kwik Star plan:

1. Incorporate upgrades to the northbound lanes (turning and through lanes) at the Greenhill-Main intersection in the proposed 2019 capacity improvements. City staff have already made plans for intersection improvements in the southbound lanes at Greenhill-Main, but have not suggested changes to the northbound lanes. Kwik Star's projected bump in northbound traffic – a whopping 27% in peak morning hours - will negatively impact access from Balboa Avenue to South Main. This congestion will be further exacerbated by future development in the South Main corridor such as the proposed Public Safety facility. For these reasons, any capacity improvements should consider northbound traffic flow.

2. Eliminate the driveway access to South Main, between Bluebell and Greenhill, from the Pinnacle Prairie Master Plan. Please refer to Figure 2, attached. This access was added without appropriate consideration when the plan was updated in 2015. A driveway placed

in this corridor does not conform to federal and state standards for driveway-to-intersection separation. Any plans to allow direct access onto South Main for future development will increase northbound traffic congestion and worsen the Balboa access issue.

3. Enforce the proposed cost-sharing agreement for 2018 Greenhill Road improvements at South Main and Coneflower. Refer to # 13 "Traffic Impact Study" in the packet. In addition, carve out appropriate right of way on the Kwik Star property for potential future upgrades to the Greenhill-Coneflower intersection. Reduce the speed limit between Prairie Parkway and South Main to 35 mph if needed to enhance access to Kwik Star from Coneflower.

4. Add a curb cut to the Coneflower median, adjacent to the east driveway of the proposed site, to facilitate northbound exits onto Coneflower. As currently proposed, the site will only accommodate southbound exits which will divert excess traffic to Greenhill-Main. While the traffic study suggests exiting traffic will re-route to Prairie Parkway, this seems unlikely due to out-of-distance travel. We note that it is twice as far (0.5 miles) to navigate from Kwik Star to the Greenhill-Prairie Parkway as compared to Greenhill-Main. It is more intuitive for the driver exiting Kwik Star to travel via the Greenhill-Main intersection. This traffic movement will overburden this intersection as described above.

Regarding the visual impact, we urge commissioners to assure that staff recommendations are closely followed during the site development. While engineering and planning officials have been diligent in mandating architectural and landscaping features, this can only be effective if appropriately enforced. We have concerns with the accuracy of the artist's depictions provided by Kwik Star, several of which incorrectly show "Kwik Stop" signage. It seems appropriate to demand more detailed plans to confirm that what's "pretty on paper" represents what Kwik Star will build.

We appreciate your consideration of these issues to help assure that residents of the South Main community will continue to enjoy an excellent quality of life.

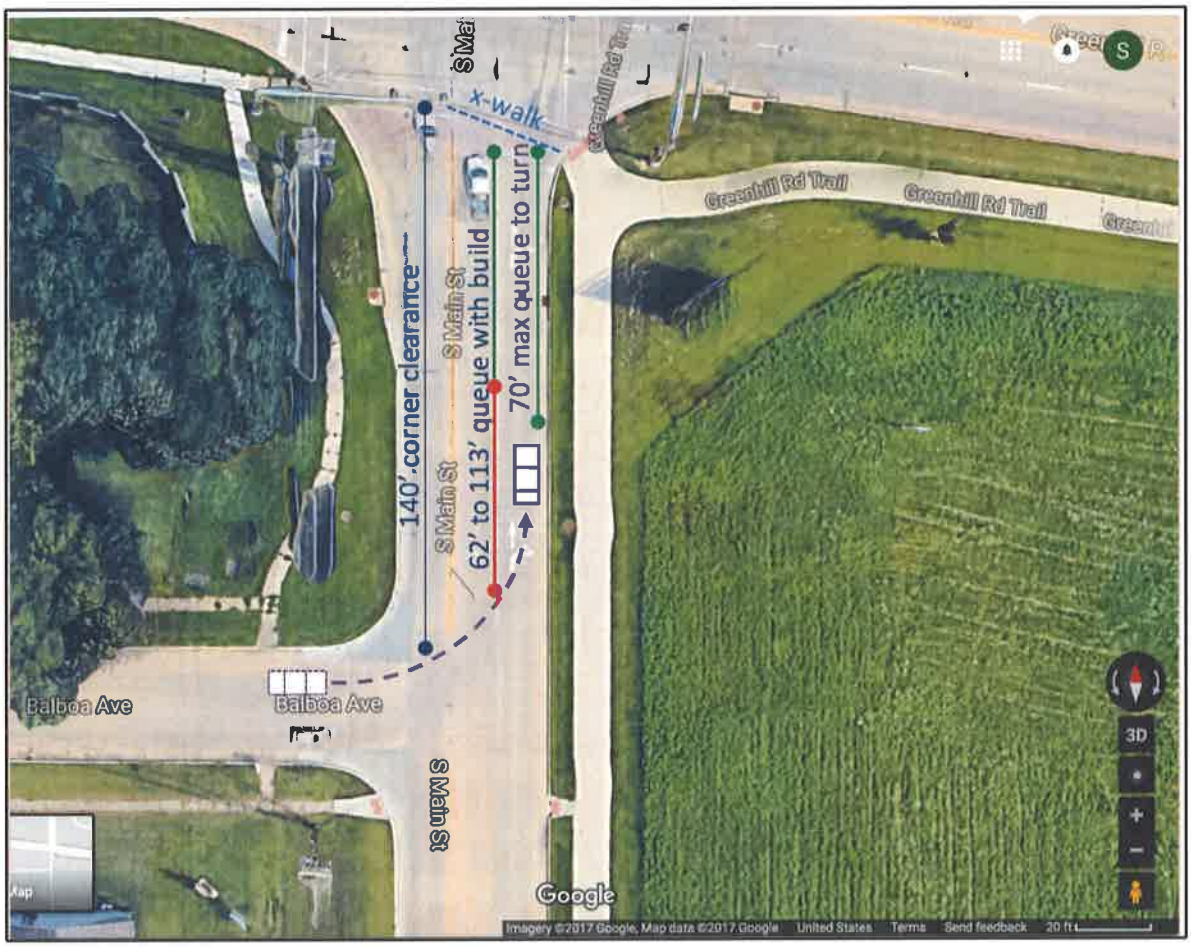
Sincerely,

Stephen R. Ephraim

Steve Ephraim

FIGURE 1
NORTHBOUND QUEUE VS. TURNING DISTANCE FOR GREENHILL-MAIL INTERSECTION

- Figure Illustrates Balboa-to-Main northbound turning conflict with Kwik Star build
  - Queues more than 70 feet will prevent safe turning clearance



SOURCE FOR KWIK STAR QUEUE IMPACT: Shive-Hattery traffic study (ref. table below)

Queuing and Blocking Report
2018 AM Peak Hour Buildout

Kwik Star - Cedar Falls
2018 AM Peak Hour Buildout

Intersection: 1: Main Street & Greenhill Road

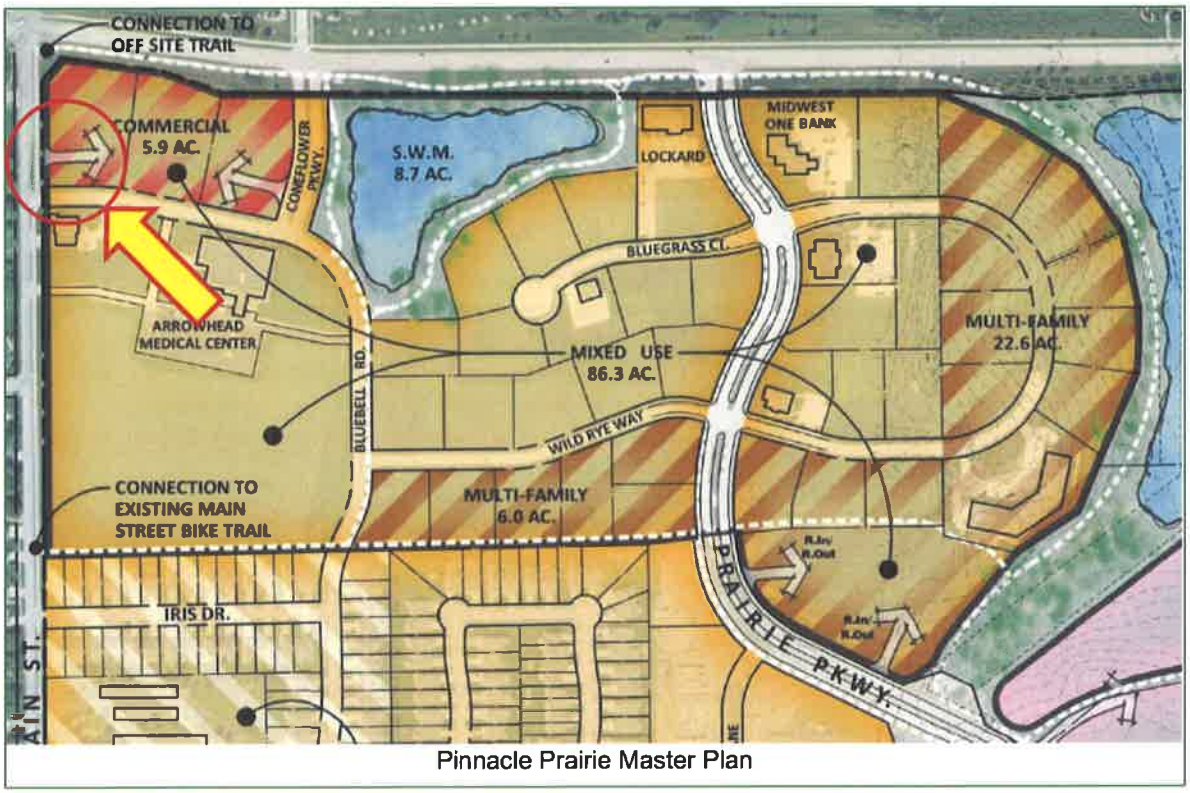
Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	184	119	81	47	181	89	139	175
Average Queue (ft)	89	45	36	14	87	36	62	89
95th Queue (ft)	154	88	67	39	149	73	113	155
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	0						0	
Queuing Penalty (veh)	0						0	

3

FIGURE 2

DRIVEWAY ACCESS TO SOUTH MAIN BETWEEN BLUEBELL AND GREENHILL

- Figure illustrates non-conforming driveway access to South Main
  - State and federal guidelines prohibit driveway placement in this area



Pinnacle Prairie Master Plan

4

Item 4.B.

Sept. 13, 2017

To: Cedar Falls Planning & Zoning Commission

Re: Kwik Star Store.

Today we received notice of the request of approval for a site plan for a Kwik Star Store at Greenhill & Coneflower Pkwy. I was not happy & was given 8 hours notice of the meeting when plans that were included is dated April 2017. I am sure you have had advance notice of this plan. As a resident of Cedar Falls I would appreciate advance notice of major changes in my neighborhood.

With that said, I OPPOSE the building of a Kwik Star Store for the following reasons:

1. The traffic on this corner and area in question has increased over the past 10 years I have lived here. The speed limit alone on both Greenhill and Main St. could cause accidents as customers would slow down, enter and exit this area. I also would not appreciate a store that could possibly be open 24/7 in my quiet neighborhood. I moved onto a dead end street for a reason.
2. The recent construction of Casey just down the road from the proposed site would seem to supply this neighborhood with ample access to gas. Kwik Star would saturate the area and is redundant.
3. The opening of Prairie Parkway does funnel traffic through our area. Commercial sites available and more safely accessable to develop should be clustered in current retail/commercial areas. Spreading and saturating redundant businesses in our area could result in negative growth

ot and bike traffic is heavy in this area. Trying to cross Greenhill and Main is nearly impossible unless you can run. I can't. Many residents in our neighborhood are Senior citizens who shy away from the trails along Greenhill because of limited access and safety fears.

Again, I OPPOSE the construction of Kwik Star. I would urge you to vote no.

Sincerely

Penny Popp & Peter Huizinga
4805 S. Main St.
Cedar Falls IA 50613
peterpenny1@gmail.com

From: Redgie Blanco <redgie.blanco@gmail.com>
Sent: Wednesday, September 13, 2017 3:00 PM
To: David Sturch
Subject: Kwik Star Site Plan

Mr. Sturch,

Could you please be so kind to provide the following letter before the meeting tonight to the Planning and Zonning Commission Board to be read and/or to be taken into consideration while discussion this request tonight

Dear Planning and Zoning Commission Board Members,

We DO NOT want a gas station at the corner of Greenhill Rd and Coneflower Parkway.

We hope that the approval of the Kwik Trip site plan be discussed in depth with the input of the people that will be affected by this new business in our neighborhood, and I ask the that the commission takes extra time to take into consideration the feedback from the people that will be directly affected by this new development and have not had a chance to voice their opinion yet.

We are thankful to receive the letter from Mr Sturch today 9/13/17, few hours before the meeting, but unfortunately, this does not give us or some of our neighboors much time to express in person concerns about this gas station in our neighborhood.

I feel that this type of business that opens 24 hours selling fuel, beer and other items, will be a safety and pollution/environmental concern for our children and adult residents. This business will increase traffic, which is already an issue for the intersection of South Main St and Greenhill Rd. It will attract additional transients to the area, will encourage loitering, which is very difficult to enforce by the city, and garbage will end up in the road, and in our yards. In addition to this this type of business will bring chemical, noise, light, and trash pollution to our neighborhood.

There are already several fueling stations in the near vicinity, and there is a new gas station soon to open a mile away at Ashworth Dr. and Algonquin Dr. I don't believe there is a need to bring this type of business in a location where traffic is already an issue, and there is plenty of other gas stations in the area to fulfill the need of this type of business in a such proximity to residential zones.

Sincerely,

Redgie Blanco
318 Alvarado Ave.
Cedar Falls Iowa 50613

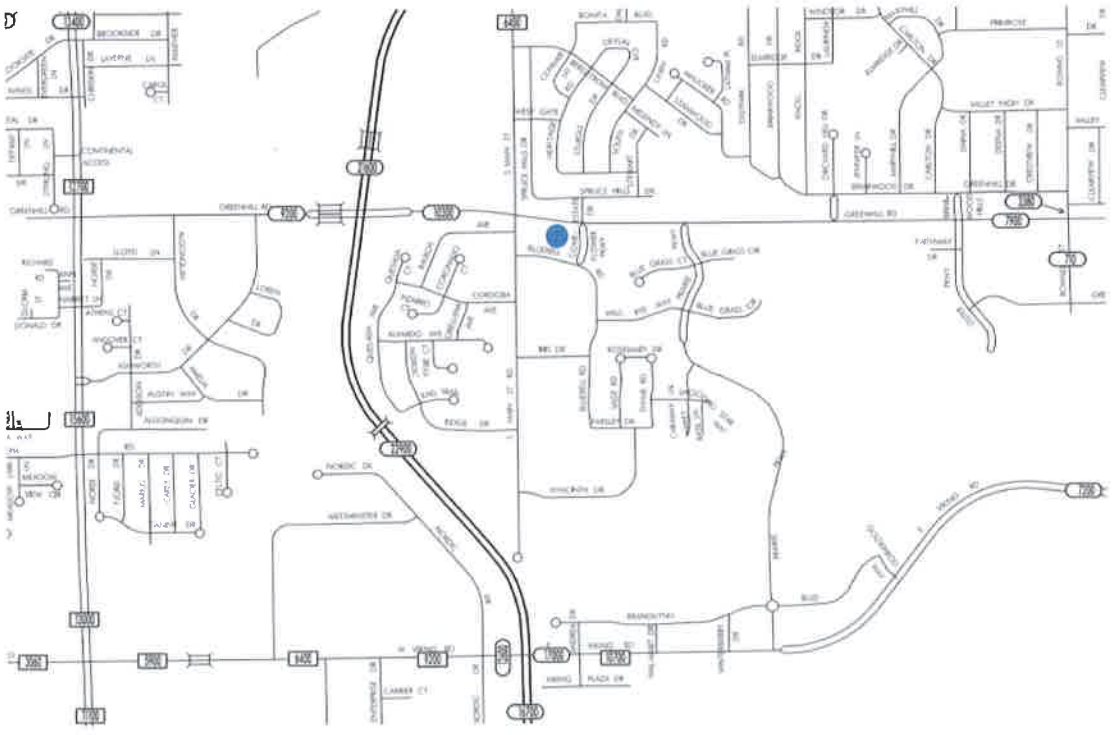
From: Steve Gardner <stevega@gmail.com>
Sent: Wednesday, September 13, 2017 11:57 AM
To: David Sturch
Subject: Re: Concerns with Kwik Star Proposal - Greenhill Dr and Coneflower Pkwy

David,

Sorry for the late notice on my concerns. This email was sent earlier in the week to others and I meant to include you. I look forward to discussing this issue this evening at the planning meeting.

Recently I received a notice that Kwik Star requested approval to build on Greenhill Dr and Coneflower Pkwy. Like many others in the neighborhood adjacent to the site, I am concerned about the impact this will have to the area and I feel other spots might be more beneficial for a gas station. I have broken down my concerns, with key points below, in addition to a proposal for other sites at the end.

Motor Vehicle Traffic Concerns -
This will be a 24 hour service station developed between a retirement community and a large neighborhood, so I see the potential for the business. I am concerned with how this will affect the traffic flow in that area. In 2014, Greenhill Dr. saw roughly 10,000 cars a day. Comparing this to the Casey's on Viking, which is a 4 lane road as well during the same time. Casey's made that potion of Viking handle 12600 cars compared to 9200 cars on the other section between Hwy 58 and Hudson Rd. Using this model as a baseline, Greenhill will see roughly 25-30% increase in traffic. This requires the area to handle at a minimum 12500 cars per day without factoring in growth in the area due to new housing and other business growth in the area over the past 3 years or future growth. Keeping this in mind, considerable changes to the Greenhill Coneflower intersection will need to take place, more details in the next section.



● Proposed Kwik Star

https://iowadot.gov/maps/msp/traffic/2014/Cities/CedarFalls.pdf

Motor Vehicle/Foot Traffic Interaction

With the addition of more cars on the road there is a greater concern for safety. Both sides of where Coneflower Pkwy and Greenhill Dr intersect there are bike trails. These trails are heavily used since they are a main thoroughfare to George Wythe, Blackhawk Park, Hudson, etc. for people in the area. As my family and I ride bikes frequently on the main bike trails around town, we are becoming increasingly nervous riding on Greenhill Dr due to the increased vehicle traffic. It seems like in order to make this proposal work a traffic light would be needed to control the flow of traffic in the area. Between the intersection of Greenhill Dr. and Hwy 58 to the intersection of Greenhill Dr. and Prairie Pkwy, there are currently 3 traffic lights. Greenhill Dr goes from a four lane road to a two lane road back to a four lane road. Coneflower Pkwy also has a median so traffic currently cant turn left into where Kwik Star would be, without affecting the median. With all these competing issues and the heavy amount of foot traffic in the area it seems like this location is a poor choice for a Kwik Star location. All these competing issues would require this intersection to becoming a major intersection instead of low traffic neighborhood roads.

Key Concerns on Safety/Traffic-

1. The area will struggle to handle the increase in traffic from the added business
2. With growing foot traffic in the area there is a safety concern with the additions of more pedestrian/vehicle interactions
3. Currently 3 traffic lights on a 0.7 mile stretch (between 58 and Prairie Pkwy) - a 4th would probably be required
4. Greenhill Dr goes from 4 lanes to 2 lanes to 4 lanes in that section, causing traffic confusion for many.
5. Coneflower Pkwy is a divided road which would have to be redesigned to allow northbound traffic access to Kwik Star
6. There are several gas stations in the area, doesn't seem like another one is necessary. There is a Casey's being built on the west side of 58 as well. (Casey's, Hyvee, Kwik Star all within 3 miles of this location)

Proposed Solution

Looking at the traffic density maps verses road layouts, there seem to be many spots better suited for a Kwik Star location.

1. Across the street from Menards on Viking. This is a high traffic, growing industrial area without a gas station on the east side. This would allow people from the east side of viking to get gas without having to go to Casey's or Murphy's, cutting down on traffic at the Viking 58 intersection.
2. Greenhill and 58 seems like a better option than Greenhill Dr and Coneflower. This area has a traffic light and more lanes that can handle the traffic without dropping to 2 lanes. This is close to the proposed Casey's though so is another gas station in this area required? Same question applies to the current proposed location.
3 Hudson and Viking or Greenhill and Cedar Heights. These areas a traffic light to handle the traffic and more lanes than Greenhill at Coneflower.

Proposed Kwik Star
Potential Spots
New Casey's

I appreciate your time in reviewing my concerns and viewing my proposal for alternate sides. I think overall business growth in the Cedar Falls area is a great thing and will be beneficial but a Kwik Star at the proposed location seems to create more problems than it solves. As a husband and father I get concern with the added traffic to the area. The implications of the traffic logistics seem difficult to manage as well. I hope to discuss this with you all Wednesday evening in greater detail.

Thank you,
Steve Gardner
424 Spruce Hills Dr.

From: denflory <denflory@aol.com>
Sent: Friday, December 01, 2017 9:23 AM
To: lsaul@pipac.com; David Sturch
Subject: Re: Kwik Star and Fareway plans part 2

I should also add, regarding the changing of Kwik Star to lots 32 and 33, the homes that back Greenhill across from those lots are shielded from noise and light pollution by a 6 to 8 foot earthen berm with another 5-6 foot double wooden fence. The homes that back Greenhill across from lots 33 and 34 have only 3 diseased ash trees and a drainage area of cat tails as noise and road pollution mitigation.
Since the change from MU to commercial zoning occurred in 2015, after the building of the 3 homes on Spruce Hills, and these commercial developments will increase noise and light pollution, increase litter, and reduce area real estate values, an earthen berm or other mitigation should be offered.

Sincerely,
Denise Flory
301 Spruce Hill Dr
Cedar Falls

Sent from my Verizon, Samsung Galaxy smartphone

-------- Original message --------
From: denflory@aol.com
Date: 12/1/17 00:01 (GMT-06:00)
To: lsaul@pipac.com, David.Sturch@cedarfalls.com
Subject: Kwik Star and Fareway plans

Dear Ms Saul and Mr. Sturch;

I oppose the proposed placement of Kwik Star and Fareway in lots 32, 33 and34 in Pinnacle Prairie Business Center North subdivision, based zoning changes, on current traffic concerns for the Greenhill and South Main area, and based on planned growth and timing of proposed development with planned road construction and reconstruction.

As written by the Cedar Falls Department of Community Development, in 2014 "staff met wit the developer to discuss changes that have occurred since the rezoning and the importance of updating the Master Plan". This update, to change the northwest section, lots 32, 33 and 34 from mixed use to commercial was formally adopted by Planning and Zoning and the City Council in Spring 2015. I do not recall, as a homeowner in the area, receiving notice of any proposed zoning change. This was wrong, oversight or not. When our home was built in 2008, we had the knowledge that with Mixed Use, professional or medical offices and businesses similar to those in the area would fill the open lots. We relied on that information to our detriment. Having a 24 / 7 gas station with a car wash with exit blowers facing residences along Greenhill does not fit with the existing development. There are currently no other 24/7 businesses in the immediate area. I understand the Public Safety Building will be operational all the time but it will not have the ongoing traffic, lights or noise pollution of the gas station.

Secondly, and this is a broken record, the traffic at Greenhill and South Main is very dense and concerning at times. With the changes to University Avenue, Greenhill has become busier. I do not have traffic studies to site, only the view from my back windows and yard, daily walking of the

trails, and driving from Estate Drive onto Greenhill. There are 5 traffic signals between 58 and Cedar Heights. With more developments along Greenhill, traffic control is critical. I understand in the next year or 2, changes will occur to "improve" the Greenhill / South Main flow of traffic. It is during that same time frame that Greenhill and HWY 58 will undergo planned changes. Planned development in the Greenhill / South Main area now include the new Public Safety Building that will need to respond to emergencies using South Main, Greenhill and Bluebell/Coneflower, the housing in the Sands Development, the Fairbanks Development, the developments by Candeo Church, Western Home expansion and other developments in Pinnacle Prairie. Each of these developments brings tax dollars to the city and traffic. A grocery store is a destination, a gas station is a destination. These two commercial developments will draw even more traffic to Greenhill and South Main.

I have heard that the businesses will pay for changes to the road to provide turn lanes. Why are turn lanes necessary? People can simply go to the light at South Main / Greenhill and make their way to Fareway and Kwik Star or make the turn at Coneflower as it is. Sure, it will take time. Traffic should be slower there because of the decrease in lanes from 4 to 3 between Coneflower and South Main that allows for the turn lane at the light. Of course, more traffic on South Main will interfere with traffic exiting Eldorado Heights. I understand that widening Greenhill for proposed turn lanes would be on the north side - closer to the established homes instead of in the currently undeveloped lots. I oppose this. I am not eager to have Greenhill Road any closer to my backyard than it already is and the infected ash trees on city property do not provide any noise mitigation.

In November, I and Kathy Barfels submitted a neighborhood petition with 132 names opposing Kwik Star at lots 34 and 33 because of high volume traffic, lack of noise mitigation for car wash blowers, a 24 hour 7 day a week gas station did not fit with the established professional office culture, the overhead lights, increased litter and pollution concerns. This list was given to David Sturch, city planner, prior to what we thought was the next P & Z meeting with Kwik Star on the agenda. That meeting ultimately was about the Public Safety Building. I understand that 2 other petitions were also provided to Mr. Sturch at or around that time.

If the area resident concerns are not heard and this commercial development continues, I would request again, that Kwik Star put the exit of the car wash to face Bluebell and install large pine trees or a fence specifically for noise mitigation, and be closed during the overnight hours.

I also suggest moving Kwik Star to the corner of Greenhill and South Main, with the entry / exit closer to the Bluebell side on lots 33 and 32. Allow Fareway to develop lots 33 and 34. I believe that Fareway, which operates reasonable daily hours, and is closed on Sundays and holidays, would be a better neighbor.

The intersection at South Main and Greenhill would work better if turn arrows and traffic patterns were installed and operated much like the intersection signal lights at Cedar Heights and Greenhill. I do not understand why this has not been done.

I would also suggest closing Estate Drive, which is only 1 block long but a point of entry and exit for Heritage Hills Development. Now that Pinnacle Drive is complete linking with Spruce Hill, Steward Lane and Melendy, traffic can flow in and out through that signaled intersection. Closing Estate Drive, which is directly across from Coneflower, would reduce entry and exit traffic onto Greenhill, making Coneflower less difficult to enter and exit. In directing traffic to Pinnacle Drive, it is possible that more traffic would use Pinnacle Drive to access 58 or Ridgeway or 20 instead of Greenhill / South Main / 58.

I thank the Planning and Zoning Commission and the Planners in Community Development for the work that is done. You have an important role in discerning whether and how submitted plans will serve the city and its citizens. There is a balance between development and quality of life. I know that this proposed development of Kwik Star and Fareway in the proposed lots will have a negative impact my family's quality of life.

Sincerely,
Denise Flory
301 Spruce Hill Dr

From: Dan Barfels <dkbarfels@hotmail.com>
Date: December 4, 2017 at 6:08:50 PM CST
To: "David.Struch@cedarfalls.com" <David.Struch@cedarfalls.com>
Subject: Kwik Star

David,

Thank you for taking my phone calls. I have a list and will consolidate my concerns into bullet points for brevity.

1. Property values are diminished by the potential of a Kwik Star across from my home. Realtor shared potential buyers backed out of purchase because of Kwik Star building on Coneflower.
2. If Kwik Star is going to do business at Coneflower or South Main & Greenhill, I ask that hours of operation cease during the nighttime hours. I also ask that carwash hours cease by 9 pm, flip the design so the carwash exits onto Bluebell or eliminate the carwash totally.
3. Greenhill is now the new University. And we now have 5 stoplights between 58 and Cedar Heights.
4. Other locations within Pinnacle Prairie would be better suited to Kwik Star, such as area by Menards and Viking, along Prairie Parkway by Unity Point complex or switch proposed placement of Kwik Star with the proposed Fareway location.
5. Traffic is steadily increasing on Greenhill. Recently, with the opening of Candeo Church with a multitude of worshipers, overflow parking now parks on Faith Way Dr. Sunday morning traffic on Greenhill is now very busy. Fareway is closed on Sundays, late nights, and on holidays so it would not impact the Sunday morning traffic like a Kwik Star.
6. Please note the petitions opposing Kwik Star that were previously submitted.
7. Traffic concerns from current and future developments from Hwy 58 to Cedar Heights along Greenhill are: Sands, Heritage Hills, Western Home, Whispering Pines, Oster Development, Green Creek Addition, Pinnacle Prairie, and Kyle Larson's development. This does not include the Public Safety Building and the proposed Kwik Star and Fareway.
8. Turn lanes should not be added to Greenhill at Cornflower or Estate Dr. These will impact established bike / walking trails and create more congestion in an area where the traffic lanes are reduced for the stop light at South Main and Greenhill. Lights at Prairie Parkway and also at South Main will facilitate any traffic into developments on Coneflower, Bluebell and Rye.
9. No businesses from Hudson Rd / Greenhill to 218 / Greenhill operate 24 hours a day. Such a business would not fit with current neighborhoods.
10. A "Gentleman's Word" was given regarding the development of lots 32-34 that it would be businesses similar to those already in Pinnacle Prairie, also as shown on the billboard at South Main and Greenhill depicting a vibrant business area - NOT GAS STATIONS. A "Gentleman's Word" regarding the Arbor traffic not using Erik Road was given to Stephanie that she shared at the Sept or Oct P&Z meeting. Whose "Gentleman's Word" is one to rely upon?

Thank you for your time and consideration.
This is a safety and quality of Life concern.

Sincerely,
Kathy Barfels
305 Spruce Hill Dr
Cedar Falls, IA

From: margaret holland <mgholland@hotmail.com>
Sent: Monday, December 11, 2017 3:35 PM
To: David Sturch
Subject: Community Development- Kwik Star and Fareway

David,

I live at 128 Balboa Ave, C1 and I am writing to comment on the proposal to built a Kwik Star and Fareway near the intersection of South Main and Greenhill. I am opposed to both of these proposals. The plan for the entrance to the Fareway off S Main will create a problem turning onto and off of Balboa. The traffic in that area is already a problem for those of us on Balboa, partly because Balboa is close to Greenhill and cars are accelerating from being stopped at the light. More traffic in that small area will lead to more accidents. The Kwik Star will generate more traffic and be open long hours. Both of these plans are inconsistent with what we were told would be built on those lots. Plus the design is not in keeping with the prairie style. I hope that the city decision makers will take the concerns of city residents into account and not be solely focused on the desires of the business community.

Thank you,
Margaret Holland

Cedar Falls Planning and Zoning Commission:

I am responding to the letter dated 12/5/2017 about the Site Plan Review.

The corner of South Main and Greenhill Road is very challenging now. It is a major route for those going South on Main who need to turn either East or West. Also those going East or West on Greenhill Road find a very busy intersection. For those of us living in the Western Home Community, the increase in traffic will make it very difficult to leave our area going North.

The new Police/Fire Department structure poses additional problems with traffic flow. Getting emergency vehicles from the new station and onto Main and/or Greenhill Road, since Main is a two lane roadway, will be a problem.

Just West of highway 27 a new convenience store/service station was built. I do not believe there is a pressing need for another such structure within that short distance.

We urge you to vote against the Kwik Star proposal.

Sincerely,

Elton and June Green
4934 Bluebell Rd.
Cedar Falls, IA

Elton Green
June L Green

Out of town December 13, 2017

From: Gowans, Doug <DGowans@eengineering.com>
Sent: Tuesday, December 12, 2017 4:30 PM
To: David Sturch
Subject: Site Plan Concerns: Fareway / Kwik Star

David,

Thanks for contacting me, regarding the Site Plan Review for the proposed Kwik Star and Fareway Grocery Stores.

I just want you and the Planning and Zoning Commission to know that **I am NOT in favor** of these two stores locating at the Greenhill Road and S. Main Street location. As a resident of Eldorado Heights, 506 Balboa Ave., I oppose this type of construction because I do not believe it fits well with the general office / professional services types of businesses that are currently located in this area.

Let's keep our Retail Trading types of businesses in our existing RTZ areas: Downtown, University Ave., College Hill and the Industrial Park. Spreading retail businesses and retail services throughout the city is not effective or efficient planning in my opinion.

Opening this corner up to retail development will also effect the traffic flow on South Main, Green Hill Road and Balboa Ave. Adding additional traffic (vehicle and pedestrian) at the South Main/Greenhill and Balboa Ave intersections is not a good idea. That intersection is already a traffic hazard.

Thanks again for talking with me on the phone. I hope the P&Z will reject the idea of development of this intersection for these types of businesses.

Best regards,

Doug Gowans and Julie Gowans,
506 Balboa Ave.
Cedar Falls,
(319) 404-8725 (Cell)
dgowans@eengineering.com
gowans@cfu.net

From: Jon Ericson <jonericson1@gmail.com>
Sent: Wednesday, December 13, 2017 1:45 PM
To: David Sturch
Subject: Kwik Star at tonight's P and Z

David,

I'm not sure if I will be able to make it to tonight's meeting, so I wanted to share my thoughts with the commission.

#1) I am opposed to the Kwik Star project primarily because it is a 24-hour business operated directly across the street from single family homes. When these homes were constructed, the Kwik Star site was planned for office development. Years after the homes were built the plan was changed to commercial development. The lighting, noise and all hours traffic generated by a 24-hour business was not what these homeowners could possible have anticipated when they purchased their homes.

#2) If the project is going forward, I would plead that all lighting and signage at the property be the most discrete options possible, and that the car wash aspect of the business not operate after 9 p.m.

#3) I would encourage the traffic/road plan around the business to remain as it is in the current iteration of the site plan. Any changes that would push more traffic to Coneflower Parkway would exacerbate issues on Greenhill Road - in particular left turns onto Greenhill Road from either Coneflower Parkway or Estate Drive will be nearly impossible at several times of day with the additional traffic generated in this area.

As far as the Fareway project, could you please direct me to the supporting materials for this plan, or send it to me? Also, is there a traffic study I could see with the Fareway project.

Thank you,
Jon Ericson
402 Spruce Hills Drive
(319) 230-2405

12 December 2017

Planning and Zone Commissioners
Cedar Falls, IA 50613

MU DISTRICT SITE PLAN REVIEW – FAREWAY GROCERY STORE

As 37-year residents of Balboa Avenue in Cedar Falls, Janice and I are requesting that you address concerns regarding the proposed Fareway Store in the Pinnacle Prairie development. After reviewing the P & Z packet and the Shive-Hattery traffic study, it's become clear that the additional traffic will adversely impact residents of the South Main community. We also have concerns with the potential visual impact of this facility on our neighborhood.

There are three traffic issues with this proposal that must be addressed before approval:

1. The Shive-Hattery traffic study has incorrectly based its recommendations on hypothetical improvements to the Greenhill-Main intersection. Please refer to Attachment 1. Approval for this project must be contingent on the city's commitment to upgrade this intersection, consistent with the study recommendations, before completing the Fareway project.

2. The proposed driveway access to Main street does not conform to Iowa SUDAS guidelines for setbacks from the Greenhill-Main intersection and Bluebell Avenue. Please refer to Attachment 2, 3 and 4 for details. This access was incorporated into the 2015 master plan without adequate consideration and must be re-considered on the basis of traffic and design considerations. There are no driveway access points between Greenhill and Bluebell that will satisfy state and federal guidelines. Fareway should instead add a second driveway access to Bluebell or incorporate Bluebell access via a shared driveway with KwikStar.

3. Access for Balboa Avenue residents must be considered with any South Main Street project. Please refer to Attachment 5. For this reason, the above issues must be addressed prior to approving a project that might affect access for Balboa residents. The proximity of Balboa to the Greenhill-Main intersection presents a special situation that is not accounted for in traffic studies. The additional queueing of northbound traffic at the Greenhill-Main stoplight makes it difficult to safely turn north onto Main from Balboa.

Regarding the visual impact, we urge commissioners to assure that recommendations of the city planners and Pinnacle Prairie architects are closely followed in the site development.

We appreciate your consideration of these issues to help assure that residents of the South Main community will continue to enjoy an excellent quality of life.

Sincerely,

Stephen R. Ephraim

Steve Ephraim

ATTACHMENT 1

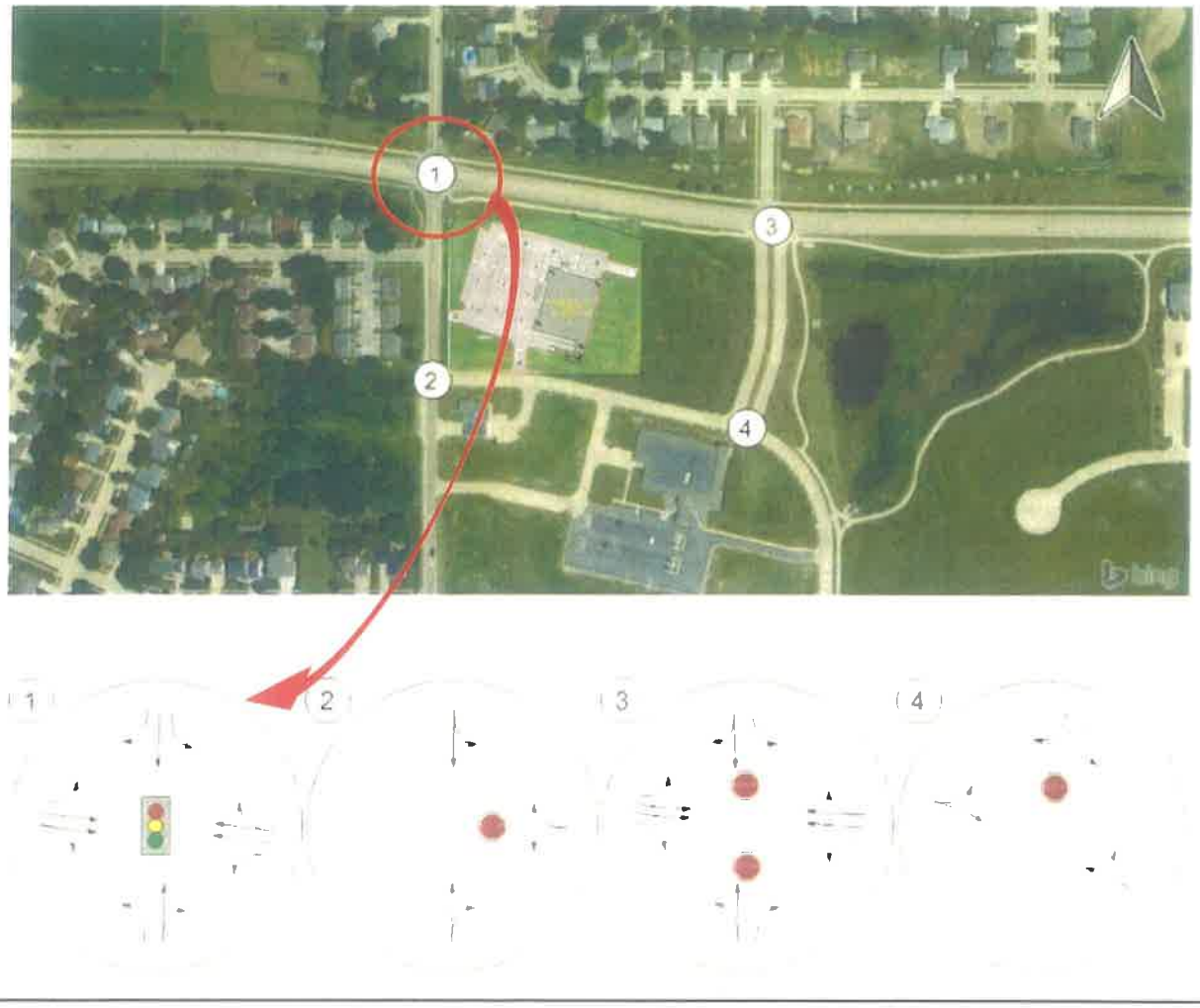
Shive-Hattery Study Based on Hypothetical Improvements to Greenhill-Main

The Shive-Hattery traffic study for Fareway Store bases its recommendations on hypothetical improvements to the Greenhill-Main intersection. As noted in Figure 10, item 1 below, these improvements include additional lanes and related upgrades to improve traffic flow. While these improvements have been slated in future plans, there is no commitment to implement them.

The study's author notes in the Conclusions of page 24 that these improvements were assumed in the traffic analysis which includes impacts of both Fareway and the adjacent KwikStar development:

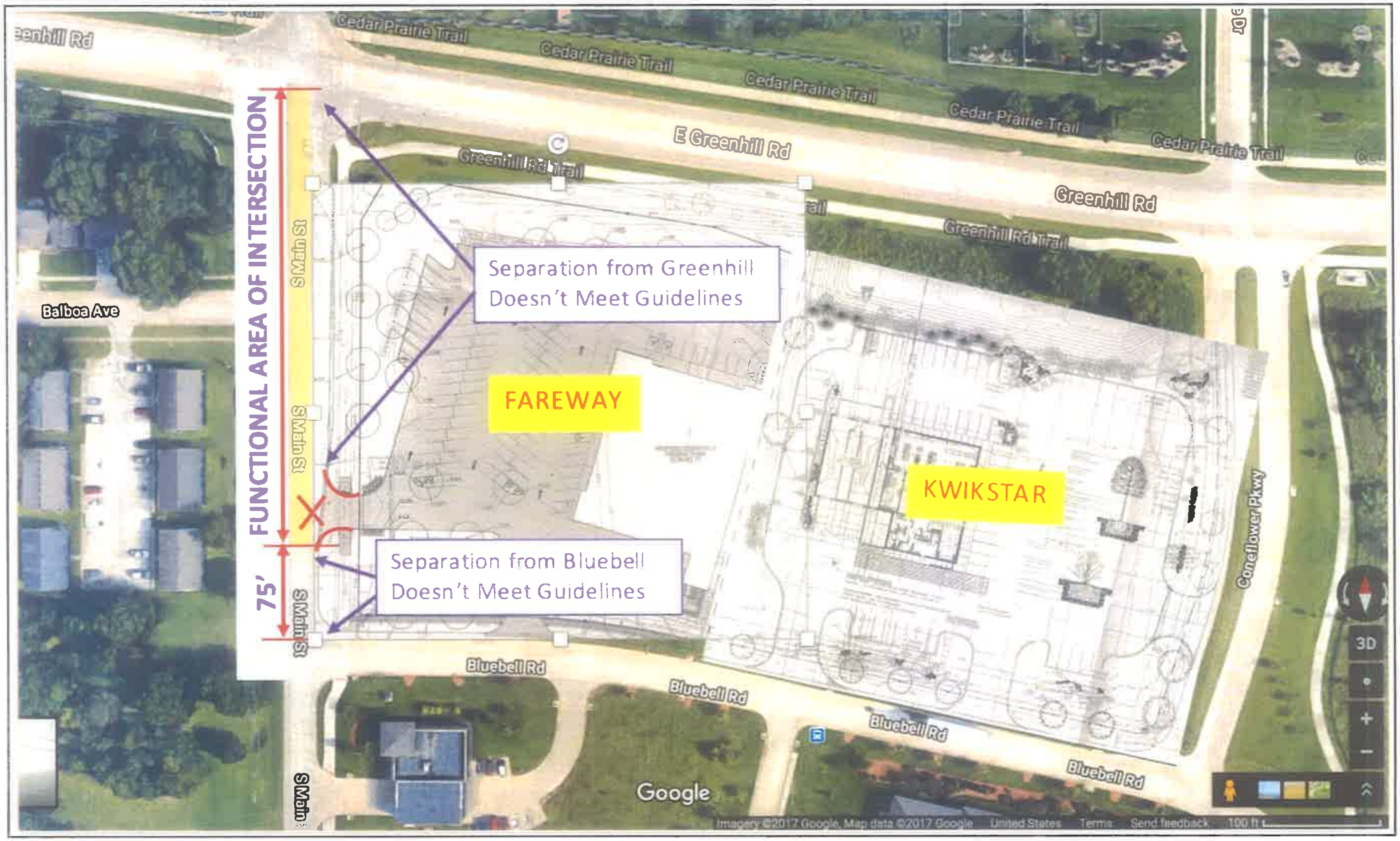
> Direction was provided by the City of Cedar Falls City Engineer to implement improvements as identified in Figure 10. However, the LOS at the intersection of Greenhill Road and Coneflower Parkway is still projected to fall below the acceptable LOS D in the PM peak hour with and without the proposed development by

Figure 10 **Study Intersections – Recommended Lane Configuration and Control By 2038**



ATTACHMENT 2

Overview Map Showing That Driveway Access to Main Street Does Not Conform to Setback Guidelines



ATTACHMENT 3

Proposed Driveway Access to Main Street Does Not Conform to Functional Intersection Guidelines

The proposed access to Main street does not conform to Iowa SUDAS guidelines for setback from the Greenhill-Main intersection. Section A of chapter 5L-3 of the Iowa SUDAS design manual, excerpted below, states that, "driveways should not be located within the functional area of an intersection or in the influence area of an adjacent driveway." ISU's Access Management FAQ states in Chapter 5, "It is important to protect the functional area of an intersection from driveway access. Driveways located within this area may result in higher crash rates and increased congestion."

Iowa SUDAS

5L-3

Design Manual
Chapter 5 - Roadway Design
5L - Access Management

Access Location, Spacing, Turn Lanes, and Medians

This section addresses access location, spacing, turn lane and median needs, including TRB Principles of Access Management 5-9:

A. Preserve the Functional Area of Intersections and Interchanges (Principle 5)

AASHTO states, "Ideally, driveways should not be located within the functional area of an intersection or in the influence area of an adjacent driveway. The functional area extends both upstream and downstream from the physical intersection area and includes the longitudinal limits of auxiliary lanes."

1. **Upstream Functional Distance:** The upstream functional distance of the intersection can be further defined as the approach distance to an intersection that is required for the driver to change speeds in order to complete a movement, such as entering an auxiliary lane or slowing down for a turn or signal. The upstream functional distance includes the sum of:

   d_1, distance traveled during driver's perception - reaction time

   d_2, deceleration distance while the driver maneuvers to a stop

   d_3, queue storage length required (50 foot minimum)

There are two key criteria for defining the functional area of an intersection. The first, explained in the excerpt above, is to tabulate the driver's perception/reaction time, deceleration distance, and vehicle queue storage length. For Greenhill-Main, this area exceeds 400 feet in length, considerably longer than the setback of the proposed driveway.

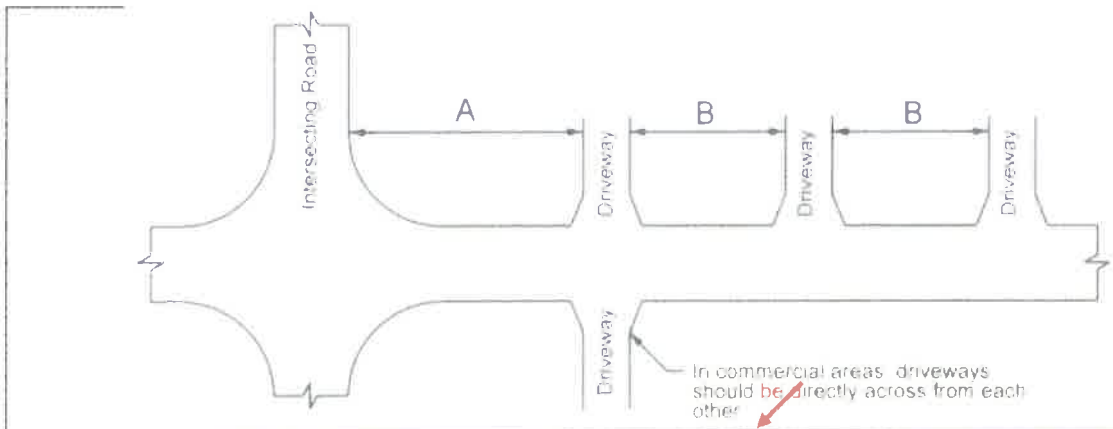
The second criteria for functional area of intersection is defined by federal AASHTO standards as including "the longitudinal limits of auxiliary lanes." For Greenhill-Main, the longitudinal limit of the northbound auxiliary lane of Main Street extends past the proposed Fareway driveway access.

ATTACHMENT 4

Driveway Setback from Bluebell Does Not Conform to Driveway to Intersection Distance Guidelines

The proposed driveway access to Main street violates Iowa SUDAS guidelines for setback from Bluebell Avenue as explained here. Table 5L-3.05 of Chapter 5L-3 of the SUDAS manual, excerpted below, depicts the minimum recommended distance between driveways and intersecting streets. As highlighted in the table, the distance from Fareway driveway to Bluebell should be a minimum of 100 feet considering that South Main is a collector street (see explanation for this classification below). As currently designed, this driveway access does not meet the minimum distance with its current location at 75 feet from the corner of Bluebell/Main.

Table 5L-3.05: Minimum Distance between Driveways or from Intersecting Streets



	Minor Arterial			Collector			Local		
	Res. Area	*C/I Area*	*Ag Area*	*Res. Area*[3]	*C/I Area*	*Ag Area*	*Res. Area*[3]	*C/I Area*	*Ag Area*
A. Minimum intersection clearance[1]	**145'**	**170'**	**300'**	100'	100'	300'	**75'**	**75'**	**150'**
B. Minimum driveway spacing[2]	**100'**	**200'**	**300'**	75'	100'	300'	---[4]	---[4]	**150'**

The justification for classifying the southern portion of Main Street as a collector is based on daily traffic counts considerably exceeding 400 vehicles per day. South Main was previous classified as a "local" street in the 2011 Cedar Falls comprehensive plan based on significantly lower traffic volumes than currently projected. See Table 2 below from the SUDAS "Roadway Design Standards for Rural and Suburban Subdivisions" which supports this "collector" classification based on volume.

Table 2. Urban and suburban cross-section geometrics

Design Elements	Connector		Collector		Local	
	Desirable	*Minimum*	*Desirable*	*Minimum*	*Desirable*	*Minimum*
Design speed (mph)	60	60	35	35	30	30
Avg. daily traffic	> 1500	>1500	400-1500	400-1500	<400	<400
Pavement width	31'	31'	31'	26'	26'	26'

ATTACHMENT 5
Proximity of Balboa Avenue to the Greenhill-Main Intersection

Balboa Avenue presents a special situation that is not accounted for in traffic studies. Contrary to federal and state guidelines, Balboa has been absorbed into the functional intersection of Greenhill-Main. It lies a mere 140 feet south of Greenhill and intersects with the northbound left-turn lane of South Main. The additional queueing of northbound traffic at the Greenhill-Main stoplight makes it difficult to safely turn onto northbound Main from Balboa. This is illustrated in Figure 1 below.

KwikStar's traffic study, which does not include hypothetical improvements to the Greenhill-Main intersection, estimates that the northbound backup for a red light (in the through/right-turn lane) will range from 62 to 113 feet. With queues beyond 70 feet a driver does not have sufficient room to turn north onto Main from Balboa, meaning that this will frequently extend wait times. This access is further complicated by conflict points with southbound Main traffic and the northbound left-turn lane. Failure to mitigate traffic impacts from KwikStar, Fareway and future Pinnacle Prairie developments will create an untenable situation for Balboa residents.

FIGURE 1
NORTHBOUND QUEUE VS. TURNING DISTANCE FOR GREENHILL-MAIL INTERSECTION

6

Nino Costarella

401 Heritage Rd. Cedar Falls, Iowa 50613 | 319-277-5415 | gdimage@cfu.net

December 13, 2017

Planning & Zoning Commission
David Sturch
Department Of Community Development
220 Clay Street
Cedar Falls Iowa 50613

Planning & Zoning Commission:

Attached are photographs showing compelling reasons opposing the proposed Kwik Star at Greenhill Road and Coneflower Parkway.

1. These photographs show how close the proposed Coneflower Kiwk Star site is to the homes across Greenhill Rd., and that in any of our local areas there is a Kiwk Star; Evansdale, Waterloo, Cedar Falls that in no case do any of these business face toward a residential area.
   They are adjacent to or face other retail, commercial, or vacant lots.
   Photos also show the condition of one of the newer Kwik Stars, debris in front of store, fuel and oil spills at the pumps (1717 E. San Marnan Dr.)
2. Approximately 300 + signatures from home owners that do not want the Kwik Star to be located at the proposed sight. These home owners' property values are in jeopardy and they are counting on you, as the board members they elected, to do the right thing.
3. No other businesses on Greenhill from Hudson Road to highway 218 are open 24 hours a day. The only retail business that are on Greenhill Rd. are between Hwy 58 and Hudson Rd... These business are not open 24 hours a day, and are not located close to any single family homes.
4. Increased traffic, traffic noise, car wash noise, debris, and contamination of the ground water.

LIGHT POLUTION; Homes across from this proposed Kwik Star will not be able to open their blinds at night or their windows in the summer.

5. SAFETY; the increased traffic will cause safety issues, on South Main, Greenhill Rd. and with pedestrians using the bike path.

If this is already a done deal for this committee, is the City of Cedar Falls, the developer, and Kwik Star going to guarantee the loss of home values by reimbursement to the home owners. The difference of amount payed for their homes plus appreciation, less the actual selling price. This devaluation being caused by the gas station you are allowing to be built in their front and back yards?

All of the homes directly north of this proposed Kwik Star site in the Heritage Hills Addition will be affected. When the homes closest to the Kwik Star sell for far less then what their values should be, the rest of neighboring homes values will drop as well. (LIKE SALES)

Also attached is a copy of one of the three previously submitted petitions which has 107 signatures of home owners who do not want the Kwik Star at that location.

I hope that elected committee members will do the right thing for the neighborhood safety, quality of life and home owner's property values.

Sincerely,

Nino Costarella

KWIK STAR SITE PLAN REVIEW

PETITION OPPOSING LOCATION

We, the below signed, oppose the proposed location of a new Kwik Star at the corner of Greenhill Road and Coneflower Parkway because of high volume traffic, noise from car wash and blowers, a 24 hour 7 day a week gas station does not fit with the established residential and professional office culture, overnight lights, increased litter and pollution, and long term effects on the nearby residential property values.

	Name	Address	
1	NINO COSTARella	401 Heritage Rd	
2	Kim Costarella	401 Heritage Rd	
3	Deb Gavin	407 Heritage R	Deborah Gavin
4	James Davis	407 Heritage Rd	James M. Davis
5	Douglas Herbon	423 Heritage Rd -	Douglas Herbon
6	Connie Herbon	423 Heritage Rd.	Connie Herbon
7	Ann Balm-Olson	4411 Briarwood Dr	Ann Balm-Olson
8		317 HERITAGE RD	
9	Jessica Johnson	4124 South lawn Rd	Jessica Johnson
10	MARC RATH	4119 SOUTH LAWN RD	Marc Rath
11	Karen Schuchart	503 Heritage Rd.	Karen Schuchart
12	Susanna Hines	4107 Southlawn Rd	Susanna Hines
13	JOHN HINES	4107 Southlawn Rd	John Hines
14	Jerene Gawinski	4101 Southlawn R	Jerene Gawinski
15	Marli Engel	4028 Southlawn	Marli Engel
16	Page Foss	4021 S. Lawn Rd	Page Foss

17	William Foss	4021 SouthLawn Rd	W Fall
18	Kay Froehner	3906 SouthLawn Rd	C Falls
19	[illegible]	3902 South Lawn Rd	C Falls
20	[illegible]	3822 SouthLawn Rd	CF
21	[illegible]	3808 SouthLawn Rd	CF
22	Joanna Rahmanzadi	3807 SOUTH LAWN RD	CF
23	[illegible]	3807 SouthLawn Rd	CF
24	Ali Rahmanzadi	3807 SOUTHLAWN RD	CF
25	Kym Koch	3903 SouthLawn Rd	CF
26	Pat Koch	3903 SouthLawn Rd	CF
27	Jeannine Smith	321 Devlin	C.F.
28	[illegible]	321 Devlin	C.F.
29	[illegible]	314 DEVLIN CT.	C.F.
30	Maxine Lawrence	308 Devlin	CF
31	[illegible]	308 Devlin Cir	CF
32	[illegible]	306 Heritage Rd	CF
33	[illegible]	306 Heritage Rd	
34	[illegible]	4204 South Lawn Rd.	
35	[illegible]	4204 South Lawn Rd.	
36	[illegible]	4118 SOUTH LAWN ROAD	
37	[illegible]	4118 S. Lawn Rd	
38	Bill Hall	4113 S. Lawn Rd	C.F

39	JOHN FREDERICKSON	311 HERITAGE RD	
40	Drew James	305 Heritage Rd	
41	Stac Vasta	301 Heritage Rd	
42	Scott Meyer	223 HERITAGE RD	
43	Chad Huhn	217 Heritage	
44	Stacy Huhn	217 Heritage	
45	Ken Klingman	4207 Heritage Rd	
46	Linda K Lingman	4207 Heritage Rd	
47	Brenda Waddle	4115 Heritage Rd	
48	Karen Schmitz	4109 Heritage Rd.	
49	Mitch Huddle	4103 Heritage Rd	
50	Thad Fever	3909 HERITAGE RD	
51		3908 Heritage Rd	Chad Nichaus
52	Boyce Heath	3920 Heritage Rd.	
53		4010 Heritage	
54			
55		4016 Heritage Rd.	Brian O'Hair
56	Scott Schipper	4021 Heritage Rd.	
57	DAVID HALTERMAN	4108 HERITAGE Rd	
58	JANET HALTERMAN	4108 HERITAGE RD	
59	Kathy Schuler	4202 Heritage Rd	
60	Dennis Schuler	"	

61 Wayne Naber 4203 Southlawn Rd. Wayne Naber

62 Jean Naber 4203 Southlawn Rd Jean Naber

63 Lindsay Wildebaer 4215 Heritage Rd

64 Paula Czarnotzki 4120 Heritage Rd

65 Darren Dieterich 4004 Heritage

66 Emily Luttrell-Narigon 3919 Convair Ln. Emily Luttrell Narig

67 Rick Siebrands 3915 Convair LN

68 Kokila S. sheth 3940 convail lane cedar falls IA

69 Cathy Moo 3827 Convair Lane Cedar Falls

70 Randy Schmidt 3830 Convair C.F. Randy Schmidt

71 Rebecca Schmidt 3830 Convair Lane C.F. Iowa

72 Don Walsh 3824 Convair C. F. IA 50613

73 Peter Gallagher 3815 Convair C.F.

74 Diane Gallagher 3815 Convair Lane C.F.

75 Diane Siebel 3721 Convair Lane CF

76 Drew Simpson 107 Devlin Cir CF

77 Kris Heyenga 116 Devlin Circle CF Kris Heyenga

78 Jeanette Fredericks 126 Devlin Cir CF 50613

79 [illegible] 126 DEVLIN CIR CF 50613

80 Larry Lonser 206 Devlin Cir. CF 50613

81 Terry Holmich 218 DEVLIN CIR CF 50613

82 [illegible] 224 Devlin Cir CF 50613

83	Lori Becker	413 Heritage Rd. Cedar Falls, Iowa	
84	David A Becker	413 Heritage Rd Cedar Falls, IA	
85	Amber Mann	504 Heritage Rd CF, IA	
86	Matt Mann	504 Heritage Rd CF, IA	
87	Fred Schoentag	4112 Sturgis Dr. C.F, IA	
88	J Warren	4106 Sturgis Dr. C.F., IA	
89	Brittany Warren	4106 Sturgis Dr CF, IA	
90	DASH FAIEL	4102 Sturgis Dr. CF.	
91	Lisa Johnson	4018 Sturgis DR CF	
92	Marty d. mullarky	3913 Sturgis Dr. CF	
93	Brian McGee	3925 Sturgis Dr. CF	
94	Ross C. CHAPIN	4003 STURGIS DR	Ross C. Chapin
95	Jeff Chapin	2012 Round St CF	
96	Sarah Miller	4013 Sturgis Dr. CF	
97	Josh Miller	4013 Sturgis Dr. CF	
98	Chris Cain	4017 Sturgis Dr CF	
99	Deb Tobiasz	4023 Sturgis Dr CF	
100	Dan Bo	4107 Sturgis Dr. CF	
101	Ryan Cain	4119 Sturgis Dr. CF	
102	Michael Hudson	4127 Sturgis Dr.	CF
103	Blair Hudson	4127 Sturgis Dr.	CF Blair Hudson
104	Barb Horstman	4201 Sturgis Dr.	CF Barb Horstman

105	Ron Olson		323 Heritage RD (CF)
106	Trevor Bourg		414 Heritage RD (CF)
107	Julia Bourg		419 Heritage Rd (CF)
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Kwik Star San Marnan Waterloo IA

Kwik Star Collage Hill Cedar Falls IA

Kwik Star Ridgeway and Hyw 58 Cedar falls IA

Kwik Star Ansborough Ave and Hyw 20 Waterloo IA

Kwik Star 9th and Hyw 218 Waterloo IA

Kwik Star Fletcher Ave. and Hyw 63

Kwik Star Evansdale

Kwik Star Cedar Bend St. and Oakwood Rd. Waterloo, IA

Kwik Star Cedar Bend St. and Oakwood Rd. Waterloo, IA

Debris, fuel and oil spils (Kwik Star 1717 E. San Marnan Dr.)

View from proposed Kwik Star Coneflower site of affected homes

View of proposed site from Spruce Hills Dr.
View from propsed Coneflower site of directly affected homes

P&Z remarks Kwik Star Project

First I would like to thank you for your time and service to the city.

These are copies of the petitions signed, mostly from the affected areas of Main, Balboa and Cordoba Streets. 133 people have signed the petitions, either in person or online, opposing Kwik Stars' plans to build a gas station and car wash at Coneflower and Bluebell. Orginials were delivered to David Sturch on October 3rd 2017.

Tonight, I am speaking on behalf of all who signed the petition. I would like to address the many concerns our neighborhood has had over the proposed plans submitted by Kwik Star.

According to Cedar Falls Code, Section 29-164 Mixed Use Zoning, the committee may recommend and city council may: deny the plan, approve as submitted or before approval, may require the applicant, in this case, Kwik Star, to modify, alter, adjust or amend the plan so that the plan preserves the intent of the section, namely to promote public health, safety and general welfare. It is our belief that the committee should DENY the plans because of the excessive impacts the project will have on the neighborhood, specifically environmental and traffic impacts, public safety and the decrease of residential property value.

Excessive environmental impacts and public health effects can occur with the proposed site plan. Excessive impacts could include:

Public health effects of air pollution. Benzene and other compounds are released into the air while pumping gas. Health effects range from nausea to cancer. According to the CDC, long term exposure, a year or more, to benzene causes "harmful effects on bone marrow, decreases red blood cells" which leads to anemia, as well as affecting the immune system.

Elevated air pollution occurs within 300 feet of a gas station, overall air quality is decreased up to 490 feet. Average gas stations release between 146 (summer measure) and 461 (winter measure) parts per billion (ppb) of benzene at the boundary of the site. Drift can occur with benzene levels inside homes less than 328 feet away at 1.9 ppb. Benzene and other vapors will drift with the breeze and affect homes and businesses.

The World Health Organization (WHO) proclaims that there is NO safe level for benzene in the air.

EXHIBIT - 1000 FOOT SENSITIVE AREA AND RECEPTORS

Petition objecting to the construction of Kwik Star Convenience Store at the Southwest co
Greenhill Road and Coneflower Parkway

Our objections include:

- Traffic congestion
- Traffic safety
- Noise pollution
- Lighting nuisance
- Chemical pollution
- Loss of water pressure
- Interference with emergency vehicles
- Decrease in residential property values

RECEIVED
OCT 03 2017
DEVELOPMENTAL SERVICES DEPARTMENT

	Name	Address	Date
1.	Penny Popp	4805 S. Main CF	9-17-17
2.	Peter Nuizinga	4805 S Main CF	
3.	Taylor Eschweiler	120 Balboa Ave CF	
4.	Randy Ostby	207 Balboa Ave CF	9.17.17
5.	Janet Greer	207 Balboa Ave CF	
6.	Skyler Dykes	228 Balboa Ave.	9.17.17
7.	Gary Furlong	403 Alvarado Ave.	9.17.17
8.	Maribel B	304 Balboa Ave	9.17.17
9.	KENNY HERNANDEZ	304 Balboa AVE	9.17.17
10.	Julie Claglske	315 Balboa Ave	9-17-17
11.	[illegible]	315 Balboa Ave	9-17-17
12.	STEVE TRIPOLINO	320 BALBOA	9/17/17

Item 4.B. ting to the construction of Kwik Star Convenience Store at the Southwest corner of Greenhill Road and Coneflower Parkway

Our objections include:

- Traffic congestion
- Traffic safety
- Noise pollution
- Lighting nuisance
- Chemical pollution
- Loss of water pressure
- Interference with emergency vehicles
- Decrease in residential property values

	Name	Address	Date
1.	Austin Ceaglske	2529 Grand Blvd	9/18/17
2.	Christy Arnell	322 Devlin Circle	9-18-17
3.	Brock Stubbs	1409 Brookside Dr.	9/18/17
4.	Matt Fink	4006 Veralta Dr	9/18/17
5.		322 Devlin Circle	9-18-17
6.	Nikki Stubbs	1409 Brookside	9/18/17
7.	Amy Fink	4006 Veralta Dr.	9/19/17
8.	Kasey Williamson	1726 W. 3rd St.	9/19/17
9.		712 E. Seerley Blvd.	9/19/17
10.		201 Balboa	9/21/17
11.	Jenny Sund	201 Balboa	9/21/17
12.	David Sund	201 Balboa ave	9/21/17

Petition objecting to the construction of Kwik Star Convenience Store at the Southwest co
Greenhill Road and Coneflower Parkway

Our objections include:

- Traffic congestion
- Traffic safety
- Noise pollution
- Lighting nuisance
- Chemical pollution
- Loss of water pressure
- Interference with emergency vehicles
- Decrease in residential property values

	Name	Address	Date
1.	Gretchen Tripoli	320 Balboa Ave	9/17/17
2.	Mike Souza	312 Córdoba Ave	9/17/17
3.	Jo fr	219 Alvarado Ave	9/17/17
4.	Shirley Dees	" "	"
5.	Chris Curran	4806 Orellana Ave	9.17.17
6.	Brian Jo	211 Alvarado Ave	9.17.17
7.	Kim Llewellyn	206 Alvarado Ave	9-17-17
8.	Amanda Jackson	427 Balboa Avenue	9/17/17
9.	Mark Jackson	427 Balboa Ave	9/17/17
10.	STEVE EPHRAIM	327 BALBOA AVE.	9/17/17
11.	MARTIN JACOBS	125 BALBOA AVE	9/17/17
12.	PATRICIA JACOBS	125 BALBOA AVE	9/17/17

Item 4.B.

Petition objecting to the construction of Kwik Star Convenience Store at the Southwest corner of Greenhill Road and Coneflower Parkway

Our objections include:

- Traffic congestion
- Traffic safety
- Noise pollution
- Lighting nuisance
- Chemical pollution
- Loss of water pressure
- Interference with emergency vehicles
- Decrease in residential property values

	Name	Address	Date
1.	Ann Barnard	110 Cordoba Ave	9.17.17
2.	MARK Barnard	110 Cordoba Ave	9.17.17
3.	Lynn Barnes	118 Cordoba Ave	9-17-17
4.	Karen Barnes	118 Cordoba Ave	9-17-17
5.	Walt Rogers	4209 S. Main St.	10-1-17
6.	Steve Hassman	4111 S. Main St	10-1-17
7.	Kiley Hass	" "	10-1-17
8.	Elija R. Blair	3925 South Main	10-1-17
9.	Jamie L Blair	3125 S. Main	10-1-17
10.	Barb Shepard	3911 S. Main	10-1-17
11.	Judy Lacey	3819 S Main St	10-1-17
12.	Doug Lacey	3819 S Main St Rd	10-1-17

Petition objecting to the construction of Kwik Star Convenience Store at the Southwest corner of Greenhill Road and Coneflower Parkway

Our objections include:

- Traffic congestion
- Traffic safety
- Noise pollution
- Lighting nuisance
- Chemical pollution
- Loss of water pressure
- Interference with emergency vehicles
- Decrease in residential property values

Name	Address	Date
1. Katie Marsh	4725 S Main CF	9/21/2017
2. Jane Rogers	4811 S. Main CF	9/21/2017
3. Kathleen Ponte	5301 S. Main CF	9-21-2017
4. Jeff Brock	4905 S. Main	9-22-17
5. Pam McFarlane	3725 S Main	10-1-17
6. Kurt Olson	3707 S MAIN	10-1-17
7. Shawna Olson	3707 S. Main	10/1/17
8. Dave Williams	4119 S Main	10/1/17
9. Ron Mussman	210 BALBOA AVE A-1	10/1/17
10. Judy Mussman	210 Balboa Ave A1	10/1/17
11. Nicole Ellis	210 Balboa Ave B1	10/1/17
12. Margaret Holland	128C1 Balboa	10/1/17

Petition objecting to the construction of Kwik Star Convenience Store at the Southwest corner of Greenhill Road and Coneflower Parkway

Our objections include:

- Traffic congestion
- Traffic safety
- Noise pollution
- Lighting nuisance
- Chemical pollution
- Loss of water pressure
- Interference with emergency vehicles
- Decrease in residential property values

	Name	Address	Date
1.	Patricia Hellum	128 Balboa Ave Bl	10-1-17
2.	Margaret Barnes	208 Cordoba Ave	10-1-17
3.	KENDALL KELLY	216 CORDOBA AVE	10-1-17
4.	Jill Fisher	203 Cordoba Ave	10-1-17
5.	READON FISHER	203 CORDOBA AVE	10-1-17
6.			
7.			
8.			
9.			
10.			
11.			

Petition objecting to the construction of Kwik Star Convenience Store at the Southwest cor
Greenhill Road and Coneflower Parkway

Our objections include:

- Traffic congestion
- Traffic safety
- Noise pollution
- Lighting nuisance
- Chemical pollution
- Loss of water pressure
- Interference with emergency vehicles
- Decrease in residential property values

	Name	Address	Date
1.	MICHAEL HALVERSON	3627 S. MAIN ST. C.F.	9/20/2017
2.	Rebecca Halverson	3627 S. Main St CF	9/20/2017
3.			
4.			
5.			
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10.			
11.			
12.			

Objection to Kwik Star

Anonymous (18) (Comments)

43 Signatures Goal: 1,000

Petition objecting to the construction of Kwik Star Convenience Store at the Southwest corner of Greenhill Road and Coneflower Parkway

Our objections include:

- Traffic congestion
- Traffic safety
- Noise pollution
- Lighting nuisance
- Chemical pollution
- Loss of water pressure
- Interference with emergency vehicles
- Decrease in residential property values

Share on Facebook

18 COMMENTS

Filter

Lillian Sesma United States, Cedar Falls
Oct 01, 2017
upvote reply show

SIGN PETITION
Oct 01, 2017

43 signaturesGoal: 1,000

Share on Facebook

18 COMMENTS

Filter

Lillian Sesma United States, Cedar Falls
Oct 01, 2017

Oct 01, 2017
upvote reply show

I live right across the street and there is too much traffic the way it is right now and with Kwik Star the traffic would be much worse.

Jeff brock United States, Cedar Falls
Oct 01, 2017

Oct 01, 2017
upvote reply show

Traffic getting crazy, add to that a new city cop/fire/admin building and it's employees on the corner, crazy

Redgie Blanco United States, Cedar Falls
Sep 30, 2017

Sep 30, 2017
upvote reply show

This business will increase traffic, which is already an issue for the intersection of South Main St and Greenhill Rd. It will attract additional transients to the area, will encourage loitering, which is very difficult to enforce by the city, and garbage will end up in the road, and in our yards. In addition to this this type of business will bring chemical fumes, noise, light, and trash pollution to our neighborhood.

SIGN PETITION
Rhonda Fedro United States, Cedar Falls
Sep 24, 2017

43 signaturesGoal: 1,000

Sep 24, 2017
upvote reply show

Too much traffic at that intersection.there was an accident there within the month, its our only main entrance..

Chris Jackson United States, Cedar Falls
Sep 23, 2017

Sep 23, 2017
upvote reply show

We do not need high traffic businesses in our residential areas. I would rather seek my own fuel opportunities than fight traffic every time I leave my driveway.

Anonymous
Sep 21, 2017

Sep 21, 2017
upvote reply show

I do not appreciate having my only entrance to my neighborhood blocked by a gas station.

Louise Heckroth United States, Belleville
Sep 20, 2017

Sep 20, 2017
upvote reply show

We have plenty enough of that type of store.

SIGN PETITION
Bonnie Poley United States, Louisville
Sep 19, 2017

43 signaturesGoal: 1,000

Sep 19, 2017
upvote reply show

As much as I like Kwik Star and would like one closer, this is NOT the right location since it impacts residential areas. Before ANYTHING is added to the area, including the Public Safety building, the Main St./Greenhill intersection needs to be improved for safety.

Anonymous
Sep 19, 2017

Sep 19, 2017
upvote reply show

Not a suitable area for a convenience store. Add to the objections: Hours of operation.

Jane Obermeier United States, Johnston
Sep 18, 2017

Sep 18, 2017
upvote reply show

The area already has a high traffic concern so the thought of adding another reason for additional traffic does not make any sense. Plus a gas station/convenience stop does not fit the dynamics of the neighborhood.

Randy Husted United States, Cedar Falls
Sep 18, 2017

Sep 18, 2017
upvote reply show

Concerned about an increase in traffic and crime.

SIGN PETITION
Karen Johns United States, Cedar Falls
Sep 18, 2017

43 signaturesGoal: 1,000

Sep 18, 2017
upvote reply show

We do not need or want this in our area.

Craig Johns United States, Cedar Falls
Sep 18, 2017

Sep 18, 2017
upvote reply show

We do not need or want this in our area.

Jeffrey Stuart Earle United States, Sevierville
Sep 18, 2017

Sep 18, 2017
upvote reply show

I oppose the addition of the proposed gas station on the corner of Greenhill and Main due to traffic congestion, Only ONE entry point to and from the neighborhood as well as general public and pedestrian safety

Angela Burk United States, Cedar Falls
Sep 18, 2017

Sep 18, 2017
upvote reply show

The El Dorado and Western Home Communities should not be subjected to additional light pollution and increased traffic. We already have enough gas stations within a mile radius of that site to serve the community's needs.

SIGN PETITION

Lydia Mustafic United States, Cedar Falls
Sep 18, 2017

43 signaturesGoal: 1,000

Sep 18, 2017
upvote reply show

I live in the El Dorado neighborhood. The intersection of Main and Greenhill is already a bottleneck. The increased traffic will increase my morning commute and contribute to my family's stress each morning. The increase in noise and pollution and further commercialization of the area will also be detrimental to our peace and health and our home values.

Daniel Christoffer United States, Cedar Falls
Sep 18, 2017

Sep 18, 2017
upvote reply show

The Greenhill and Main intersection is bad enough without the gas station.

Debra Raymond United States, Cedar Falls
Sep 18, 2017

Sep 18, 2017
upvote reply show

Garbage blowing around from the dumpsters as well as the items listed.

COMMENT*

Add comment Cancel

SIGN PETITION

43 SIGNATURES

20 minutes ago
Elisabeth Brock United States
20 minutes ago

4905 S. Main

14 hours ago
Lillian Sesma United States
14 hours ago

19 hours ago
Gene Janssen United States
19 hours ago

2 days ago
Carol Nemmers United States
2 days ago

5045 Nordic Ridge Dr.

2 days ago
Jeff brock United States
2 days ago

4905 S. Main

2 days ago
Dave Deibler United States
2 days ago

SIGN PETITION

2 days ago
Janet Despard United States
2 days ago

2 days ago
Salem Fauser United States
2 days ago

2 days ago
Amanda Owen United States
2 days ago

4941 Kylie Ct.

3 days ago
Redgie Blanco United States
3 days ago

318 Alvarado

3 days ago
Alice Janssen United States
3 days ago

SIGN PETITION

1 week ago
Rhonda Fedro United States
1 week ago

Quesada Ave

1 week ago
Chris Jackson United States
1 week ago

2 weeks ago
Louise Heckroth United States
2 weeks ago

2 weeks ago
Timothy Raymond United States
2 weeks ago

213 Balboa

2 weeks ago
Bonnie Poley United States
2 weeks ago

109 Cordoba

SIGN PETITION

2 weeks ago
Wesley Poley United States
2 weeks ago

109 Cordoba

2 weeks ago
Shane McCollow United States
2 weeks ago

2 weeks ago
Pat Boe United States
2 weeks ago

2 weeks ago
Beth Weber United States
2 weeks ago

5055 Nordic Ridge Dr.

2 weeks ago
Jane Obermeier United States
2 weeks ago

SIGN PETITION

2 weeks ago
Misty Reinard United States
2 weeks ago

5035 Kael Trl.

2 weeks ago
Lee Ann Remetch United States
2 weeks ago

2 weeks ago
Randy Husted United States
2 weeks ago

2 weeks ago
Karen Johns United States
2 weeks ago

4504 Coronado Ct.

2 weeks ago
Craig Johns United States
2 weeks ago

4504 Coronado Ct.

SIGN PETITION

2 weeks ago
Jeffrey Stuart Earle United States
2 weeks ago

4720 Orellana

2 weeks ago
Angela Burk United States
2 weeks ago

323 Cordoba

2 weeks ago
Lydia Mustafic United States
2 weeks ago

2 weeks ago
Daniel Christoffer United States
2 weeks ago

210 Balboa B2

2 weeks ago
Debra Raymond United States
2 weeks ago

213 Balboa

SIGN PETITION

2 weeks ago
Tiffany Tott United States
2 weeks ago

2 weeks ago
Kim Jackson United States
2 weeks ago

4500 Quesada Ct.

2 weeks ago
Dustin Reinard United States
2 weeks ago

5035 Kael Trl.

2 weeks ago
Joey Miller United States
2 weeks ago

5001 S. Main

2 weeks ago
Sue McBroom United States
2 weeks ago

SIGN PETITION

2 weeks ago
Alyson Myers United States
2 weeks ago

SIGN PETITION

Item 4.B.

RECEIVED
OCT 4 2017
DEVELOPMENTAL SERVICES DEPARTMENT

KWIK STAR SITE PLAN REVIEW
PETITION **OPPOSING** LOCATION

We, the below signed, oppose the proposed location of a new Kwik Star at the corner of Greenhill Road and Coneflower Parkway because of high volume traffic, lack of noise mitigation for car wash blowers, a 24 hour 7 day a week gas station does not fit with the established professional office culture, also overnight lights, increased litter and pollution concerns.

	Name	Address
1	Cheryl Nedrow	4201 Stewart Lane, CF
2	Ronda a. Watt	4107 Stewart LN, CF
3	Carol J. Rush	4103 Stewart Lane, CF
4	Roger & Tamara	502 Melendy Lane C.F.
5	Barb Giunta	507 Melendy CF
6	Aaron Nugent	518 Melendy CF.
7	Jaime Nugent	518 Melendy CF
8	Lisa Bartholomew	522 Melendy Lane CF
9	Dan Gatti	4104 Stewart Ln. CF
10	LoriLynn Layton	4104 Stewart Ln. C.F.
11	RJM	4117 Stewart Ln C.F.
12	Bart H. Bu	4218 Stewart LN C.F.
13	Kaci Fan	4312 Stewart Ln C.F.
14	J Linders	4301 Stewart Ln CF
15	Karen Hughes	4301 Stewart lane CF
16	Dinna Flory	301 Spruce Hill Dr. CF

Kwik Star Site Plan Petition OPPOSING Site

17	Ronald D. Story	301 Spruce Hill Dr CF
18	RANDY BERNING	319 SPRUCE HILLS
19	[illegible]	415 SPRUCE HILLS
20	[signature]	427 Spruce Hills
21	[signature]	425 Spruce Hills Dr
22	Haley Parker	519 Spruce Hills Dr.
23	[signature]	4305 Stewart Lane
24	[signature]	424 SPRUCE HILLS DR
25	Stacy Gardner	424 Spruce Hills Dr
26	[signature]	410 Spruce Hills Dr
27	[signature]	406 Spruce Hills Dr
28	Nancy Fairbanks	405 Spruce Hills Dr.
29	Joshua Graves	318 Spruce Hill Dr.
30	[signature]	302 Spruce Hills Dr
31	Tanner McCormack	224 Spruce Hills Dr.
32	KATHY McCORMICK	4022 Southdown Rd
33	Terrie Dixon	218 Spruce Hills Dr
34	Jerry Dixon	218 Spruce Hills Dr.
35	Ashley Stout	206 Spruce Hills Dr
36	Mike Stout	206 Spruce Hills Dr
37	[signature]	4201 Spruce Hills Dr.
38	Rebecca Rinehart	4227 Spruce Hills Dr
39	Ron Rinehart	4227 Spruce Hills Dr.

~~39~~ 40	Sandra Ferguson	4303 Spruce Hills Dr Cedar Falls, IA
40		4303 Spruce Hills Dr. C.F
~~41~~ 42	Melanie McCrea	4309 Spruce Hills Dr C.F.
~~42~~ 43	Brian McCrea	4309 Spruce Hills Dr C.F.
~~43~~ 44	Grant Eby	201 Spruce Hills dr
45	Theresa Babeau	201 Spruce Hills Dr
~~45~~ 46	Kent Schmitt	211 Spruce Hills Dr.
~~46~~ 47	Colleen Wagner	217 Spruce Hills Dr.
~~47~~ 48	Mike Wagner	217 Spruce Hills Dr.
~~48~~ 49	Bridget Bakula	306 Spruce Hills Dr.
~~49~~ 50	Tom Bakula	306 Spruce Hills Dr
50	Lee Engen	4906 Bluebell Rd
51	Marlene Engen	4906 Bluebell Rd
~~52~~ 53	Jami Rothlisberger	5203 Sweet Basil Lane
~~53~~ 54		5203 Sweet Basil Lane
~~54~~ 55	Bev Brandt	4914 Bluebell R
~~55~~ 56	Lorraine Crotty	4916 Bluebell Dr
~~56~~ 57	Wendell Crotty	4916 Bluebell
~~57~~ 58	for Zick	4931 Bluebell Rd.
~~58~~ 59	Jack Hovelson	5107 Bluebell Rd
~~59~~ 60	Jimmy Burt	211 Alvarado
~~60~~		

61	LeRoy Bierwirth	5027 Bluebell Rd.
62	William B Nichols	303 Iris Dr
63	Kathy Thompson	311 Iris Dr.
64	Marian Brandt	301 Iris Dr
65	David J Brandt	301 Iris Dr
66	CLIFFORD SUND	209 IRIS
67	Karen Sund	209 Iris
68	Geo T Dubin	203 Iris
69	[illegible]	201 IRIS
70	Karen C Page	119 Iris
71	Cindy Glaesner	204 Iris
72	David Glaesner	204 Iris
73	Lori Wiskmeyer	212 Iris
74	Jack H Focht	222 IRIS
75	Judy Focht	222 Iris
76	David Beeson	302 IRIS
77	Richard Beeson	302 Iris
78	Ruth Peterson	324 Iris
79	James L Peterson	304 Iris
80	Dorothy Mayser	4924 Bluebell
81	June Green	4934 Bluebell
82	Elton Green	4934 Bluebell Rd.

83	Karen Mukai	5006 Bluebell C.F.
84	Terri Mukai	5006 " "
85	Joanne Tefft	5313 Caraway Ln #305 C.F.
86	Robert C. Tefft	5313 CARAWAY LN. #305 CF
87	Asim Saric	325 Spruce Hills
88	Jeri Kelly	223 Spruce Hills Dr. CF
89	Kristi Arnold	205 Spruce Hills Dr. CF
90	Gary McCormack	123 Spruce Hills DR, CF
91	Linda McCormack	123 Spruce Hills Dr. CF
92	Michael Whelan	119 SPRUCE HILLS DR CF
93	Tony Ruiz	4205 Spruce Hills Dr. C.F.
94	Lynn Kopp	523 Spruce Hills Dr. CF
95	Mary Rhoades	4118 Stewart Lane C.F.
96	Kim Rhoads	4118 STEWART LANE CF
97	Kristi Tibben	4105 Stewart Ln, CF
98	Mary Wallingford	312 Spruce Hills Dr. CF. Mary Wallingford
99	EUGENE WALLINGFORD	312 SPRUCE HILLS DR, CF Eugene Wallingford
100	Jon Ericson	402 Spruce Hills Dr., CF
101	Kelly Barfels	305 Spruce Hills Dr. CF
102	Dan Barfels	305 SPRUCE HILLS DR. CF
103	Lauren Albrecht	4226 Spruce Hills Dr. CF
104	Cassie Sells	11

105	Deb Mahler	4226 Spruce Hills Dr
106	Nadia McKee	4224 Spruce Hills
107	Alec Gridden	4218 Spruce Hill Dr
108	Kelly Archangel	4211 Spruce Hills DR
109	Nancy Semet	4111 Spruce Hills Dr,
110	Jeremy Fischer	4027 Spruce Hills Dr
111	Mark Pingel	4112 Spruce Hills Dr.
112	Linda Pingel	4112 Spruce Hills DR
113	Russell Schuler	4117 Spruce Hills Dr
114	Seena Reynolds	4206 Spruce Hill Dr.
115	Kent Marrero	4208 spruce hills dr.
116	Brandon NOSEK	4206 spruce hills dr
117	JM Courter	4212 SPRUCE HILLS DR
118	Bob Roeder	4214 " " "
119	Beth Paulson	121 Maryhill Dr
120	John Paulson	121 Maryhill Dr
121	Ashley Stark	206 Spruce Hills Dr
122	Marilyn Dade	4307 Briarwood Dr
123	Dennis L Dade	" " "
124	[illegible]	3220 Wyacotah
125	[illegible]	"
126	Alex Six	4524 Colorado Ct.

Kwik Star Site Plan Petition OPPOSING Site

127	Osbondak	4513 Coronado Ct.
128	Baer	4607 Coronado Ct.
129	Scott Trimble	4613 Coronado ct.
130	Tiffany Bay	309 COBBORA AVE
131	Tony Ruiz	4205 Spruce Hills Dr.
132	Cheryl Payne	4118 Spruce Hill Dr. CF
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An aerial rendition shows the proposed location of a new public safety building in southern Cedar Falls.

InVision Architecture

Mayor Jim Brown said it's time to proceed with the project at the South Main site, and he believes there's enough public support for it as well.

P&Z remarks Kwik Star Project

The Environmental Protection Agency (EPA) has also established a health risk between gas stations and sensitive areas. Sensitive Areas are identified because of pollutants, toxins and pesticides used in the surrounding area and the adverse effects on the surrounding population. Sensitive areas include medical facilities, schools, and elderly housing. These sensitive receptors are more susceptible to the effects of exposure to toxins and other pollutants. The EPA also suggests that no gas station should be within 1000 feet of a school due to long term exposure risks. If schools are at risk at 1000 feet, then other sensitive receptors are at risk. Remember, Arrowhead Medical Center is right across the lane. And to put that in terms that everyone can visualize, many homes directly north of Greenhill are affected. Homes on Main and Balboa are also affected. If the proposed Fareway and Public Safety Building are completed, they too are affected. Would this be a violation of public health?

Water Resource Impacts
A severe threat to ground and surface water occurs on or near a gas station site. Contaiminant levels in water runoff from a gas station are 5-30 times higher than residential runoff.

EXHIBIT - (a)195 LUST 15 MILE RADIUS, (b)CLOSER VIEW, LUST IN CEDAR FALLS

Fuel storage tanks can and will leak. As of October 1, 2017, 195 locations exist within a 15 mile radius of the proposed site that have leaking underground storage tanks or LUST. This means the stored gasoline is actively leaking into the surrounding areas' soil and water. For example, Caseys has 6 sites leaking, 2 are in Cedar Falls. Kum & Go has 5 sites leaking, 3 are in Cedar Falls. Kwik Star has 15 sites leaking, 1 of which is in Cedar Falls. Kwik Star seems to have double the sites that have had leaking tanks. We need more information on why this company seems to have excessive leakage problems from the storage of gasoline. More information on these sites can be found at the Iowa Department of Natural Resources under LUST sites.

Spillage at gas station pumps can reach 40 gallons per year through incidental leakage. Incidential leakage is the drop or two of gas that falls from the pump when you pull it out of the tank or perhaps you overfilled your tank and gas spilled down the side of your car. Gas will also percolate through the concrete pad into the ground water and into the local water table.

A study found in the Journal of Contaiminant Hydrology (Vol 170 pp39-52, 9/14) looks at the leakage of gasoline into the concrete underpad of gas stations as well as vapors that drift into the air. This study shows over the lifetime of the station, the underpad accumulates excessive amounts of gasoline and other byproducts that will leak into the soil and groundwater.

P&Z remarks Kwik Star Project

That leads us to our Dry Run Creek Watershed.

Dry Run Creek is an impaired watershed in our city. Since 2002, Dry Run Creek has been listed on the States' 303 (d) list of impaired waters due to the lack of diversity and abundance of aquatic life. 2008 saw the addition of bacterial impairment, which is a suspected E Coli contamination from the Pet Park on Main, according to a water quality expert at CFU and the Blackhawk County Soil and Water Conservation District.

EXHIBIT - STORM WATER MANAGEMENT FLOW, CHANNEL

The proposed site, which is located in the Dry Run Creek watershed, also provides for a storm water management area that will be a open bottom basin for excess water. This area is along Greenhill. The basin will drain into the existing storm water management area to the east. For those of you who are not familiar with this, all of the chemicals, pollutants, garbage and rainwater are deposited into this basin which carries the water under Greenhill, north to a exposed concrete bottom channel. As the water continues to Dry Run Creek, and eventually the Cedar River, the channel becomes open bottom. Any pollutants or chemicals are now able to percolate into the soil or be carried further into Dry Run Creek itself. What will happen if and when a spill does occur? All of the gasoline will be washed into the Dry Run Creek Watershed.

I would be leary of open water flowing through the channels, the safety and welfare of the children who live and play in the area, soil conditions, and not to mention the impact on wildlife.

Also, directly at the site, is the probablitiy of the local water table being contaiminated. Our water table runs 3-6 feet below the surface of the soil. Long range impacts could include contamination of ground water in the water table through chemical agents generated by the operation of the site, traffic, as well as additional contaimination from de-icing agents.

EXHIBIT - SOURCEWATER PROTECTION AREA MAP

The proposed site also sits just outside of our Sourcewater Protection Area (SWP). A SWP is an area identified as providing drinking water for the city and where excessive building and overuse of the land could pollute or pose a risk to the water supply. If you look at the map, SWP exists over much of Cedar Falls. With the completion of Caseys, 9/10ths of a mile west, we believe this project could be deemed a hazard and redundant business.

For these environmental impacts, we would request specifics from Kwik Star on all open LUST cases in Blackhawk County, and perhaps the State of Iowa. This way the City can fully

integrate all relevant information and make a more informed decision on this project. Communication with surrounding towns may also be beneficial to establish the active or inactive participation of Kwik Star in concluding matters and mitigation surrounding other open LUST cases.

Environmental impacts have long range implications on the community. Controled, proper growth must be maintained to achieve goals set out by our City's vision. We ask the committee to DENY this project due to excessive environmental impacts and the effects on public health, welfare and safety.

EXHIBIT - TRAFFIC ISSUE MAP

Excessive and hazardous traffic sitiuations can cause an adverse effect on public safety. The planning and zoning laws require that a site approval not have an adverse effect on public safety. As you may know, I have been speaking out about traffic issues and concerns over the past few months. I met with Stephanie Sheetz, Community Development, David Sturch, Planner and Jon Resler, Engineer on 11/16/2017 to present specific concerns regarding the Greenhill and Main intersection. All of the concerns I presented were gathered when I canvassed the neighborhood about this proposed project. I listened and found the common theme everyone was talking about. Traffic. The following issues were compiled from those conversations and additional observations:

1. Greenhill has been identified as an alternate route for the 2018 Hwy 58 and Viking road construction project. More vehicles will be using this intersection.

2. Greenhill heading eastbound, the left turn lane during peak hours has stopped vehicles and an overflowing dedicated left turn lane.

3. Main St. southbound has a sight distance problem because of the throat of the intersection allowing cars a free right or through lane which becomes hazardous for northbound left turning vehicles.

4. Balboa funnels directly into a dedicated left turn lane heading north on Main. Residents also experience a limited sight distance from right turning vehicles from Greenhill. Complaints about long wait times to exit the area were also voiced.

5. Cordoba also mirrors the problems of Balboa.

P&Z remarks Kwik Star Project

Snow has been piled on both corners of Balboa and Cordoba in the winter so that seeing past the pile is impossible.

Balboa and Cordoba are main exits from the El Dorado Hts. neighborhood. The new public safety entrance will be directly across from Cordoba, increasing wait times.

Main St also experiences traffic congestion on Sundays with various churches funneling their traffic indirectly, or directly on Main St.

6. Residents on Main St complain about the inability to exit their property due to the uptick in consistent traffic 7 days a week.

EXHIBIT - STUDY 1, 2, 3 INTERSECTION SHOTS

Plans to address these issues are being based on 3 traffic studies. First, "Greenhill Road Traffic Study" prepared for the City of Cedar Falls, March 2014, second, "Traffic Impact Study for Kwik Star", May 2017 and revision August 2017, and third, "Traffic Impact Study for Fareway", November 2017. The two latter studies, both by the same firm, are eeirely similiar. Four intersections were included in the analysis:

1. Greenhill and Main
2. Bluebell and Main
3. Greenhill and Coneflower/Estate Dr.
4. Bluebell and Coneflower

I submit that the information being used by the City to make proper decisions on proposed projects in this area is skewed.

The raw data used for the study, collected on May 4, 2017 could be inaccurate. Construction on University Ave. had not been completed. Traffic patterns and intensity has now changed.

Trip generation data (or for the layperson, the reason of the visit being either you are driving by and need to stop or you need a gallon of milk and this is your primary destination) will be skewed because of the completion of the Caseys 9/10ths of a mile to the west. Kwik Star is estimating approximately 237 vehicle stops will be made during AM peak travel times each day and approximately 277 vehicle stops in the PM peak travel times. How does the completion of Caseys affect this part of the study? Surely some traffic counted in the current study from the west will opt to use Caseys in lieu of Kwik Star due to convience or loyality.

P&Z remarks Kwik Star Project

The most glaring omission in these studies, the minor streets of Balboa and Cordoba were not included. The City must consider the vehicle use of the El Dorado Hts neighboorhood. The only available exits from this neighborhood are 3 streets, Balboa, Cordoba and Nordic Ridge, all of which empty onto Main. Main ends 3/4 mile south of Greenhill. Until Prairie Parkway opened, Main St. was the only road through.

There are approximately 275 homes in this neighborhood. Assuming 2 vehicles per home, 550 cars could travel daily in and out of Balboa, Cordoba and Nordic Ridge.

And finally, the Kwik Star Traffic Impact Study identifies each road used in the study according to a standard classification.

1. Greenhill is classified as a major arterial.
2. Main St north of Greenhill is classified as a major collector.
3. Main St. south of Greenhill is classified as a local roadway.
4. Bluebell, Coneflower and Estate are also identified as local roadways.

In the Iowa Statewide Urban Design and Specifications guide, 2018 ediition, Chapter 5, Roadway Design, Section 5B-1, Street Classifications, definitions of types of roadways are explained.

We believe that the classification status of Main St. south of Greenhill is in error. Main St south of Greenhill should be considered either a minor or major collector due to the function of the street.

If the City is to truely plan effective changes to allieviate traffic concerns and issues, all involved major and minor streets must be included, not just a select few.

Consideration must be made for the addition of Public Safety building and Greenhill being designated as a planned alternative route for the Hwy 58 and Viking road project when discussing temporary and long term plans.

A new traffic study should be done to include all affected major and minor roads, as well as the amended classification for Main St. south of Greenhill to a collector road. Information from the new traffic study could then be compaired to the 3 studies the City is relying on.

We ask that the committee DENY the project due to possible skewed information used in generating the traffic studies for the intended area. More information about these issues are

necessary.

Property Value Impacts

Property values can decrease in the neighborhood because of the appearance of a gas station. Spillage and leaking from underground tanks also decrease property values. A study done in 2010 entitled "The Effect of Leaking Underground Tanks on the Values of Nearby Houses" is extremely poignant to us. This study, done at UNI, looked at the "effects of proximity to a leaking underground storage tank on housing value" in our own town of Cedar Falls. They confirmed "previous studies findings that proximity to a LUST site does adversely affect the value of nearby houses" but it does decrease "rapidly" with the distance from the LUST. Price impacts ranged from a decrease in sale prices of medium sized homes of approximately 5.5% to 11% with an annual citywide loss of home value of just over 3 million dollars.

Any commercial development can depress residential values within a half mile to a mile radius of the location.

Crime Impacts

6% of all robberies in the nation are at gas stations.

The newest crime spreading at gas stations occurs when people leave their vehicles unlocked and unattended while they are paying or shopping inside the store. Cars pull up and steal valuables left unattended and are gone without a trace. It is called sliding and this trend is spreading across the country.

To access what is happening at Kwik Star here in Cedar Falls, I requested police call response and crime reporting information from the Police Department for a 5 year period beginning January, 2012 through Oct 1, 2017. I reviewed 2 Kwik Star locations, the College Hill site and the newer station on Nordic Ave.

For the period of January, 2012 through October, 2017, the College Hill location had a total of 508 responses from Police for calls relating to fights, assaults, trespass, intoxication, drug related issues, motor vehicle accidents, business issues and other reported crimes.

EXHIBIT - CRIME INFORMATION

P&Z remarks Kwik Star Project

I also reviewed the records for the Nordic Drive location for the same period of January 2012 through Oct, 2017. Being the newer location with the surrounding area more similar to the proposed location at Greenhill and Main, I have prepared a brief overview of the annual calls.

In 2012 - 70 calls were made by police with 3 calls specified as fire department response for gas spills.

2013- 42 calls were made. 2 fire department responses for a gas spill

2014- 49 calls were recorded with 2 calls for fire department response, 1 gas spill, 1 undetermined

2015- 35 calls were made with 2 calls for fire department response for gas spills

2016- 48 calls were made with 1 call for fire department response for a natural gas release inside

2017 through October 1, 2017, 18 calls were made with 1 call for fire department response for a natural gas release outside.

Crime reporting at this location included vandalism, larceny, fraud, disorderly conduct, traffic stops, traffic parking violations, traffic moving violations, traffic hazards, motor vehicle accidents with property damage, injury to pedestrian, hit and run and an undetermined factor, OWI, harassment, suspicious persons, medical calls, welfare checks, intoxication, found items, lost items, assistance, loitering and business checks.
The Fire Department response included gas spills, natural gas release inside and natural gas release outside. A total of 262 calls were recorded. I understand that crime is a part of our society. The Police Department does its' best to deter crime. I am presenting this information so that the residents in our neighborhood will be aware of the additional crime, vehicle occurances, and hazards that will accompany the establishment of Kwik Star. The additional information supplied by these reports indicate gas spills have occurred.

I encourage our neighbors to look at the facts and decide for themselves whether this is a project they are willing to support.

Again, is this project best for the communitys' safety?

Noise Impacts

P&Z remarks Kwik Star Project

The Kwik Star plans include a car wash with 2 bays that could operate 24/7.
Has a site specific noise analysis for 24/7 stores and car washes been done for the proposed site?
What other information has been provided to the City to address this?
Reasonable separation between homes and other businesses is 300 feet. Acceptable nighttime noise is 45-55 dba.

As we have seen with the noise buffering attempts on Greenhill, even a wall cannot keep the constant din of traffic drifiting throughout the neighborhood.

I am requesting a specific noise analysis be done for this site. All decisions should be put on hold until the information is received and studied.

To recap

We, the residents who have signed petitions regarding the proposed project by Kwik Star OPPOSE the plans.

Impacts of the gasoline and other chemicals may affect our local watershed and water table. Open storm water management areas may become hazardous to the residents in the area. Homeowners that are adjacent or downstream of the underground storage tanks should be presented with plans and reporting procedures prior to an accidential spill or leakage of gasoline by Kwik Star and/or the City. This would allow the homeowner to fully understand the impacts that may occur on their property. It would also inform the homeowner of the rights and responsibilites of Kwik Star in the event of a spill.

I am requesting specifics on all Kwik Stars' LUST sites in Blackhawk County.

I am requesting a revised traffic study be done due to inaccurate raw data parameters. Balboa and Cordoba Streets should be included. Inaccurate classification of Main St. may affect the traffic studies. Specific traffic concerns and issues must be dealt with before any more construction is allowed to proceed.

Plans need to be revealed to the affected neighborhood for crime deterance by either Kwik Star or the City of Cedar Falls.

A site specific noise analysis should be submitted for the operation of the car wash so neighbors will know what to type of additional noise is to be expected from a gas station and car wash in

their backyards.

The City should use caution when approving redundent businesses. Oversaturation of gas stations will occur.

We urge all members of the committee to DENY or at least TABLE the proposed plans for Kwik Star for the health, safety and welfare of our community. I have a copy of my remarks for the committee and representative of Kwik Star. I hope you will take this information into consideration before voting on the Kwik Star at Coneflower and Bluebell. Our community has many unanswered questions. More information is vital to making a decision. Please wait until all information can be received and studied.

Thank you for your time.

Penny Popp
4805 S Main St
Cedar Falls, IA 50613
peterpenny1@gmail.com

Supporting and Additional Information obtained from:
City of Cedar Falls
LUST Information and Details: Iowa Department of Natural Resources, as of Oct. 1, 2017
Environmental Protection Area, Website
Cedar Falls Utilities
Blackhawk County Conservation Board
Journal of Contaiminant Hydrology (Vol 170 pp 39-52, 9/14)
Greenhill Road Traffic Study, City of Cedar Falls, March 2014
Traffic Impact Study for Kwik Star, May 2017, revision August 2017
Traffic Impact Study for Fareway, November, 2017
Iowa Statewide Urban Design and Specifications, 2018 edition, available at Iowa DOT Electronic Reference Library (ERL)
The Effect of Leaking Underground Tanks on the Values of Nearby Homes, Isakson, Hans, University of Northern Iowa, April 2010
Crime Reporting Data supplied by City of Cedar Falls Police Department, January 2012 through Oct 1, 2017
Selected overview maps through Blackhawk County Assessors Office
Google Maps

P&Z remarks Kwik Star Project

Additional Supporting Information:

Resource and Energy Economics, A hedonic analysis of the impact of LUST sites on house prices, Zabel, Jeffrey, Guignet, Dennis, 34 (2012) 549-564

Journal of Real Estate Research, The Effect of Underground Storage Tankls on Residential Property Values in Cuyahoga County, Ohio, Simons, R., Bowen, W., Sementelli, A., Vol 14, No. 1/2, 1997 pp29-42

Black Hawk County Real Estate and Tax

Locate Parcels by:

1. Parcel ID 2. Address 3. Sales
4. Subdivision 5. Transfer Document

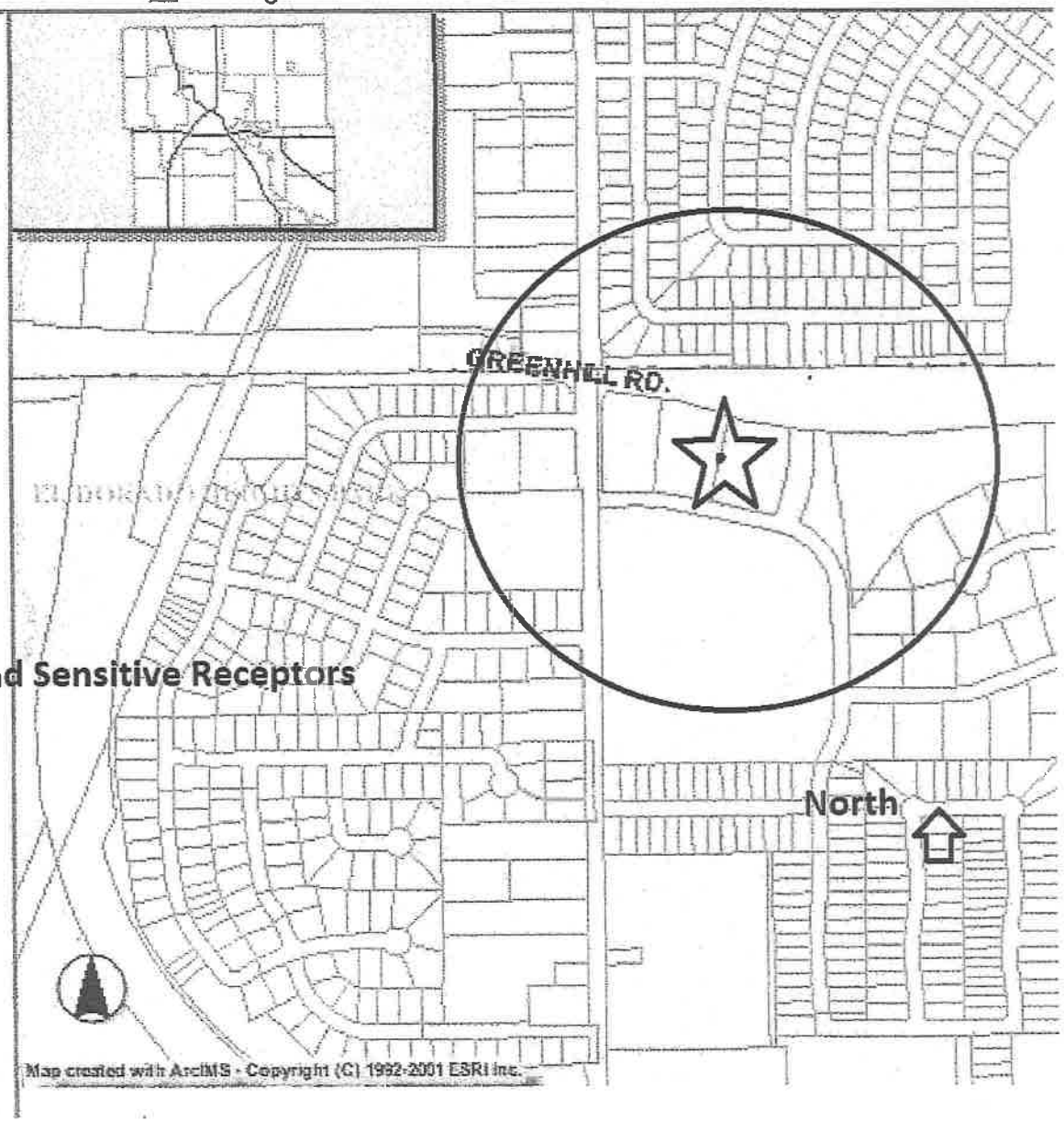
Layers: ☐ Schools ☐ Subdivisions ☐ Zoning

Refresh Ma

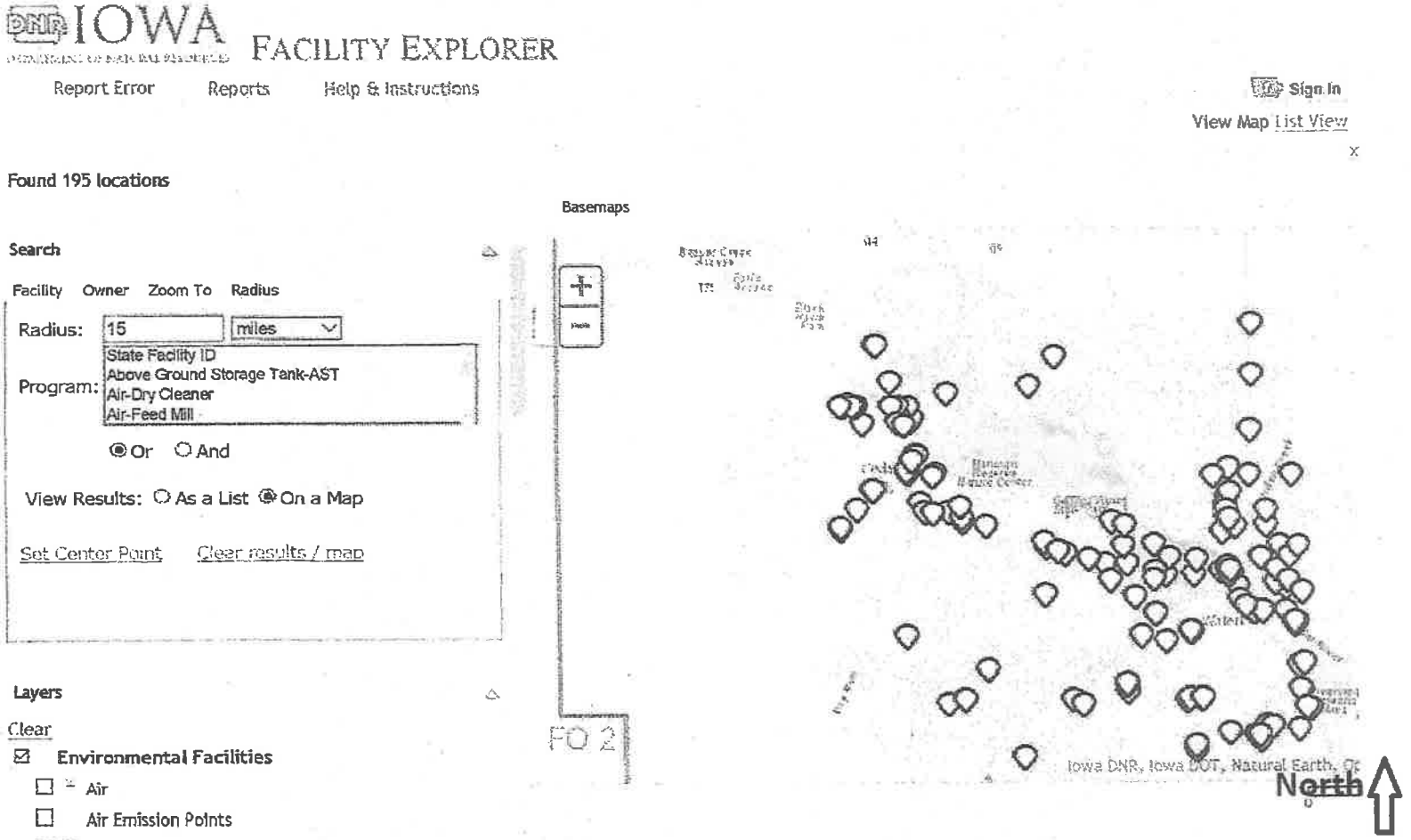
Map Tools

hospital

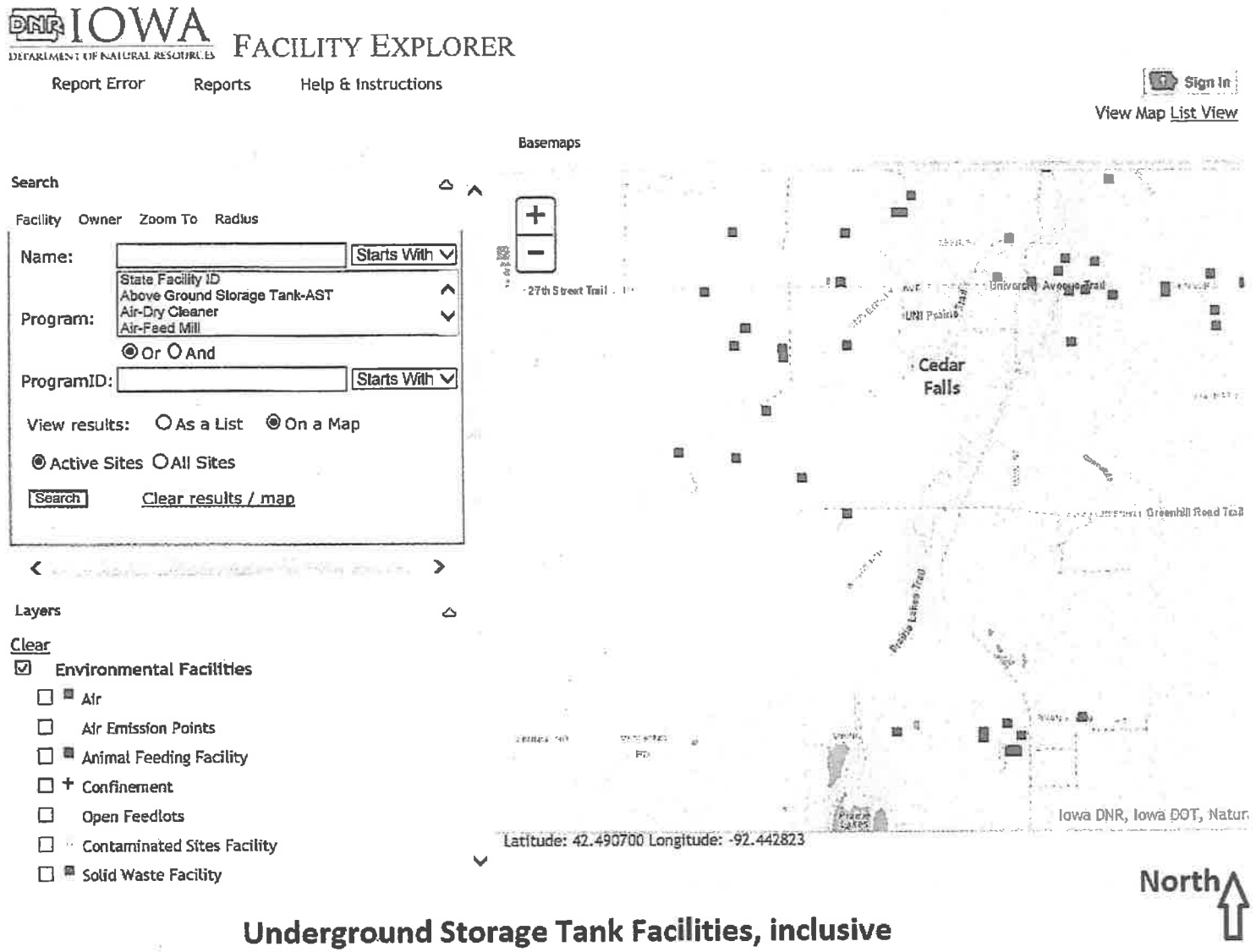
Measure Totals cleared.



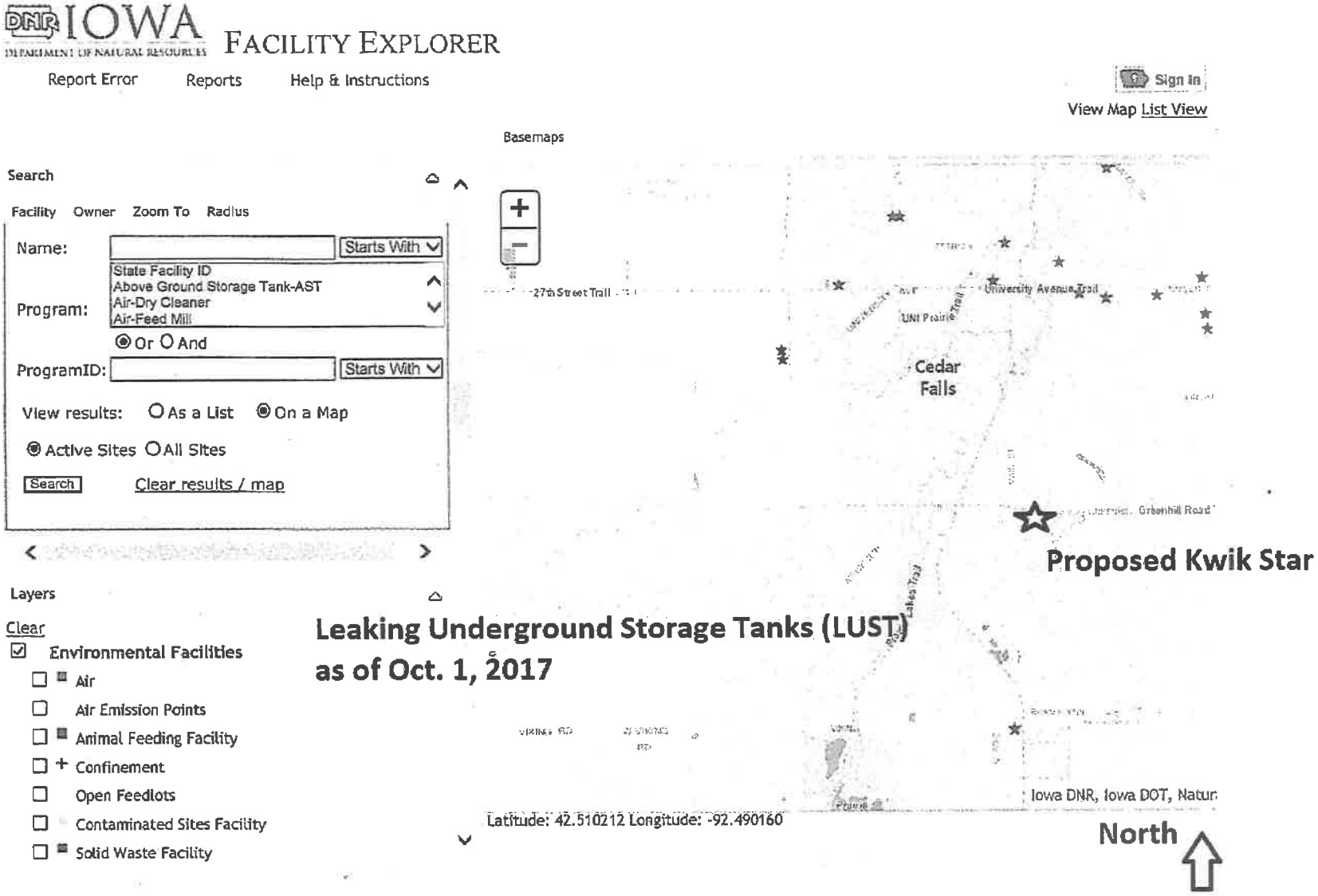
1000 foot Sensitive Area and Sensitive Receptors



195 locations within 15 miles of proposed Kwik Star with Leaking Underground Storage Tanks as of 10/1/2017



Underground Storage Tank Facilities, inclusive as of Oct. 1, 2017


DNR IOWA
DEPARTMENT OF NATURAL RESOURCES
FACILITY EXPLORER
Report Error
Reports
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Sign in
View Map List View
Basemaps
Search
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Name:
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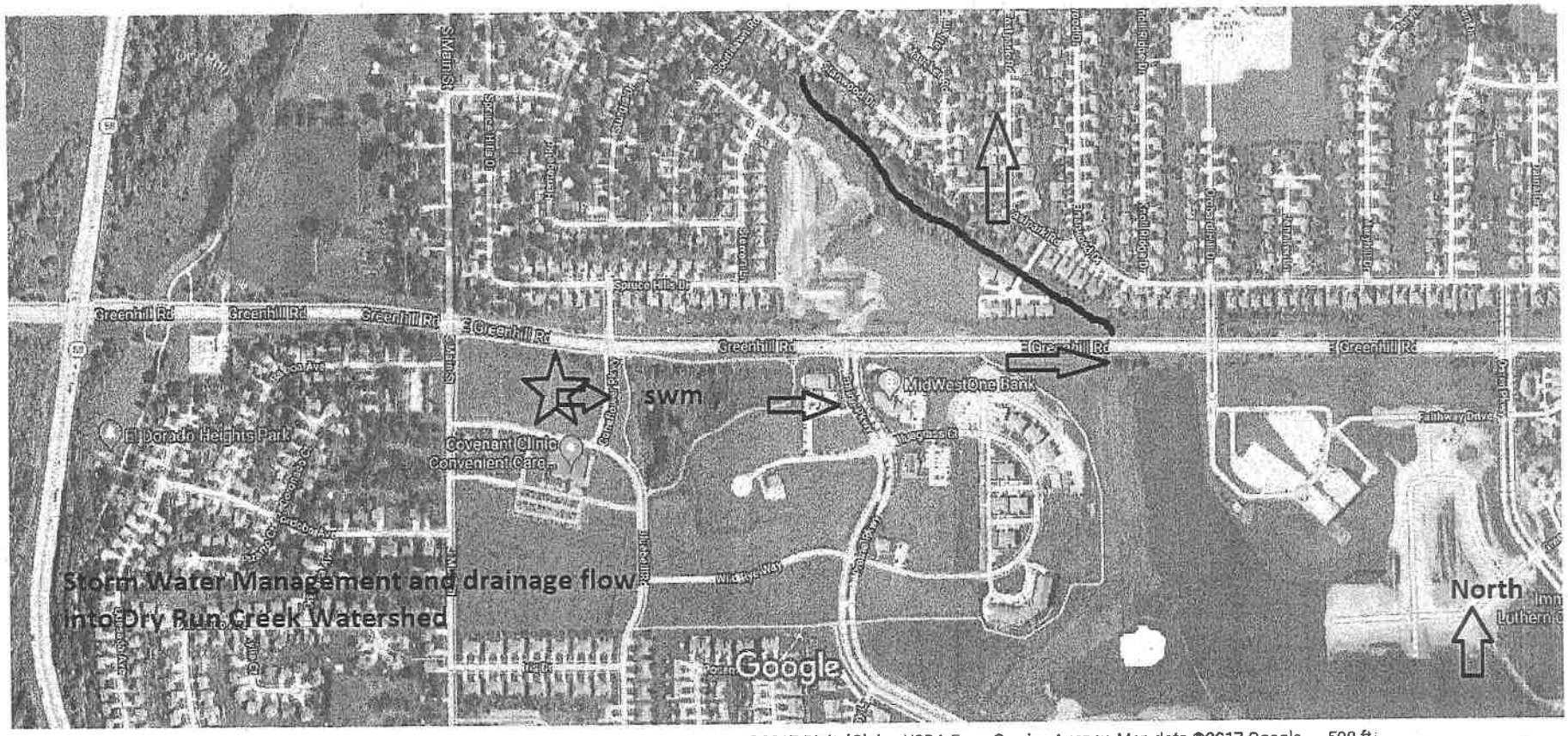
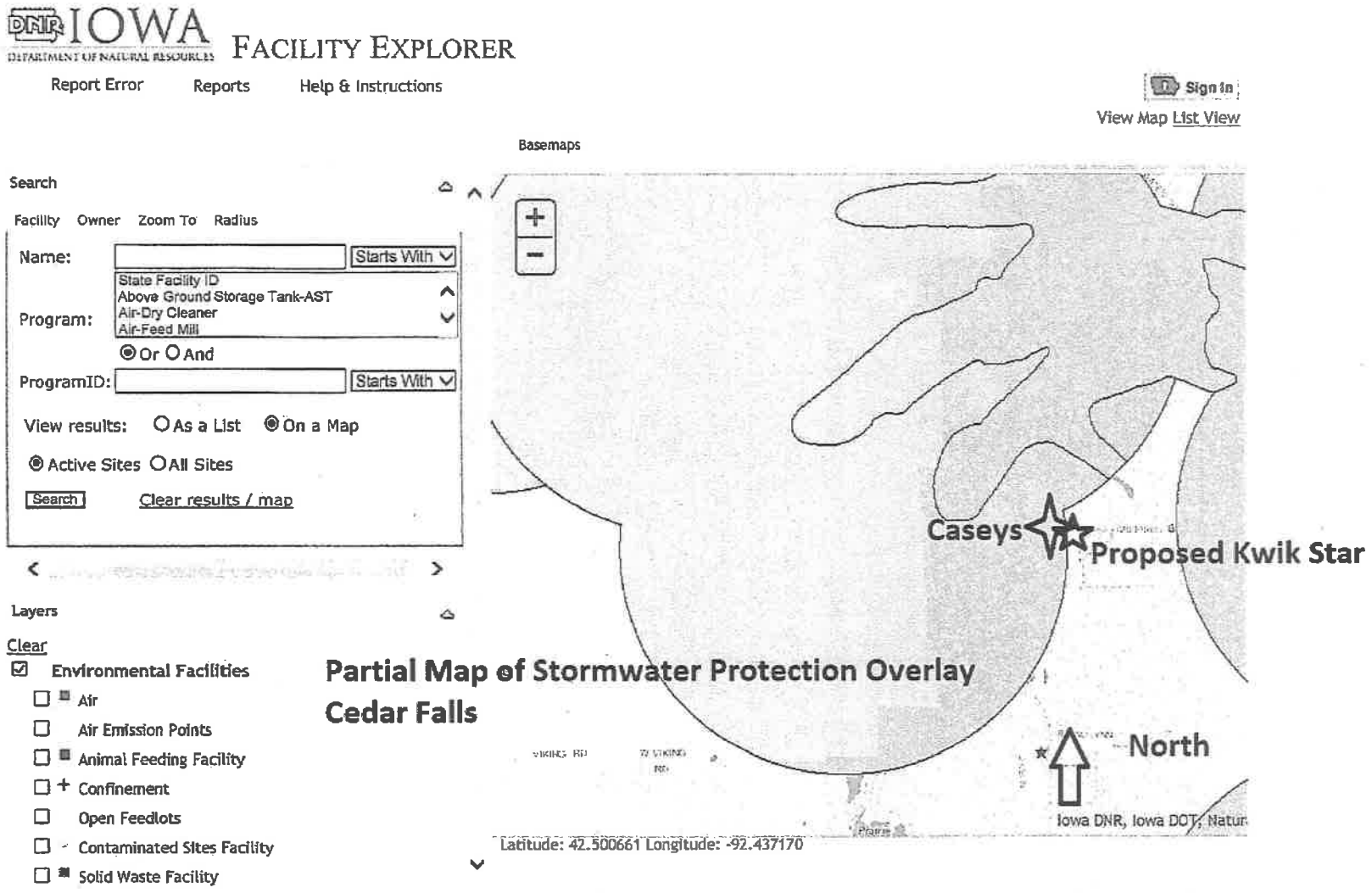
State Facility ID
Above Ground Storage Tank-AST
Air-Dry Cleaner
Air-Feed Mill
Program:
Or And
ProgramID:
Starts With
View results: As a List On a Map
Active Sites All Sites
Search
Clear results / map
Layers
Clear
Environmental Facilities
Air
Air Emission Points
Animal Feeding Facility
Confinement
Open Feedlots
Contaminated Sites Facility
Solid Waste Facility
27th Street Trail
University Avenue Trail
UNI Prairie
Cedar Falls
Greenhill Road
Proposed Kwik Star
Leaking Underground Storage Tanks (LUST)
as of Oct. 1, 2017
Iowa DNR, Iowa DOT, Natur
Latitude: 42.510212 Longitude: -92.490160
North

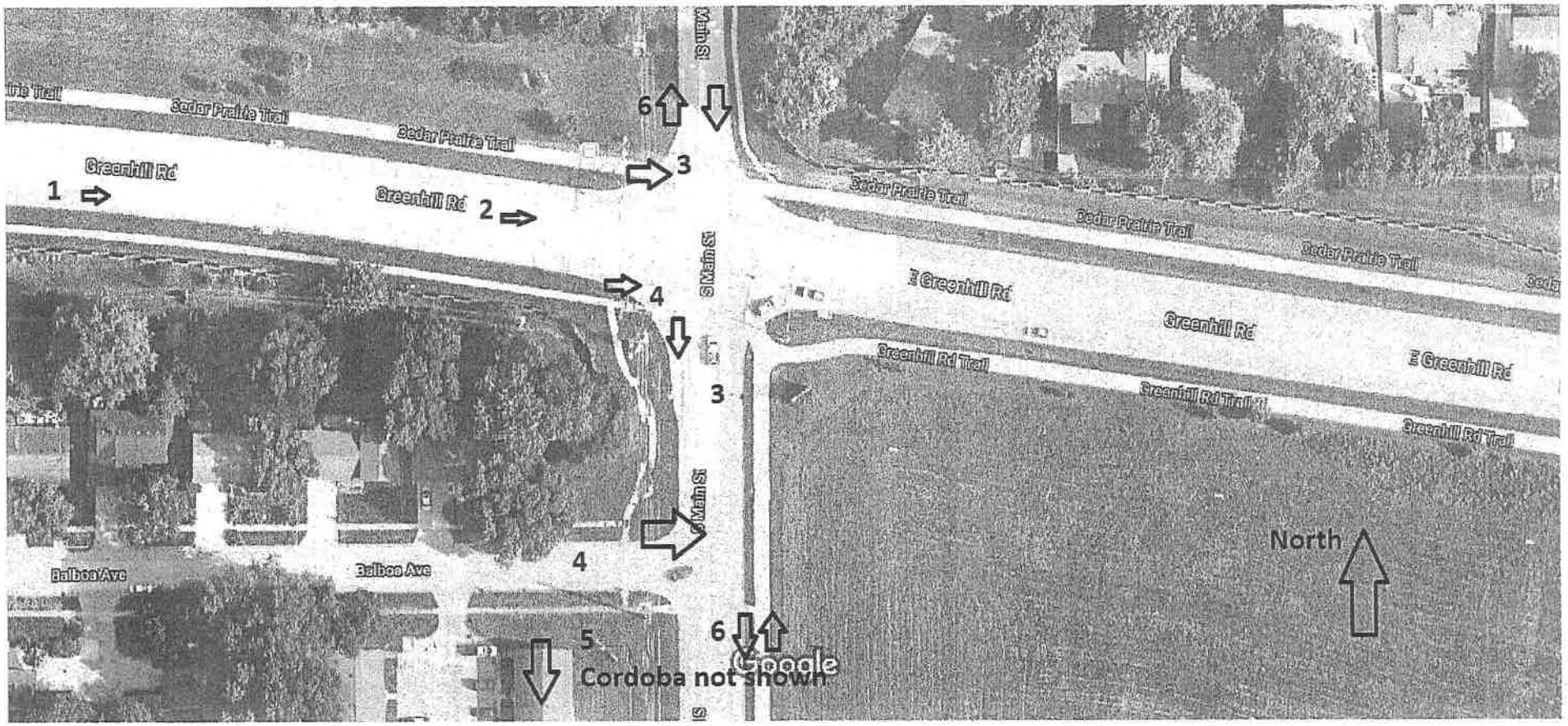
Google Maps



Imagery ©2017 DigitalGlobe, USDA Farm Service Agency, Map data ©2017 Google 500 ft


DNR IOWA
DEPARTMENT OF NATURAL RESOURCES
FACILITY EXPLORER
Report Error
Reports
Help & Instructions
Sign In
View Map List View
Basemaps
Search
Facility Owner Zoom To Radius
Name:
Starts With
State Facility ID
Above Ground Storage Tank-AST
Air-Dry Cleaner
Air-Feed Mill
Program:
Or And
ProgramID:
Starts With
View results: As a List On a Map
Active Sites All Sites
Search
Clear results / map
Layers
Clear
Environmental Facilities
Air
Air Emission Points
Animal Feeding Facility
Confinement
Open Feedlots
Contaminated Sites Facility
Solid Waste Facility
Caseys
Proposed Kwik Star
Partial Map of Stormwater Protection Overlay
Cedar Falls
North
Iowa DNR, Iowa DOT, Natur
Latitude: 42.500661 Longitude: -92.437170

Google Maps

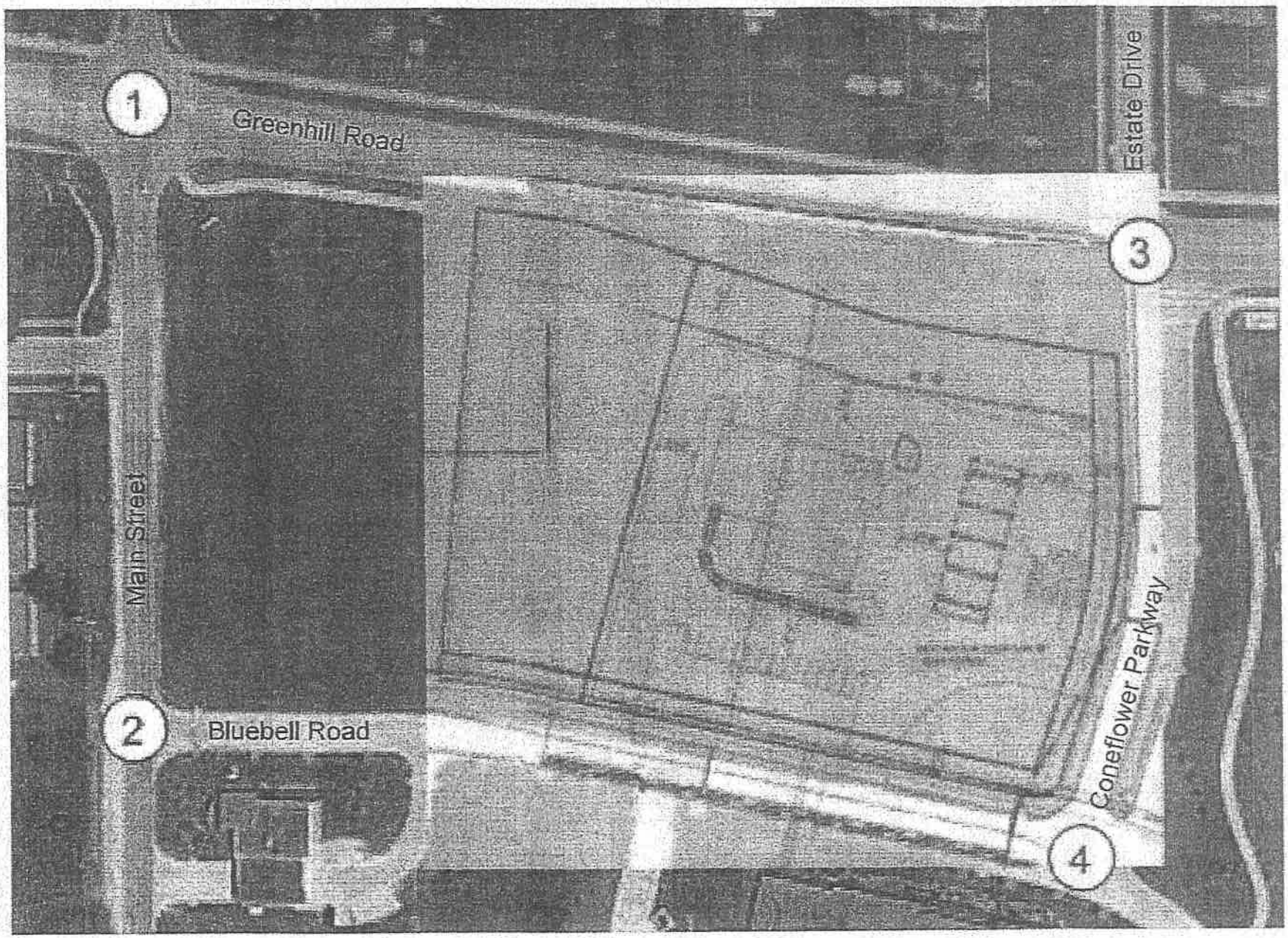


Imagery ©2017 DigitalGlobe, Map data ©2017 Google 50 ft

Item 4.B.

SOUTH MAIN STREET
ESTATE DRIVE/
CONEFLOWER PKWY
PRAIRIE PARKWAY
ORCHARD
HILL DRIVE
OSTER PARKWAY /
BRIARWOOD HILLS
ROWND STREET
GREEN CREEK ROAD
CEDAR HEIGHTS DRIVE
810'
1215'
1325'
1495'
1325'
1320'
980'
2014 STUDY FOR CITY OF CEDAR FALLS
AECOM
FIGURE 1
GREENHILL ROAD STUDY
LOCATION MAP

Figure 1 **Study Area Map**

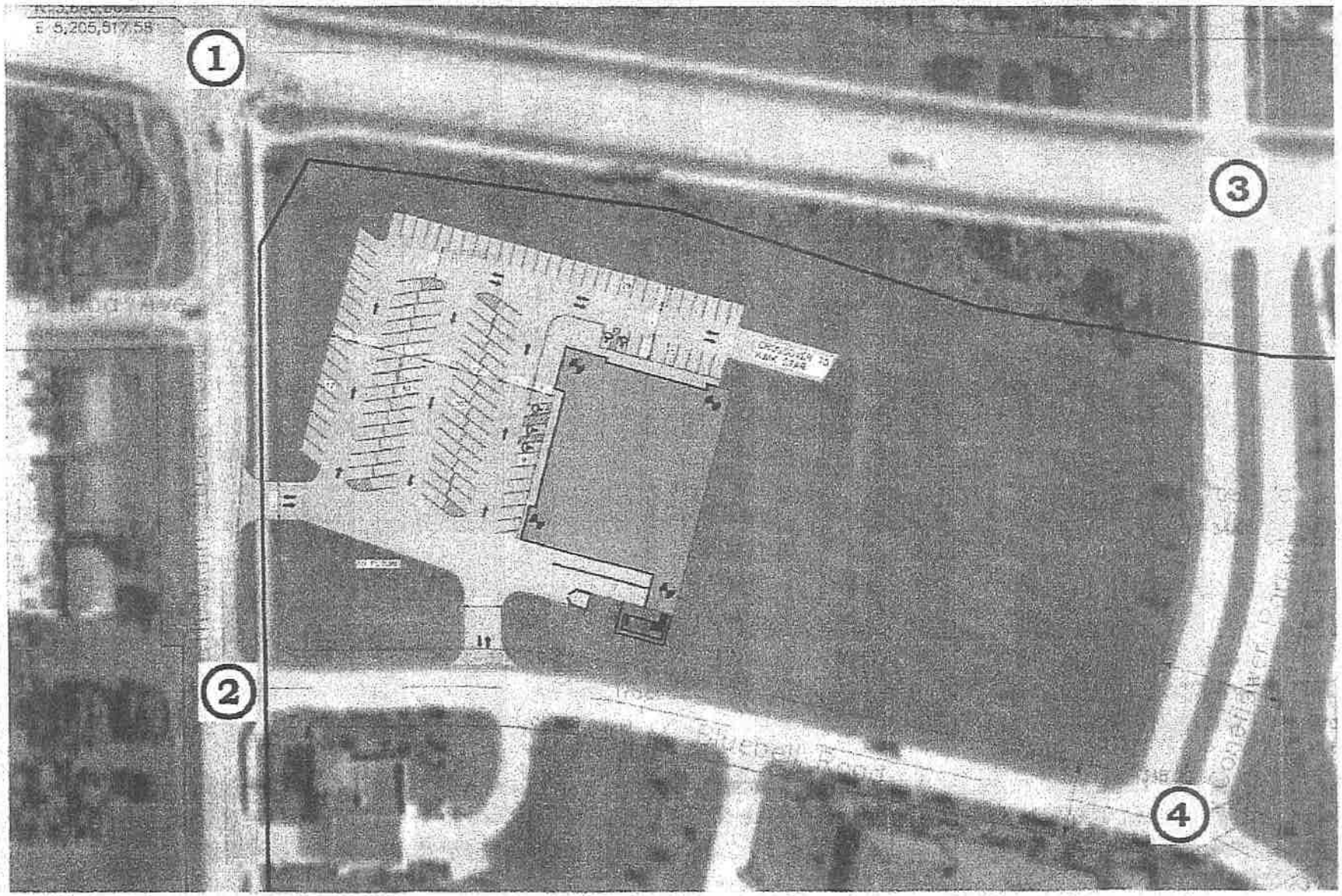


KWIK STAR, AUG 2017

Project # 2171910 | August 2017 Kwik Star

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

Figure 1 **Study Area Map**



FAREWAY, NOV 2017

Project # 2172660 Fareway

SHIVE-HATTERY
ARCHITECTURE + ENGINEERING

Crimes Reported at Kwik Star, Nordic Dr. 1/2017 - 10/1/2017

Vandalism

Larceny

Fraud

Disorderly Conduct

Traffic Stops, moving violations, parking violations, traffic hazards

Motor Vehicle Accidents with property damage, injury to pedestrian, hit and run and an undetermined factor

OWI

Harassment

Suspicious persons

Medical calls, welfare checks

Intoxication

December 14, 2017

Planning & Zoning Committee
220 Clay Street
Cedar Falls IA 50613

To Whom It May Concern,

I was at the planning and zoning meeting last night, December 13, 2017, regarding the Kwik Star. I heard many grievances as to why the community does not want this business in their back yards. However, the one thing that stood out to me was the fact that, it seemed, the community was willing to allow this dirty, noisy, and light polluted business if some minor concessions would be made by the Kwik Star.

1. Eliminate the car wash. Kwik star says NO that is not an option.
2. Turn the car wash to face away from the homes. Kwik Star says NO, that is not an options
3. Limit the hours of the car wash. Kwik Star says NO, that is not an option.

Well, to them then I say "GO HOME" and to you, council members, I feel you should say the same. Big business cannot, and should not be allowed to operate how they see fit in our, in YOUR community. The community you were elected to preserve and protect by the people that live here.
For this, I respectfully request that you deny the Kwik Star proposal.

Regards,

Kim Costarella

Kimberly Costarella
401 Heritage Rd
Cedar Falls, IA 50613
319-230-3690

Item 4.B.

December 19, 2017

Cedar Falls Planning and Zoning Commission Members:

Sadly, I struggle to find the words to express my disappointment concerning the commission's responses to the interest Kwik Star and Fareway have expressed in building along Greenhill Road near South Main Street. This is not where these businesses should be building, due to how they will adversely affect traffic, aesthetics, and the neighborhood milieu. I don't know why they have not already been directed to the Viking Road area, especially east of Michael's or across from or around Menards, where similar businesses and the needed traffic infrastructure already exist, while residential housing does not.

The LED lighting a Kwik Star representative addressed at last week's meeting is not really a solution for the neighborhood. The reason they need fewer LED lights is because LEDs are brighter. Installing them under a canopy may reduce what shines up into the sky above the structure but does not resolve the glare that will shine out on all sides at the building and ground level. The car wash concerns were simply set aside. Neither of these businesses uses the professional type of office building that current residents were promised when they were looking to purchase homes in this neighborhood.

I doubt any of you would want these stores, valuable as they may be, to build directly across the street from your home. I don't understand why you would want other Cedar Falls residents to have that experience, especially when other locations serve their purpose better. There is even a plot of land presently for sale on the corner of Viking Road and the Parkway southwest of Menards. With the new hospital construction soon to develop on Greenhill, many professional offices will look to locate near those currently in the area around the Arrowhead and Unity Point facilities. Another possible alternative for a gas station and grocery store would be land that has not yet been developed west of Highway 58. That area will be quickly built up as the infrastructure is prepared for the new elementary school to be built farther west, perhaps between Viking Road and where a new western section of Greenhill will curve north.

Thank you for your service to the city. Please consider better alternatives to the plans you are currently considering.

Sincerely,

Mary Wallingford

Rod Larsen
4516 Quesada Ct.
Cedar Falls, Iowa 50613
E-mail: rhlarsen@cu.net

December 17, 2017

The Honorable Jim Brown
220 Clay St.
Cedar Falls, IA 50613

RE: Fareway and Kwik Trip proposals

Dear Mayor Brown,

This is to convey my support for the proposed development at Greenhill Road and South Main Street. I will be out of state for the Holidays and was hoping you and Stephanie could include this in the public comment file for the Council and P & Z as appropriate.

My planning career at INRCOG and the Iowa DOT included extensive development of the metropolitan area street and highway plan. Greenhill was constructed as part of this plan and was always envisioned to be a major, efficient, east –west arterial street supporting multiple adjacent activities including residential, neighborhood commercial, and office development.

I am aware that some of my neighbors in the El Dorado Heights Subdivision have expressed concerns over traffic and possible noise. I have never seen any development proposal that was not criticized for traffic impacts. Of course, any development creates some additional traffic; however, this proposal is consistent with the City's Land Use Plan along with the Pinnacle Prairie Master Plan.

Cedar Falls is fortunate to have these quality businesses working with a highly regarded developer to complement the vibrant growth in the southern part of our City. Coincidentally, I will personally appreciate the convenience of having both businesses at this location.

The amount of traffic generated by these businesses should be comfortably served by the existing local streets with the potential need for operational improvements at the Greenhill/South Main intersection.

Respectively submitted,

Rod Larsen

Cc Stephanie Houk Sheetz

Planning and Zoning Commission Members

City of Cedar Falls

220 Clay Street

Cedar Falls, Iowa 50613

301 Spruce Hills Drive

Cedar Falls, Iowa 50613

4 January 2018

Re: 1. Proposed Kwik Star/Trip at Greenhill/Coneflower

2. Proposed Fareway at Greenhill/South Main

Dear Planning and Zoning,

I do support the Fareway proposal, noting they are working with the city to resolve driveway issues with entrance and exit. Fareway is family oriented and would make a good neighbor. It closes by 9:30 pm, with most of its lights off by then, and is closed on Sundays and most holidays.

I do not support Kwik Trip/Star. As a 7 day per week, everyday business, with all its lights, noises, increased traffic, gas product runoff, it is not a fit for a neighborhood.

Kwik Star as a neighbor would decrease the quality of life that I value in Cedar Falls over other areas I have lived. Please do not encourage me to look somewhere else to live.

Ronald D. Flory

Ronald D. Flory, MD, retired

301 Spruce Hills Dr.
Cedar Falls, IA 50613
January 4, 2018

Dear Members of the Planning and Zoning Commission;

Re: 1. Proposed Kwik Trip / Kwik Star gas station at Greenhill Rd and Coneflower
2. Proposed Fareway at corner of Greenhill Rd and South Main St.

I write this letter as a concerned neighbor regarding these proposed developments. I live at 301 Spruce Hills Dr. My backyard is directly across Greenhill from the proposed site of the Kwik Star.

Addressing Kwik Star: I continue to oppose this development for the following reasons:

1. Increased light pollution and petroleum based pollution. Petroleum: Although Kwik Star states they have a double filter system for surface drainage and new underground storage tanks, such systems are prone to leaks. The flora and fauna in the nearby catch basin and Dry Run Creek cannot withstand additional pollution. Gas stations also emit petroleum odors and vehicle exhaust.

   Lights: The down facing lights at the new Kwik Star on Ansborough and Hwy 20 in Waterloo are as white and bright as any I have seen. If these same lights are intended for use at the proposed Kwik Star and installed at the proposed height, my home interior will be brightly lit 24 hours a day.
2. Increased litter and trash. Gas stations are dirty. People drop papers, cups, wrappers, receipts, and any number of things that blow in the wind. These will blow into the neighborhoods that surround this site, unless a wire mesh fence or other type of abatement surrounds the site.
3. Increased noise pollution – It is unclear if the car wash relocation, in the latest mailing, demonstrates the exit facing Bluebell because the interior drawing appears to exit facing Greenhill. There are no berms or noise abatement structures built into the plan. Did Kwik Star in fact change the car wash exit to face Bluebell? Supposedly this was "impossible" according to the Kwik Star representative. I wonder what other requests from the Planning Commission were considered and accepted as "impossible" – like eliminating the carwash or reducing hours of operation for the carwash and store hours of operation?
4. Hours: Kwik Star is a 24 hour 7 day a week business. Other than the planned Public Safety Building, this proposed gas station does not fit with the hours of established businesses in the area. The surrounding neighborhoods are also quiet in the overnight hours. Viking and University both have 24 hour businesses and the increased noise and traffic that accompany them. Greenhill has no 24 hour businesses.
5. Unresolved traffic concerns. Neighbors have addressed the traffic congestion at South Main and Greenhill and continue to raise concerns. With the planned area road construction / re-construction in 2018 and 2019, and increased development of area housing and businesses, Greenhill will carry even more traffic. I predict this area will become much like the current Viking and 58.
6. Saturation: There are already 4 gas stations within 0.5 to 2.0 miles from this site. Does Planning and Zoning wish to allow a glut of gas stations when diversity would better serve this area?

Addressing Fareway:

1. I support the Fareway proposal and hope the entrance / exit concerns can be resolved. Fareway is a family oriented business with a purpose and hours that would be a good fit for this area.

Sincerely,

Denise Flory

Traffic Impact Study:

Kwik Star – Cedar Falls Store #934

Cedar Falls, Iowa

December 27, 2017

Prepared for: Kwik Trip, Inc.

Prepared by:

SHIVEHATTERY
ARCHITECTURE + ENGINEERING
316 Second Street SE, Suite 500
Cedar Rapids, IA 52406
(515) 364-0027

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Appendices

Executive Summary

Kwik Trip, Inc. initiated this traffic study to identify potential traffic impacts on the adjacent roadway network and provide traffic mitigation measures, if necessary, due to their proposed Kwik Star #934 Convenience Store development. The development will be located on the northwest corner of Bluebell Road and Coneflower Parkway in Cedar Falls, IA.

The following study intersections within the study area were identified for analysis:

1. Greenhill Road & South Main Street (Greenhill Road & Main Street hereafter)
2. Bluebell Road & South Main Street (Bluebell Road & Main Street hereafter)
3. Greenhill Road & Coneflower Parkway/Estate Drive (Greenhill Road & Coneflower Parkway hereafter)
4. Bluebell Road & Coneflower Parkway

The above list assigns each study intersection with a number that is used throughout the report. (e.g. #1 = Greenhill Road and Main Street).

The area immediately surrounding the proposed development generally incorporates medical, residential, and undeveloped land uses.

The proposed development is a Kwik Star Convenience Store with gasoline pumps and a car wash. The development will be located on the northwest corner of Bluebell Road and Coneflower Parkway. Three access points to the development are being proposed, with two on Bluebell Road and one intersecting the southbound lanes of Coneflower Parkway, which will be a right-in/right-out only access. The development is expected to be completely built by the end of 2018. Sight visibility zones corresponding to intersection sight distance calculations as defined through AASHTO should be identified and maintained at these access points. These zones should not contain structures or plantings that would preclude unobstructed views of oncoming traffic. Current designs for the development do not indicate obstructions within the sight visibility zones.

Morning (AM) and evening (PM) peak hour volumes at the study intersections were collected between the hours of 7:00 AM and 9:00 AM and between 4:00 PM and 6:00 PM, respectively. The peak hours of the study intersections were determined based on the highest consecutive 15-minute turning movement counts at Greenhill Road and Main Street. The AM and PM peak hours at Greenhill Road and Main Street governed the AM and PM peak hour because it is the study intersection with the highest volume of entering vehicles. The AM peak hour was determined to occur between 7:30 and 8:30. The PM peak hour was determined to occur between 4:30 and 5:30. The AM and PM peak hour volumes were collected on Thursday, May 4, 2017. The raw and refined volume data are provided in Appendix 1 of this report.

Projected traffic analysis will typically apply an annual growth rate to study intersections' existing turning movement volumes prior to adding project development trips to account for growth in background traffic (traffic unrelated to the Kwik Star Convenience Store). In coordination with the local Metropolitan Planning Organization the Iowa Northland Regional Council of Governments, a 1.5% annual growth rate was identified for this study. As such, a 1.5% annual growth rate was applied to existing 2017 volumes to reflect design year 2038 volumes, which could be expected through a sustained constant area growth without the Kwik Star Convenience Store development. It should be noted, over time growth rates generally do not exhibit a straight line growth, but rather tend to level off as the surrounding area continues to develop. Therefore, the use of a straight line growth rate for the prediction of future events can be thought of as conservative and should be considered as such when reviewing the output of this analysis.

The Safety Analysis, Visualization, and Exploration Resource (SAVER) website administered by Iowa DOT was used to collect available crash data near the project site for the five-year period between January 1,

2012 and December 31, 2016. All of the study intersections had crash rates that were lower than the statewide average for intersections with a similar daily volume of entering vehicles.

Project trip generation is based on nationally accepted trip generation rates contained in the Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition, 2012. The development is expected to be completely built by the end of 2018. Trips were generated for the expected type of project and correspond to the AM and PM peak hour of the adjacent roadway network.

Trip distribution percentages for the Kwik Star Convenience Store are based on recommendations from the City of Cedar Falls City Engineer.

LOS D or better is generally identified as acceptable in urban conditions. The analysis presented herein indicates the study intersections will operate at an acceptable LOS D or better during the AM and PM peak hour conditions through 2038 with buildout of the proposed development, except for the intersection of Greenhill Road and Coneflower Parkway. This analysis assumes existing lane configuration and control for existing 2017 and projected 2018 conditions as identified in Figure 3 and recommended lane configuration and control for projected 2038 conditions as identified in Figure 8. Assuming intersection improvements will not be constructed by 2018 provides a conservative analysis.

Direction was provided by the City of Cedar Falls City Engineer to implement improvements as identified in Figure 8. However, the LOS at the intersection of Greenhill Road and Coneflower Parkway is still projected to fall below the acceptable LOS D in the PM peak hour with and without the proposed development by 2038. This analysis indicates additional improvements at this intersection will be necessary in order to maintain an acceptable LOS during the peak hours by 2038 regardless if the Kwik Star Convenience Store is built or not. Provided the City of Cedar Falls is willing to accept that the southbound approach to this intersection may fall below the acceptable LOS of D by the design year of 2038 during PM peak hour conditions; no other changes/improvements to the study intersections lane configuration and control from what is depicted in Figure 8 are considered necessary. It should be noted, this analysis assumes the annual background growth rate at this intersection will grow at 1.5% per year through the design year of 2038, which is a conservative assumption. It should also be noted, based on the traffic volumes used for the analysis herein, the Manual on Uniform Traffic Control Devices traffic control signal Warrant 2 (Four-Hour Vehicular Volume) will not be met by 2038 with buildout of the development (analysis worksheet is included in Appendix 2). In addition, motorists will generally choose routes that minimize their travel time/distance. Therefore, as the intersection of Greenhill Road and Coneflower Parkway becomes congested, motorists may choose alternate routes that experience less delay. For example, motorists may choose to transit the signalized intersection Greenhill Road and Prairie Parkway to the east (southbound approach is currently under construction) over the Greenhill Road and Coneflower Parkway intersection, which would likely result in a better LOS than what is reported in Table 8.

Existing & Projected No Build Conditions

Kwik Trip, Inc. initiated this traffic study to identify potential traffic impacts on the adjacent roadway network and provide traffic mitigation measures, if necessary, due to their proposed Kwik Star #934 Convenience Store development. The development will be located on the northwest corner of Bluebell Road and Coneflower Parkway in Cedar Falls, IA.

The following study intersections within the study area were identified for analysis:

1. Greenhill Road & South Main Street (Greenhill Road & Main Street hereafter)
2. Bluebell Road & South Main Street (Bluebell Road & Main Street hereafter)
3. Greenhill Road & Coneflower Parkway/Estate Drive (Greenhill Road & Coneflower Parkway hereafter)
4. Bluebell Road & Coneflower Parkway

The above list assigns each study intersection with a number that is used throughout the report. (e.g. #1 = Greenhill Road and Main Street).

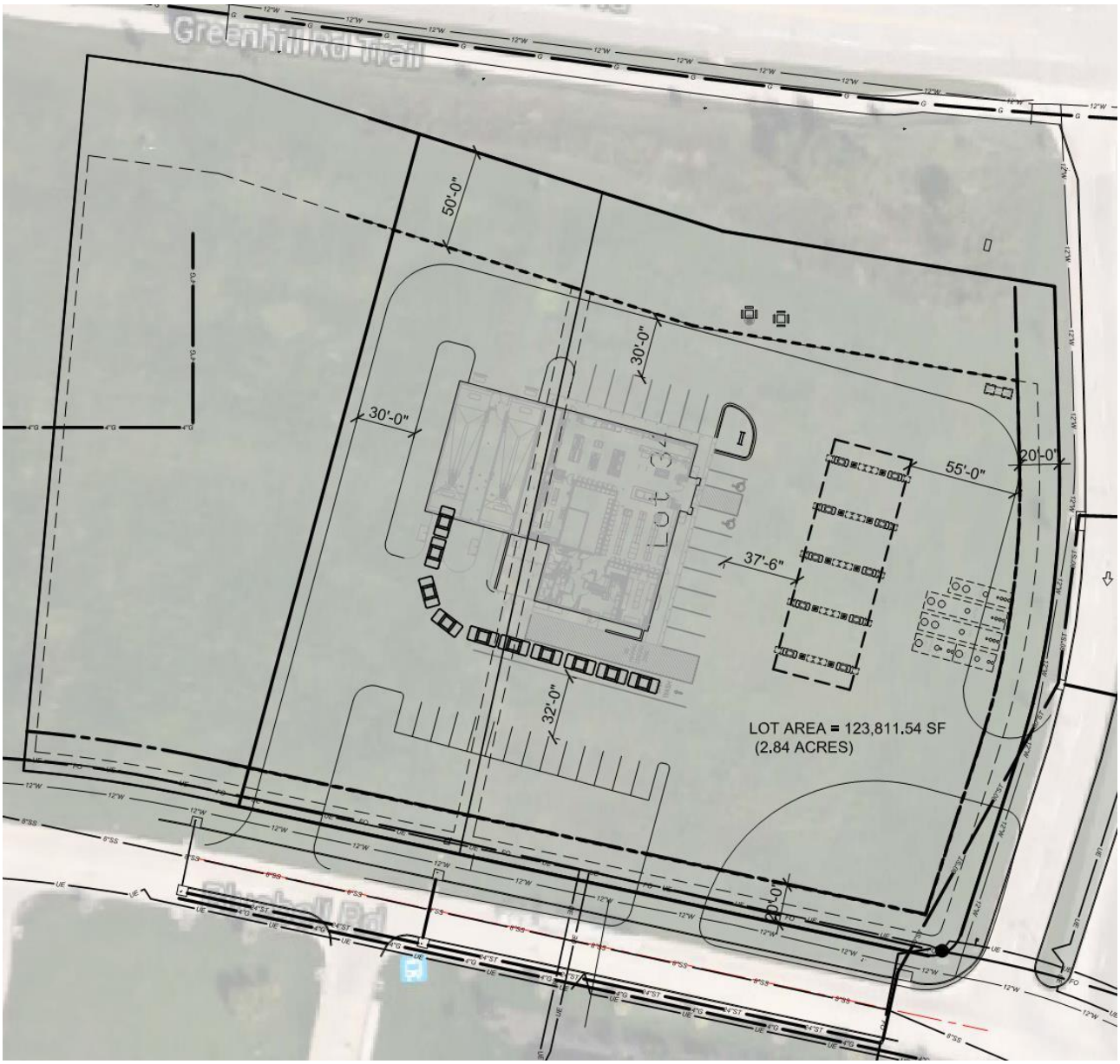
The area immediately surrounding the proposed development generally incorporates medical, residential, and undeveloped land uses. A study area map depicting the location of the study intersections, as well the location of proposed development is depicted in Figure 1.

Figure 1 Study Area Map

Project Description

The proposed development is a Kwik Star Convenience Store with gasoline pumps and a car wash. The development will be located on the northwest corner of Bluebell Road and Coneflower Parkway. Three access points to the development are being proposed, with two on Bluebell Road and one intersecting the southbound lanes of Coneflower Parkway, which will be a right-in/right-out only access. The development is expected to be completely built by the end of 2018. A preliminary site plan is provided in Figure 2.

Figure 2 Preliminary Site Plan



Adjacent Streets

Greenhill Road is an east/west (primarily two lanes in each direction) major arterial roadway, with additional left-turn bays at its intersection with Main Street. Parking is prohibited along Greenhill Road. The posted speed limit along Greenhill Road is 45 mph.

Main Street is a north/south (one lane in each direction) roadway, with an additional northbound left-turn bay at its intersection with Greenhill Road. North of Greenhill Road Main Street is classified as major collector. South of Greenhill Road Main Street is classified as a local roadway. Parking is prohibited along Main Street. The posted speed limit along Main Street is 35 mph.

Bluebell Road, near the proposed development is an east/west (one lane in each direction) roadway with parking restrictions along both sides of the roadway. Bluebell Road is classified as a local roadway with a posted speed limit of 25 mph.

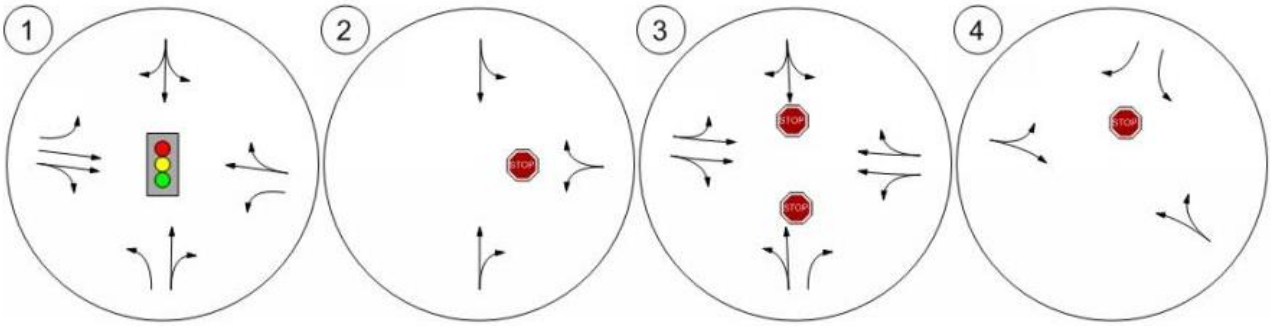
Coneflower Parkway between Greenhill Road and Bluebell Road is a north/south (two lanes in each direction) local roadway. Parking is prohibited along Coneflower Parkway. The posted speed limit along Coneflower Parkway is 25 mph.

Estate Drive is a north/south (one lane in each direction) local roadway. Parking is generally allowed on both sides of Estate Drive. The posted speed limit along Estate Drive is 25 mph.

Existing Intersection Conditions

The existing lane configuration and control for the study intersections are presented in Figure 3.

Figure 3 Study Intersections - Existing (2017) Lane Configuration and Control



Traffic Volume Data

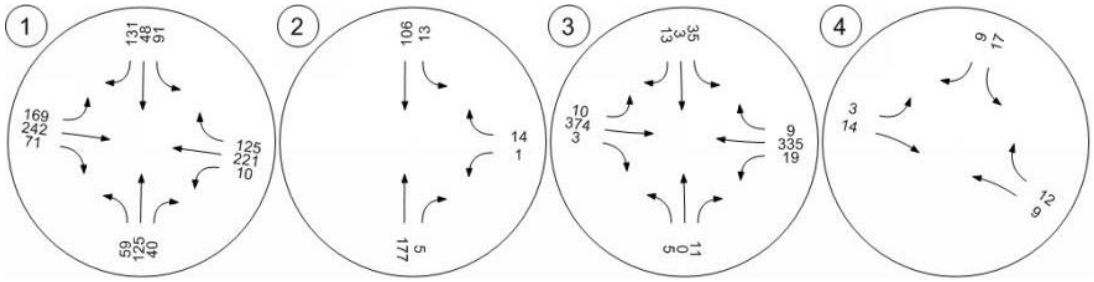
Morning (AM) and evening (PM) peak hour volumes at the study intersections were collected between the hours of 7:00 AM and 9:00 AM and between 4:00 PM and 6:00 PM, respectively. The peak hours of the study intersections were determined based on the highest consecutive 15-minute turning movement counts at Greenhill Road and Main Street. The AM and PM peak hours at Greenhill Road and Main Street governed the AM and PM peak hour because it is the study intersection with the highest volume of entering vehicles. The AM peak hour was determined to occur between 7:30 and 8:30. The PM peak hour was determined to occur between 4:30 and 5:30. The AM and PM peak hour volumes were collected on Thursday, May 4, 2017. The raw and refined volume data are provided in Appendix 1 of this report.

Background Traffic Growth

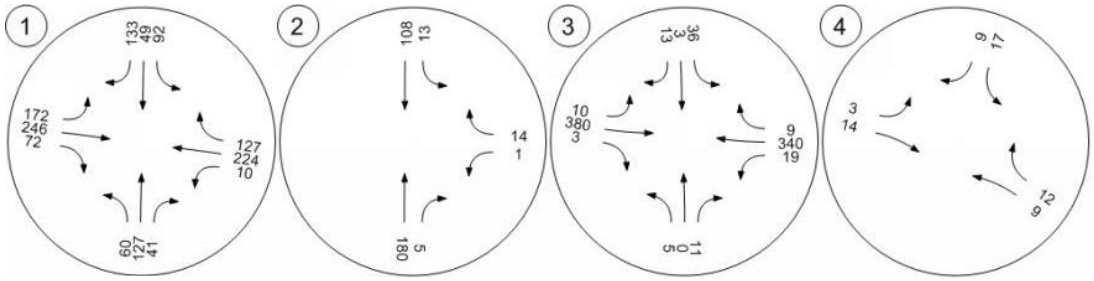
Projected traffic analysis will typically apply an annual growth rate to study intersections' existing turning movement volumes prior to adding project development trips to account for growth in background traffic (traffic unrelated to the Kwik Star Convenience Store). In coordination with the local Metropolitan Planning Organization the Iowa Northland Regional Council of Governments, a 1.5% annual growth rate was identified for this study. As such, a 1.5% annual growth rate was applied to existing 2017 volumes to reflect design year 2038 volumes, which could be expected through a sustained constant area growth without the Kwik Star Convenience Store development. It should be noted, over time growth rates generally do not exhibit a straight line growth, but rather tend to level off as the surrounding area continues to develop. Therefore, the use of a straight line growth rate for the prediction of future events can be thought of as conservative and should be considered as such when reviewing the output of this analysis. Existing 2017 and projected 2018 and 2038 AM and PM peak hour turning movement volumes without the proposed development (no build) are presented in Figure 4 and Figure 5, respectively.

Figure 4 Study Intersections – AM Peak Hour No Build Volumes

2017 AM Peak Hour



2018 AM Peak Hour



2038 AM Peak Hour

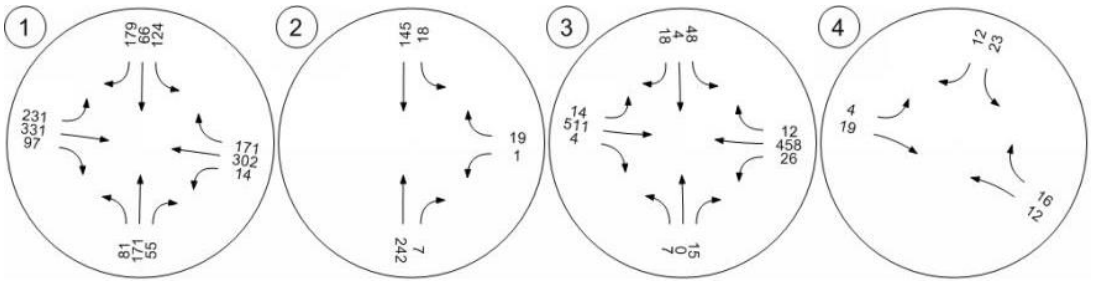
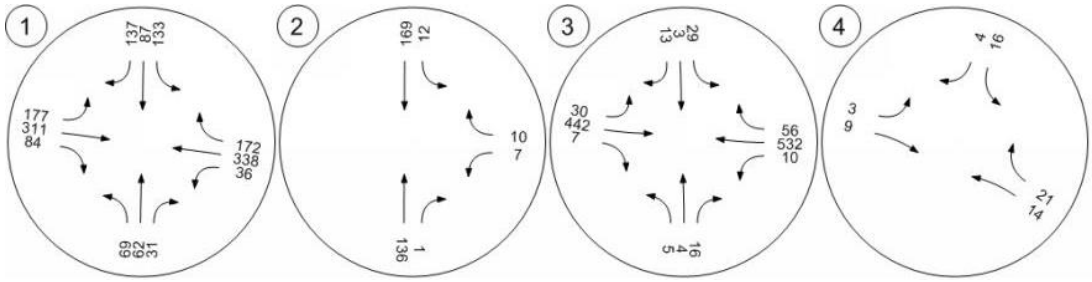
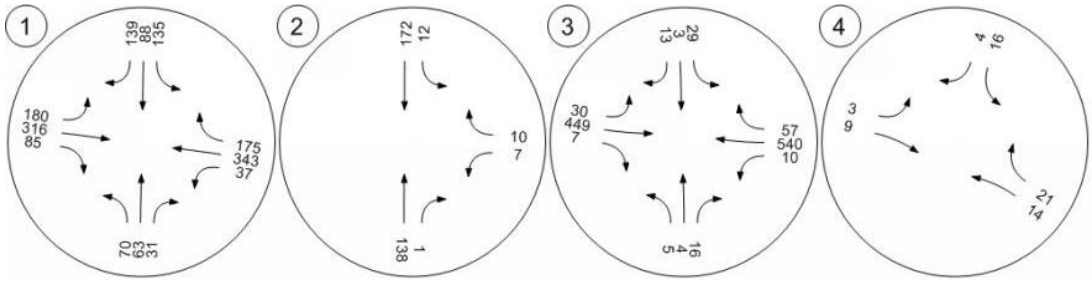


Figure 5 Study Intersections – PM Peak Hour No Build Volumes

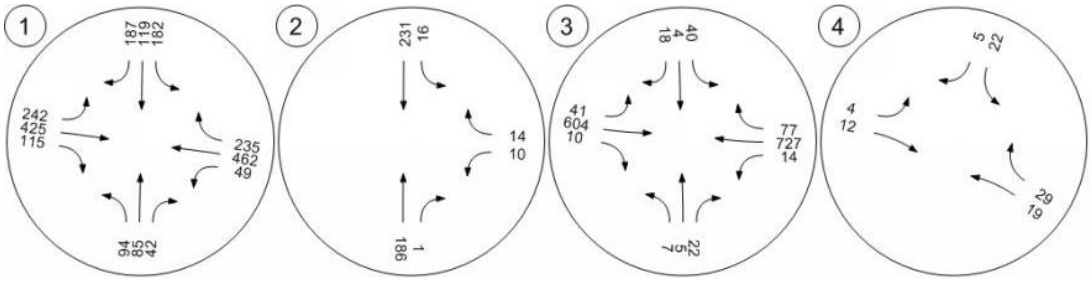
2017 PM Peak Hour



2018 PM Peak Hour



2038 PM Peak Hour



Crash Analysis

The Safety Analysis, Visualization, and Exploration Resource (SAVER) website administered by Iowa DOT was used to collect available crash data near the project site for the five-year period between January 1, 2012 and December 31, 2016.

Table 1 presents crash statistics at each study intersection organized by crash type.

Table 1 Crash Type by Intersection (1/1/12 – 12/31/16)

Study Intersection		Crash Type						
		Rear End	Sideswipe Opposite Direction	Sideswipe Same Direction	Oncoming Left Turn	Broadside	Single Vehicle	Total
1	Greenhill Rd & Main St	4	1	1	7	0	0	**13**
2	Bluebell Rd & Main St	0	0	0	0	1	0	**1**
3	Greenhill Rd & Coneflower Pkwy	0	0	0	0	0	1	**1**
4	Bluebell Rd & Coneflower Pkwy	0	0	0	0	0	1	**1**
Total		**4**	**1**	**1**	**7**	**1**	**2**	**16**

Source: Iowa Department of Transportation, Bureau of Transportation Safety.

A total of 16 crashes occurred at the study intersections over the analysis period. 11 of the 16 crashes occurred during dry conditions; the remaining 5 crashes occurred during inclement weather (wet, snow, ice/frost).

The intersection of Greenhill Road and Main Street experienced the highest number of crashes, which is not unexpected given the relatively higher volume of entering vehicles. Major contributing factors for the crashes at this intersection include failure to yield the right-of-way, crossed the centerline, distracted driving, and driving too fast. Crossing the centerline was identified as a major contributing factor at the intersections of Greenhill Road and Coneflower Parkway and Bluebell Road and Coneflower Parkway. Losing control was the major contributing factor identified at the intersection of Bluebell Road and Main Street.

Intersection crash rates are expressed in crashes per million entering vehicles (crashes/MEV) and can be calculated with the following equation:

$$\text{Crash Rate} = \frac{1{,}000{,}000 \times \text{Total Crashes}}{\text{AADT}_{\text{Entering vpd}} \times 365 \times \#\text{ of Years in Study Period}}$$

Table 2 summarizes crash rates at the study intersections and compares it to average statewide crash rates for intersections with a similar number of entering vehicles. For the purposes of this analysis, the weekday PM peak hour entering traffic volume at the study intersections was assumed to be 10% of the daily weekday entering volume, which is standard for urban intersections and is consistent with methodology used by the Federal Highway Administration. The statewide average crash rate for intersections with a similar number of entering vehicles was prepared by the Iowa Department of Transportation, Bureau of Transportation Safety.

Table 2 Intersection Crash Rate Summary

Study Intersection		Total Crashes	Daily Entering Volume	Crash Rate (crashes/MEV)	Statewide Average Crash Rate (crashes/MEV)	Comparison to Statewide Average Crash Rate
1	Greenhill Rd & Main St	13	13,320	0.53	0.8	**Lower**
2	Bluebell Rd & Main St	1	3,160	0.17	1.0	**Lower**
3	Greenhill Rd & Coneflower Pkwy	1	8,170	0.07	0.7	**Lower**
4	Bluebell Rd & Coneflower Pkwy	1	640	0.86	1.3	**Lower**

Source: Iowa Department of Transportation, Bureau of Transportation Safety.

All of the study intersections had crash rates that were lower than the statewide average for intersections with a similar daily volume of entering vehicles.

Table 3 presents crash injury statistics at the study intersections organized by severity.

Table 3 Crash Injuries at each Intersection by Crash Severity (1/1/12 – 12/31/16)

Study Intersection		Number of Crashes	Severity					
			Suspected Injury		Possible Injury	Uninjured	Unknown	Injuries per Crash
			Serious	Minor				
1	Greenhill Rd & Main St	13	0	0	2	25	0	0.15
2	Bluebell Rd & Main St	1	0	0	0	2	0	0.00
3	Greenhill Rd & Coneflower Pkwy	1	0	0	0	1	0	0.00
4	Bluebell Rd & Coneflower Pkwy	1	0	0	0	1	0	0.00

2 out of the 31 individuals involved in the 16 crashes were identified as possibly injured. Both of these crashes occurred at the intersection of Greenhill Road and Main Street. The remaining 29 individuals involved in the 16 crashes were identified as uninjured.

Projected Buildout Conditions & Mitigation

Trip Generation

Project trip generation is based on nationally accepted trip generation rates contained in the Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition, 2012. The development is expected to be completely built by the end of 2018. Trips were generated for the expected type of project and correspond to the AM and PM peak hour of the adjacent roadway network.

The Kwik Star Convenience Store will include a gas station and car wash. This type of development is most closely represented by ITE's Gasoline/Service Station with Convenience Store and Car Wash (ITE Code 946). Table 4 presents trip generation estimates for the Kwik Star Convenience Store.

Table 4 Trip Generation

Land Use	ITE Code [1]	Quantity	AM Peak Hour					PM Peak Hour				
			Trips	% In	% Out	Trips In	Trips Out	Trips	% In	% Out	Trips In	Trips Out
Gas Station with Market & Car Wash	946	20 VFP [2]	237	51%	49%	121	116	277	51%	49%	141	136

[1] Institue of Transportation Engineers Trip Generation Handbook, 9th Edition, 2012
[2] VFP = Vehicle Fueling Positions

Trip Classifications

Traffic impact studies for gas stations will generally consider two types of trips, pass-by trips and primary trips. As discussed in the ITE Trip Generation Handbook, Second Edition, June 2004, pass-by trips are those trips that are attracted from the existing traffic stream passing the site on an adjacent street with direct access to the site. Consequently, these types of trips do not add new traffic to the adjacent street system, but do add trips to the development's access points. For this study, it can be reasonably assumed some pass-by trips will be attracted from the direct access points along Coneflower Parkway and Bluebell Road. Primary trips, as discussed by ITE, are trips generally made for the specific purpose of visiting the generator. The stop at the generator (i.e. the Kwik Star Convenience Store) is the primary reason for the trip. Primary trips typically go from origin to generator and then returns to the origin. For example, a home-to-shopping-to-home combination of trips is a primary trip set.

The percent of pass-by and non-pass-by trips attracted to the Kwik Star Convenience Store are based upon the Trip Generation Handbook, Second Edition, June 2004, as well as existing traffic patterns as reflected in the existing AM and PM peak hour turning movement volumes. Assumed pass-by and non-pass-by trip percentages are presented in Table 5.

Table 5 Pass-by & Primary Trips

Trip Classification	AM Peak Hour				PM Peak Hour			
	Percent	In	Out	Total	Percent	In	Out	Total
Pass-by Trips [1]	22%	27	26	52	17%	24	23	47
Primary Trips [1]	78%	94	91	185	83%	117	113	230
Total Generation	**100%**	**121**	**116**	**237**	**100%**	**141**	**136**	**277**

[1] Calculated based on the expected amount of pass-by trips and primary trips as reported by ITE Trip Generation Handbook, Second Edition, June 2004 as well as existing traffic patterns as reflected in the existing AM and PM peak hour turning movement volumes.

Trip Distribution

Trip distribution percentages for the Kwik Star Convenience Store are based on recommendations from the City of Cedar Falls City Engineer. Projected 2018 and 2038 AM and PM peak hour turning movement volumes upon buildout of the Kwik Star Convenience Store are presented in Figure 6 and Figure 7, respectively. In coordination with the City of Cedar Falls the following improvements are recommended by the design year of 2038:

Intersection of Greenhill Road and Main Street

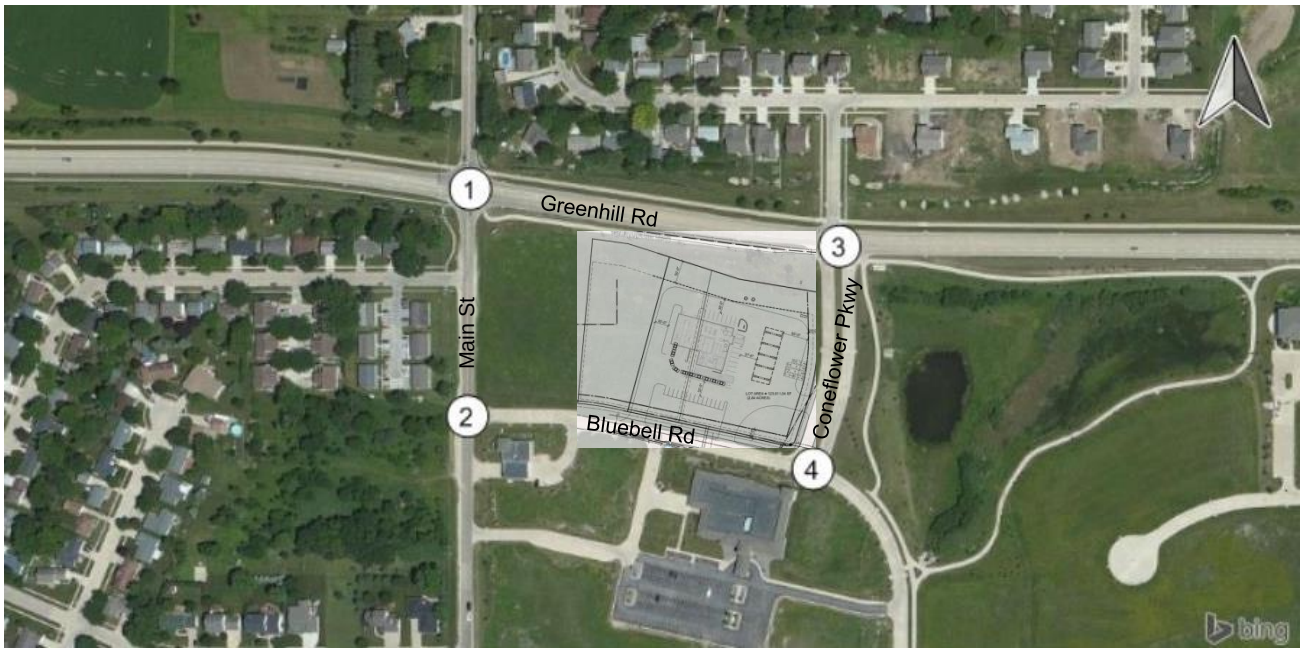
- Dedicated southbound left, through, and right-turn lanes
- An additional westbound through lane

Intersection of Greenhill Road and Coneflower Parkway

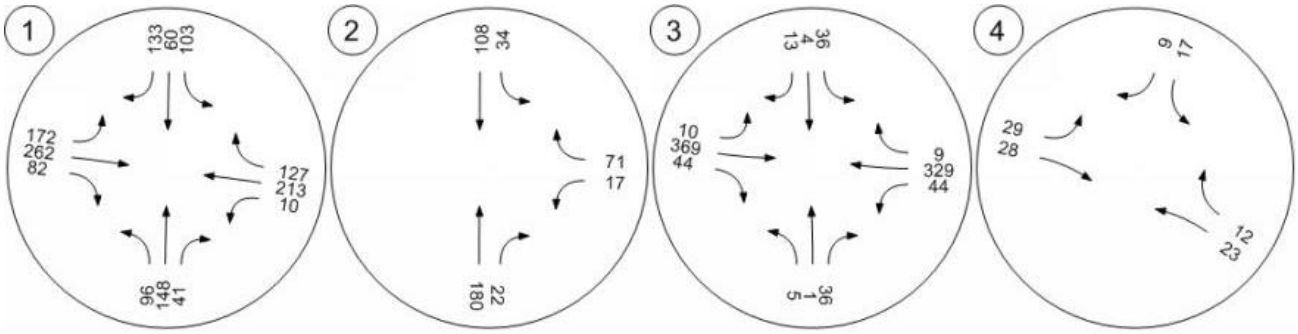
- Dedicated southbound left-turn lane
- Eastbound and westbound center two-way left-turn lane
- Dedicated eastbound right-turn lane

The recommended lane configuration and control at each study intersection by the design year of 2038 is presented in Figure 8.

Figure 6 Study Intersections – AM Peak Hour Buildout Volumes



2018 AM Peak Hour



2038 AM Peak Hour

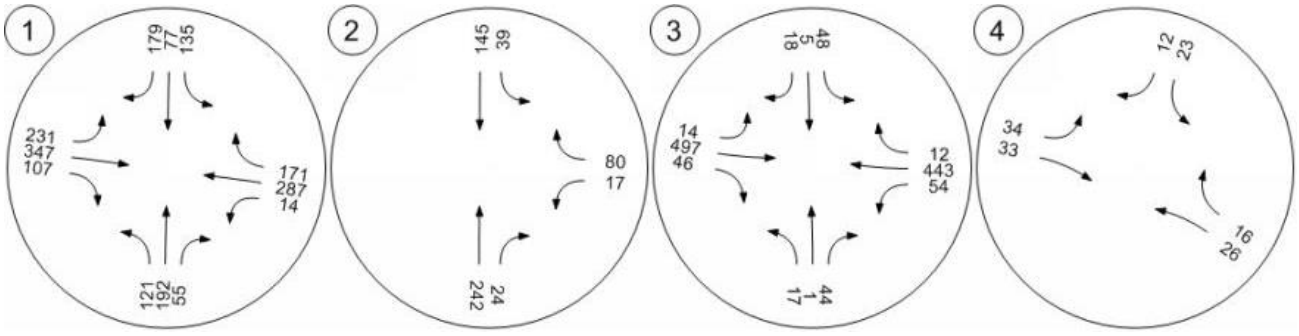
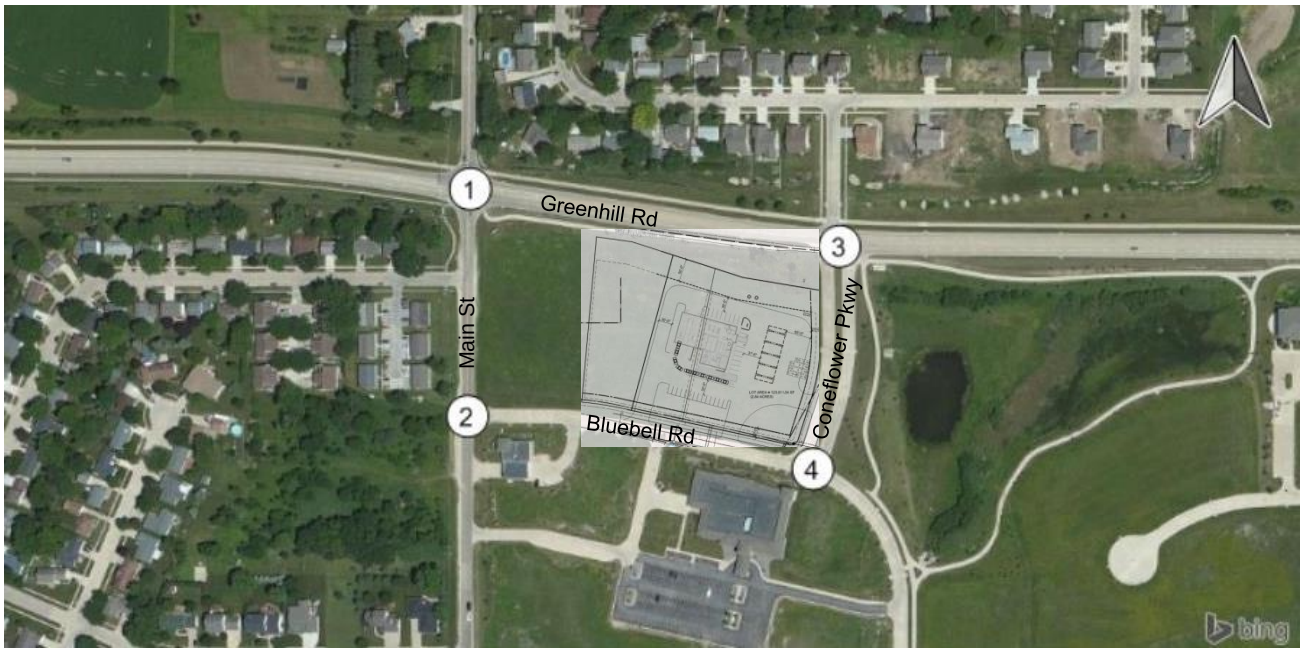
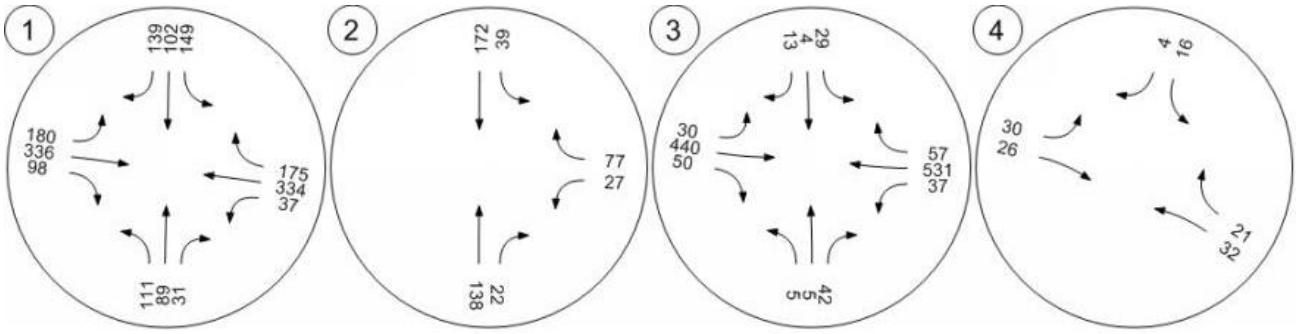


Figure 7 Study Intersections – PM Peak Hour Buildout Volumes



2018 PM Peak Hour



2038 PM Peak Hour

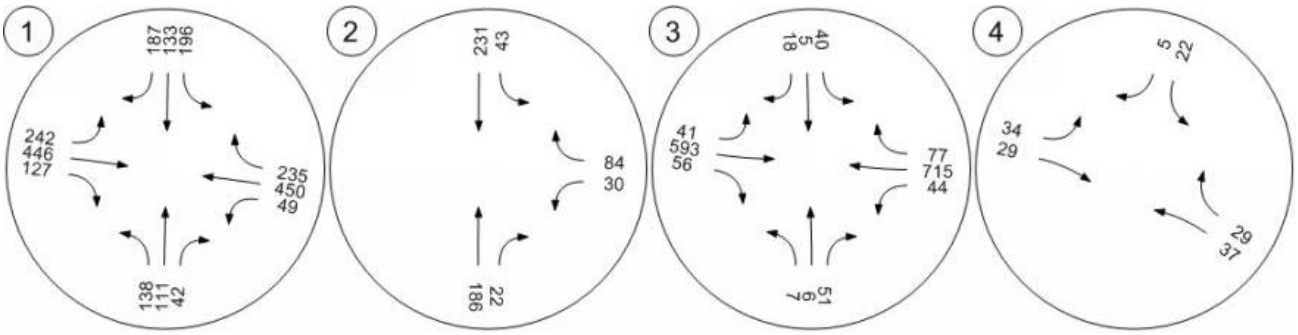
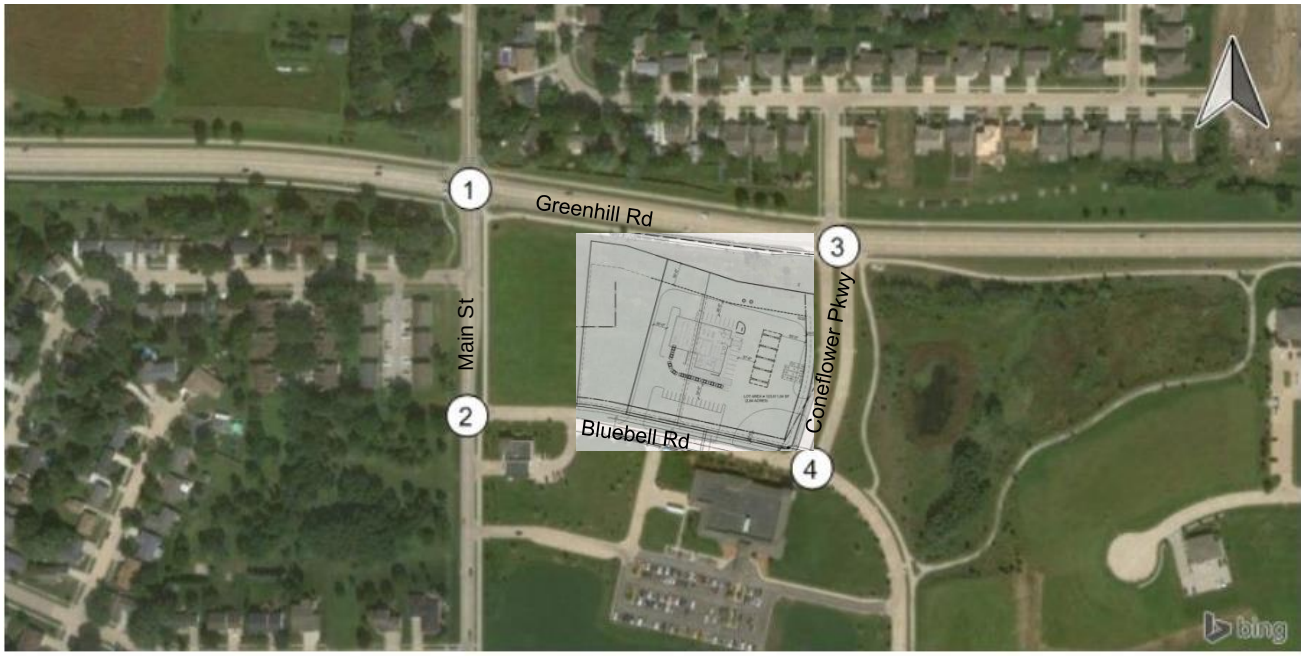
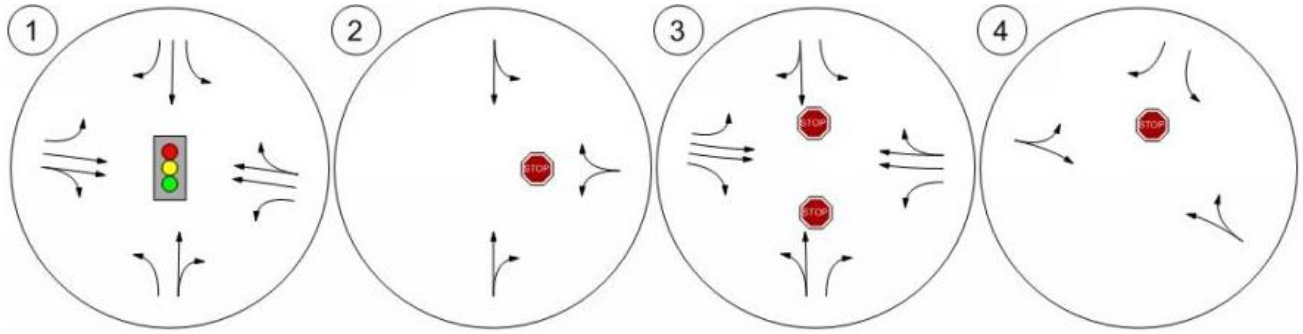


Figure 8 Study Intersections – Recommended Lane Configuration and Control By 2038





Traffic Modeling

Operational Analysis

Vehicular operational analysis for this study was performed using the methodology of the 2010 Highway Capacity Manual through Synchro 8 traffic analysis software. Operational analysis is generally categorized in terms of Level of Service (LOS). LOS describes the quality of traffic operations and is graded from A to F; with LOS A representing free-flow conditions and LOS F representing congested conditions.

Procedures outlined in Chapter 18 of the HCM 2010 were used to analyze intersection performance at signalized intersections. The primary measure used to quantify LOS at signalized intersections is control delay. Control delay is the delay experienced by vehicles slowing down as they are approaching the intersection, the wait time at the intersection and the time for vehicles to speed up through the intersection and enter into the traffic stream. The average intersection control delay is a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches.

Procedures outlined in Chapter 19 of the HCM 2010 were used to analyze intersection performance at unsignalized intersections. While LOS for signalized intersections is primarily based on the volume weighted average delay per vehicle traveling through the intersection (intersection control delay), LOS for unsignalized intersections is based primarily on the approach with the longest delay.

Table 6 presents the range of traffic delays associated for signalized and unsignalized intersections.

Table 6 LOS Criteria for Signalized and Unsignalized Intersections

LOS	Signalized Intersection Average Delay (sec/veh)	Unsignalized Intersection Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 to 20	> 10 to 15
C	> 20 to 35	> 15 to 25
D	> 35 to 55	> 25 to 35
E	> 55 to 80	> 35 to 50
F	> 80	> 50

Source: HCM 2010, Exhibit 18-4 LOS Criteria for Signalized Intersections and HCM 2010, Exhibit 19-1 LOS Criteria for Unsignalized Intersections.
sec/veh = seconds per vehicle

LOS D or better is generally identified as acceptable in urban conditions. The analysis presented herein indicates the study intersections will operate at an acceptable LOS D or better during the AM and PM peak hour conditions through 2038 with buildout of the proposed development, except for the intersection of Greenhill Road and Coneflower Parkway. This analysis assumes existing lane configuration and control for existing 2017 and projected 2018 conditions as identified in Figure 3 and recommended lane configuration and control for projected 2038 conditions as identified in Figure 8. Assuming intersection improvements will not be constructed by 2018 provides a conservative analysis.

Direction was provided by the City of Cedar Falls City Engineer to implement improvements as identified in Figure 8. However, the LOS at the intersection of Greenhill Road and Coneflower Parkway is still projected to fall below the acceptable LOS D in the PM peak hour with and without the proposed development by 2038. This analysis indicates additional improvements at this intersection will be necessary in order to maintain an acceptable LOS during the peak hours by 2038 regardless if the Kwik Star Convenience Store is built or not. Provided the City of Cedar Falls is willing to accept that the southbound approach to this intersection may fall below the acceptable LOS of D by the design year of 2038 during PM peak hour

conditions; no other changes/improvements to the study intersections lane configuration and control from what is depicted in Figure 8 are considered necessary. It should be noted, this analysis assumes the annual background growth rate at this intersection will grow at 1.5% per year through the design year of 2038, which is a conservative assumption. It should also be noted, based on the traffic volumes used for the analysis herein, the Manual on Uniform Traffic Control Devices traffic control signal Warrant 2 (Four-Hour Vehicular Volume) will not be met by 2038 with buildout of the development (analysis worksheet is included in Appendix 2). In addition, motorists will generally choose routes that minimize their travel time/distance. Therefore, as the intersection of Greenhill Road and Coneflower Parkway becomes congested, motorists may choose alternate routes that experience less delay. For example, motorists may choose to transit the signalized intersection Greenhill Road and Prairie Parkway to the east (southbound approach is currently under construction) over the Greenhill Road and Coneflower Parkway intersection, which would likely result in a better LOS than what is reported in Table 8.

Table 7 and Table 8 presents signalized and unsignalized AM and PM peak hour operational conditions for existing 2017, as well as projected 2018 and 2038 conditions under no build and buildout conditions, respectively. The signalized operations assume optimized cycle lengths and phasing splits as identified through Synchro 8. Operational analysis worksheets are contained in Appendix 3.

Table 7 Existing & Projected Signalized Intersection Operations

Intersection		Scenario	Metric	AM Peak Hour				PM Peak Hour			
				EB	WB	NB	SB	EB	WB	NB	SB
1	Greenhill Rd & Main St	2017 Existing Conditions	Approach Delay	14.6	12.7	14.8	20.1	14.8	14.3	13.8	19.9
			Approach LOS	B	B	B	C	B	B	B	B
			95th %tile Queue	L	TR	TR	LTR	L	TR	TR	LTR
			(Longest Movement) in Feet	130	146	91	127	220	198	64	177
			Intersection Delay & LOS	15.2, B				15.6, B			
		2018 No Build	Approach Delay	14.8	12.7	15.0	20.9	15.2	14.5	13.8	20.1
			Approach LOS	B	B	B	C	B	B	B	C
			95th %tile Queue	L	TR	TR	LTR	T	TR	TR	LTR
			(Longest Movement) in Feet	147	148	101	128	320	215	67	194
			Intersection Delay & LOS	15.5, B				15.9, B			
		2018 Buildout	Approach Delay	14.5	13.2	11.8	17.3	14.3	14.1	13.7	20.6
			Approach LOS	B	B	B	B	B	B	B	B
			95th %tile Queue [2]	L	TR	TR	LTR	T	TR	L	LTR
			(Longest Movement) in Feet	152	138	89	135	485	222	91	210
			Intersection Delay & LOS	14.2, B				15.6, B			
		2038 No Build [1]	Approach Delay	17.2	13.8	18.7	24.2	18.2	13.6	24.0	38.8
			Approach LOS	B	B	B	C	B	B	C	D
			95th %tile Queue [2]	T	TR	TR	TR	T	TR	TR	TR
			(Longest Movement) in Feet	398	105	135	119	449	155	100	199
			Intersection Delay & LOS	17.9, B				21.7, C			
		2038 Buildout [1]	Approach Delay	18.5	26.1	18.9	17.3	20.7	36.2	18.3	19.8
			Approach LOS	B	C	B	B	C	D	B	B
			95th %tile Queue [2]	TR	TR	TR	L	TR	TR	L	T
			(Longest Movement) in Feet	161	126	171	93	198	185	127	98
			Intersection Delay & LOS	20.2, C				25.0, C			

Queue, Delay, and LOS analysis based on HCM 2010 Signalized Methodology

[1] Arrival rates are assumed to be more consistent by 2038.

Table 8 Existing & Projected Unsignalized Intersection Operations

Intersection		Scenario	AM Peak Hour			PM Peak Hour		
			Worst Approach Movement Delay (sec)		HCM LOS	Worst Approach Movement Delay (sec)		HCM LOS
2	Bluebell Rd & Main St	2017 Existing Conditions	WB	9.7	A	WB	9.8	A
		2018 No Build	WB	9.8	A	WB	9.8	A
		2018 Buildout	WB	11.0	B	WB	10.5	B
		2038 No Build [1]	WB	9.8	A	WB	10.3	B
		2038 Buildout [1]	WB	10.8	B	WB	11.0	B
3	Greenhill Rd & Coneflower Pkwy	2017 Existing Conditions	SB	17.9	C	SB	21.6	C
		2018 No Build	SB	18.3	C	SB	21.9	C
		2018 Buildout	SB	21.1	C	SB	25.6	D
		2038 No Build [1]	SB	19.1	C	SB	36.0	E
		2038 Buildout [1]	SB	21.2	C	SB	43.8	E
4	Bluebell Rd & Coneflower Pkwy	2017 Existing Conditions	SB	8.7	A	SB	8.8	A
		2018 No Build	SB	8.7	A	SB	8.8	A
		2018 Buildout	SB	9.1	A	SB	9.3	A
		2038 No Build [1]	SB	8.7	A	SB	8.8	A
		2038 Buildout [1]	SB	9.1	A	SB	9.3	A

Delay and LOS analysis based on HCM 2010 Two-way Stop Control Methodology
[1] Arrival rates are assumed to be more consistent by 2038.

Conclusion and Recommendations

The proposed development is a Kwik Star Convenience Store with gasoline pumps and a car wash. The development will be located on the northwest corner of Bluebell Road and Coneflower Parkway. Three access points to the development are being proposed, with two on Bluebell Road and one intersecting the southbound lanes of Coneflower Parkway, which will be a right-in/right-out only access. The development is expected to be completely built by the end of 2018. Sight visibility zones corresponding to intersection sight distance calculations as defined through AASHTO should be identified and maintained at this access points. These zones should not contain structures or plantings that would preclude unobstructed views of oncoming traffic. Current designs for the development do not indicate obstructions within the sight visibility zones.

The Safety Analysis, Visualization, and Exploration Resource (SAVER) website administered by Iowa DOT was used to collect available crash data near the project site for the five-year period between January 1, 2012 and December 31, 2016. All of the study intersections had crash rates that were lower than the statewide average for intersections with a similar daily volume of entering vehicles.

LOS D or better is generally identified as acceptable in urban conditions. The analysis presented herein indicates the study intersections will operate at an acceptable LOS D or better during the AM and PM peak hour conditions through 2038 with buildout of the proposed development, except for the intersection of Greenhill Road and Coneflower Parkway. This analysis assumes existing lane configuration and control for existing 2017 and projected 2018 conditions as identified in Figure 3 and recommended lane configuration and control for projected 2038 conditions as identified in Figure 8. Assuming intersection improvements will not be constructed by 2018 provides a conservative analysis.

Direction was provided by the City of Cedar Falls City Engineer to implement improvements as identified in Figure 8. However, the LOS at the intersection of Greenhill Road and Coneflower Parkway is still projected to fall below the acceptable LOS D in the PM peak hour with and without the proposed development by 2038. This analysis indicates additional improvements at this intersection will be necessary in order to maintain an acceptable LOS during the peak hours by 2038 regardless if the Kwik Star Convenience Store is built or not. Provided the City of Cedar Falls is willing to accept that the southbound approach to this intersection may fall below the acceptable LOS of D by the design year of 2038 during PM peak hour conditions; no other changes/improvements to the study intersections lane configuration and control from what is depicted in Figure 8 are considered necessary. It should be noted, this analysis assumes the annual background growth rate at this intersection will grow at 1.5% per year through the design year of 2038, which is a conservative assumption. It should also be noted, based on the traffic volumes used for the analysis herein, the Manual on Uniform Traffic Control Devices traffic control signal Warrant 2 (Four-Hour Vehicular Volume) will not be met by 2038 with buildout of the development (analysis worksheet is included in Appendix 2). In addition, motorists will generally choose routes that minimize their travel time/distance. Therefore, as the intersection of Greenhill Road and Coneflower Parkway becomes congested, motorists may choose alternate routes that experience less delay. For example, motorists may choose to transit the signalized intersection Greenhill Road and Prairie Parkway to the east (southbound approach is currently under construction) over the Greenhill Road and Coneflower Parkway intersection, which would likely result in a better LOS than what is reported in Table 8.

Appendix 1

Background Traffic Counts (Raw Data)

(1) Main Street and Greenhill Road - All Vehicles

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Greenhill Road			From South (Northbound) Main Street			From West (Eastbound) Greenhill Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	15	3	17	2	40	20	13	11	12	11	38	13	195	1212
7:15 - 7:30	10	5	29	2	56	35	18	18	7	25	48	9	262	1311
7:30 - 7:45	27	11	34	3	58	36	19	28	10	29	52	15	322	1332
7:45 - 8:00	27	13	30	4	75	35	23	52	11	68	75	20	433	1298
8:00 - 8:15	19	12	35	2	43	24	9	29	12	39	48	22	294	1203
8:15 - 8:30	18	12	32	1	45	30	8	16	7	33	67	14	283	
8:30 - 8:45	23	12	47	4	59	24	8	10	5	38	45	13	288	
8:45 - 9:00	26	12	54	6	54	29	18	17	7	36	61	18	338	

4:00 - 4:15	41	22	40	13	81	47	23	19	15	45	71	19	436	1618
4:15 - 4:30	39	26	30	9	77	35	20	17	6	47	76	15	397	1605
4:30 - 4:45	33	18	35	14	96	42	18	14	9	35	78	25	417	1637
4:45 - 5:00	27	23	29	9	65	36	10	21	12	50	63	23	368	1569
5:00 - 5:15	37	22	35	7	84	42	27	10	8	49	91	11	423	1201
5:15 - 5:30	36	24	38	6	93	52	14	17	2	43	79	25	429	
5:30 - 5:45	34	15	36	9	83	34	10	10	10	39	58	11	349	
5:45 - 6:00	23	13	28	3	44	40	9	17	8	42	56	13	296	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.77
PM Intersection Peak Hour Factor (PHF) = 0.95

(1) Main Street and Greenhill Road - Articulated Trucks

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Greenhill Road			From South (Northbound) Main Street			From West (Eastbound) Greenhill Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	3
7:45 - 8:00	0	0	0	0	1	0	0	0	0	0	0	0	1	5
8:00 - 8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	6
8:15 - 8:30	0	0	0	0	2	0	0	0	0	0	0	0	2	
8:30 - 8:45	0	0	0	0	2	0	0	0	0	0	0	0	2	
8:45 - 9:00	0	0	0	0	0	0	1	0	0	1	0	0	2	

4:00 - 4:15	0	0	0	0	1	0	0	0	0	0	0	0	1	1
4:15 - 4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:30 - 4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 - 5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 - 5:15	0	0	1	0	0	0	0	0	0	0	0	0	1	1
5:15 - 5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 - 5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

Background Traffic Counts (Raw Data)

(2) Main Street and Bluebell Road - All Vehicles

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Bluebell Road			From South (Northbound) Main Street			From West (Eastbound) NA			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	1	16		1		3		28	0				49	295
7:15 - 7:30	3	13		0		0		41	0				57	320
7:30 - 7:45	4	21		1		5		47	4				82	316
7:45 - 8:00	4	32		0		3		68	0				107	286
8:00 - 8:15	1	33		0		4		36	0				74	253
8:15 - 8:30	4	20		0		2		26	1				53	
8:30 - 8:45	3	26		0		1		21	1				52	
8:45 - 9:00	5	29		0		3		36	1				74	
4:00 - 4:15	3	44		2		2		49	2				102	351
4:15 - 4:30	4	39		1		3		32	0				79	335
4:30 - 4:45	3	46		3		3		35	1				91	335
4:45 - 5:00	4	40		0		2		33	0				79	301
5:00 - 5:15	2	38		4		1		41	0				86	283
5:15 - 5:30	3	45		0		4		27	0				79	
5:30 - 5:45	3	26		2		3		23	0				57	
5:45 - 6:00	1	23		1		2		32	2				61	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.75
PM Intersection Peak Hour Factor (PHF) = 0.92

(2) Main Street and Bluebell Road - Articulated Trucks

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Bluebell Road			From South (Northbound) Main Street			From West (Eastbound) NA			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0	0		0		0		0	0				0	0
7:15 - 7:30	0	0		0		0		0	0				0	0
7:30 - 7:45	0	0		0		0		0	0				0	0
7:45 - 8:00	0	0		0		0		0	0				0	0
8:00 - 8:15	0	0		0		0		0	0				0	0
8:15 - 8:30	0	0		0		0		0	0				0	
8:30 - 8:45	0	0		0		0		0	0				0	
8:45 - 9:00	0	0		0		0		0	0				0	
4:00 - 4:15	0	0		0		0		0	0				0	0
4:15 - 4:30	0	0		0		0		0	0				0	0
4:30 - 4:45	0	0		0		0		0	0				0	0
4:45 - 5:00	0	0		0		0		0	0				0	0
5:00 - 5:15	0	0		0		0		0	0				0	0
5:15 - 5:30	0	0		0		0		0	0				0	
5:30 - 5:45	0	0		0		0		0	0				0	
5:45 - 6:00	0	0		0		0		0	0				0	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

Background Traffic Counts (Raw Data)

(3) Estate Drive/Cornflower Parkway and Greenhill Road - All Vehicles

15-min Interval	From North (Southbound) Estate Drive			From East (Westbound) Greenhill Road			From South (Northbound) Cornflower Parkway			From West (Eastbound) Greenhill Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	8	0	2	6	58	2	0	0	0	1	65	0	142	791
7:15 - 7:30	12	1	2	3	91	2	0	0	2	1	66	0	180	820
7:30 - 7:45	14	0	5	3	95	4	0	0	2	1	86	0	210	817
7:45 - 8:00	10	0	3	7	106	3	0	0	1	4	124	1	259	777
8:00 - 8:15	9	1	2	6	64	1	3	0	5	4	76	0	171	716
8:15 - 8:30	2	2	3	3	70	1	2	0	3	1	88	2	177	
8:30 - 8:45	5	0	4	1	80	3	1	0	1	1	73	1	170	
8:45 - 9:00	6	0	5	4	80	2	3	0	4	2	90	2	198	
4:00 - 4:15	4	0	5	1	130	10	1	0	6	8	121	0	286	1098
4:15 - 4:30	4	0	4	6	115	12	2	0	3	9	106	0	261	1105
4:30 - 4:45	8	1	6	4	144	13	2	1	5	7	109	5	305	1147
4:45 - 5:00	5	1	2	4	112	15	1	0	1	4	101	0	246	1083
5:00 - 5:15	8	0	0	1	130	11	1	1	6	9	126	0	293	1026
5:15 - 5:30	8	1	5	1	146	17	1	2	4	10	106	2	303	
5:30 - 5:45	3	0	6	0	117	10	1	0	1	2	101	0	241	
5:45 - 6:00	3	1	3	2	81	5	3	0	4	2	84	1	189	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.79
PM Intersection Peak Hour Factor (PHF) = 0.95

(3) Estate Drive/Cornflower Parkway and Greenhill Road - Articulated Trucks

15-min Interval	From North (Southbound) Estate Drive			From East (Westbound) Greenhill Road			From South (Northbound) Cornflower Parkway			From West (Eastbound) Greenhill Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	2
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	3
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	4
7:45 - 8:00	0	0	0	0	1	0	0	0	0	1	0	0	2	5
8:00 - 8:15	0	0	0	0	1	0	0	0	0	0	0	0	1	3
8:15 - 8:30	0	0	0	0	1	0	0	0	0	0	0	0	1	
8:30 - 8:45	0	0	1	0	0	0	0	0	0	0	0	0	1	
8:45 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:00 - 4:15	0	0	1	0	0	0	0	0	0	0	0	0	1	1
4:15 - 4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 - 4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 - 5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 - 5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 - 5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 - 5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

Background Traffic Counts (Raw Data)

(4) Cornflower Parkway and Bluebell Road - All Vehicles

15-min Interval	From North (Southbound) Cornflower Parkway			From East (Westbound) Bluebell Road			From South (Northbound) NA			From West (Eastbound) Bluebell Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	4		2		2	0				0	4		12	46
7:15 - 7:30	2		1		1	1				1	1		7	54
7:30 - 7:45	0		4		3	0				1	6		14	64
7:45 - 8:00	5		2		3	0				0	3		13	55
8:00 - 8:15	6		2		2	7				2	1		20	62
8:15 - 8:30	6		1		1	5				0	4		17	
8:30 - 8:45	1		0		1	2				0	1		5	
8:45 - 9:00	4		1		3	6				0	6		20	
4:00 - 4:15	1		0		5	4				4	3		17	69
4:15 - 4:30	5		0		3	4				0	4		16	69
4:30 - 4:45	8		1		5	7				1	2		24	67
4:45 - 5:00	3		2		2	2				0	3		12	52
5:00 - 5:15	1		1		4	7				1	3		17	55
5:15 - 5:30	4		0		3	5				1	1		14	
5:30 - 5:45	0		0		5	3				0	1		9	
5:45 - 6:00	3		0		3	5				1	3		15	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.80
PM Intersection Peak Hour Factor (PHF) = 0.72

(4) Cornflower Parkway and Bluebell Road - Articulated Trucks

15-min Interval	From North (Southbound) Cornflower Parkway			From East (Westbound) Bluebell Road			From South (Northbound) NA			From West (Eastbound) Bluebell Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0		0		0	0				0	0		0	0
7:15 - 7:30	0		0		0	0				0	0		0	0
7:30 - 7:45	0		0		0	0				0	0		0	0
7:45 - 8:00	0		0		0	0				0	0		0	0
8:00 - 8:15	0		0		0	0				0	0		0	0
8:15 - 8:30	0		0		0	0				0	0		0	
8:30 - 8:45	0		0		0	0				0	0		0	
8:45 - 9:00	0		0		0	0				0	0		0	
4:00 - 4:15	0		0		0	0				0	0		0	0
4:15 - 4:30	0		0		0	0				0	0		0	0
4:30 - 4:45	0		0		0	0				0	0		0	0
4:45 - 5:00	0		0		0	0				0	0		0	0
5:00 - 5:15	0		0		0	0				0	0		0	0
5:15 - 5:30	0		0		0	0				0	0		0	
5:30 - 5:45	0		0		0	0				0	0		0	
5:45 - 6:00	0		0		0	0				0	0		0	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

Peak Hour Turning Movement Volumes

(1) Main Street and Greenhill Road - All Vehicles

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Greenhill Road			From South (Northbound) Main Street			From West (Eastbound) Greenhill Road			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:30 - 7:45	27	11	34	3	58	36	19	28	10	29	52	15	322
7:45 - 8:00	27	13	30	4	75	35	23	52	11	68	75	20	433
8:00 - 8:15	19	12	35	2	43	24	9	29	12	39	48	22	294
8:15 - 8:30	18	12	32	1	45	30	8	16	7	33	67	14	283
2017 Volumes	**91**	**48**	**131**	**10**	**221**	**125**	**59**	**125**	**40**	**169**	**242**	**71**	**1332**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**92**	**49**	**133**	**10**	**224**	**127**	**60**	**127**	**41**	**172**	**246**	**72**	**1353**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**124**	**66**	**179**	**14**	**302**	**171**	**81**	**171**	**55**	**231**	**331**	**97**	**1822**
Percent Heavy Vehicle	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.77

4:30 - 4:45	33	18	35	14	96	42	18	14	9	35	78	25	417
4:45 - 5:00	27	23	29	9	65	36	10	21	12	50	63	23	368
5:00 - 5:15	37	22	35	7	84	42	27	10	8	49	91	11	423
5:15 - 5:30	36	24	38	6	93	52	14	17	2	43	79	25	429
2017 Volumes	**133**	**87**	**137**	**36**	**338**	**172**	**69**	**62**	**31**	**177**	**311**	**84**	**1637**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**135**	**88**	**139**	**37**	**343**	**175**	**70**	**63**	**31**	**180**	**316**	**85**	**1662**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**182**	**119**	**187**	**49**	**462**	**235**	**94**	**85**	**42**	**242**	**425**	**115**	**2237**
Percent Heavy Vehicle	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.95

(2) Main Street and Bluebell Road - All Vehicles

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Bluebell Road			From South (Northbound) Main Street			From West (Eastbound) NA			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:30 - 7:45	4	21		1		5		47	4				82
7:45 - 8:00	4	32		0		3		68	0				107
8:00 - 8:15	1	33		0		4		36	0				74
8:15 - 8:30	4	20		0		2		26	1				53
2017 Volumes	**13**	**106**	**0**	**1**	**0**	**14**	**0**	**177**	**5**	**0**	**0**	**0**	**316**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**13**	**108**	**0**	**1**	**0**	**14**	**0**	**180**	**5**	**0**	**0**	**0**	**321**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**18**	**145**	**0**	**1**	**0**	**19**	**0**	**242**	**7**	**0**	**0**	**0**	**432**
Percent Heavy Vehicle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.74

4:30 - 4:45	3	46		3		3		35	1				91
4:45 - 5:00	4	40		0		2		33	0				79
5:00 - 5:15	2	38		4		1		41	0				86
5:15 - 5:30	3	45		0		4		27	0				79
2017 Volumes	**12**	**169**	**0**	**7**	**0**	**10**	**0**	**136**	**1**	**0**	**0**	**0**	**335**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**12**	**172**	**0**	**7**	**0**	**10**	**0**	**138**	**1**	**0**	**0**	**0**	**340**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**16**	**231**	**0**	**10**	**0**	**14**	**0**	**186**	**1**	**0**	**0**	**0**	**458**
Percent Heavy Vehicle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.92

Peak Hour Turning Movement Volumes

(3) Estate Drive/Cornflower Parkway and Greenhill Road - All Vehicles

15-min Interval	From North (Southbound) Estate Drive			From East (Westbound) Greenhill Road			From South (Northbound) Cornflower Parkway			From West (Eastbound) Greenhill Road			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:30 - 7:45	14	0	5	3	95	4	0	0	2	1	86	0	210
7:45 - 8:00	10	0	3	7	106	3	0	0	1	4	124	1	259
8:00 - 8:15	9	1	2	6	64	1	3	0	5	4	76	0	171
8:15 - 8:30	2	2	3	3	70	1	2	0	3	1	88	2	177
2017 Volumes	**35**	**3**	**13**	**19**	**335**	**9**	**5**	**0**	**11**	**10**	**374**	**3**	**817**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**36**	**3**	**13**	**19**	**340**	**9**	**5**	**0**	**11**	**10**	**380**	**3**	**829**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**48**	**4**	**18**	**26**	**458**	**12**	**7**	**0**	**15**	**14**	**511**	**4**	**1117**
Percent Heavy Vehicle	0%	0%	0%	0%	1%	0%	0%	0%	0%	10%	0%	0%	-
												PHF =	0.79
4:30 - 4:45	8	1	6	4	144	13	2	1	5	7	109	5	305
4:45 - 5:00	5	1	2	4	112	15	1	0	1	4	101	0	246
5:00 - 5:15	8	0	0	1	130	11	1	1	6	9	126	0	293
5:15 - 5:30	8	1	5	1	146	17	1	2	4	10	106	2	303
2017 Volumes	**29**	**3**	**13**	**10**	**532**	**56**	**5**	**4**	**16**	**30**	**442**	**7**	**1147**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**29**	**3**	**13**	**10**	**540**	**57**	**5**	**4**	**16**	**30**	**449**	**7**	**1163**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**40**	**4**	**18**	**14**	**727**	**77**	**7**	**5**	**22**	**41**	**604**	**10**	**1569**
Percent Heavy Vehicle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.95

(4) Cornflower Parkway and Bluebell Road - All Vehicles

15-min Interval	From North (Southbound) Cornflower Parkway			From East (Westbound) Bluebell Road			From South (Northbound) NA			From West (Eastbound) Bluebell Road			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:30 - 7:45	0		4		3	0				1	6		14
7:45 - 8:00	5		2		3	0				0	3		13
8:00 - 8:15	6		2		2	7				2	1		20
8:15 - 8:30	6		1		1	5				0	4		17
2017 Volumes	**17**	**0**	**9**	**0**	**9**	**12**	**0**	**0**	**0**	**3**	**14**	**0**	**64**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**17**	**0**	**9**	**0**	**9**	**12**	**0**	**0**	**0**	**3**	**14**	**0**	**64**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**23**	**0**	**12**	**0**	**12**	**16**	**0**	**0**	**0**	**4**	**19**	**0**	**86**
Percent Heavy Vehicle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.80
4:30 - 4:45	8		1		5	7				1	2		24
4:45 - 5:00	3		2		2	2				0	3		12
5:00 - 5:15	1		1		4	7				1	3		17
5:15 - 5:30	4		0		3	5				1	1		14
2017 Volumes	**16**	**0**	**4**	**0**	**14**	**21**	**0**	**0**	**0**	**3**	**9**	**0**	**67**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**16**	**0**	**4**	**0**	**14**	**21**	**0**	**0**	**0**	**3**	**9**	**0**	**67**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**22**	**0**	**5**	**0**	**19**	**29**	**0**	**0**	**0**	**4**	**12**	**0**	**91**
Percent Heavy Vehicle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.70

Appendix 2

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

201 Third Ave. SE Suite 500, PO Box 1803
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Telephone (319) 364-0227
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TRAFFIC SIGNAL WARRANTS – 2038 Future With Project

PROJECT NUMBER: 2171910 DATE: September 6, 2017
PROJECT NAME: Kwik Star Convenience Store – Cedar Falls
PREPARED BY: Shive-Hattery

Major Street: Greenhill Road — Critical Approach Speed: **45** mph
Minor Street: Estate Drive/Coneflower Parkway — Critical Approach Speed: **25** mph

Critical speed of major street traffic > 40mph ☐ RURAL (R)
In built up area of isolated community of < 10,000 population ☐ RURAL (R)
☒ URBAN (U)

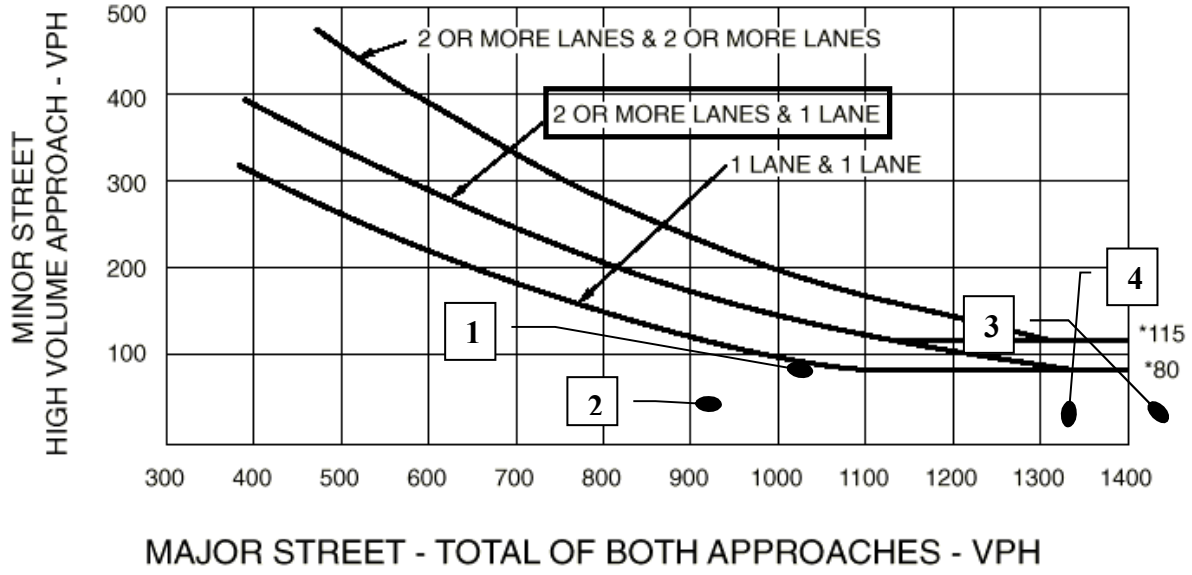
WARRANT 2 – Four Hour Vehicular Volume

SATISFIED* YES ☐ NO ☒

	APPROACH LANES		4-Hours			
APPROACH LANES	ONE	2 or MORE	7-8 AM	8-9 AM	4-5 PM	5-6 PM
Both Approaches – Major Street		X	**1011**	**911**	**1434**	**1336**
Highest Approach – Minor Street	X		**79**	**44**	**56**	**39**

*Refer to Figure-1 to determine if this warrant is satisfied.

FIGURE 1 - FOUR HOUR VEHICULAR VOLUME



*Note: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor street approach with one lane.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right-of-way assignment must be shown.

1

Appendix 3

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Kwik Star - Cedar Falls
2017 Existing AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	169	242	71	10	221	125	59	125	40	91	48	131
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1888	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	219	314	92	13	287	162	77	162	52	118	62	170
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	377	1254	361	501	514	290	475	499	160	219	130	253
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.36	0.36	0.36	0.36	0.36	0.36
Sat Flow, veh/h	956	2767	797	995	1135	640	1167	1379	443	380	359	699
Grp Volume(v), veh/h	219	203	203	13	0	449	77	0	214	350	0	0
Grp Sat Flow(s),veh/h/ln	956	1805	1759	995	0	1775	1167	0	1822	1438	0	0
Q Serve(g_s), s	12.9	4.1	4.2	0.5	0.0	11.0	0.0	0.0	5.0	7.4	0.0	0.0
Cycle Q Clear(g_c), s	23.9	4.1	4.2	4.7	0.0	11.0	3.8	0.0	5.0	12.5	0.0	0.0
Prop In Lane	1.00		0.45	1.00		0.36	1.00		0.24	0.34		0.49
Lane Grp Cap(c), veh/h	377	818	797	501	0	804	475	0	659	601	0	0
V/C Ratio(X)	0.58	0.25	0.25	0.03	0.00	0.56	0.16	0.00	0.32	0.58	0.00	0.00
Avail Cap(c_a), veh/h	387	835	814	511	0	821	475	0	659	601	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.7	10.0	10.0	11.5	0.0	11.9	13.3	0.0	13.7	16.0	0.0	0.0
Incr Delay (d2), s/veh	2.1	0.2	0.2	0.0	0.0	0.8	0.7	0.0	1.3	4.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	2.1	2.1	0.1	0.0	5.5	1.0	0.0	2.7	5.5	0.0	0.0
LnGrp Delay(d),s/veh	22.7	10.2	10.2	11.5	0.0	12.7	14.1	0.0	15.0	20.1	0.0	0.0
LnGrp LOS	C	B	B	B		B	B		B	C		
Approach Vol, veh/h		625			462			291			350	
Approach Delay, s/veh		14.6			12.7			14.8			20.1	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		27.0		32.4		27.0		32.4
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		21.5		27.5		21.5		27.5
Max Q Clear Time (g_c+I1), s		7.0		25.9		14.5		13.0
Green Ext Time (p_c), s		3.5		1.0		2.3		5.9

Intersection Summary	
HCM 2010 Ctrl Delay	15.2
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	14	177	5	13	106
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	19	239	7	18	143

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	421	243	0	0	246	0
Stage 1	243	-	-	-	-	-
Stage 2	178	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	593	801	-	-	1332	-
Stage 1	802	-	-	-	-	-
Stage 2	858	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	584	801	-	-	1332	-
Mov Cap-2 Maneuver	584	-	-	-	-	-
Stage 1	802	-	-	-	-	-
Stage 2	845	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	0.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	782	1332	-
HCM Lane V/C Ratio	-	-	0.026	0.013	-
HCM Control Delay (s)	-	-	9.7	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	374	3	19	335	9	5	0	11	35	3	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	10	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	13	473	4	24	424	11	6	0	14	44	4	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	435	0	0	477	0	0	763	985	239	740	981	218
Stage 1	-	-	-	-	-	-	501	501	-	478	478	-
Stage 2	-	-	-	-	-	-	262	484	-	262	503	-
Critical Hdwy	4.3	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.3	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1066	-	-	1096	-	-	297	250	768	309	251	792
Stage 1	-	-	-	-	-	-	526	546	-	543	559	-
Stage 2	-	-	-	-	-	-	726	555	-	726	545	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1066	-	-	1096	-	-	277	239	768	293	240	792
Mov Cap-2 Maneuver	-	-	-	-	-	-	277	239	-	293	240	-
Stage 1	-	-	-	-	-	-	517	537	-	534	543	-
Stage 2	-	-	-	-	-	-	685	539	-	701	536	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.5	12.5	17.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	277	768	1066	-	-	1096	-	-	344
HCM Lane V/C Ratio	0.023	0.018	0.012	-	-	0.022	-	-	0.188
HCM Control Delay (s)	18.3	9.8	8.4	0.1	-	8.4	0.1	-	17.9
HCM Lane LOS	C	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0.1	-	-	0.7

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	3	14	9	12	17	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	4	18	11	15	21	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	26	0	-	0	44	19
Stage 1	-	-	-	-	19	-
Stage 2	-	-	-	-	25	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1601	-	-	-	972	1065
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	1003	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1601	-	-	-	969	1065
Mov Cap-2 Maneuver	-	-	-	-	969	-
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	1000	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1601	-	-	-	969	1065
HCM Lane V/C Ratio	0.002	-	-	-	0.022	0.011
HCM Control Delay (s)	7.3	0	-	-	8.8	8.4
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	155	83	84	43	177	75	103	151
Average Queue (ft)	75	45	35	7	87	31	52	72
95th Queue (ft)	130	77	66	27	146	64	91	127
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	0						0	
Queuing Penalty (veh)	0						0	

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Kwik Star - Cedar Falls
2017 Existing PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	177	311	84	36	338	172	69	62	31	133	87	137
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1893	1900
Adj Flow Rate, veh/h	186	327	88	38	356	181	73	65	33	140	92	144
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	320	1294	343	501	545	277	485	426	216	259	170	215
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.36	0.36	0.36	0.36	0.36	0.36
Sat Flow, veh/h	882	2824	749	987	1189	604	1162	1190	604	493	475	601
Grp Volume(v), veh/h	186	207	208	38	0	537	73	0	98	376	0	0
Grp Sat Flow(s),veh/h/ln	882	1805	1768	987	0	1793	1162	0	1793	1569	0	0
Q Serve(g_s), s	12.4	4.2	4.3	1.5	0.0	13.9	0.0	0.0	2.2	8.9	0.0	0.0
Cycle Q Clear(g_c), s	26.3	4.2	4.3	5.8	0.0	13.9	3.4	0.0	2.2	11.9	0.0	0.0
Prop In Lane	1.00		0.42	1.00		0.34	1.00		0.34	0.37		0.38
Lane Grp Cap(c), veh/h	320	827	810	501	0	822	485	0	643	645	0	0
V/C Ratio(X)	0.58	0.25	0.26	0.08	0.00	0.65	0.15	0.00	0.15	0.58	0.00	0.00
Avail Cap(c_a), veh/h	320	827	810	501	0	822	485	0	643	645	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	22.7	9.9	10.0	11.8	0.0	12.6	13.4	0.0	13.1	16.0	0.0	0.0
Incr Delay (d2), s/veh	2.6	0.2	0.2	0.1	0.0	1.9	0.7	0.0	0.5	3.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	2.1	2.1	0.4	0.0	7.1	0.9	0.0	1.2	5.9	0.0	0.0
LnGrp Delay(d),s/veh	25.4	10.1	10.1	11.8	0.0	14.4	14.1	0.0	13.6	19.9	0.0	0.0
LnGrp LOS	C	B	B	B		B	B		B	B		
Approach Vol, veh/h		601			575			171			376	
Approach Delay, s/veh		14.8			14.3			13.8			19.9	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		27.0		33.0		27.0		33.0
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		21.5		27.5		21.5		27.5
Max Q Clear Time (g_c+I1), s		5.4		28.3		13.9		15.9
Green Ext Time (p_c), s		3.0		0.0		2.0		5.7

Intersection Summary	
HCM 2010 Ctrl Delay	15.6
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	7	10	136	1	12	169
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	8	11	148	1	13	184

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	358	148	0	0	149	0
Stage 1	148	-	-	-	-	-
Stage 2	210	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	644	904	-	-	1445	-
Stage 1	884	-	-	-	-	-
Stage 2	830	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	638	904	-	-	1445	-
Mov Cap-2 Maneuver	638	-	-	-	-	-
Stage 1	884	-	-	-	-	-
Stage 2	822	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	0.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	772	1445	-
HCM Lane V/C Ratio	-	-	0.024	0.009	-
HCM Control Delay (s)	-	-	9.8	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	442	7	10	532	56	5	4	16	29	3	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	32	465	7	11	560	59	5	4	17	31	3	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	619	0	0	473	0	0	835	1172	236	909	1147	309
Stage 1	-	-	-	-	-	-	532	532	-	611	611	-
Stage 2	-	-	-	-	-	-	303	640	-	298	536	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	971	-	-	1099	-	-	264	194	772	233	201	693
Stage 1	-	-	-	-	-	-	504	529	-	453	487	-
Stage 2	-	-	-	-	-	-	687	473	-	692	527	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	971	-	-	1099	-	-	244	182	772	214	189	693
Mov Cap-2 Maneuver	-	-	-	-	-	-	244	182	-	214	189	-
Stage 1	-	-	-	-	-	-	481	505	-	433	480	-
Stage 2	-	-	-	-	-	-	659	466	-	641	503	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.2	14.5	21.6
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	212	772	971	-	-	1099	-	-	264
HCM Lane V/C Ratio	0.045	0.022	0.033	-	-	0.01	-	-	0.179
HCM Control Delay (s)	22.8	9.8	8.8	0.2	-	8.3	0.1	-	21.6
HCM Lane LOS	C	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	0.1	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	3	9	14	21	16	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	4	13	20	30	23	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	50	0	-	0	56	35
Stage 1	-	-	-	-	35	-
Stage 2	-	-	-	-	21	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1570	-	-	-	957	1044
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	1007	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1570	-	-	-	954	1044
Mov Cap-2 Maneuver	-	-	-	-	954	-
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	1004	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1570	-	-	-	954	1044
HCM Lane V/C Ratio	0.003	-	-	-	0.024	0.005
HCM Control Delay (s)	7.3	0	-	-	8.9	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	225	340	293	73	220	82	68	204
Average Queue (ft)	128	78	62	20	124	33	33	105
95th Queue (ft)	220	237	199	50	198	64	61	177
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	9							
Queuing Penalty (veh)	13							

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Kwik Star - Cedar Falls
2018 AM Peak Hour No Build

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	172	246	72	10	224	127	60	127	41	92	49	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1888	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	223	319	94	13	291	165	78	165	53	119	64	173
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	375	1259	365	500	516	293	464	496	159	215	129	249
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.36	0.36	0.36	0.36	0.36	0.36
Sat Flow, veh/h	950	2763	801	988	1132	642	1161	1379	443	374	358	692
Grp Volume(v), veh/h	223	207	206	13	0	456	78	0	218	356	0	0
Grp Sat Flow(s),veh/h/ln	950	1805	1759	988	0	1775	1161	0	1822	1423	0	0
Q Serve(g_s), s	13.4	4.2	4.3	0.5	0.0	11.2	0.0	0.0	5.2	8.0	0.0	0.0
Cycle Q Clear(g_c), s	24.7	4.2	4.3	4.8	0.0	11.2	4.0	0.0	5.2	13.1	0.0	0.0
Prop In Lane	1.00		0.46	1.00		0.36	1.00		0.24	0.33		0.49
Lane Grp Cap(c), veh/h	375	823	801	500	0	809	464	0	656	593	0	0
V/C Ratio(X)	0.60	0.25	0.26	0.03	0.00	0.56	0.17	0.00	0.33	0.60	0.00	0.00
Avail Cap(c_a), veh/h	379	831	810	504	0	817	464	0	656	593	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.9	10.0	10.0	11.5	0.0	11.9	13.5	0.0	13.9	16.4	0.0	0.0
Incr Delay (d2), s/veh	2.5	0.2	0.2	0.0	0.0	0.9	0.8	0.0	1.4	4.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	2.1	2.1	0.1	0.0	5.6	1.0	0.0	2.9	5.8	0.0	0.0
LnGrp Delay(d),s/veh	23.4	10.1	10.2	11.5	0.0	12.8	14.3	0.0	15.2	20.9	0.0	0.0
LnGrp LOS	C	B	B	B		B	B		B	C		
Approach Vol, veh/h		636			469			296			356	
Approach Delay, s/veh		14.8			12.7			15.0			20.9	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		27.0		32.7		27.0		32.7
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		21.5		27.5		21.5		27.5
Max Q Clear Time (g_c+I1), s		7.2		26.7		15.1		13.2
Green Ext Time (p_c), s		3.5		0.6		2.2		5.9

Intersection Summary	
HCM 2010 Ctrl Delay	15.5
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	14	180	5	13	108
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	19	243	7	18	146

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	428	247	0	0	250	0
Stage 1	247	-	-	-	-	-
Stage 2	181	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	588	797	-	-	1327	-
Stage 1	799	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	579	797	-	-	1327	-
Mov Cap-2 Maneuver	579	-	-	-	-	-
Stage 1	799	-	-	-	-	-
Stage 2	842	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	0.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	777	1327	-
HCM Lane V/C Ratio	-	-	0.026	0.013	-
HCM Control Delay (s)	-	-	9.8	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	380	3	19	340	9	5	0	11	36	3	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	10	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	13	481	4	24	430	11	6	0	14	46	4	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	442	0	0	485	0	0	773	998	242	750	994	221
Stage 1	-	-	-	-	-	-	508	508	-	484	484	-
Stage 2	-	-	-	-	-	-	265	490	-	266	510	-
Critical Hdwy	4.3	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.3	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1060	-	-	1088	-	-	292	246	765	304	247	789
Stage 1	-	-	-	-	-	-	521	542	-	538	555	-
Stage 2	-	-	-	-	-	-	723	552	-	722	541	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1060	-	-	1088	-	-	273	235	765	288	236	789
Mov Cap-2 Maneuver	-	-	-	-	-	-	273	235	-	288	236	-
Stage 1	-	-	-	-	-	-	512	533	-	529	539	-
Stage 2	-	-	-	-	-	-	683	536	-	697	532	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.5	12.5	18.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	273	765	1060	-	-	1088	-	-	337
HCM Lane V/C Ratio	0.023	0.018	0.012	-	-	0.022	-	-	0.195
HCM Control Delay (s)	18.5	9.8	8.4	0.1	-	8.4	0.1	-	18.3
HCM Lane LOS	C	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0.1	-	-	0.7

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	3	14	9	12	17	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	4	18	11	15	21	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	26	0	-	0	44	19
Stage 1	-	-	-	-	19	-
Stage 2	-	-	-	-	25	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1601	-	-	-	972	1065
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	1003	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1601	-	-	-	969	1065
Mov Cap-2 Maneuver	-	-	-	-	969	-
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	1000	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1601	-	-	-	969	1065
HCM Lane V/C Ratio	0.002	-	-	-	0.022	0.011
HCM Control Delay (s)	7.3	0	-	-	8.8	8.4
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	172	90	82	34	175	63	124	152
Average Queue (ft)	81	44	35	6	88	24	52	75
95th Queue (ft)	147	83	67	24	148	52	101	128
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	0						0	
Queuing Penalty (veh)	0						0	

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Kwik Star - Cedar Falls
2018 AM Peak Hour Buildout

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	172	262	82	10	213	127	96	148	41	103	60	133
Future Volume (veh/h)	172	262	82	10	213	127	96	148	41	103	60	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1888	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	223	340	106	13	277	165	125	192	53	134	78	173
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	339	1058	325	448	432	257	518	526	145	244	144	229
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.37	0.37	0.37	0.37	0.37	0.37
Sat Flow, veh/h	962	2722	836	959	1110	661	1147	1434	396	371	394	624
Grp Volume(v), veh/h	223	224	222	13	0	442	125	0	245	385	0	0
Grp Sat Flow(s),veh/h/ln	962	1805	1753	959	0	1771	1147	0	1830	1390	0	0
Q Serve(g_s), s	8.4	3.9	4.0	0.4	0.0	9.1	0.0	0.0	4.4	6.9	0.0	0.0
Cycle Q Clear(g_c), s	17.5	3.9	4.0	4.4	0.0	9.1	4.6	0.0	4.4	11.3	0.0	0.0
Prop In Lane	1.00		0.48	1.00		0.37	1.00		0.22	0.35		0.45
Lane Grp Cap(c), veh/h	339	702	682	448	0	689	518	0	671	617	0	0
V/C Ratio(X)	0.66	0.32	0.33	0.03	0.00	0.64	0.24	0.00	0.37	0.62	0.00	0.00
Avail Cap(c_a), veh/h	339	702	682	448	0	689	518	0	671	617	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.2	9.6	9.6	11.2	0.0	11.2	10.5	0.0	10.4	12.6	0.0	0.0
Incr Delay (d2), s/veh	4.6	0.3	0.3	0.0	0.0	2.0	1.1	0.0	1.5	4.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	2.0	2.0	0.1	0.0	4.8	1.3	0.0	2.5	5.0	0.0	0.0
LnGrp Delay(d),s/veh	23.8	9.9	9.9	11.2	0.0	13.2	11.6	0.0	12.0	17.3	0.0	0.0
LnGrp LOS	C	A	A	B		B	B		B	B		
Approach Vol, veh/h		669			455			370			385	
Approach Delay, s/veh		14.5			13.2			11.8			17.3	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		22.0		23.0		22.0		23.0
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		16.5		17.5		16.5		17.5
Max Q Clear Time (g_c+I1), s		6.6		19.5		13.3		11.1
Green Ext Time (p_c), s		1.4		0.0		0.8		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	14.2
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	2.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	71	180	22	34	108
Future Vol, veh/h	17	71	180	22	34	108
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	23	96	243	30	46	146

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	496	258	0	0	273	0
Stage 1	258	-	-	-	-	-
Stage 2	238	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	537	786	-	-	1302	-
Stage 1	790	-	-	-	-	-
Stage 2	806	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	517	786	-	-	1302	-
Mov Cap-2 Maneuver	517	-	-	-	-	-
Stage 1	760	-	-	-	-	-
Stage 2	806	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	1.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	714	1302	-
HCM Lane V/C Ratio	-	-	0.167	0.035	-
HCM Control Delay (s)	-	-	11	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.1	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	369	44	44	329	9	5	1	36	36	4	13
Future Vol, veh/h	10	369	44	44	329	9	5	1	36	36	4	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	10	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	13	467	56	56	416	11	6	1	46	46	5	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	427	0	0	523	0	0	844	1060	262	794	1083	214
Stage 1	-	-	-	-	-	-	521	521	-	534	534	-
Stage 2	-	-	-	-	-	-	323	539	-	260	549	-
Critical Hdwy	4.3	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.3	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1074	-	-	1054	-	-	260	226	743	282	219	797
Stage 1	-	-	-	-	-	-	512	535	-	503	528	-
Stage 2	-	-	-	-	-	-	669	525	-	728	520	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1074	-	-	1054	-	-	233	207	743	246	200	797
Mov Cap-2 Maneuver	-	-	-	-	-	-	233	207	-	246	200	-
Stage 1	-	-	-	-	-	-	503	526	-	494	491	-
Stage 2	-	-	-	-	-	-	603	488	-	670	511	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.2	11.8	21.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	228	743	1074	-	-	1054	-	-	290
HCM Lane V/C Ratio	0.033	0.061	0.012	-	-	0.053	-	-	0.231
HCM Control Delay (s)	21.3	10.2	8.4	0.1	-	8.6	0.2	-	21.1
HCM Lane LOS	C	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.2	0	-	-	0.2	-	-	0.9

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	29	28	23	12	17	9
Future Vol, veh/h	29	28	23	12	17	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	36	35	29	15	21	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	44	0	-	0	144	37
Stage 1	-	-	-	-	37	-
Stage 2	-	-	-	-	107	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1577	-	-	-	853	1041
Stage 1	-	-	-	-	991	-
Stage 2	-	-	-	-	922	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1577	-	-	-	833	1041
Mov Cap-2 Maneuver	-	-	-	-	833	-
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	922	-

Approach	EB	WB	SB
HCM Control Delay, s	3.7	0	9.1
HCM LOS			A

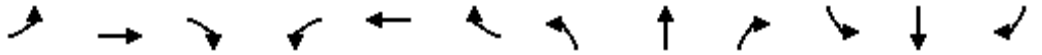
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1577	-	-	-	833	1041
HCM Lane V/C Ratio	0.023	-	-	-	0.026	0.011
HCM Control Delay (s)	7.3	0	-	-	9.4	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	180	111	89	38	177	98	111	169
Average Queue (ft)	81	44	37	7	80	39	50	79
95th Queue (ft)	152	89	71	28	138	75	89	135
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	1	0				0	0	
Queuing Penalty (veh)	1	0				0	0	

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Kwik Star - Cedar Falls
2018 PM Peak Hour No Build



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	180	316	85	37	343	175	70	63	31	135	88	139
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1893	1900
Adj Flow Rate, veh/h	189	333	89	39	361	184	74	66	33	142	93	146
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	314	1296	342	497	544	277	482	429	214	260	169	215
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.36	0.36	0.36	0.36	0.36	0.36
Sat Flow, veh/h	875	2828	745	980	1188	605	1159	1196	598	495	472	601
Grp Volume(v), veh/h	189	211	211	39	0	545	74	0	99	381	0	0
Grp Sat Flow(s),veh/h/ln	875	1805	1768	980	0	1793	1159	0	1794	1567	0	0
Q Serve(g_s), s	12.9	4.3	4.4	1.5	0.0	14.2	0.0	0.0	2.2	9.2	0.0	0.0
Cycle Q Clear(g_c), s	27.1	4.3	4.4	5.9	0.0	14.2	3.5	0.0	2.2	12.1	0.0	0.0
Prop In Lane	1.00		0.42	1.00		0.34	1.00		0.33	0.37		0.38
Lane Grp Cap(c), veh/h	314	827	811	497	0	822	482	0	643	644	0	0
V/C Ratio(X)	0.60	0.25	0.26	0.08	0.00	0.66	0.15	0.00	0.15	0.59	0.00	0.00
Avail Cap(c_a), veh/h	314	827	811	497	0	822	482	0	643	644	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	23.2	10.0	10.0	11.8	0.0	12.6	13.5	0.0	13.1	16.1	0.0	0.0
Incr Delay (d2), s/veh	3.2	0.2	0.2	0.1	0.0	2.0	0.7	0.0	0.5	4.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	2.1	2.2	0.4	0.0	7.4	0.9	0.0	1.2	6.0	0.0	0.0
LnGrp Delay(d),s/veh	26.4	10.1	10.2	11.9	0.0	14.7	14.1	0.0	13.6	20.1	0.0	0.0
LnGrp LOS	C	B	B	B		B	B		B	C		
Approach Vol, veh/h		611			584			173			381	
Approach Delay, s/veh		15.2			14.5			13.8			20.1	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		27.0		33.0		27.0		33.0
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		21.5		27.5		21.5		27.5
Max Q Clear Time (g_c+I1), s		5.5		29.1		14.1		16.2
Green Ext Time (p_c), s		3.1		0.0		2.0		5.7

Intersection Summary	
HCM 2010 Ctrl Delay	15.9
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	7	10	138	1	12	172
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	8	11	150	1	13	187

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	364	151	0	0	151	0
Stage 1	151	-	-	-	-	-
Stage 2	213	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	639	901	-	-	1442	-
Stage 1	882	-	-	-	-	-
Stage 2	827	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	633	901	-	-	1442	-
Mov Cap-2 Maneuver	633	-	-	-	-	-
Stage 1	882	-	-	-	-	-
Stage 2	819	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	0.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	767	1442	-
HCM Lane V/C Ratio	-	-	0.024	0.009	-
HCM Control Delay (s)	-	-	9.8	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	449	7	10	540	57	5	4	16	29	3	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	32	473	7	11	568	60	5	4	17	31	3	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	628	0	0	480	0	0	846	1188	240	921	1162	314
Stage 1	-	-	-	-	-	-	539	539	-	619	619	-
Stage 2	-	-	-	-	-	-	307	649	-	302	543	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	964	-	-	1093	-	-	259	190	767	229	197	688
Stage 1	-	-	-	-	-	-	499	525	-	448	483	-
Stage 2	-	-	-	-	-	-	683	469	-	688	523	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	964	-	-	1093	-	-	239	179	767	210	185	688
Mov Cap-2 Maneuver	-	-	-	-	-	-	239	179	-	210	185	-
Stage 1	-	-	-	-	-	-	477	501	-	428	475	-
Stage 2	-	-	-	-	-	-	654	461	-	637	499	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.2	14.6	21.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	208	767	964	-	-	1093	-	-	260
HCM Lane V/C Ratio	0.046	0.022	0.033	-	-	0.01	-	-	0.182
HCM Control Delay (s)	23.1	9.8	8.9	0.2	-	8.3	0.1	-	21.9
HCM Lane LOS	C	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	0.1	-	-	0	-	-	0.7

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	3	9	14	21	16	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	4	13	20	30	23	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	50	0	-	0	56	35
Stage 1	-	-	-	-	35	-
Stage 2	-	-	-	-	21	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1570	-	-	-	957	1044
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	1007	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1570	-	-	-	954	1044
Mov Cap-2 Maneuver	-	-	-	-	954	-
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	1004	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1570	-	-	-	954	1044
HCM Lane V/C Ratio	0.003	-	-	-	0.024	0.005
HCM Control Delay (s)	7.3	0	-	-	8.9	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	229	372	314	65	258	77	85	231
Average Queue (ft)	136	107	89	21	131	32	34	116
95th Queue (ft)	230	320	277	50	215	64	67	194
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	15							
Queuing Penalty (veh)	24							

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Kwik Star - Cedar Falls
2018 PM Peak Hour Buildout

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	336	98	37	334	175	111	89	31	149	102	139
Future Volume (veh/h)	180	336	98	37	334	175	111	89	31	149	102	139
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1893	1900
Adj Flow Rate, veh/h	189	354	103	39	352	184	117	94	33	157	107	146
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	315	1234	354	475	524	274	475	477	167	268	171	193
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	882	2770	795	949	1176	615	1144	1345	472	502	483	545
Grp Volume(v), veh/h	189	229	228	39	0	536	117	0	127	410	0	0
Grp Sat Flow(s),veh/h/ln	882	1805	1760	949	0	1791	1144	0	1817	1529	0	0
Q Serve(g_s), s	11.5	4.4	4.5	1.5	0.0	13.0	0.0	0.0	2.7	10.3	0.0	0.0
Cycle Q Clear(g_c), s	24.5	4.4	4.5	6.0	0.0	13.0	5.4	0.0	2.7	12.9	0.0	0.0
Prop In Lane	1.00		0.45	1.00		0.34	1.00		0.26	0.38		0.36
Lane Grp Cap(c), veh/h	315	804	784	475	0	798	475	0	644	633	0	0
V/C Ratio(X)	0.60	0.28	0.29	0.08	0.00	0.67	0.25	0.00	0.20	0.65	0.00	0.00
Avail Cap(c_a), veh/h	315	804	784	475	0	798	475	0	644	633	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.9	9.7	9.7	11.6	0.0	12.1	13.2	0.0	12.3	15.6	0.0	0.0
Incr Delay (d2), s/veh	3.1	0.2	0.2	0.1	0.0	2.2	1.2	0.0	0.7	5.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	2.2	2.2	0.4	0.0	6.9	1.5	0.0	1.5	6.4	0.0	0.0
LnGrp Delay(d),s/veh	25.0	9.9	9.9	11.7	0.0	14.3	14.4	0.0	13.0	20.6	0.0	0.0
LnGrp LOS	C	A	A	B		B	B		B	C		
Approach Vol, veh/h		646			575			244			410	
Approach Delay, s/veh		14.3			14.1			13.7			20.6	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		25.0		30.0		25.0		30.0
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		19.5		24.5		19.5		24.5
Max Q Clear Time (g_c+I1), s		7.4		26.5		14.9		15.0
Green Ext Time (p_c), s		0.9		0.0		1.1		2.6

Intersection Summary	
HCM 2010 Ctrl Delay	15.6
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	2.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	27	77	138	22	39	172
Future Vol, veh/h	27	77	138	22	39	172
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	29	84	150	24	42	187

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	433	162	0	0	174	0
Stage 1	162	-	-	-	-	-
Stage 2	271	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	584	888	-	-	1415	-
Stage 1	872	-	-	-	-	-
Stage 2	779	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	565	888	-	-	1415	-
Mov Cap-2 Maneuver	565	-	-	-	-	-
Stage 1	843	-	-	-	-	-
Stage 2	779	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	1.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	773	1415	-
HCM Lane V/C Ratio	-	-	0.146	0.03	-
HCM Control Delay (s)	-	-	10.5	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	440	50	37	531	57	5	5	42	29	4	13
Future Vol, veh/h	30	440	50	37	531	57	5	5	42	29	4	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	32	463	53	39	559	60	5	5	44	31	4	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	619	0	0	516	0	0	914	1251	258	965	1247	310
Stage 1	-	-	-	-	-	-	554	554	-	667	667	-
Stage 2	-	-	-	-	-	-	360	697	-	298	580	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	971	-	-	1060	-	-	231	174	747	212	175	692
Stage 1	-	-	-	-	-	-	489	517	-	419	460	-
Stage 2	-	-	-	-	-	-	636	446	-	692	503	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	971	-	-	1060	-	-	205	156	747	179	157	692
Mov Cap-2 Maneuver	-	-	-	-	-	-	205	156	-	179	157	-
Stage 1	-	-	-	-	-	-	466	493	-	399	434	-
Stage 2	-	-	-	-	-	-	582	421	-	614	479	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.7	13.3	25.6
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	177	747	971	-	-	1060	-	-	223
HCM Lane V/C Ratio	0.059	0.059	0.033	-	-	0.037	-	-	0.217
HCM Control Delay (s)	26.6	10.1	8.8	0.2	-	8.5	0.2	-	25.6
HCM Lane LOS	D	B	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.2	0.2	0.1	-	-	0.1	-	-	0.8

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	26	32	21	16	4
Future Vol, veh/h	20	26	32	21	16	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	29	37	46	30	23	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	76	0	-	0	156	61
Stage 1	-	-	-	-	61	-
Stage 2	-	-	-	-	95	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1536	-	-	-	840	1010
Stage 1	-	-	-	-	967	-
Stage 2	-	-	-	-	934	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1536	-	-	-	824	1010
Mov Cap-2 Maneuver	-	-	-	-	824	-
Stage 1	-	-	-	-	949	-
Stage 2	-	-	-	-	934	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	9.3
HCM LOS			A

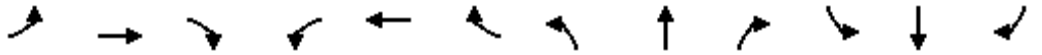
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1536	-	-	-	824	1010
HCM Lane V/C Ratio	0.019	-	-	-	0.028	0.006
HCM Control Delay (s)	7.4	0	-	-	9.5	8.6
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	229	386	344	57	269	110	107	247
Average Queue (ft)	144	159	146	19	126	49	42	128
95th Queue (ft)	255	485	446	46	222	91	84	210
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	24	0				0	0	
Queuing Penalty (veh)	40	0				0	0	

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Kwik Star - Cedar Falls
2038 AM Peak Hour No Build



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	231	331	97	14	302	171	81	171	55	124	66	179
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1888	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	236	338	99	14	308	174	83	174	56	127	67	183
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	377	1046	302	402	844	466	408	391	126	212	133	363
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.05	0.28	0.28	0.06	0.29	0.29
Sat Flow, veh/h	928	2766	798	967	2233	1232	1810	1378	444	3510	451	1232
Grp Volume(v), veh/h	236	219	218	14	246	236	83	0	230	127	0	250
Grp Sat Flow(s),veh/h/ln	928	1805	1759	967	1794	1671	1810	0	1822	1755	0	1683
Q Serve(g_s), s	14.7	5.1	5.2	0.6	5.9	6.1	1.9	0.0	6.2	2.1	0.0	7.3
Cycle Q Clear(g_c), s	20.8	5.1	5.2	5.9	5.9	6.1	1.9	0.0	6.2	2.1	0.0	7.3
Prop In Lane	1.00		0.45	1.00		0.74	1.00		0.24	1.00		0.73
Lane Grp Cap(c), veh/h	377	683	665	402	678	632	408	0	517	212	0	495
V/C Ratio(X)	0.63	0.32	0.33	0.03	0.36	0.37	0.20	0.00	0.44	0.60	0.00	0.50
Avail Cap(c_a), veh/h	377	683	665	402	678	632	442	0	517	242	0	495
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.9	13.1	13.1	15.2	13.3	13.4	14.2	0.0	17.5	27.2	0.0	17.4
Incr Delay (d2), s/veh	3.2	0.3	0.3	0.0	0.3	0.4	0.2	0.0	2.8	3.2	0.0	3.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	2.5	2.6	0.2	2.9	2.8	0.9	0.0	3.5	1.1	0.0	3.9
LnGrp Delay(d),s/veh	24.2	13.4	13.4	15.2	13.7	13.8	14.5	0.0	20.2	30.4	0.0	21.0
LnGrp LOS	C	B	B	B	B	B	B		C	C		C
Approach Vol, veh/h		673			496			313			377	
Approach Delay, s/veh		17.2			13.8			18.7			24.2	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.1	22.4		28.0	8.5	23.0		28.0
Change Period (Y+Rc), s	5.5	5.5		5.5	5.5	5.5		5.5
Max Green Setting (Gmax), s	4.1	16.9		22.5	4.1	16.9		22.5
Max Q Clear Time (g_c+I1), s	4.1	8.2		22.8	3.9	9.3		8.1
Green Ext Time (p_c), s	0.0	2.0		0.0	0.0	1.8		6.2

Intersection Summary	
HCM 2010 Ctrl Delay	17.9
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	19	242	7	18	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	19	247	7	18	148

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	436	251	0	0	254	0
Stage 1	251	-	-	-	-	-
Stage 2	185	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	581	793	-	-	1323	-
Stage 1	795	-	-	-	-	-
Stage 2	852	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	572	793	-	-	1323	-
Mov Cap-2 Maneuver	572	-	-	-	-	-
Stage 1	795	-	-	-	-	-
Stage 2	839	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	778	1323	-
HCM Lane V/C Ratio	-	-	0.026	0.014	-
HCM Control Delay (s)	-	-	9.8	7.8	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	14	511	4	26	458	12	7	0	15	48	4	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	0	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	10	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	14	521	4	27	467	12	7	0	15	49	4	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	480	0	0	526	0	0	841	1085	263	816	1081	240
Stage 1	-	-	-	-	-	-	552	552	-	527	527	-
Stage 2	-	-	-	-	-	-	289	533	-	289	554	-
Critical Hdwy	4.3	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.3	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1024	-	-	1051	-	-	261	218	742	272	220	767
Stage 1	-	-	-	-	-	-	491	518	-	508	532	-
Stage 2	-	-	-	-	-	-	700	528	-	700	517	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1024	-	-	1051	-	-	244	209	742	258	211	767
Mov Cap-2 Maneuver	-	-	-	-	-	-	244	209	-	258	211	-
Stage 1	-	-	-	-	-	-	484	511	-	501	518	-
Stage 2	-	-	-	-	-	-	660	514	-	676	510	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.4	13.2	19.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	244	742	1024	-	-	1051	-	-	258	519
HCM Lane V/C Ratio	0.029	0.021	0.014	-	-	0.025	-	-	0.19	0.043
HCM Control Delay (s)	20.2	10	8.6	-	-	8.5	-	-	22.2	12.3
HCM Lane LOS	C	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0.1	-	-	0.7	0.1

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	4	19	12	16	23	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	4	19	12	16	23	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	29	0	-	0	48	20
Stage 1	-	-	-	-	20	-
Stage 2	-	-	-	-	28	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1597	-	-	-	967	1064
Stage 1	-	-	-	-	1008	-
Stage 2	-	-	-	-	1000	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1597	-	-	-	964	1064
Mov Cap-2 Maneuver	-	-	-	-	964	-
Stage 1	-	-	-	-	1008	-
Stage 2	-	-	-	-	997	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1597	-	-	-	964	1064
HCM Lane V/C Ratio	0.003	-	-	-	0.024	0.012
HCM Control Delay (s)	7.3	0	-	-	8.8	8.4
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	L	TR
Maximum Queue (ft)	230	426	368	41	113	120	109	163	94	42	149
Average Queue (ft)	163	153	119	10	59	61	36	76	46	13	65
95th Queue (ft)	265	398	324	33	95	105	76	135	80	38	119
Link Distance (ft)		1209	1209	730	730	730		420	986	986	986
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	205						130				
Storage Blk Time (%)	26							1			
Queuing Penalty (veh)	43							1			

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Kwik Star - Cedar Falls
2038 AM Peak Hour Buildout

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	231	347	107	14	287	171	121	192	55	135	77	179
Future Volume (veh/h)	231	347	107	14	287	171	121	192	55	135	77	179
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1888	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	236	354	109	14	293	174	123	196	56	138	79	183
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	384	790	240	316	410	237	537	401	115	446	544	463
Arrive On Green	0.12	0.29	0.29	0.01	0.19	0.19	0.07	0.28	0.28	0.07	0.29	0.29
Sat Flow, veh/h	1810	2730	829	1810	2191	1267	1810	1422	406	1810	1900	1615
Grp Volume(v), veh/h	236	232	231	14	238	229	123	0	252	138	79	183
Grp Sat Flow(s),veh/h/ln	1810	1805	1754	1810	1794	1665	1810	0	1828	1810	1900	1615
Q Serve(g_s), s	6.0	6.3	6.5	0.4	7.5	7.8	2.8	0.0	6.9	3.2	1.9	5.5
Cycle Q Clear(g_c), s	6.0	6.3	6.5	0.4	7.5	7.8	2.8	0.0	6.9	3.2	1.9	5.5
Prop In Lane	1.00		0.47	1.00		0.76	1.00		0.22	1.00		1.00
Lane Grp Cap(c), veh/h	384	522	507	316	336	311	537	0	516	446	544	463
V/C Ratio(X)	0.61	0.44	0.45	0.04	0.71	0.73	0.23	0.00	0.49	0.31	0.15	0.40
Avail Cap(c_a), veh/h	384	569	553	411	476	442	545	0	516	446	544	463
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.3	17.5	17.5	19.4	23.0	23.1	13.6	0.0	18.0	14.0	16.0	17.3
Incr Delay (d2), s/veh	2.9	0.6	0.6	0.1	2.8	3.8	0.2	0.0	3.3	0.4	0.6	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	3.2	3.2	0.2	4.0	3.9	1.4	0.0	4.0	1.6	1.1	2.8
LnGrp Delay(d),s/veh	19.2	18.1	18.2	19.5	25.8	26.8	13.8	0.0	21.3	14.3	16.6	19.8
LnGrp LOS	B	B	B	B	C	C	B		C	B	B	B
Approach Vol, veh/h		699			481			375			400	
Approach Delay, s/veh		18.5			26.1			18.9			17.3	
Approach LOS		B			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	22.5	4.8	22.9	9.7	22.8	11.0	16.8
Change Period (Y+Rc), s	5.5	5.5	4.0	5.5	5.5	5.5	4.0	5.5
Max Green Setting (Gmax), s	4.5	17.0	4.0	19.0	4.5	17.0	7.0	16.0
Max Q Clear Time (g_c+I1), s	5.2	8.9	2.4	8.5	4.8	7.5	8.0	9.8
Green Ext Time (p_c), s	0.0	0.9	0.0	2.0	0.0	0.7	0.0	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	20.2
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	80	242	24	39	145
Future Vol, veh/h	17	80	242	24	39	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	17	82	247	24	40	148

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	487	259	0	0	271	0
Stage 1	259	-	-	-	-	-
Stage 2	228	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	543	785	-	-	1304	-
Stage 1	789	-	-	-	-	-
Stage 2	815	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	525	785	-	-	1304	-
Mov Cap-2 Maneuver	525	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	815	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	1.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	722	1304	-
HCM Lane V/C Ratio	-	-	0.137	0.031	-
HCM Control Delay (s)	-	-	10.8	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	497	46	54	443	12	11	1	44	48	5	18
Future Vol, veh/h	14	497	46	54	443	12	11	1	44	48	5	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	0	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	10	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	14	507	47	55	452	12	11	1	45	49	5	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	464	0	0	554	0	0	874	1109	254	850	1150	232
Stage 1	-	-	-	-	-	-	535	535	-	568	568	-
Stage 2	-	-	-	-	-	-	339	574	-	282	582	-
Critical Hdwy	4.3	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.3	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1039	-	-	1026	-	-	247	211	752	257	200	776
Stage 1	-	-	-	-	-	-	502	527	-	480	510	-
Stage 2	-	-	-	-	-	-	655	506	-	707	502	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1039	-	-	1026	-	-	224	197	752	228	187	776
Mov Cap-2 Maneuver	-	-	-	-	-	-	224	197	-	228	187	-
Stage 1	-	-	-	-	-	-	495	520	-	474	482	-
Stage 2	-	-	-	-	-	-	599	479	-	655	495	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.9	12.7	21.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	221	752	1039	-	-	1026	-	-	228	461
HCM Lane V/C Ratio	0.055	0.06	0.014	-	-	0.054	-	-	0.215	0.051
HCM Control Delay (s)	22.2	10.1	8.5	-	-	8.7	-	-	25.1	13.2
HCM Lane LOS	C	B	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	0.2	0.2	0	-	-	0.2	-	-	0.8	0.2

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	34	33	26	16	23	12
Future Vol, veh/h	34	33	26	16	23	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	35	34	27	16	23	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	43	0	-	0	139	35
Stage 1	-	-	-	-	35	-
Stage 2	-	-	-	-	104	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1579	-	-	-	859	1044
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	925	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1579	-	-	-	839	1044
Mov Cap-2 Maneuver	-	-	-	-	839	-
Stage 1	-	-	-	-	970	-
Stage 2	-	-	-	-	925	-

Approach	EB	WB	SB
HCM Control Delay, s	3.7	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1579	-	-	-	839	1044
HCM Lane V/C Ratio	0.022	-	-	-	0.028	0.012
HCM Control Delay (s)	7.3	0	-	-	9.4	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	174	147	195	34	117	146	154	207	120	72	91
Average Queue (ft)	85	32	98	7	64	75	53	95	50	28	44
95th Queue (ft)	146	101	161	25	102	126	118	171	93	61	75
Link Distance (ft)		1196	1196	734	734	734		397	984	984	984
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	205						130				
Storage Blk Time (%)	0	0					0	3			
Queuing Penalty (veh)	0	0					1	4			

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Kwik Star - Cedar Falls
2038 PM Peak Hour No Build

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	242	425	115	49	462	235	94	85	42	182	119	187
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1888	1900
Adj Flow Rate, veh/h	247	434	117	50	471	240	96	87	43	186	121	191
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	350	1334	357	424	1099	557	286	280	139	257	167	263
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.05	0.23	0.23	0.07	0.25	0.25
Sat Flow, veh/h	750	2819	753	870	2322	1176	1810	1201	594	3510	661	1043
Grp Volume(v), veh/h	247	277	274	50	366	345	96	0	130	186	0	312
Grp Sat Flow(s),veh/h/ln	750	1805	1767	870	1805	1693	1810	0	1795	1755	0	1704
Q Serve(g_s), s	24.4	7.1	7.3	2.9	10.0	10.1	3.0	0.0	4.5	3.9	0.0	12.6
Cycle Q Clear(g_c), s	34.5	7.1	7.3	10.1	10.0	10.1	3.0	0.0	4.5	3.9	0.0	12.6
Prop In Lane	1.00		0.43	1.00		0.69	1.00		0.33	1.00		0.61
Lane Grp Cap(c), veh/h	350	854	836	424	854	801	286	0	419	257	0	429
V/C Ratio(X)	0.71	0.32	0.33	0.12	0.43	0.43	0.34	0.00	0.31	0.72	0.00	0.73
Avail Cap(c_a), veh/h	350	854	836	424	854	801	286	0	419	257	0	429
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.5	12.3	12.3	15.5	13.0	13.1	21.0	0.0	23.8	34.0	0.0	25.7
Incr Delay (d2), s/veh	6.4	0.2	0.2	0.1	0.3	0.4	0.7	0.0	1.9	9.6	0.0	10.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	3.6	3.6	0.7	5.1	4.8	1.5	0.0	2.4	2.2	0.0	7.1
LnGrp Delay(d),s/veh	30.8	12.5	12.5	15.6	13.4	13.4	21.7	0.0	25.7	43.6	0.0	36.0
LnGrp LOS	C	B	B	B	B	B	C		C	D		D
Approach Vol, veh/h		798			761			226			498	
Approach Delay, s/veh		18.2			13.6			24.0			38.8	
Approach LOS		B			B			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.0	23.0		41.0	9.6	24.4		41.0
Change Period (Y+Rc), s	5.5	5.5		5.5	5.5	5.5		5.5
Max Green Setting (Gmax), s	5.5	17.5		35.5	4.1	18.9		35.5
Max Q Clear Time (g_c+I1), s	5.9	6.5		36.5	5.0	14.6		12.1
Green Ext Time (p_c), s	0.0	2.1		0.0	0.0	1.1		11.4

Intersection Summary	
HCM 2010 Ctrl Delay	21.7
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	14	186	1	16	231
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	10	14	190	1	16	236

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	458	190	0	0	191	0
Stage 1	190	-	-	-	-	-
Stage 2	268	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	565	857	-	-	1395	-
Stage 1	847	-	-	-	-	-
Stage 2	782	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	558	857	-	-	1395	-
Mov Cap-2 Maneuver	558	-	-	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	772	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.3	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	701	1395	-
HCM Lane V/C Ratio	-	-	0.035	0.012	-
HCM Control Delay (s)	-	-	10.3	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	41	604	10	14	727	77	7	5	22	40	4	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	0	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	42	616	10	14	742	79	7	5	22	41	4	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	820	0	0	627	0	0	1107	1554	313	1204	1520	410
Stage 1	-	-	-	-	-	-	705	705	-	810	810	-
Stage 2	-	-	-	-	-	-	402	849	-	394	710	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	818	-	-	965	-	-	167	114	689	142	120	596
Stage 1	-	-	-	-	-	-	398	442	-	344	396	-
Stage 2	-	-	-	-	-	-	601	380	-	608	440	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	818	-	-	965	-	-	150	107	689	126	112	596
Mov Cap-2 Maneuver	-	-	-	-	-	-	150	107	-	126	112	-
Stage 1	-	-	-	-	-	-	378	419	-	326	390	-
Stage 2	-	-	-	-	-	-	568	374	-	551	417	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.2	19.5	36
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	128	689	818	-	-	965	-	-	126	334
HCM Lane V/C Ratio	0.096	0.033	0.051	-	-	0.015	-	-	0.324	0.067
HCM Control Delay (s)	36.1	10.4	9.6	-	-	8.8	-	-	46.7	16.6
HCM Lane LOS	E	B	A	-	-	A	-	-	E	C
HCM 95th %tile Q(veh)	0.3	0.1	0.2	-	-	0	-	-	1.3	0.2

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	4	12	19	29	22	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	4	12	19	30	22	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	49	0	-	0	54	34
Stage 1	-	-	-	-	34	-
Stage 2	-	-	-	-	20	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1571	-	-	-	959	1045
Stage 1	-	-	-	-	994	-
Stage 2	-	-	-	-	1008	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1571	-	-	-	956	1045
Mov Cap-2 Maneuver	-	-	-	-	956	-
Stage 1	-	-	-	-	994	-
Stage 2	-	-	-	-	1005	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1571	-	-	-	956	1045
HCM Lane V/C Ratio	0.003	-	-	-	0.023	0.005
HCM Control Delay (s)	7.3	0	-	-	8.9	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	L	TR
Maximum Queue (ft)	230	430	405	82	149	183	98	109	155	137	249
Average Queue (ft)	186	207	162	31	83	95	42	57	88	43	112
95th Queue (ft)	273	449	383	67	126	155	80	100	143	110	199
Link Distance (ft)		1209	1209	730	730	730		420	986	986	986
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	205						130				
Storage Blk Time (%)	38						0	0			
Queuing Penalty (veh)	80						0	0			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	242	446	127	49	450	235	138	111	42	196	133	187
Future Volume (veh/h)	242	446	127	49	450	235	138	111	42	196	133	187
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1881
Adj Flow Rate, veh/h	247	455	130	50	459	240	141	113	43	200	136	191
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	1
Cap, veh/h	343	855	242	323	541	281	458	352	134	483	516	434
Arrive On Green	0.11	0.31	0.31	0.04	0.24	0.24	0.06	0.27	0.27	0.07	0.27	0.27
Sat Flow, veh/h	1810	2778	788	1810	2300	1194	1810	1312	499	1810	1900	1599
Grp Volume(v), veh/h	247	294	291	50	360	339	141	0	156	200	136	191
Grp Sat Flow(s),veh/h/ln	1810	1805	1761	1810	1805	1689	1810	0	1812	1810	1900	1599
Q Serve(g_s), s	6.3	8.6	8.8	1.3	12.2	12.3	3.6	0.0	4.4	4.3	3.6	6.3
Cycle Q Clear(g_c), s	6.3	8.6	8.8	1.3	12.2	12.3	3.6	0.0	4.4	4.3	3.6	6.3
Prop In Lane	1.00		0.45	1.00		0.71	1.00		0.28	1.00		1.00
Lane Grp Cap(c), veh/h	343	556	542	323	425	398	458	0	486	483	516	434
V/C Ratio(X)	0.72	0.53	0.54	0.15	0.85	0.85	0.31	0.00	0.32	0.41	0.26	0.44
Avail Cap(c_a), veh/h	343	556	542	370	451	422	458	0	486	483	516	434
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.6	18.3	18.4	17.6	23.4	23.4	15.6	0.0	18.8	16.8	18.3	19.3
Incr Delay (d2), s/veh	7.2	1.0	1.0	0.2	13.4	15.0	0.4	0.0	1.7	0.6	1.2	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	4.4	4.4	0.7	7.6	7.4	1.8	0.0	2.4	0.9	2.1	3.2
LnGrp Delay(d),s/veh	23.8	19.3	19.4	17.8	36.8	38.4	16.0	0.0	20.5	17.3	19.6	22.5
LnGrp LOS	C	B	B	B	D	D	B		C	B	B	C
Approach Vol, veh/h		832			749			297			527	
Approach Delay, s/veh		20.7			36.2			18.3			19.8	
Approach LOS		C			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.8	22.7	6.4	25.2	9.6	22.9	11.0	20.6
Change Period (Y+Rc), s	5.5	5.5	4.0	5.5	5.5	5.5	4.0	5.5
Max Green Setting (Gmax), s	4.3	17.2	4.0	19.0	4.1	17.4	7.0	16.0
Max Q Clear Time (g_c+I1), s	6.3	6.4	3.3	10.8	5.6	8.3	8.3	14.3
Green Ext Time (p_c), s	0.0	0.5	0.0	2.3	0.0	0.9	0.0	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	25.0
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	84	186	22	43	231
Future Vol, veh/h	30	84	186	22	43	231
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	31	86	190	22	44	236

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	525	201	0	0	212	0
Stage 1	201	-	-	-	-	-
Stage 2	324	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	516	845	-	-	1370	-
Stage 1	838	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	497	845	-	-	1370	-
Mov Cap-2 Maneuver	497	-	-	-	-	-
Stage 1	807	-	-	-	-	-
Stage 2	738	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	1.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	714	1370	-
HCM Lane V/C Ratio	-	-	0.163	0.032	-
HCM Control Delay (s)	-	-	11	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.1	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	41	593	56	44	715	77	7	6	51	40	5	18
Future Vol, veh/h	41	593	56	44	715	77	7	6	51	40	5	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	0	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	42	605	57	45	730	79	7	6	52	41	5	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	809	0	0	662	0	0	1147	1588	303	1250	1606	405
Stage 1	-	-	-	-	-	-	689	689	-	860	860	-
Stage 2	-	-	-	-	-	-	458	899	-	390	746	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	825	-	-	936	-	-	156	109	699	131	106	601
Stage 1	-	-	-	-	-	-	407	450	-	321	376	-
Stage 2	-	-	-	-	-	-	557	360	-	611	424	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	825	-	-	936	-	-	134	98	699	107	96	601
Mov Cap-2 Maneuver	-	-	-	-	-	-	134	98	-	107	96	-
Stage 1	-	-	-	-	-	-	386	427	-	305	358	-
Stage 2	-	-	-	-	-	-	507	343	-	529	402	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.5	16.6	43.8
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	115	699	825	-	-	936	-	-	107	280
HCM Lane V/C Ratio	0.115	0.074	0.051	-	-	0.048	-	-	0.381	0.084
HCM Control Delay (s)	40.3	10.6	9.6	-	-	9	-	-	58	19
HCM Lane LOS	E	B	A	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	0.4	0.2	0.2	-	-	0.2	-	-	1.6	0.3

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	34	29	37	29	22	5
Future Vol, veh/h	34	29	37	29	22	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	35	30	38	30	22	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	68	0	-	0	153	53
Stage 1	-	-	-	-	53	-
Stage 2	-	-	-	-	100	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1546	-	-	-	843	1020
Stage 1	-	-	-	-	975	-
Stage 2	-	-	-	-	929	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1546	-	-	-	824	1020
Mov Cap-2 Maneuver	-	-	-	-	824	-
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	929	-

Approach	EB	WB	SB
HCM Control Delay, s	4	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1546	-	-	-	824	1020
HCM Lane V/C Ratio	0.022	-	-	-	0.027	0.005
HCM Control Delay (s)	7.4	0	-	-	9.5	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	214	198	211	65	165	209	124	143	153	123	94
Average Queue (ft)	106	65	128	23	100	120	54	65	71	51	48
95th Queue (ft)	190	158	198	52	149	185	98	119	127	98	83
Link Distance (ft)		1196	1196	734	734	734		397	984	984	984
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	205						130				
Storage Blk Time (%)	1	0					0	1			
Queuing Penalty (veh)	3	0					0	1			

DEPARTMENT OF COMMUNITY DEVELOPMENT

City of Cedar Falls
220 Clay Street
Cedar Falls, Iowa 50613
Phone: 319-273-8600
Fax: 319-273-8610
www.cedarfalls.com

MEMORANDUM

Planning & Community Services Division

TO: Planning and Zoning Commission

FROM: David Sturch, Planner III

DATE: January 5, 2018

SUBJECT: MU District Site Plan Review – Fareway Grocery Store

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REQUEST: Site plan review and approval for a new Fareway Grocery Store

PETITIONER: Fareway Stores, Inc.

LOCATION: A part of Lot 33 and all of Lot 32 of the Pinnacle Prairie Business Center North.

PROPOSAL

The petitioner is proposing a single story 20,784 square Fareway grocery store near the southeast corner of the property. The property is 3.03 acres with a driveway onto S. Main Street and Bluebell Road. This Fareway store will operate during their normal business hours from 7:00 am to 9:00 pm, Monday through Saturday.

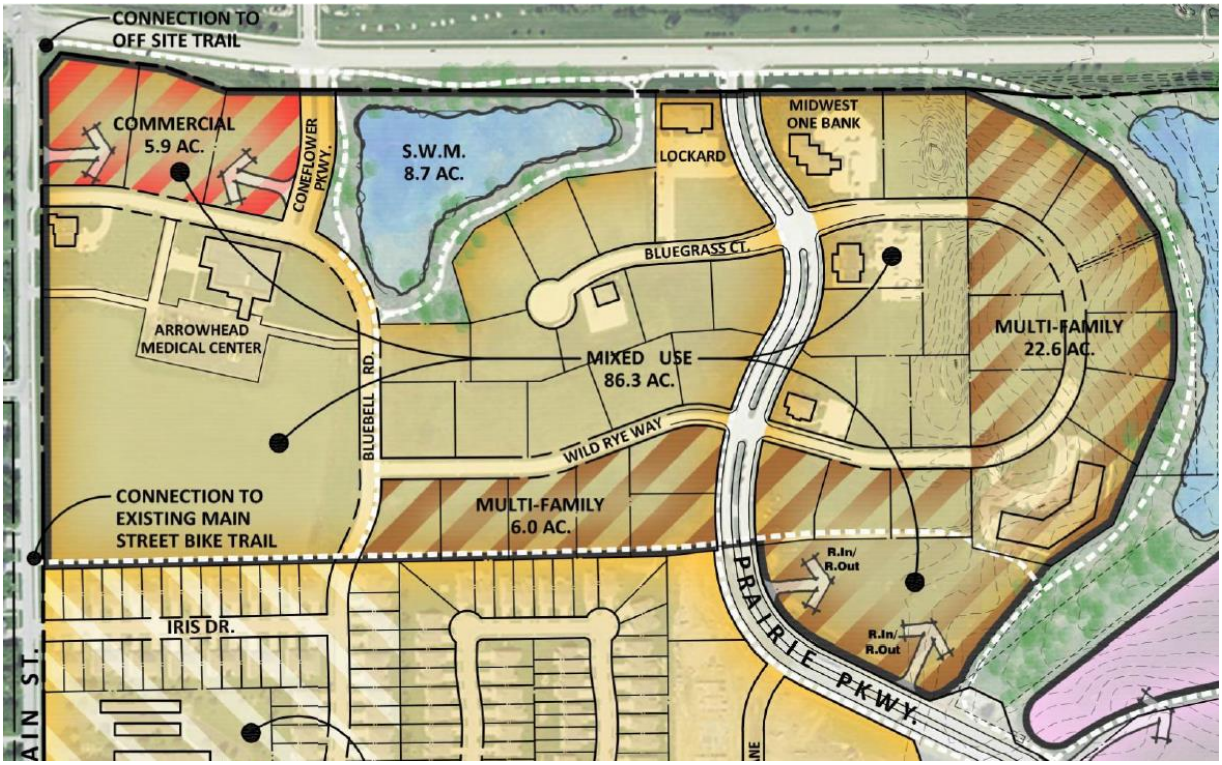
BACKGROUND

The Pinnacle Prairie Master Plan was approved in the summer of 2004 for the Pinnacle Prairie area, when the property was rezoned to MU, Mixed Use Residential District. This property is included in the Pinnacle Prairie Business Center North subdivision. The preliminary plat and final plat was approved by the Planning and Zoning Commission and the City Council in the spring of 2005.

In August 2014, staff met with the developer to discuss changes that have occurred since the rezoning and the importance of updating the Master Plan (see below). The Master Plan was formally adopted by the Planning and Zoning Commission and the City Council in the spring of 2015. Even though a grocery store is a permitted use under the MU zoning district, this plan classified the land uses for the area in the northwest portion of the development for commercial uses while the remaining area of the subdivision is mixed use with office, medical and residential.

The MU District is established for the purpose of accommodating integrated residential and neighborhood commercial uses. Appropriate uses would include: grocery, drug store,

restaurant, retail shops, gasoline station, bookstore, theatre, household appliance store, etc.



Pinnacle Prairie Master Plan

ANALYSIS

This property is located in the MU, Mixed Use Residential, District which is intended to integrate residential and neighborhood commercial land uses for the purpose of creating viable, self-supporting neighborhood districts. A detailed site plan review is required to ensure that the development site satisfies a number of standards. Attention to details such as parking, open green space, landscaping, signage, building design, traffic and other similar factors help to ensure orderly development in the entire area.

Following is a review of the zoning ordinance requirements:

1) Use: This site plan includes a 20,784 square foot single story grocery store. A Master Plan was developed and recently revisited considering the mix of uses, of which this site was identified for neighborhood commercial uses. **Use is allowed and consistent with the Master Plan.**

2) Building Location: The setbacks for this district are as follows:
   - North setback along Greenhill Road is 50-feet (50' utility and landscape easement).
   - West setback along S. Main Street is 30-feet.
   - South setback along Bluebell Road is 20 feet.
   - East setback is 8 feet due to the new utility easement.

   These setbacks must be free and clear of all buildings, parking areas and signage. The proposed building is located on the east half of the lot and the parking lot occupies the

west half of the lot. All driveways, parking areas, buildings and signs are located outside the aforementioned setback areas. **All setbacks satisfied.**

3) Parking: The parking requirement for a grocery store is 4.5 stalls for every 1,000 square feet of gross floor area. The proposed grocery store is 20,784 square feet in area. This yields to 94 parking stalls. The plan has a total of 119 stalls around the building.

   Access to the parking lot was a point of discussion at the Planning and Zoning Commission meeting on December 13, 2017. The proposal is for two driveways that access this site, one from S. Main Street and the other from Bluebell Road. During the last Commission meeting, it was questioned as to the location of the S. Main Street driveway and the distance from Bluebell Road. The driveway onto S. Main Street is approximately 90 feet north of Bluebell Road. The driveway onto Bluebell Road is approximately 160 feet east of S. Main Street. The City has determined that these driveway locations are acceptable for this site.

   According to the Pinnacle Prairie Design Guidelines parking for all commercial uses should be behind the building. The Design Guidelines are part of the Development Agreement; therefore the city should consider the extent to which they are met in a site plan review. The point of having parking in the back of a commercial development is that parking will not be the focal point of the development. The Fareway site plan has their parking in front and on the north side of the building. The Design Guidelines state that if the parking is in front of the building, enhanced landscaping will be required around the parking lot. There is enhanced landscaping with a line of overstory trees and flowering shrubs along the north and west side of the parking lot along Greenhill Road and S. Main Street. This plan also satisfies the perimeter parking lot landscaping requirements. **The parking plan is satisfied.**

4) Open Green Space/Landscaping: The MU District requires that open green space be provided at the rate of 10% of the total development site area excluding the required setbacks. The development site is 3.03 acres or 132,000 square feet. The proposed plan offers 1.16 acres or 50,563 square feet (38%) of open space. When deducting the setbacks for this property, the open space area is 22,032 square feet or 17% of the property. Since this property is adjacent to Greenhill Road, the property is located in the Highway Corridor and Greenbelt Overlay District (HCG). This overlay requires all commercial lots exceeding one acre in area to have a minimum of 25% open space for the entire property. Again, the site plan shows approximately 38% of the total site reserved for open space.

   The required landscape plantings in the HCG is 0.03 points per square foot of lot area and the MU district equals 0.02 points per square foot of lot is required. Below is a table listing the planting requirements and what is being provided:

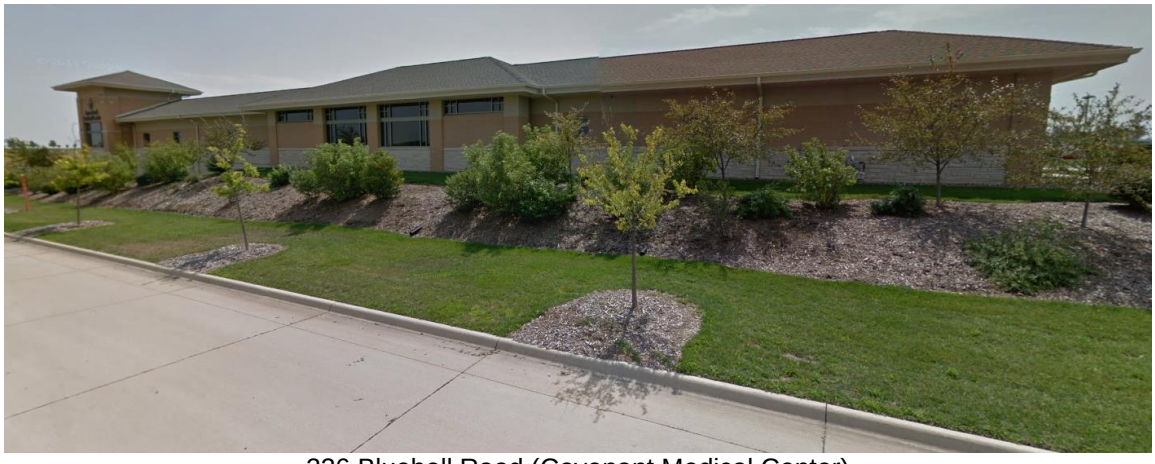
Landscaping			
Type	HCG Points	MU Points	Points Provided
Development site	3,495	2,640	3,605

Street Trees	819	819	835
Parking trees	8	8	8

The table above summarizes the landscaping requirements for the HCG and MU districts. The total development site exceeds the MU district standards and the HCG requirements. The focus of the landscaping is two-fold: along roadways, for buffering and around the building/parking lot. The landscaping is well distributed. In addition to the required landscape plantings, the site includes a mixture of overstory trees, understory trees, evergreen trees, shrubs and ornamental grasses. The Design Guidelines require additional plantings 10%-15% greater than what is outlined in the MU district. These guidelines will be satisfied since the HCG district requires more plantings. **Open green space and landscaping requirements are satisfied.**

5) Building Design: The MU District requires a design review of various elements to ensure architectural compatibility to surrounding structures. These are noted below with a review on how each element is addressed. While the proposed building is in the Business Center North development, there are multiple buildings in this area from which to relate the design. These buildings were designed to meet the Pinnacle Prairie Design Guidelines. As the Pinnacle Prairie Design Guidelines are part of the Development Agreement and all commercial buildings currently in the MU district meet these design requirements; staff review will not only cover how the Zoning Ordinance is met but also the Pinnacle Prairie Design Guidelines.

Below are examples of existing commercial buildings Business Center North district:



226 Bluebell Road (Covenant Medical Center)

Corner of S. Main Street and Bluebell Road (Cedar Falls Fire and Ambulance Building)

a) ***Proportion:*** *The relationship between the width and height of the front elevations of adjacent buildings shall be considered in the construction or alteration of a building; the relationship of width to height of windows and doors of adjacent buildings shall be considered in the construction or alteration of a building.*

The scale and height of this grocery store is comparable to the other buildings in the Business Center North development including the recently approved Public Safety building. The overall height of the Fareway store is approximately 23 feet. The finish floor of the proposed building will be at 949' as compared to the Kwik Star store at 943' and the Public Safety building at 952'.

The design of the building includes windows on the west and north side of the building. The window design includes a sash bar that separates the transom on the top third of the windows. These features are found on other buildings in this MU District. The main entrance is at the northwest corner of the store.

b) ***Roof shape, pitch, and direction****: The similarity or compatibility of the shape, pitch, and direction of roofs in the immediate area shall be considered in the construction or alteration of a building.*

The proposed Fareway store includes a flat roof to replicate the long horizontal lines of the prairie design. Other buildings in the immediate area have long horizontal features with a hip style roof. There are buildings in the Pinnacle Prairie development with flat roof features including the Unity Point Clinic on Prairie Parkway and the new Public Safety building on S. Main Street. A parapet wall is located along the north and west side of the building in order to break up the massing of the wall. The roof line is topped with a decorative cornice to match the dark bronze color on the window frames. Metal screen panels are located on the roof to conceal the heating and cooling units and other features on top of the building.

c) ***Pattern:*** *Alternating solids and openings (wall to windows and doors) in the front facade and sides and rear of a building create a rhythm observable to viewers. This pattern of solids and openings shall be considered in the construction or alteration of a building.*

Overall, the design of the store is an attractive building which represents a new design for Fareway. The pattern includes long horizontal and vertical lines repeated around the building with a two tone color of bricks to separate these patterns. The corners of the building extend out from the rest of the facade to interrupt the massing of the wall. The windows and doors create a nice pattern around the building. These openings are encased in a dark bronze frame. Again, these design features are found on other buildings in this MU District.

d) ***Materials and texture****: The similarity or compatibility of existing materials and textures on the exterior walls and roofs of buildings in the immediate area shall be considered in the construction or alteration of a building. A building or alteration shall be considered compatible if the materials and texture used are appropriate in the context of other buildings in the immediate area.*

The primary materials used on the building are brick, stone, glass and metal treatments. The building has a brick wainscot along the bottom third of the facade with horizontal and vertical lines in complementary brick colors. The entry at the northwest corner of the building includes a cultured stone material with aluminum panels over the doors. One would find these materials on other buildings in this MU District.

The Pinnacle Prairie Design Guidelines outline the design for the buildings to be prairie style architecture, with naturally occurring stone and large overhangs. The materials commonly used are brick and Anamosa limestone. The windows shall be bronze or champagne color to blend with the color choice of the brick. All MU commercial buildings have met these requirements. More details on the cultured stone material are needed to support the design guidelines.

e) ***Color****: The similarity or compatibility of existing colors of exterior walls and roofs of buildings in the area shall be considered in the construction or alteration of a building.*

The building design includes a golden brick face color with dark sandstone accent brick colors. Earth tones are the common color in this MU District. The dark sandstone base will match the horizontal and vertical brick banding. The cornice, window trim, overhang/awnings and roof top screens are a dark bronze color. These details are found on other buildings in this MU District.

f) ***Architectural features****: Architectural features, including but not limited to, cornices, entablatures, doors, windows, shutters, and fanlights, prevailing in the immediate area, shall be considered in the construction or alteration of a building. It is not intended that the details of existing buildings be duplicated precisely, but those features should be regarded as suggestive of the extent, nature, and scale of details that would be appropriate on new buildings or alterations.*

The proposed Fareway store's design matches that of others in this MU District utilizing the prairie style architecture with vertical and horizontal window openings, horizontal lines in the brick design and brick columns to around the building. Metal awnings cover the top of the windows on the north and west facade. This is not only a modern type of design but also replicates the design elements found on other commercial buildings in the MU District. **Overall, the design of the building fits the intent of this MU District. It should be noted that the developer approved the design of this new Fareway store.**

Proposed Light Fixtures

6) <u>Trash Dumpster and Refrigeration Unit Site:</u> The site plan shows a trash dumpster area and refrigeration unit near the

southeast corner of the building. The building design shows a brick wall enclosure for the dumpster. The refrigeration unit is placed in a bed of river rock surrounded with a viburnum landscape and enclosed with a 10-foot privacy fence. This creates a thick hedge 8-10 feet in height that will provide a nice screen from Bluebell Circle.

7) Lighting: The intent of the the MU District encourages innovative designs with a common theme for all properties in the district. This includes the type and style of lights distributed throughout each site. The lighting style on the existing properties in the Business Center North Development includes antique style lanterns fixed to a 12'-15' tall pole. The applicant submitted a plan for a flat LED fixture on a 20-foot pole that is commonly found in the Prairie Business Park along the east side of Prairie Parkway. This lighting change is a diversion from the standard lantern style lights found on other nearby properties. The "Green Lantern Box Downlight" is not an LED, which requires more fixtures on the site. Fareway proposed to use a "Bronze/Brown Downlight LED" to match the colors of the building. The developer indicated that these LED light fixtures are acceptable for the commercial properties on Greenhill Road. **The Planning and Zoning Commission should consider if this style of light fixture is appropriate in this area.**

   It is proposed to install a 20-foot tall light pole on a 3-foot base. The plan includes a total of six poles in the parking lot area. See attached design sheets. Since this store closes at 9:00 pm, the only light near the front entry will be on at night. A photometric lighting design was submitted and attached to this staff report. This plan shows the LED lights poles to cast a downward light just beyond the paved portion of the site.

8) Signage: The site plan indicates a number of wall signs for the proposed Fareway store. The "Fareway" signs are located on the west and north wall of the building. These signs are approximately 120 square feet in area which is well below the 20% wall area maximum for these signs. There are Fareway "shield" signs over the front entry on the west and north side of the building. **A signage plan depicted below conforms to this district's requirements. All signs will require a separate permit prior to installation.**

9) Sidewalks: A public sidewalk will be installed along Bluebell Road to connect into the existing trail along S. Main Street. A recreational trail will connect the parking area along the north side of the store to the Greenhill Road trail. **Sidewalk requirements are met.**

10) Storm water management: The site includes two stormwater detention basins. One basin is located at the southwest corner of site near S. Main Street and Bluebell Road. This will collect the 100 year event and release it into the existing storm sewer on Bluebell Road. The other basin is located near the northeast corner of the property. This will collect the 10 year event and release it into the basin that will be graded for the Kwik Star site to the east of this property. From there, the storm water will be released under Coneflower Parkway to the area wide detention basin. A maintenance and repair agreement between Fareway and Kwik Star will be required for this detention basin in the Greenhill Road ditch. **Submit a stormwater maintenance and repair agreement prior to City Council approval.**

11) Easement Vacation and Dedication: The petitioner is purchasing the west half of Lot 33 to merge it with Lot 32 for this development. The plat includes a 10-foot utility easement on the original lot line. Those easements will be vacated as part of this project. A new 8' wide

utility easement will be dedicated along the easterly property line of this site. **The easement vacation and dedication is accepted by staff and CFU personnel.**

12) Other Site Plan Details: The site plan includes bike racks located near the northeast corner of the building. The loading dock is located at the southeast corner of the building which includes an overhead door and service door.

13) Traffic Impact Study: Fareway submitted a Traffic Impact Study (TIS) for this proposed store at the corner of S. Main Street and Greenhill Road. The four intersections surrounding this site were evaluated for current traffic volumes, projected traffic volumes, crash rates and growth rates. This site will have access onto S. Main Street between Balboa Avenue and Bluebell Road. An additional driveway is located off of Bluebell Road.

This area has experienced development and growth over the past five years with the expansion of the Western Home campus, residential development, and commercial projects in the Viking Road corridor. The City realizes that this intersection at Greenhill and S. Main will need to be upgraded in the future and this is the reason that this project has been placed in the Capital Improvements Program for construction in 2021. Short term, the City will develop a traffic model to analyze the turning movements at this intersection to determine the near and long term improvement options. After evaluation, staff will make a recommendation to City Council for consideration. This is anticipated to occur in February 2018.

14) Petitions: Attached to this staff report are a number of letters and comments from the adjoining neighborhood. Also attached are additional comments, documents and photos that were presented at the last Commission meeting on December 13, 2017.

TECHNICAL COMMENTS:
All basic utility services are available to the property. The property owner/contractor is responsible to extend all utility services to the building. These utility extensions will be reviewed by CFU personnel as part of the building plan review. An 8” water service stub has been installed to both lots 32 and 33 off of Bluebell Rd. Both of the water services will be in the new proposed lot. One water service will be required to be abandoned at the owners cost. The owner/contractor must coordinate all utility accommodations with CFU personnel.

The site plan review fee has been submitted. A notice of this meeting was mailed to the adjacent neighborhoods on January 2, 2018.

STAFF RECOMMENDATION
The Community Development Department recommends approval of the Fareway site plan and utility easement vacation/dedication subject to the following conditions:

1) Submit a storm water maintenance and repair agreement prior to City Council approval.
2) Submit a utility easement dedication plat.
3) Conformance with the technical comments identified in the staff report.
4) Any additional comments or direction specified by the Planning and Zoning Commission.

PLANNING & ZONING COMMISSION

Discussion 12/13/2017

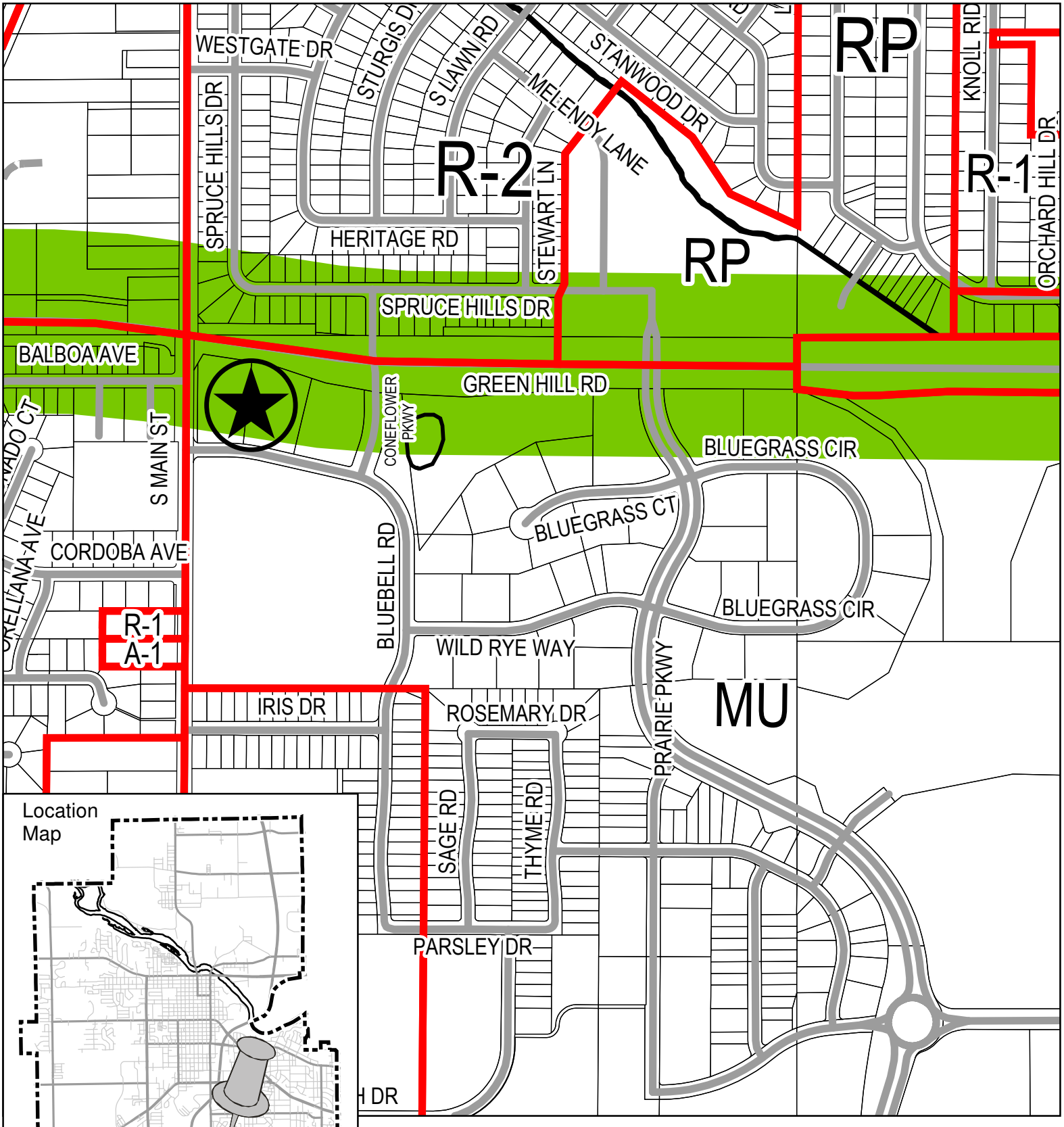
Chair Oberle introduced the item and Mr. Sturch provided background information, noting that this item will just be for discussion at this time. It is proposed to construct a new Fareway grocery store at the southeast corner of Greenhill Road and S. Main Street. He summarized the site plan details and recommendations listed in the staff report. There were some comments from the Commission members.

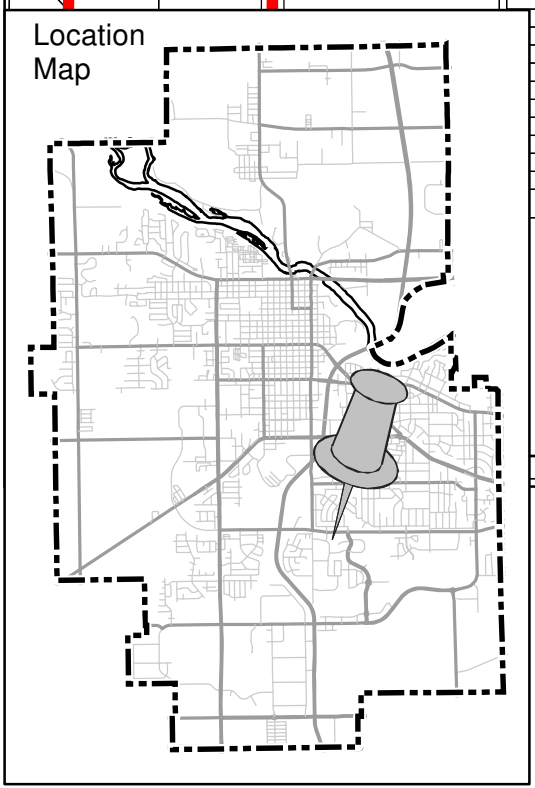
Garrett Piklapp from Fareway came forward to address the questions and concerns that were presented by the Commission.

There were several neighbors that had some concerns on the additional traffic that the store will create at the already busy intersection at Main and Greenhill. A full summary of these comments are found in the attached minutes.

The discussion ended and Chair Oberle reminded everyone that this item will be back on the agenda in the coming weeks for additional discussion.

Attachments:
Location Map
Site Plan
Landscaping Plan
Architectural renderings
Utility Easement Dedication Plat
Lighting Specifications
Petition Letters
Traffic Impact Study





MU District Site Plan Review -
New Fareway Grocery Store

SITE PLANS

FOR

CEDAR FALLS FAREWAY

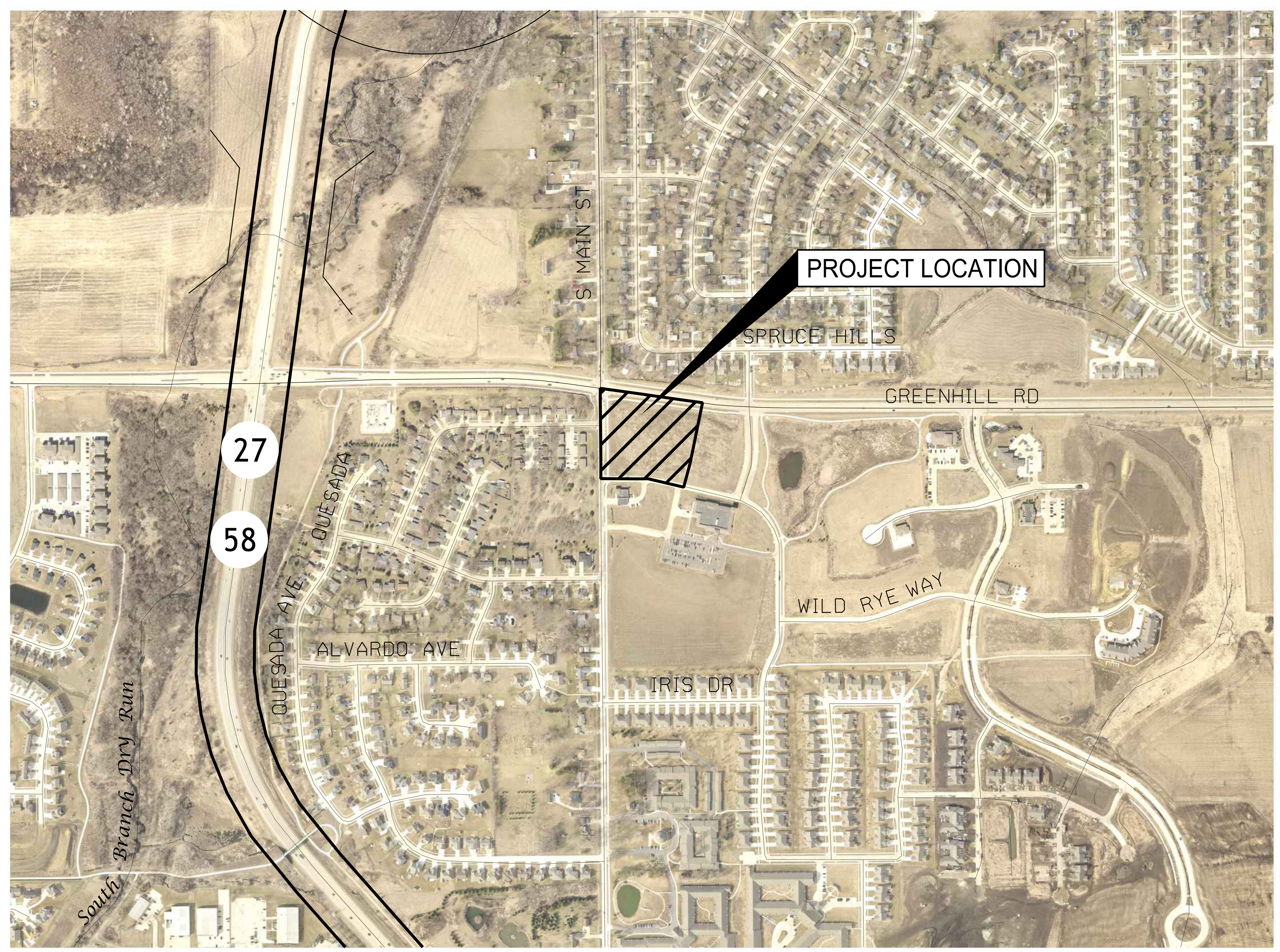
CITY OF CEDAR FALLS, BLACKHAWK COUNTY, IOWA

OWNER/DEVELOPER

FAREWAY STORES, INC.
715 8TH STREET
PO BOX 70
BOONE, IOWA 50036-0070

ENGINEER/SURVEYOR

SNYDER & ASSOCIATES, INC.
2727 SNYDER BLVD.
ANKENY, IOWA 50023
(515) 964-2020



NOT TO SCALE

VICINITY MAP

INDEX OF SHEETS

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Jason A. Ledden, P.E. Date

License Number 24117

My License Renewal Date is December 31, 2018

Pages or sheets covered by this seal:
Sheets 1-5, 7

I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly licensed Professional Landscape Architect under the laws of the State of Iowa.

Lara F. Guldenpfennig, ASLA Date

License Number 668

Pages or sheets covered by this seal:
Sheet 6

License Expires: June 30, 2018

MARK	REVISION	DATE	BY
4.	REVISED AS PER OWNER COMMENTS	12/29/17	RMM
3.	REVISED AS PER CITY COMMENTS	12/18/17	RMM
2.	REVISED AS PER OWNER COMMENTS	12/12/17	KSS
1.	REVISED AS PER CITY COMMENTS	10/30/17	GJC

Engineer: JAL Checked By: TLW
Technician: LFG Date: 10/11/17 Field Bk: Pg:
Project No: 117.0829 Sheet 1 of 7

CEDAR FALLS FAREWAY SITE PLAN

TITLE SHEET

CEDAR FALLS, IA

SNYDER & ASSOCIATES, INC.

2727 S.W. SNYDER BLVD.
ANKENY, IOWA 50023
515-964-2020 | www.snyder-associates.com

Item 4.C.

LEGEND

Features	Existing	Proposed
Spot Elevation	93.0	×93.0
Contour Elevation	93	93
Fence (Barbed, Field, Hog)		
Fence (Chain Link)		
Fence (Wood)		
Fence (Silt)		
Tree Line		
Tree Stump		
Deciduous Tree \ Shrub		
Coniferous Tree \ Shrub		
Communication	C(*)	C
Overhead Communication	OC(*)	OC
Fiber Optic	FO(*)	FO
Underground Electric	E(*)	E
Overhead Electric	OE(*)	OE
Gas Main with Size	4" G(*)	4" G
High Pressure Gas Main with Size	4" HPG(*)	4" HPG
Water Main with Size	8" W(*)	8" W
Sanitary Sewer with Size	8" S(*)	8" S
Duct Bank	DUCT(*)	
Test Hole Location for SUE w/ID	1	

(*) Denotes the survey quality service level for utilities

Features	Existing	Proposed
Sanitary Manhole		
Storm Sewer with Size	12" ST	12" ST
Storm Manhole		
Single Storm Sewer Intake		
Double Storm Sewer Intake		
Fire Hydrant		
Fire Hydrant on Building		
Water Main Valve		
Water Service Valve		
Well		
Utility Pole		
Guy Anchor		
Utility Pole with Light		
Utility Pole with Transformer		
Street Light		
Yard Light		
Electric Box	EB	
Electric Transformer		
Traffic Sign		
Communication Pedestal		
Communication Manhole		
Communication Handhole		
Fiber Optic Manhole		
Fiber Optic Handhole		
Gas Valve		
Gas Manhole		
Gas Apparatus		
Fence Post or Guard Post		
Underground Storage Tank		
Above Ground Storage Tank	AST	
Sign		
Satellite Dish		
Mailbox		
Soil Boring		

UTILITY QUALITY SERVICE LEVELS

QUALITY LEVELS OF UTILITIES ARE SHOWN IN THE PARENTHESES WITH THE UTILITY TYPE AND WHEN APPLICABLE, SIZE. THE QUALITY LEVELS ARE BASED ON THE CI/ ASCE 38-02 STANDARD.

QUALITY LEVEL (D) INFORMATION IS DERIVED FROM EXISTING UTILITY RECORDS OR ORAL RECOLLECTIONS.

QUALITY LEVEL (C) INFORMATION IS OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND USING PROFESSIONAL JUDGMENT IN CORRELATING THIS INFORMATION WITH QUALITY D INFORMATION.

QUALITY LEVEL (B) INFORMATION IS OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES.

QUALITY LEVEL (A) IS HORIZONTAL AND VERTICAL POSITION OF UNDERGROUND UTILITIES OBTAINED BY ACTUAL EXPOSURE OR VERIFICATION OF PREVIOUSLY EXPOSED SUBSURFACE UTILITIES, AS WELL AS THE TYPE, SIZE, CONDITION, MATERIAL, AND OTHER CHARACTERISTICS.

UTILITY WARNING

THE UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND/OR RECORDS OBTAINED. THE SURVEYOR MAKES NO GUARANTEE THAT THE UTILITIES OR SUBSURFACE FEATURES SHOWN COMPRISE ALL SUCH ITEMS IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UTILITIES OR SUBSURFACE FEATURES SHOWN ARE IN THE EXACT LOCATION INDICATED EXCEPT WHERE NOTED AS QUALITY LEVEL A.

UTILITY CONTACT INFORMATION

UTILITY CONTACT FOR MAPPING INFORMATION SHOWN AS RECEIVED FROM THE IOWA ONE CALL DESIGN REQUEST SYSTEM, TICKET NUMBER 551703943.

E1-ELECTRIC HPG1-HIGH PRESSURE GAS G1-GAS FO1-FIBER OPTIC C1-COMMUNICATION W1-WATER S-SANITARY SEWER	CEDAR FALLS UTILITIES JERALD LUKENSMEYER 319-268-5330 jlukensmeyer@cfu.net CITY OF CEDAR FALLS RANDY LORENZEN 319-268-5176 randy.lorenzen@cedarfalls.com
C2	CENTURYLINK TOM STURMER 720-578-8090 thomas.sturmer@centurylink.com
C3	MEDIACOM KEVIN PARKER 845-867-0932 kparker@mediacomcc.com

IOWA ONE CALL
1-800-292-8989
www.iowaonecall.com
811 Know what's below. Call before you dig.

GENERAL NOTES

A. NOTIFY UTILITY PROVIDERS PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITIES AND COORDINATE WITH UTILITY PROVIDERS AS NECESSARY DURING CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR DETERMINING EXISTENCE, EXACT LOCATION, AND DEPTH OF ALL UTILITIES. PROTECT ALL UTILITY LINES AND STRUCTURES NOT SHOWN FOR REMOVAL OR MODIFICATION. ANY DAMAGES TO UTILITY ITEMS NOT SHOWN FOR REMOVAL OR MODIFICATION SHALL BE REPAIRED TO THE UTILITY OWNER'S SPECIFICATIONS AT THE CONTRACTOR'S EXPENSE.

B. LENGTH OF UTILITIES SHOWN ON PLANS ARE DIMENSIONED FROM CENTERLINE OF STRUCTURE TO CENTERLINE OF STRUCTURE.

C. ALL TRAFFIC CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH REQUIREMENTS SET FORTH IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). WHEN CONSTRUCTION ACTIVITIES OBSTRUCT PORTIONS OF THE ROADWAY, FLAGGERS SHALL BE PROVIDED. FLAGGERS SHALL CONFORM TO THE MUTCD IN APPEARANCE, EQUIPMENT AND ACTIONS.

D. NOTIFY OWNER, ENGINEER, AND CITY OF CEDAR FALLS PUBLIC WORKS, AT LEAST 48 HOURS PRIOR TO BEGINNING WORK.

E. CONSTRUCT MANHOLES AND APPURTENANCES AS WORK PROGRESSES. BACKFILL WITH SUITABLE MATERIAL AND COMPACT TO 95% MAXIMUM DENSITY.

F. IN THE EVENT OF A DISCREPANCY BETWEEN THE QUANTITY ESTIMATES AND THE DETAILED PLANS, THE DETAILED PLANS SHALL GOVERN.

G. ALL FIELD TILES ENCOUNTERED DURING CONSTRUCTION SHALL BE RECONNECTED AND NOTED ACCORDINGLY ON THE AS-BUILT DOCUMENTS.

H. DIMENSIONS, BUILDING LOCATION, UTILITIES AND GRADING OF THIS SITE ARE BASED ON AVAILABLE INFORMATION AT THE TIME OF DESIGN. DEVIATIONS MAY BE NECESSARY IN THE FIELD. ANY SUCH CHANGES OR CONFLICTS BETWEEN THIS PLAN AND FIELD CONDITIONS ARE TO BE REPORTED TO THE ARCHITECT/ENGINEER PRIOR TO STARTING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT VERIFICATION OF ALL SITE IMPROVEMENTS PRIOR TO CONSTRUCTION.

I. CONTRACTOR TO LOAD AND TRANSPORT ALL MATERIALS CONSIDERED TO BE UNDESIRABLE TO BE INCORPORATED INTO THE PROJECT TO AN APPROVED OFF-SITE WASTE SITE.

J. CONTRACTOR TO STRIP AND STOCKPILE TOPSOIL FROM ALL AREAS TO BE CUT OR FILLED. RESPREAD TO MINIMUM 6" DEPTH TO FINISH GRADES.

K. ALL PROPOSED CONTOURS AND SPOT ELEVATIONS SHOWN ARE FINISHED GRADES AND/OR TOP OF PAVING SLAB (GUTTER), UNLESS OTHERWISE NOTED.

L. THE CONTRACTOR IS RESPONSIBLE FOR CLEANING DIRT AND DEBRIS FROM NEIGHBORING STREETS, DRIVEWAYS, AND SIDEWALKS CAUSED BY CONSTRUCTION ACTIVITIES IN A TIMELY MANNER.

M. THE ADJUSTMENT OF ANY EXISTING UTILITY APPURTENANCES TO FINAL GRADE IS CONSIDERED INCIDENTAL TO THE SITE WORK.

N. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING EROSION CONTROL MEASURES AS NECESSARY. CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR MAINTAINING ANY EXISTING EROSION CONTROL MEASURES ON SITE AT THE TIME OF CONSTRUCTION. GRADING AND SOIL EROSION CONTROL CODE REQUIREMENTS SHALL BE MET BY CONTRACTOR. A GRADING PERMIT IS REQUIRED FOR THIS PROJECT.

O. CONTRACTOR TO COORDINATE NATURAL GAS, ELECTRICAL, TELEPHONE AND ANY OTHER FRANCHISE UTILITY SERVICES WITH UTILITY SERVICE PROVIDER, THE CITY AND THE OWNER PRIOR TO CONSTRUCTION.

P. CONTRACTOR TO VERIFY ALL UTILITY CROSSINGS AND MAINTAIN MINIMUM 18" VERTICAL AND HORIZONTAL CLEARANCE BETWEEN UTILITIES. CONTRACTOR TO COORDINATE UTILITY ROUTING TO BUILDING AND VERIFY CONNECTION LOCATIONS AND INVERTS PRIOR TO CONSTRUCTION.

Q. THE SITE CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT VERIFICATION OF ALL SITE IMPROVEMENTS PRIOR TO CONSTRUCTION. CONTRACTOR TO CONSTRUCT ALL SITE IMPROVEMENTS AND UTILITIES IN ACCORDANCE WITH THE STATEWIDE URBAN DESIGN AND SPECIFICATIONS PROGRAM.

R. SAW-CUT AT TERMINATION TO FULL DEPTH ALL PAVEMENTS TO BE REMOVED.

S. THE CONTRACTOR IS RESPONSIBLE FOR KEEPING AND MAINTAINING A SET OF RECORD DRAWINGS. RECORD DRAWINGS SHALL SHOW ALL CHANGES TO PLANS, AND REPRESENT THE AS-BUILT CONDITION. SUBMIT RECORD DRAWINGS TO ENGINEER PRIOR TO FINAL PAYMENT.

T. MINIMUM COMPRESSIVE STRENGTH FOR PCC PAVEMENT SHALL BE 4,000 PSI AT 28 DAYS.

U. ALL PARKING LOT JOINTS SHALL BE 15' X 15' MAXIMUM SPACING. ALL JOINTS SHALL BE 1/4" SAWED AND SEALED FULL DEPTH WITH OWNER APPROVED SEALANT. NO BACKER ROD ALLOWED. UNLESS OTHERWISE NOTED, JOINTS SHALL BE TYPE 'C'. TYPE 'CT' AT ALL COLD JOINTS. ALL TIE BARS SHALL BE EPOXY COATED NO. 5 BARS.

V. ALL GREEN SPACE AREAS (PERVIOUS SURFACES) SHALL BE DRILL SEEDED WITH LAWN SEED MIX WITH HYDRAULIC MULCH COVER AT A RATE OF 300 LBS/ACRE.

W. LANDSCAPER TO WATER ALL TREES AND SHRUBS UNTIL THEY ARE ESTABLISHED THROUGH FIRST GROWING SEASON. ALL LANDSCAPE PLANTINGS SHALL HAVE A ONE YEAR WARRANTY.

HORIZONTAL CONTROL

IOWA REGIONAL COORDINATE SYSTEM ZONE 5 (WATERLOO)
NAD83(2011)(EPOCH 2010.00) IARTN DERIVED - US SURVEY FEET

CP1 N=8844400.92 E=15447233.03
1/2" REBAR WITH YELLOW CAP 15' NORTHEAST OF INTAKE, SOUTHWEST CORNER OF SITE.

CP2 N=8844789.28 E=15447250.52
1/2" REBAR WITH YELLOW CAP 35' SOUTHEAST OF MAST ARM, NORTHWEST CORNER OF SITE.

CP3 N=8844683.84 E=15447721.90
1/2" REBAR WITH YELLOW CAP 60' SOUTH OF TRAIL, NORTHEAST CORNER OF SITE.

CP4 N=8844381.33 E=15447514.55
1/2" REBAR WITH YELLOW CAP 12' NORTH OF INTAKE, SOUTH SIDE OF SITE.

BENCHMARKS

NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88 - GEOID12A)
IARTN DERIVED - US SURVEY FEET

BM1 ELEV=946.24
ARROW ON HYDRANT ON NORTH SIDE OF BLUEBELL ROAD 20' NORTHEAST OF INTAKE, SOUTHEAST CORNER OF SITE.

BM2 ELEV=950.77
ARROW ON HYDRANT IN NORTHEAST QUADRANT OF SOUTH MAIN STREET & BLUEBELL ROAD, SOUTHWEST CORNER OF SITE.

GENERAL USE

GROCERY STORE

BUILDING DESCRIPTION

TOTAL BUILDING HEIGHT= 22'-8" TO TOP PARAPET
FLOOR SF = 20,784 SF

PARKING REQUIREMENTS:

119 STALLS PROVIDED (5 HC STALLS)
4.5 STALLS PER 1000 SF OF BUILDING SF
20,784 SF/1000 SF X 4.5 = 94 STALLS REQUIRED

PROPERTY ADDRESS:

XXX XXXXXX X
CEDAR FALLS, IOWA 5XXXX

ZONING

MU - MIXED - USE RESIDENTUAL

PROPOSED LAND USE

NEIGHBORHOOD - GROCERY STORE

EMPLOYEES (COMMERCIAL)

60 - 80 FULL/PART TIME EMPLOYEES (TOTAL)

MARK	REVISION	DATE	BY
4.	REVISED AS PER OWNER COMMENTS	12/29/17	RMM
3.	REVISED AS PER CITY COMMENTS	12/18/17	RMM
2.	REVISED AS PER OWNER COMMENTS	12/12/17	KSS
1.	REVISED AS PER CITY COMMENTS	10/30/17	GJC

Engineer: JAL Checked By: TLW
Techn
Proj

Item 4.C.

CEDAR FALLS FAREWAY SITE PLAN

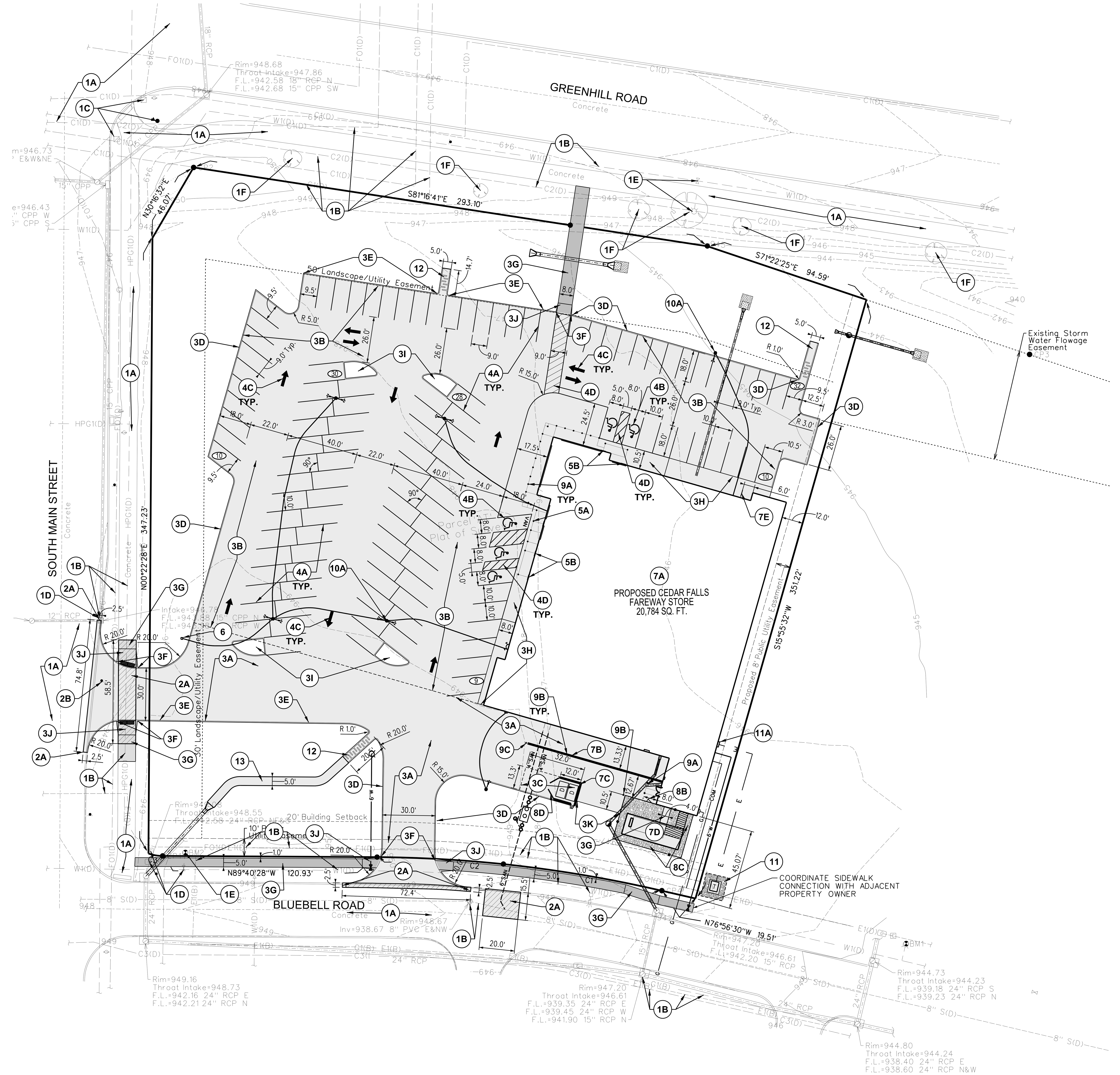
PROJECT INFORMATION

CEDAR FALLS, IA

SNYDER & ASSOCIATES, INC.
2727 S.W. SNYDER BLVD.
ANKENY, IOWA 50023
515-964-2020 | www.snyder-associates.com

SNYDER & ASSOCIATES

Project No: 117.0829



DIMENSION PLAN CONSTRUCTION NOTES

1. EXISTING FEATURES, PROTECT THE FOLLOWING:
   A. PAVEMENTS TO REMAIN.
   B. PROTECT EXISTING UTILITIES.
   C. EXISTING TRAFFIC SIGNAL AND ASSOCIATED TRAFFIC VAULTS.
   D. ADJUST EXISTING UTILITY TO GRADE AS NEEDED.
   E. EXISTING HYDRANT ASSEMBLY.
   F. PROTECT EXISTING TREES.

2. DEMOLITION, REMOVE THE FOLLOWING:
   A. EXISTING PAVEMENT. SAW CUT TO FULL DEPTH ALL PAVEMENTS TO BE REMOVED.
   B. EXISTING STREET SIGN. COORDINATE REMOVAL/RELOCATION WITH CITY.

3. PAVEMENTS, PROVIDE THE FOLLOWING:
   A. PCC DRIVES, 8" DEPTH PAVEMENT WITH INTEGRAL CURB AND 4" GRANULAR SUBBASE.
   B. PCC PARKING, 6" DEPTH PAVEMENT WITH INTEGRAL CURB AND 4" GRANULAR SUBBASE.
   C. 8" DEPTH REINFORCED PCC AT TRASH ENCLOSURE.
   D. 6" CURB.
   E. 3" ROLL CURB.
   F. TAPER CURB.
   G. PCC SIDEWALKS, 4" DEPTH PAVEMENT.
   H. INTEGRAL CURB AND 4" PCC SIDEWALK.
   I. MEDIAN WITH 6" PCC CURB.
   J. PEDESTRIAN RAMP WITH A MAXIMUM SLOPE OF 8.33%. INSTALL DETECTABLE WARNING SYSTEM AS PROVIDED BY CITY AT RAMPS WHERE SHOWN.
   K. NO CURB.

4. PAVEMENT MARKINGS, PROVIDE THE FOLLOWING:
   A. 4" WIDE PAINTED PARKING STALL LINES.
   B. PAINTED STATE OF IOWA APPROVED ACCESSIBLE PARKING SYMBOL.
   C. TRAFFIC FLOW ARROW.
   D. 45°STRIPING AT 3' O.C. SPACE WHERE SHOWN.

5. SIGNS, PROVIDE THE FOLLOWING:
   A. PROVIDE VAN ACCESSIBLE PARKING SIGNAGE AS PER ADAAG REQUIREMENTS.
   B. PROVIDE ACCESSIBLE PARKING SIGNAGE AS PER ADAAG REQUIREMENTS. MOUNT ON BUILDING.

6. PLACE WATERPROOF ELECTRICAL JUNCTION BOX PER THIS CONTRACT.

7. BUILDING IMPROVEMENTS. REFER TO ARCHITECTURAL PLANS.
   A. BUILDING. SEE ARCHITECTURAL PLANS.
   B. DOCK WALL.
   C. TRASH ENCLOSURE.
   D. REFRIGERATION UNIT AND PAD.
   E. BIKE RACKS.

8. FENCING
   A. 10' HT COMPOSITE SOLID FENCE, RAINIER HEAVY DUTY, TAN COLOR.
   B. 1 EA. 3' WIDE GATE TO MATCH FENCING.
   C. 1 - 1/2" WASHED RIVER ROCK OVER ENGINEERING FABRIC, ROCK TO BE 3" MIN. DEPTH WITH PERIMETER TREATED 2"X6" WOOD EDGING.
   D. 2 - 6' GATES (12' TOTAL OPENING) TO BE 2X COMPOSITE WOOD.

9. BOLLARDS. SEE STRUCTURAL PLANS FOR DETAIL LAYOUT. SEE DETAIL 5 ON SHEET 8.
   A. ENTRY BOLLARD 6" DIAMETER.
   B. DOCK BOLLARD 4" DIAMETER.
   C. DOCK BOLLARD 10" DIAMETER.

10. SITE LIGHTING, PROVIDE THE FOLLOWING:
   A. SITE LIGHTING SHOWN IS FOR ILLUSTRATION PURPOSES ONLY. CONTRACTOR TO COORDINATE WITH THE OWNER AND ELECTRICAL ENGINEER ALL ASPECTS OF SITE LIGHTING PRIOR TO CONSTRUCTION. SEE SCHEDULE ON UTILITY PLAN.

11. TRANSFORMER/TRANSFORMER MOAT TO BE CONSTRUCTED AS PER UTILITY PROVIDER'S REQUIREMENTS. COORDINATE INSTALLATION WITH ADJACENT PROPERTY OWNER.
   A. CT CABINET (MOUNTED TO BACK OF BUILDING)

12. CONCRETE FLUME WITH ENERGY DISSIPATOR AND 12" HIGH CURB EXTENSIONS. SEE DETAILS 6 AND 10 ON SHEET 7.

13. 6" DEPTH CONCRETE FLUME V-CHANNEL WITH NO CURB. PROVIDE #4 EPOXY COATED BARS 12" ON-CENTERS BOTH WAYS.

CEDAR FALLS FAREWAY SITE PLAN

LAYOUT AND DIMENSION PLAN

CEDAR FALLS, IA

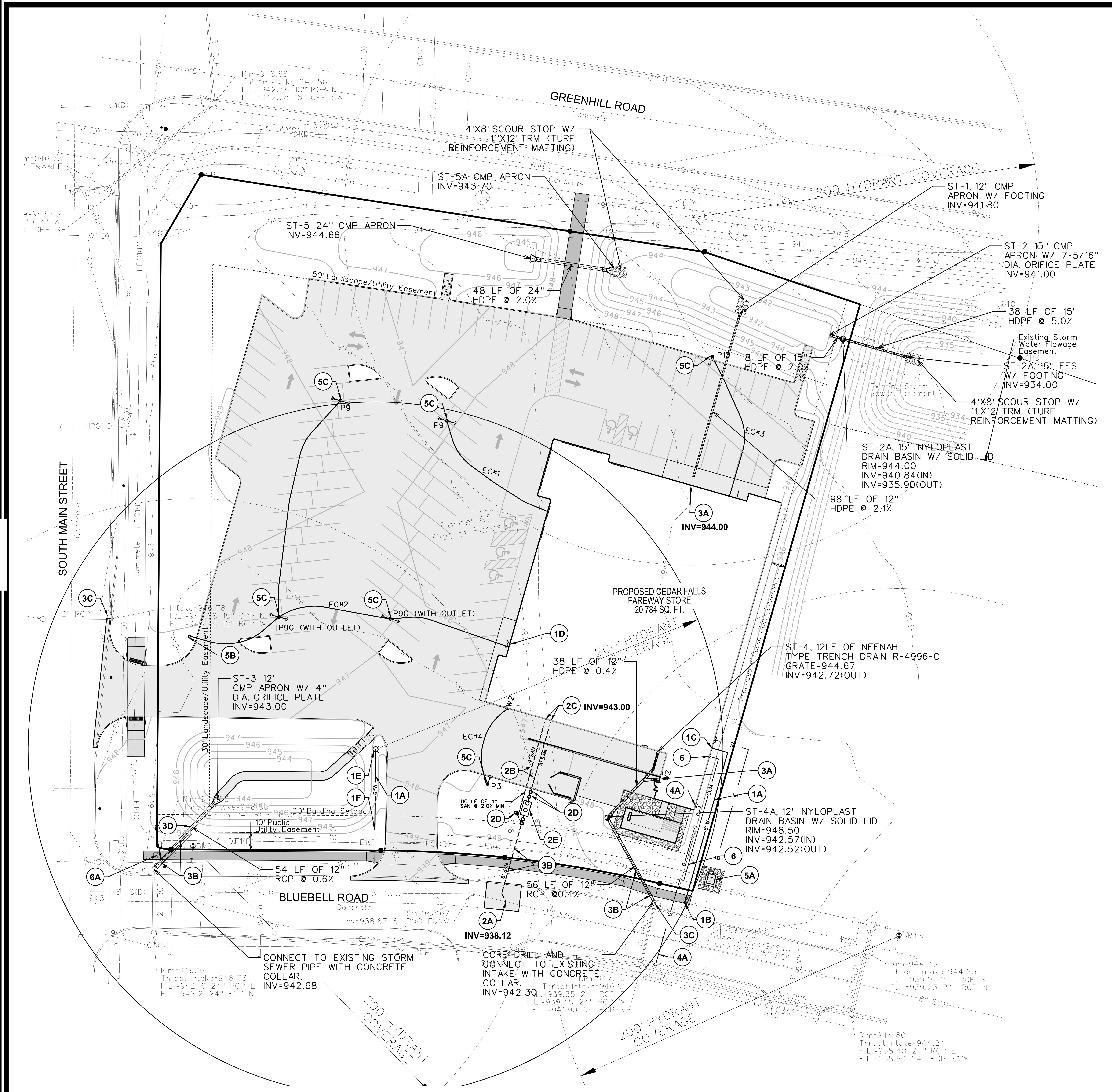
SNYDER & ASSOCIATES, INC.

2727 S.W. SNYDER BLVD. ANKENY, IOWA 50023
515-964-2020 | www.snyder-associates.com

MARK	REVISION	DATE	BY
1.	REVISED AS PER CITY COMMENTS	10/30/17	GJC
2.	REVISED AS PER OWNER COMMENTS	12/12/17	KSS
3.	REVISED AS PER CITY COMMENTS	12/18/17	RMM
4.	REVISED AS PER OWNER COMMENTS	12/29/17	RMM

Engineer: JAL Checked By: TLW 30'
Technician: LFG Date: 10/11/17 Field Bk: Pg:
Project No: 117.0829 Sheet 3 of 7

Item 4.C.



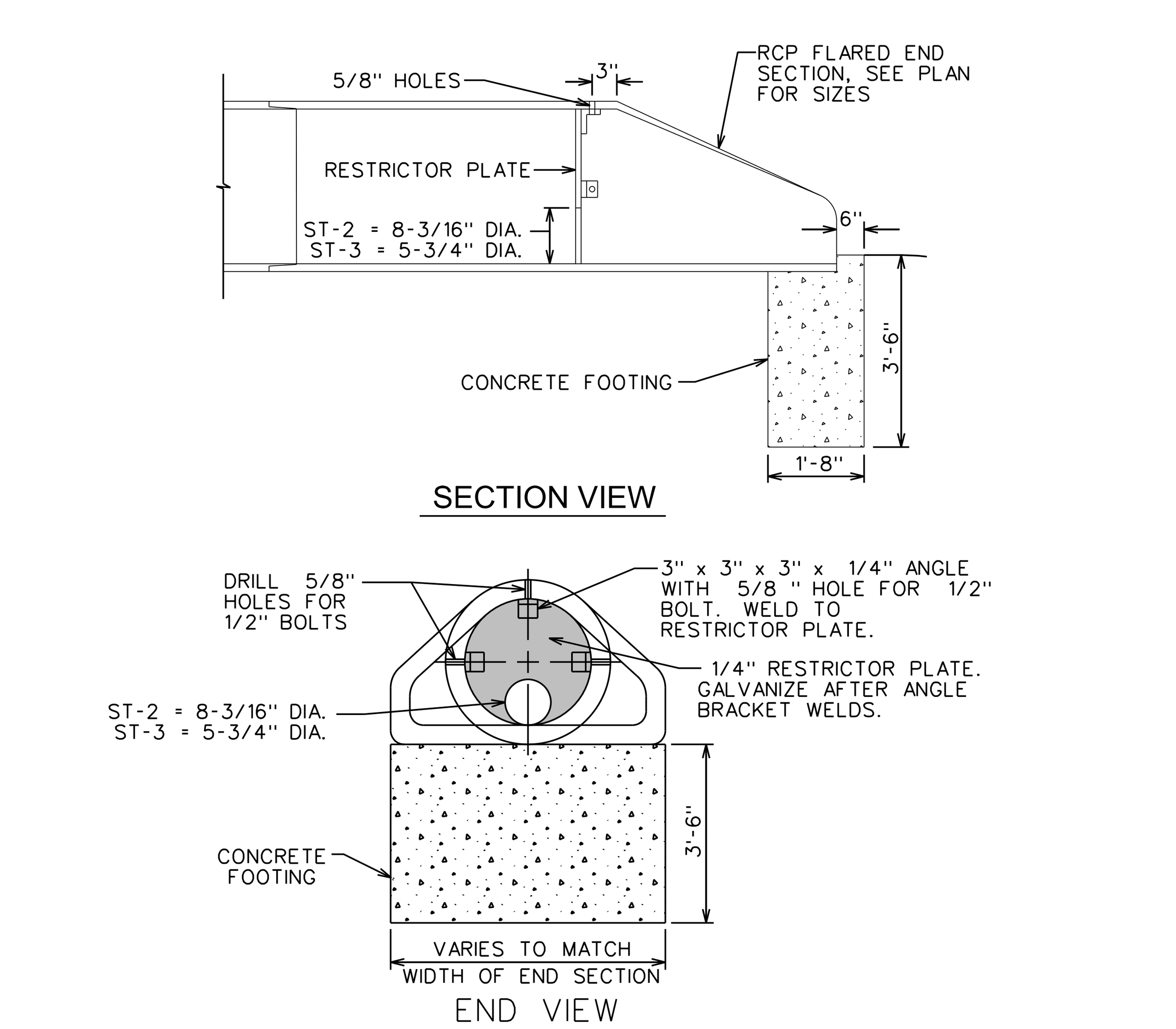
UTILITY PLAN CONSTRUCTION NOTES

1. WATER SERVICE, PROVIDE THE FOLLOWING AS PER CITY OF CEDAR FALLS STANDARDS:
   A. 6" WATER SERVICE WITH FITTINGS, BENDS AND THRUST BLOCKS AS NECESSARY. DOMESTIC AND FIRE PROTECTION LINES TO BE SPLIT INTERNAL.
   B. CONNECT TO EXISTING WATER MAIN WITH TAPPING VALVE AND SLEEVE.
   C. CONNECT TO BUILDING WATER SERVICE. VERIFY LOCATION WITH PLUMBING PLANS PRIOR TO CONSTRUCTION. DOMESTIC WATER SERVICE TO SPLIT IN BUILDING.
   D. REMOTE FIRE DEPARTMENT CONNECTION.
   E. FIRE HYDRANT ASSEMBLY.
   F. CONNECT TO EXISTING 6" WATER SERVICE STUB.
2. SANITARY SEWER SERVICE, PROVIDE THE STRUCTURES AND SERVICE LINE AS SHOWN AND LISTED BELOW AS PER CITY OF CEDAR FALLS STANDARDS:
   A. CONNECT TO CITY SANITARY SEWER MAIN WITH 1:1 RISER PIPE. CONTRACTOR TO VERIFY LOCATION AND ELEVATION PRIOR TO CONSTRUCTION.
   B. 4" SANITARY SEWER SERVICE AT MINIMUM 2% SLOPE.
   C. CONNECT TO BUILDING SANITARY SERVICE. VERIFY LOCATION AND ELEVATION WITH PLUMBING PLANS PRIOR TO CONSTRUCTION.
   D. SANITARY SEWER CLEAN OUT. SEE PLUMBING PLANS FOR ADDITIONAL INFORMATION.
   E. CONNECT TO 1,000 GALLON GREASE INTERCEPTOR. SEE PLUMBING PLANS FOR DETAILS.
3. PROVIDE STORM SEWER IMPROVEMENTS AS SHOWN ON THE PLANS AND AS PER CITY OF CEDAR FALLS STANDARDS.
   A. ROOF DRAINS TO CONNECT TO PROPOSED STORM SEWER. VERIFY LOCATION AND ELEVATION WITH PLUMBING PLANS PRIOR TO CONSTRUCTION.
   B. CRITICAL CROSSING. PROVIDE MINIMUM 18" OF COVER BETWEEN PIPE WALLS.
   C. PROTECT EXISTING INTAKE DURING CONSTRUCTION. ANY DAMAGE TO STRUCTURE WILL BE REPLACED AT CONTRACTOR'S EXPENSE.
   D. REMOVE EXISTING PIPE TO LIMITS SHOWN.
4. PROVIDE GAS SERVICE. COORDINATE WITH FRANCHISE UTILITY PROVIDER PRIOR TO CONSTRUCTION.
   A. GAS METER TO BE MOUNTED ON BUILDING. COORDINATE WITH FRANCHISE UTILITY PROVIDER PRIOR TO CONSTRUCTION.
5. PROVIDE ELECTRIC SERVICE, BY OTHERS. COORDINATE WITH FRANCHISE UTILITY PROVIDER PRIOR TO CONSTRUCTION
   A. PROPOSED TRANSFORMER LOCATION. COORDINATE LOCATION WITH OWNER, ADJACENT PROPERTY OWNER AND FRANCHISE UTILITY PROVIDER.
   B. INSTALL UNDERGROUND CONDUIT WITH WEATHER-PROOF JUNCTION BOX FOR FUTURE MONUMENT SIGN.
   C. SEE PHOTOMETRIC PLAN AND LUMINAIRE SCHEDULE FOR SITE LIGHTING INFORMATION.
6. COMMUNICATION SERVICE. COORDINATE WITH CEDAR FALLS FRANCHISE UTILITY PROVIDER.
   A. ADJUST EXISTING COMMUNICATION HANDHOLE TO PROPOSED GRADE AS NEEDED.
7. VERIFY CONNECTION ELEVATIONS TO PUBLIC UTILITIES PRIOR TO CONSTRUCTION.

LUMINAIRE SCHEDULE

QTY	LABEL	Arrangement	DISCRIPTION
1	P10	Single	CREE ARE-EDG-4M-DA-12-E-UL-525-40K - LYTEPOLES 101-4011-20-AB-MODBASE-D1-TMB **L/ABT** POLE
1	P3	Single	CREE ARE-EDG 3M-DA-12-E-UL-525-40K - LYTEPOLES 101-4011-20-AB-MODBASE-D1-TMB **L/ABT** POLE
4	P9	Back-Back	CREE ARE-EDG 5M-DA-12-E-UL-525-40K - LYTEPOLES 101-4011-20-AB-MODBASE-D2-TMB **L/ABT** POLE
4	P9G	Back-Back	CREE ARE-EDG 5M-DA-12-E-UL-525-40K - LYTEPOLES 101-4011-20-AB-MODBASE-D2-TMB **L/ABT** **GFI** POLE
2	W2	Single	HUBBELL LNC2-18LU-4K-4

ALL LIGHT POLES ARE 20'-0" IN LENGTH, SET ON TOP OF A 3'-0" CONCRETE POLE BASE



1/4 FLARED END SECTION CIRCULAR RESTRICTOR PLATE
NO SCALE

MARK	REVISION	DATE	BY
4.	REVISED AS PER OWNER COMMENTS	12/29/17	RMM
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Engineer: JAL Checked By: TLW

Item 4.C.

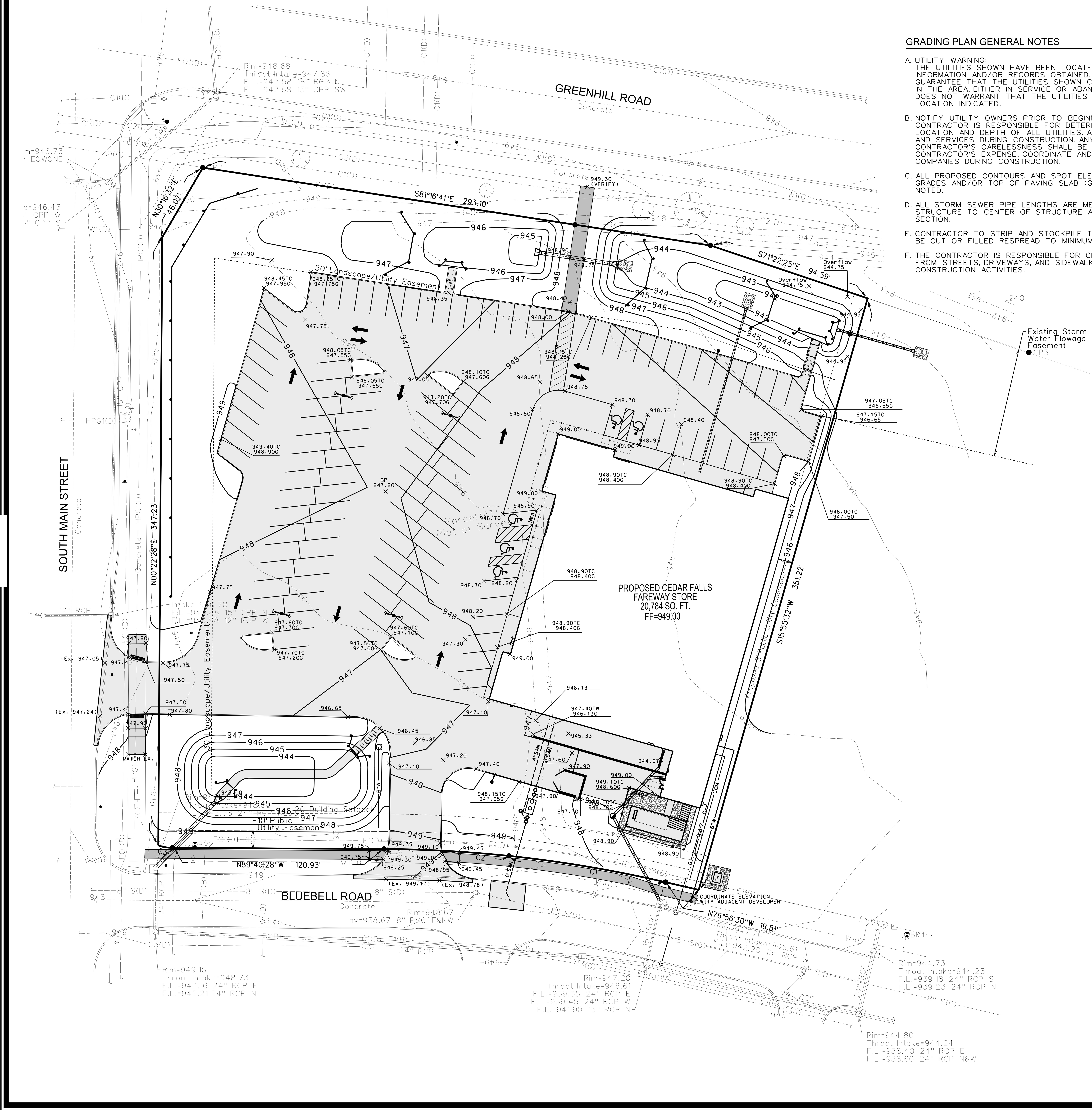
CEDAR FALLS FAREWAY SITE PLAN

CEDAR FALLS, IA

UTILITY PLAN

SNYDER & ASSOCIATES, INC.
2727 S.W. SNYDER BLVD. ANKENY, IOWA 50023
515-964-2020 | www.snyder-associates.com

Project No: 117.0829



GRADING PLAN GENERAL NOTES

A. UTILITY WARNING:
THE UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND/OR RECORDS OBTAINED. THE SURVEYOR MAKES NO GUARANTEE THAT THE UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEY FURTHER DOES NOT WARRANT THAT THE UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED.

B. NOTIFY UTILITY OWNERS PRIOR TO BEGINNING ANY CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR DETERMINING EXISTENCE, EXACT LOCATION AND DEPTH OF ALL UTILITIES. AVOID DAMAGE TO UTILITIES AND SERVICES DURING CONSTRUCTION. ANY DAMAGE DUE TO THE CONTRACTOR'S CARELESSNESS SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE. COORDINATE AND COOPERATE WITH UTILITY COMPANIES DURING CONSTRUCTION.

C. ALL PROPOSED CONTOURS AND SPOT ELEVATIONS SHOWN ARE FINISHED GRADES AND/OR TOP OF PAVING SLAB (GUTTER), UNLESS OTHERWISE NOTED.

D. ALL STORM SEWER PIPE LENGTHS ARE MEASURED FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE AND INCLUDE FLARED END SECTION.

E. CONTRACTOR TO STRIP AND STOCKPILE TOPSOIL FROM ALL AREAS TO BE CUT OR FILLED. RESPREAD TO MINIMUM 6" DEPTH TO FINISH GRADES.

F. THE CONTRACTOR IS RESPONSIBLE FOR CLEANING DIRT AND DEBRIS FROM STREETS, DRIVEWAYS, AND SIDEWALKS CAUSED BY CONSTRUCTION ACTIVITIES.

POLLUTION PREVENTION NOTES

A. POLLUTION PREVENTION AND EROSION PROTECTION

1. CODE COMPLIANCE: THE CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL POTENTIAL POLLUTION AND SOIL EROSION CONTROL REQUIREMENTS OF THE IOWA CODE, THE IOWA DEPARTMENT OF NATURAL RESOURCES (IDNR) NPDES PERMIT, THE U.S. CLEAN WATER ACT AND ANY LOCAL ORDINANCES. THE CONTRACTOR SHALL TAKE ALL NECESSARY STEPS TO PROTECT AGAINST EROSION AND POLLUTION FROM THIS PROJECT SITE AND ALL OFF-SITE BORROW OR DEPOSIT AREAS DURING PERFORMANCE OR AS A RESULT OF PERFORMANCE.

2. DAMAGE CLAIMS: THE CONTRACTOR WILL HOLD THE OWNER AND ARCHITECT / ENGINEER HARMLESS FROM ANY AND ALL CLAIMS OF ANY TYPE WHATSOEVER RESULTING FROM DAMAGES TO ADJOINING PUBLIC OR PRIVATE PROPERTY, INCLUDING REASONABLE ATTORNEY FEES INCURRED TO OWNER. FURTHER, IF THE CONTRACTOR FAILS TO TAKE NECESSARY STEPS TO PROMPTLY REMOVE EARTH SEDIMENTATION OR DEBRIS WHICH COMES ONTO ADJOINING PUBLIC OR PRIVATE PROPERTY, THE OWNER MAY, BUT NEED NOT, REMOVE SUCH ITEMS AND DEDUCT THE COST THEREOF FROM AMOUNTS DUE TO THE CONTRACTOR.

B. STORM WATER DISCHARGE PERMIT

1. THIS PROJECT REQUIRES COVERAGE UNDER THE NPDES GENERAL PERMIT NO. 2 FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES FROM THE IDNR, AS REQUIRED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA). THE GENERAL CONTRACTOR AND ALL SUBCONTRACTORS ARE RESPONSIBLE FOR COMPLIANCE WITH AND FULFILLMENT OF ALL REQUIREMENTS OF THE NPDES GENERAL PERMIT NO. 2 INCLUDING CREATING OR MAINTAINING THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND POSSIBLY OBTAINING THE GENERAL PERMIT COVERAGE FROM THE IDNR.

2. ALL DOCUMENTS RELATED TO THE STORM WATER DISCHARGE PERMIT, INCLUDING, BUT NOT LIMITED TO, THE NOTICE OF INTENT, PROOF OF PUBLICATIONS, DISCHARGE AUTHORIZATION LETTER, CURRENT SWPPP, SITE INSPECTION LOG, AND OTHER ITEMS, SHALL BE KEPT ON SITE AT ALL TIMES AND MUST BE PRESENTED TO ANY JURISDICTIONAL AGENCIES UPON REQUEST. FAILURE TO COMPLY WITH THE NPDES PERMIT REQUIREMENTS IS A VIOLATION OF THE CLEAN WATER ACT AND THE CODE OF IOWA.

3. A "NOTICE OF DISCONTINUATION" MUST BE FILED WITH THE IDNR UPON FINAL STABILIZATION OF THE DISTURBED SITE AND REMOVAL OF ALL TEMPORARY EROSION CONTROL MEASURES. ALL PLANS, INSPECTION REPORTS, AND OTHER DOCUMENTS MUST BE RETAINED FOR A PERIOD OF THREE YEARS AFTER PROJECT COMPLETION. THE CONTRACTOR SHALL RETAIN A RECORD COPY AND PROVIDE THE ORIGINAL DOCUMENTS TO THE OWNER UPON PROJECT ACCEPTANCE AND/OR SUBMITTAL OF THE NOTICE OF DISCONTINUATION.

C. POLLUTION PREVENTION PLAN:

1. THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IS A SEPARATE DOCUMENT IN ADDITION TO THESE PLAN DRAWINGS. THE CONTRACTOR SHOULD REFER TO THE SWPPP FOR ADDITIONAL REQUIREMENTS AND MODIFICATIONS TO THE POLLUTION PREVENTION PLAN MADE DURING CONSTRUCTION.

2. THE SWPPP ILLUSTRATES GENERAL MEASURES AND BEST MANAGEMENT PRACTICES (BMP) FOR COMPLIANCE WITH THE PROJECT'S NPDES PERMIT COVERAGE. ALL BMP'S AND EROSION CONTROL MEASURES REQUIRED AS A RESULT OF CONSTRUCTION ACTIVITIES ARE THE RESPONSIBILITY OF THE CONTRACTOR TO IDENTIFY, NOTE AND IMPLEMENT. ADDITIONAL BMP'S FROM THOSE SHOWN ON THE PLAN MAY BE REQUIRED.

3. THE SWPPP AND SITE MAP SHOULD BE EXPEDITIOUSLY REVISED TO REFLECT CONSTRUCTION PROGRESS AND CHANGES AT THE PROJECT SITE.

4. THE CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL REQUIREMENTS OF THE GENERAL PERMIT AND SWPPP, INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING BMP'S UNLESS INFEASIBLE OR NOT APPLICABLE:

a. UTILIZE OUTLET STRUCTURES THAT WITHDRAW WATER FROM THE SURFACE WHEN DISCHARGING FROM BASINS, PROVIDE AND MAINTAIN NATURAL BUFFERS AROUND SURFACE WATERS, DIRECT STORM WATER TO VEGETATED AREAS TO INCREASE SEDIMENT REMOVAL AND MAXIMIZE STORM WATER INFILTRATION, AND MINIMIZE SOIL COMPACTION.

b. INSTALL PERIMETER AND FINAL SEDIMENT CONTROL MEASURES SUCH AS SILT BARRIERS, DITCH CHECKS, DIVERSION BERMS, OR SEDIMENTATION BASINS DOWNSTREAM OF SOIL DISTURBING ACTIVITIES PRIOR TO SITE CLEARING AND GRADING OPERATIONS.

c. PRESERVE EXISTING VEGETATION IN AREAS NOT NEEDED FOR CONSTRUCTION AND LIMIT TO A MINIMUM THE TOTAL AREA DISTURBED BY CONSTRUCTION OPERATIONS AT ANY TIME.

d. MAINTAIN ALL TEMPORARY AND PERMANENT EROSION CONTROL MEASURES IN WORKING ORDER, INCLUDING CLEANING, REPAIRING, REPLACEMENT, AND SEDIMENT REMOVAL THROUGHOUT THE PERMIT PERIOD. CLEAN OR REPLACE SILT CONTROL DEVICES WHEN THE MEASURES HAVE LOST 50% OF THEIR ORIGINAL CAPACITY.

e. INSPECT THE PROJECT AREA AND CONTROL DEVICES (BY QUALIFIED PERSONNEL ASSIGNED BY THE CONTRACTOR) EVERY SEVEN CALENDAR DAYS. RECORD THE FINDINGS OF THESE INSPECTIONS AND ANY RESULTING ACTIONS IN THE SWPPP WITH A COPY SUBMITTED WEEKLY TO THE OWNER OR ENGINEER DURING CONSTRUCTION. REVISE THE SWPPP AND IMPLEMENT ANY RECOMMENDED MEASURES WITHIN 7 DAYS.

f. PREVENT ACCUMULATION OF EARTH AND DEBRIS FROM CONSTRUCTION ACTIVITIES ON ADJOINING PUBLIC OR PRIVATE PROPERTIES, INCLUDING STREETS, DRIVEWAYS, SIDEWALKS, DRAINAGEWAYS, OR UNDERGROUND SEWERS. REMOVE ANY ACCUMULATION OF EARTH OR DEBRIS IMMEDIATELY AND TAKE REMEDIAL ACTIONS FOR FUTURE PREVENTION.

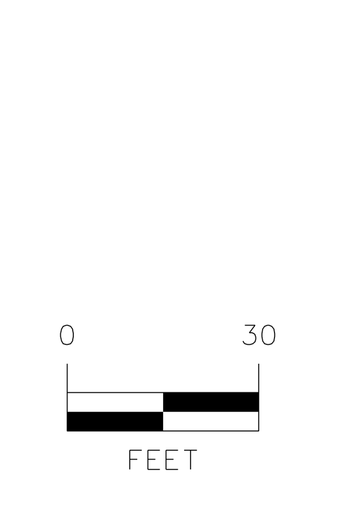
g. INSTALL NECESSARY CONTROL MEASURES SUCH AS SILT BARRIERS, EROSION CONTROL MATS, MULCH, DITCH CHECKS OR RIPRAP AS SOON AS AREAS REACH THEIR FINAL GRADES AND AS CONSTRUCTION OPERATIONS PROGRESS TO ENSURE CONTINUOUS RUNOFF CONTROL. PROVIDE INLET AND OUTLET CONTROL MEASURES AS SOON AS STORM SEWERS ARE INSTALLED.

h. RESPREAD A MINIMUM OF 4 INCHES OF TOPSOIL (INCLUDING TOPSOIL FOUND IN SOD) ON ALL DISTURBED AREAS, EXCEPT WHERE PAVEMENT, BUILDINGS OR OTHER IMPROVEMENTS ARE LOCATED.

i. STABILIZE UNDEVELOPED, DISTURBED AREAS WITH MULCH, TEMPORARY SEED MIX, PERMANENT SEED MIX, OR SOD AS SOON AS PRACTICAL UPON COMPLETION OR DELAY OF GRADING OPERATIONS. INITIATE STABILIZATION MEASURES NO LATER THAN 14 CALENDAR DAYS AFTER CONSTRUCTION ACTIVITY HAS FINISHED OR IS PLANNED TO BE DELAYED MORE THAN 21 CALENDAR DAYS.

j. COORDINATE LOCATIONS OF STAGING AREAS WITH THE OWNER AND RECORD IN THE SWPPP. UNLESS NOTED OTHERWISE, STAGING AREAS SHOULD CONTAIN THE FOLLOWING: JOB TRAILERS, FUELING / VEHICLE MAINTENANCE AREA, TEMPORARY SANITARY FACILITIES, MATERIALS STORAGE, AND CONCRETE WASHOUT FACILITY. CONTROL RUNOFF FROM STAGING AREAS WITH DIVERSION BERMS AND/OR SILT BARRIERS AND DIRECT TO A SEDIMENT BASIN OR OTHER CONTROL DEVICE WHERE POSSIBLE. CONCRETE WASHOUT MUST BE CONTAINED ONSITE.

k. REMOVE ALL TEMPORARY EROSION CONTROL MEASURES AND SITE WASTE PRIOR TO FILING OF THE "NOTICE OF DISCONTINUATION".



MARK	REVISION	DATE	BY
4.	REVISED AS PER OWNER COMMENTS	12/29/17	RMM
3.	REVISED AS PER CITY COMMENTS	12/18/17	RMM
2.	REVISED AS PER OWNER COMMENTS	12/12/17	KSS
1.	REVISED AS PER CITY COMMENTS	10/30/17	GJC

Engineer: JAL Checked By: TLW
Technician: LFG Date: 10/11/17 Field Bk: Pg:
Project No: 117.0829 Sheet 5 of 7

CEDAR FALLS FAREWAY SITE PLAN

GRADING AND EROSION CONTROL PLAN

CEDAR FALLS, IA

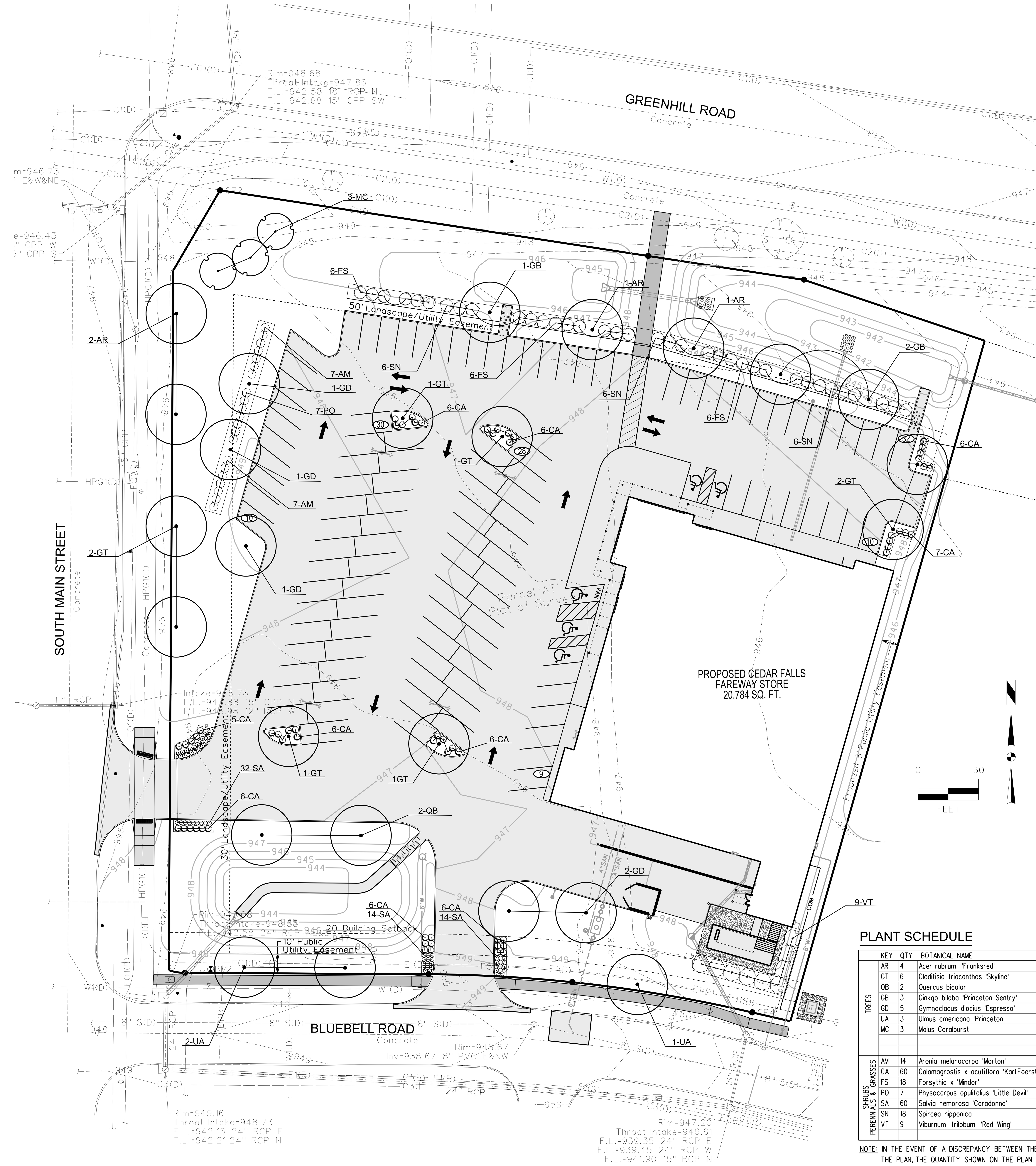
SNYDER & ASSOCIATES, INC.
2727 S.W. SNYDER BLVD.
ANKENY, IOWA 50023
515-964-2020 | www.snyder-associates.com

SNYDER & ASSOCIATES

Project No: 11

Sheet 5 o

Item 4.C.



PLANTING PLAN GENERAL NOTES

A. UTILITY WARNING:
THE UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND/OR RECORDS OBTAINED. THE URVEYOR MAKES NO GUARANTEE THAT THE UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEY FURTHER DOES NOT WARRANT THAT THE UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED.

B. NOTIFY UTILITY OWNERS PRIOR TO BEGINNING ANY CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR DETERMINING EXISTENCE, EXACT LOCATION AND DEPTH OF ALL UTILITIES. AVOID DAMAGE TO UTILITIES AND SERVICES DURING CONSTRUCTION. ANY DAMAGE DUE TO THE CONTRACTOR'S CARELESSNESS SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE. COORDINATE AND COOPERATE WITH UTILITY COMPANIES DURING CONSTRUCTION.

C. ALL PLANT MATERIAL SHALL AT LEAST MEET MINIMUM REQUIREMENTS SHOWN IN THE "AMERICAN STANDARDS FOR NURSERY STOCK" (ANSI Z60.1-LATEST EDITION).

D. CONTRACTOR TO WATER ALL TREES AND SHRUBS UNTIL THEY ARE ESTABLISHED THROUGH FIRST GROWING SEASON. ALL LANDSCAPE PLANTINGS SHALL HAVE A ONE YEAR WARRANTY.

E. PROVIDE 3-INCH DEPTH SHREDDED HARDWOOD MULCH AROUND ALL PLANTINGS TO A MIN. 3-FOOT PERIMETER WITH TOOLED EDGE, AND IN ALL AREAS INDICATED ON PLAN.

LANDSCAPE REQUIREMENTS

(AS PER MIXED USED RESIDENTIAL DISTRICT CITY OF CEDAR FALLS MUNICIPAL CODE)

OPEN SPACE REQUIREMENTS:
TOTAL LOT AREA: 132,147 SF X 10% (MINIMUM) = 13,215 SF MINIMUM OPEN SPACE
50,563 SF PROVIDED (38.26%) - 28,531 SF (REQ. LANDSCAPE SETBACKS) = 22,032 SF (16.67%)

POINTS REQUIRED: 132,147 X .02 = 2,643 POINTS REQUIRED
MINIMUM 65% OF POINTS SHALL BE TREES (1,718 POINTS)
1,750 POINTS PROVIDED
MINIMUM 10% OF POINTS SHALL BE EVERGREEN/SHRUBS (265 POINTS)
1040 POINTS PROVIDED
TOTAL POINTS PROVIDED: 2,790

STREET FRONTAGE REQUIREMENTS:
BLUEBELL ROAD: 311 LF X .75 = 233.25 POINTS REQUIRED
TOTAL POINTS PROVIDED: 255
SOUTH MAIN STREET: 394 LF X .75 = 295.5 POINTS REQUIRED
TOTAL POINTS PROVIDED: 340
GREENHILL ROAD: 388 LF X .75 = 291 POINTS REQUIRED
TOTAL POINTS PROVIDED: NONE - 5 EXISTING TREES

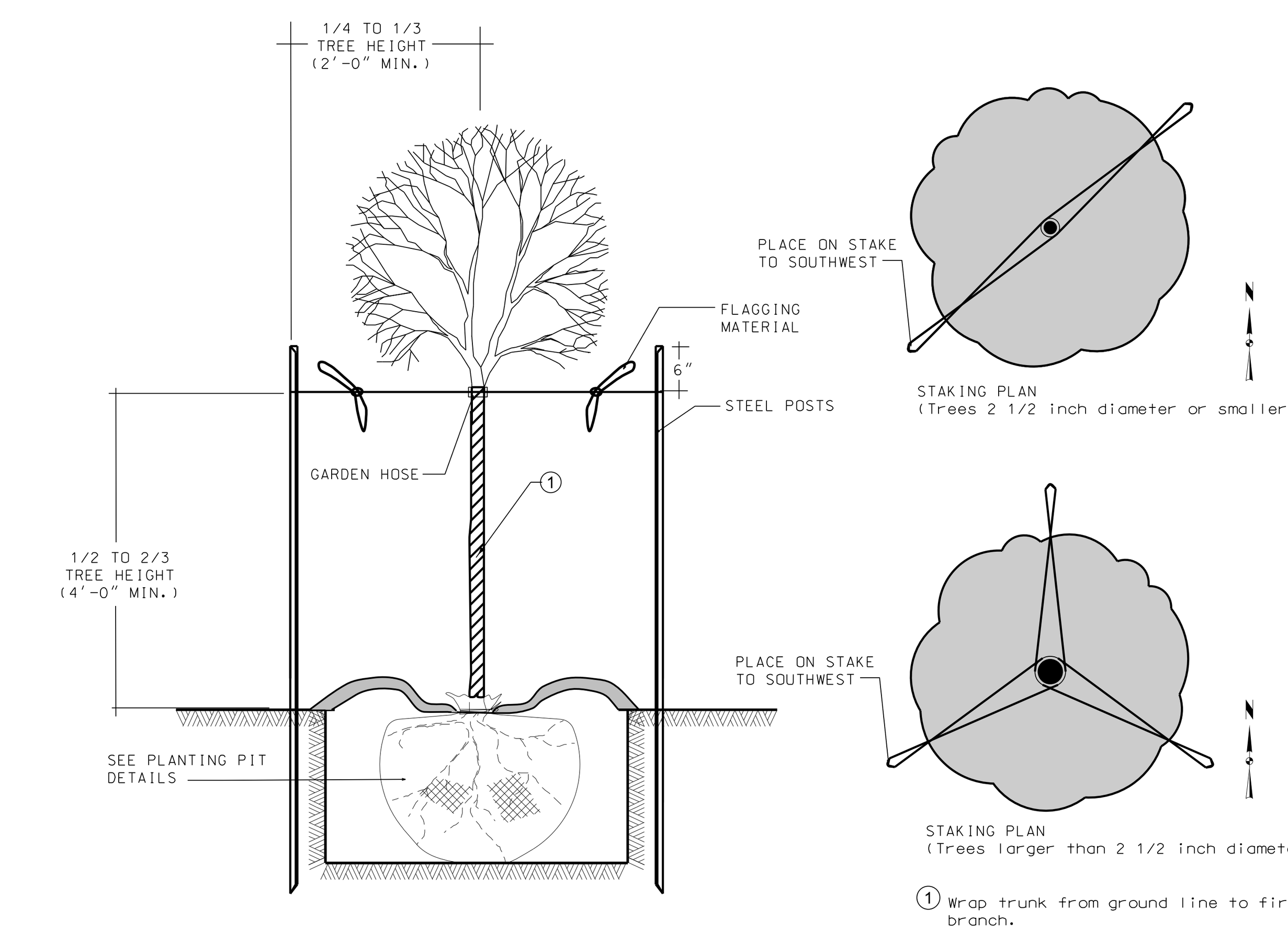
PERIPHERAL PARKING LOT REQUIREMENTS:
TOTAL PARKING AREA: 57,664 SF (119 PARKING STALLS)
1 TREE PER 15 PARKING STALLS: 119/15 = 7.93 TREES REQUIRED
8 TREES PROVIDED
HEADLIGHT SCREENING REQUIRED: 57 SHRUBS PROVIDED

INTERIOR PARKING LOT REQUIREMENTS:
MINIMUM 5% LANDSCAPED AREA LOCATED WITHIN PARKING LOT AREA
57,664 SF X 5% = 2,883.20 SF REQUIRED LANDSCAPED AREA
1 TREE PER 21 PARKING STALLS: 119/21 = 5.66 TREES REQUIRED
6 TREES PROVIDED
TOTAL LANDSCAPED AREA PROVIDED: 1,328 SF

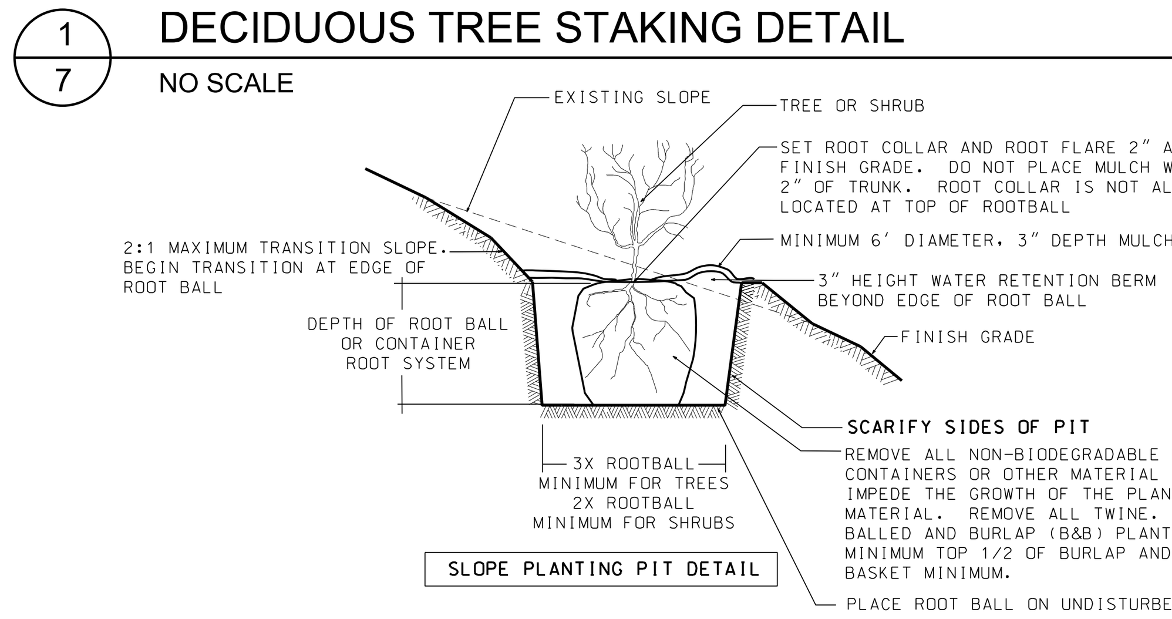
PLANT SCHEDULE

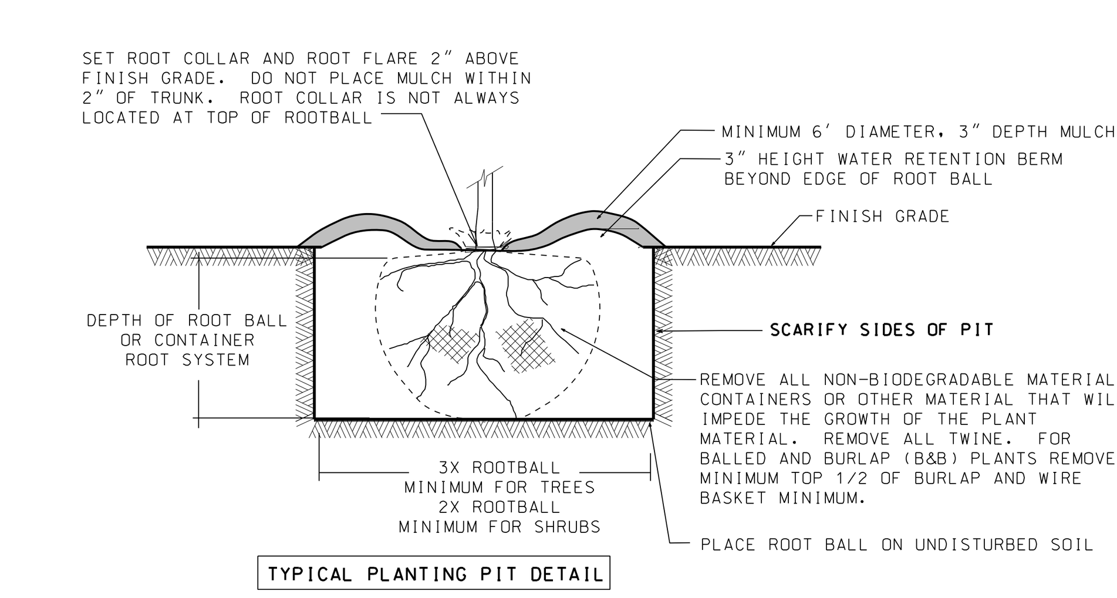
	KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	COMMENTS
TREES	AR	4	Acer rubrum 'Franksred'	RED SUNSET MAPLE	2.5" CAL.	B&B
	GT	6	Gleditisia triacanthos 'Skyline'	SKYLINE HONEYLOCUST	2.5" CAL.	B&B
	QB	2	Quercus bicolor	SWAMP WHITE OAK	2.5" CAL.	B&B
	GB	3	Ginkgo biloba 'Princeton Sentry'	PRINCETON SENTRY GINKGO	2.5" CAL.	B&B
	GD	5	Gymnocladus diocius 'Espresso'	ESPRESSO KENTUCKY COFFEETREE	2.5" CAL.	B&B
	UA	3	Ulmus americana 'Princeton'	PRINCETON AMERICAN ELM	2.5" CAL.	B&B
	MC	3	Malus Coralburst	CORALBURST CRABAPPLE	6' HT.	B&B
SHRUBS PERENNIALS & GRASSES	AM	14	Aronia melanocarpa 'Morton'	IROQUOIS BEAUTY BLACK CHOKEBERRY	24" HT.	2 GAL. CONT.; 5' O.C.
	CA	60	Calamagrostis x acutiflora 'KarlFoerster'	KARL FOERSTER FEATHER REED GRASS	24" HT.	2 GAL. CONT.; 3' O.C.
	FS	18	Forsythia x 'Mindor'	SHOW OFF FORSYTHIA	24" HT.	5 GAL. CONT.; 6' O.C.
	PO	7	Physocarpus opulifolius 'Little Devil'	LITTLE DEVIL NINEBARK	24" HT.	2 GAL. CONT.; 5' O.C.
	SA	60	Salvia nemorosa 'Caradonna'	CARADONNA SALVIA	12" HT.	2 GAL. CONT.; 2' O.C.
	SN	18	Spiraea nipponica	SNOWMOUND SPIREA	36" HT.	5 GAL. CONT.; 6' O.C.
	VT	9	Viburnum trilobum 'Red Wing'	REDWING AMERICAN CRANBERRYBUSH VIBURNUM	36" HT.	5 GAL. CONT.; 8' O.C.

NOTE: IN THE EVENT OF A DISCREPANCY BETWEEN THE QUANTITY SHOWN IN THE PLANT SCHEDULE AND THE QUANTITY SHOWN ON THE PLAN, THE QUANTITY SHOWN ON THE PLAN SHALL GOVERN.



1/7 DECIDUOUS TREE STAKING DETAIL
NO SCALE





2/7 PLANTING PIT DETAILS
NO SCALE

MARK	REVISION	DATE	BY
4.	REVISED AS PER OWNER COMMENTS	12/29/17	RMM
3.	REVISED AS PER CITY COMMENTS	12/18/17	RMM
2.	REVISED AS PER OWNER COMMENTS	12/12/17	KSS
1.	REVISED AS PER CITY COMMENTS	10/30/17	GJC

Engineer: JAL Checked By: TLW
Techn:
Proj:

CEDAR FALLS FAREWAY SITE PLAN

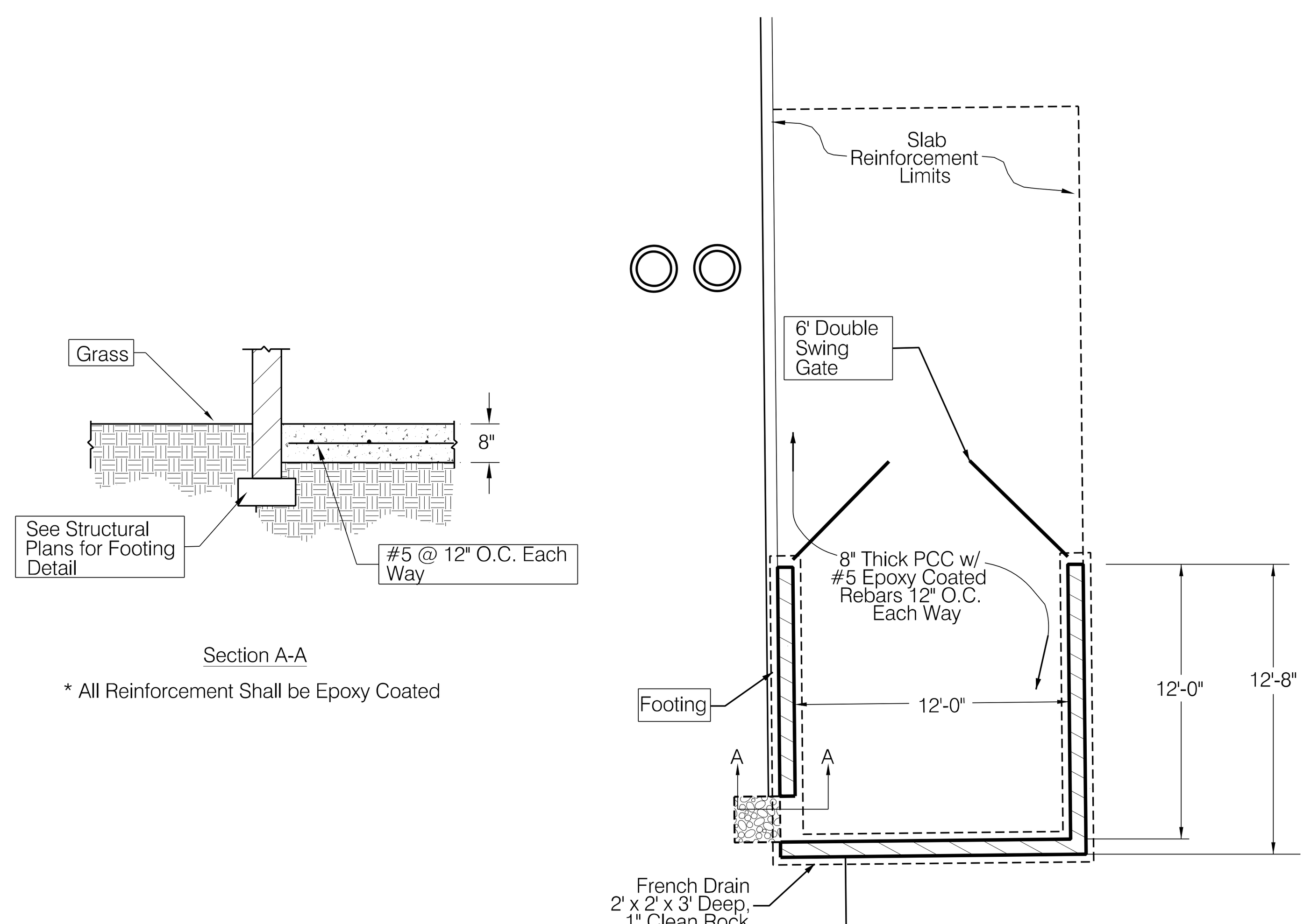
CEDAR FALLS, IA

PLANTING PLAN

SNYDER & ASSOCIATES, INC.
2727 S.W. SNYDER BLVD.
ANKENY, IOWA 50023
515-964-2020 | www.snyder-associates.com

Project No: 117.0829

Sheet 6 of 7

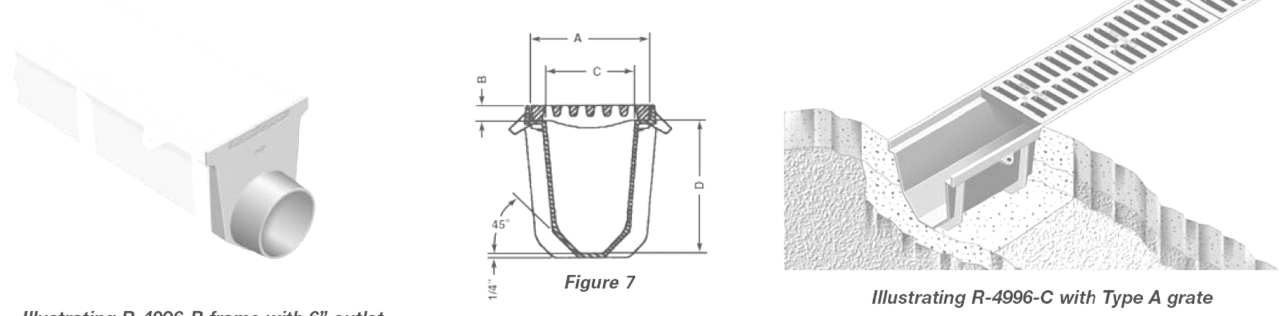


1/7 TRASH ENCLOSURE DETAIL
NO SCALE

4/7 10' TALL PRIVACY FENCE
NO SCALE

R-4996 Series
SELF-FORMING TRENCH PAN
Heavy Duty

- Durability and permanence of cast iron
- Labor and material saving installation
- Competitively priced
- Quick, inexpensive forms & installation
- Iron pans will withstand rough jobsite handling
- Tested and proven hydraulic performance
- Assembly materials are reusable



Illustrating R-4996-B frame with 6" outlet

Figure 7

Illustrating R-4996-C with Type A grate

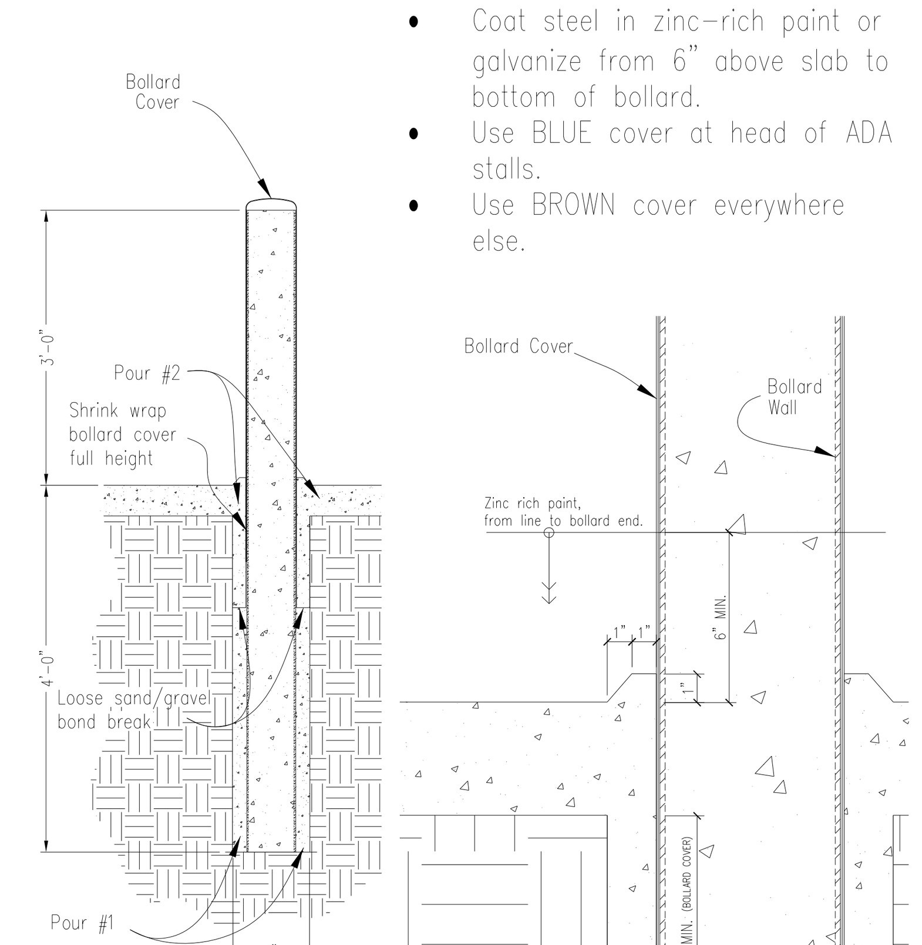
All grates/covers and frames can be bolted if required.

Catalog No.	Standard Cover Dimensions A	B	C	D	Frame Length	Outlet Location/Sizes Side	Bottom	End	Available Grate/Cover
R-4996-A	8	1	6	9	30	4,6	4	4	Q**
R-4996-B	10	1	8	10 3/8	30	4,6,8	4,6	4,6	P,Q**
R-4996-C	12	1 1/2	10	10	36	4,6,8	4,6,8	4,6,8	A,C,D,L,P,Q
R-4996-CA*	12	1 1/2	10	10	36	4,6,8	4,6,8	4,6,8	A

Type L grates come standard bolted.
* Aircraft Rated - Standard Bolted.
**Can be incorporated into plans for ADA compliance.

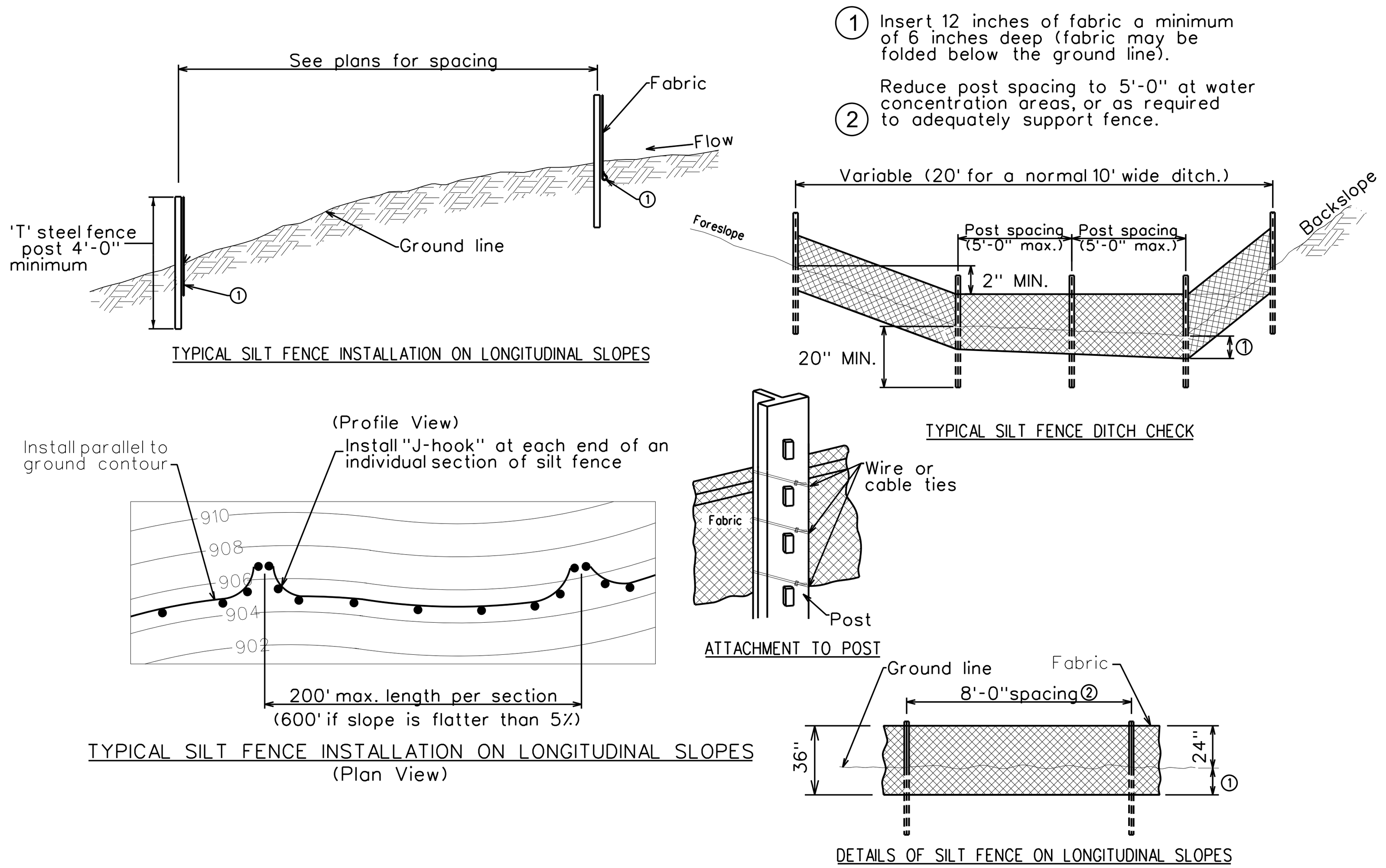
2/7 INTAKE DETAIL
NO SCALE

- Coat steel in zinc-rich paint or galvanize from 6" above slab to bottom of bollard.
- Use BLUE cover at head of ADA stalls.
- Use BROWN cover everywhere else.

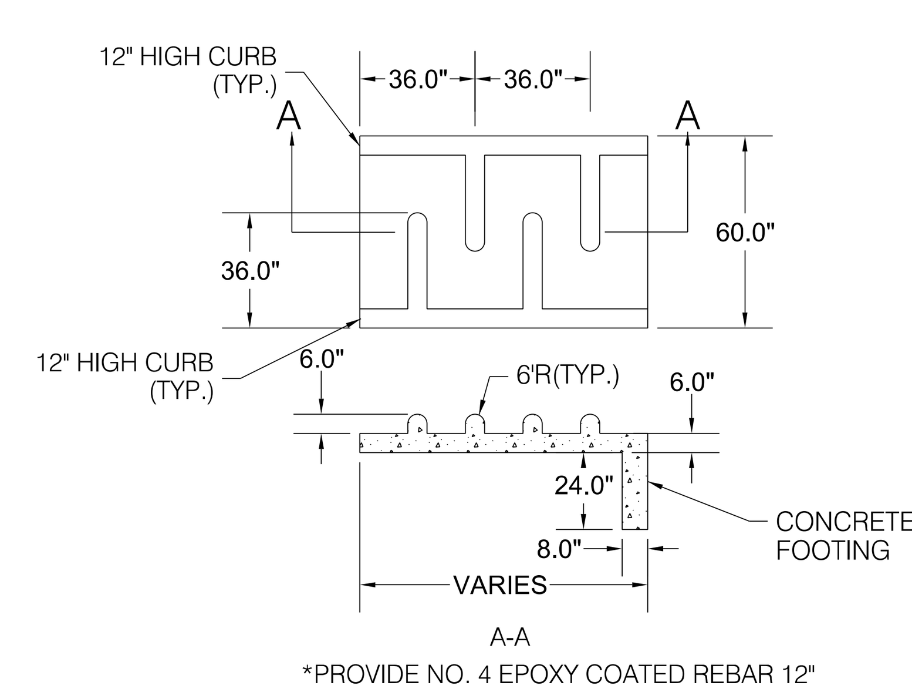


5/7 TYPICAL 6" DIA BOLLARD DETAIL
NO SCALE

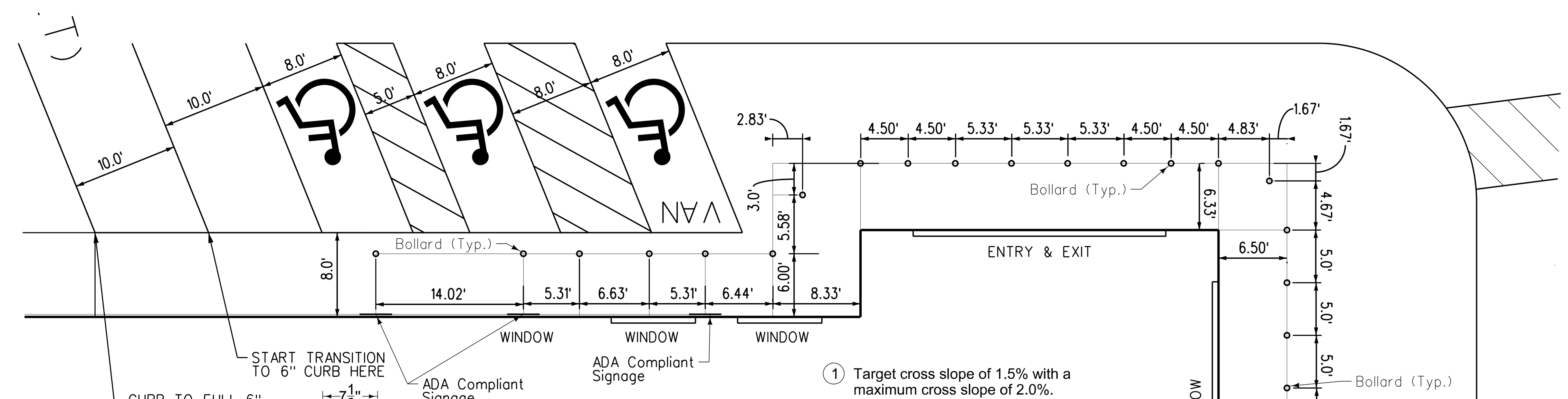
1. Insert 12 inches of fabric a minimum of 6 inches deep (fabric may be folded below the ground line).
2. Reduce post spacing to 5'-0" at water concentration areas, or as required to adequately support fence.

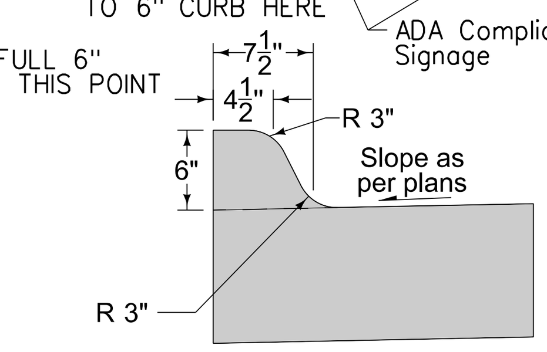


3/7 SILT FENCE DETAIL
NO SCALE

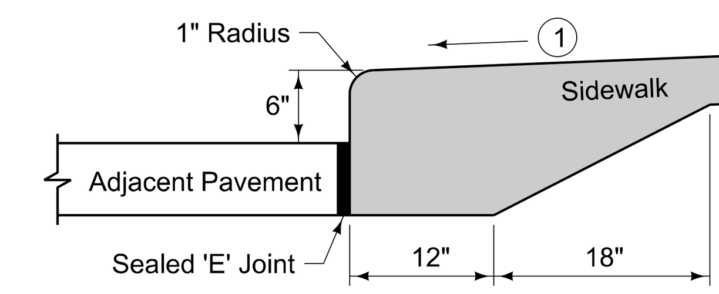


6/7 FLUME ENERGY DISSIPATOR DETAIL
NO SCALE

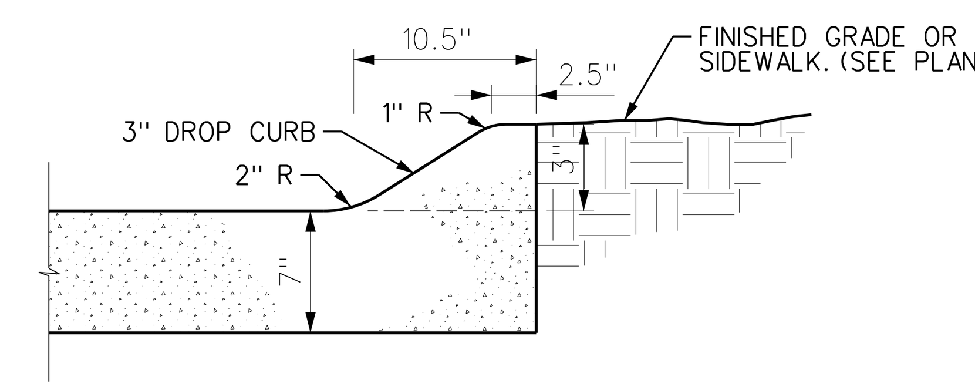




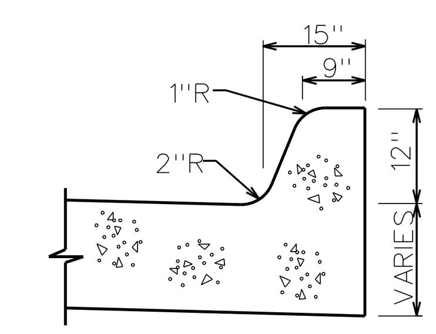
7/7 6" PCC STANDARD CURB
NO SCALE



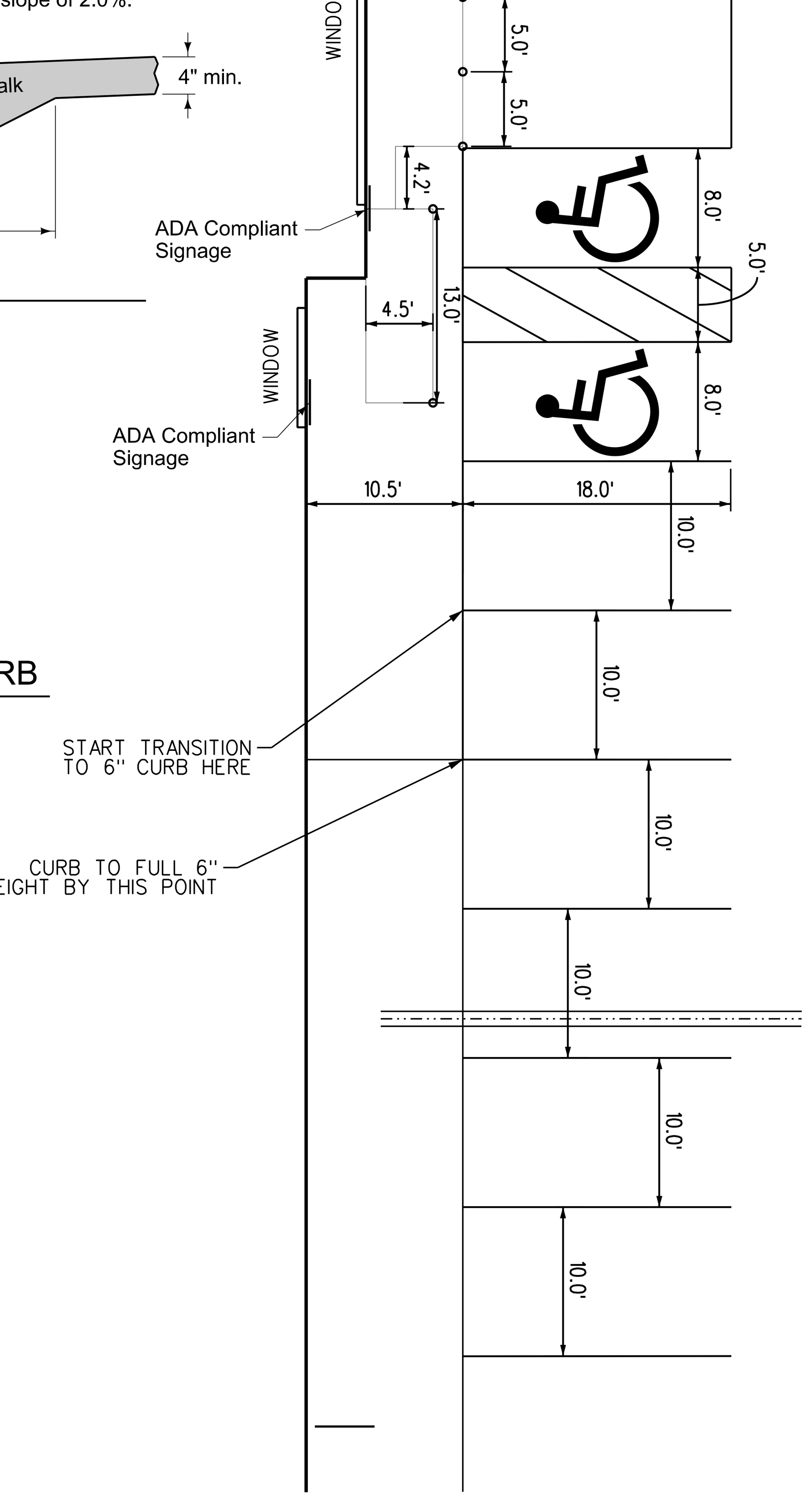
8/7 PCC INTEGRAL CURB
NO SCALE



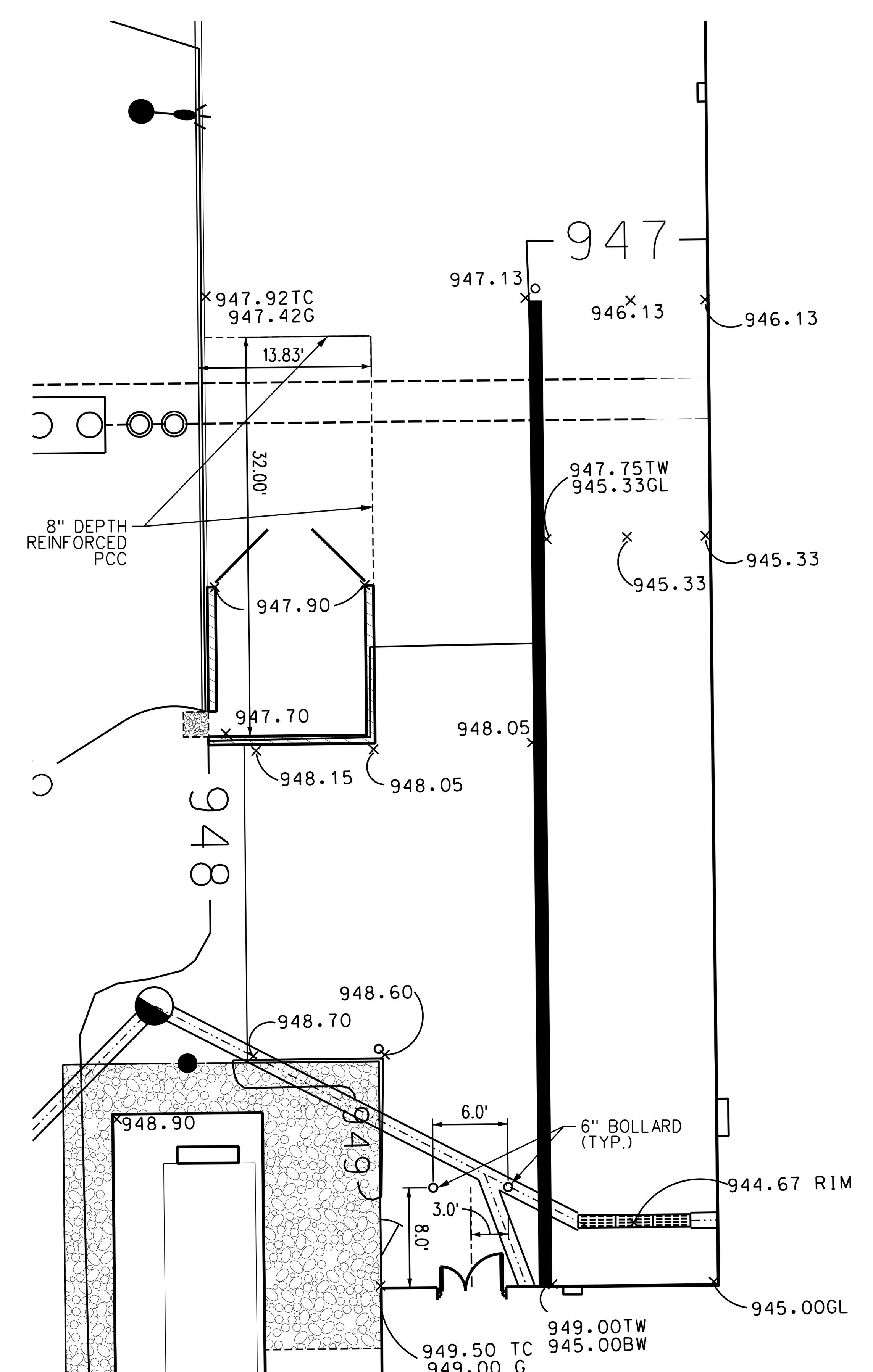
9/7 3-INCH ROLLED CURB
NO SCALE



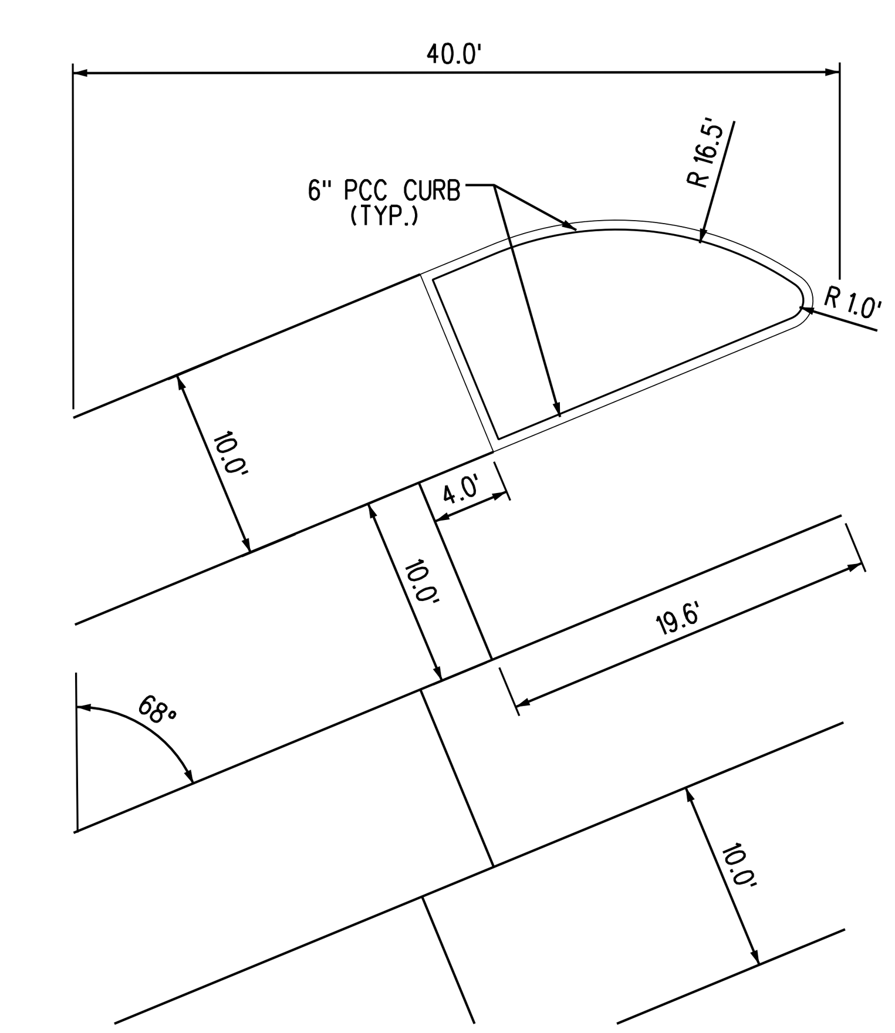
10/7 12" PCC STANDARD CURB
NO SCALE



12/7 PARKING LOT DETAIL
1" = 10' - 0"



11/7 DOCK AREA DETAIL
1" = 10' - 0"



13/7 TYPICAL PARKING STALL LAYOUT
1" = 10' - 0"

MARK	REVISION	DATE	BY
4.	REVISED AS PER OWNER COMMENTS	12/29/17	RMM
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Engineer: JAL Checked By: TLW Field Bk:
Technician: LFG Date: 10/11/17 Pg:
Project No: 117.0829 Sheet 7 of 7

CEDAR FALLS FAREWAY SITE PLAN
CEDAR FALLS, IA
SITE DETAILS

SNYDER & ASSOCIATES, INC.
2727 S.W. SNYDER BLVD.
ANKENY, IOWA 50023
515-964-2020 | www.snyder-associates.com

Item 4.C.

Project No: 117.0829
Sheet 7 of 7

Rietz
Rietz Consultants, Ltd.
Consulting Engineers
2708 Stange Road
Ames, Iowa 50010
Telephone 515.292.7026
Facsimile 515.292.7101
www.rietz.com

View from Southwest

View from Northwest

PRELIMINARY

REVISION | DATE | DESCRIPTION

New Retail Store: Cedar Falls, IA 50613
Fareway Stores, Inc.
2300 East Eighth Street
Boone, Iowa 50036

vs

Item 4.C.

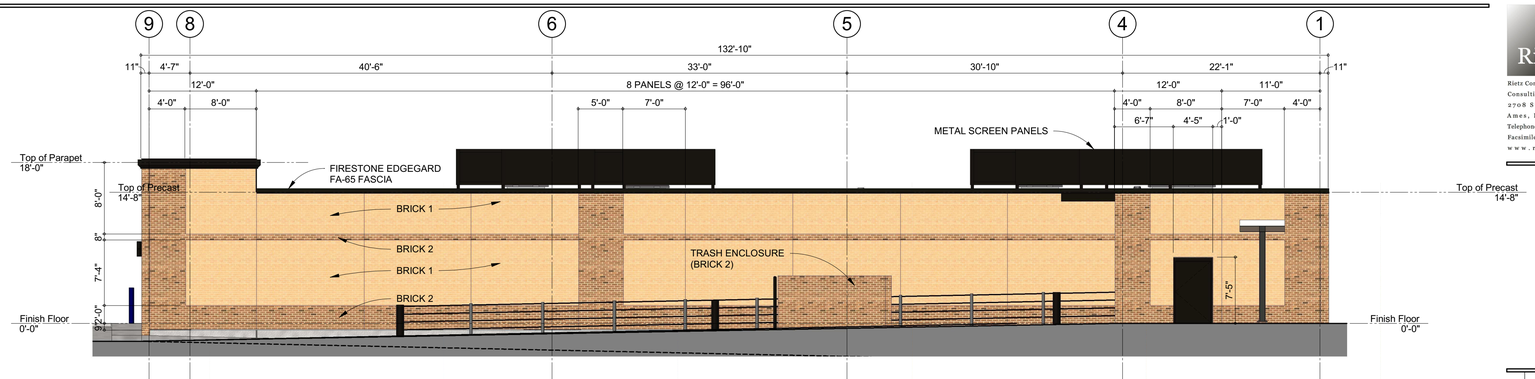
REVIEW

Building Materials - South Elevation		
Building Material	**Area (SF)**	**Material %**
Brick	2,073	95%
Door	32	1%
Fascia / Cornice	80	4%
Totals	2,185	100%

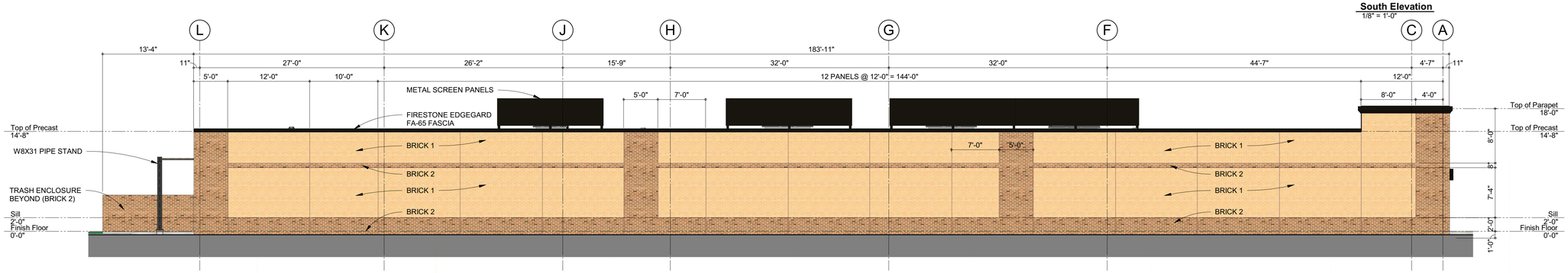
Building Materials - East Elevation		
Building Material	**Area (SF)**	**Material %**
Brick	2,741	96%
Fascia / Cornice	108	4%
Totals	2,849	100%

Building Materials - West Elevation		
Building Materials	**Area (SF)**	**Material %**
Brick	1,868	57%
Stone Veneer	208	6%
Doors	125	4%
Windows	464	14%
Awnings	133	4%
Aluminum Panels	244	7%
Fascia / Cornice	251	8%
Totals	3,293	100%

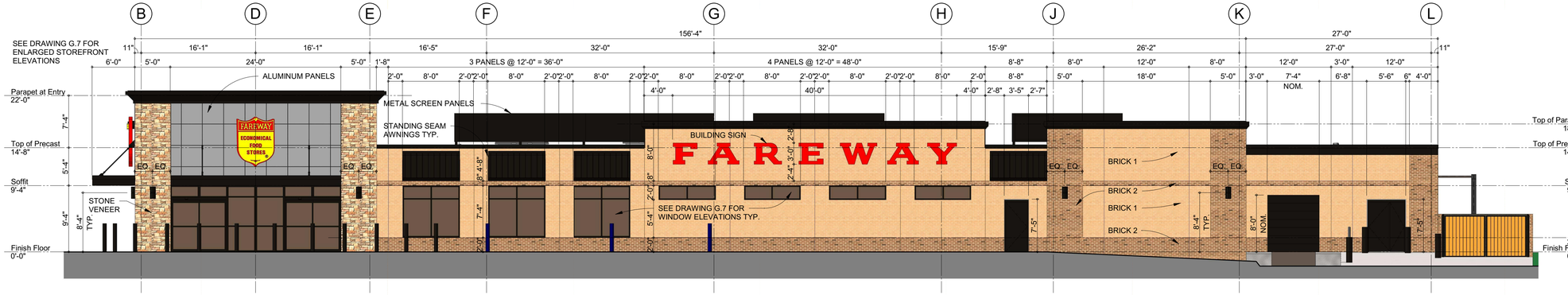
Building Materials - North Elevation		
Building Materials	**Area (SF)**	**Material %**
Brick	1,507	59%
Stone Veneer	205	8%
Doors	25	1%
Windows	315	12%
Awnings	67	3%
Aluminum Panels	244	9%
Fascia / Cornice	195	8%
Totals	2,558	100%



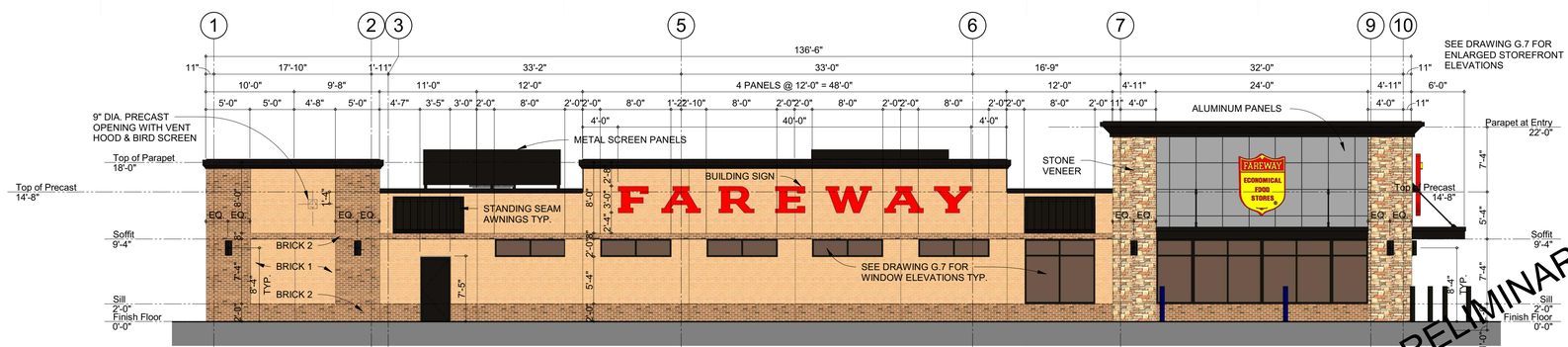
South Elevation
1/8" = 1'-0"



East Elevation
1/8" = 1'-0"



West Elevation
1/8" = 1'-0"



North Elevation
1/8" = 1'-0"

PRELIMINARY

REVIEW

Shield Elevation

NOTES	
Modular Thin Brick 1:	Main Brick Field (Light Brick) Endicott Modular Keyback Thin Brick Embedded in Precast Color: 100% Golden Buff Texture: Velour
Modular Thin Brick 2:	Brick Below +2'-0", 8" Horizontal Band & Vertical Columns (Dark Brick) Endicott Modular Keyback Thin Brick Embedded in Precast Color: 70% Dark Sandstone, 20% Executive Ironspot, 10% Sienna Ironspot Texture: Velour
Stone Veneer at Entry:	Cultured Stone. Country Ledgestone. Color: Caramel
Fascia, Flashing & Trim:	Firestone UNA-CLAD 24 Gage Galvanized Steel Dark Bronze Kynar 500 / Hylar 5000 Siliconized Modified Polyester
Metal Soffit Panels:	Firestone UNA-CLAD UC-500 12" Panel Width 24 Gage Galvanized Steel Dark Bronze Kynar 500 / Hylar 5000 Siliconized Modified Polyester
Standing Seam at Sloped Awnings:	Firestone UNA-CLAD UC-4 9.75" Panel Width 24 Gage Galvanized Steel Dark Bronze Kynar 500 / Hylar 5000 Siliconized Modified Polyester
Steel Doors & Frames, Steel Sectional Door:	See Door Schedule Exterior Door Paint Color: Dark Bronze Field Painted Finish Interior Door Paint Color: Sherwin Williams - Fareway Tan
Metal Panels Above Entry Canopies:	Firestone Series 1000 Composite Panel System Color: Aluminum Cityscape
Aluminum Storefront:	2" x 4.1/2" Thermally Broken Framing Dark Bronze Anodized
Metal Screen Panels:	24" Panel Width, 1.1/2" Panel Depth, 24 Gage Galvanized Steel Dark Bronze Kynar 500 / Hylar 5000 Siliconized Modified Polyester
Building Sign:	Individual Letter Backlit Red Molded Plastic

Rietz
Rietz Consultants, Ltd.
Consulting Engineers
2708 Stange Road
Ames, Iowa 50010
Telephone 515.292.7026
Facsimile 515.292.7101
www.rietz.com

New Retail Store: Cedar Falls, IA 50613
Fareway Stores, Inc.
2300 East Eighth Street
Boone, Iowa 50036

DESCRIPTION
DATE
REVISION

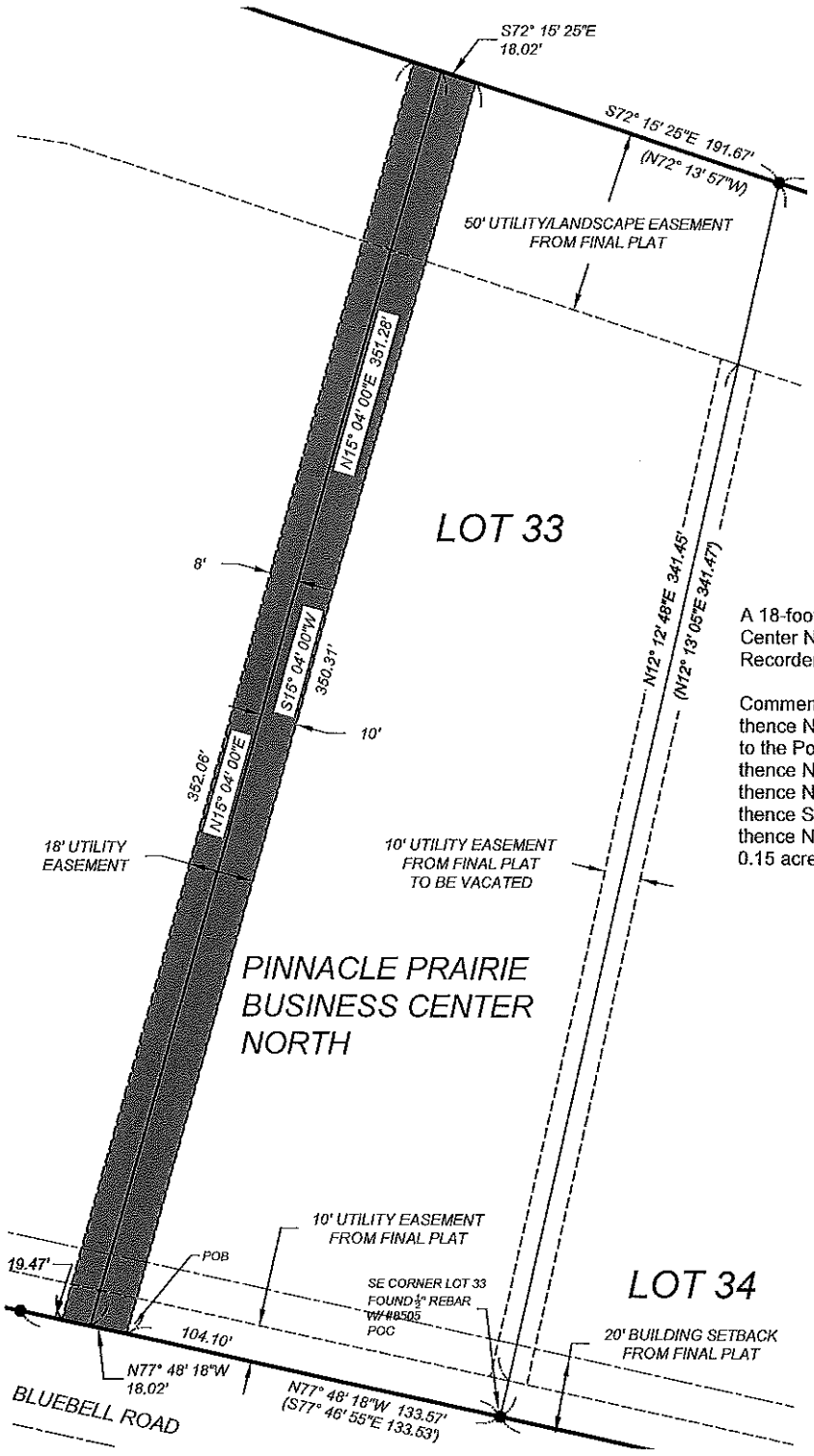
ISIONS
Item 4.C.

A-2

-75-

EXHIBIT B

18-FOOT WIDE UTILITY EASEMENT



OWNER: GREENHILL ESTATES, INC.

LEGAL DESCRIPTION

EXHIBIT B
18 – FOOT WIDE UTILITY EASEMENT

A 18-foot wide Utility Easement in Lot 33, Pinnacle Prairie Business Center North recorded in Book 27 Page 207, Black Hawk County Recorder's Office, Black Hawk County, Iowa is described as follows:

Commencing as a point of reference at the SE corner of said Lot 33;
thence N77°48'18"W along the south line of said Lot 33, 104.10 feet to the Point of Beginning;
thence N77°48'18"W along said south line, 18.02 feet;
thence N15°04'00"E, 352.06 feet to the north line of said Lot 33;
thence S72°15'25"E along said north line, 18.02 feet;
thence N15°04'00"E, 350.31 feet to the Point of Beginning containing 0.15 acres.

0 25 50 100

N

●	FOUND 1/2" REBAR W/ #8505 OR AS LABELED
POB	POINT OF BEGINNING
()	RECORDED AS
UE	UTILITY EASEMENT
UDE	UTILITY & DRAINAGE EASEMENT
YPC	YELLOW PLASTIC CAP

DATE OF SURVEY 01/11/17

PAGE 2

Project No. 507117-10

BRAIN ENGINEERING, INC.
CIVIL • LAND DEVELOPMENT • SURVEYING • TRANSPORTATION

Drawing Title:

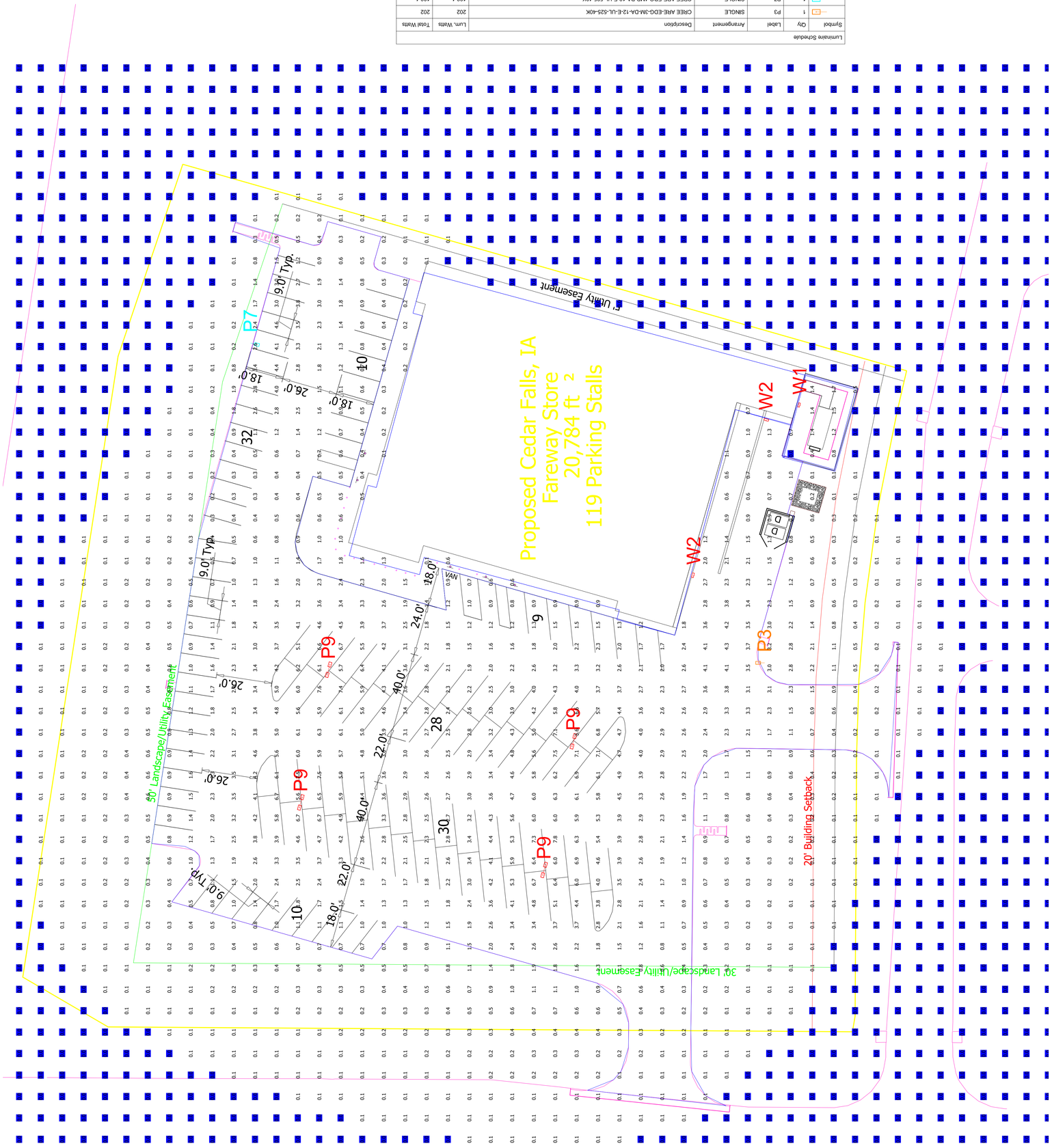
EXHIBIT B

18 - FOOT WIDE UTILITY EASEMENT

K:\Proj\507117-10 Cedar Falls\507117-10 Vacated Easement.dwg

Calculation Summary								
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min	
CalcPts_1	Illuminance	Fc	0.59	7.5	0.0	N.A.	N.A.	

Luminaire Schedule						
Symbol	Qty	Label	Arrangement	Description	Lum. Watts	Total Watts
	1	P3	SINGLE	CREE ARE-EDG-3M-DA-12-E-UL-525-40K	202	202
	1	P7	SINGLE	CREE ARE-EDG-4MB-DA-12-E-UL-525-40K	198.4	198.4
	4	P9	BACK-BACK	CREE ARE-EDG-5M-DA-12-E-UL-525-40K	202	1616
	1	W1	SINGLE	LNC-9LU-SK-4	22.2	22.2
	2	W2	SINGLE	LNC2-18LU-HK-4	43	86



Luminaire Schedule						
Symbol	Qty	Label	Arrangement	Description	Lum. Watts	Total Watts
	1	P9	BACK-BACK	CREE ARE-EDG-5M-DA-12-E-UL-525-40K	202	404
	1	W1	SINGLE	LNC-26LU-5K-4	22.2	22.2
	2	W2	SINGLE	LNC2-18LU-4K-4	22.2	43

Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts_1	Illuminance	Fc	0.13	6.2	0.0	N.A.	N.A.

Cree Edge™ Series

LED Area/Flood Luminaire

Product Description

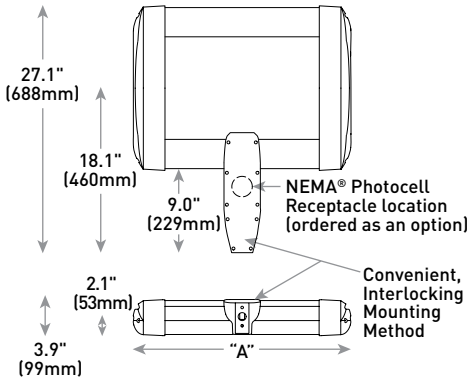
The Cree Edge™ Series has a slim, low profile design. Its rugged cast aluminum housing minimizes wind load requirements and features an integral, weathertight LED driver compartment and high performance aluminum heat sinks. Various mounting choices: Adjustable Arm, Direct Arm, Direct Arm Long, or Side Arm (details on page 2). Includes a leaf/debris guard.
Applications: Parking lots, walkways, campuses, car dealerships, office complexes, and internal roadways

Performance Summary

- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 4000K (+/- 300K), 5700K (+/- 500K) standard
- **Limited Warranty†:** 10 years on luminaire/10 years on Colorfast DeltaGuard® finish

†See http://lighting.cree.com/warranty for warranty terms

DA Mount



LED Count (x10)	Dim. "A"	Weight
02	12.1" (306mm)	21 lbs. (10kg)
04	12.1" (306mm)	24 lbs. (11kg)
06	14.1" (357mm)	27 lbs. (12kg)
08	16.1" (408mm)	28 lbs. (13kg)
10	18.1" (459mm)	32 lbs. (15kg)
12	20.1" (510mm)	34 lbs. (15kg)
14	22.1" (560mm)	37 lbs. (17kg)
16	24.1" (611mm)	41 lbs. (19kg)

AA/DL/SA Mount - see page 22 for weight & dimensions

Accessories

Field-Installed	
Bird Spikes XA-BRDSPK **Hand-Held Remote** XA-SENSREM - For successful implementation of the programmable multi-level option, a minimum of one hand-held remote is required	**Backlight Control Shields** XA-20BLS-4 - Four-pack - Unpainted stainless steel

Ordering Information

Example: ARE-EDG-2M-AA-12-E-UL-SV-350

					E				
Product	**Optic**			**Mounting***	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
ARE-EDG	**2M** Type II Medium **2MB** Type II Medium w/BLS **2MP** Type II Medium w/Partial BLS **3M** Type III Medium	**3MB** Type III Medium w/BLS **3MP** Type III Medium w/Partial BLS **4M** Type IV Medium **4MB** Type IV Medium w/BLS	**4MP** Type IV Medium w/Partial BLS **5M** Type V Medium **5S** Type V Short	**AA** Adjustable Arm **DA** Direct Arm **DL** Direct Long Arm	**02** **04** **06** **08** **10** **12** **14** **16**	**E**	**UL** Universal 120-277V **UH** Universal 347-480V	**BK** Black **BZ** Bronze **SV** Silver **WH** White	**350** 350mA **525** 525mA **700** 700mA - Available with 20-60 LEDs	**DIM 0-10V Dimming** - Control by others - Refer to Dimming spec sheet for details - Can't exceed specified drive current **F Fuse** - Refer to ML spec sheet for availability with ML options - Available with UL voltage only - Available for U.S. applications only - When code dictates fusing, use time delay fuse **HL Hi/Low (Dual Circuit Input)** - Refer to HL spec sheet for details - Sensor not included **ML Multi-Level** - Refer to ML spec sheet for details - Intended for downlight applications at 0° tilt **P Photocell** - Refer to ML spec sheet for availability with ML options - Available with UL voltage only **PML Programmable Multi-Level, 20-40' Mounting Height** - Refer to PML spec sheet for details - Intended for downlight applications at 0° tilt **PML2 Programmable Multi-Level, 10-30' Mounting Height** - Refer to PML spec sheet for details - Intended for downlight applications at 0° tilt **R NEMA® Photocell Receptacle** - Intended for downlight applications with maximum 45° tilt - Photocell by others - Refer to ML spec sheet for availability with ML options **40K 4000K Color Temperature** - Minimum 70 CRI - Color temperature per luminaire
FLD-EDG	**25** 25° Flood **40** 40° Flood	**70** 70° Flood **SN** Sign	**N6** NEMA® 6	**AA** Adjustable Arm **SA** Side Arm - Available with 20-60 LEDs						

* Reference EPA and pole configuration suitability data beginning on page 19
NOTE: Price adder may apply depending on configuration

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile, minimizing wind load requirements
- Luminaire sides are rugged die cast aluminum with integral, weathertight LED driver compartment and high performance heat sinks
- DA and DL mount utilizes convenient interlocking mounting method. Mounting is rugged die cast aluminum, mounts to 3-6" (76-152mm) square or round pole and secures to pole with 5/16-18 UNC bolts spaced on 2" (51mm) centers
- AA and SA mounts are rugged die cast aluminum and mount to 2" (51mm) IP, 2.375" (60mm) O.D. tenons
- Includes leaf/debris guard
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Black, bronze, silver, and white are available
- **Weight:** See Dimensions and Weight Charts on pages 1 and 22

ELECTRICAL SYSTEM

- **Input Voltage:** 120-277V or 347-480V, 50/60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- DA and DL mounts designed with integral weathertight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- When code dictates fusing, a slow blow fuse or type C/D breaker should be used to address inrush current
- **Maximum 10V Source Current:** 20 LED (350mA): 10mA; 20 LED (525 & 700mA) and 40-80 LED: 0.15mA; 100-160 LED: 0.30mA

REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards when ordered with AA, DA and DL mounts
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Meets FCC Part 15, Subpart B, Class A standards for conducted and radiated emissions
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- DLC qualified with select FLD-EDG SKUs. Refer to https://www.designlights.org/search/ for most current information
- Meets Buy American requirements within ARRA

Electrical Data*

LED Count (x10)	System Watts 120-480V	Total Current (A)					
		120V	208V	240V	277V	347V	480V
350mA							
02	25	0.21	0.13	0.11	0.10	0.08	0.07
04	46	0.36	0.23	0.21	0.20	0.15	0.12
06	66	0.52	0.31	0.28	0.26	0.20	0.15
08	90	0.75	0.44	0.38	0.34	0.26	0.20
10	110	0.92	0.53	0.47	0.41	0.32	0.24
12	130	1.10	0.63	0.55	0.48	0.38	0.28
14	158	1.32	0.77	0.68	0.62	0.47	0.35
16	179	1.49	0.87	0.77	0.68	0.53	0.39
525mA							
02	37	0.30	0.19	0.17	0.16	0.12	0.10
04	70	0.58	0.34	0.31	0.28	0.21	0.16
06	101	0.84	0.49	0.43	0.38	0.30	0.22
08	133	1.13	0.66	0.58	0.51	0.39	0.28
10	171	1.43	0.83	0.74	0.66	0.50	0.38
12	202	1.69	0.98	0.86	0.77	0.59	0.44
14	232	1.94	1.12	0.98	0.87	0.68	0.50
16	263	2.21	1.27	1.11	0.97	0.77	0.56
700mA							
02	50	0.41	0.25	0.22	0.20	0.15	0.12
04	93	0.78	0.46	0.40	0.36	0.27	0.20
06	134	1.14	0.65	0.57	0.50	0.39	0.29

* Electrical data at 25°C (77°F). Actual wattage may differ by +/- 10% when operating between 120-480V +/- 10%

Recommended Cree Edge™ Series Lumen Maintenance Factors (LMF)[1]

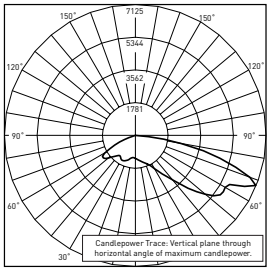
Ambient	Initial LMF	25K hr Projected[2] LMF	50K hr Projected[2] LMF	75K hr Calculated[3] LMF	100K hr Calculated[3] LMF
5°C (41°F)	1.04	1.01	0.99	0.98	0.96
10°C (50°F)	1.03	1.00	0.98	0.97	0.95
15°C (59°F)	1.02	0.99	0.97	0.96	0.94
20°C (68°F)	1.01	0.98	0.96	0.95	0.93
25°C (77°F)	1.00	0.97	0.95	0.94	0.92

[1] Lumen maintenance values at 25°C are calculated per TM-21 based on LM-80 data and in-situ luminaire testing
[2] In accordance with IESNA TM-21-11, Projected Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ((DUT) i.e. the packaged LED chip)
[3] In accordance with IESNA TM-21-11, Calculated Values represent time durations that exceed six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ((DUT) i.e. the packaged LED chip)

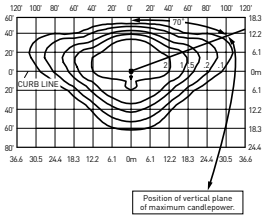
Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP accredited laboratory. To obtain an IES file specific to your project consult: http://lighting.cree.com/products/outdoor/area/cree-edge-series-1

2M



CSA Test Report #: 6371
ARE-EDG-2M-**-06-E-UL-700-40K
Initial Delivered Lumens: 10,985



ARE-EDG-2M-**-10-E-UL-525-40K
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 17,504
Initial FC at grade

Type II Medium Distribution				
LED Count (x10)	4000K		5700K	
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
350mA				
02	2,501	B1 U0 G1	2,551	B1 U0 G1
04	5,003	B1 U0 G1	5,102	B1 U0 G1
06	7,418	B2 U0 G2	7,565	B2 U0 G2
08	9,891	B2 U0 G2	10,087	B2 U0 G2
10	12,334	B2 U0 G2	12,578	B2 U0 G2
12	14,801	B3 U0 G3	15,094	B3 U0 G3
14	17,158	B3 U0 G3	17,498	B3 U0 G3
16	19,609	B3 U0 G3	19,998	B3 U0 G3
525mA				
02	3,550	B1 U0 G1	3,624	B1 U0 G1
04	7,099	B2 U0 G2	7,248	B2 U0 G2
06	10,527	B2 U0 G2	10,748	B2 U0 G2
08	14,037	B3 U0 G3	14,331	B3 U0 G3
10	17,504	B3 U0 G3	17,870	B3 U0 G3
12	21,004	B3 U0 G3	21,444	B3 U0 G3
14	24,350	B3 U0 G3	24,860	B3 U0 G3
16	27,828	B4 U0 G3	28,411	B4 U0 G3
700mA				
02	4,189	B1 U0 G1	4,275	B1 U0 G1
04	8,379	B2 U0 G2	8,549	B2 U0 G2
06	12,425	B2 U0 G2	12,678	B2 U0 G2

* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf

From: denflory <denflory@aol.com>
Sent: Friday, December 01, 2017 9:23 AM
To: lsaul@pipac.com; David Sturch
Subject: Re: Kwik Star and Fareway plans part 2

I should also add, regarding the changing of Kwik Star to lots 32 and 33, the homes that back Greenhill across from those lots are shielded from noise and light pollution by a 6 to 8 foot earthen berm with another 5-6 foot double wooden fence. The homes that back Greenhill across from lots 33 and 34 have only 3 diseased ash trees and a drainage area of cat tails as noise and road pollution mitigation.
Since the change from MU to commercial zoning occurred in 2015, after the building of the 3 homes on Spruce Hills, and these commercial developments will increase noise and light pollution, increase litter, and reduce area real estate values, an earthen berm or other mitigation should be offered.

Sincerely,
Denise Flory
301 Spruce Hill Dr
Cedar Falls

Sent from my Verizon, Samsung Galaxy smartphone

-------- Original message --------
From: denflory@aol.com
Date: 12/1/17 00:01 (GMT-06:00)
To: lsaul@pipac.com, David.Sturch@cedarfalls.com
Subject: Kwik Star and Fareway plans

Dear Ms Saul and Mr. Sturch;

I oppose the proposed placement of Kwik Star and Fareway in lots 32, 33 and34 in Pinnacle Prairie Business Center North subdivision, based zoning changes, on current traffic concerns for the Greenhill and South Main area, and based on planned growth and timing of proposed development with planned road construction and reconstruction.

As written by the Cedar Falls Department of Community Development, in 2014 "staff met wit the developer to discuss changes that have occurred since the rezoning and the importance of updating the Master Plan". This update, to change the northwest section, lots 32, 33 and 34 from mixed use to commercial was formally adopted by Planning and Zoning and the City Council in Spring 2015. I do not recall, as a homeowner in the area, receiving notice of any proposed zoning change. This was wrong, oversight or not. When our home was built in 2008, we had the knowledge that with Mixed Use, professional or medical offices and businesses similar to those in the area would fill the open lots. We relied on that information to our detriment. Having a 24 / 7 gas station with a car wash with exit blowers facing residences along Greenhill does not fit with the existing development. There are currently no other 24/7 businesses in the immediate area. I understand the Public Safety Building will be operational all the time but it will not have the ongoing traffic, lights or noise pollution of the gas station.

Secondly, and this is a broken record, the traffic at Greenhill and South Main is very dense and concerning at times. With the changes to University Avenue, Greenhill has become busier. I do not have traffic studies to site, only the view from my back windows and yard, daily walking of the

trails, and driving from Estate Drive onto Greenhill. There are 5 traffic signals between 58 and Cedar Heights. With more developments along Greenhill, traffic control is critical. I understand in the next year or 2, changes will occur to "improve" the Greenhill / South Main flow of traffic. It is during that same time frame that Greenhill and HWY 58 will undergo planned changes. Planned development in the Greenhill / South Main area now include the new Public Safety Building that will need to respond to emergencies using South Main, Greenhill and Bluebell/Coneflower, the housing in the Sands Development, the Fairbanks Development, the developments by Candeo Church, Western Home expansion and other developments in Pinnacle Prairie. Each of these developments brings tax dollars to the city and traffic. A grocery store is a destination, a gas station is a destination. These two commercial developments will draw even more traffic to Greenhill and South Main.

I have heard that the businesses will pay for changes to the road to provide turn lanes. Why are turn lanes necessary? People can simply go to the light at South Main / Greenhill and make their way to Fareway and Kwik Star or make the turn at Coneflower as it is. Sure, it will take time. Traffic should be slower there because of the decrease in lanes from 4 to 3 between Coneflower and South Main that allows for the turn lane at the light. Of course, more traffic on South Main will interfere with traffic exiting Eldorado Heights. I understand that widening Greenhill for proposed turn lanes would be on the north side - closer to the established homes instead of in the currently undeveloped lots. I oppose this. I am not eager to have Greenhill Road any closer to my backyard than it already is and the infected ash trees on city property do not provide any noise mitigation.

In November, I and Kathy Barfels submitted a neighborhood petition with 132 names opposing Kwik Star at lots 34 and 33 because of high volume traffic, lack of noise mitigation for car wash blowers, a 24 hour 7 day a week gas station did not fit with the established professional office culture, the overhead lights, increased litter and pollution concerns. This list was given to David Sturch, city planner, prior to what we thought was the next P & Z meeting with Kwik Star on the agenda. That meeting ultimately was about the Public Safety Building. I understand that 2 other petitions were also provided to Mr. Sturch at or around that time.

If the area resident concerns are not heard and this commercial development continues, I would request again, that Kwik Star put the exit of the car wash to face Bluebell and install large pine trees or a fence specifically for noise mitigation, and be closed during the overnight hours.

I also suggest moving Kwik Star to the corner of Greenhill and South Main, with the entry / exit closer to the Bluebell side on lots 33 and 32. Allow Fareway to develop lots 33 and 34. I believe that Fareway, which operates reasonable daily hours, and is closed on Sundays and holidays, would be a better neighbor.

The intersection at South Main and Greenhill would work better if turn arrows and traffic patterns were installed and operated much like the intersection signal lights at Cedar Heights and Greenhill. I do not understand why this has not been done.

I would also suggest closing Estate Drive, which is only 1 block long but a point of entry and exit for Heritage Hills Development. Now that Pinnacle Drive is complete linking with Spruce Hill, Steward Lane and Melendy, traffic can flow in and out through that signaled intersection. Closing Estate Drive, which is directly across from Coneflower, would reduce entry and exit traffic onto Greenhill, making Coneflower less difficult to enter and exit. In directing traffic to Pinnacle Drive, it is possible that more traffic would use Pinnacle Drive to access 58 or Ridgeway or 20 instead of Greenhill / South Main / 58.

I thank the Planning and Zoning Commission and the Planners in Community Development for the work that is done. You have an important role in discerning whether and how submitted plans will serve the city and its citizens. There is a balance between development and quality of life. I know that this proposed development of Kwik Star and Fareway in the proposed lots will have a negative impact my family's quality of life.

Sincerely,
Denise Flory
301 Spruce Hill Dr

From: Williams Dave <williams@cfu.net>
Sent: Sunday, December 10, 2017 12:29 PM
To: David Sturch; Mardy Holst
Cc: David A. Wieland
Subject: Southeast Corner Greenhill Road and S. Main Street

David and Mardy -

(I am including Mardy because his address is the only one I have for P&Z folks)

This is not to deter or disagree with petitions and other public comment opposing this retail construction. Like most others in the area, I would rather see professional services.

I wonder what the traffic study for these projects has revealed. I live on South Main approximately 600 yards north of the intersection and my driveway entrance is blocked every afternoon, Monday through Friday. Maybe there is already a plan to mitigate the current traffic situation. Don't you think it's going to be much worse with retail development?

Please address lighting regarding Kwik Star and Fareway if you are going to approve this construction. We don't want garish signage lighting up the neighborhood or parking lot lights polluting the night sky anymore than it already is. The City has done a good job with streetlights and the lighting around the fire station and nearby commercial properties is pretty good when it comes to limiting "offsite" light pollution. By contrast, the lighting coming from Brandilynn Blvd has a negative impact of the aesthetics along Greenhill.

We don't want this, and Fareway and Kwik Star don't need it to attract customers.

Item 4.C.

Signs this obnoxious are not needed.

From: margaret holland <mgholland@hotmail.com>
Sent: Monday, December 11, 2017 3:35 PM
To: David Sturch
Subject: Community Development- Kwik Star and Fareway

David,

I live at 128 Balboa Ave, C1 and I am writing to comment on the proposal to built a Kwik Star and Fareway near the intersection of South Main and Greenhill. I am opposed to both of these proposals. The plan for the entrance to the Fareway off S Main will create a problem turning onto and off of Balboa. The traffic in that area is already a problem for those of us on Balboa, partly because Balboa is close to Greenhill and cars are accelerating from being stopped at the light. More traffic in that small area will lead to more accidents. The Kwik Star will generate more traffic and be open long hours. Both of these plans are inconsistent with what we were told would be built on those lots. Plus the design is not in keeping with the prairie style. I hope that the city decision makers will take the concerns of city residents into account and not be solely focused on the desires of the business community.

Thank you,
Margaret Holland

From: Gowans, Doug <DGowans@eengineering.com>
Sent: Tuesday, December 12, 2017 4:30 PM
To: David Sturch
Subject: Site Plan Concerns: Fareway / Kwik Star

David,

Thanks for contacting me, regarding the Site Plan Review for the proposed Kwik Star and Fareway Grocery Stores.

I just want you and the Planning and Zoning Commission to know that **I am NOT in favor** of these two stores locating at the Greenhill Road and S. Main Street location. As a resident of Eldorado Heights, 506 Balboa Ave., I oppose this type of construction because I do not believe it fits well with the general office / professional services types of businesses that are currently located in this area.

Let's keep our Retail Trading types of businesses in our existing RTZ areas: Downtown, University Ave., College Hill and the Industrial Park. Spreading retail businesses and retail services throughout the city is not effective or efficient planning in my opinion.

Opening this corner up to retail development will also effect the traffic flow on South Main, Green Hill Road and Balboa Ave. Adding additional traffic (vehicle and pedestrian) at the South Main/Greenhill and Balboa Ave intersections is not a good idea. That intersection is already a traffic hazard.

Thanks again for talking with me on the phone. I hope the P&Z will reject the idea of development of this intersection for these types of businesses.

Best regards,

Doug Gowans and Julie Gowans,
506 Balboa Ave.
Cedar Falls,
(319) 404-8725 (Cell)
dgowans@eengineering.com
gowans@cfu.net

Cedar Falls Planning and Zoning Commission:

I am responding to the letter dated 12/5/2017 about the Site Plan Review.

The corner of South Main and Greenhill Road is very challenging now. It is a major route for those going South on Main who need to turn either East or West. Also those going East or West on Greenhill Road find a very busy intersection. For those of us living in the Western Home Community, the increase in traffic will make it very difficult to leave our area going North.

The new Police/Fire Department structure poses additional problems with traffic flow. Getting emergency vehicles from the new station and onto Main and/or Greenhill Road, since Main is a two lane roadway, will be a problem.

Just West of highway 27 a new convenience store/service station was built. I do not believe there is a pressing need for another such structure within that short distance.

We urge you to vote against the Kwik Star proposal.

Sincerely,
Elton and June Green
4934 Bluebell Rd.
Cedar Falls, IA

Elton Green
June L. Green

Out of town December 13, 2017

RECEIVED
DEC 11 2017
DEVELOPMENTAL SERVICES
DEPARTMENT

12 December 2017

Planning and Zone Commissioners
Cedar Falls, IA 50613

MU DISTRICT SITE PLAN REVIEW – FAREWAY GROCERY STORE

As 37-year residents of Balboa Avenue in Cedar Falls, Janice and I are requesting that you address concerns regarding the proposed Fareway Store in the Pinnacle Prairie development. After reviewing the P & Z packet and the Shive-Hattery traffic study, it's become clear that the additional traffic will adversely impact residents of the South Main community. We also have concerns with the potential visual impact of this facility on our neighborhood.

There are three traffic issues with this proposal that must be addressed before approval:

1. The Shive-Hattery traffic study has incorrectly based its recommendations on hypothetical improvements to the Greenhill-Main intersection. Please refer to Attachment 1. Approval for this project must be contingent on the city's commitment to upgrade this intersection, consistent with the study recommendations, before completing the Fareway project.

2. The proposed driveway access to Main street does not conform to Iowa SUDAS guidelines for setbacks from the Greenhill-Main intersection and Bluebell Avenue. Please refer to Attachment 2, 3 and 4 for details. This access was incorporated into the 2015 master plan without adequate consideration and must be re-considered on the basis of traffic and design considerations. There are no driveway access points between Greenhill and Bluebell that will satisfy state and federal guidelines. Fareway should instead add a second driveway access to Bluebell or incorporate Bluebell access via a shared driveway with KwikStar.

3. Access for Balboa Avenue residents must be considered with any South Main Street project. Please refer to Attachment 5. For this reason, the above issues must be addressed prior to approving a project that might affect access for Balboa residents. The proximity of Balboa to the Greenhill-Main intersection presents a special situation that is not accounted for in traffic studies. The additional queueing of northbound traffic at the Greenhill-Main stoplight makes it difficult to safely turn north onto Main from Balboa.

Regarding the visual impact, we urge commissioners to assure that recommendations of the city planners and Pinnacle Prairie architects are closely followed in the site development.

We appreciate your consideration of these issues to help assure that residents of the South Main community will continue to enjoy an excellent quality of life.

Sincerely,

Stephen R. Ephraim

Steve Ephraim

ATTACHMENT 1

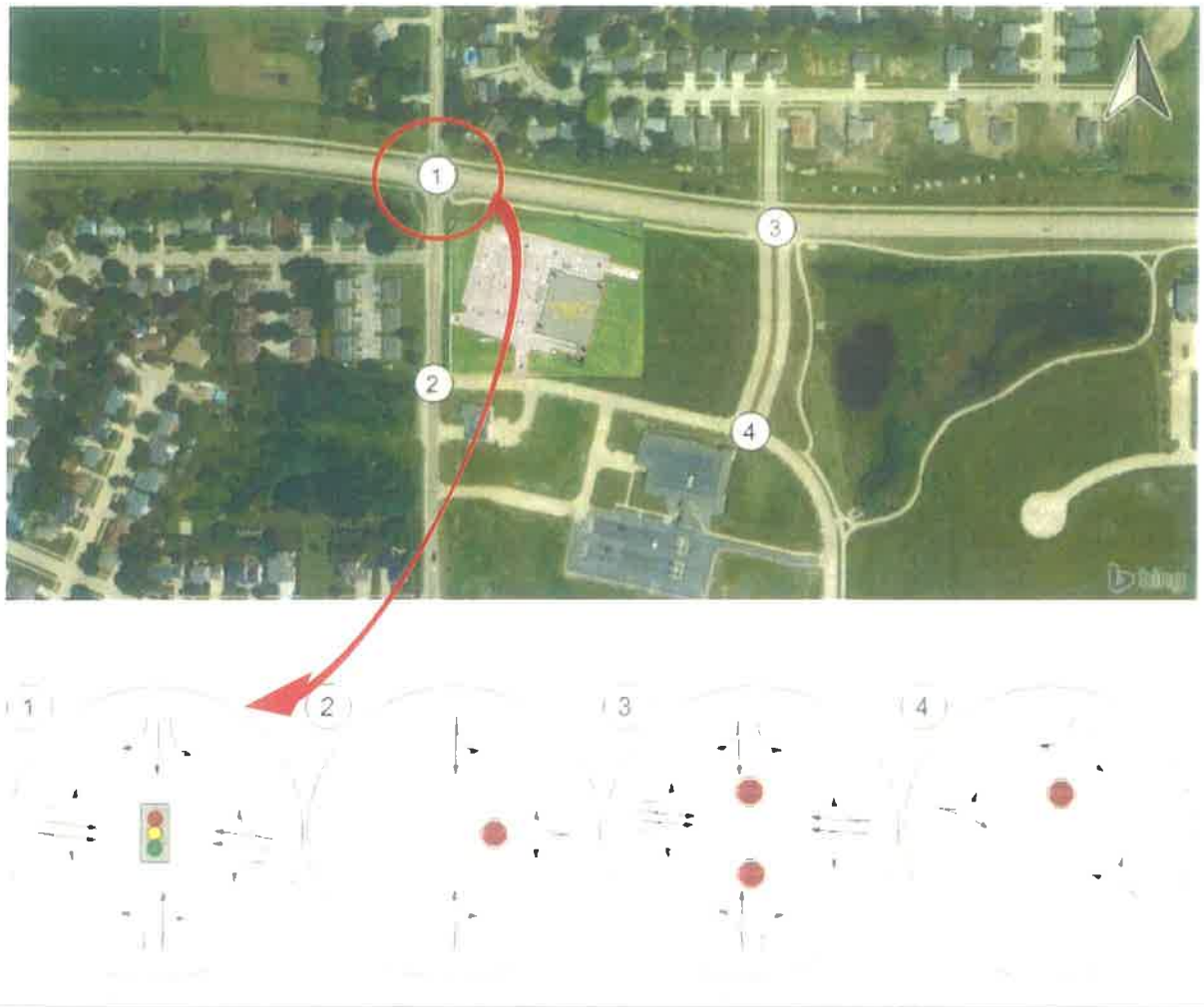
Shive-Hattery Study Based on Hypothetical Improvements to Greenhill-Main

The Shive-Hattery traffic study for Fareway Store bases its recommendations on hypothetical improvements to the Greenhill-Main intersection. As noted in Figure 10, item 1 below, these improvements include additional lanes and related upgrades to improve traffic flow. While these improvements have been slated in future plans, there is no commitment to implement them.

The study's author notes in the Conclusions of page 24 that these improvements were assumed in the traffic analysis which includes impacts of both Fareway and the adjacent KwikStar development:

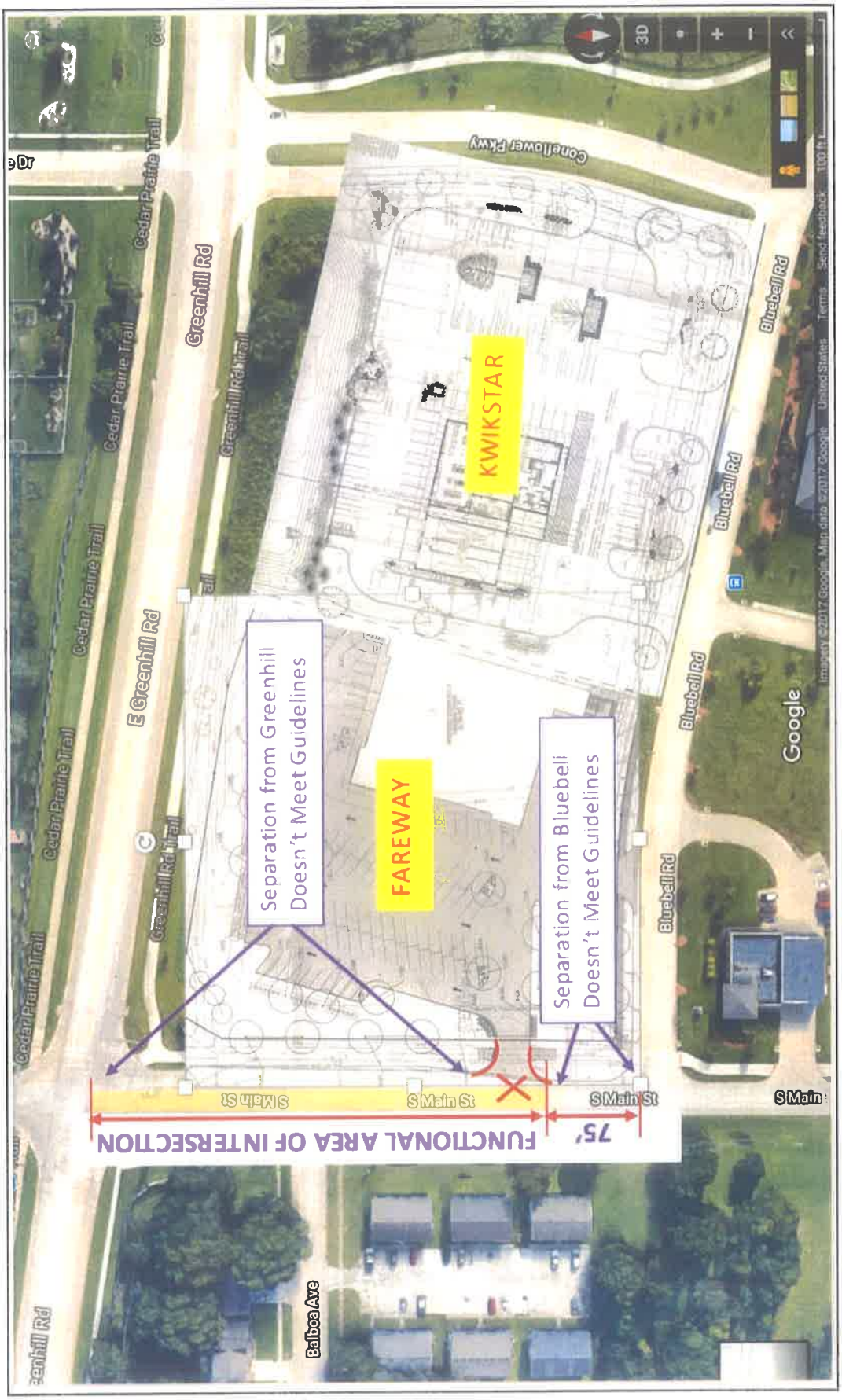
> Direction was provided by the City of Cedar Falls City Engineer to implement improvements as identified in Figure 10. However, the LOS at the intersection of Greenhill Road and Coneflower Parkway is still projected to fall below the acceptable LOS D in the PM peak hour with and without the proposed development by

Figure 10 Study Intersections – Recommended Lane Configuration and Control By 2038



ATTACHMENT 2

Overview Map Showing That Driveway Access to Main Street Does Not Conform to Setback Guidelines



3

ATTACHMENT 3

Proposed Driveway Access to Main Street Does Not Conform to Functional Intersection Guidelines

The proposed access to Main street does not conform to Iowa SUDAS guidelines for setback from the Greenhill-Main intersection. Section A of chapter 5L-3 of the Iowa SUDAS design manual, excerpted below, states that, "driveways should not be located within the functional area of an intersection or in the influence area of an adjacent driveway." ISU's Access Management FAQ states in Chapter 5, "It is important to protect the functional area of an intersection from driveway access. Driveways located within this area may result in higher crash rates and increased congestion."

Iowa SUDAS

5L-3

Design Manual
Chapter 5 - Roadway Design
5L - Access Management

Access Location, Spacing, Turn Lanes, and Medians

This section addresses access location, spacing, turn lane and median needs, including TRB Principles of Access Management 5-9:

A. Preserve the Functional Area of Intersections and Interchanges (Principle 5)

AASHTO states, "Ideally, driveways should not be located within the functional area of an intersection or in the influence area of an adjacent driveway. The functional area extends both upstream and downstream from the physical intersection area and includes the longitudinal limits of auxiliary lanes."

1. **Upstream Functional Distance:** The upstream functional distance of the intersection can be further defined as the approach distance to an intersection that is required for the driver to change speeds in order to complete a movement, such as entering an auxiliary lane or slowing down for a turn or signal. The upstream functional distance includes the sum of:

   d_1, distance traveled during driver's perception - reaction time

   d_2, deceleration distance while the driver maneuvers to a stop

   d_3, queue storage length required (50 foot minimum)

There are two key criteria for defining the functional area of an intersection. The first, explained in the excerpt above, is to tabulate the driver's perception/reaction time, deceleration distance, and vehicle queue storage length. For Greenhill-Main, this area exceeds 400 feet in length, considerably longer than the setback of the proposed driveway.

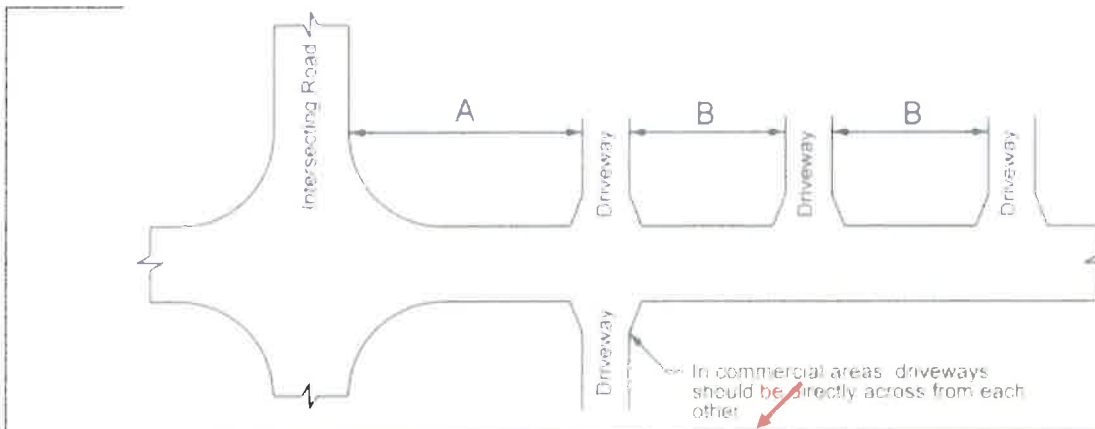
The second criteria for functional area of intersection is defined by federal AASHTO standards as including "the longitudinal limits of auxiliary lanes." For Greenhill-Main, the longitudinal limit of the northbound auxiliary lane of Main Street extends past the proposed Fareway driveway access.

ATTACHMENT 4

Driveway Setback from Bluebell Does Not Conform to Driveway to Intersection Distance Guidelines

The proposed driveway access to Main street violates Iowa SUDAS guidelines for setback from Bluebell Avenue as explained here. Table 5L-3.05 of Chapter 5L-3 of the SUDAS manual, excerpted below, depicts the minimum recommended distance between driveways and intersecting streets. As highlighted in the table, the distance from Fareway driveway to Bluebell should be a minimum of 100 feet considering that South Main is a collector street (see explanation for this classification below). As currently designed, this driveway access does not meet the minimum distance with its current location at 75 feet from the corner of Bluebell/Main.

Table 5L-3.05: Minimum Distance between Driveways or from Intersecting Streets



	Minor Arterial			Collector			Local		
	Res. Area	*C/I Area*	*Ag Area*	*Res. Area*[3]	*C/I Area*	*Ag Area*	*Res. Area*[3]	*C/I Area*	*Ag Area*
A. Minimum intersection clearance[1]	**145'**	**170'**	**300'**	100'	100'	300'	**75'**	**75'**	**150'**
B. Minimum driveway spacing[2]	**100'**	**200'**	**300'**	75'	100'	300'	---[4]	---[4]	**150'**

The justification for classifying the southern portion of Main Street as a collector is based on daily traffic counts considerably exceeding 400 vehicles per day. South Main was previous classified as a "local" street in the 2011 Cedar Falls comprehensive plan based on significantly lower traffic volumes than currently projected. See Table 2 below from the SUDAS "Roadway Design Standards for Rural and Suburban Subdivisions" which supports this "collector" classification based on volume.

Table 2. Urban and suburban cross-section geometrics

Design Elements	Connector		Collector		Local	
	Desirable	*Minimum*	*Desirable*	*Minimum*	*Desirable*	*Minimum*
Design speed (mph)	60	60	35	35	30	30
Avg. daily traffic	> 1500	>1500	400-1500	400-1500	<400	<400
Pavement width	31'	31'	31'	26'	26'	26'

ATTACHMENT 5
Proximity of Balboa Avenue to the Greenhill-Main Intersection

Balboa Avenue presents a special situation that is not accounted for in traffic studies. Contrary to federal and state guidelines, Balboa has been absorbed into the functional intersection of Greenhill-Main. It lies a mere 140 feet south of Greenhill and intersects with the northbound left-turn lane of South Main. The additional queueing of northbound traffic at the Greenhill-Main stoplight makes it difficult to safely turn onto northbound Main from Balboa. This is illustrated in Figure 1 below.

KwikStar's traffic study, which does not include hypothetical improvements to the Greenhill-Main intersection, estimates that the northbound backup for a red light (in the through/right-turn lane) will range from 62 to 113 feet. With queues beyond 70 feet a driver does not have sufficient room to turn north onto Main from Balboa, meaning that this will frequently extend wait times. This access is further complicated by conflict points with southbound Main traffic and the northbound left-turn lane. Failure to mitigate traffic impacts from KwikStar, Fareway and future Pinnacle Prairie developments will create an untenable situation for Balboa residents.

FIGURE 1
NORTHBOUND QUEUE VS. TURNING DISTANCE FOR GREENHILL-MAIL INTERSECTION

December 19, 2017

Cedar Falls Planning and Zoning Commission Members:

Sadly, I struggle to find the words to express my disappointment concerning the commission's responses to the interest Kwik Star and Fareway have expressed in building along Greenhill Road near South Main Street. This is not where these businesses should be building, due to how they will adversely affect traffic, aesthetics, and the neighborhood milieu. I don't know why they have not already been directed to the Viking Road area, especially east of Michael's or across from or around Menards, where similar businesses and the needed traffic infrastructure already exist, while residential housing does not.

The LED lighting a Kwik Star representative addressed at last week's meeting is not really a solution for the neighborhood. The reason they need fewer LED lights is because LEDs are brighter. Installing them under a canopy may reduce what shines up into the sky above the structure but does not resolve the glare that will shine out on all sides at the building and ground level. The car wash concerns were simply set aside. Neither of these businesses uses the professional type of office building that current residents were promised when they were looking to purchase homes in this neighborhood.

I doubt any of you would want these stores, valuable as they may be, to build directly across the street from your home. I don't understand why you would want other Cedar Falls residents to have that experience, especially when other locations serve their purpose better. There is even a plot of land presently for sale on the corner of Viking Road and the Parkway southwest of Menards. With the new hospital construction soon to develop on Greenhill, many professional offices will look to locate near those currently in the area around the Arrowhead and Unity Point facilities. Another possible alternative for a gas station and grocery store would be land that has not yet been developed west of Highway 58. That area will be quickly built up as the infrastructure is prepared for the new elementary school to be built farther west, perhaps between Viking Road and where a new western section of Greenhill will curve north.

Thank you for your service to the city. Please consider better alternatives to the plans you are currently considering.

Sincerely,

Mary Wallingford

Item 4.C.

Rod Larsen
4516 Quesada Ct.
Cedar Falls, Iowa 50613
E-mail: rhlarsen@cu.net

December 17, 2017

The Honorable Jim Brown
220 Clay St.
Cedar Falls, IA 50613

RE: Fareway and Kwik Trip proposals

Dear Mayor Brown,

This is to convey my support for the proposed development at Greenhill Road and South Main Street. I will be out of state for the Holidays and was hoping you and Stephanie could include this in the public comment file for the Council and P & Z as appropriate.

My planning career at INRCOG and the Iowa DOT included extensive development of the metropolitan area street and highway plan. Greenhill was constructed as part of this plan and was always envisioned to be a major, efficient, east –west arterial street supporting multiple adjacent activities including residential, neighborhood commercial, and office development.

I am aware that some of my neighbors in the El Dorado Heights Subdivision have expressed concerns over traffic and possible noise. I have never seen any development proposal that was not criticized for traffic impacts. Of course, any development creates some additional traffic; however, this proposal is consistent with the City's Land Use Plan along with the Pinnacle Prairie Master Plan.

Cedar Falls is fortunate to have these quality businesses working with a highly regarded developer to complement the vibrant growth in the southern part of our City. Coincidentally, I will personally appreciate the convenience of having both businesses at this location.

The amount of traffic generated by these businesses should be comfortably served by the existing local streets with the potential need for operational improvements at the Greenhill/South Main intersection.

Respectively submitted,

Rod

Rod Larsen

Cc Stephanie Houk Sheetz

Planning and Zoning Commission Members

City of Cedar Falls

220 Clay Street

Cedar Falls, Iowa 50613

301 Spruce Hills Drive

Cedar Falls, Iowa 50613

4 January 2018

Re: 1. Proposed Kwik Star/Trip at Greenhill/Coneflower

2. Proposed Fareway at Greenhill/South Main

Dear Planning and Zoning,

I do support the Fareway proposal, noting they are working with the city to resolve driveway issues with entrance and exit. Fareway is family oriented and would make a good neighbor. It closes by 9:30 pm, with most of its lights off by then, and is closed on Sundays and most holidays.

I do not support Kwik Trip/Star. As a 7 day per week, everyday business, with all its lights, noises, increased traffic, gas product runoff, it is not a fit for a neighborhood.

Kwik Star as a neighbor would decrease the quality of life that I value in Cedar Falls over other areas I have lived. Please do not encourage me to look somewhere else to live.

Ronald D. Flory

Ronald D. Flory, MD, retired

Item 4.C.

301 Spruce Hills Dr.
Cedar Falls, IA 50613
January 4, 2018

Dear Members of the Planning and Zoning Commission;

Re: 1. Proposed Kwik Trip / Kwik Star gas station at Greenhill Rd and Coneflower
2. Proposed Fareway at corner of Greenhill Rd and South Main St.

I write this letter as a concerned neighbor regarding these proposed developments. I live at 301 Spruce Hills Dr. My backyard is directly across Greenhill from the proposed site of the Kwik Star.

Addressing Kwik Star: I continue to oppose this development for the following reasons:

1. Increased light pollution and petroleum based pollution. Petroleum: Although Kwik Star states they have a double filter system for surface drainage and new underground storage tanks, such systems are prone to leaks. The flora and fauna in the nearby catch basin and Dry Run Creek cannot withstand additional pollution. Gas stations also emit petroleum odors and vehicle exhaust.

   Lights: The down facing lights at the new Kwik Star on Ansborough and Hwy 20 in Waterloo are as white and bright as any I have seen. If these same lights are intended for use at the proposed Kwik Star and installed at the proposed height, my home interior will be brightly lit 24 hours a day.
2. Increased litter and trash. Gas stations are dirty. People drop papers, cups, wrappers, receipts, and any number of things that blow in the wind. These will blow into the neighborhoods that surround this site, unless a wire mesh fence or other type of abatement surrounds the site.
3. Increased noise pollution – It is unclear if the car wash relocation, in the latest mailing, demonstrates the exit facing Bluebell because the interior drawing appears to exit facing Greenhill. There are no berms or noise abatement structures built into the plan. Did Kwik Star in fact change the car wash exit to face Bluebell? Supposedly this was "impossible" according to the Kwik Star representative. I wonder what other requests from the Planning Commission were considered and accepted as "impossible" – like eliminating the carwash or reducing hours of operation for the carwash and store hours of operation?
4. Hours: Kwik Star is a 24 hour 7 day a week business. Other than the planned Public Safety Building, this proposed gas station does not fit with the hours of established businesses in the area. The surrounding neighborhoods are also quiet in the overnight hours. Viking and University both have 24 hour businesses and the increased noise and traffic that accompany them. Greenhill has no 24 hour businesses.
5. Unresolved traffic concerns. Neighbors have addressed the traffic congestion at South Main and Greenhill and continue to raise concerns. With the planned area road construction / re-construction in 2018 and 2019, and increased development of area housing and businesses, Greenhill will carry even more traffic. I predict this area will become much like the current Viking and 58.
6. Saturation: There are already 4 gas stations within 0.5 to 2.0 miles from this site. Does Planning and Zoning wish to allow a glut of gas stations when diversity would better serve this area?

Addressing Fareway:

1. I support the Fareway proposal and hope the entrance / exit concerns can be resolved. Fareway is a family oriented business with a purpose and hours that would be a good fit for this area.

Sincerely,

Denise Flory

Traffic Impact Study:
Fareway – Cedar Falls Store

Cedar Falls, Iowa

December 27, 2017

Prepared for: Fareway Stores, Inc.

Prepared by:

SHIVEHATTERY
ARCHITECTURE + ENGINEERING
316 Second Street SE, Suite 500
Cedar Rapids, IA 52406
(515) 364-0027

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Executive Summary

Fareway Stores, Inc. initiated this traffic study to identify potential traffic impacts on the adjacent roadway network and provide traffic mitigation measures, if necessary, due to their proposed Fareway Grocery Store development. The development will be located on the northeast corner of Bluebell Road and South Main Street in Cedar Falls, IA.

The following study intersections within the study area were identified for analysis:

1. East Greenhill Road & South Main Street (Greenhill Road & Main Street hereafter)
2. Bluebell Road & South Main Street (Bluebell Road & Main Street hereafter)
3. East Greenhill Road & Coneflower Parkway/Estate Drive (Greenhill Road & Coneflower Parkway hereafter)
4. Bluebell Road & Coneflower Parkway

The above list assigns each study intersection with a number that is used throughout the report. (e.g. #1 = Greenhill Road and Main Street).

The area immediately surrounding the proposed development generally incorporates medical, residential, and undeveloped land uses.

Two access points to the proposed Fareway Grocery Store development are being proposed, with one on Main Street and one on Bluebell Road. The development is expected to be completely built by the end of 2018. Sight visibility zones corresponding to intersection sight distance calculations as defined through AASHTO should be identified and maintained at these access points. These zones should not contain structures or plantings that would preclude unobstructed views of oncoming traffic. Current designs for the development do not indicate obstructions within the sight visibility zones.

Morning (AM) and evening (PM) peak hour volumes at the study intersections were collected between the hours of 7:00 AM and 9:00 AM and between 4:00 PM and 6:00 PM, respectively. The peak hours of the study intersections were determined based on the highest consecutive 15-minute turning movement counts at Greenhill Road and Main Street. The AM and PM peak hours at Greenhill Road and Main Street governed the AM and PM peak hour because it is the study intersection with the highest volume of entering vehicles. The AM peak hour was determined to occur between 7:30 and 8:30. The PM peak hour was determined to occur between 4:30 and 5:30. The AM and PM peak hour volumes were collected on Thursday, May 4, 2017. The raw and refined volume data are provided in Appendix 1 of this report.

Projected traffic analysis will typically apply an annual growth rate to study intersections' existing turning movement volumes prior to adding project development trips to account for growth in background traffic (traffic unrelated to the proposed Fareway Grocery Store development). In coordination with the local Metropolitan Planning Organization the Iowa Northland Regional Council of Governments, a 1.5% annual growth rate was identified for this study. As such, a 1.5% annual growth rate was applied to existing 2017 volumes to reflect projected future volumes, which could be expected through a sustained constant area growth without the Fareway Grocery Store development. It should be noted, over time growth rates generally do not exhibit a straight line growth, but rather tend to level off as the surrounding area continues to develop. Therefore, the use of a straight line growth rate for the prediction of future events can be thought of as conservative and should be considered as such when reviewing the output of this analysis.

The Safety Analysis, Visualization, and Exploration Resource (SAVER) website administered by Iowa DOT was used to collect available crash data near the project site for the five-year period between January 1, 2012 and December 31, 2016. All of the study intersections had crash rates that were lower than the statewide average for intersections with a similar daily volume of entering vehicles.

Project trip generation is based on nationally accepted trip generation rates contained in the Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition, 2012. The development is expected to be completely built by the end of 2018. Trips were generated for the expected type of project and correspond to the AM and PM peak hour of the adjacent roadway network.

Trip distribution percentages for the proposed Fareway Grocery Store development are based on recommendations from the City of Cedar Falls City Engineer.

LOS D or better is generally identified as acceptable in urban conditions. The analysis presented herein indicates the study intersections will operate at an acceptable LOS D or better during the AM and PM peak hour conditions through 2038 with buildout of the proposed development, except for the intersection of Greenhill Road and Coneflower Parkway. This analysis assumes existing lane configuration and control for existing 2017 and projected 2018 conditions as identified in Figure 3 and recommended lane configuration and control for projected 2038 conditions as identified in Figure 8. Assuming intersection improvements will not be constructed by 2018 provides a conservative analysis.

Direction was provided by the City of Cedar Falls City Engineer to implement improvements as identified in Figure 8. However, the LOS at the intersection of Greenhill Road and Coneflower Parkway is still projected to fall below the acceptable LOS D in the PM peak hour with and without the proposed development by 2038. However, the LOS at this intersection is still projected to fall below the acceptable LOS D in the PM peak hour with and without the proposed development by 2038. This analysis indicates additional improvements at this intersection will be necessary in order to maintain an acceptable LOS during the peak hours by 2038 regardless if the proposed Fareway Grocery Store development is built or not. Provided the City of Cedar Falls is willing to accept that the southbound approach to this intersection may fall below the acceptable LOS of D by the design year of 2038 during PM peak hour conditions; no other changes/improvements to the study intersections lane configuration and control from what is depicted in Figure 8 are considered necessary. It should be noted, this analysis assumes the annual background growth rate at this intersection will grow at 1.5% per year through the design year of 2038, which is a conservative assumption. It should also be noted, based on the traffic volumes used for the analysis herein, the Manual on Uniform Traffic Control Devices traffic control signal Warrant 2 (Four-Hour Vehicular Volume) will not be met by 2038 with buildout of the development (analysis worksheet is included in Appendix 2). In addition, motorists will generally choose routes that minimize their travel time/distance. Therefore, as the intersection of Greenhill Road and Coneflower Parkway becomes congested, motorists may choose alternate routes that experience less delay. For example, motorists may choose to transit the signalized intersection Greenhill Road and Prairie Parkway to the east (southbound approach is currently under construction) over the Greenhill Road and Coneflower Parkway intersection, which would likely result in a better LOS than what is reported in Table 9.

Existing & Projected No Build Conditions

Fareway Stores, Inc. initiated this traffic study to identify potential traffic impacts on the adjacent roadway network and provide traffic mitigation measures, if necessary, due to their proposed Fareway Grocery Store development. The development will be located on the northeast corner of Bluebell Road and South Main Street in Cedar Falls, IA.

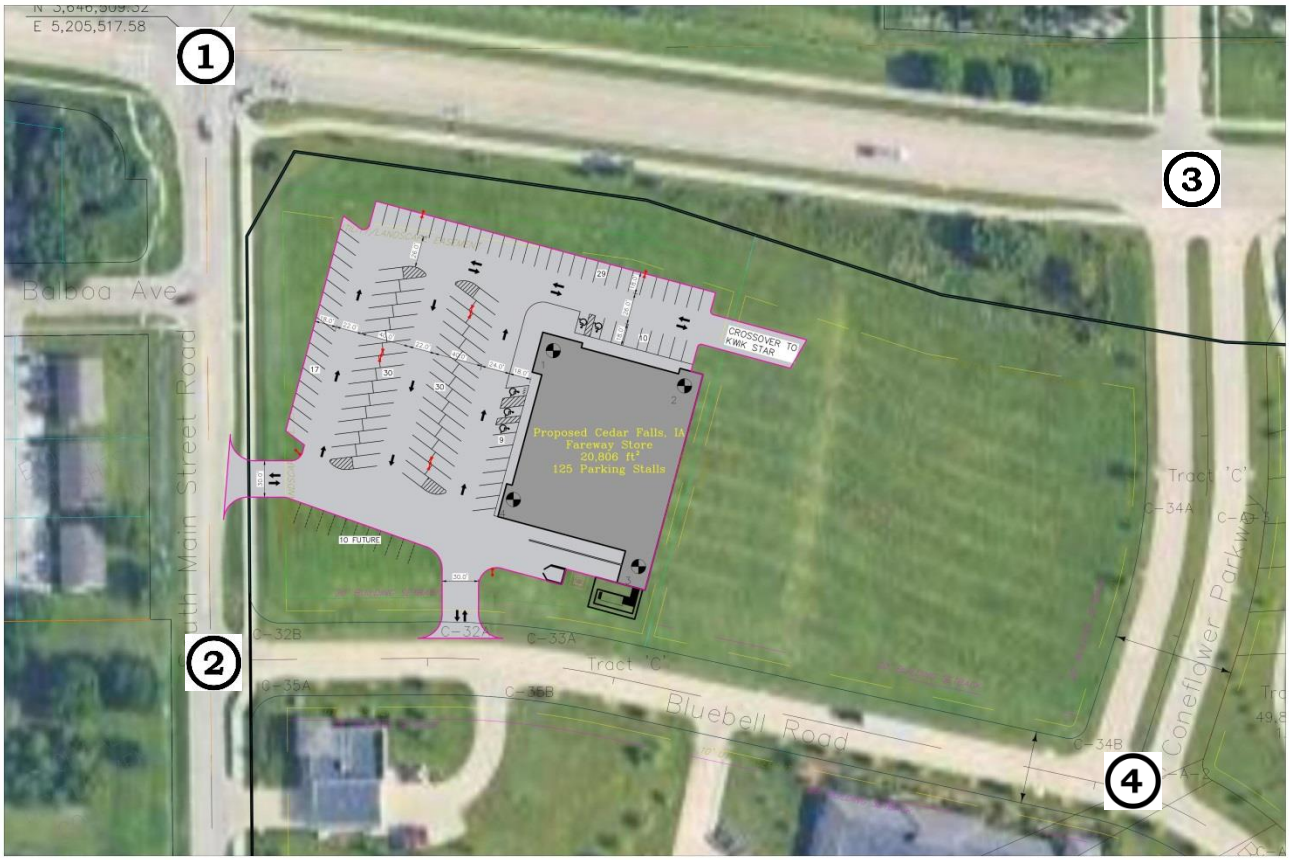
The following study intersections within the study area were identified for analysis:

1. East Greenhill Road & South Main Street (Greenhill Road & Main Street hereafter)
2. Bluebell Road & South Main Street (Bluebell Road & Main Street hereafter)
3. East Greenhill Road & Coneflower Parkway/Estate Drive (Greenhill Road & Coneflower Parkway hereafter)
4. Bluebell Road & Coneflower Parkway

The above list assigns each study intersection with a number that is used throughout the report. (e.g. #1 = Greenhill Road and Main Street).

The area immediately surrounding the proposed development generally incorporates medical, residential, and undeveloped land uses. A study area map depicting the location of the study intersections, as well the location of proposed development is depicted in Figure 1.

Figure 1 Study Area Map



Project Description

The proposed development is a Fareway Grocery Store. The development will be located on the northeast corner of Bluebell Road and Main Street. Two access points to the development are being proposed, with one on Main Street and one on Bluebell Road. The development is expected to be completely built by the end of 2018. A preliminary site plan is provided in Figure 2.

Figure 2 Preliminary Site Plan

Adjacent Streets

Greenhill Road is an east/west (primarily two lanes in each direction) major arterial roadway, with additional left-turn bays at its intersection with Main Street. Parking is prohibited along Greenhill Road. The posted speed limit along Greenhill Road is 45 mph.

Main Street is a north/south (one lane in each direction) roadway, with an additional northbound left-turn bay at its intersection with Greenhill Road. North of Greenhill Road Main Street is classified as major collector. South of Greenhill Road Main Street is classified as a local roadway. Parking is prohibited along Main Street. The posted speed limit along Main Street is 35 mph.

Bluebell Road, near the proposed development is an east/west (one lane in each direction) roadway with parking restrictions along both sides of the roadway. Bluebell Road is classified as a local roadway with a posted speed limit of 25 mph.

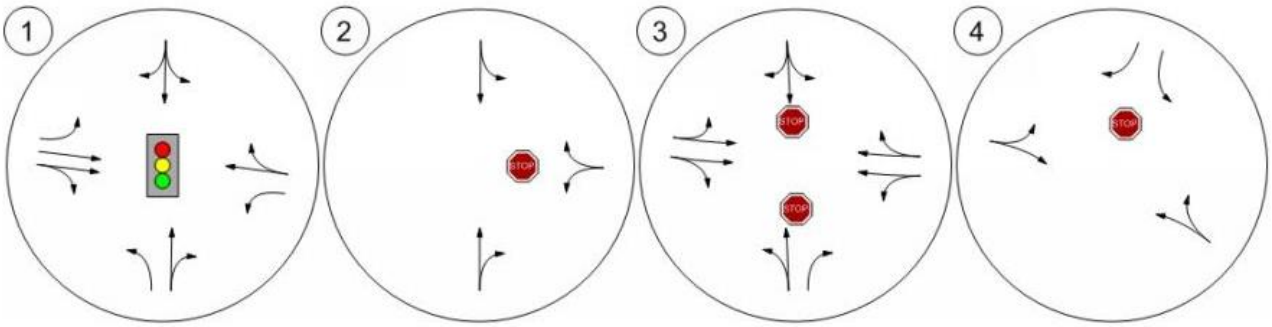
Coneflower Parkway between Greenhill Road and Bluebell Road is a north/south (two lanes in each direction) local roadway. Parking is prohibited along Coneflower Parkway. The posted speed limit along Coneflower Parkway is 25 mph.

Estate Drive is a north/south (one lane in each direction) local roadway. Parking is generally allowed on both sides of Estate Drive. The posted speed limit along Estate Drive is 25 mph.

Existing Intersection Conditions

The existing lane configuration and control for the study intersections are presented in Figure 3.

Figure 3 Study Intersections - Existing (2017) Lane Configuration and Control



Traffic Volume Data

Morning (AM) and evening (PM) peak hour volumes at the study intersections were collected between the hours of 7:00 AM and 9:00 AM and between 4:00 PM and 6:00 PM, respectively. The peak hours of the study intersections were determined based on the highest consecutive 15-minute turning movement counts at Greenhill Road and Main Street. The AM and PM peak hours at Greenhill Road and Main Street governed the AM and PM peak hour because it is the study intersection with the highest volume of entering vehicles. The AM peak hour was determined to occur between 7:30 and 8:30. The PM peak hour was determined to occur between 4:30 and 5:30. The AM and PM peak hour volumes were collected on Thursday, May 4, 2017. The raw and refined volume data are provided in Appendix 1 of this report.

Background Traffic Growth

Projected traffic analysis will typically apply an annual growth rate to study intersections' existing turning movement volumes prior to adding project development trips to account for growth in background traffic (traffic unrelated to the proposed Fareway Grocery Store development). In coordination with the local Metropolitan Planning Organization the Iowa Northland Regional Council of Governments, a 1.5% annual growth rate was identified for this study. As such, a 1.5% annual growth rate was applied to existing 2017 volumes to reflect projected future volumes, which could be expected through a sustained constant area growth without the Fareway Grocery Store development. It should be noted, over time growth rates generally do not exhibit a straight line growth, but rather tend to level off as the surrounding area continues to develop. Therefore, the use of a straight line growth rate for the prediction of future events can be thought of as conservative and should be considered as such when reviewing the output of this analysis. Existing 2017 and projected 2018 and 2038 AM and PM peak hour turning movement volumes without the proposed development (no build) are presented in Figure 4 and Figure 5, respectively.

Cumulative Projects

Cumulative projects are City approved development projects that could affect traffic conditions at the study intersection identified in this report. The City of Cedar Falls identified one cumulative development project, which is expected to be completely built by 2018. For the purposes of this analysis this development is identified as the Kwik Star #934 Convenience Store development that will be located directly east of the proposed Fareway Grocery Store development. A separate traffic impact study was conducted for this cumulative project by Shive-Hattery and what follows is a summary of that study.

Project trip generation for the proposed Kwik Star #934 Convenience Store development was calculated based on nationally accepted trip generation rates and fitted curve equations contained in the Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition, 2012. Trips were generated for the expected type of land use and correspond to the AM and PM peak hour of the adjacent roadway network. In addition, reductions in the quantity of total trips were accounted for due to pass-by trips. Pass-by trips are those trips that are attracted from the existing traffic stream passing the site on an adjacent street. Consequently, these types of trips do not add new traffic to the adjacent street system.

Table 1 presents trip generation estimates for the cumulative project development, which were added to the roadway network along with existing volumes and annual background traffic volume growth to estimate projected future traffic conditions at the study intersection without the proposed Fareway Grocery Store development. These projected volumes are represented as no build 2018 and 2038 volumes in Figure 5.

Table 1 Trip Generation – Cumulative Project

Land Use	ITE Code [1]	Quantity	AM Peak Hour					PM Peak Hour				
			Trips	% In	% Out	Trips In	Trips Out	Trips	% In	% Out	Trips In	Trips Out
Gas Station with Market & Car Wash	946	20 VFP [2]	185	51%	49%	94	91	230	51%	49%	117	113

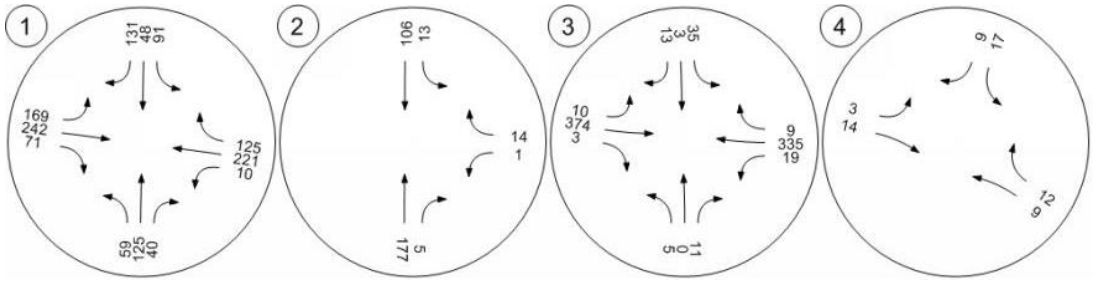
[1] Institue of Transportation Engineers Trip Generation Handbook, 9th Edition, 2012
[2] VFP = Vehicle Fueling Positions

Trip Distribution – Cumulative Project

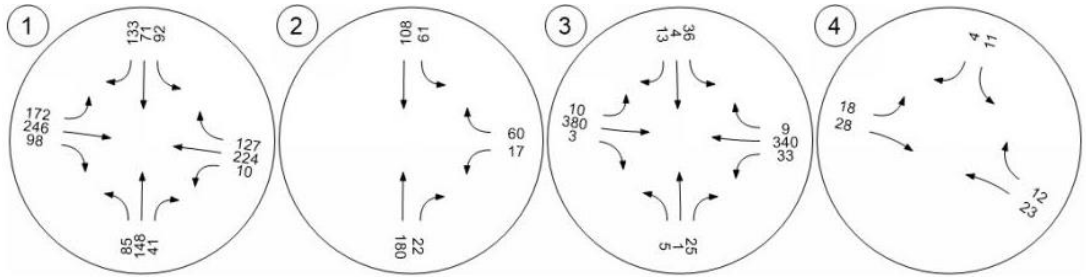
Trip distribution percentages for the proposed Kwik Star #934 Convenience Store development are based on recommendations from the City of Cedar Falls City Engineer. Existing 2017 and projected 2018 and 2038 no build AM peak hour turning movement volumes are presented in Figure 4. Existing 2017 and projected 2018 and 2038 no build PM peak hour turning movement volumes are presented in Figure 5. Figure 4 and Figure 5 include trips generated by the proposed Kwik Star #934 Convenience Store development, but not the proposed Fareway Grocery Store development.

Figure 4 Study Intersections – AM Peak Hour No Build Volumes

2017 AM Peak Hour



2018 AM Peak Hour (Cumulative Projects Trips Included)



2038 AM Peak Hour (Cumulative Project Trips Included)

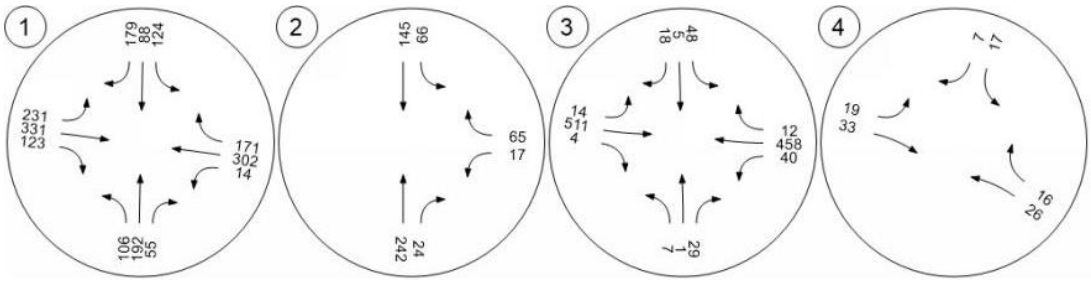
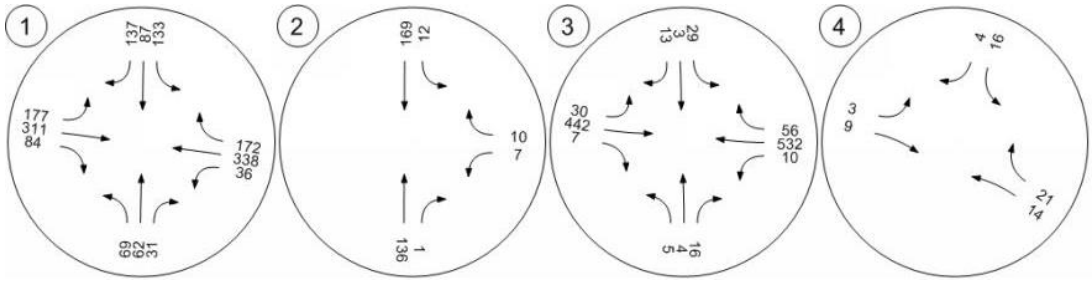
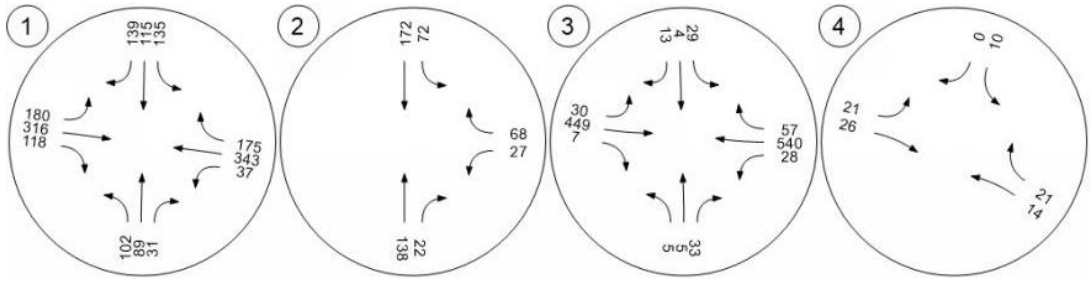


Figure 5 Study Intersections – PM Peak Hour No Build Volumes

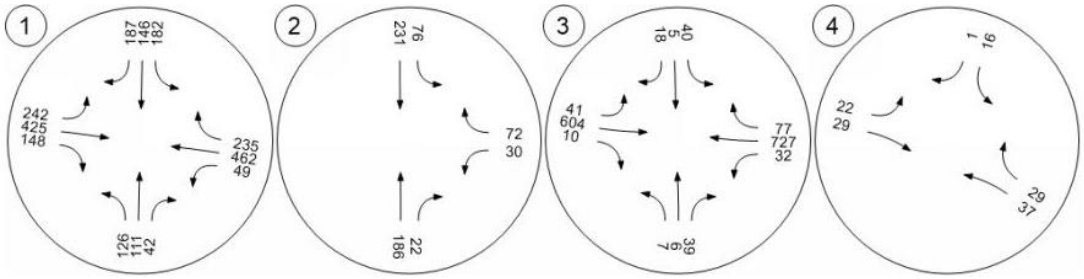
2017 PM Peak Hour



2018 PM Peak Hour (Cumulative Project Trips Included)



2038 PM Peak Hour (Cumulative Project Trips Included)



Crash Analysis

The Safety Analysis, Visualization, and Exploration Resource (SAVER) website administered by Iowa DOT was used to collect available crash data near the project site for the five-year period between January 1, 2012 and December 31, 2016.

Table 2 presents crash statistics at each study intersection organized by crash type.

Table 2 Crash Type by Intersection (1/1/12 – 12/31/16)

Study Intersection		Crash Type						
		Rear End	Sideswipe Opposite Direction	Sideswipe Same Direction	Oncoming Left Turn	Broadside	Single Vehicle	Total
1	Greenhill Rd & Main St	4	1	1	7	0	0	**13**
2	Bluebell Rd & Main St	0	0	0	0	1	0	**1**
3	Greenhill Rd & Coneflower Pkwy	0	0	0	0	0	1	**1**
4	Bluebell Rd & Coneflower Pkwy	0	0	0	0	0	1	**1**
Total		**4**	**1**	**1**	**7**	**1**	**2**	**16**

Source: Iowa Department of Transportation, Bureau of Transportation Safety.

A total of 16 crashes occurred at the study intersections over the analysis period. 11 of the 16 crashes occurred during dry conditions; the remaining 5 crashes occurred during inclement weather (wet, snow, and ice/frost).

The intersection of Greenhill Road and Main Street experienced the highest number of crashes, which is not unexpected given the relatively higher volume of entering vehicles. Major contributing factors for the crashes at this intersection include failure to yield the right-of-way, crossed the centerline, distracted driving, and driving too fast. Crossing the centerline was identified as a major contributing factor at the intersections of Greenhill Road and Coneflower Parkway and Bluebell Road and Coneflower Parkway. Losing control was the major contributing factor identified at the intersection of Bluebell Road and Main Street.

Intersection crash rates are expressed in crashes per million entering vehicles (crashes/MEV) and can be calculated with the following equation:

$$\text{Crash Rate} = \frac{1{,}000{,}000 \times \text{Total Crashes}}{\text{AADT}_{\text{Entering vpd}} \times 365 \times \#\text{ of Years in Study Period}}$$

Table 3 summarizes crash rates at the study intersections and compares it to average statewide crash rates for intersections with a similar volume of entering vehicles. For the purposes of this analysis, the weekday PM peak hour entering traffic volume at the study intersections was assumed to be 10% of the daily weekday entering volume, which is standard for urban intersections and is consistent with methodology used by the Federal Highway Administration. The statewide average crash rate for intersections with a similar volume of entering vehicles was prepared by the Iowa Department of Transportation, Bureau of Transportation Safety.

Table 3 Intersection Crash Rate Summary

Study Intersection		Total Crashes	Daily Entering Volume	Crash Rate (crashes/MEV)	Statewide Average Crash Rate (crashes/MEV)	Comparison to Statewide Average Crash Rate
1	Greenhill Rd & Main St	13	13,320	0.53	0.8	**Lower**
2	Bluebell Rd & Main St	1	3,160	0.17	1.0	**Lower**
3	Greenhill Rd & Coneflower Pkwy	1	8,170	0.07	0.7	**Lower**
4	Bluebell Rd & Coneflower Pkwy	1	640	0.86	1.3	**Lower**

Source: Iowa Department of Transportation, Bureau of Transportation Safety.

All of the study intersections had crash rates that were lower than the statewide average for intersections with a similar daily volume of entering vehicles.

Table 4 presents crash injury statistics at the study intersections organized by severity.

Table 4 Crash Injuries at each Intersection by Crash Severity (1/1/12 – 12/31/16)

Study Intersection		Number of Crashes	Severity					
			Suspected Injury		Possible Injury	Uninjured	Unknown	Injuries per Crash
			Serious	Minor				
1	Greenhill Rd & Main St	13	0	0	2	25	0	0.15
2	Bluebell Rd & Main St	1	0	0	0	2	0	0.00
3	Greenhill Rd & Coneflower Pkwy	1	0	0	0	1	0	0.00
4	Bluebell Rd & Coneflower Pkwy	1	0	0	0	1	0	0.00

2 out of the 31 individuals involved in the 16 crashes were identified as possibly injured. Both of these crashes occurred at the intersection of Greenhill Road and Main Street. The remaining 29 individuals involved in the 16 crashes were identified as uninjured.

Projected Buildout Conditions & Mitigation

Trip Generation

Project trip generation is based on nationally accepted trip generation rates contained in the Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition, 2012. The development is expected to be completely built by the end of 2018. Trips were generated for the expected type of project and correspond to the AM and PM peak hour of the adjacent roadway network.

The proposed Fareway Grocery Store development is most closely represented by ITE's Supermarket (ITE Code 850). Table 5 presents trip generation estimates for the development.

Table 5 Trip Generation

Land Use	ITE Code [1]	Quantity	AM Peak Hour					PM Peak Hour				
			Trips	% In	% Out	Trips In	Trips Out	Trips	% In	% Out	Trips In	Trips Out
Supermarket	850	20.806 KSF [2]	71	62%	38%	44	27	244	51%	49%	124	120

[1] Institue of Transportation Engineers Trip Generation Handbook, 9th Edition, 2012
[2] KSF = Thousand Square Feet

Trip Classifications

Traffic impact studies for supermarkets will generally consider two types of trips, pass-by trips and primary trips. As discussed in the ITE Trip Generation Handbook, Second Edition, June 2004, pass-by trips are those trips that are attracted from the existing traffic stream passing the site on an adjacent street with direct access to the site. Consequently, these types of trips do not add new traffic to the adjacent street system, but do add trips to the development's access points. For this study, it can be reasonably assumed some pass-by trips will be attracted from the direct access points along Main Street and Bluebell Road. Primary trips, as discussed by ITE, are trips generally made for the specific purpose of visiting the generator. The stop at the generator (i.e. the proposed Fareway Grocery Store development) is the primary reason for the trip. Primary trips typically go from origin to generator and then returns to the origin. For example, a home-to-shopping-to-home combination of trips is a primary trip set.

The percent of pass-by and non-pass-by trips attracted to the proposed Fareway Grocery Store development are based upon the ITE Trip Generation Handbook, Second Edition, June 2004, as well as existing traffic patterns as reflected in the existing PM peak hour turning movement volumes. Please note the ITE Trip Generation Handbook does not contain pass-by trip percentages for supermarkets in the AM peak hour. The Assumed pass-by and non-pass-by trip percentages are presented in Table 6.

Table 6 Pass-by & Primary Trips

Trip Classification	AM Peak Hour				PM Peak Hour			
	Percent	In	Out	Total	Percent	In	Out	Total
Pass-by Trips [1]	0%	0	0	0	36%	45	43	88
Primary Trips [1]	100%	44	27	71	64%	79	77	156
Total Generation	**100%**	**44**	**27**	**237**	**100%**	**124**	**136**	**244**

[1] Calculated based on the expected amount of pass-by trips and primary trips as reported by ITE Trip Generation Handbook, Second Edition, June 2004 as well as existing traffic patterns as reflected in the existing PM peak hour turning movement volumes.

Trip Distribution

Trip distribution percentages for the proposed Fareway Grocery Store development are based on recommendations from the City of Cedar Falls City Engineer. Projected 2018 and 2038 AM and PM peak hour turning movement volumes upon buildout of the Fareway Grocery Store are presented in Figure 6 and Figure 7, respectively. In coordination with the City of Cedar Falls the following improvements are recommended by the design year of 2038:

Intersection of Greenhill Road and Main Street

- Dedicated southbound left, through, and right-turn lanes
- An additional westbound through lane

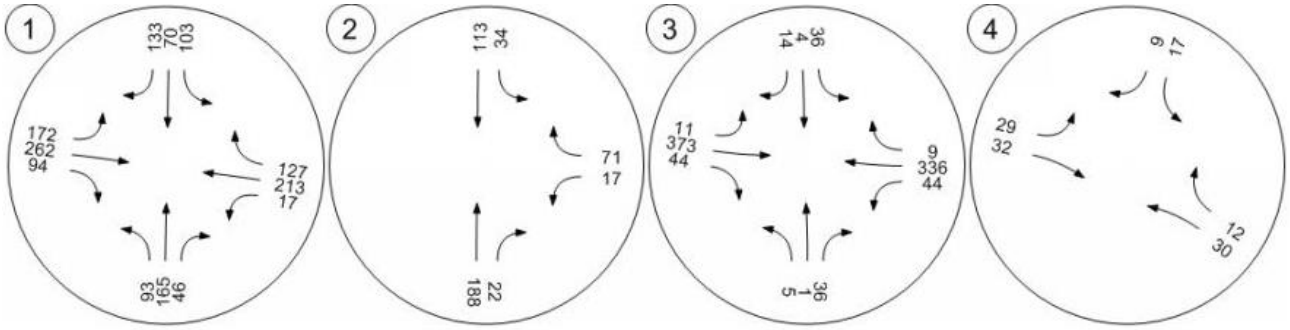
Intersection of Greenhill Road and Coneflower Parkway

- Dedicated southbound left-turn lane
- Eastbound and westbound center two-way left-turn lane
- Dedicated eastbound right-turn lane

The recommended lane configuration and control at each study intersection by the design year of 2038 is presented in Figure 8.

Figure 6 Study Intersections – AM Peak Hour Buildout Volumes

2018 AM Peak Hour



2038 AM Peak Hour

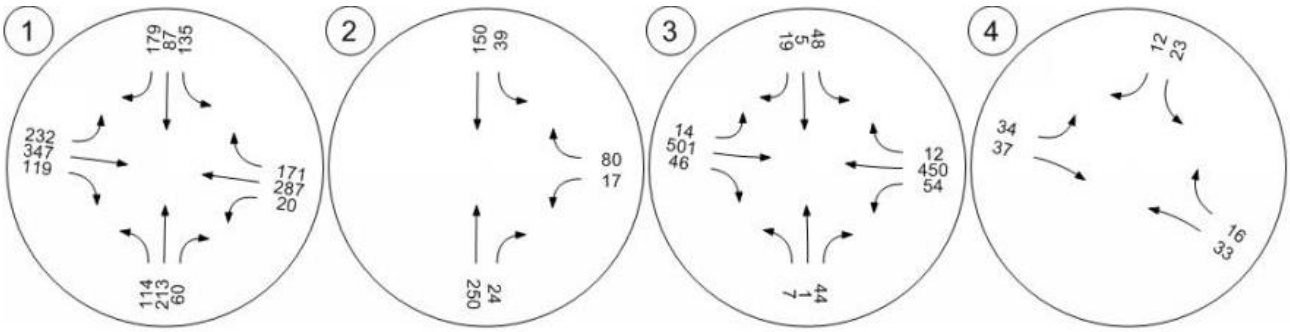
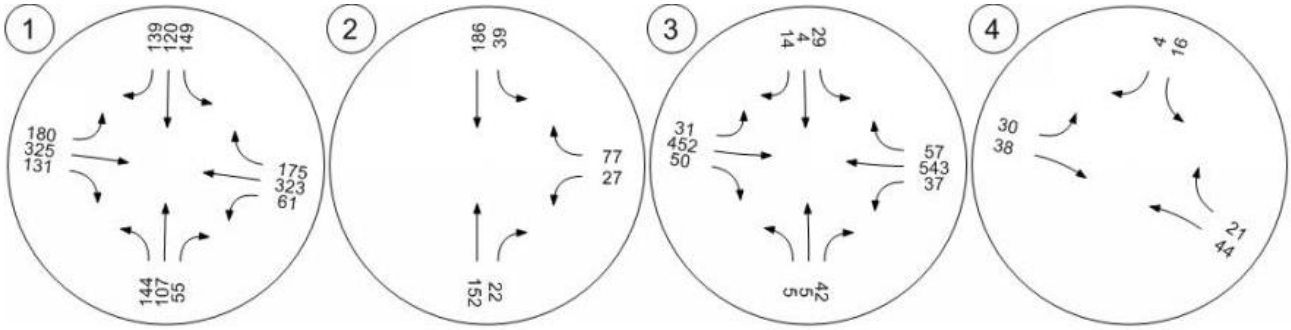


Figure 7 Study Intersections – PM Peak Hour Buildout Volumes

2018 PM Peak Hour



2038 PM Peak Hour

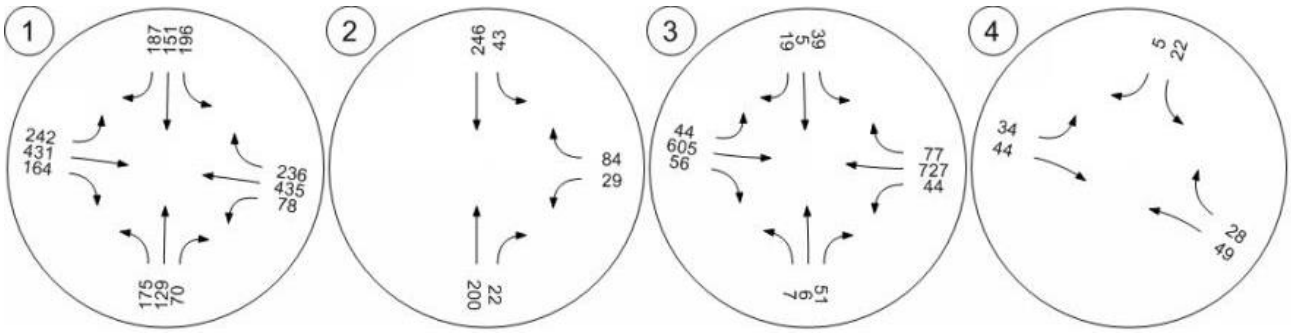
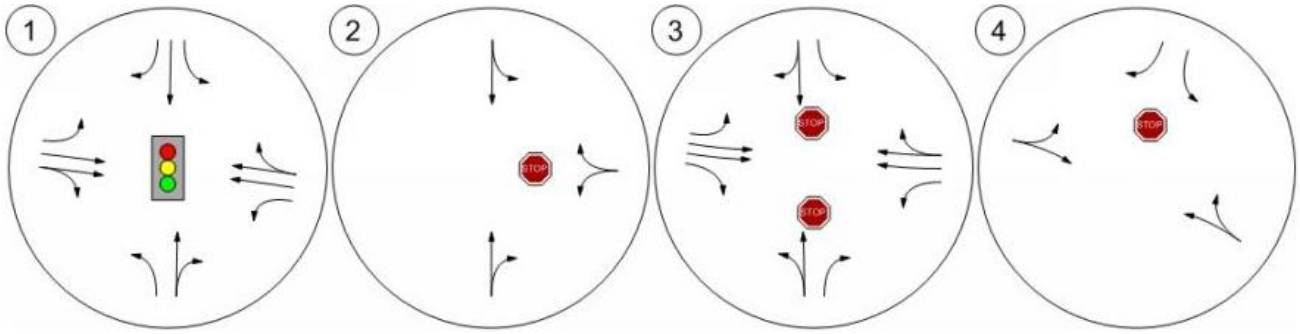


Figure 8 Study Intersections – Recommended Lane Configuration and Control By 2038



Traffic Modeling

Operational Analysis

Vehicular operational analysis for this study was performed using the methodology of the 2010 Highway Capacity Manual through Synchro 8 traffic analysis software. Operational analysis is generally categorized in terms of Level of Service (LOS). LOS describes the quality of traffic operations and is graded from A to F; with LOS A representing free-flow conditions and LOS F representing congested conditions.

Procedures outlined in Chapter 18 of the HCM 2010 were used to analyze intersection performance at signalized intersections. The primary measure used to quantify LOS at signalized intersections is control delay. Control delay is the delay experienced by vehicles slowing down as they are approaching the intersection, the wait time at the intersection and the time for vehicles to speed up through the intersection and enter into the traffic stream. The average intersection control delay is a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches.

Procedures outlined in Chapter 19 of the HCM 2010 were used to analyze intersection performance at unsignalized intersections. While LOS for signalized intersections is primarily based on the volume weighted average delay per vehicle traveling through the intersection (intersection control delay), LOS for unsignalized intersections is based primarily on the approach with the longest delay.

Table 7 presents the range of traffic delays associated for signalized and unsignalized intersections.

Table 7 LOS Criteria for Signalized and Unsignalized Intersections

LOS	Signalized Intersection Average Delay (sec/veh)	Unsignalized Intersection Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 to 20	> 10 to 15
C	> 20 to 35	> 15 to 25
D	> 35 to 55	> 25 to 35
E	> 55 to 80	> 35 to 50
F	> 80	> 50

Source: HCM 2010, Exhibit 18-4 LOS Criteria for Signalized Intersections and HCM 2010, Exhibit 19-1 LOS Criteria for Unsignalized Intersections.
sec/veh = seconds per vehicle

LOS D or better is generally identified as acceptable in urban conditions. The analysis presented herein indicates the study intersections will operate at an acceptable LOS D or better during the AM and PM peak hour conditions through 2038 with buildout of the proposed development, except for the intersection of Greenhill Road and Coneflower Parkway. This analysis assumes existing lane configuration and control for existing 2017 and projected 2018 conditions as identified in Figure 3 and recommended lane configuration and control for projected 2038 conditions as identified in Figure 8. Assuming intersection improvements will not be constructed by 2018 provides a conservative analysis.

Direction was provided by the City of Cedar Falls City Engineer to implement improvements as identified in Figure 8. However, the LOS at the intersection of Greenhill Road and Coneflower Parkway is still projected to fall below the acceptable LOS D in the PM peak hour with and without the proposed development by 2038. This analysis indicates additional improvements at this intersection will be necessary in order to maintain an acceptable LOS during the peak hours by 2038 regardless if the proposed Fareway Grocery Store development is built or not. Provided the City of Cedar Falls is willing to accept that the southbound approach to this intersection may fall below the acceptable LOS of D by the design year of 2038 during PM

peak hour conditions; no other changes/improvements to the study intersections lane configuration and control from what is depicted in Figure 8 are considered necessary. It should be noted, this analysis assumes the annual background growth rate at this intersection will grow at 1.5% per year through the design year of 2038, which is a conservative assumption. It should also be noted, based on the traffic volumes used for the analysis herein, the Manual on Uniform Traffic Control Devices traffic control signal Warrant 2 (Four-Hour Vehicular Volume) will not be met by 2038 with buildout of the development (analysis worksheet is included in Appendix 2). In addition, motorists will generally choose routes that minimize their travel time/distance. Therefore, as the intersection of Greenhill Road and Coneflower Parkway becomes congested, motorists may choose alternate routes that experience less delay. For example, motorists may choose to transit the signalized intersection Greenhill Road and Prairie Parkway to the east (southbound approach is currently under construction) over the Greenhill Road and Coneflower Parkway intersection, which would likely result in a better LOS than what is reported in Table 9.

Table 8 and Table 9 presents signalized and unsignalized AM and PM peak hour operational conditions for existing 2017, as well as projected 2018 and 2038 conditions under no build and buildout conditions, respectively. The signalized operations assume optimized cycle lengths and phasing splits as identified through Synchro 8. Operational analysis worksheets are contained in Appendix 3.

Table 8 Existing & Projected Signalized Intersection Operations

Intersection		Scenario	Metric	AM Peak Hour				PM Peak Hour			
				EB	WB	NB	SB	EB	WB	NB	SB
1	Greenhill Rd & Main St	2017 Existing Conditions	Approach Delay	14.6	12.7	14.8	20.1	14.8	14.3	13.8	19.9
			Approach LOS	B	B	B	C	B	B	B	B
			95th %tile Queue	L	TR	TR	LTR	L	TR	TR	LTR
			(Longest Movement) in Feet	130	146	91	127	220	198	64	177
			Intersection Delay & LOS	15.2, B				15.6, B			
		2018 No Build	Approach Delay	14.8	13.1	13.0	18.4	14.6	14.4	13.5	19.9
			Approach LOS	B	B	B	C	B	B	B	B
			95th %tile Queue	L	TR	TR	LTR	T	TR	TR	LTR
			(Longest Movement) in Feet	139	137	103	138	390	238	88	215
			Intersection Delay & LOS	14.8, B				15.5, B			
		2018 Buildout	Approach Delay	14.4	13.1	12.2	19.0	14.9	14.7	14.2	21.9
			Approach LOS	B	B	B	B	B	B	B	C
			95th %tile Queue [2]	L	TR	TR	LTR	T	TR	L	LTR
			(Longest Movement) in Feet	138	132	92	142	279	206	103	255
			Intersection Delay & LOS	14.6, B				15.5, B			
		2038 No Build [1]	Approach Delay	18.4	26.4	19.2	17.2	20.8	37.1	18.3	19.9
			Approach LOS	B	C	B	C	C	D	B	B
			95th %tile Queue [2]	TR	TR	TR	T	TR	TR	TR	L
			(Longest Movement) in Feet	153	132	154	75	187	210	105	107
			Intersection Delay & LOS	20.3, B				25.5, C			
		2038 Buildout [1]	Approach Delay	20.9	16.0	18.5	25.2	19.7	14.7	23.3	30.6
			Approach LOS	C	B	B	C	B	B	C	C
			95th %tile Queue [2]	T	TR	TR	L	T	TR	TR	TR
			(Longest Movement) in Feet	330	116	173	123	552	150	134	213
			Intersection Delay & LOS	20.1, C				21.1, C			

Queue, Delay, and LOS analysis based on HCM 2010 Signalized Methodology
[1] Arrival rates are assumed to be more consistent by 2038.

Table 9 Existing & Projected Unsignalized Intersection Operations

Intersection		Scenario	AM Peak Hour			PM Peak Hour		
			Worst Approach Movement Delay (sec)		HCM LOS	Worst Approach Movement Delay (sec)		HCM LOS
2	Bluebell Rd & Main St	2017 Existing Conditions	WB	9.7	A	WB	9.8	A
		2018 No Build	WB	11.3	B	WB	10.8	A
		2018 Buildout	WB	11.2	B	WB	10.6	B
		2038 No Build [1]	WB	10.9	B	WB	11.4	B
		2038 Buildout [1]	WB	10.9	B	WB	11.2	B
3	Greenhill Rd & Coneflower Pkwy	2017 Existing Conditions	SB	17.9	C	SB	21.6	C
		2018 No Build	SB	20.1	C	SB	21.9	C
		2018 Buildout	SB	21.1	C	SB	26.2	D
		2038 No Build [1]	SB	20.4	C	SB	41.2	E
		2038 Buildout [1]	SB	21.3	C	SB	45.3	E
4	Bluebell Rd & Coneflower Pkwy	2017 Existing Conditions	SB	8.7	A	SB	8.8	A
		2018 No Build	SB	9.0	A	SB	9.3	A
		2018 Buildout	SB	9.2	A	SB	9.7	A
		2038 No Build [1]	SB	9.0	A	SB	9.3	A
		2038 Buildout [1]	SB	9.2	A	SB	9.5	A

Delay and LOS analysis based on HCM 2010 Two-way Stop Control Methodology
[1] Arrival rates are assumed to be more consistent by 2038.

Conclusion and Recommendations

The proposed development is a Fareway Grocery Store. The development will be located on the northeast corner of Bluebell Road and Main Street. Two access points to the development are being proposed, with one on Main Street and one on Bluebell Road. The development is expected to be completely built by the end of 2018. Sight visibility zones corresponding to intersection sight distance calculations as defined through AASHTO should be identified and maintained at this access points. These zones should not contain structures or plantings that would preclude unobstructed views of oncoming traffic. Current designs for the development do not indicate obstructions within the sight visibility zones.

The Safety Analysis, Visualization, and Exploration Resource (SAVER) website administered by Iowa DOT was used to collect available crash data near the project site for the five-year period between January 1, 2012 and December 31, 2016. All of the study intersections had crash rates that were lower than the statewide average for intersections with a similar daily volume of entering vehicles.

LOS D or better is generally identified as acceptable in urban conditions. The analysis presented herein indicates the study intersections will operate at an acceptable LOS D or better during the AM and PM peak hour conditions through 2038 with buildout of the proposed development, except for the intersection of Greenhill Road and Coneflower Parkway. This analysis assumes existing lane configuration and control for existing 2017 and projected 2018 conditions as identified in Figure 3 and recommended lane configuration and control for projected 2038 conditions as identified in Figure 8. Assuming intersection improvements will not be constructed by 2018 provides a conservative analysis.

Direction was provided by the City of Cedar Falls City Engineer to implement improvements as identified in Figure 8. However, the LOS at the intersection of Greenhill Road and Coneflower Parkway is still projected to fall below the acceptable LOS D in the PM peak hour with and without the proposed development by 2038. This analysis indicates additional improvements at this intersection will be necessary in order to maintain an acceptable LOS during the peak hours by 2038 regardless if the proposed Fareway Grocery Store development is built or not. Provided the City of Cedar Falls is willing to accept that the southbound approach to this intersection may fall below the acceptable LOS of D by the design year of 2038 during PM peak hour conditions; no other changes/improvements to the study intersections lane configuration and control from what is depicted in Figure 8 are considered necessary. It should be noted, this analysis assumes the annual background growth rate at this intersection will grow at 1.5% per year through the design year of 2038, which is a conservative assumption. It should also be noted, based on the traffic volumes used for the analysis herein, the Manual on Uniform Traffic Control Devices traffic control signal Warrant 2 (Four-Hour Vehicular Volume) will not be met by 2038 with buildout of the development (analysis worksheet is included in Appendix 2). In addition, motorists will generally choose routes that minimize their travel time/distance. Therefore, as the intersection of Greenhill Road and Coneflower Parkway becomes congested, motorists may choose alternate routes that experience less delay. For example, motorists may choose to transit the signalized intersection Greenhill Road and Prairie Parkway to the east (southbound approach is currently under construction) over the Greenhill Road and Coneflower Parkway intersection, which would likely result in a better LOS than what is reported in Table 9.

Appendix 1

Background Traffic Counts (Raw Data)

(1) Main Street and Greenhill Road - All Vehicles

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Greenhill Road			From South (Northbound) Main Street			From West (Eastbound) Greenhill Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	15	3	17	2	40	20	13	11	12	11	38	13	195	1212
7:15 - 7:30	10	5	29	2	56	35	18	18	7	25	48	9	262	1311
7:30 - 7:45	27	11	34	3	58	36	19	28	10	29	52	15	322	1332
7:45 - 8:00	27	13	30	4	75	35	23	52	11	68	75	20	433	1298
8:00 - 8:15	19	12	35	2	43	24	9	29	12	39	48	22	294	1203
8:15 - 8:30	18	12	32	1	45	30	8	16	7	33	67	14	283	
8:30 - 8:45	23	12	47	4	59	24	8	10	5	38	45	13	288	
8:45 - 9:00	26	12	54	6	54	29	18	17	7	36	61	18	338	

4:00 - 4:15	41	22	40	13	81	47	23	19	15	45	71	19	436	1618
4:15 - 4:30	39	26	30	9	77	35	20	17	6	47	76	15	397	1605
4:30 - 4:45	33	18	35	14	96	42	18	14	9	35	78	25	417	1637
4:45 - 5:00	27	23	29	9	65	36	10	21	12	50	63	23	368	1569
5:00 - 5:15	37	22	35	7	84	42	27	10	8	49	91	11	423	1201
5:15 - 5:30	36	24	38	6	93	52	14	17	2	43	79	25	429	
5:30 - 5:45	34	15	36	9	83	34	10	10	10	39	58	11	349	
5:45 - 6:00	23	13	28	3	44	40	9	17	8	42	56	13	296	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.77
PM Intersection Peak Hour Factor (PHF) = 0.95

(1) Main Street and Greenhill Road - Articulated Trucks

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Greenhill Road			From South (Northbound) Main Street			From West (Eastbound) Greenhill Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	3
7:45 - 8:00	0	0	0	0	1	0	0	0	0	0	0	0	1	5
8:00 - 8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	6
8:15 - 8:30	0	0	0	0	2	0	0	0	0	0	0	0	2	
8:30 - 8:45	0	0	0	0	2	0	0	0	0	0	0	0	2	
8:45 - 9:00	0	0	0	0	0	0	1	0	0	1	0	0	2	

4:00 - 4:15	0	0	0	0	1	0	0	0	0	0	0	0	1	1
4:15 - 4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:30 - 4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 - 5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 - 5:15	0	0	1	0	0	0	0	0	0	0	0	0	1	1
5:15 - 5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 - 5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

Background Traffic Counts (Raw Data)

(2) Main Street and Bluebell Road - All Vehicles

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Bluebell Road			From South (Northbound) Main Street			From West (Eastbound) NA			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	1	16		1		3		28	0				49	295
7:15 - 7:30	3	13		0		0		41	0				57	320
7:30 - 7:45	4	21		1		5		47	4				82	316
7:45 - 8:00	4	32		0		3		68	0				107	286
8:00 - 8:15	1	33		0		4		36	0				74	253
8:15 - 8:30	4	20		0		2		26	1				53	
8:30 - 8:45	3	26		0		1		21	1				52	
8:45 - 9:00	5	29		0		3		36	1				74	
4:00 - 4:15	3	44		2		2		49	2				102	351
4:15 - 4:30	4	39		1		3		32	0				79	335
4:30 - 4:45	3	46		3		3		35	1				91	335
4:45 - 5:00	4	40		0		2		33	0				79	301
5:00 - 5:15	2	38		4		1		41	0				86	283
5:15 - 5:30	3	45		0		4		27	0				79	
5:30 - 5:45	3	26		2		3		23	0				57	
5:45 - 6:00	1	23		1		2		32	2				61	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.75
PM Intersection Peak Hour Factor (PHF) = 0.92

(2) Main Street and Bluebell Road - Articulated Trucks

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Bluebell Road			From South (Northbound) Main Street			From West (Eastbound) NA			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0	0		0		0		0	0				0	0
7:15 - 7:30	0	0		0		0		0	0				0	0
7:30 - 7:45	0	0		0		0		0	0				0	0
7:45 - 8:00	0	0		0		0		0	0				0	0
8:00 - 8:15	0	0		0		0		0	0				0	0
8:15 - 8:30	0	0		0		0		0	0				0	
8:30 - 8:45	0	0		0		0		0	0				0	
8:45 - 9:00	0	0		0		0		0	0				0	
4:00 - 4:15	0	0		0		0		0	0				0	0
4:15 - 4:30	0	0		0		0		0	0				0	0
4:30 - 4:45	0	0		0		0		0	0				0	0
4:45 - 5:00	0	0		0		0		0	0				0	0
5:00 - 5:15	0	0		0		0		0	0				0	0
5:15 - 5:30	0	0		0		0		0	0				0	
5:30 - 5:45	0	0		0		0		0	0				0	
5:45 - 6:00	0	0		0		0		0	0				0	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

Background Traffic Counts (Raw Data)

(3) Estate Drive/Cornflower Parkway and Greenhill Road - All Vehicles

15-min Interval	From North (Southbound) Estate Drive			From East (Westbound) Greenhill Road			From South (Northbound) Cornflower Parkway			From West (Eastbound) Greenhill Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	8	0	2	6	58	2	0	0	0	1	65	0	142	791
7:15 - 7:30	12	1	2	3	91	2	0	0	2	1	66	0	180	820
7:30 - 7:45	14	0	5	3	95	4	0	0	2	1	86	0	210	817
7:45 - 8:00	10	0	3	7	106	3	0	0	1	4	124	1	259	777
8:00 - 8:15	9	1	2	6	64	1	3	0	5	4	76	0	171	716
8:15 - 8:30	2	2	3	3	70	1	2	0	3	1	88	2	177	
8:30 - 8:45	5	0	4	1	80	3	1	0	1	1	73	1	170	
8:45 - 9:00	6	0	5	4	80	2	3	0	4	2	90	2	198	
4:00 - 4:15	4	0	5	1	130	10	1	0	6	8	121	0	286	1098
4:15 - 4:30	4	0	4	6	115	12	2	0	3	9	106	0	261	1105
4:30 - 4:45	8	1	6	4	144	13	2	1	5	7	109	5	305	1147
4:45 - 5:00	5	1	2	4	112	15	1	0	1	4	101	0	246	1083
5:00 - 5:15	8	0	0	1	130	11	1	1	6	9	126	0	293	1026
5:15 - 5:30	8	1	5	1	146	17	1	2	4	10	106	2	303	
5:30 - 5:45	3	0	6	0	117	10	1	0	1	2	101	0	241	
5:45 - 6:00	3	1	3	2	81	5	3	0	4	2	84	1	189	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.79
PM Intersection Peak Hour Factor (PHF) = 0.95

(3) Estate Drive/Cornflower Parkway and Greenhill Road - Articulated Trucks

15-min Interval	From North (Southbound) Estate Drive			From East (Westbound) Greenhill Road			From South (Northbound) Cornflower Parkway			From West (Eastbound) Greenhill Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	2
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	3
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	4
7:45 - 8:00	0	0	0	0	1	0	0	0	0	1	0	0	2	5
8:00 - 8:15	0	0	0	0	1	0	0	0	0	0	0	0	1	3
8:15 - 8:30	0	0	0	0	1	0	0	0	0	0	0	0	1	
8:30 - 8:45	0	0	1	0	0	0	0	0	0	0	0	0	1	
8:45 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:00 - 4:15	0	0	1	0	0	0	0	0	0	0	0	0	1	1
4:15 - 4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 - 4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 - 5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 - 5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 - 5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 - 5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

Background Traffic Counts (Raw Data)

(4) Cornflower Parkway and Bluebell Road - All Vehicles

15-min Interval	From North (Southbound) Cornflower Parkway			From East (Westbound) Bluebell Road			From South (Northbound) NA			From West (Eastbound) Bluebell Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	4		2		2	0				0	4		12	46
7:15 - 7:30	2		1		1	1				1	1		7	54
7:30 - 7:45	0		4		3	0				1	6		14	64
7:45 - 8:00	5		2		3	0				0	3		13	55
8:00 - 8:15	6		2		2	7				2	1		20	62
8:15 - 8:30	6		1		1	5				0	4		17	
8:30 - 8:45	1		0		1	2				0	1		5	
8:45 - 9:00	4		1		3	6				0	6		20	
4:00 - 4:15	1		0		5	4				4	3		17	69
4:15 - 4:30	5		0		3	4				0	4		16	69
4:30 - 4:45	8		1		5	7				1	2		24	67
4:45 - 5:00	3		2		2	2				0	3		12	52
5:00 - 5:15	1		1		4	7				1	3		17	55
5:15 - 5:30	4		0		3	5				1	1		14	
5:30 - 5:45	0		0		5	3				0	1		9	
5:45 - 6:00	3		0		3	5				1	3		15	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.80
PM Intersection Peak Hour Factor (PHF) = 0.72

(4) Cornflower Parkway and Bluebell Road - Articulated Trucks

15-min Interval	From North (Southbound) Cornflower Parkway			From East (Westbound) Bluebell Road			From South (Northbound) NA			From West (Eastbound) Bluebell Road			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0		0		0	0				0	0		0	0
7:15 - 7:30	0		0		0	0				0	0		0	0
7:30 - 7:45	0		0		0	0				0	0		0	0
7:45 - 8:00	0		0		0	0				0	0		0	0
8:00 - 8:15	0		0		0	0				0	0		0	0
8:15 - 8:30	0		0		0	0				0	0		0	
8:30 - 8:45	0		0		0	0				0	0		0	
8:45 - 9:00	0		0		0	0				0	0		0	
4:00 - 4:15	0		0		0	0				0	0		0	0
4:15 - 4:30	0		0		0	0				0	0		0	0
4:30 - 4:45	0		0		0	0				0	0		0	0
4:45 - 5:00	0		0		0	0				0	0		0	0
5:00 - 5:15	0		0		0	0				0	0		0	0
5:15 - 5:30	0		0		0	0				0	0		0	
5:30 - 5:45	0		0		0	0				0	0		0	
5:45 - 6:00	0		0		0	0				0	0		0	

* AM and PM counts collected during peak hours on Thursday, May 4, 2017.

Peak Hour Turning Movement Volumes

(1) Main Street and Greenhill Road - All Vehicles

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Greenhill Road			From South (Northbound) Main Street			From West (Eastbound) Greenhill Road			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:30 - 7:45	27	11	34	3	58	36	19	28	10	29	52	15	322
7:45 - 8:00	27	13	30	4	75	35	23	52	11	68	75	20	433
8:00 - 8:15	19	12	35	2	43	24	9	29	12	39	48	22	294
8:15 - 8:30	18	12	32	1	45	30	8	16	7	33	67	14	283
2017 Volumes	**91**	**48**	**131**	**10**	**221**	**125**	**59**	**125**	**40**	**169**	**242**	**71**	**1332**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**92**	**49**	**133**	**10**	**224**	**127**	**60**	**127**	**41**	**172**	**246**	**72**	**1353**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**124**	**66**	**179**	**14**	**302**	**171**	**81**	**171**	**55**	**231**	**331**	**97**	**1822**
Percent Heavy Vehicle	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.77
4:30 - 4:45	33	18	35	14	96	42	18	14	9	35	78	25	417
4:45 - 5:00	27	23	29	9	65	36	10	21	12	50	63	23	368
5:00 - 5:15	37	22	35	7	84	42	27	10	8	49	91	11	423
5:15 - 5:30	36	24	38	6	93	52	14	17	2	43	79	25	429
2017 Volumes	**133**	**87**	**137**	**36**	**338**	**172**	**69**	**62**	**31**	**177**	**311**	**84**	**1637**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**135**	**88**	**139**	**37**	**343**	**175**	**70**	**63**	**31**	**180**	**316**	**85**	**1662**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**182**	**119**	**187**	**49**	**462**	**235**	**94**	**85**	**42**	**242**	**425**	**115**	**2237**
Percent Heavy Vehicle	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.95

(2) Main Street and Bluebell Road - All Vehicles

15-min Interval	From North (Southbound) Main Street			From East (Westbound) Bluebell Road			From South (Northbound) Main Street			From West (Eastbound) NA			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:30 - 7:45	4	21		1		5		47	4				82
7:45 - 8:00	4	32		0		3		68	0				107
8:00 - 8:15	1	33		0		4		36	0				74
8:15 - 8:30	4	20		0		2		26	1				53
2017 Volumes	**13**	**106**	**0**	**1**	**0**	**14**	**0**	**177**	**5**	**0**	**0**	**0**	**316**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**13**	**108**	**0**	**1**	**0**	**14**	**0**	**180**	**5**	**0**	**0**	**0**	**321**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**18**	**145**	**0**	**1**	**0**	**19**	**0**	**242**	**7**	**0**	**0**	**0**	**432**
Percent Heavy Vehicle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.74
4:30 - 4:45	3	46		3		3		35	1				91
4:45 - 5:00	4	40		0		2		33	0				79
5:00 - 5:15	2	38		4		1		41	0				86
5:15 - 5:30	3	45		0		4		27	0				79
2017 Volumes	**12**	**169**	**0**	**7**	**0**	**10**	**0**	**136**	**1**	**0**	**0**	**0**	**335**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**12**	**172**	**0**	**7**	**0**	**10**	**0**	**138**	**1**	**0**	**0**	**0**	**340**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**16**	**231**	**0**	**10**	**0**	**14**	**0**	**186**	**1**	**0**	**0**	**0**	**458**
Percent Heavy Vehicle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.92

Peak Hour Turning Movement Volumes

(3) Estate Drive/Cornflower Parkway and Greenhill Road - All Vehicles

15-min Interval	From North (Southbound) Estate Drive			From East (Westbound) Greenhill Road			From South (Northbound) Cornflower Parkway			From West (Eastbound) Greenhill Road			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:30 - 7:45	14	0	5	3	95	4	0	0	2	1	86	0	210
7:45 - 8:00	10	0	3	7	106	3	0	0	1	4	124	1	259
8:00 - 8:15	9	1	2	6	64	1	3	0	5	4	76	0	171
8:15 - 8:30	2	2	3	3	70	1	2	0	3	1	88	2	177
2017 Volumes	**35**	**3**	**13**	**19**	**335**	**9**	**5**	**0**	**11**	**10**	**374**	**3**	**817**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**36**	**3**	**13**	**19**	**340**	**9**	**5**	**0**	**11**	**10**	**380**	**3**	**829**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**48**	**4**	**18**	**26**	**458**	**12**	**7**	**0**	**15**	**14**	**511**	**4**	**1117**
Percent Heavy Vehicle	0%	0%	0%	0%	1%	0%	0%	0%	0%	10%	0%	0%	-
												PHF =	0.79
4:30 - 4:45	8	1	6	4	144	13	2	1	5	7	109	5	305
4:45 - 5:00	5	1	2	4	112	15	1	0	1	4	101	0	246
5:00 - 5:15	8	0	0	1	130	11	1	1	6	9	126	0	293
5:15 - 5:30	8	1	5	1	146	17	1	2	4	10	106	2	303
2017 Volumes	**29**	**3**	**13**	**10**	**532**	**56**	**5**	**4**	**16**	**30**	**442**	**7**	**1147**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**29**	**3**	**13**	**10**	**540**	**57**	**5**	**4**	**16**	**30**	**449**	**7**	**1163**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**40**	**4**	**18**	**14**	**727**	**77**	**7**	**5**	**22**	**41**	**604**	**10**	**1569**
Percent Heavy Vehicle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.95

(4) Cornflower Parkway and Bluebell Road - All Vehicles

15-min Interval	From North (Southbound) Cornflower Parkway			From East (Westbound) Bluebell Road			From South (Northbound) NA			From West (Eastbound) Bluebell Road			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:30 - 7:45	0		4		3	0				1	6		14
7:45 - 8:00	5		2		3	0				0	3		13
8:00 - 8:15	6		2		2	7				2	1		20
8:15 - 8:30	6		1		1	5				0	4		17
2017 Volumes	**17**	**0**	**9**	**0**	**9**	**12**	**0**	**0**	**0**	**3**	**14**	**0**	**64**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**17**	**0**	**9**	**0**	**9**	**12**	**0**	**0**	**0**	**3**	**14**	**0**	**64**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**23**	**0**	**12**	**0**	**12**	**16**	**0**	**0**	**0**	**4**	**19**	**0**	**86**
Percent Heavy Vehicle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.80
4:30 - 4:45	8		1		5	7				1	2		24
4:45 - 5:00	3		2		2	2				0	3		12
5:00 - 5:15	1		1		4	7				1	3		17
5:15 - 5:30	4		0		3	5				1	1		14
2017 Volumes	**16**	**0**	**4**	**0**	**14**	**21**	**0**	**0**	**0**	**3**	**9**	**0**	**67**
Growth Factor	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015	1.015
2018 Volumes	**16**	**0**	**4**	**0**	**14**	**21**	**0**	**0**	**0**	**3**	**9**	**0**	**67**
Growth Factor	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367	1.367
2038 Volumes	**22**	**0**	**5**	**0**	**19**	**29**	**0**	**0**	**0**	**4**	**12**	**0**	**91**
Percent Heavy Vehicle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
												PHF =	0.70

Appendix 2

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

201 Third Ave. SE Suite 500, PO Box 1803
Cedar Rapids, Iowa 52406-1803
Telephone (319) 364-0227
FAX (319) 364-1778

TRAFFIC SIGNAL WARRANTS – 2038 Future With Project

PROJECT NUMBER: 2172660 DATE: May 16, 2017
PROJECT NAME: Fareway Grocery Store – Cedar Falls
PREPARED BY: Shive-Hattery

Major Street: Greenhill Road — Critical Approach Speed: **45** mph
Minor Street: Estate Drive/Coneflower Parkway — Critical Approach Speed: **25** mph

Critical speed of major street traffic > 40mph ☐ RURAL (R)
In built up area of isolated community of < 10,000 population ☐ RURAL (R)
☒ URBAN (U)

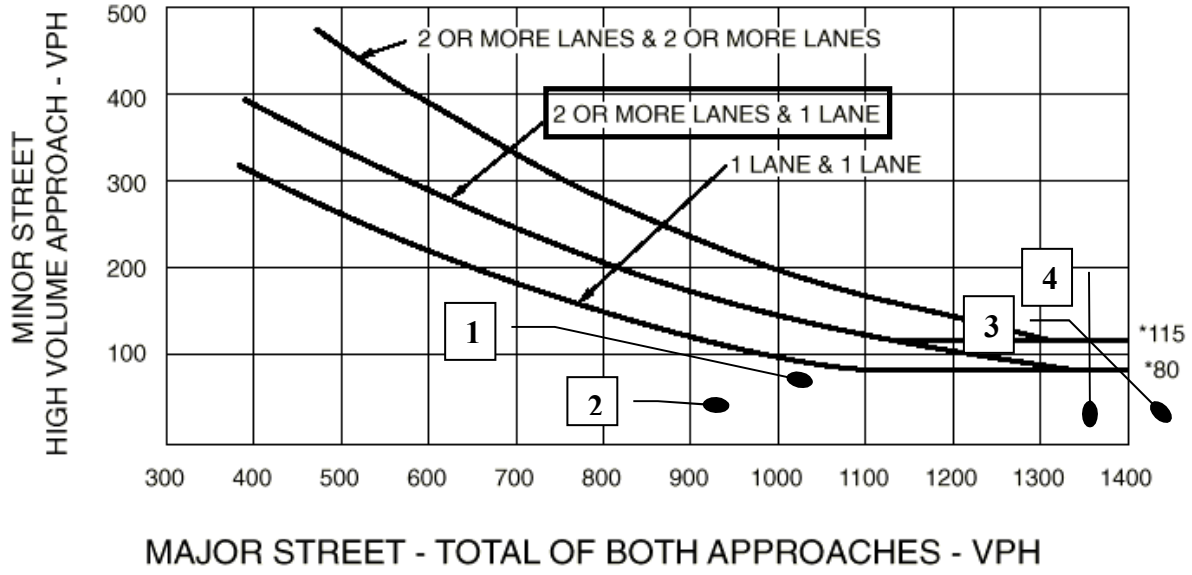
WARRANT 2 – Four Hour Vehicular Volume

SATISFIED* YES ☐ NO ☒

	APPROACH LANES		4-Hours			
APPROACH LANES	ONE	2 or MORE	7-8 AM	8-9 AM	4-5 PM	5-6 PM
Both Approaches – Major Street		**X**	**1022**	**922**	**1458**	**1360**
Highest Approach – Minor Street	**X**		**79**	**44**	**56**	**39**

*Refer to Figure-1 to determine if this warrant is satisfied.

FIGURE 1 - FOUR HOUR VEHICULAR VOLUME



*Note: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor street approach with one lane.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right-of-way assignment must be shown.

1

Appendix 3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	169	242	71	10	221	125	59	125	40	91	48	131
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1888	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	219	314	92	13	287	162	77	162	52	118	62	170
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	377	1254	361	501	514	290	475	499	160	219	130	253
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.36	0.36	0.36	0.36	0.36	0.36
Sat Flow, veh/h	956	2767	797	995	1135	640	1167	1379	443	380	359	699
Grp Volume(v), veh/h	219	203	203	13	0	449	77	0	214	350	0	0
Grp Sat Flow(s),veh/h/ln	956	1805	1759	995	0	1775	1167	0	1822	1438	0	0
Q Serve(g_s), s	12.9	4.1	4.2	0.5	0.0	11.0	0.0	0.0	5.0	7.4	0.0	0.0
Cycle Q Clear(g_c), s	23.9	4.1	4.2	4.7	0.0	11.0	3.8	0.0	5.0	12.5	0.0	0.0
Prop In Lane	1.00		0.45	1.00		0.36	1.00		0.24	0.34		0.49
Lane Grp Cap(c), veh/h	377	818	797	501	0	804	475	0	659	601	0	0
V/C Ratio(X)	0.58	0.25	0.25	0.03	0.00	0.56	0.16	0.00	0.32	0.58	0.00	0.00
Avail Cap(c_a), veh/h	387	835	814	511	0	821	475	0	659	601	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.7	10.0	10.0	11.5	0.0	11.9	13.3	0.0	13.7	16.0	0.0	0.0
Incr Delay (d2), s/veh	2.1	0.2	0.2	0.0	0.0	0.8	0.7	0.0	1.3	4.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	2.1	2.1	0.1	0.0	5.5	1.0	0.0	2.7	5.5	0.0	0.0
LnGrp Delay(d),s/veh	22.7	10.2	10.2	11.5	0.0	12.7	14.1	0.0	15.0	20.1	0.0	0.0
LnGrp LOS	C	B	B	B		B	B		B	C		
Approach Vol, veh/h		625			462			291			350	
Approach Delay, s/veh		14.6			12.7			14.8			20.1	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		27.0		32.4		27.0		32.4
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		21.5		27.5		21.5		27.5
Max Q Clear Time (g_c+I1), s		7.0		25.9		14.5		13.0
Green Ext Time (p_c), s		3.5		1.0		2.3		5.9

Intersection Summary	
HCM 2010 Ctrl Delay	15.2
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	14	177	5	13	106
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	19	239	7	18	143

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	421	243	0	0	246	0
Stage 1	243	-	-	-	-	-
Stage 2	178	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	593	801	-	-	1332	-
Stage 1	802	-	-	-	-	-
Stage 2	858	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	584	801	-	-	1332	-
Mov Cap-2 Maneuver	584	-	-	-	-	-
Stage 1	802	-	-	-	-	-
Stage 2	845	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	0.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	782	1332	-
HCM Lane V/C Ratio	-	-	0.026	0.013	-
HCM Control Delay (s)	-	-	9.7	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	374	3	19	335	9	5	0	11	35	3	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	10	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	13	473	4	24	424	11	6	0	14	44	4	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	435	0	0	477	0	0	763	985	239	740	981	218
Stage 1	-	-	-	-	-	-	501	501	-	478	478	-
Stage 2	-	-	-	-	-	-	262	484	-	262	503	-
Critical Hdwy	4.3	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.3	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1066	-	-	1096	-	-	297	250	768	309	251	792
Stage 1	-	-	-	-	-	-	526	546	-	543	559	-
Stage 2	-	-	-	-	-	-	726	555	-	726	545	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1066	-	-	1096	-	-	277	239	768	293	240	792
Mov Cap-2 Maneuver	-	-	-	-	-	-	277	239	-	293	240	-
Stage 1	-	-	-	-	-	-	517	537	-	534	543	-
Stage 2	-	-	-	-	-	-	685	539	-	701	536	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.5	12.5	17.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	277	768	1066	-	-	1096	-	-	344
HCM Lane V/C Ratio	0.023	0.018	0.012	-	-	0.022	-	-	0.188
HCM Control Delay (s)	18.3	9.8	8.4	0.1	-	8.4	0.1	-	17.9
HCM Lane LOS	C	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0.1	-	-	0.7

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	3	14	9	12	17	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	4	18	11	15	21	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	26	0	-	0	44	19
Stage 1	-	-	-	-	19	-
Stage 2	-	-	-	-	25	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1601	-	-	-	972	1065
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	1003	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1601	-	-	-	969	1065
Mov Cap-2 Maneuver	-	-	-	-	969	-
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	1000	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	8.7
HCM LOS			A

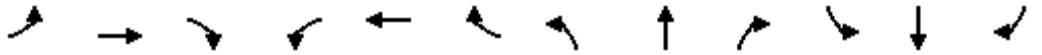
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1601	-	-	-	969	1065
HCM Lane V/C Ratio	0.002	-	-	-	0.022	0.011
HCM Control Delay (s)	7.3	0	-	-	8.8	8.4
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	155	83	84	43	177	75	103	151
Average Queue (ft)	75	45	35	7	87	31	52	72
95th Queue (ft)	130	77	66	27	146	64	91	127
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	0						0	
Queuing Penalty (veh)	0						0	

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Fareway Grocery - Cedar Falls
2017 Existing PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	177	311	84	36	338	172	69	62	31	133	87	137
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1893	1900
Adj Flow Rate, veh/h	186	327	88	38	356	181	73	65	33	140	92	144
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	320	1294	343	501	545	277	485	426	216	259	170	215
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.36	0.36	0.36	0.36	0.36	0.36
Sat Flow, veh/h	882	2824	749	987	1189	604	1162	1190	604	493	475	601
Grp Volume(v), veh/h	186	207	208	38	0	537	73	0	98	376	0	0
Grp Sat Flow(s),veh/h/ln	882	1805	1768	987	0	1793	1162	0	1793	1569	0	0
Q Serve(g_s), s	12.4	4.2	4.3	1.5	0.0	13.9	0.0	0.0	2.2	8.9	0.0	0.0
Cycle Q Clear(g_c), s	26.3	4.2	4.3	5.8	0.0	13.9	3.4	0.0	2.2	11.9	0.0	0.0
Prop In Lane	1.00		0.42	1.00		0.34	1.00		0.34	0.37		0.38
Lane Grp Cap(c), veh/h	320	827	810	501	0	822	485	0	643	645	0	0
V/C Ratio(X)	0.58	0.25	0.26	0.08	0.00	0.65	0.15	0.00	0.15	0.58	0.00	0.00
Avail Cap(c_a), veh/h	320	827	810	501	0	822	485	0	643	645	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	22.7	9.9	10.0	11.8	0.0	12.6	13.4	0.0	13.1	16.0	0.0	0.0
Incr Delay (d2), s/veh	2.6	0.2	0.2	0.1	0.0	1.9	0.7	0.0	0.5	3.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	2.1	2.1	0.4	0.0	7.1	0.9	0.0	1.2	5.9	0.0	0.0
LnGrp Delay(d),s/veh	25.4	10.1	10.1	11.8	0.0	14.4	14.1	0.0	13.6	19.9	0.0	0.0
LnGrp LOS	C	B	B	B		B	B		B	B		
Approach Vol, veh/h		601			575			171			376	
Approach Delay, s/veh		14.8			14.3			13.8			19.9	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		27.0		33.0		27.0		33.0
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		21.5		27.5		21.5		27.5
Max Q Clear Time (g_c+I1), s		5.4		28.3		13.9		15.9
Green Ext Time (p_c), s		3.0		0.0		2.0		5.7

Intersection Summary	
HCM 2010 Ctrl Delay	15.6
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	7	10	136	1	12	169
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	8	11	148	1	13	184

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	358	148	0	0	149	0
Stage 1	148	-	-	-	-	-
Stage 2	210	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	644	904	-	-	1445	-
Stage 1	884	-	-	-	-	-
Stage 2	830	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	638	904	-	-	1445	-
Mov Cap-2 Maneuver	638	-	-	-	-	-
Stage 1	884	-	-	-	-	-
Stage 2	822	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	0.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	772	1445	-
HCM Lane V/C Ratio	-	-	0.024	0.009	-
HCM Control Delay (s)	-	-	9.8	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	442	7	10	532	56	5	4	16	29	3	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	32	465	7	11	560	59	5	4	17	31	3	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	619	0	0	473	0	0	835	1172	236	909	1147	309
Stage 1	-	-	-	-	-	-	532	532	-	611	611	-
Stage 2	-	-	-	-	-	-	303	640	-	298	536	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	971	-	-	1099	-	-	264	194	772	233	201	693
Stage 1	-	-	-	-	-	-	504	529	-	453	487	-
Stage 2	-	-	-	-	-	-	687	473	-	692	527	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	971	-	-	1099	-	-	244	182	772	214	189	693
Mov Cap-2 Maneuver	-	-	-	-	-	-	244	182	-	214	189	-
Stage 1	-	-	-	-	-	-	481	505	-	433	480	-
Stage 2	-	-	-	-	-	-	659	466	-	641	503	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.2	14.5	21.6
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	212	772	971	-	-	1099	-	-	264
HCM Lane V/C Ratio	0.045	0.022	0.033	-	-	0.01	-	-	0.179
HCM Control Delay (s)	22.8	9.8	8.8	0.2	-	8.3	0.1	-	21.6
HCM Lane LOS	C	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	0.1	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	3	9	14	21	16	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	4	13	20	30	23	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	50	0	-	0	56	35
Stage 1	-	-	-	-	35	-
Stage 2	-	-	-	-	21	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1570	-	-	-	957	1044
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	1007	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1570	-	-	-	954	1044
Mov Cap-2 Maneuver	-	-	-	-	954	-
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	1004	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1570	-	-	-	954	1044
HCM Lane V/C Ratio	0.003	-	-	-	0.024	0.005
HCM Control Delay (s)	7.3	0	-	-	8.9	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	225	340	293	73	220	82	68	204
Average Queue (ft)	128	78	62	20	124	33	33	105
95th Queue (ft)	220	237	199	50	198	64	61	177
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	9							
Queuing Penalty (veh)	13							

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Fareway Grocery - Cedar Falls
2018 AM Peak Hour No Build

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	172	246	98	10	224	127	85	148	41	92	71	133
Future Volume (veh/h)	172	246	98	10	224	127	85	148	41	92	71	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1888	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	223	319	127	13	291	165	110	192	53	119	92	173
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	345	1051	410	458	469	266	488	525	145	218	165	237
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.37	0.37	0.37	0.37	0.37	0.37
Sat Flow, veh/h	950	2539	991	959	1132	642	1132	1434	396	337	452	647
Grp Volume(v), veh/h	223	225	221	13	0	456	110	0	245	384	0	0
Grp Sat Flow(s),veh/h/ln	950	1805	1725	959	0	1775	1132	0	1830	1435	0	0
Q Serve(g_s), s	10.6	4.2	4.3	0.5	0.0	10.1	0.0	0.0	4.9	7.0	0.0	0.0
Cycle Q Clear(g_c), s	20.7	4.2	4.3	4.8	0.0	10.1	4.8	0.0	4.9	11.9	0.0	0.0
Prop In Lane	1.00		0.57	1.00		0.36	1.00		0.22	0.31		0.45
Lane Grp Cap(c), veh/h	345	747	714	458	0	735	488	0	670	620	0	0
V/C Ratio(X)	0.65	0.30	0.31	0.03	0.00	0.62	0.23	0.00	0.37	0.62	0.00	0.00
Avail Cap(c_a), veh/h	345	747	714	458	0	735	488	0	670	620	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.2	9.8	9.8	11.4	0.0	11.6	11.6	0.0	11.6	13.8	0.0	0.0
Incr Delay (d2), s/veh	4.2	0.2	0.2	0.0	0.0	1.6	1.1	0.0	1.5	4.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	2.1	2.1	0.1	0.0	5.3	1.2	0.0	2.7	5.4	0.0	0.0
LnGrp Delay(d),s/veh	24.4	10.0	10.1	11.5	0.0	13.2	12.6	0.0	13.1	18.4	0.0	0.0
LnGrp LOS	C	B	B	B		B	B		B	B		
Approach Vol, veh/h		669			469			355			384	
Approach Delay, s/veh		14.8			13.1			13.0			18.4	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		23.8		26.2		23.8		26.2
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		18.3		20.7		18.3		20.7
Max Q Clear Time (g_c+I1), s		6.9		22.7		13.9		12.1
Green Ext Time (p_c), s		1.4		0.0		1.0		2.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	60	180	22	61	108
Future Vol, veh/h	17	60	180	22	61	108
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	23	81	243	30	82	146

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	568	258	0	0	273	0
Stage 1	258	-	-	-	-	-
Stage 2	310	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	488	786	-	-	1302	-
Stage 1	790	-	-	-	-	-
Stage 2	748	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	454	786	-	-	1302	-
Mov Cap-2 Maneuver	454	-	-	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	748	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	2.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	677	1302	-
HCM Lane V/C Ratio	-	-	0.154	0.063	-
HCM Control Delay (s)	-	-	11.3	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.2	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	380	3	33	340	9	5	1	25	36	4	13
Future Vol, veh/h	10	380	3	33	340	9	5	1	25	36	4	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	10	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	13	481	4	42	430	11	6	1	32	46	5	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	441	0	0	485	0	0	811	1034	243	787	1031	221
Stage 1	-	-	-	-	-	-	509	509	-	520	520	-
Stage 2	-	-	-	-	-	-	302	525	-	267	511	-
Critical Hdwy	4.3	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.3	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1061	-	-	1088	-	-	274	234	764	286	235	789
Stage 1	-	-	-	-	-	-	520	541	-	512	535	-
Stage 2	-	-	-	-	-	-	688	533	-	721	540	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1061	-	-	1088	-	-	250	218	764	259	219	789
Mov Cap-2 Maneuver	-	-	-	-	-	-	250	218	-	259	219	-
Stage 1	-	-	-	-	-	-	511	532	-	503	508	-
Stage 2	-	-	-	-	-	-	633	506	-	678	531	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.9	11.9	20.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	244	764	1061	-	-	1088	-	-	305
HCM Lane V/C Ratio	0.031	0.041	0.012	-	-	0.038	-	-	0.22
HCM Control Delay (s)	20.2	9.9	8.4	0.1	-	8.4	0.2	-	20.1
HCM Lane LOS	C	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0.1	-	-	0.8

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	18	28	23	12	11	4
Future Vol, veh/h	18	28	23	12	11	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	23	35	29	15	14	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	44	0	-	0	118	37
Stage 1	-	-	-	-	37	-
Stage 2	-	-	-	-	81	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1577	-	-	-	883	1041
Stage 1	-	-	-	-	991	-
Stage 2	-	-	-	-	947	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1577	-	-	-	870	1041
Mov Cap-2 Maneuver	-	-	-	-	870	-
Stage 1	-	-	-	-	976	-
Stage 2	-	-	-	-	947	-

Approach	EB	WB	SB
HCM Control Delay, s	2.9	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1577	-	-	-	870	1041
HCM Lane V/C Ratio	0.014	-	-	-	0.016	0.005
HCM Control Delay (s)	7.3	0	-	-	9.2	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	172	81	82	39	164	91	122	172
Average Queue (ft)	80	43	38	7	80	37	56	79
95th Queue (ft)	139	74	71	28	137	72	103	138
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	0					0	0	
Queuing Penalty (veh)	0					0	0	

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Fareway Grocery - Cedar Falls
2018 AM Peak Hour Buildout

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	172	262	94	17	213	127	93	165	46	103	70	133
Future Volume (veh/h)	172	262	94	17	213	127	93	165	46	103	70	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1888	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	223	340	122	22	277	165	121	214	60	134	91	173
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	339	1018	359	440	432	257	493	524	147	232	152	212
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.37	0.37	0.37	0.37	0.37	0.37
Sat Flow, veh/h	962	2618	924	945	1110	661	1133	1429	401	340	413	579
Grp Volume(v), veh/h	223	233	229	22	0	442	121	0	274	398	0	0
Grp Sat Flow(s),veh/h/ln	962	1805	1737	945	0	1771	1133	0	1829	1332	0	0
Q Serve(g_s), s	8.4	4.1	4.2	0.8	0.0	9.1	0.0	0.0	5.0	7.6	0.0	0.0
Cycle Q Clear(g_c), s	17.5	4.1	4.2	4.9	0.0	9.1	4.8	0.0	5.0	12.6	0.0	0.0
Prop In Lane	1.00		0.53	1.00		0.37	1.00		0.22	0.34		0.43
Lane Grp Cap(c), veh/h	339	702	675	440	0	689	493	0	671	595	0	0
V/C Ratio(X)	0.66	0.33	0.34	0.05	0.00	0.64	0.25	0.00	0.41	0.67	0.00	0.00
Avail Cap(c_a), veh/h	339	702	675	440	0	689	493	0	671	595	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.2	9.6	9.7	11.4	0.0	11.2	10.5	0.0	10.6	13.1	0.0	0.0
Incr Delay (d2), s/veh	4.6	0.3	0.3	0.0	0.0	2.0	1.2	0.0	1.8	5.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	2.1	2.0	0.2	0.0	4.8	1.3	0.0	2.9	5.4	0.0	0.0
LnGrp Delay(d),s/veh	23.8	9.9	10.0	11.5	0.0	13.2	11.7	0.0	12.5	19.0	0.0	0.0
LnGrp LOS	C	A	A	B		B	B		B	B		
Approach Vol, veh/h		685			464			395			398	
Approach Delay, s/veh		14.4			13.1			12.2			19.0	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		22.0		23.0		22.0		23.0
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		16.5		17.5		16.5		17.5
Max Q Clear Time (g_c+I1), s		7.0		19.5		14.6		11.1
Green Ext Time (p_c), s		1.5		0.0		0.5		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.6
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	71	188	22	34	113
Future Vol, veh/h	17	71	188	22	34	113
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	23	96	254	30	46	153

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	514	269	0	0	284	0
Stage 1	269	-	-	-	-	-
Stage 2	245	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	524	775	-	-	1290	-
Stage 1	781	-	-	-	-	-
Stage 2	800	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	504	775	-	-	1290	-
Mov Cap-2 Maneuver	504	-	-	-	-	-
Stage 1	751	-	-	-	-	-
Stage 2	800	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	1.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	702	1290	-
HCM Lane V/C Ratio	-	-	0.169	0.036	-
HCM Control Delay (s)	-	-	11.2	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.1	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	373	44	44	336	9	5	1	36	36	3	14
Future Vol, veh/h	11	373	44	44	336	9	5	1	36	36	3	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	10	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	14	472	56	56	425	11	6	1	46	46	4	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	436	0	0	528	0	0	855	1076	264	808	1099	218
Stage 1	-	-	-	-	-	-	528	528	-	543	543	-
Stage 2	-	-	-	-	-	-	327	548	-	265	556	-
Critical Hdwy	4.3	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.3	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1065	-	-	1049	-	-	255	221	741	276	214	792
Stage 1	-	-	-	-	-	-	507	531	-	497	523	-
Stage 2	-	-	-	-	-	-	665	520	-	723	516	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1065	-	-	1049	-	-	229	201	741	240	195	792
Mov Cap-2 Maneuver	-	-	-	-	-	-	229	201	-	240	195	-
Stage 1	-	-	-	-	-	-	497	521	-	488	486	-
Stage 2	-	-	-	-	-	-	599	483	-	664	506	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.1	11.8	21.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	224	741	1065	-	-	1049	-	-	290
HCM Lane V/C Ratio	0.034	0.061	0.013	-	-	0.053	-	-	0.231
HCM Control Delay (s)	21.6	10.2	8.4	0.1	-	8.6	0.2	-	21.1
HCM Lane LOS	C	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.2	0	-	-	0.2	-	-	0.9

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	29	32	30	12	17	9
Future Vol, veh/h	29	32	30	12	17	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	36	40	38	15	21	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	53	0	-	0	158	46
Stage 1	-	-	-	-	46	-
Stage 2	-	-	-	-	112	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1566	-	-	-	838	1029
Stage 1	-	-	-	-	982	-
Stage 2	-	-	-	-	918	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1566	-	-	-	818	1029
Mov Cap-2 Maneuver	-	-	-	-	818	-
Stage 1	-	-	-	-	958	-
Stage 2	-	-	-	-	918	-

Approach	EB	WB	SB
HCM Control Delay, s	3.5	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1566	-	-	-	818	1029
HCM Lane V/C Ratio	0.023	-	-	-	0.026	0.011
HCM Control Delay (s)	7.4	0	-	-	9.5	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	163	86	91	34	168	100	104	168
Average Queue (ft)	77	39	40	11	76	39	56	82
95th Queue (ft)	138	70	73	33	132	77	92	142
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)						0	0	
Queuing Penalty (veh)						0	0	

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Fareway Grocery - Cedar Falls
2018 PM Peak Hour No Build

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	316	118	37	343	175	102	89	31	135	115	139
Future Volume (veh/h)	180	316	118	37	343	175	102	89	31	135	115	139
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1893	1900
Adj Flow Rate, veh/h	189	333	124	39	361	184	107	94	33	142	121	146
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	309	1154	422	475	529	270	472	477	167	250	197	199
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	875	2590	948	949	1188	605	1130	1345	472	458	555	562
Grp Volume(v), veh/h	189	230	227	39	0	545	107	0	127	409	0	0
Grp Sat Flow(s),veh/h/ln	875	1805	1733	949	0	1793	1130	0	1817	1574	0	0
Q Serve(g_s), s	11.2	4.5	4.6	1.5	0.0	13.3	0.0	0.0	2.7	9.4	0.0	0.0
Cycle Q Clear(g_c), s	24.5	4.5	4.6	6.1	0.0	13.3	5.0	0.0	2.7	12.2	0.0	0.0
Prop In Lane	1.00		0.55	1.00		0.34	1.00		0.26	0.35		0.36
Lane Grp Cap(c), veh/h	309	804	772	475	0	799	472	0	644	646	0	0
V/C Ratio(X)	0.61	0.29	0.29	0.08	0.00	0.68	0.23	0.00	0.20	0.63	0.00	0.00
Avail Cap(c_a), veh/h	309	804	772	475	0	799	472	0	644	646	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	22.2	9.7	9.7	11.7	0.0	12.1	13.1	0.0	12.3	15.3	0.0	0.0
Incr Delay (d2), s/veh	3.5	0.2	0.2	0.1	0.0	2.4	1.1	0.0	0.7	4.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	2.2	2.2	0.4	0.0	7.0	1.3	0.0	1.5	6.2	0.0	0.0
LnGrp Delay(d),s/veh	25.8	9.9	9.9	11.7	0.0	14.5	14.2	0.0	13.0	19.9	0.0	0.0
LnGrp LOS	C	A	A	B		B	B		B	B		
Approach Vol, veh/h		646			584			234			409	
Approach Delay, s/veh		14.6			14.4			13.5			19.9	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		25.0		30.0		25.0		30.0
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		19.5		24.5		19.5		24.5
Max Q Clear Time (g_c+I1), s		7.0		26.5		14.2		15.3
Green Ext Time (p_c), s		0.8		0.0		1.2		2.6

Intersection Summary	
HCM 2010 Ctrl Delay	15.5
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	3.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	27	68	138	22	72	172
Future Vol, veh/h	27	68	138	22	72	172
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	29	74	150	24	78	187

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	505	162	0	0	174	0
Stage 1	162	-	-	-	-	-
Stage 2	343	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	530	888	-	-	1415	-
Stage 1	872	-	-	-	-	-
Stage 2	723	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	497	888	-	-	1415	-
Mov Cap-2 Maneuver	497	-	-	-	-	-
Stage 1	818	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	2.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	726	1415	-
HCM Lane V/C Ratio	-	-	0.142	0.055	-
HCM Control Delay (s)	-	-	10.8	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.2	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	449	7	28	540	57	5	5	33	29	4	13
Future Vol, veh/h	30	449	7	28	540	57	5	5	33	29	4	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	32	473	7	29	568	60	5	5	35	31	4	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	628	0	0	480	0	0	885	1227	240	959	1200	314
Stage 1	-	-	-	-	-	-	541	541	-	656	656	-
Stage 2	-	-	-	-	-	-	344	686	-	303	544	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	964	-	-	1093	-	-	243	180	767	214	187	688
Stage 1	-	-	-	-	-	-	498	524	-	426	465	-
Stage 2	-	-	-	-	-	-	650	451	-	687	522	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	964	-	-	1093	-	-	219	165	767	187	171	688
Mov Cap-2 Maneuver	-	-	-	-	-	-	219	165	-	187	171	-
Stage 1	-	-	-	-	-	-	476	500	-	407	446	-
Stage 2	-	-	-	-	-	-	605	433	-	620	499	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.5	13.5	24.5
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	188	767	964	-	-	1093	-	-	233
HCM Lane V/C Ratio	0.056	0.045	0.033	-	-	0.027	-	-	0.208
HCM Control Delay (s)	25.3	9.9	8.9	0.2	-	8.4	0.2	-	24.5
HCM Lane LOS	D	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.2	0.1	0.1	-	-	0.1	-	-	0.8

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	21	26	14	21	10	0
Future Vol, veh/h	21	26	14	21	10	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	30	37	20	30	14	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	50	0	-	0	132	35
Stage 1	-	-	-	-	35	-
Stage 2	-	-	-	-	97	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1570	-	-	-	867	1044
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	932	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1570	-	-	-	850	1044
Mov Cap-2 Maneuver	-	-	-	-	850	-
Stage 1	-	-	-	-	973	-
Stage 2	-	-	-	-	932	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1570	-	-	-	850	-
HCM Lane V/C Ratio	0.019	-	-	-	0.017	-
HCM Control Delay (s)	7.3	0	-	-	9.3	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	-

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	229	408	347	72	293	98	93	261
Average Queue (ft)	149	136	113	21	143	50	41	131
95th Queue (ft)	257	390	345	52	238	88	78	215
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	23	0				0	0	
Queuing Penalty (veh)	36	0				0	0	

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Fareway Grocery - Cedar Falls
2018 PM Peak Hour Buildout

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	325	131	61	323	175	144	107	55	149	120	139
Future Volume (veh/h)	180	325	131	61	323	175	144	107	55	149	120	139
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1894	1900
Adj Flow Rate, veh/h	189	342	138	64	340	184	152	113	58	157	126	146
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	307	1093	434	449	502	272	463	435	223	255	187	182
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.37	0.37	0.37	0.37	0.37	0.37
Sat Flow, veh/h	892	2526	1002	929	1161	628	1125	1185	608	451	510	496
Grp Volume(v), veh/h	189	243	237	64	0	524	152	0	171	429	0	0
Grp Sat Flow(s),veh/h/ln	892	1805	1723	929	0	1789	1125	0	1793	1457	0	0
Q Serve(g_s), s	10.9	4.8	5.0	2.7	0.0	12.9	0.0	0.0	3.7	11.1	0.0	0.0
Cycle Q Clear(g_c), s	23.8	4.8	5.0	7.7	0.0	12.9	7.9	0.0	3.7	14.8	0.0	0.0
Prop In Lane	1.00		0.58	1.00		0.35	1.00		0.34	0.37		0.34
Lane Grp Cap(c), veh/h	307	781	746	449	0	774	463	0	658	625	0	0
V/C Ratio(X)	0.61	0.31	0.32	0.14	0.00	0.68	0.33	0.00	0.26	0.69	0.00	0.00
Avail Cap(c_a), veh/h	307	781	746	449	0	774	463	0	658	625	0	0
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	22.4	10.2	10.3	12.8	0.0	12.5	13.5	0.0	12.2	15.8	0.0	0.0
Incr Delay (d2), s/veh	3.6	0.2	0.2	0.1	0.0	2.4	1.9	0.0	1.0	6.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	2.4	2.4	0.7	0.0	6.8	2.0	0.0	2.0	6.9	0.0	0.0
LnGrp Delay(d),s/veh	26.0	10.4	10.5	12.9	0.0	14.9	15.4	0.0	13.1	21.9	0.0	0.0
LnGrp LOS	C	B	B	B		B	B		B	C		
Approach Vol, veh/h		669			588			323			429	
Approach Delay, s/veh		14.9			14.7			14.2			21.9	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		25.7		29.3		25.7		29.3
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		20.2		23.8		20.2		23.8
Max Q Clear Time (g_c+I1), s		9.9		25.8		16.8		14.9
Green Ext Time (p_c), s		1.1		0.0		0.9		2.6

Intersection Summary	
HCM 2010 Ctrl Delay	16.2
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	27	77	152	22	39	186
Future Vol, veh/h	27	77	152	22	39	186
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	29	84	165	24	42	202

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	463	177	0	0	189	0
Stage 1	177	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	561	871	-	-	1397	-
Stage 1	859	-	-	-	-	-
Stage 2	767	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	542	871	-	-	1397	-
Mov Cap-2 Maneuver	542	-	-	-	-	-
Stage 1	830	-	-	-	-	-
Stage 2	767	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.6	0	1.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	752	1397	-
HCM Lane V/C Ratio	-	-	0.15	0.03	-
HCM Control Delay (s)	-	-	10.6	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	452	50	37	543	57	5	5	42	29	4	14
Future Vol, veh/h	31	452	50	37	543	57	5	5	42	29	4	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	33	476	53	39	572	60	5	5	44	31	4	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	632	0	0	529	0	0	935	1279	265	987	1275	316
Stage 1	-	-	-	-	-	-	569	569	-	680	680	-
Stage 2	-	-	-	-	-	-	366	710	-	307	595	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	960	-	-	1048	-	-	223	167	739	205	168	686
Stage 1	-	-	-	-	-	-	479	509	-	412	454	-
Stage 2	-	-	-	-	-	-	631	440	-	683	496	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	960	-	-	1048	-	-	197	150	739	173	151	686
Mov Cap-2 Maneuver	-	-	-	-	-	-	197	150	-	173	151	-
Stage 1	-	-	-	-	-	-	456	484	-	392	428	-
Stage 2	-	-	-	-	-	-	576	414	-	604	472	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.7	13.5	26.2
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	170	739	960	-	-	1048	-	-	219
HCM Lane V/C Ratio	0.062	0.06	0.034	-	-	0.037	-	-	0.226
HCM Control Delay (s)	27.6	10.2	8.9	0.2	-	8.6	0.2	-	26.2
HCM Lane LOS	D	B	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.2	0.2	0.1	-	-	0.1	-	-	0.8

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	38	44	21	16	4
Future Vol, veh/h	30	38	44	21	16	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	43	54	63	30	23	6

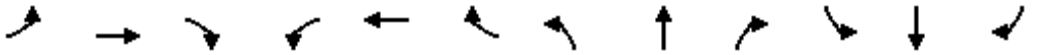
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	93	0	-	0	218	78
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	140	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1514	-	-	-	775	988
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	892	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1514	-	-	-	753	988
Mov Cap-2 Maneuver	-	-	-	-	753	-
Stage 1	-	-	-	-	922	-
Stage 2	-	-	-	-	892	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1514	-	-	-	753	988
HCM Lane V/C Ratio	0.028	-	-	-	0.03	0.006
HCM Control Delay (s)	7.4	0	-	-	9.9	8.7
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	219	288	268	86	248	131	106	280
Average Queue (ft)	124	91	81	32	128	59	51	143
95th Queue (ft)	222	279	236	64	206	103	92	255
Link Distance (ft)		1213	1213	737	737		421	1000
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	205					130		
Storage Blk Time (%)	12					0	0	
Queuing Penalty (veh)	19					0	0	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	231	331	123	14	302	171	106	192	55	124	88	179
Future Volume (veh/h)	231	331	123	14	302	171	106	192	55	124	88	179
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1888	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	236	338	126	14	308	174	108	196	56	127	90	183
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	383	758	278	318	426	235	520	400	114	441	553	470
Arrive On Green	0.12	0.29	0.29	0.01	0.19	0.19	0.06	0.28	0.28	0.07	0.29	0.29
Sat Flow, veh/h	1810	2589	949	1810	2233	1232	1810	1422	406	1810	1900	1615
Grp Volume(v), veh/h	236	234	230	14	246	236	108	0	252	127	90	183
Grp Sat Flow(s),veh/h/ln	1810	1805	1733	1810	1794	1671	1810	0	1828	1810	1900	1615
Q Serve(g_s), s	6.0	6.4	6.5	0.4	7.8	8.0	2.5	0.0	6.9	2.9	2.1	5.5
Cycle Q Clear(g_c), s	6.0	6.4	6.5	0.4	7.8	8.0	2.5	0.0	6.9	2.9	2.1	5.5
Prop In Lane	1.00		0.55	1.00		0.74	1.00		0.22	1.00		1.00
Lane Grp Cap(c), veh/h	383	529	508	318	342	319	520	0	515	441	553	470
V/C Ratio(X)	0.62	0.44	0.45	0.04	0.72	0.74	0.21	0.00	0.49	0.29	0.16	0.39
Avail Cap(c_a), veh/h	383	568	545	413	475	443	542	0	515	445	553	470
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.2	17.3	17.4	19.2	22.9	23.0	13.8	0.0	18.1	14.0	15.9	17.1
Incr Delay (d2), s/veh	3.0	0.6	0.6	0.1	3.2	4.2	0.2	0.0	3.3	0.4	0.6	2.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	3.2	3.2	0.2	4.1	4.0	1.3	0.0	4.0	1.5	1.2	2.7
LnGrp Delay(d),s/veh	19.2	17.9	18.0	19.3	26.1	27.2	14.0	0.0	21.4	14.4	16.6	19.5
LnGrp LOS	B	B	B	B	C	C	B		C	B	B	B
Approach Vol, veh/h		700			496			360			400	
Approach Delay, s/veh		18.4			26.4			19.2			17.2	
Approach LOS		B			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.9	22.5	4.8	23.2	9.3	23.1	11.0	17.0
Change Period (Y+Rc), s	5.5	5.5	4.0	5.5	5.5	5.5	4.0	5.5
Max Green Setting (Gmax), s	4.5	17.0	4.0	19.0	4.5	17.0	7.0	16.0
Max Q Clear Time (g_c+I1), s	4.9	8.9	2.4	8.5	4.5	7.5	8.0	10.0
Green Ext Time (p_c), s	0.0	0.9	0.0	2.0	0.0	0.7	0.0	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	20.3
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	65	242	24	66	145
Future Vol, veh/h	17	65	242	24	66	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	17	66	247	24	67	148

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	541	259	0	0	271	0
Stage 1	259	-	-	-	-	-
Stage 2	282	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	506	785	-	-	1304	-
Stage 1	789	-	-	-	-	-
Stage 2	770	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	478	785	-	-	1304	-
Mov Cap-2 Maneuver	478	-	-	-	-	-
Stage 1	745	-	-	-	-	-
Stage 2	770	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	2.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	693	1304	-
HCM Lane V/C Ratio	-	-	0.121	0.052	-
HCM Control Delay (s)	-	-	10.9	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.2	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	511	4	40	458	12	7	1	29	48	5	18
Future Vol, veh/h	14	511	4	40	458	12	7	1	29	48	5	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	0	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	10	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	14	521	4	41	467	12	7	1	30	49	5	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	479	0	0	525	0	0	867	1110	261	844	1108	240
Stage 1	-	-	-	-	-	-	549	549	-	555	555	-
Stage 2	-	-	-	-	-	-	318	561	-	289	553	-
Critical Hdwy	4.3	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.3	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1025	-	-	1052	-	-	250	211	744	260	212	767
Stage 1	-	-	-	-	-	-	493	520	-	489	516	-
Stage 2	-	-	-	-	-	-	673	513	-	700	518	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1025	-	-	1052	-	-	230	200	744	239	201	767
Mov Cap-2 Maneuver	-	-	-	-	-	-	230	200	-	239	201	-
Stage 1	-	-	-	-	-	-	486	513	-	482	496	-
Stage 2	-	-	-	-	-	-	625	493	-	662	511	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.7	12.5	20.4
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	226	744	1025	-	-	1052	-	-	239	476
HCM Lane V/C Ratio	0.036	0.04	0.014	-	-	0.039	-	-	0.205	0.049
HCM Control Delay (s)	21.5	10	8.6	-	-	8.6	-	-	23.9	13
HCM Lane LOS	C	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0.1	-	-	0.8	0.2

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	33	26	16	17	7
Future Vol, veh/h	19	33	26	16	17	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	19	34	27	16	17	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	43	0	-	0	107	35
Stage 1	-	-	-	-	35	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1579	-	-	-	895	1044
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	956	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1579	-	-	-	884	1044
Mov Cap-2 Maneuver	-	-	-	-	884	-
Stage 1	-	-	-	-	981	-
Stage 2	-	-	-	-	956	-

Approach	EB	WB	SB
HCM Control Delay, s	2.7	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1579	-	-	-	884	1044
HCM Lane V/C Ratio	0.012	-	-	-	0.02	0.007
HCM Control Delay (s)	7.3	0	-	-	9.2	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	180	127	173	40	113	155	134	210	101	96	94
Average Queue (ft)	84	30	90	11	67	77	45	86	42	35	43
95th Queue (ft)	144	91	153	33	107	132	92	154	81	75	73
Link Distance (ft)		1196	1196	734	734	734		397	984	984	984
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	205						130				
Storage Blk Time (%)	0						0	1			
Queuing Penalty (veh)	0						0	1			

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Fareway Grocery - Cedar Falls
2038 AM Peak Hour Buildout

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	232	347	119	20	287	171	114	213	60	135	87	179
Future Volume (veh/h)	232	347	119	20	287	171	114	213	60	135	87	179
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1888	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	237	354	121	20	293	174	116	217	61	138	89	183
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	0	0	0	0	1	1	0	0	0	0	0	0
Cap, veh/h	331	873	294	331	721	417	571	422	119	176	620	527
Arrive On Green	0.33	0.33	0.33	0.33	0.33	0.33	0.07	0.30	0.30	0.10	0.33	0.33
Sat Flow, veh/h	941	2654	894	934	2191	1267	1810	1428	401	1810	1900	1615
Grp Volume(v), veh/h	237	239	236	20	238	229	116	0	278	138	89	183
Grp Sat Flow(s),veh/h/ln	941	1805	1742	934	1794	1665	1810	0	1829	1810	1900	1615
Q Serve(g_s), s	13.2	6.1	6.2	1.0	6.1	6.3	2.6	0.0	7.5	4.4	2.0	5.1
Cycle Q Clear(g_c), s	19.5	6.1	6.2	7.2	6.1	6.3	2.6	0.0	7.5	4.4	2.0	5.1
Prop In Lane	1.00		0.51	1.00		0.76	1.00		0.22	1.00		1.00
Lane Grp Cap(c), veh/h	331	594	573	331	590	548	571	0	540	176	620	527
V/C Ratio(X)	0.72	0.40	0.41	0.06	0.40	0.42	0.20	0.00	0.51	0.78	0.14	0.35
Avail Cap(c_a), veh/h	331	594	573	331	590	548	616	0	540	198	620	527
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.8	15.4	15.4	18.2	15.4	15.5	12.9	0.0	17.3	26.1	14.1	15.2
Incr Delay (d2), s/veh	7.3	0.4	0.5	0.1	0.4	0.5	0.2	0.0	3.5	16.6	0.5	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	3.1	3.0	0.3	3.1	2.9	1.3	0.0	4.3	3.0	1.1	2.5
LnGrp Delay(d),s/veh	31.1	15.8	15.9	18.3	15.8	16.0	13.1	0.0	20.8	42.8	14.6	17.0
LnGrp LOS	C	B	B	B	B	B	B		C	D	B	B
Approach Vol, veh/h		712			487			394			410	
Approach Delay, s/veh		20.9			16.0			18.5			25.2	
Approach LOS		C			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.3	23.0		25.0	9.4	24.8		25.0
Change Period (Y+Rc), s	5.5	5.5		5.5	5.5	5.5		5.5
Max Green Setting (Gmax), s	6.5	17.5		19.5	5.4	18.6		19.5
Max Q Clear Time (g_c+I1), s	6.4	9.5		21.5	4.6	7.1		9.2
Green Ext Time (p_c), s	0.0	1.0		0.0	0.0	0.8		2.1

Intersection Summary	
HCM 2010 Ctrl Delay	20.1
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	80	250	24	39	150
Future Vol, veh/h	17	80	250	24	39	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	17	82	255	24	40	153

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	500	267	0	0	279	0
Stage 1	267	-	-	-	-	-
Stage 2	233	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	534	777	-	-	1295	-
Stage 1	782	-	-	-	-	-
Stage 2	810	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	516	777	-	-	1295	-
Mov Cap-2 Maneuver	516	-	-	-	-	-
Stage 1	755	-	-	-	-	-
Stage 2	810	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	1.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	714	1295	-
HCM Lane V/C Ratio	-	-	0.139	0.031	-
HCM Control Delay (s)	-	-	10.9	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	501	46	54	450	12	7	1	44	48	5	19
Future Vol, veh/h	14	501	46	54	450	12	7	1	44	48	5	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	0	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	10	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	14	511	47	55	459	12	7	1	45	49	5	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	471	0	0	558	0	0	881	1120	256	859	1161	236
Stage 1	-	-	-	-	-	-	539	539	-	575	575	-
Stage 2	-	-	-	-	-	-	342	581	-	284	586	-
Critical Hdwy	4.3	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.3	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1033	-	-	1023	-	-	244	208	749	253	197	772
Stage 1	-	-	-	-	-	-	499	525	-	475	506	-
Stage 2	-	-	-	-	-	-	652	503	-	705	500	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1033	-	-	1023	-	-	221	194	749	225	184	772
Mov Cap-2 Maneuver	-	-	-	-	-	-	221	194	-	225	184	-
Stage 1	-	-	-	-	-	-	492	518	-	468	479	-
Stage 2	-	-	-	-	-	-	595	476	-	652	493	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.9	12	21.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	217	749	1033	-	-	1023	-	-	225	463
HCM Lane V/C Ratio	0.038	0.06	0.014	-	-	0.054	-	-	0.218	0.053
HCM Control Delay (s)	22.2	10.1	8.5	-	-	8.7	-	-	25.4	13.2
HCM Lane LOS	C	B	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	0.1	0.2	0	-	-	0.2	-	-	0.8	0.2

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	34	37	33	16	23	12
Future Vol, veh/h	34	37	33	16	23	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	35	38	34	16	23	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	50	0	-	0	150	42
Stage 1	-	-	-	-	42	-
Stage 2	-	-	-	-	108	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1570	-	-	-	847	1034
Stage 1	-	-	-	-	986	-
Stage 2	-	-	-	-	921	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1570	-	-	-	828	1034
Mov Cap-2 Maneuver	-	-	-	-	828	-
Stage 1	-	-	-	-	963	-
Stage 2	-	-	-	-	921	-

Approach	EB	WB	SB
HCM Control Delay, s	3.5	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1570	-	-	-	828	1034
HCM Lane V/C Ratio	0.022	-	-	-	0.028	0.012
HCM Control Delay (s)	7.3	0	-	-	9.5	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	229	356	277	62	114	135	154	205	161	73	76
Average Queue (ft)	164	111	111	14	57	67	49	100	67	29	40
95th Queue (ft)	266	330	203	42	96	116	102	173	123	62	69
Link Distance (ft)		1196	1196	734	734	734		397	984	984	984
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	205						130				
Storage Blk Time (%)	25	0						3			
Queuing Penalty (veh)	43	0						4			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	242	425	148	49	462	235	126	111	42	182	146	187
Future Volume (veh/h)	242	425	148	49	462	235	126	111	42	182	146	187
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1881
Adj Flow Rate, veh/h	247	434	151	50	471	240	129	113	43	186	149	191
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	1
Cap, veh/h	340	815	281	323	551	279	448	356	135	480	515	433
Arrive On Green	0.11	0.31	0.31	0.04	0.24	0.24	0.06	0.27	0.27	0.06	0.27	0.27
Sat Flow, veh/h	1810	2636	909	1810	2322	1176	1810	1312	499	1810	1900	1599
Grp Volume(v), veh/h	247	296	289	50	366	345	129	0	156	186	149	191
Grp Sat Flow(s),veh/h/ln	1810	1805	1740	1810	1805	1693	1810	0	1812	1810	1900	1599
Q Serve(g_s), s	6.3	8.7	8.8	1.3	12.4	12.6	3.3	0.0	4.4	4.1	4.0	6.4
Cycle Q Clear(g_c), s	6.3	8.7	8.8	1.3	12.4	12.6	3.3	0.0	4.4	4.1	4.0	6.4
Prop In Lane	1.00		0.52	1.00		0.69	1.00		0.28	1.00		1.00
Lane Grp Cap(c), veh/h	340	558	538	323	428	401	448	0	491	480	515	433
V/C Ratio(X)	0.73	0.53	0.54	0.15	0.85	0.86	0.29	0.00	0.32	0.39	0.29	0.44
Avail Cap(c_a), veh/h	340	558	538	370	450	422	448	0	491	480	515	433
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.6	18.3	18.4	17.6	23.4	23.5	15.4	0.0	18.7	16.6	18.5	19.4
Incr Delay (d2), s/veh	7.5	1.0	1.1	0.2	14.3	15.9	0.4	0.0	1.7	0.5	1.4	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	4.4	4.4	0.7	7.9	7.6	1.7	0.0	2.4	0.7	2.3	3.2
LnGrp Delay(d),s/veh	24.1	19.3	19.4	17.8	37.7	39.3	15.8	0.0	20.4	17.1	19.9	22.6
LnGrp LOS	C	B	B	B	D	D	B		C	B	B	C
Approach Vol, veh/h		832			761			285			526	
Approach Delay, s/veh		20.8			37.1			18.3			19.9	
Approach LOS		C			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	22.9	6.4	25.4	9.6	22.9	11.0	20.7
Change Period (Y+Rc), s	5.5	5.5	4.0	5.5	5.5	5.5	4.0	5.5
Max Green Setting (Gmax), s	4.1	17.4	4.0	19.0	4.1	17.4	7.0	16.0
Max Q Clear Time (g_c+I1), s	6.1	6.4	3.3	10.8	5.3	8.4	8.3	14.6
Green Ext Time (p_c), s	0.0	0.6	0.0	2.3	0.0	1.0	0.0	0.7

Intersection Summary	
HCM 2010 Ctrl Delay	25.5
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	72	186	22	76	231
Future Vol, veh/h	30	72	186	22	76	231
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	31	73	190	22	78	236

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	593	201	0	0	212	0
Stage 1	201	-	-	-	-	-
Stage 2	392	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	472	845	-	-	1370	-
Stage 1	838	-	-	-	-	-
Stage 2	687	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	441	845	-	-	1370	-
Mov Cap-2 Maneuver	441	-	-	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	687	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.4	0	1.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	666	1370	-
HCM Lane V/C Ratio	-	-	0.156	0.057	-
HCM Control Delay (s)	-	-	11.4	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.2	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	41	604	10	32	727	77	7	6	39	40	5	18
Future Vol, veh/h	41	604	10	32	727	77	7	6	39	40	5	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	0	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	42	616	10	33	742	79	7	6	40	41	5	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	821	0	0	626	0	0	1140	1587	308	1243	1558	411
Stage 1	-	-	-	-	-	-	700	700	-	848	848	-
Stage 2	-	-	-	-	-	-	440	887	-	395	710	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	817	-	-	965	-	-	158	109	694	133	114	596
Stage 1	-	-	-	-	-	-	401	444	-	327	380	-
Stage 2	-	-	-	-	-	-	571	365	-	607	440	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	817	-	-	965	-	-	138	100	694	112	105	596
Mov Cap-2 Maneuver	-	-	-	-	-	-	138	100	-	112	105	-
Stage 1	-	-	-	-	-	-	381	421	-	310	367	-
Stage 2	-	-	-	-	-	-	527	353	-	535	418	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.3	17.8	41.2
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	117	694	817	-	-	965	-	-	112	296
HCM Lane V/C Ratio	0.113	0.057	0.051	-	-	0.034	-	-	0.364	0.079
HCM Control Delay (s)	39.7	10.5	9.6	-	-	8.9	-	-	54.5	18.2
HCM Lane LOS	E	B	A	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	0.4	0.2	0.2	-	-	0.1	-	-	1.5	0.3

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	22	29	37	29	16	1
Future Vol, veh/h	22	29	37	29	16	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	22	30	38	30	16	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	68	0	-	0	127	53
Stage 1	-	-	-	-	53	-
Stage 2	-	-	-	-	74	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1546	-	-	-	872	1020
Stage 1	-	-	-	-	975	-
Stage 2	-	-	-	-	954	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1546	-	-	-	860	1020
Mov Cap-2 Maneuver	-	-	-	-	860	-
Stage 1	-	-	-	-	961	-
Stage 2	-	-	-	-	954	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1546	-	-	-	860	1020
HCM Lane V/C Ratio	0.015	-	-	-	0.019	0.001
HCM Control Delay (s)	7.4	0	-	-	9.3	8.5
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	208	217	220	58	200	261	124	128	126	133	108
Average Queue (ft)	101	66	124	25	109	130	50	57	61	55	47
95th Queue (ft)	181	156	187	51	168	210	97	105	107	103	81
Link Distance (ft)		1196	1196	734	734	734		397	984	984	984
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	205						130				
Storage Blk Time (%)	1	0					0	0			
Queuing Penalty (veh)	2	0					0	0			

HCM 2010 Signalized Intersection Summary
1: Main Street & Greenhill Road

Fareway Grocery - Cedar Falls
2038 PM Peak Hour Buildout

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	242	431	164	78	435	236	175	129	70	196	151	187
Future Volume (veh/h)	242	431	164	78	435	236	175	129	70	196	151	187
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1890	1900
Adj Flow Rate, veh/h	247	440	167	80	444	241	179	132	71	200	154	191
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	331	1119	421	365	988	532	306	308	165	423	199	246
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.07	0.26	0.26	0.06	0.26	0.26
Sat Flow, veh/h	769	2568	966	826	2268	1221	1810	1164	626	1810	768	953
Grp Volume(v), veh/h	247	308	299	80	353	332	179	0	203	200	0	345
Grp Sat Flow(s),veh/h/ln	769	1805	1730	826	1805	1684	1810	0	1790	1810	0	1721
Q Serve(g_s), s	20.8	8.1	8.3	5.1	9.6	9.7	4.9	0.0	6.6	4.5	0.0	13.0
Cycle Q Clear(g_c), s	30.5	8.1	8.3	13.4	9.6	9.7	4.9	0.0	6.6	4.5	0.0	13.0
Prop In Lane	1.00		0.56	1.00		0.73	1.00		0.35	1.00		0.55
Lane Grp Cap(c), veh/h	331	786	754	365	786	734	306	0	473	423	0	445
V/C Ratio(X)	0.75	0.39	0.40	0.22	0.45	0.45	0.58	0.00	0.43	0.47	0.00	0.78
Avail Cap(c_a), veh/h	331	786	754	365	786	734	306	0	473	423	0	445
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.4	13.4	13.5	18.0	13.9	13.9	19.5	0.0	21.4	19.6	0.0	24.1
Incr Delay (d2), s/veh	8.9	0.3	0.3	0.3	0.4	0.4	2.9	0.0	2.8	0.8	0.0	12.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	4.1	4.0	1.2	4.8	4.5	1.2	0.0	3.6	2.9	0.0	7.7
LnGrp Delay(d),s/veh	34.3	13.8	13.8	18.3	14.3	14.3	22.4	0.0	24.2	20.4	0.0	36.5
LnGrp LOS	C	B	B	B	B	B	C		C	C		D
Approach Vol, veh/h		854			765			382			545	
Approach Delay, s/veh		19.7			14.7			23.3			30.6	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.0	24.0		36.0	10.4	23.6		36.0
Change Period (Y+Rc), s	5.5	5.5		5.5	5.5	5.5		5.5
Max Green Setting (Gmax), s	4.5	18.5		30.5	4.9	18.1		30.5
Max Q Clear Time (g_c+I1), s	6.5	8.6		32.5	6.9	15.0		15.4
Green Ext Time (p_c), s	0.0	0.7		0.0	0.0	0.6		4.4

Intersection Summary	
HCM 2010 Ctrl Delay	21.1
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	29	84	200	22	43	246
Future Vol, veh/h	29	84	200	22	43	246
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	30	86	204	22	44	251

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	554	215	0	0	226	0
Stage 1	215	-	-	-	-	-
Stage 2	339	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	497	830	-	-	1354	-
Stage 1	826	-	-	-	-	-
Stage 2	726	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	478	830	-	-	1354	-
Mov Cap-2 Maneuver	478	-	-	-	-	-
Stage 1	795	-	-	-	-	-
Stage 2	726	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	1.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	698	1354	-
HCM Lane V/C Ratio	-	-	0.165	0.032	-
HCM Control Delay (s)	-	-	11.2	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.1	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	44	605	56	44	727	77	7	6	51	39	5	19
Future Vol, veh/h	44	605	56	44	727	77	7	6	51	39	5	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	0	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	45	617	57	45	742	79	7	6	52	40	5	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	821	0	0	674	0	0	1171	1618	309	1274	1636	411
Stage 1	-	-	-	-	-	-	707	707	-	872	872	-
Stage 2	-	-	-	-	-	-	464	911	-	402	764	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	817	-	-	927	-	-	150	104	693	126	102	596
Stage 1	-	-	-	-	-	-	397	441	-	316	371	-
Stage 2	-	-	-	-	-	-	553	356	-	601	416	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	817	-	-	927	-	-	128	93	693	102	92	596
Mov Cap-2 Maneuver	-	-	-	-	-	-	128	93	-	102	92	-
Stage 1	-	-	-	-	-	-	375	417	-	299	353	-
Stage 2	-	-	-	-	-	-	502	339	-	518	393	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.5	17.1	45.3
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	109	693	817	-	-	927	-	-	102	278
HCM Lane V/C Ratio	0.122	0.075	0.055	-	-	0.048	-	-	0.39	0.088
HCM Control Delay (s)	42.6	10.6	9.7	-	-	9.1	-	-	61.3	19.2
HCM Lane LOS	E	B	A	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	0.4	0.2	0.2	-	-	0.2	-	-	1.6	0.3

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	34	44	49	28	22	5
Future Vol, veh/h	34	44	49	28	22	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	35	45	50	29	22	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	79	0	-	0	180	65
Stage 1	-	-	-	-	65	-
Stage 2	-	-	-	-	115	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1532	-	-	-	814	1005
Stage 1	-	-	-	-	963	-
Stage 2	-	-	-	-	915	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1532	-	-	-	795	1005
Mov Cap-2 Maneuver	-	-	-	-	795	-
Stage 1	-	-	-	-	941	-
Stage 2	-	-	-	-	915	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1532	-	-	-	795	1005
HCM Lane V/C Ratio	0.023	-	-	-	0.028	0.005
HCM Control Delay (s)	7.4	0	-	-	9.7	8.6
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0

Intersection: 1: Main Street & Greenhill Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	TR
Maximum Queue (ft)	230	504	412	137	134	181	145	168	162	223
Average Queue (ft)	188	234	196	55	76	88	74	77	75	130
95th Queue (ft)	280	552	405	115	124	150	120	134	132	213
Link Distance (ft)		1209	1209	734	734	734		397	987	987
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	205						130			
Storage Blk Time (%)	48	0					0	1		
Queuing Penalty (veh)	104	0					0	2		

DEPARTMENT OF COMMUNITY DEVELOPMENT

City of Cedar Falls
220 Clay Street
Cedar Falls, Iowa 50613
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MEMORANDUM
Planning & Community Services Division

TO: Planning and Zoning Commission

FROM: Shane Graham, Planner II

DATE: January 5, 2018

SUBJECT: 100 E 2nd Street (MU2) Site Plan Amendment

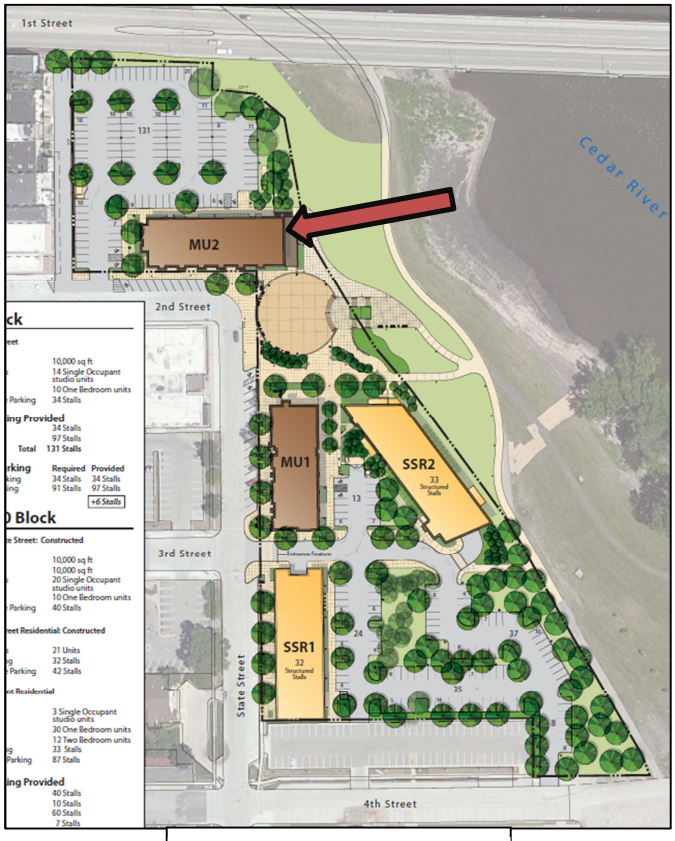
REQUEST: Request to approve an amendment to the River Place site plan for the MU2 building.

PETITIONER: River Place Properties, LC

LOCATION: 100 E 2nd Street. The property is located at the intersection of E. 2nd Street and State Street.

PROPOSAL

It is proposed to amend the previously approved site plan for the MU2 building that was part of the overall River Place Mixed Use Development Project. The approved plan showed a 48 foot tall building with commercial space on the first level, a mezzanine area above the commercial space, and two levels of residential uses. It is being proposed to increase the building height by approximately 8 feet, which would then allow for the mezzanine area above the first level commercial space to be converted into its own floor for office uses. The developer has indicated that there is a need for additional office space in the downtown area, and this will help to fill that need.



River Place Master Plan

BACKGROUND

The River Place Mixed Use Development project was originally proposed in 2012 with details of the mixed use development plan

being reviewed during the course of several meetings in 2012 leading to the initial Master Plan being approved in 2012. Subsequently the River Place Master Plan was revised, updated and approved again in 2015.

In October 2012 the River Place Addition preliminary plat covering all 6 acres from 4th Street to 1st Street was approved along with River Place 1st Addition that created Lot 1. This lot is the site of 300 State Street, 21 residential units completed in 2014.

In May 2013 the River Place 2nd Addition Final Plat was approved creating two lots; Lot 1 on which MU1 (200 State Street) is currently situated and Lot 2 proposed for the SSR2 residential building scheduled for 2016 construction.

In March 2016 the River Place 3rd Addition Final Plat was approved and included minor revisions to the two lots platted under River Place 2nd Addition (Lots 1 and 2) along with the "new" platting of Lot 3 (Plaza) and Lot 4 (MU2 and parking lot).

Also in March 2016 the MU2 building, River Place Plaza, and SSR2 building site plans were approved. The construction of the SSR2 building has been completed, and work on the River Place Plaza and MU2 building will begin in the Spring of 2018.

ANALYSIS

The site plan for the MU2 building was first presented to the Planning & Zoning Commission on 1/22/16. At that meeting suggestions were made to the developer regarding the general design of the building; in particular regarding the percentage of metal and fiber cement paneling that was being proposed. The site plan came back to the Commission on 2/3/16, where changes were made to the design to increase the use of brick materials and decrease the use of metal panels and fiber cement panels. The Commission recommended approval of the site plan, including the building's design, based on those suggested changes. The same materials that were previously approved will be carried forward with the increased height; however the percentages will change slightly as they will be utilizing more brick materials and less metal paneling.

For this request, the building is being proposed to be increased in height by approximately 8 feet from approximately 48 feet in height to approximately 56 feet in height. The applicant has provided a building height diagram in order to show how the increased height of the building would relate to the adjacent building. The plan shows the masonry tower being lowered slightly in order to match the height of the adjacent building to begin the stepping/varying heights of the masonry portions along 2nd Street. The property is zoned C-3 Commercial District, which has a building height limitation of 165 feet or three times the width of the road that the building faces. In this case E 2nd Street is 34 feet in width, meaning that the maximum building height allowed would be 102 feet (34 feet x 3). As this structure would be 56 feet in height, it would meet the height requirement of the Zoning Ordinance. This property is also located within the Central Business District Overlay Zoning District. This overlay district does not have a specific height limitation for buildings, but it does call for reviewing building proportion, or the relationship between the height of the front elevations of adjacent buildings, when considering a development. In the height diagram provided by the applicant, it shows that the overall height of the building will be slightly taller than the adjacent building, but the masonry tower at the west end of the building that is closest to the adjacent building was lowered in order to match the height of that building.

There are no parking requirements in the C-3 Commercial district. However, as a condition of developing this property along State Street, the residential components to the plan were required to provide off-street parking at a rate of one parking stall for each efficiency unit and two parking stalls for the one and two bedroom units, per the River Place Master Plan. For the MU2 building, there are 14 studio units and 10 one-bedroom units, therefore requiring 34 parking stalls. It should be noted that no changes have been made to the amount of residential units in the building. The previously approved plan indicated 37 available parking spaces for the residential component, which would be in compliance with the agreement. The applicant has provided an updated parking plan, which shows that 41 parking spaces are provided for the MU2 building. Also, a surplus of 10 parking spaces is shown on the rest of the development property. By removing the mezzanine area above the commercial uses and adding between 8,000 and 13,000 square feet of new office space, there could be a concern on the need for additional parking (even though parking for this use is not required). For the overall River Place Development Project, a total of 206 private parking stalls and 91 public parking stalls were required per the Master Plan. The Developer has provided 216 private parking stalls and 100 public parking stalls, which in total is 19 parking stalls more than what was required. By providing more parking stalls than what was previously required, this could provide parking for any additional traffic that the new office space could generate.

This requested amendment is to change the overall height of the building by approximately 8 feet to allow for a second floor office area. The office area addition is proposed to be approximately 8,000 to 13,000 square feet, with each individual office space ranging from 1,500 to 3,000 square feet (approximately 4-8 office spaces). Other elements of the previously approved site plan will not change with this amendment, including the setbacks of the building, landscaping, sidewalks, lighting, signage and trash enclosures.

A notice to surrounding property owners was sent on Tuesday, January 2, 2018. In addition, Community Main Street was also notified of the request on Tuesday, January 2, 2018.

TECHNICAL COMMENTS

There were no technical comments noted for this particular request.

STAFF RECOMMENDATION

The Community Development Department has reviewed the amended site plan and recommends approval, subject to the following stipulations:

1. Construction of the River Place Plaza as indicated on the River Place Master Plan which was previously approved by the Planning & Zoning Commission and City Council.
2. Any additional comments or direction specified by the Planning & Zoning Commission.

PLANNING & ZONING COMMISSION

Discussion 12/13/2017	Chair Oberle introduced the item and Mr. Graham provided background information. He noted an email was received from a neighbor who had concerns with regard to parking. Mr. Graham noted that the parking and landscaping are unchanged with the new site plan. Mr. Holst stated that he has had several people reach out to him with concerns regarding parking. Ms. Saul also noted that people have reached out to her with regard to the height and has concerns about the parking as well.

Mr. Wingert asked if there had ever been a proposal for an event center and if this was in this building. Steve Long, Eagle View Partners, stated that this is the building that was proposed, but it was switched to office space because Millrace is 100% occupied and businesses are asking for more Class A office space. They have also gotten requests from businesses outside the area looking to move here. They may keep part of the mezzanine level, but the banquet facility is no longer being considered. All tenants of the office space will have parking passes and be required to use the parking lot behind Millrace where there is excess capacity. The residents will have reserved space on private lots.

Alan Dailey, 3115 Apollo Street, owner of Chocolatier Stam, noted that parking is a concern.

Dawn Wilson, 3620 Rownd Street, owner of Cup of Joe, asked about what will be done for future developments. She stated that the parking study that was done by volunteers is already obsolete as new developments have come in. She asked for more consideration of parking lots provided by the City.

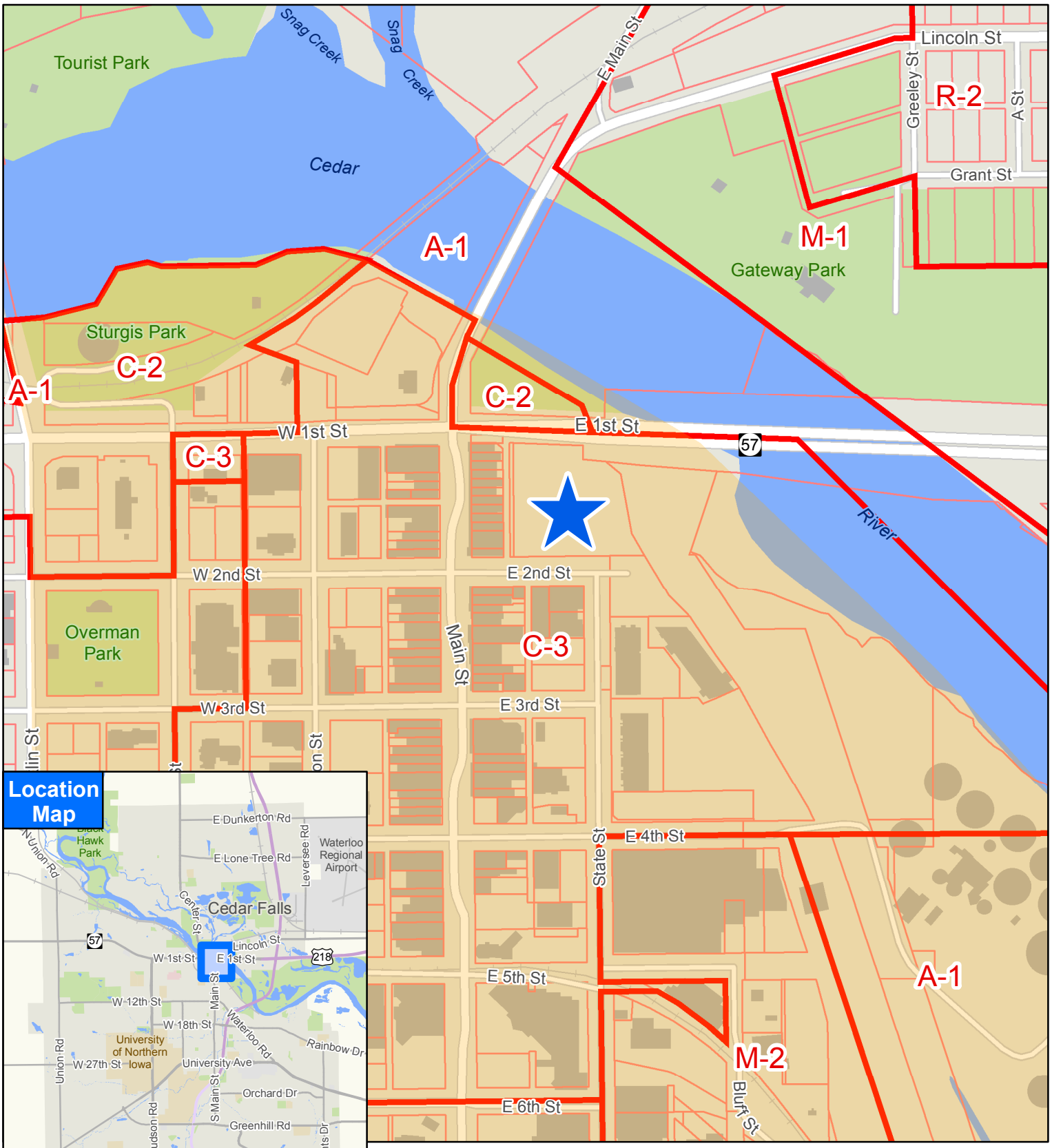
Julie Shimek, 104 Main Street, stated her parking concerns as an area business owner. She noted that property owners were also concerned with leaseability and that many businesses struggled this summer while the parking lot was being repaired. She also pointed out that there is more of a parking issue in the evenings than during the day.

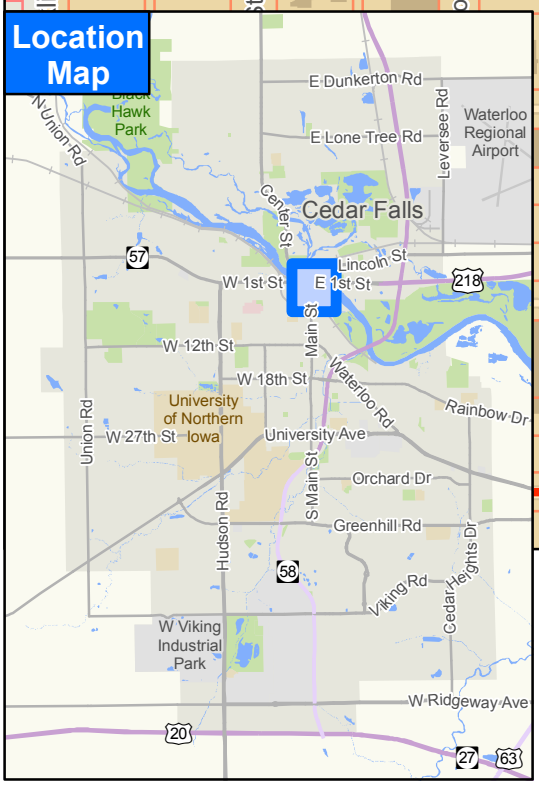
Carol Lilly, Community Main Street (206 Main Street), said that several businesses have reached out to her with regard to building height, parking and lease rates. The Board has discussed the issues presented and they will continue to share information with staff and the Commission.

Vote
1/10/2018

Cedar Falls Planning & Zoning Commission
January 10, 2018

Item 4.D.





MU2 Site Plan Amendment -
River Place Properties, LC

RIVER PLACE - MU2

MATERIAL PERCENTAGES

MU2 - MATERIAL PERCENTAGES - 3 STORY OPTION

MATERIAL	NORTH ELEVATION		
BRICK MASONRY	2247	sf	25.7%
FIBER CEMENT	1061	sf	12.1%
GLASS	2088	sf	23.9%
BURNISHED BLOCK	1779	sf	20.3%
HORIZONTAL METAL PANEL	145	sf	1.7%
VERTICAL METAL PANEL	1431	sf	16.4%
TOTAL	**8751**	sf	

NORTH ELEVATION 3 STORY OPTION W/ MEZZANINE

SCALE: 1/16" = 1'-0"

MU2 - MATERIAL PERCENTAGES - 4 STORY OPTION

MATERIAL	NORTH ELEVATION		
BRICK MASONRY	3545	sf	33.6%
FIBER CEMENT	1897	sf	18.0%
GLASS	2430	sf	23.1%
BURNISHED BLOCK	1489	sf	14.1%
HORIZONTAL METAL PANEL	244	sf	2.3%
VERTICAL METAL PANEL	934	sf	8.9%
TOTAL	**10539**	sf	

NORTH ELEVATION 4 STORY OPTION

SCALE: 1/16" = 1'-0"

GNITSHOT
ARCHITECTURE

Item 4.D.

RIVER PLACE - MU2

MATERIAL PERCENTAGES

EAST ELEVATION 3 STORY OPTION W/ MEZZANINE

SCALE: 1/16" = 1'-0"

MU2 - MATERIAL PERCENTAGES - 3 STORY OPTION

MATERIAL	EAST ELEVATION		
BRICK MASONRY	710	sf	25.9%
FIBER CEMENT	0	sf	0.0%
GLASS	844	sf	30.8%
BURNISHED BLOCK	398	sf	14.5%
HORIZONTAL METAL PANEL	12	sf	0.4%
VERTICAL METAL PANEL	779	sf	28.4%
TOTAL	**2743**	sf	

EAST ELEVATION 4 STORY OPTION

SCALE: 1/16" = 1'-0"

MU2 - MATERIAL PERCENTAGES - 4 STORY OPTION

MATERIAL	EAST ELEVATION		
BRICK MASONRY	1623	sf	36.6%
FIBER CEMENT	0	sf	0.0%
GLASS	1186	sf	26.7%
BURNISHED BLOCK	309	sf	7.0%
HORIZONTAL METAL PANEL	48	sf	1.1%
VERTICAL METAL PANEL	1271	sf	28.6%
TOTAL	**4437**	sf	

SPLINTSHOT
ARCHITECTURE

RIVER PLACE - MU2

MATERIAL PERCENTAGES

MU2 - MATERIAL PERCENTAGES - 3 STORY OPTION

MATERIAL	SOUTH ELEVATION		
BRICK MASONRY	1638	sf	18.2%
FIBER CEMENT	613	sf	6.8%
GLASS	3406	sf	37.8%
BURNISHED BLOCK	382	sf	4.2%
HORIZONTAL METAL PANEL	451	sf	5.0%
VERTICAL METAL PANEL	2510	sf	27.9%
TOTAL	**9000**	sf	

3 SOUTH ELEVATION 3 STORY OPTION W/ MEZZANINE

SCALE: 1/16" = 1'-0"

MU2 - MATERIAL PERCENTAGES - 4 STORY OPTION

MATERIAL	SOUTH ELEVATION		
BRICK MASONRY	3144	sf	29.2%
FIBER CEMENT	657	sf	6.1%
GLASS	3810	sf	35.3%
BURNISHED BLOCK	163	sf	1.5%
HORIZONTAL METAL PANEL	703	sf	6.5%
VERTICAL METAL PANEL	2305	sf	21.4%
TOTAL	**10782**	sf	

SOUTH ELEVATION 4 STORY OPTION

SCALE: 1/16" = 1'-0"

97-

ARCHITECTURE

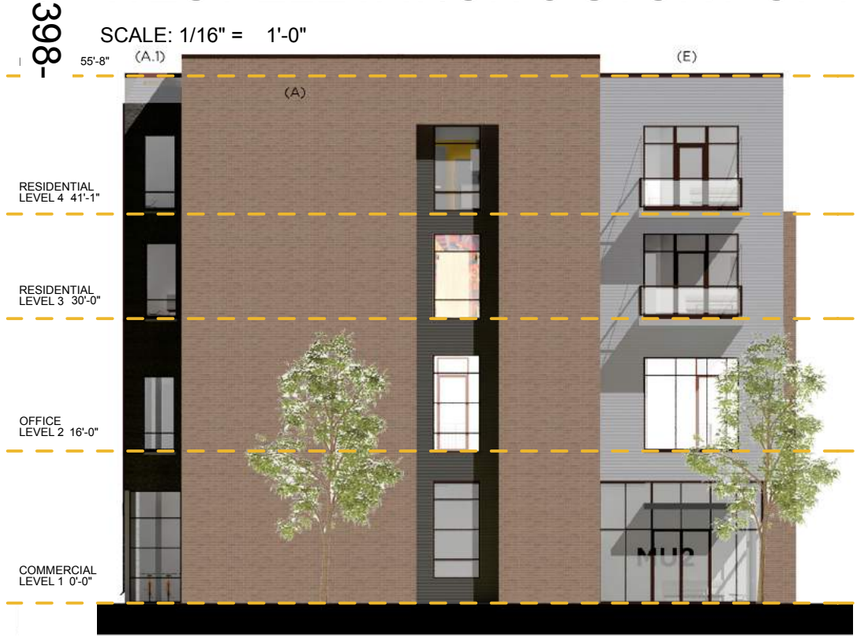
Item 4.D.

RIVER PLACE - MU2

MATERIAL PERCENTAGES

WEST ELEVATION 3 STORY OPTION W/ MEZZANINE

SCALE: 1/16" = 1'-0"



WEST ELEVATION 4 STORY OPTION

SCALE: 1/16" = 1'-0"

MU2 - MATERIAL PERCENTAGES - 3 STORY OPTION

MATERIAL	WEST ELEVATION		
BRICK MASONRY	1819	sf	58.2%
FIBER CEMENT	0	sf	0.0%
GLASS	710	sf	22.7%
BURNISHED BLOCK	70	sf	2.2%
HORIZONTAL METAL PANEL	22	sf	0.7%
VERTICAL METAL PANEL	503	sd	16.1%
TOTAL	**3124**	sf	

MU2 - MATERIAL PERCENTAGES - 4 STORY OPTION

MATERIAL	WEST ELEVATION		
BRICK MASONRY	2357	sf	58.8%
FIBER CEMENT	0	sf	0.0%
GLASS	825	sf	20.6%
BURNISHED BLOCK	0	sf	0.0%
HORIZONTAL METAL PANEL	47	sf	1.2%
VERTICAL METAL PANEL	780	sd	19.5%
TOTAL	**4009**	sf	

ARCHITECTURE

SOUTH ELEVATION 3 STORY OPTION WITH MEZZANINE

MU2 - MATERIAL PERCENTAGES - 3 STORY OPTION

MATERIAL	SOUTH ELEVATION	
BRICK MASONRY	1638 sf	18.2%
FIBER CEMENT	613 sf	6.8%
GLASS	3406 sf	37.8%
BURNISHED BLOCK	382 sf	4.2%
HORIZONTAL METAL PANEL	451 sf	5.0%
VERTICAL METAL PANEL	2510 sf	27.9%
TOTAL	**9000** sf	

SOUTH ELEVATION 4 STORY OPTION

MU2 - MATERIAL PERCENTAGES - 4 STORY OPTION

MATERIAL	SOUTH ELEVATION	
BRICK MASONRY	3144 sf	29.2%
FIBER CEMENT	657 sf	6.1%
GLASS	3810 sf	35.3%
BURNISHED BLOCK	163 sf	1.5%
HORIZONTAL METAL PANEL	703 sf	6.5%
VERTICAL METAL PANEL	2305 sf	21.4%
TOTAL	**10782** sf	

River Place | Parking Location Plan

Cedar Falls, Iowa

RIVER PLACE
downtown lifestyle opportunities

1st Street
2nd Street
3rd Street
4th Street
Main Street
State Street
Cedar River

90
41
MU2
MU1
SSR2
38
40
SSR1
32
55
10

100 Block

Surface Parking

MU2	41 Stalls
Public	90 Stalls
Total	131 Stalls

200/300 Block

SSR1
Structured Parking: **32 stalls**

SSR2
Structured Parking: **38 stalls**

Surface Parking

MU1	40 Stalls
SSR1	10 Stalls
SSR2	55 Stalls
Public	10 Stalls
Total	115 Stalls

Project Total 316 Stalls

Revised: February 2, 2015
VANDEWALLE & ASSOCIATES INC.

0' 50' 100'

NOTE:
ALL IMPROVEMENTS SHALL SATISFY CITY OF CEDAR FALLS STORMWATER REQUIREMENTS FOLLOWING RIVER PLACE DEVELOPMENT-WIDE STORMWATER MASTER PLAN AS DEVELOPED BY AECOM.

PLANT MATERIAL SCHEDULE – 100 BLOCK DEVELOPMENT

KEY	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS	SPACING	QUANTITY	POINTS
AAB	Acer x freemanii "Autumn Blaze"	Autumn Blaze Maple	2"	Caliper	Varies	6	480
BNR	Betula nigra	River Birch	12'	Multi-stem	Varies	9	720
CFG	Calamagrostis acutiflora 'K.F.'	Feather Reed Grass	#1	Cont.	18"	223	0
GBP	Ginkgo biloba "Princeton Sentry"	Princeton Sentry Ginkgo	2"	Caliper	Varies	6	480
GTI	Gleditsia triacanthos inermis 'Skyline'	Skyline Honeylocust	2"	Caliper	Varies	5	400
PVS	Panicum virgatum "Shenandoah"	Shenandoah Switchgrass	#1	Cont.	24"	74	0
QSW	Quercus bicolor	Swamp White Oak	2"	Caliper	Varies	2	160
RIB	Ribes alpinum "Green Mound"	Green Mound Alpine Currant	24"-30"	5 Gal.	30"	72	720
RAG	Rhus aromatica "Gro-low"	Gro-low Fragrant Sumac	24"-30"	5 Gal.	48"	46	460
SPD	Sporobolus heterolepis	Prairie Dropseed	#1	Cont.	24"	22	0
SOC	Symphoricarpos orbiculatus	Indian Currant Coralberry	24"-30"	5 Gal.	36"	8	80
TMT	Taxus x media "Tauntoni"	Taunton Spreading Yew	24"-30"	5 Gal.	48"	33	330

TOTAL POINTS = 3830

PARKING LOT LANDSCAPING:

131 PARKING STALLS REQUIRES 6 INTERIOR PARKING LOT TREES (9 PROVIDED)

PARKING LOT PAVEMENT AREA = 44,900 SQ. FT.
INTERIOR PARKING LOT LANDSCAPE AREA = 2207 SQ. FT. = 5% OF PARKING LOT AREA

LANDSCAPE NOTES

1. ALL LANDSCAPE WORK SHALL CONFORM TO APPLICABLE CITY OF CEDAR FALLS STANDARD SPECIFICATIONS.

2. ALL AREAS DISTURBED BY CONSTRUCTION AND NOT INCLUDED IN PLANTING BEDS SHALL BE SODDED AS PER THE SPECIFICATIONS.

3. PLACE LANDSCAPE WEED BARRIER FABRIC BELOW WASHED RIVER ROCK MULCH IN SHRUB AND PERENNIAL BEDS. FABRIC SHALL BE A WOVEN POLYPURPERENE, 3.5 TO 4.0 OUNCE PRODUCTS.

4. WOOD MULCH FOR TREE RINGS IN LAWN (IF APPLICABLE) SHALL BE 3" DEEP, COMPOSED OF CEDAR OR CYPRESS WOOD OF UNIFORM COLOR AND LONG, FIBROUS NATURE (2-4 INCHES IN LENGTH). DO NOT USE WALNUT. APPLY SURFLAN PRE-EMERGENCE OR EQUAL OVER THE TOP OF ALL WOOD MULCH AREAS. MULCH RINGS AROUND NEW TREES SHALL BE MINIMUM 6' IN DIAMETER.

5. ALL PLANTING BEDS SHALL BE EDGED WITH 4" X 3/16" STEEL LAWN EDGING (ALUMINUM WILL NOT BE ACCEPTED). EDGING SHALL BE HOT ROLLED STEEL WITH AN ELECTROSTATICALLY APPLIED POWDER COAT SURFACE PAINT, BLACK IN COLOR.

PLAN NOTES

1. BENCHES SHALL BE 58 SERIES (6' LENGTH, PAINTED BLACK) AS MANUFACTURED BY DUMOR FURNISHINGS, INC. (OUTDOOR RECREATION PRODUCTS 800-747-5437) TO MATCH CEDAR FALLS MAIN STREET.

2. WASTE RECEPTACLES SHALL BE IRONSITES SD-42 (SIDE DOOR WITH LOCK, SMOOTH TAPERED LID, PAINTED BLACK) AS MANUFACTURED BY VICTOR STANLEY, INC. (1-800-368-2573) TO MATCH CEDAR FALLS MAIN STREET.

3. BIKE RACKS SHALL BE PI RACK (SURFACE MOUNT, PAINTED BLACK) AS MANUFACTURED BY LANDSCAPE FORMS, INC. (SITE SOURCE 816-678-2004) TO MATCH CEDAR FALLS MAIN STREET.

4. PARKING LOT LIGHTS SHALL BE PHILIPS GARDCO ECOFORM LED FIXTURES (ECF-1-4-215LA-641A-NW-UNV-BLP) ON 5" ROUND STEEL POLES (PAINTED BLACK) AS SUPPLIED BY NRG SALES (319-365-5259). NOTE: DUAL-HEADED LIGHT FIXTURES MARKED WITH ASTERISK.

5. PEDESTRIAN LIGHT BOLLARDS SHALL BE ANNAPOLIS LED LIGHTED BOLLARD (6" EMBEDDED MOUNTING, PAINTED BLACK) AS MANUFACTURED BY LANDSCAPE FORMS, INC. (SITE SOURCE 816-678-2004) TO MATCH RIVER PLACE SSR1 SITE.

6. PEDESTRIAN SCALE SINGLE LIGHT FIXTURES SHALL BE LUMEC SERENADE (S55-80WLED4K-R-ACDR-LE3-VOLT-SFOK-FN8-GN8TX) ON PERIOD POLES (RTA906V-14-GFII-BAS18/2-GN8TX) AS SUPPLIED BY NRG SALES (319-350-5298) OR APPROVED EQUAL. NOTE: EXISTING LIGHTS TO REMAIN MARKED WITH ASTERISK.

7. PEDESTRIAN SCALE DOUBLE LIGHT FIXTURES SHALL BE LUMEC SERENADE (S55-80WLED4K-R-ACDR-LE3-VOLT-SFOK-FN8-GN8TX) ON PERIOD POLES (CRE-2-GN8TX-RTA906V-12-GFII-BAS18/2-GN8TX) AS SUPPLIED BY NRG SALES (319-350-5298) OR APPROVED EQUAL.

8. CUSTOM PLAZA LIGHT FIXTURE - THEATRICAL THEMED LED FIXTURES ON 25' STEEL POLES TO PROVIDE LIGHTING FOR PLAZA AND STAGE.

1 SITE LANDSCAPE PLAN
SCALE IN FEET 0 15 30 45

NORTH

-403-

RITLAND+KUIPER
LANDSCAPE ARCHITECTS
501 SYCAMORE STREET - MEZZ. A
WATERLOO, IOWA 50703
319-233-8090 www.ritlandkuiper.com

SIGNATURE ARCHITECTURE
305 EAST COURT AVENUE, DES MOINES, IA 50309 T 515-243-0074

RIVER PLACE MU1

P&Z SUBM
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NO. REVISION SCI
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NOT FOR CONSTRUCTION

Item 4.D.

L.1

River Place | Master Plan

Cedar Falls, Iowa

RIVER PLACE
downtown lifestyle opportunities

100 Block

MU2 - 2nd Street

3 Floors	
Retail	10,000 sq ft
Residential Units	15 Single Occupant studio units
	11 One Bedroom units
Required Private Parking	37 Stalls

Surface Parking Provided

MU2 (Private)	37 Stalls
Public	94 Stalls
Total	**131 Stalls**

100 Block Parking	Required	Provided
Total Private Parking	37 Stalls	37 Stalls
Total Public Parking	91 Stalls	94 Stalls

200/300 Block

MU1 - 200 State Street: Constructed

4 Floors	
Retail	10,000 sq ft
Office	10,000 sq ft
Residential Units	20 Single Occupant studio units
	10 One Bedroom units
Required Private Parking	40 Stalls

SSR1 - State Street Residential: Constructed

3 Floors	
Residential Units	21 Units
Structured Parking	32 Stalls
Required Private Parking	42 Stalls

SSR2 - Riverfront Residential

4 Floors	
Residential Units	3 Single Occupant studio units
	30 One Bedroom units
	12 Two Bedroom units
Structured Parking	38 Stalls
Required Parking	87 Stalls

Surface Parking Provided

MU1 (Private)	40 Stalls
SSR1 (Private)	10 Stalls
SSR2 (Private)	55 Stalls
Public	10 Stalls
Total	**115 Stalls**

200/300 Block Parking	Required	Provided
Total Private Parking	169 Stalls	175 Stalls
Total Public Parking	0 Stalls	10 Stalls

Total Parking	Required	Provided
Total Private Parking	206 Stalls	212 Stalls
Total Public Parking	91 Stalls	104 Stalls
Overall Parking	**297 Stalls**	**316 Stalls**

Revised: February 17, 2015

VANDEWALLE & ASSOCIATES INC.

0' 50' 100'

100 STATE STREET (MU2) SITE PLAN AMENDMENT NARRATIVE

The approved site plan for the construction of the MU2 building at 100 State Street included a mix of residential and commercial uses in an approximately 46,000 SF three-story building with a mezzanine on floor one. The uses included 24 studio and one-bedroom apartments and 13,750 gross SF of first floor commercial space (with mezzanine). The site plan included 37 parking spaces available on-site and 91 additional parking spaces available in the new public parking lot adjacent to the building. Actual parking constructed includes 37 on-site and 106 additional parking spaces.

The Applicant is asking for an amendment to the approved site plan to include the addition of office space to the MU2 building, in place of the mezzanine level on the first floor. The addition of the second floor office space will add much needed Class A office space downtown. There are businesses currently at the Mill Race that have outgrown or are close to outgrowing their space and want to stay downtown, but options are limited. There are also businesses from outside the metro area that have contacted the Applicant that are looking for office space opportunities downtown. The total amount of new office space on the second floor will be in the range of 8,000 SF to 13,000 SF (1,000 SF to 2,500 SF may remain a mezzanine space for the first floor commercial/retail space) with each individual space ranging from 1,500-3,000 SF. The amount of commercial/retail space on the first floor will remain the same at 13,750 gross SF and the amount of residential units on floors three and four will remain the same at 24 units. The only change to the original approved site plan is to remove the mezzanine level and add office space on the second floor.

The addition of the office space will not increase the amount of parking required and it will only increase the height of the building by 7’ 8” because of the tall height of the originally approved mezzanine level.

The same materials for the exterior will be used as approved in the original site plan, but the material percentages are changing slightly. In general, the proposed four-story building will use more brick masonry material and less of the metal panels.

The Applicant asks for the approval of the amendment to the approved MU2 site plan to allow for the removal of the mezzanine level and the addition of office space.

DEPARTMENT OF COMMUNITY DEVELOPMENT

City of Cedar Falls
220 Clay Street
Cedar Falls, Iowa 50613
Phone: 319-273-8600
Fax: 319-273-8610
www.cedarfalls.com

MEMORANDUM

Planning & Community Services Division

TO: Planning & Zoning Commission

FROM: Shane Graham, Planner II

DATE: January 5, 2018

SUBJECT: Gateway Business Park at Cedar Falls Preliminary Plat

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REQUEST:	Request to approve the Gateway Business Park at Cedar Falls Preliminary Plat
PETITIONER:	CF Gateway Park, Inc., Owner; Shive-Hattery, Engineer; Russell Construction, Contractor
LOCATION:	46 acre parcel at the northeast corner of Hudson Road and W Ridgeway Avenue

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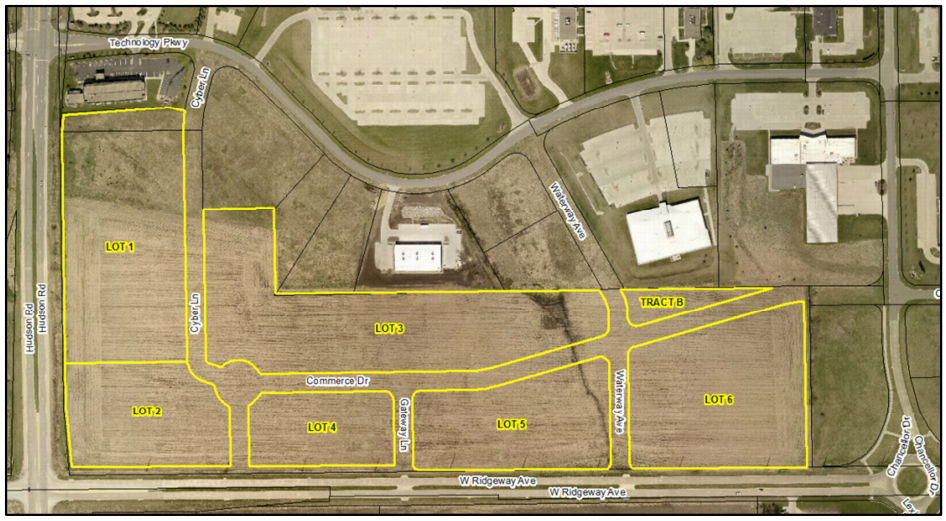
PROPOSAL

It is proposed to create six (6) lots zoned HWY-1 Highway Commercial District for commercial development on a 46-acre parcel in southwestern Cedar Falls.



BACKGROUND

This 46-acre property has been utilized as farm ground for as far back as City records go, and was purchased by the applicant in the fall of 2017 with the intent of developing it into lots for potential commercial and office uses.

ANALYSIS

The subdivision plat is located on 46 acres of land in the southwest portion of Cedar Falls. Cyber Lane will be a new north/south street that connects the subdivision to Technology Parkway to the north and W Ridgeway Avenue to the south. Commerce Drive will be extended from Chancellor Drive to the west through the subdivision and will connect into Cyber Lane. Waterway Avenue will extend from the north through the plat and connect with W Ridgeway Avenue to the south. And Gateway Lane will be a new road that connects from Commerce Drive to W Ridgeway Avenue. All of the new streets within the development will be constructed as 31-foot wide public streets.

The six lots range in size from 3.01 acres to 10.12 acres. There is one tract (Tract B) shown for storm water detention purposes, with several other detention areas shown on the individual lots. All lots, except for Lot 1, would gain access from the new interior streets and not from W Ridgeway Avenue or Hudson Road. Lot 1, which the applicant proposes to submit a site plan for in the near future, would include 2 right-in/right-out accesses onto Hudson Road. Development within this subdivision will include a site plan review by the Planning & Zoning Commission and City Council for each proposed use, as the property is zoned HWY-1 Highway Commercial District.

A future trail connection along Hudson Road and W Ridgeway Avenue is also shown. An existing trail is located along W Ridgeway Avenue, and ends at the roundabout at the intersection of W Ridgeway Avenue and Chancellor Drive.

TECHNICAL COMMENTS

City technical staff, including Cedar Falls Utilities (CFU) personnel, noted that the water, gas and communication services are available to the site. The developer will be responsible for extending the utility services to the proposed development. The easements identified on the plat satisfy CFU requirements.

All necessary infrastructure will be extended to serve the subdivision, including a public water main, storm sewer and sanitary sewer. Water mains will be extended along W Ridgeway Avenue and Hudson Road, and from Commerce Drive and Technology Parkway. A 15” Sanitary sewer will extend along Hudson Road south to the corner of W Ridgeway Avenue. An 8” main will extend between Lots 1 and 2 and will connect in with Cyber Lane and over to Commerce Drive. Also, 8” sanitary sewer mains will be located within Gateway Avenue, Waterway Avenue and Commerce Drive, which will head north through Waterway Avenue to tie into an existing main located within Technology Parkway. Storm sewers are located within the public right-of-way, and will collect storm water runoff from the streets to several regional detention basins located on Lots 1, 2 and 3, and Tract B. Gas, electric and fiber optic service are also included in this subdivision.

A storm water management plan has been submitted and reviewed for this plat. The plan for the storm water will be collected via intakes along the new streets and directed to several regional detention basins. These basins are located on the north side of Lot 1, the north side of Lot 2, the east side of Lot 3, and all of Tract B. The developer is planning on phasing this development, where only the approximate west half of the 46-acre parcel would be final graded at this time. This would call for the construction of detention basins A and B right away, with basins C and D being constructed at a later time. There have been some minor technical comments from our Engineering Department regarding the stormwater management plan, which the developer has been working with city staff on addressing. It is anticipated that all stormwater comments would

be addressed by the time of the vote on the request by the Planning & Zoning Commission.

A wetland delineation report has been submitted for this plat, which shows several areas of wetlands on or near the property. There is a wetland area shown along the ditch along the east side of Hudson Road adjacent to the property, an area at the east end of Lot 3 where storm water detention basin C is located, and a very small area located at the southeast corner of Lot 5. The developer's engineer has submitted an application to the Iowa DNR and US Army Corps of Engineers to determine if the wetland areas need to be mitigated or not as part of this development. Any applicable permits from all regulation authorities must be submitted prior to final stormwater management approval during the final plat approval process.

A traffic impact study has been submitted and reviewed for this plat, with several comments noted by the City Engineer. Some of the comments/questions include:

- A concern with the trip distribution percentages shown coming from US Highway 20 and from the east on Ridgeway Avenue in the report.
- Would like to see how the traffic is distributed at each of the four intersections in the report.
- No right turn lanes would appear needed along W Ridgeway Avenue at the three entrances to the site, but the recreation trail should be set back far enough to accommodate any right turn lanes should they be needed in the future.
- Right turn lanes will be needed for safety and better traffic flow at the two right-in/right-out access points off of Hudson Road.

These comments have been submitted to the developer's traffic engineer, and they have indicated that they will update the traffic report based on those comments. The developer would like some time to address the last point regarding the turning lanes however, as there are delineated wetlands along the ditch in Hudson Road that are currently under review by the Iowa DNR and US Army Corps of Engineers, who should make a determination on if the wetlands need to be mitigated or not by March of 2018.

City zoning staff notes that the proposed lots appear to be of sufficient lot area to meet the anticipated development plans. The HWY-1 District requires a 20-foot setback along the perimeter of the district and interior street network. Buildings and parking lots must be located outside this setback area. A more detailed site plan for these lots will be presented to the Commission in the coming months once they are proposed to be developed.

The property is located outside of the designated 100-year floodplain.

Approval of a Preliminary Plat allows the developer to proceed with the construction and installation of all required public infrastructure such as streets, sewers and other utilities. The platting documents including the Deed of Dedication, proof of ownership, and a plat fee of $300.00 have been submitted.

STAFF RECOMMENDATION

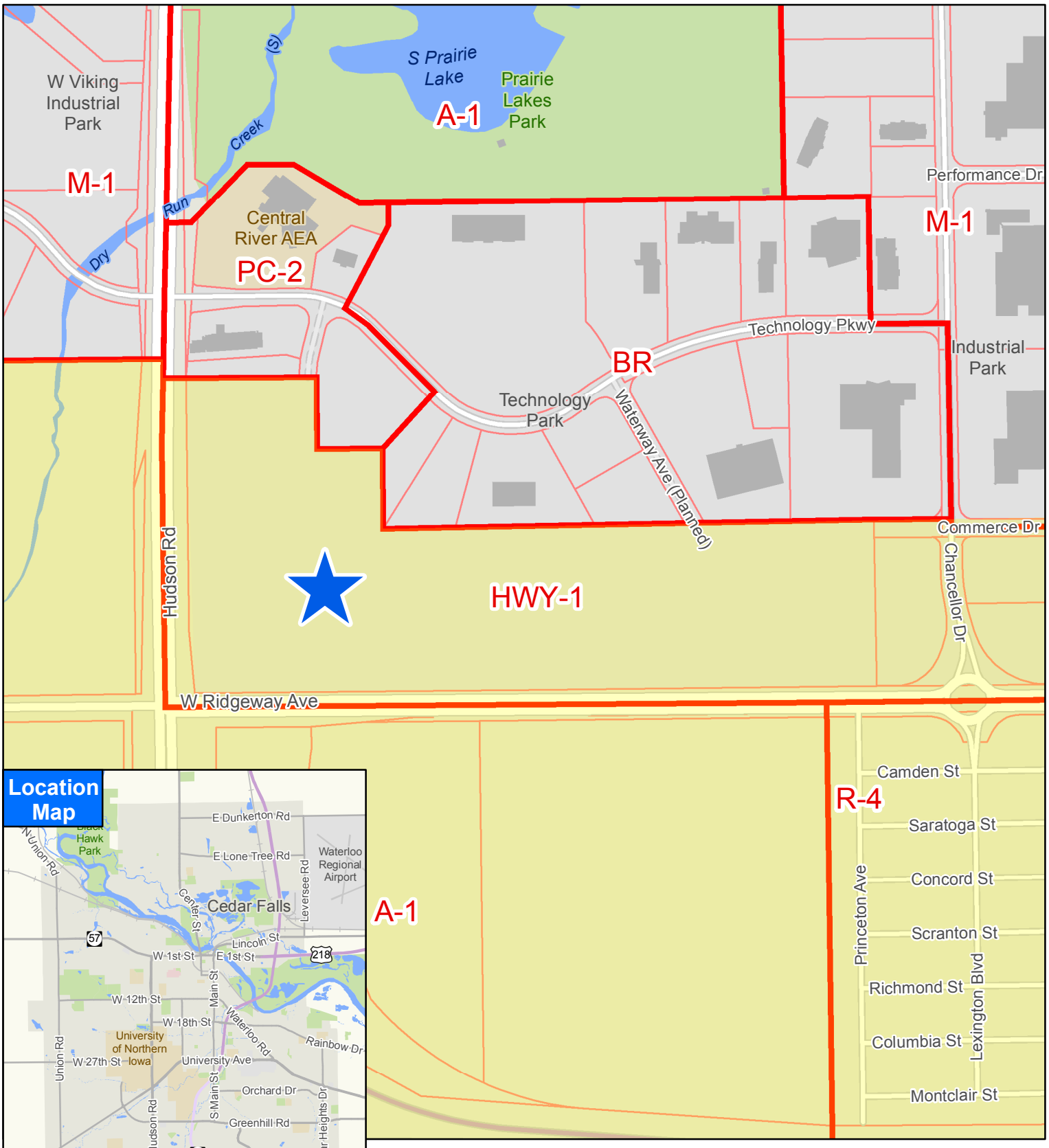
The introduction of this plat is for discussion purposes only. The Community Development Department has reviewed this plat and provides the following comments:

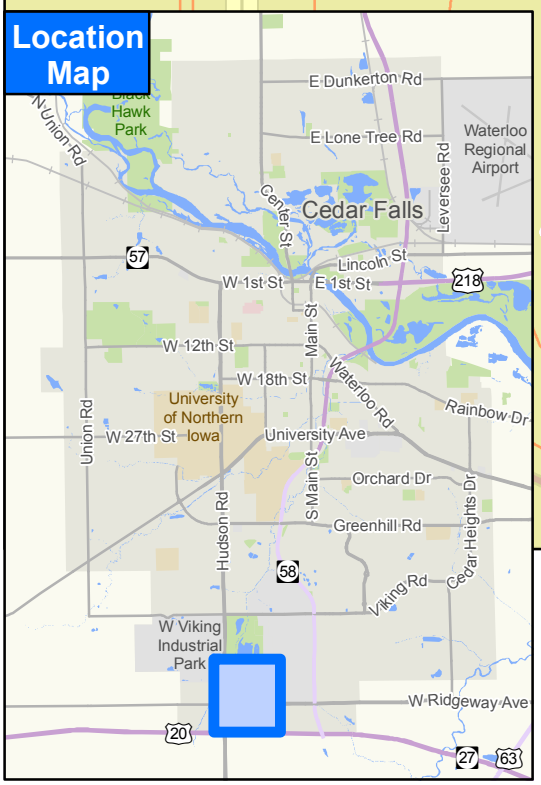
1) Conformance with any technical comments by City staff.
2) Any comments or direction specified by the Planning and Zoning Commission.

PLANNING & ZONING COMMISSION
Discussion
1/10/2018

Cedar Falls Planning & Zoning Commission
January 10, 2018

Item 5.A.





Gateway Business Park at Cedar Falls Preliminary Plat

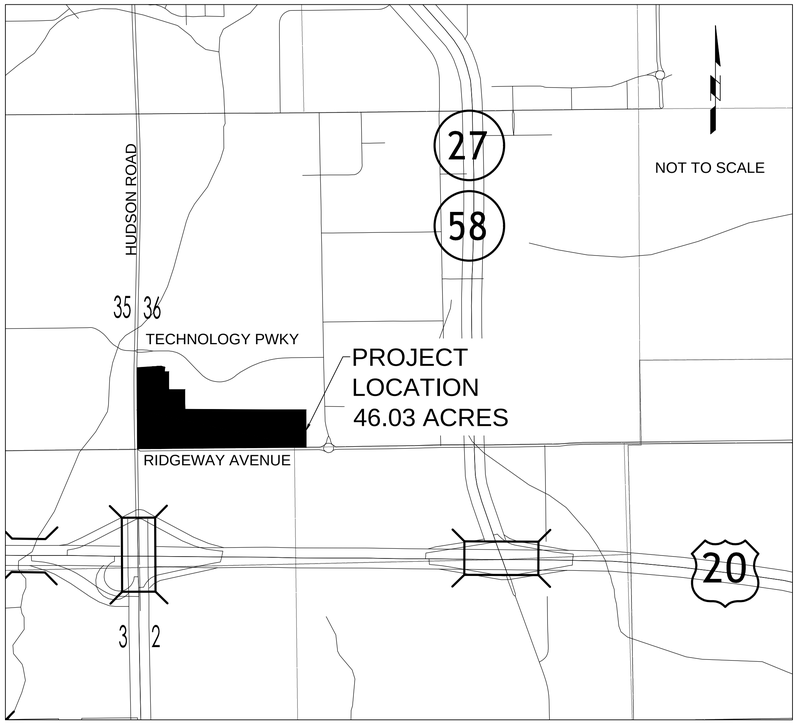
PRELIMINARY PLAT
GATEWAY BUSINESS PARK AT CEDAR FALLS I
IN THE CITY OF CEDAR FALLS, BLACK HAWK COUNTY, IOWA

OWNER AND APPLICANT:
CEDAR FALLS GATEWAY PARK, INC.
ATTN: ATUL PATEL
307 WINDING RIDGE ROAD
CEDAR FALLS, IA 50613

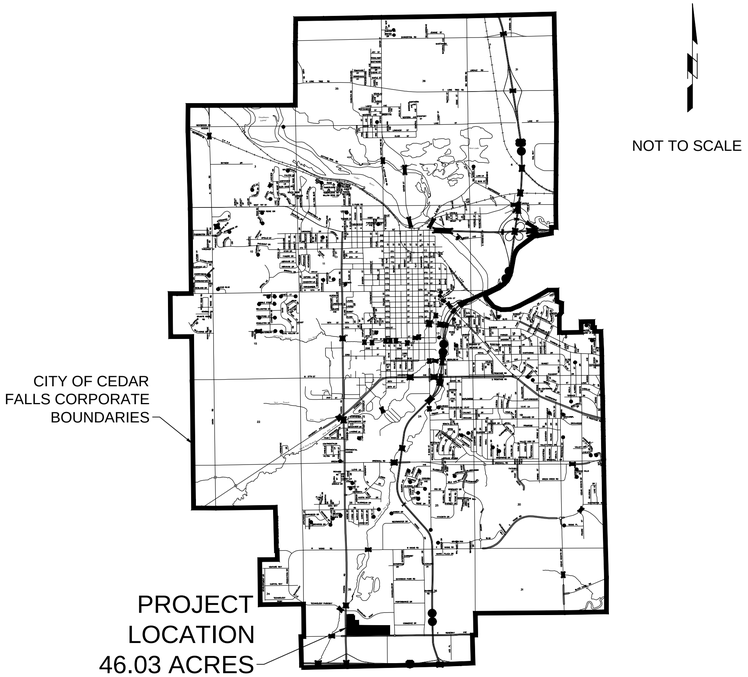
OWNER'S AGENT:
RUSSELL CONSTRUCTION
ATTN: ALISHA SCHMITZ
4600 EAST 53RD STREET
DAVENPORT, IA 52807
563-459-4600

PLAT PREPARER:
SHIVE-HATTERY
ATTN: ISAAC HODGINS
316 SECOND STREET SE SUITE 500
CEDAR RAPIDS, IA 52406
319-364-0227

SITE LOCATION MAP



CITY MAP



LEGAL DESCRIPTION:

That part of the Southeast Quarter of Section No. 35, Township No. 89 North, Range No. 14 West of the Fifth Principal Meridian in the City of Cedar Falls, Black Hawk County, Iowa, lying Southerly of Cedar Falls Technology Park Phase II, City of Cedar Falls, Iowa, except those parcels deeded for road purposes in 112 LD 487, 539 LD 335, 539 LD 338 and 552 LD 935.

AND

Lot 23 in Cedar Falls Technology Park Phase II, City of Cedar Falls, Iowa, except that part of Lot 23, Cedar Falls Technology Park, Phase II described as follows:

Commencing at the Southwest corner of said Lot 23;

Thence N04° 09 '06" E 62.91 feet along the West line of said Lot 23 to the point of beginning;

Thence N85° 40' 03" E 374.63 feet; thence S75° 44' 42" E 57.22 feet to the East line of said Lot 23;

Thence Northerly 42.91 feet along a 433.00 foot radius curve, concave Easterly (said curve having a long chord of 42.90 feet and bearing N11° 24' 00" E);

Thence N14° 14' 21" E 81.41 feet along the East line of Lot 23;

Thence Northwesterly 100.58 feet along a 55.00 foot radius curve, concave Southwesterly (said curve having a long chord of 87.14 feet and bearing N38° 09' 02" W);

Thence S89° 27' 35" W 196.82 feet along the North line of said Lot 23;

Thence S83° 44' 57" W 182.43 feet along the North line of said Lot 23;

Thence Southwesterly 20.84 feet along a 15 foot radius curve, concave Southeasterly (said curve having a long chord of 19.20 feet and bearing S43° 57' 02" W);

Thence S 04° 09' 06" W 168.60 feet along the West line of said Lot 23 to the point of beginning,

Subject to restrictive covenants, ordinances, and limited access provisions of record, if any, and to existing easements of record.

FLOODPLAIN NOTE:

FEMA FLOOD INSURANCE RATE MAP PANEL 0277F SHOWS THAT A FLOODPLAIN IS LOCATED WEST OF HUDSON ROAD AND NORTH OF TECHNOLOGY PARKWAY AND THAT THERE ARE NONE LOCATED WITHIN THE PROPOSED SUBDIVISION.

WETLAND NOTE:

INITIAL CONSTRUCTION SHALL ONLY INCLUDE LOT 1 AND THE INSTALLATION OF TWO (2) ENTRANCES ONTO HUDSON ROAD WHICH WILL CROSS AN EXISTING WETLAND, IMPACTING 0.02 ACRES. ACTIVITY IN AND AROUND THE DELINEATED WETLAND WILL BE COORDINATED WITH THE US ARMY CORPS OF ENGINEERS AND THE IOWA DEPARTMENT OF NATURAL RESOURCES. NO WORK WILL COMMENCE PRIOR TO RECEIVING WETLAND BOUNDARY APPROVALS/CONCURRENCE AND APPLICABLE PERMITS FROM ALL REGULATING AUTHORITIES.

FUTURE CONSTRUCTION OF COMMERCE ROAD AND THE ADJACENT LOTS WILL DISTURB ADDITIONAL WETLAND AREAS. THIS WORK WILL ALSO BE COORDINATED WITH THE USACE AND IDNR. NO WORK WILL COMMENCE PRIOR TO RECEIVING WETLAND BOUNDARY APPROVALS/CONCURRENCE AND APPLICABLE PERMITS FROM ALL REGULATING AUTHORITIES, INCLUDING AN APPROVED COMPENSATORY MITIGATION PLAN SHOULD MITIGATION BE REQUIRED.

MISCELLANEOUS NOTES:

1. THE DEVELOPER'S INTENTION IS TO FINAL PLAT LOT 1, LOT 2 AND CYBER LANE AS THE FIRST ADDITION. THE INTENDED FIRST ADDITION WILL BE AREAS THAT DRAIN TO DETENTION BASINS A AND B. THOSE ARE THE ONLY AREAS INTENDED TO BE DISTURBED IN THE NEAR FUTURE. ALL DISTURBED AREAS PLANNED DURING THE FINAL PLAT PHASE WILL REQUIRE THE ASSOCIATED REGIONAL BASIN TO BE CONSTRUCTED AT THAT TIME.
2. ALL PROPOSED GRADING SHOWN IN PRELIMINARY PLAT IS PRELIMINARY. INDIVIDUAL LOT BUILDOUT WILL NEED TO PROVIDE FLOOD PROTECTION AND ADEQUATE COVER FOR ALL UTILITIES.
3. TOPOGRAPHIC SLOPES THROUGHOUT THE PARCEL GENERALLY RANGE FROM 1% TO 6% WITH THE MAJORITY OF SLOPES FALLING IN THE 2%-4% RANGE.
4. TOPOGRAPHIC CHANGES INCLUDE FLATTENING THE WESTERN PORTION OF THE PROPERTY AND FILLING IN THE AREA OF THE EXISTING SWALE TO THE EAST (WITH CULVERT INSTALLATION UNDER THE PROPOSED ROADWAY).
5. A CULVERT IS SHOWN UNDER COMMERCE ROAD, BUT AN UNDERGROUND STORM SEWER SYSTEM IS POSSIBLE FOR CONVEYING THE EXISTING DRAINAGE WAY WITH INDIVIDUAL LOT DEVELOPMENT.
6. THE DISTURBED AREA IS GREATER THAN ONE (1) ACRE. AN NPDES PERMIT WILL BE APPLIED FOR AND ACQUIRED PRIOR TO CONSTRUCTION.

THIS PRELIMINARY PLAT HAS BEEN APPROVED BY THE CITY COUNCIL BY RESOLUTION NO.

ON _____

_____
PLANNING & DEVELOPMENT DIRECTOR DATE

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	CABLE LINE - OVERHEAD	
	CABLE LINE - UNDERGROUND	
OE	ELECTRIC LINE - OVERHEAD	OE
E	ELECTRICAL LINE - UNDERGROUND	E
G	GAS MAIN	G
	SANITARY SEWER	
	STEAM	
	STORM SEWER	
T	OVERHEAD TELEPHONE	T
	FIBER OPTICS	
T	UNDERGROUND TELEPHONE	T
W	WATER MAIN	W
	UTILITY EASEMENT	
	PROPERTY BOUNDARY	
	ADJACENT PROPERTY	
	CHAIN LINK FENCE	
1093	CONTOUR	1096

TELEPHONE PEDESTAL	T	LIGHT POLE	
GAS VALVE		POWER POLE	
SANITARY MANHOLE	S	TRANSFORMER	TRANS
WATER VALVE		ELECTRIC MANHOLE	E
FIRE HYDRANT		TRAFFIC SIGN	
WATER MAIN REDUCER		CURB INTAKE	
WATER MANHOLE	W	AREA INTAKE	
SIGNAL BASE		CURB INTAKE W/ GRATE	
SIGNAL CONTROLLER		STORM MANHOLE	D
HANDHOLE		FLARED END SECTION	
SIGNAL HEAD		PROPERTY PIN	
JUNIPER TREE		BUILDING/STRUCTURE FOOTPRINT	EXISTING / PROPOSED
DECIDUOUS TREE		GRANULAR SURFACE	
SHRUB		PROPOSED PAVEMENT LIMITS	
		PARKING SPACE COUNT	X

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ARCHITECTURE + ENGINEERING
316 Second Street SE Suite 500 | Cedar Rapids, Iowa 52401
319.364.0227 | fax 319.364.4251 | www.shive-hattery.com
Iowa | Illinois | Indiana

GATEWAY BUSINESS PARK AT CEDAR FALLS I
PRELIMINARY PLAT

RUSSELL CONSTRUCTION
GATEWAY BUSINESS PARK AT CEDAR FALLS I, CEDAR FALLS, IA

PRELIMINARY
- NOT FOR
CONSTRUCTION

DRAWN: KAL
APPROVED: IJH
ISSUED FOR: REVIEW
- / ---
12/29/2017
P:\217\620

PRELIMINARY PLAT
- COVER SHEET

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Item 5.A.

-415-

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GATEWAY BUSINESS PARK AT CEDAR FALLS I
PRELIMINARY PLAT

RUSSELL CONSTRUCTION

GATEWAY BUSINESS PARK AT CEDAR FALLS I, CEDAR FALLS, IA

PRELIMINARY - NOT FOR CONSTRUCTION

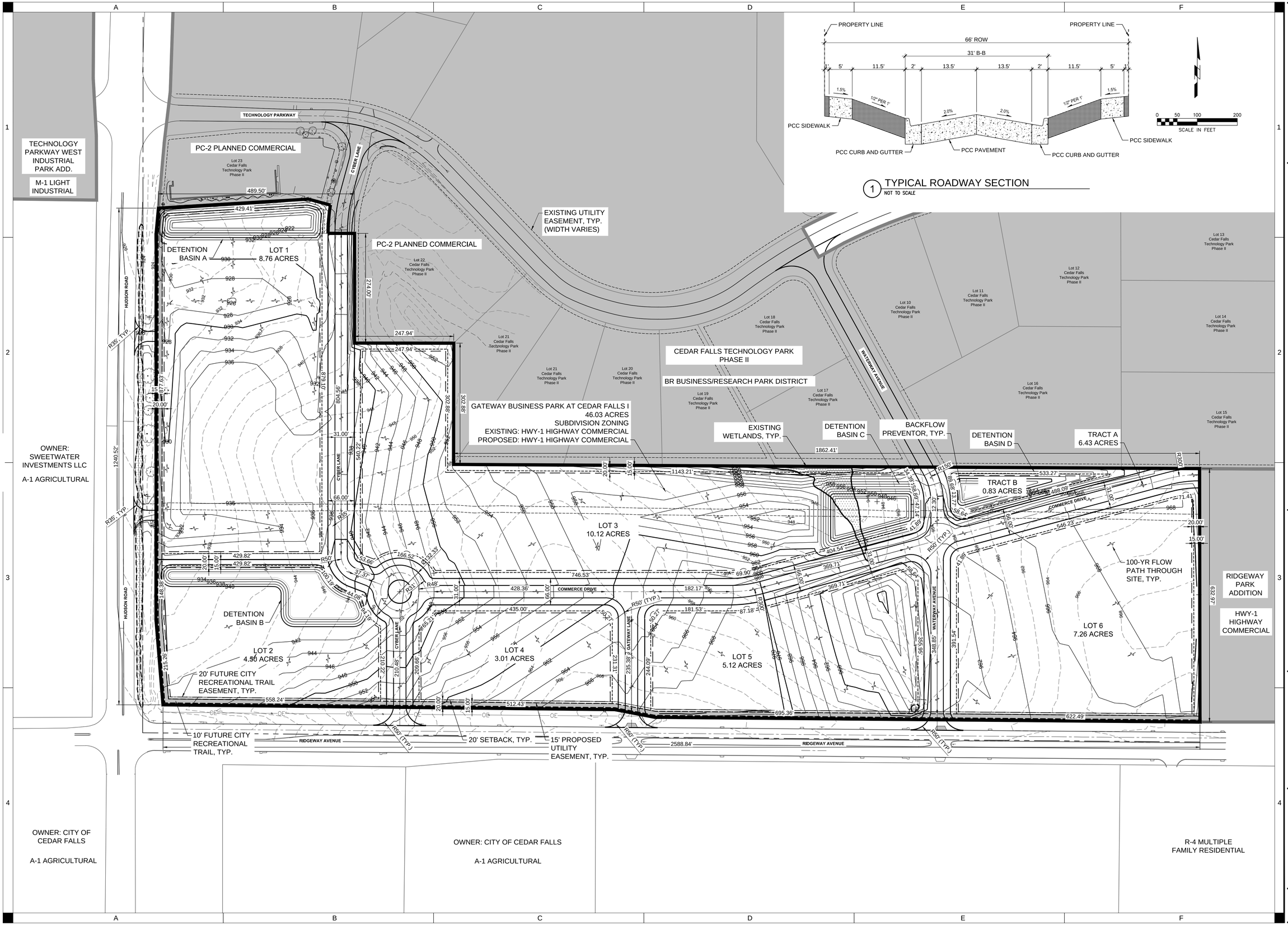
DRAWN: KAL
APPROVED: LIH
ISSUED FOR: REVIEW
DATE: 12/29/2017
PROJECT NO: 2171620
FIELD BOOK: —
CLIENT NO: —

PRELIMINARY PLAT - SITE MAP

2 of 4

-416-

1 TYPICAL ROADWAY SECTION
NOT TO SCALE



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EXISTING WATER MAIN, TYP.
TECHNOLOGY PARKWAY
EX. 10' UTILITY EASEMENT
CYBER LANE
EXISTING ELECTRIC, TYP.
EXISTING UTILITY EASEMENT, TYP. (WIDTH VARIES)
EX. SAN MH RIM 922.27 IE N 912.16
DETENTION BASIN A
LOT 1 8.76 ACRES
PROPOSED STORM SEWER, TYP.
HUDSON ROAD
EX. SAN MH RIM 937.42 IE SE 924.64
EXISTING SANITARY SEWER, TYP.
TECHNOLOGY PARKWAY
EXISTING FIBER OPTIC, TYP.
EXISTING GAS, TYP.
WATERWAY AVENUE
WETLAND AREA 0.32 ACRES
EX. 20' UTILITY EASEMENT
GATEWAY BUSINESS PARK AT CEDAR FALLS I 46.03 ACRES
WETLAND AREA 0.29 ACRES
DETENTION BASIN C
BACKFLOW PREVENTOR, TYP.
DETENTION BASIN D
TRACT A 6.43 ACRES
EX. 10' UTILITY EASEMENT
EX. STORM FES IE 927.17
EX. 16.5' TELEPHONE EASEMENT (TO BE RELOCATED AND VACATED)
TRACT B 0.83 ACRES
COMMERCE DRIVE
LOT 3 10.12 ACRES
PROPOSED WATER MAIN, TYP.
PROPOSED SANITARY SEWER, TYP.
EX. 20' GAS MAIN EASEMENT
DETENTION BASIN B
LOT 6 7.26 ACRES
LOT 2 4.50 ACRES
LOT 4 3.01 ACRES
LOT 5 5.12 ACRES
EX. DRAINAGE EASEMENT
WETLAND AREA 0.01 ACRES
EX. SAN MH RIM 938.92 IE S 923.34
20' FUTURE CITY RECREATIONAL TRAIL EASEMENT, TYP.
EX. STORM FES IE 933.88
10' FUTURE CITY RECREATIONAL TRAIL, TYP.
RIDGEWAY AVENUE
20' SETBACK, TYP.
15' PROPOSED UTILITY EASEMENT, TYP.
EX. 20' ELECTRIC TRANSMISSION EASEMENT
RIDGEWAY AVENUE
EX. STORM FES IE 854.41
EXISTING STORM SEWER, TYP.

0 50 100 200
SCALE IN FEET

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Iowa | Illinois | Indiana

GATEWAY BUSINESS PARK AT CEDAR FALLS I
PRELIMINARY PLAT

RUSSELL CONSTRUCTION

GATEWAY BUSINESS PARK AT CEDAR FALLS I, CEDAR FALLS, IA

PRELIMINARY - NOT FOR CONSTRUCTION

DRAWN: KAL
APPROVED: LIH
ISSUED FOR: REVIEW
12/29/2017
21217620

PRELIMINARY PLAT - UTILITY PLAN 1

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Item 5.A.

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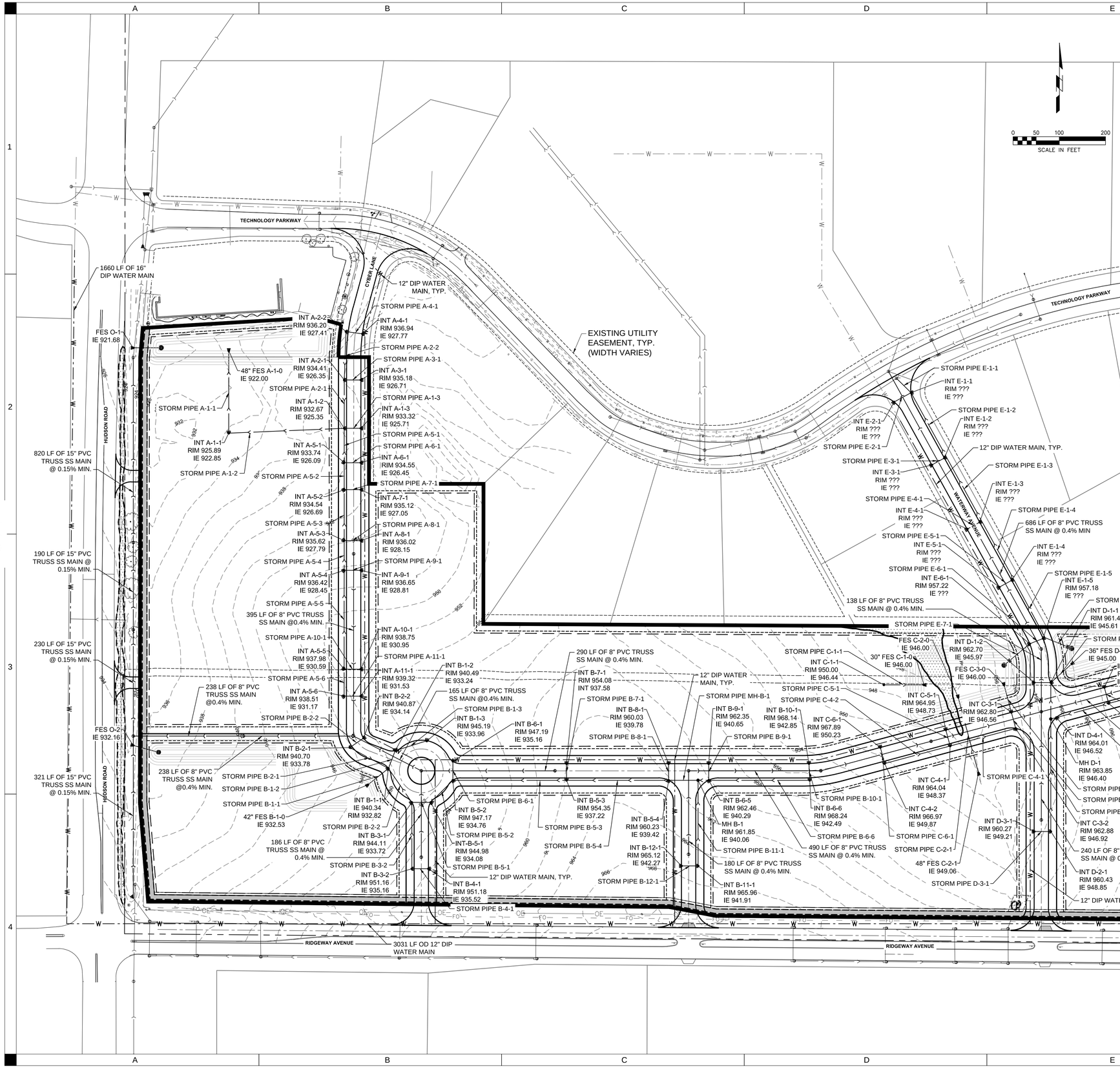

STORM SEWER PIPE SIZE TABLE

PIPE	DIAMETER (in.)	LENGTH (ft.)	SLOPE		PIPE	DIAMETER (in.)	LENGTH (ft.)	SLOPE
A-1-1	48	170	0.50%		B-12-1	12	36	1.00%
A-1-2	30	250	1.00%		C-1-1	30	87	0.50%
A-1-3	12	36	1.00%		C-2-1	48	167	0.50%
A-2-1	12	100	1.00%		C-3-1	12	57	1.00%
A-2-2	12	105	1.00%		C-3-2	12	35	1.00%
A-3-1	12	36	1.00%		C-4-1	12	145	1.00%
A-4-1	12	36	1.00%		C-4-2	12	150	1.00%
A-5-1	24	74	1.00%		C-5-1	12	36	1.00%
A-5-2	24	60	1.00%		C-6-1	12	36	1.00%
A-5-3	24	110	1.00%		D-1-1	36	61	1.00%
A-5-4	24	65	1.00%		D-1-2	12	36	1.00%
A-5-5	12	214	1.00%		MH-D-1	36	79	1.00%
A-5-6	12	58	1.00%		D-2-1	12	245	1.00%
A-6-1	12	36	1.00%		D-3-1	36	36	1.00%
A-7-1	15	36	1.00%		D-4-1	12	12	1.00%
A-8-1	12	36	1.00%		D-4-2	12	118	1.00%
A-9-1	18	36	1.00%		D-4-3	12	117	1.00%
A-10-1	12	36	1.00%		D-5-1	12	36	1.00%
A-11-1	12	36	1.00%		D-6-1	15	36	1.00%
B-1-1	42	57	0.50%		E-1-1	12	44	0.50%
B-1-2	24	41	1.00%		E-1-2	12	158	0.50%
B-1-3	15	72	1.00%		E-1-3	12	158	0.50%
B-2-1	12	96	1.00%		E-1-4	12	144	0.50%
B-2-2	12	36	1.00%		E-1-5	12	144	0.50%
B-3-1	36	89	1.00%		E-1-6	12	65	0.50%
B-3-2	12	144	1.00%		E-2-1	12	42	0.50%
B-4-1	12	36	1.00%		E-3-1	12	31	0.50%
B-5-1	30	36	1.00%		E-4-1	12	31	0.50%
B-5-2	30	68	1.00%		E-5-1	12	31	0.50%
B-5-3	24	246	1.00%		E-6-1	12	31	0.50%
B-5-4	18	220	1.00%		E-7-1	12	71	0.50%
MH-B-1	15	64	1.00%		F-1-1	15	28	0.50%
B-5-5	15	23	1.00%		F-1-2	12	140	0.50%
B-5-6	15	220	1.00%		F-1-3	12	141	0.50%
B-6-1	18	40	1.00%		F-1-4	12	186	0.50%
B-7-1	12	36	1.00%		F-2-1	12	41	0.50%
B-8-1	12	36	1.00%		F-3-1	12	36	0.50%
B-9-1	12	36	1.00%		F-4-1	12	31	0.50%
B-10-1	12	36	1.00%		F-5-1	12	34	0.50%
B-11-1	12	185	1.00%					

STORM SEWER NOTES:
1. ALL STORM SEWER IS RCP (DIAMETER VARIES).
2. ALL CURB INTAKES ARE PER SUDAS DETAIL SW-510.
3. SEE THIS SHEET FOR STORM PIPE LOCATIONS.

SHIVEHATTERY
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GATEWAY BUSINESS PARK AT CEDAR FALLS I
PRELIMINARY PLAT

RUSSELL CONSTRUCTION

GATEWAY BUSINESS PARK AT CEDAR FALLS I, CEDAR FALLS, IA

PRELIMINARY
- NOT FOR
CONSTRUCTION

DRAWN:	KAL
APPROVED:	LIH
ISSUED FOR:	REVIEW
DATE:	12/29/2017
PROJECT NO:	2171620
FIELD BOOK:	---
CLIENT NO:	---

PRELIMINARY PLAT
- UTILITY PLAN 2

Prepared by and Return to: Jennifer Belby, PC, 4600 E. 53rd Street, Davenport, IA 52807, (563) 459-4600

(Space above this line for recording purposes)

DEED OF DEDICATION

OF

GATEWAY BUSINESS PARK AT CEDAR FALLS FIRST ADDITION
IN THE CITY OF CEDAR FALLS, BLACK HAWK COUNTY, IOWA

KNOW ALL PERSONS BY THESE PRESENTS:

That, Cedar Falls Gateway Park, Inc., with its principal office in Independence, Iowa, being desirous of setting and platting into lots and streets the land described in the attached Certificate of Survey by VJ Engineering, a licensed land surveyor, dated the _____ day of _____, 2017, does by these presents designate and set apart the aforesaid premises as a subdivision of the City of Cedar Falls, Iowa, the same to be known as

GATEWAY BUSINESS PARK AT CEDAR FALLS FIRST ADDITION
IN THE CITY OF CEDAR FALLS, BLACK HAWK COUNTY, IOWA

all of which is with the free consent and the desire of the undersigned, and the undersigned does hereby designate and set apart for public use the streets and avenues as shown upon the attached plat.

EASEMENTS

The owner does hereby grant and convey to the City of Cedar Falls, Iowa, its successors and assigns, and to any private corporation, firm or person furnishing utilities for the transmission and/or distribution of water, sanitary sewer, storm sewer, drain tile, surface drainage, gas, electricity, communication services or cable television, perpetual easements for the erection, laying, building, and maintenance of said services over, across, on and/or under the property as shown on the attached plat.

RESTRICTIONS

Be it also known that the undersigned does hereby covenant and agree for itself and its successors and assigns that each and all of the lots in said subdivision be and the same are hereby made subject to the following restrictions upon their use and occupancy as fully and effectively to all intents and purposes as if the same were contained and set forth in each deed of conveyance or mortgage that the undersigned or its successors in interest may hereinafter make for any of said lots and that such restrictions shall run with the land and with each individual lot thereof of for length of time and in all particulars hereinafter started to wit:

I. DEFINITIONS.

For the purpose of this Declaration, the following terms shall have the following definitions, except as otherwise specifically provided:

A. “Plat” shall mean and refer to the real property described as Lot 1, Gateway Business Park at Cedar Falls First Addition in the City of Cedar Falls, Black Hawk County, Iowa.

B. “Declarant” shall mean and refer to Cedar Falls Gateway Park, Inc.

C. “Lot” shall mean and refer to an individual parcel of land within the Plat.

D. “Owner” shall mean and refer to the record owner, whether one or more persons or entities, of the legal or equitable title to any Lot that is a part of the Plat.

E. “City” shall mean the City of Cedar Falls, Iowa.

II. DESIGNATION OF USE.

All Lots shall be known and described as commercial or neighborhood commercial lots and shall not be improved, used or occupied for other than those purposes. Commercial activity may be conducted on any Lot or in any structure constructed or maintained on any Lot as permitted under the terms of the zoning ordinance of the City. The authority to enforce the restrictions and easements set forth herein shall be vested in the Declarant.

III. BUILDING TYPES.

The development of the subdivision shall be in accordance with the current zoning district classification set forth in the City of Cedar Falls, Iowa, zoning ordinance.

IV. BUILDING AREA DESIGN AND CONSTRUCTION.
All buildings erected on any Lot in the subdivision shall be construed in accordance with the Building, Plumbing, and Electrical Codes of the City of Cedar Falls, Iowa.

The Declarant, its successors or assigns, shall have the right to review and approve all building and site plan designs, including, but not limited to, location of access, drives, landscaping, and other improvements. All plans and specifications for structures to be built on any Lot in the subdivision, shall be submitted in writing to and approved in writing by the Declarant or its authorized agent or agents. All buildings on any Lot in the subdivision shall be kept in a reasonable state of repair and upkeep.

V. EASEMENTS.

Easements for installation and maintenance of utilities and drainage facilities, and sewer, are reserved as shown on the Plat as recorded. The Owner of each Lot, shall, at the expense of such Owner, maintain, keep, and preserve that portion of the easement within the Lot at all times in good repair and condition and shall neither erect nor permit erection of any building, structure, fence or other improvement of any kind within the easement areas (except customary ground cover) which might interfere in any way with the use, maintenance, replacement, inspection or patrolling of any of the utility services, drainage facilities and pedestrian trail, within such easements areas. Any berm and/or swale constructed for drainage purposes shall be preserved and maintained to accomplish the purposes for which it was constructed.

VI. NUISANCE.

No noxious or offensive activity or odors shall be permitted on or to escape from any Lot, nor shall anything be done thereon which is or may become an annoyance or a nuisance, either temporarily or permanently.

VII. SIGNS.

Any signs erected on any Lot in the subdivision shall be constructed in accordance with the Sign Ordinance of the City of Cedar Falls, Iowa, and subject to the review and approval of Declarant.

VIII. UTILITIES.

Except for necessary above ground utility devices, all utility lines shall be underground.

IX. CURBLINE MAINTENANCE.

The Owner and/or occupant of each Lot shall jointly and severally be responsible to keep in good order or to maintain the area between the curbline and the property line abutting their property including keeping said area free of holes, pitfalls, stumps of trees, fences, brick, stone, cement, stakes, posts or rods to which a metal, plastic or similar receptacle designed to hold newspapers are affixed, private irrigation or sprinkler systems, retaining walls, landscaping brick, block, stone, timber or other similar material, or any other similar obstructions.

X. MAINTENANCE.

The Owner and/or occupant of each Lot shall be responsible to keep the same free of trash, weeds and debris and to keep the lawn and landscaping well maintained in accordance with governing ordinances. The Owner and/or occupant of each Lot shall be responsible to maintain the exterior of any structure and all other improvements.

XI. SURFACE WATER.

The topography of the Plat is such that the surface water may flow from certain Lots onto other Lots. In regard to all matters concerning surface water, each Lot shall be subject to an benefited by such easements as may exist from the flowage of surface water under the laws of the State of Iowa, as may be in effect from time to time; and all Owners shall have such rights and obligations with respect thereto as may be provided by such laws.

XII. DEVIATION BY AGREEMENT.

The Declarant hereby reserves the right to enter into agreements with the purchaser of any Lot in the subdivision to deviate from any and all of these restrictive covenants and any such deviation (which shall be manifested by an agreement in writing) shall not constitute a waiver of the particular covenant involved or any other as to the remaining Plat. Such deviation shall be reasonably consistent with the purpose of these restrictions, and provide that the requested deviation is in the best interest of the part or parts of the Plat and the variance requested is compatible with the character of the Plat.

Whenever, in the exercise of its discretion, the Declarant grants a deviation, each Owner of a Lot hereby acknowledges that such variance shall constitute a waiver of any conflicting provisions of these restrictions and this Declaration. Each Owner of a Lot appoints the Declarant as its true and lawful attorney-in-fact for the limited purpose of consenting to and granting variances in compliance with the terms of these covenants.

XIII. ENFORCEMENT OF COVENANTS.

This Declaration shall be deemed to run with the land, and the Declarant or the Owner of any Lot may bring an action in any court of competent jurisdiction to enforce this Declaration to enjoin its violation or for damages for the breach thereof, or for any other remedy or combination of remedies recognized at law or in equity, and shall further be entitled to recover reasonable legal fees and costs if the Declarant or Owner prevails in any such action.

XIV. AMENDMENTS OF COVENANTS.

A. For so long as Declarant owns any Lot or any part of the Plat, Declarant may amend these Restrictions by an instrument in writing filed and recorded in the records of Black Hawk County, Iowa, without the approval of any Owner of any Lot or part of the Plat estate. Provided,

however, that (i) in the event that such instrument materially alters or changes any Owner's and/or occupant's right to the use and enjoyment of such Owner's and/or occupant's Lot or if such amendment adversely effects the title to any Lot or part of the Plat, such amendment shall be valid only upon approval thereof by all Owners and/or occupants affected thereby, and (ii) in the event that such amendment adversely affects the security, title and interest of any mortgagee, such amendment shall be valid only upon the approval thereof by all mortgagees affected thereby. Each Owner, by acceptance of a deed or other conveyance to a Lot or part of the real estate, agrees to be bound by such amendments as are permitted by this section and further agrees that, if requested to do so by Declarant, such Owner will consent to the amendment of this Declaration or any other instruments related to the real estate: (i) if such amendment is necessary to bring any provisions hereof or thereof into compliance or conformity with the provisions of any applicable governmental statute, rule or ordinance or any judicial determination which shall be in conflict therewith; (ii) if such amendment is necessary to enable any reputable title insurance company to issue title insurance coverage with respect to any Lot subject to these restrictions; and (iii) if such amendment is necessary to correct a scrivener's error in the drafting of these restrictions.

B. At such time as Declarant no longer owns any Lot or any part of the Plat, these restrictions may be amended from time to time with the approval of the Owners. Such approval shall be given by the affirmative vote of not less than two-thirds (2/3) of the Owners. The Owner of each Lot (or joint Owners of a single Lot in the aggregate) shall be entitled to cast one vote on account of each Lot owned.

XV. PERIOD OF COVENANTS.

This Declaration shall continue and remain in full force and effect at all times as to the Plat and as to the Owners of any Lot, regardless of how title was acquired, until the date twenty-one (21) years after the recording of this Declaration, on which date this Declaration shall automatically be extended for two (2) successive periods of five (5) years each, unless on or before the end of the base period, or the first extension period, the Owners of not less than fifty percent (50%) of the Lots, by written instrument duly recorded, declare a termination of the same.

XVI. ENFORCEMENT AND WAIVER.

A. In the event that any one or more of the foregoing covenants, conditions or restrictions shall be declared for any reason by a court of competent jurisdiction to be null and void, such judgment or decree shall not in any manner whatsoever affect, modify, change, abrogate, or nullify any of the covenants, conditions and restrictions not so expressly held to be void, which shall continue unimpaired and in full force and effect.

B. The Plat shall also be subject to any and all rights and privileges of the City, now held or hereafter acquired, by dedication or conveyance, or by reason of the platting and recording of the Plat, or by this Declaration or by law. Wherever there is a conflict between this Declaration and the zoning ordinance of the City, the more restrictive shall be binding.

C. This Declaration shall not be applicable to property dedicated to the City, and the City may allow appropriate public use on city-owned property within the Plat.

XVII. PUBLIC IMPROVMENTS REQUIRED IN PLAT.

The Owner, in consideration of approval of this Plat by the Cedar Falls Planning and Zoning Commission and the City Council of the City of Cedar Falls, Iowa, agrees for itself, its successors and assigns, as follows:

A. That the streets shown on the attached Plat will be brought to city grade and that the streets will be thirty-one (31) feet, back of curb to back of curb, with approved hard surface pavement in accordance with City of Cedar Falls Standard Specifications. Parking shall be allowed on only one side of each street as determined by the City Engineer.

B. That concrete sidewalks four (4) inches thick will be installed during or immediately after construction of a building on any particular Lot, and the sidewalks constructed shall be across the full width of the Lot and on corner Lots and also across the parking and full length of the Lot.

C. That sanitary sewer, together with the necessary manholes and sewer service lines to all Lots in the subdivision will be provided.

D. That underground utilities, as required by the City of Cedar Falls Subdivision Ordinance, shall be installed.

E. That City water shall be provided and stubbed in to each Lot as required by the Cedar Falls Municipal Utilities.

F. That Municipal fire hydrants will be provided as required by the Cedar Falls Public Safety Department.

G. That storm sewer will be provided as required by the City Engineer of the City of Cedar Falls.

H. That handicap ramps will be provided as required by law.

I. All buildings erected on any Lot in said subdivision shall be constructed in accordance with the building, plumbing and electrical codes of the City of Cedar Falls.

J. The Declarant shall construct and install all required public improvements within the subdivision plat, to conform with approved construction plans which meet the specifications of the City of Cedar Falls, Iowa. Such required public improvements shall meet the following requirements:

1. Shall be constructed and installed in a good and workmanlike manner;

2. Shall be free of defects in workmanship or materials;

3. Shall be free of any conditions that could result in structural or other failure of said improvements;

4. Shall be constructed and installed in accordance with the design standards and technical standards established for such public improvements by the City and by Cedar Falls Utilities;

5. Shall be constructed and installed in strict compliance with the minimum acceptable specifications for the construction of public improvements set forth in the Cedar Falls Code of Ordinances, including without limitation, Chapter 24, Subdivisions, and as such specifications shall be recommended for approval by the City Engineer from time to time, and approved by the City Council.

The Developer's construction plans are now on file in the Office of the City Engineer.

K. That the work and improvements called for herein shall be in accordance with City specifications under the supervision of the City Engineer, and shall be completed within eighteen (18) months of the date of approval of the final Plat. Further, the Owner and its successors and assigns shall comply with site plan review and approval by the Cedar Falls Planning and Zoning Commission and the Cedar Falls City Council.

L. That in the event the improvements called for herein shall not be performed in accordance with the City Ordinances and the above Agreement, the City may perform said work, levy the costs thereof as assessments, and the undersigned agree that said assessments so levied shall be a lien on all of the Lots in this Addition with the same force and effect as though all legal provisions relating to the levy of such special assessments have been observed and further authorize the City Clerk to certify such assessments to the County Auditor as assessments to be paid in installments as provided by law.

IN WITNESS WHEREOF, this Deed of Dedication, was made the date first written above by the Declarant.

DECLARANT:

CEDAR FALLS GATEWAY PARK, INC.

By: _____
Atuldesi Patel, Officer

STATE OF IOWA)
) ss.
COUNTY OF BLACK HAWK)

This record was acknowledged before me on this _____ day of _____, 2017, by Atuldesi Patel, as Officer of Cedar Falls Gateway Park, Inc.

_____
Notary Public in and for the State of Iowa

Traffic Impact Study:

Proposed Open Door Hospitality Development

Cedar Falls, Iowa

September 18, 2017

Prepared for: Open Door Hospitality.

Prepared by:

SHIVEHATTERY
ARCHITECTURE + ENGINEERING
316 Second Street SE, Suite 500
Cedar Rapids, IA 52406
(319) 364-0027

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Executive Summary

The Open Door Hospitality (ODH) Group initiated this traffic impact study to identify potential traffic impacts on the adjacent roadway network and provide traffic mitigation measures, if necessary, due to their proposed multi-use development. The proposed development will be bounded by Hudson Road to the west, Ridgeway Avenue to the south, Chancellor Drive to the east, and Technology Parkway to the north in Cedar Falls, IA. The following study intersections within the study area were identified for analysis:

1. Hudson Road & Technology Parkway
2. Hudson Road & West Ridgeway Avenue (Hudson Road & Ridgeway Avenue hereafter)
3. Chancellor Drive & Technology Parkway
4. Chancellor Drive/Lexington Boulevard & West Ridgeway Avenue (Chancellor Drive & Ridgeway Avenue hereafter)

The above list assigns each study intersection with a number that is used throughout the report. (e.g. #1 = Hudson Road and Technology Parkway).

The area immediately surrounding the proposed development generally incorporates lodging, service, office, residential, agricultural, and undeveloped land uses.

The proposed ODH development is an approximate 49 acre multi-use development. Three right-in/right out access points are proposed along Hudson Road between Technology Parkway and Ridgeway Avenue, three full access points are proposed along Ridgeway Avenue between Hudson Road and Chancellor Drive and one full access point is proposed and would become the westbound approach to the existing T-intersection of Chancellor Drive and Commerce Drive. None of the site access points are anticipated to present safety or operational concerns. Sight visibility zones corresponding to intersection sight distance calculations as defined through AASHTO should be identified and maintained at these access points. These zones should not contain structures or plantings that would preclude unobstructed views of oncoming traffic. Current designs for the development do not indicate obstructions within the sight visibility zones. For the purposes of this traffic impact study two future projected analysis years were analyzed. The first analysis year analyzed land uses expected to be built by the end of 2019. The second analysis year is 2040, which assumes full buildout of the development.

Morning (AM) and evening (PM) peak hour volumes at the study intersections were collected between the hours of 7:00 AM and 9:00 AM and between 4:00 PM and 6:00 PM, respectively. The AM and PM peak hour volumes were collected on Wednesday, May 25, 2017. The peak hours of the study intersections were determined based on the highest consecutive 15-minute turning movement counts at Hudson Road and Technology Parkway. The AM and PM peak hours at Hudson Road and Technology Parkway governed the AM and PM peak hours at the study intersections because it is the study intersection with the highest volume of entering vehicles. The AM peak hour was determined to occur between 7:15 and 8:15. The PM peak hour was determined to occur between 4:30 and 5:30. The raw and refined volume data are provided in Appendix 2 of this report.

Projected traffic analysis will typically apply an annual growth rate to study intersections' existing turning movement volumes prior to adding project development trips to account for growth in background traffic (traffic growth unrelated to the proposed ODH development). A review of 2001 through 2014 Annual Average Daily Traffic (AADT) volumes obtained from the Iowa DOT, along Ridgeway Avenue indicated an approximate 2.8 percent annual growth rate. Thus, a 2.8 percent annual growth rate was applied to existing 2017 study intersection volumes to reflect projected future background traffic volume growth, which can be expected through a sustained constant area growth without the ODH development. It should be noted, over time growth rates generally do not exhibit a straight line growth, but rather tend to level off as the surrounding area continues to develop. Therefore, the use of a straight line growth rate for the prediction of future events can be thought of as conservative and should be considered as such when reviewing the output of this analysis. It should be noted, existing 2017 refined peak hour turning movement volumes at roadway

approaches with less than 5 vehicles per hour (VPH) were adjusted to 5 VPH to allow for background traffic growth.

The Safety Analysis, Visualization, and Exploration Resource (SAVER) website administered by Iowa DOT was used to collect available crash data near the project site for the five-year period between January 1, 2012 and December 31, 2016. All of the study intersections had crash rates that were lower than the statewide average for intersections with a similar daily volume of entering vehicles.

Project trip generation is based on nationally accepted trip generation rates contained in the Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition, 2012 and procedures outlined in the ITE Trip Generation Handbook, Second Edition, June 2004.

Trip distribution percentages for the ODH development, which are based upon expected travel patterns in the surrounding roadway network for the analysis years of 2019 and 2040, are presented in the following Figures.

Figure ES1 Project Trip Distribution - 2019

Figure ES2 Project Trip Distribution - 2040

Currently, the closest bus stop to the proposed development is just east of the Kaplan University building, which is located on the southwest corner of the Nordic Drive and Performance Drive intersection. As the area develops, the City of Cedar Falls should coordinate with the Waterloo – Cedar Falls Metropolitan Transit Authority (MET) to provide a transit service stop or stops within the proposed development site. Prairie Lake Park is located to the north of the proposed development, which has a multi-use trail system around the lake and extending down to intersect with Technology Parkway. Sidewalks, bike lanes, and bike racks should be considered throughout the proposed ODH development.

The analysis presented herein indicates the study intersections will operate at an acceptable LOS D or better during the AM and PM peak hour conditions through 2040 with buildout of the proposed development, except for the intersection of Hudson Road and Ridgeway Avenue. Under projected 2019 conditions the intersection of Hudson Road and Ridgeway Avenue is projected to fall to LOS E in the AM peak hour with buildout and in the PM peak hour regardless if the proposed ODH development is built or not. This analysis assumes

existing lane configuration and control for 2017 existing and 2019 projected conditions as identified in Figure 3 and recommended lane configuration and control for 2040 projected conditions as identified in Figure 11. The study intersection of Hudson Road and Ridgeway Avenue is not projected to meet MUTCD Warrant 2 criteria to justify a traffic control signal upon buildout 2019 conditions, but is upon buildout 2029 conditions. It is recommended this intersection be regularly assessed to determine when it should be signalized based upon MUTCD criteria and operational and safety considerations. Assuming the identified intersection improvements presented in Figure 11 are implemented, no other improvements at the study intersections is considered necessary.

Existing Conditions

The Open Door Hospitality (ODH) Group initiated this traffic impact study to identify potential traffic impacts on the adjacent roadway network and provide traffic mitigation measures, if necessary, due to their proposed multi-use development. The proposed development will be bounded by Hudson Road to the west, Ridgeway Avenue to the south, Chancellor Drive to the east, and Technology Parkway to the north in Cedar Falls, IA. The following study intersections within the study area were identified for analysis:

1. Hudson Road & Technology Parkway
2. Hudson Road & West Ridgeway Avenue (Hudson Road & Ridgeway Avenue hereafter)
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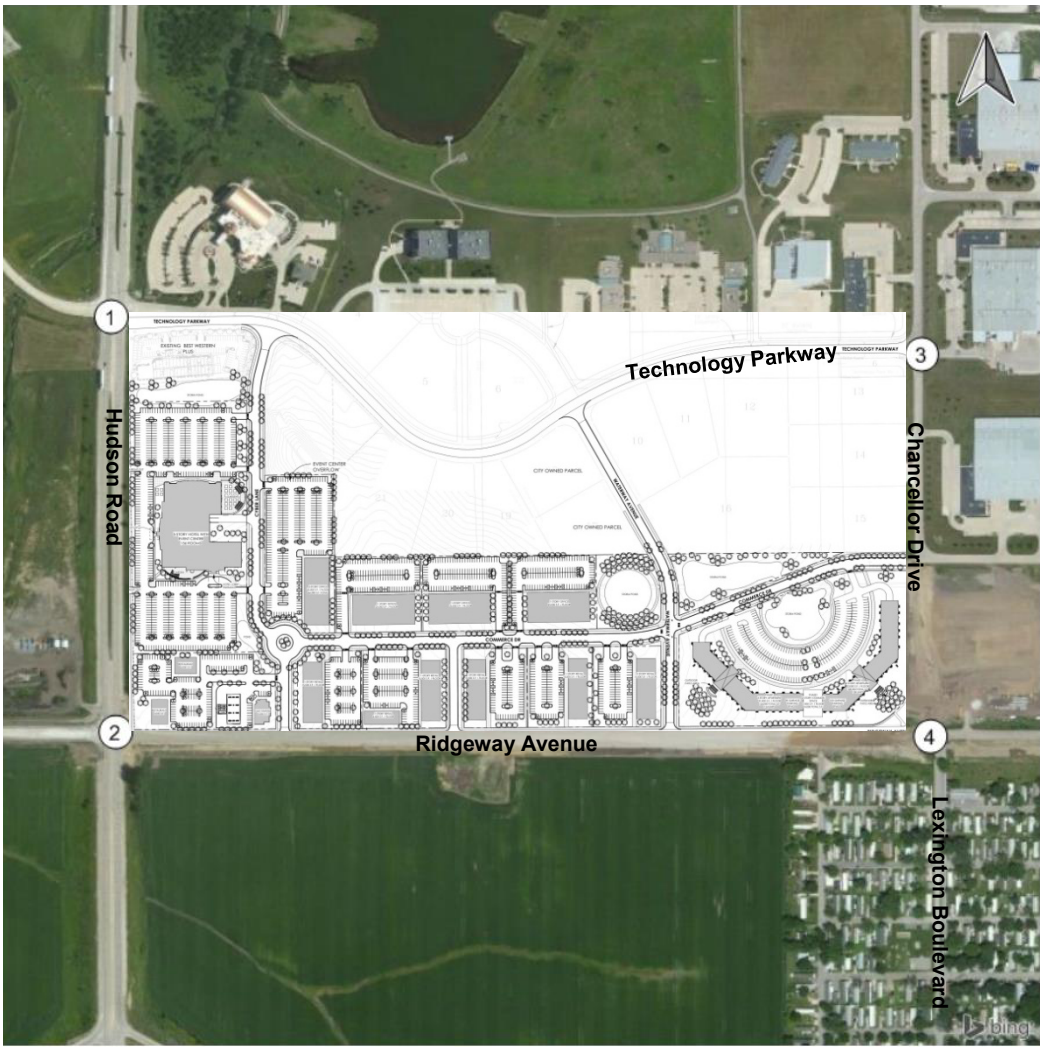
4. Chancellor Drive/Lexington Boulevard & West Ridgeway Avenue (Chancellor Drive & Ridgeway Avenue hereafter)

The above list assigns each study intersection with a number that is used throughout the report. (e.g. #1 = Hudson Road and Technology Parkway).

The area immediately surrounding the proposed development generally incorporates lodging, service, office, residential, agricultural, and undeveloped land uses. A study area map depicting the location of the study intersections, as well the location of proposed development is depicted in Figure 1.

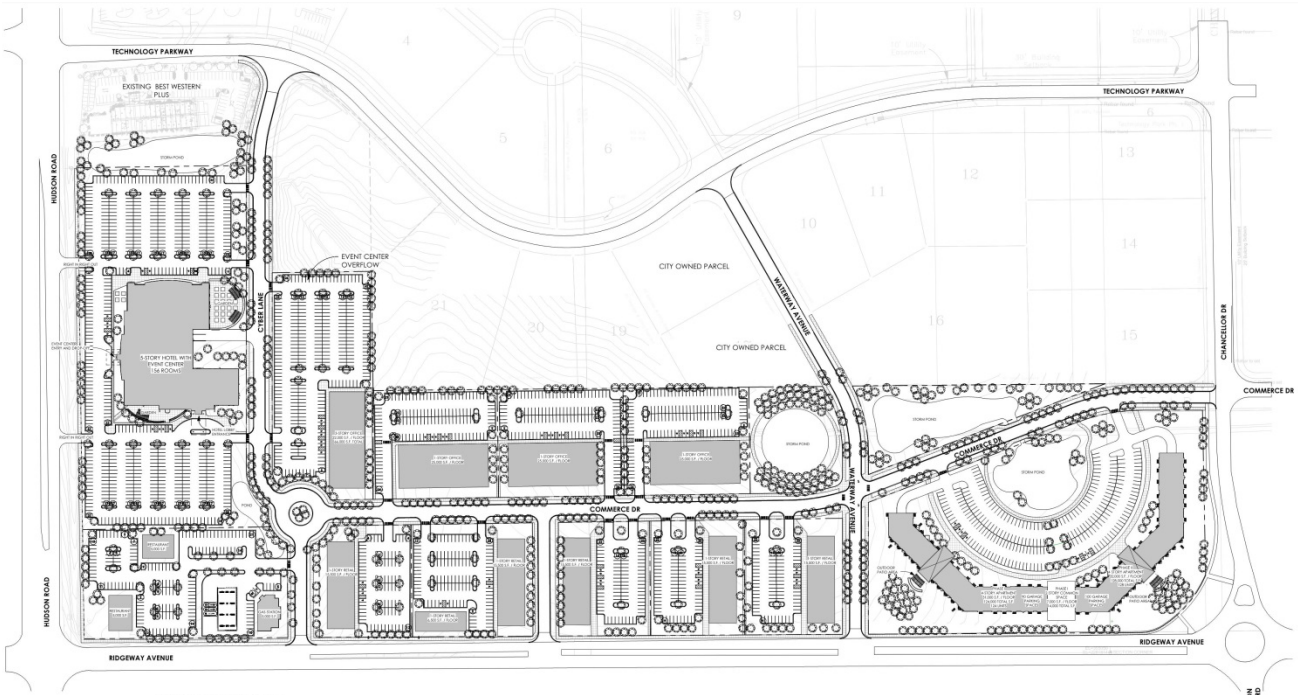
Figure 1 Study Area Map



Project Description

The proposed ODH development is an approximate 49 acre multi-use development. Three right-in/right out access points are proposed along Hudson Road between Technology Parkway and Ridgeway Avenue, three full access points are proposed along Ridgeway Avenue between Hudson Road and Chancellor Drive and one full access point is proposed and would become the westbound approach to the existing T-intersection of Chancellor Drive and Commerce Drive. None of the site access points are anticipated to present safety or operational concerns. For the purposes of this traffic impact study two future projected analysis years will be analyzed. The first analysis year will analyze land uses expected to be built by the end of 2019. The second analysis year will be 2040, which assumes full buildout of the development. A preliminary site plan is provided in Figure 2 and included as Appendix 1.

Figure 2 Preliminary Site Plan



Adjacent Streets

Hudson Road between Technology Parkway and Ridgeway Avenue is a four lane (two through lanes in each direction) divided minor arterial roadway with a posted speed limit of 45 mph. On-street parking is prohibited along Hudson Road.

Ridgeway Avenue between Hudson Road and Chancellor Drive is a four lane (two through lanes in each direction) divided minor arterial roadway with a posted speed limit of 45 mph. On-street parking is prohibited along Ridgeway Avenue.

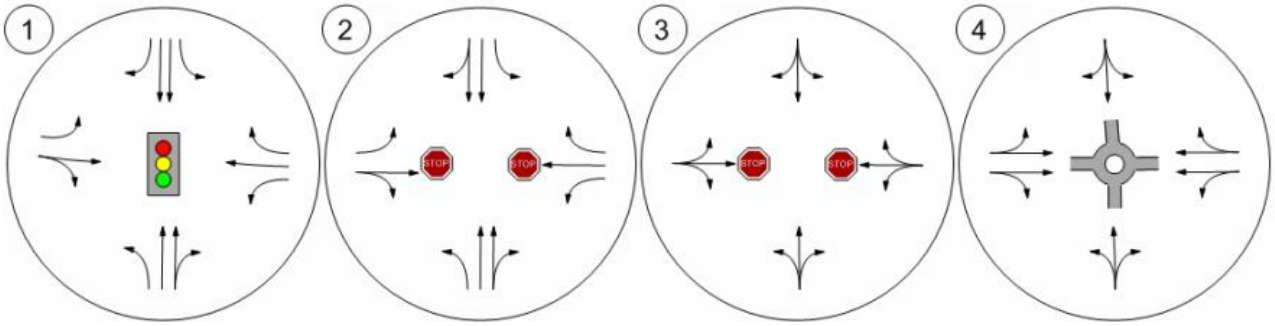
Chancellor Drive between Technology Parkway and Ridgeway Avenue is a two lane (one through lane in each direction) local roadway with a posted speed limit of 25 mph. No on-street parking restrictions are posted along Chancellor Drive.

Technology Parkway between Hudson Road and Chancellor Drive is a two lane (one through lane in each direction) local roadway with a posted speed limit of 25 mph. No on-street parking restrictions are posted along Technology Parkway.

Existing Intersection Conditions

The existing lane configuration and control for the study intersections are presented in Figure 3.

Figure 3 Study Intersections - Existing (2017) Lane Configuration and Control



Traffic Volume Data

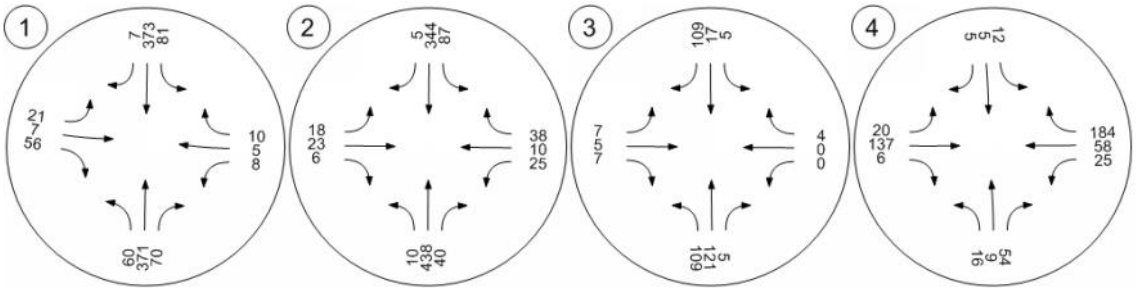
Morning (AM) and evening (PM) peak hour volumes at the study intersections were collected between the hours of 7:00 AM and 9:00 AM and between 4:00 PM and 6:00 PM, respectively. The AM and PM peak hour volumes were collected on Wednesday, May 25, 2017. The peak hours of the study intersections were determined based on the highest consecutive 15-minute turning movement counts at Hudson Road and Technology Parkway. The AM and PM peak hours at Hudson Road and Technology Parkway governed the AM and PM peak hours at the study intersections because it is the study intersection with the highest volume of entering vehicles. The AM peak hour was determined to occur between 7:15 and 8:15. The PM peak hour was determined to occur between 4:30 and 5:30. The raw and refined volume data are provided in Appendix 2 of this report.

Background Traffic Growth

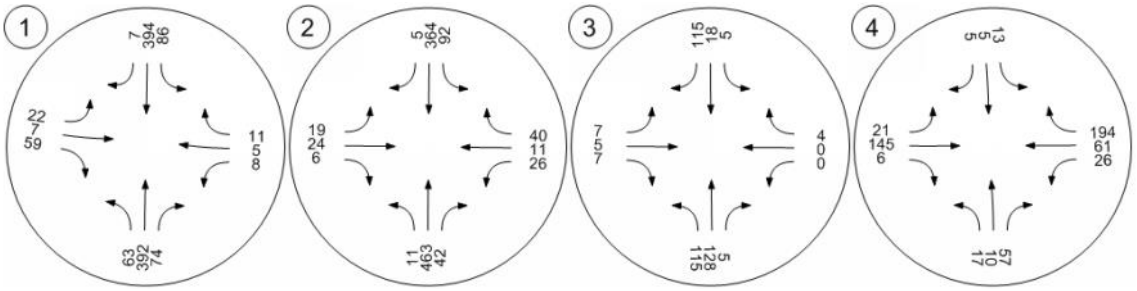
Projected traffic analysis will typically apply an annual growth rate to study intersections' existing turning movement volumes prior to adding project development trips to account for growth in background traffic (traffic growth unrelated to the proposed ODH development). A review of 2001 through 2014 Annual Average Daily Traffic (AADT) volumes obtained from the Iowa DOT, along Ridgeway Avenue indicated an approximate 2.8 percent annual growth rate. Thus, a 2.8 percent annual growth rate was applied to existing 2017 study intersection volumes to reflect projected future background traffic volume growth, which can be expected through a sustained constant area growth without the ODH development. It should be noted, over time growth rates generally do not exhibit a straight line growth, but rather tend to level off as the surrounding area continues to develop. Therefore, the use of a straight line growth rate for the prediction of future events can be thought of as conservative and should be considered as such when reviewing the output of this analysis. It should be noted, existing 2017 refined peak hour turning movement volumes at roadway approaches with less than 5 vehicles per hour (VPH) were adjusted to 5 VPH to allow for background traffic growth. Existing 2017 and projected 2019 and 2040 AM and PM peak hour turning movement volumes without the proposed development (no build) are presented in Figure 4 and Figure 5, respectively.

Figure 4 Study Intersections – AM Peak Hour No Build Volumes

2017 AM Peak Hour



2019 AM Peak Hour



2040 AM Peak Hour

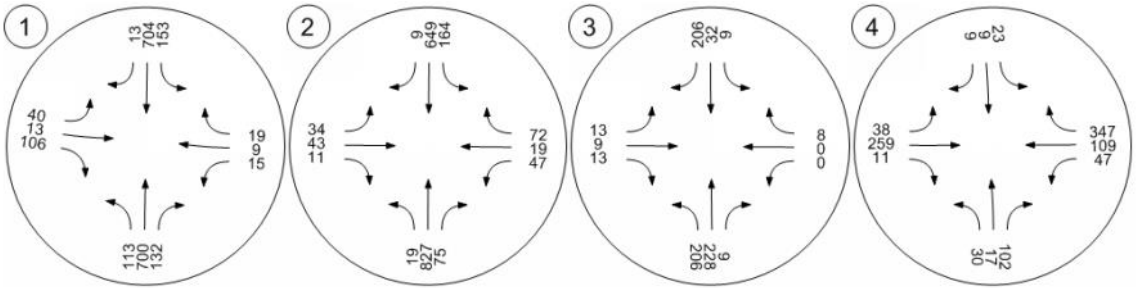
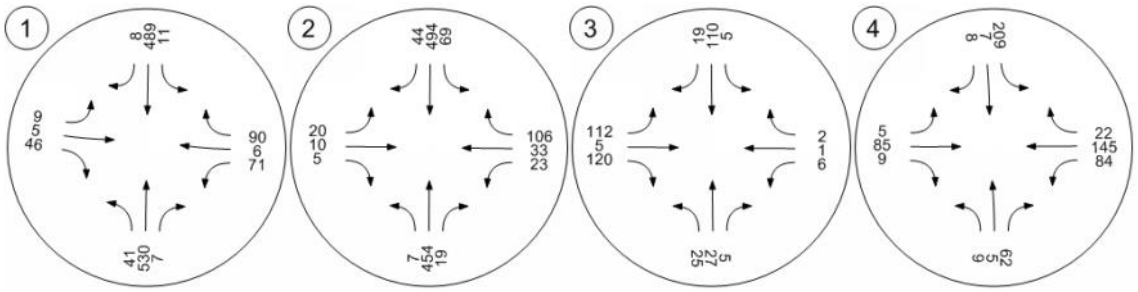
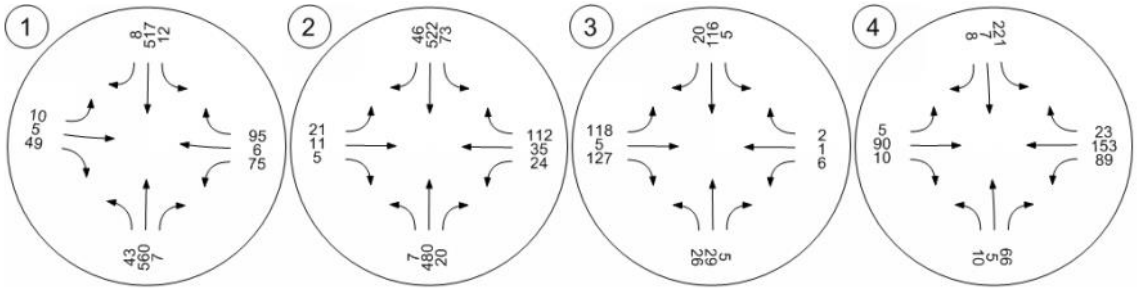


Figure 5 Study Intersections – PM Peak Hour No Build Volumes

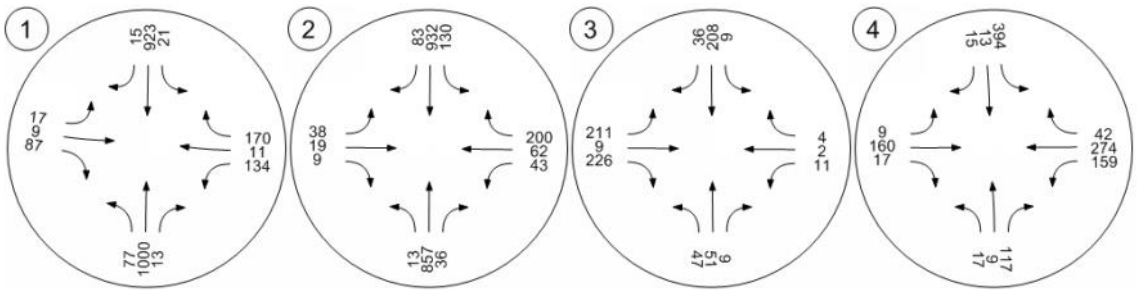
2017 PM Peak Hour



2019 PM Peak Hour



2040 PM Peak Hour



Crash Analysis

The Safety Analysis, Visualization, and Exploration Resource (SAVER) website administered by Iowa DOT was used to collect available crash data near the project site for the five-year period between January 1, 2012 and December 31, 2016.

Table 1 presents crash statistics at each study intersection organized by crash type.

Table 1 Crash Type by Intersection (1/1/12 – 12/31/16)

Study Intersection		Crash Type						
		Rear End	Sideswipe Same Direction	Sideswipe Opposite Direction	Oncoming Left Turn	Broadside	Single Vehicle	Total
1	Hudson Rd & Technology Pkwy	1	2	1	2	1	0	**7**
2	Hudson Rd & Ridgeway Ave	2	2	0	1	9	1	**15**
3	Chancellor Dr & Technology Pkwy	0	0	0	0	1	0	**1**
4	Chancellor Dr & Ridgeway Ave	0	1	0	0	0	3	**4**
Total		**3**	**5**	**1**	**3**	**11**	**4**	**27**

Source: Iowa Department of Transportation, Bureau of Transportation Safety.

A total of 27 crashes occurred at the study intersections over the analysis period. Twenty-three (23) of the 27 crashes occurred during dry roadway surface conditions; the remaining 4 crashes occurred during unideal (snow and ice/frost) roadway surface conditions.

The intersection of Hudson Road and Ridgeway Avenue experienced the highest number of crashes, with Broadside crashes being reported as the highest crash type. Broadside crashes commonly occur due to drivers failing to yield the right-of-way. Major contributing factors for the crashes at this intersection included failure to yield the right-of-way (9 crashes), ran stop sign (1 crash), driving too fast for conditions (1 crash), improper lane changing (1 crash), lost control (1 crash), ran off the road (1 crash), and distracted driving (1 crash).

Intersection crash rates are expressed in crashes per million entering vehicles (crashes/MEV) and can be calculated with the following equation:

$$\text{Crash Rate} = \frac{1{,}000{,}000 \times \text{Total Crashes}}{\text{AADT}_{\text{Entering vpd}} \times 365 \times \#\text{ of Years in Study Period}}$$

Table 2 summarizes crash rates at the study intersections and compares it to average statewide crash rates for intersections with a similar number of entering vehicles. The statewide average crash rate for intersections with a similar number of entering vehicles was prepared by the Iowa DOT, Bureau of Transportation Safety. For the purposes of this analysis, the weekday PM peak hour entering traffic volume

at the study intersections was assumed to be 10% of the daily weekday entering volume, which is standard for urban intersections and is consistent with methodology used by the Federal Highway Administration.

Table 2 Intersection Crash Rate Summary

Study Intersection		Total Crashes	Daily Entering Volume	Crash Rate (crashes/MEV)	Statewide Average Crash Rate (crashes/MEV)	Comparison to Statewide Average Crash Rate
1	Hudson Rd & Technology Pkwy	7	13,130	0.29	0.80	**Lower**
2	Hudson Rd & Ridgeway Ave	15	12,840	0.64	0.80	**Lower**
3	Chancellor Dr & Technology Pkwy	1	4,370	0.13	1.00	**Lower**
4	Chancellor Dr & Ridgeway Ave	4	6,500	0.34	0.70	**Lower**

Source: Iowa Department of Transportation, Bureau of Transportation Safety.

All of the study intersections had crash rates that were lower than the statewide average for intersections with a similar daily volume of entering vehicles.

Table 3 presents crash injury statistics at the study intersections organized by severity.

Table 3 Crash Injuries at each Intersection by Crash Severity (1/1/12 – 12/31/16)

Study Intersection		Number of Crashes	Severity					
			Suspected Injury		Possible Injury	Uninjured	Unknown	Injuries per Crash
			Serious	Minor				
1	Hudson Rd & Technology Pkwy	7	0	0	4	15	0	0.57
2	Hudson Rd & Ridgeway Ave	15	1	5	7	17	0	0.87
3	Chancellor Dr & Technology Pkwy	1	0	0	0	2	0	0.00
4	Chancellor Dr & Ridgeway Ave	4	0	1	0	4	1	0.25

Over the five-year analysis period there were a total of 57 people involved in 27 crashes at the study intersections. One (1) suspected serious and 6 suspected minor injuries were reported, as well as 11 possible injuries and 1 unknown. All other 38 individuals involved in the crash incidents were reported as uninjured. Study intersection crash data for the analysis period is provided in Appendix 3.

Proposed Site Improvements

Trip Generation

Project trip generation is based on nationally accepted trip generation rates contained in the Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition, 2012. For the purposes of this traffic impact study two future projected analysis years were analyzed. The first analysis year analyzed land uses expected to be built by the end of 2019. The second analysis year is 2040, which assumes full buildout of the development. Trips were generated for the expected type of project and correspond to the AM and PM peak hour of the adjacent roadway network.

Table 4 identifies the amount of development expected to be built by the end of 2019 and the associated raw (prior to internal capture and pass-by reductions) AM and PM peak hour trip generation.

Table 4 Raw Trip Generation Estimates – End of 2019

Land Use	ITE Code [1]	Quantity [2]	AM Peak Hour					PM Peak Hour				
			Trips	% In	% Out	Trips In	Trips Out	Trips	% In	% Out	Trips In	Trips Out
Shopping Center (Retail)	820	31 KSF	76	62%	38%	47	29	285	48%	52%	137	148
General Office Building	710	0 KSF	0	88%	12%	0	0	0	17%	83%	0	0
Quality Restaurant	931	10 KSF	8	50%	50%	4	4	75	67%	33%	50	25
Gas Station with Convenience Market	945	18 VFP	182	50%	50%	91	91	244	50%	50%	122	122
Apartments	220	124 DU	64	20%	80%	13	51	91	65%	35%	59	32
Hotel	310	156 Occupied Rooms	152	58%	42%	88	64	92	49%	51%	45	47
Convention Center	NA	53.882 KSF	75	85%	15%	64	11	75	15%	85%	11	64
Total Trips			**557**			**307**	**250**	**862**			**424**	**438**

[1] Institue of Transportation Engineers Trip Generation Handbook, 9th Edition, 2012
[2] KSF = Thousand Square Feet, DU = Dwelling Units, VFP = Vehicle Fueling Positions

The development is assumed to be completely built out by the end of 2040. Table 5 identifies the developments full buildout raw (prior to internal capture and pass-by reductions) AM and PM peak hour trip generation.

Table 5 Raw Trip Generation Estimates – End of 2040

Land Use	ITE Code [1]	Quantity	AM Peak Hour					PM Peak Hour				
			Trips	% In	% Out	Trips In	Trips Out	Trips	% In	% Out	Trips In	Trips Out
Shopping Center (Retail)	820	84 KSF	140	62%	38%	87	53	533	48%	52%	256	277
General Office Building	710	141 KSF	252	88%	12%	222	30	236	17%	83%	40	196
Quality Restaurant	931	10 KSF	8	50%	50%	4	4	75	67%	33%	50	25
Gas Station with Convenience Market	945	18 VFP	182	50%	50%	91	91	244	50%	50%	122	122
Apartments (Residential)	220	248 DU	125	20%	80%	25	100	154	65%	35%	100	54
Hotel	310	156 Occupied Rooms	152	58%	42%	88	64	110	49%	51%	54	56
Convention Center	NA	53.882 KSF	75	85%	15%	64	11	75	15%	85%	11	64
Total Trips			**934**			**581**	**353**	**1,427**			**633**	**794**

[1] Institue of Transportation Engineers Trip Generation Handbook, 9th Edition, 2012
[2] KSF = Thousand Square Feet, DU = Dwelling Units, VFP = Vehicle Fueling Positions

Internal Trip Capture

Generally, within multi-use developments such as the one proposed for this site, there is a likelihood of internal interaction between the various land uses contained within the development. For example, some trips generated by retail and residential development land uses can be reasonably expected to originate from each other within the proposed ODH development site. This internal interaction between land uses at a site is known as internal capture and reduces the quantity of trips generated to the site via the surrounding roadway system. Following the guidelines in the Trip Generation Handbook 2nd Edition, An ITE Recommended Practice, 2004 for multi-use developments, the internal capture between the proposed land uses at this site was identified to be approximately 16% and 15% for the generated PM peak hour trips by the end of 2019 and 2040, respectively. No internal capture reduction is assumed for the AM peak hour, because the Trip Generation Handbook 2nd Edition, An ITE Recommended Practice, 2004 does not provide any data for the AM peak hour. It is important to note the internal capture reduction is separate from the pass-by trips (discussed below) reductions. Internal capture calculation tables are presented in Appendix 4.

Primary versus Pass-by Trips

As discussed in the ITE Trip Generation Handbook, Second Edition, June 2004, pass-by trips are those trips that are attracted from the existing traffic stream passing the site on an adjacent street with direct access to the site. Consequently, these types of trips do not add new traffic to the adjacent street system, but do add trips to the development's access points. For this study, it can be reasonably assumed some pass-by trips

will be attracted from the direct access points along Hudson Road, Ridgeway Avenue, and Chancellor Drive. Primary trips, as discussed by ITE, are trips generally made for the specific purpose of visiting the generator. The stop at the generator (i.e. the ODH development) is the primary reason for the trip. Primary trips typically go from origin to generator and then returns to the origin. For example, a home-to-shopping-to-home combination of trips is a primary trip set.

The percent of primary and pass-by trips attracted to the ODH development are based upon the Trip Generation Handbook, Second Edition, June 2004, as well as existing traffic patterns as reflected in the existing AM and PM peak hour turning movement volumes. As discussed above, reductions for internal trip capture between the various land uses is included in the following estimates of primary and pass-by trips. Assumed primary and pass-by trip percentages by the end of 2019 and 2040 are presented in Table 6 and Table 7, respectively.

Table 6 Primary and Pass-by Trips - 2019

Condition	AM Peak Hour				PM Peak Hour			
	Percent	In	Out	Total	Percent	In	Out	Total
Primary Trips [1]								
Shopping Center (Retail)	100%	47	29	79	66%	75	86	161
General Office Building	100%	0	0	0	100%	0	0	0
Quality Restaurant	100%	4	4	8	56%	28	14	42
Gas Station with Convenience Market	37%	34	34	68	34%	41	41	82
Apartments (Residential)	100%	13	51	64	100%	44	13	57
Hotel	100%	88	64	152	100%	45	47	92
Convention Center	100%	64	11	75	100%	11	64	75
Subtotal Primary Trips		**250**	**193**	**443**		**247**	**266**	**513**
Pass-by Trips [1]								
Shopping Center (Retail)	0%	0	0	0	34%	39	44	83
General Office Building	0%	0	0	0	0%	0	0	0
Quality Restaurant	0%	0	0	0	44%	22	11	33
Gas Station with Convenience Market	63%	58	58	116	66%	80	41	121
Apartments (Residential)	0%	0	0	0	0%	0	0	0
Hotel	0%	0	0	0	0%	0	0	0
Convention Center	0%	0	0	0	0%	0	0	0
Subtotal Pass-by Trips		**58**	**58**	**116**		**141**	**96**	**237**
Total Generation (Includes Internal Capture Reduction)		**308**	**251**	**559**		**385**	**361**	**746**

[1] Calculated based on the expected amount of pass-by trips and primary trips as reported by Trip Generation Handbook 2nd Edition, An ITE Recommended Practice, 2004.

Table 7 Primary and Pass-by Trips - 2040

Condition	AM Peak Hour				PM Peak Hour			
	Percent	In	Out	Total	Percent	In	Out	Total
Primary Trips [1]								
Shopping Center (Retail)	100%	87	53	140	66%	145	162	307
General Office Building	100%	222	30	252	100%	32	189	221
Quality Restaurant	100%	4	4	8	56%	28	14	42
Gas Station with Convenience Market	37%	34	34	68	34%	41	41	82
Apartments (Residential)	100%	25	100	125	100%	75	23	98
Hotel	100%	88	64	152	100%	45	47	92
Convention Center	100%	64	11	75	100%	11	64	75
Subtotal Primary Trips		**524**	**296**	**820**		**377**	**540**	**917**
Pass-by Trips [1]								
Shopping Center (Retail)	0%	0	0	0	34%	75	84	159
General Office Building	0%	0	0	0	0%	0	0	0
Quality Restaurant	0%	0	0	0	44%	22	11	33
Gas Station with Convenience Market	63%	58	58	116	66%	80	80	160
Apartments (Residential)	0%	0	0	0	0%	0	0	0
Hotel	0%	0	0	0	0%	0	0	0
Convention Center	0%	0	0	0	0%	0	0	0
Subtotal Pass-by Trips		**58**	**58**	**116**		**177**	**175**	**352**
Total Generation (Includes Internal Capture Reduction)		**582**	**354**	**936**		**554**	**715**	**1,269**

[1] Calculated based on the expected amount of pass-by trips and primary trips as reported by Trip Generation Handbook 2nd Edition, An ITE Recommended Practice, 2004.

Trip Distribution

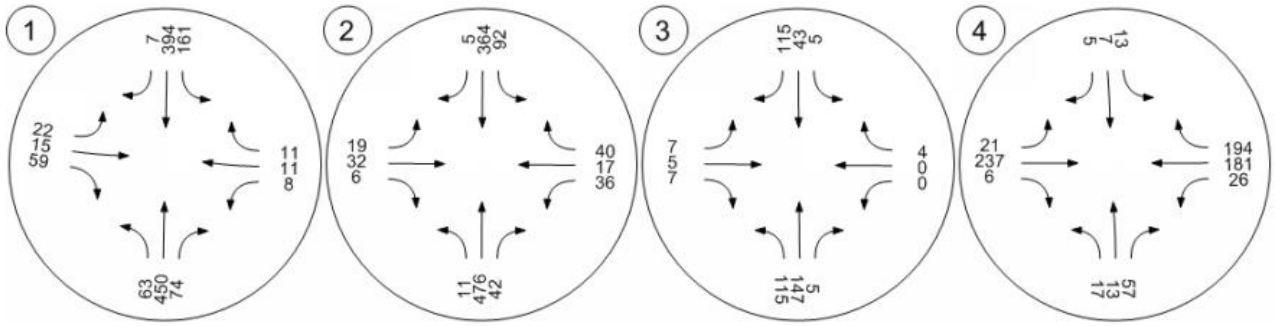
Trip distribution percentages for the ODH development, which are based upon expected travel patterns in the surrounding roadway network for the analysis years of 2019 and 2040, are presented in Figure 6 and Figure 7, respectively. Projected 2019 and 2040 AM and PM peak hour turning movement volumes upon buildout of the ODH development are presented in Figure 8 and Figure 9, respectively.

Figure 6 Project Trip Distribution - 2019

Figure 7 Project Trip Distribution - 2040

Figure 8 Study Intersections – AM Peak Hour Buildout Volumes

2019 AM Peak Hour



2040 AM Peak Hour

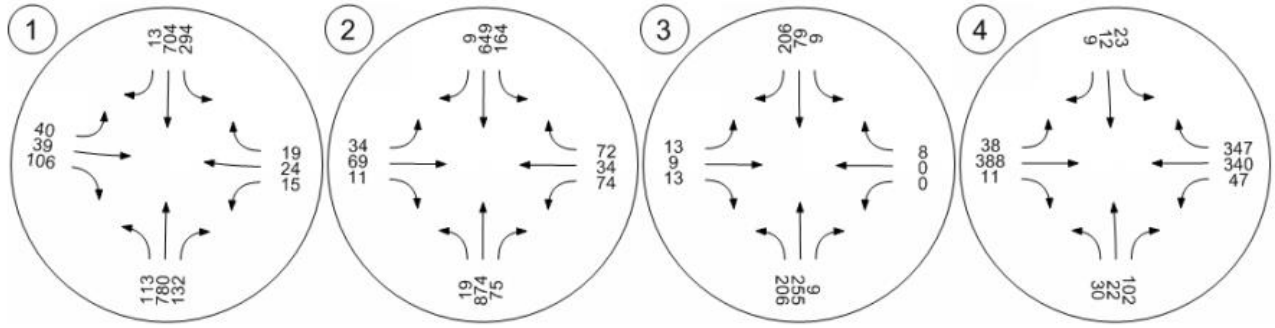
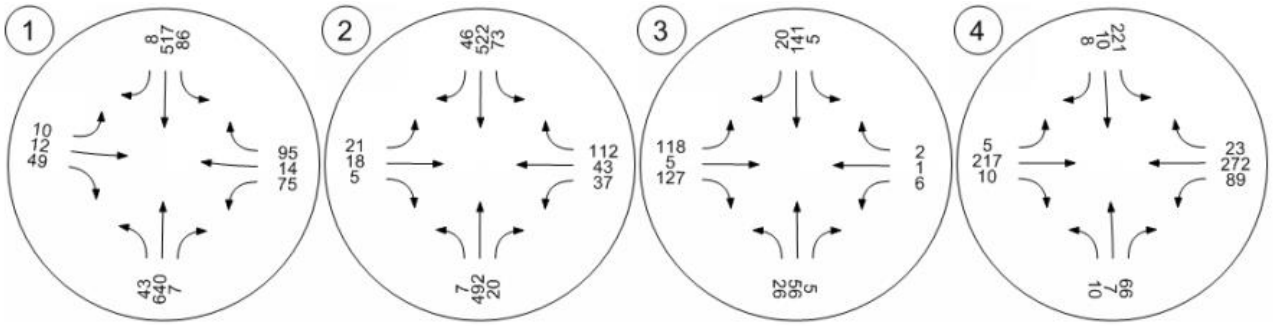
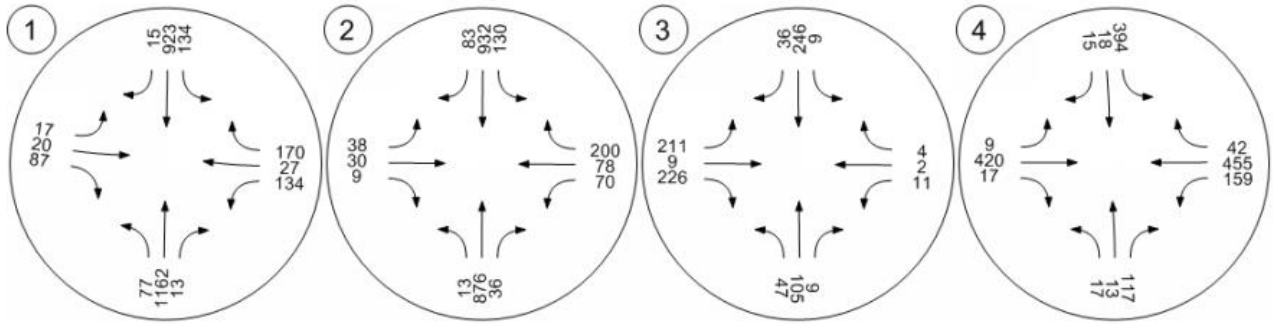


Figure 9 Study Intersections – PM Peak Hour Buildout Volumes

2019 PM Peak Hour



2040 PM Peak Hour



Traffic Modeling

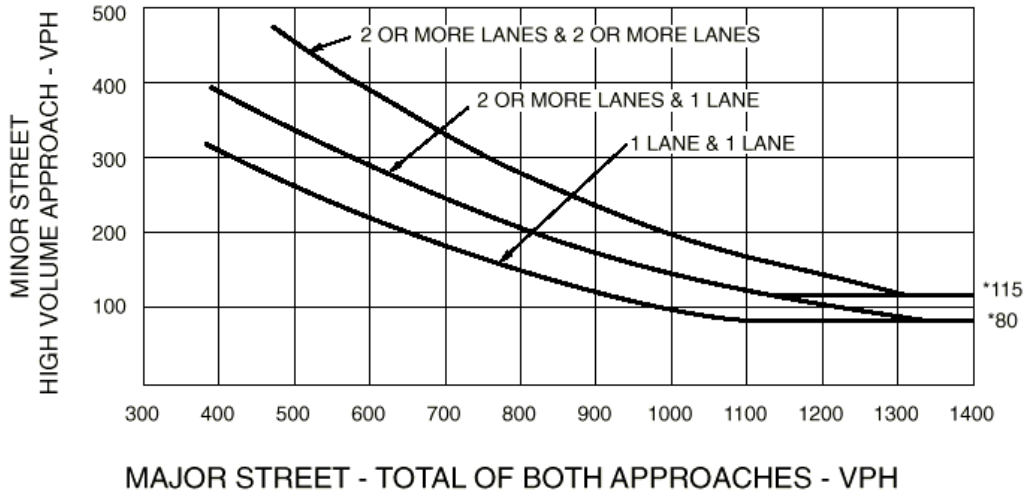
Traffic Control Warrant Analysis

The traffic control warrant analysis presented herein was conducted for the study intersections of Hudson Road and Ridgeway Avenue under projected 2019 and 2029 buildout conditions. Traffic volume counts for this intersection were collected in late May 2017. The analysis was performed under the guidelines and procedures as outlined in the 2009 Manual of Uniform Traffic Control Devices (MUTCD). The satisfaction of a traffic control warrant or warrants does not in itself require a modification to the existing traffic control. In general, a modification to an existing traffic control should not be made unless analysis indicates it will improve the overall safety and or operations of the intersection. The ultimate decision resides on engineering judgement.

Warrant 2 – Four-Hour Vehicular Volume

The Four-Hour Vehicular Volume signal warrant condition is intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. This warrant is satisfied when the plotted points representing vehicles per hour on the major street (total of both approaches) and corresponding vehicles per hour on the higher volume minor street approach (one direction only) all fall above the curve in Figure 10 for the existing combination of approach lanes for all four selected hours of an average day. On the minor street, the higher volume is not required to be on the same approach during each of the four hours. For the purposes of this analysis, the hours between 7:00 and 9:00 AM and 4:00 and 6:00 PM were selected.

Figure 10 Four Hour Vehicular Volume Warrant



*Note: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: Manual of Uniform Traffic Control Devices, December 2009, page 440.

Summary of the traffic control warrant results is presented in Table 8. Signal warrant analysis worksheets are provided in Appendix 5.

Table 8 Traffic Control Warrant Analysis Summary

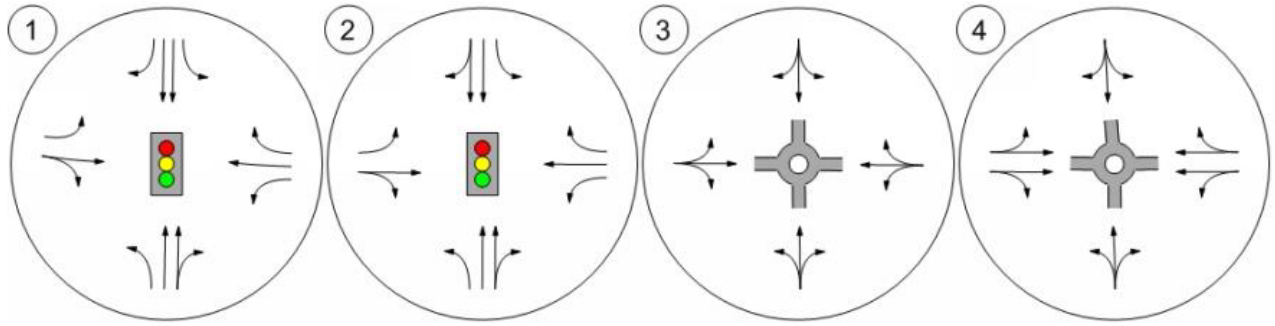
	Hudson Road & Ridgeway Avenue	
	2019 Buildout Conditions	2029 Buildout Conditions
	4 Hours Required	
Hours Met	2 Hour Met	4 Hours Met
Warranted?	**No**	**Yes**

The study intersection of Hudson Road and Ridgeway Avenue is projected to meet MUTCD Warrant 2 criteria to justify a traffic control signal upon full buildout 2029 conditions.

The study intersection recommended lane configuration and control by the analysis year of 2040 is presented in Figure 11. Figure 11 recommends the study intersection of Hudson Road and Ridgeway Avenue be signalized and the study intersection of Chancellor Drive and Technology Parkway be converted to a single lane roundabout. It should be noted the frequency of broadside crashes, which was the highest reported crash type at the intersection of Hudson Road and Ridgeway Avenue, is expected to be reduced as result of converting the intersection from two-way stop control to a signalized intersection. Similarly, the frequency of all types of crashes is expected to be reduced at the intersection of Chancellor Drive and Technology Parkway as a result of converting the intersection from two-way stop control to a roundabout. [1] Roundabouts generally reduce the frequency and severity of crashes over signalized/stop controlled intersections due to fewer conflict points and lower vehicular speeds transiting the intersection. In addition to safety considerations, these intersection improvements will be needed in order to provide an acceptable LOS at these two intersections. No intersection improvements are recommended at the other two intersections of Hudson Road and Technology Parkway and Chancellor Drive and Ridgeway Avenue.

[1] Highway Safety Manual 1st Edition, 2010

Figure 11 Study Intersections – 2040 Recommended Lane Configuration and Control



Operational Analysis

Vehicular operational analysis for this study was performed using the methodology of the Highway Capacity Manual (HCM) 6th Edition through PTV Vistro 5:00-00 traffic analysis software. Operational analysis is generally categorized in terms of Level of Service (LOS). LOS describes the quality of traffic operations and is graded from A to F; with LOS A representing free-flow conditions and LOS F representing congested conditions.

A queueing analysis was also performed at signalized intersections. A vehicle queue is a line of vehicles waiting to pass through an intersection. Queue lengths at intersection approaches are constantly changing. As vehicles arrive the queue grows, and as the movement is served, the queue length shrinks. To account for this variation, it is common to consider the 95th percentile queue length. The 95th percentile queue is the length of which the queue will be less than 95 percent of the time.

Procedures outlined in the signalized intersection chapter of the HCM were used to analyze intersection performance at signalized intersections. The primary measure used to quantify LOS at signalized intersections is average intersection control delay. Control delay is the delay experienced by vehicles slowing down as they are approaching the intersection, the wait time at the intersection and the time for vehicles to speed up through the intersection and enter into the traffic stream. The average intersection control delay is

a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches.

Procedures outlined in the unsignalized intersection chapter of the HCM were used to analyze intersection performance at unsignalized (stop control and roundabout) intersections. While LOS for signalized intersections is primarily based on the volume weighted average delay per vehicle traveling through the intersection (intersection control delay), LOS for unsignalized intersections is based primarily on the approach with the longest delay. LOS thresholds and methodology for roundabouts are consistent with those for other unsignalized intersections.

It should be noted delay thresholds for a given LOS for unsignalized intersections are lower than those given for signalized intersections. This difference, as explained in the HCM, is to account for the greater variability in delay associated with unsignalized movements in addition to different driver expectations associated with each type of intersection control, with the expectation that signalized intersections are designed to carry higher traffic volumes and therefore will experience greater delay than an unsignalized intersection.

Table 6 presents the range of traffic delays associated for signalized and unsignalized intersections.

Table 9 LOS Criteria for Signalized and Unsignalized Intersections

LOS	Signalized Intersection Average Control Delay (sec/veh)	Unsignalized Intersection Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 to 20	> 10 to 15
C	> 20 to 35	> 15 to 25
D	> 35 to 55	> 25 to 35
E	> 55 to 80	> 35 to 50
F	> 80	> 50

Source: HCM 6th Edition
sec/veh = seconds per vehicle

LOS D or better is generally identified as acceptable in urban conditions. The analysis presented herein indicates the study intersections will operate at an acceptable LOS D or better during the AM and PM peak hour conditions through 2040 with buildout of the proposed development, except for the intersection of Hudson Road and Ridgeway Avenue. Under projected 2019 conditions the intersection of Hudson Road and Ridgeway Avenue is projected to fall to LOS E in the AM peak hour with buildout and in the PM peak hour regardless if the proposed ODH development is built or not. This analysis assumes existing lane configuration and control for 2017 existing and 2019 projected conditions as identified in Figure 3 and recommended lane configuration and control for 2040 projected conditions as identified in Figure 11.

Table 10 presents signalized operational conditions including 95th percentile queue lengths. Signalized operations at the study intersections assumes optimized cycle lengths and phasing splits as identified through Vistro 5:00-00. Table 8 presents unsignalized operational conditions. Operational analysis worksheets are contained in Appendix 6.

Table 10 Existing & Projected Signalized Intersection Operations

Intersection		Scenario	Metric	AM Peak Hour NB	AM Peak Hour SB	AM Peak Hour EB	AM Peak Hour WB	PM Peak Hour NB	PM Peak Hour SB	PM Peak Hour EB	PM Peak Hour WB
1	Hudson Rd & Technology Pkwy	2017 Existing Conditions	Approach Delay	6.04	5.21	40.06	30.40	6.44	7.05	37.10	26.97
			Approach LOS	A	A	D	C	A	A	D	C
			95th %tile Queue	T	T	TR	R	T	T	TR	R
			(Longest Movement) in Feet	62	45	71	9	61	58	47	69
			Intersection Delay & LOS	8.89, A				10.71, B			
		2019 No Build	Approach Delay	6.31	5.42	39.45	30.28	6.71	7.31	37.41	27.29
			Approach LOS	A	A	D	C	A	A	D	C
			95th %tile Queue	T	T	TR	L	T	T	TR	R
			(Longest Movement) in Feet	68	49	74	10	66	64	50	74
			Intersection Delay & LOS	9.03, A				10.97, B			
		2019 Buildout	Approach Delay	7.36	5.64	38.29	29.08	9.15	7.12	38.21	26.10
			Approach LOS	A	A	D	C	A	A	D	C
			95th %tile Queue [2]	T	T	TR	L	T	T	TR	R
			(Longest Movement) in Feet	87	53	80	10	101	65	56	72
			Intersection Delay & LOS	9.51, A				11.74, B			
		2040 No Build [1]	Approach Delay	10.48	8.52	30.64	23.99	11.77	12.17	31.76	25.56
			Approach LOS	A	A	C	C	B	B	C	C
			95th %tile Queue [2]	T	T	TR	R	T	T	TR	R
			(Longest Movement) in Feet	136	96	87	12	171	160	71	116
			Intersection Delay & LOS	11.51, B				14.59, B			
		2040 Buildout [1]	Approach Delay	13.46	10.74	29.27	21.87	18.10	12.10	32.76	24.70
			Approach LOS	B	B	C	C	B	B	C	C
			95th %tile Queue [2]	T	T	TR	L	T	T	TR	R
			(Longest Movement) in Feet	182	109	103	14	255	163	80	114
			Intersection Delay & LOS	13.80, B				17.26, B			
2	Hudson Rd & Ridgeway Ave	2040 No Build [1]	Approach Delay	10.77	6.69	27.44	29.88	16.90	14.02	18.00	25.62
			Approach LOS	B	A	C	C	B	B	B	C
			95th %tile Queue [2]	T	T	TR	R	T	TR	L	R
			(Longest Movement) in Feet	142	71	36	53	198	200	15	126
			Intersection Delay & LOS	11.15, B				16.67, B			
		2040 Buildout [1]	Approach Delay	17.79	10.65	21.23	25.97	24.02	19.62	15.81	23.80
			Approach LOS	B	B	C	C	C	B	B	C
			95th %tile Queue [2]	T	T	TR	R	T	T	TR	R
			(Longest Movement) in Feet	214	109	43	121	244	247	18	177
			Intersection Delay & LOS	16.31, B				21.77, C			

[1] Arrival rates are assumed to be more consistent by 2040.
Queue, Delay, and LOS analysis based on HCM 6th Edition Signalized Methodology

Table 11 Existing & Projected Unsignalized Intersection Operations

Intersection		Scenario	AM Peak Hour			PM Peak Hour		
			Worst Approach Delay (sec)		HCM LOS	Worst Approach Delay (sec)		HCM LOS
2	Hudson Rd & Ridgeway Ave	2017 Existing Conditions	EB	27.46	D	EB	32.39	D
		2019 No Build	EB	31.07	D	EB	37.66	E
		2019 Buildout	EB	36.25	E	EB	45.16	E
3	Chancellor Dr & Technology Pkwy	2017 Existing Conditions	EB	14.29	B	EB	13.93	B
		2019 No Build (Two-way Stop)	EB	14.88	B	EB	14.68	B
		2019 Buildout (Two-way Stop)	EB	16.03	C	EB	16.46	C
		2040 No Build [1] (Roundabout)	NB	5.78	A	EB	7.89	A
		2040 Buildout [1] (Roundabout)	NB	5.80	A	EB	8.41	A
4	Chancellor Dr & Ridgeway Ave	2017 Existing Conditions	NB	4.09	A	SB	6.26	A
		2019 No Build	NB	4.20	A	SB	6.59	A
		2019 Buildout	NB	4.86	A	SB	8.10	A
		2040 No Build [1]	NB	5.06	A	SB	11.06	B
		2040 Buildout [1]	NB	5.99	A	SB	16.15	C

Delay and LOS analysis based on HCM 6th Edition
[1] Arrival rates are assumed to be more consistent by 2040.

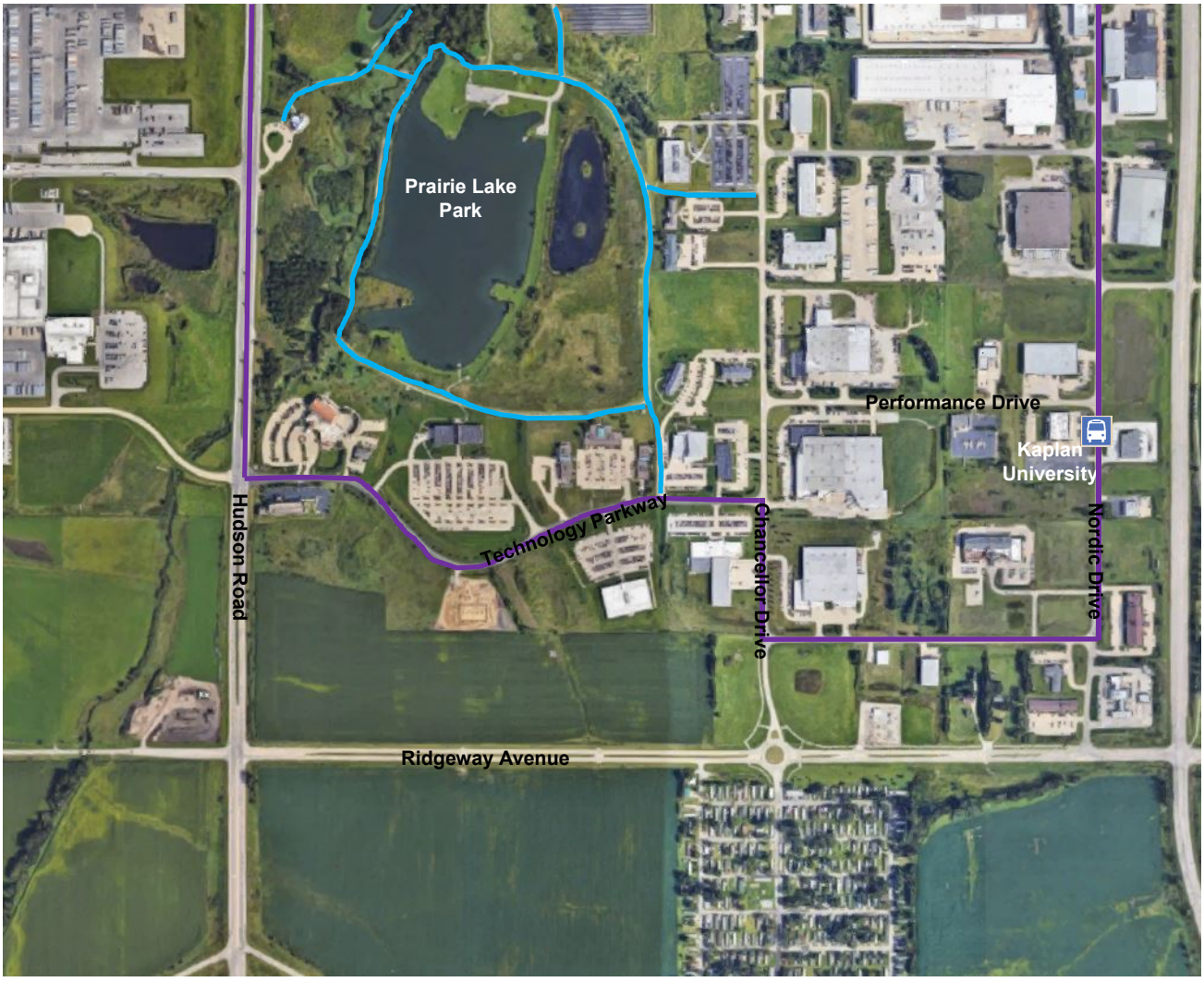
Multimodal Review

Currently, the closest bus stop to the proposed development is just east of the Kaplan University building, which is located on the southwest corner of the Nordic Drive and Performance Drive intersection. The #9 Cedar Falls Loop (purple route indicated below) serves this bus stop. As the area develops, the City of Cedar Falls should coordinate with the Waterloo – Cedar Falls Metropolitan Transit Authority (MET) to provide a transit service stop or stops within the proposed development site.

Prairie Lake Park is located to the north of the proposed development, which has a multi-use trail system around the lake and extending down to intersect with Technology Parkway. Sidewalks, bike lanes, and bike racks should be considered throughout the proposed ODH development.

Figure 10 identifies the bus stop location near the Kaplan University building and the multi-use trail system (blue line) at the Prairie Lake Park.

Figure 12 Transit and Bicycle/Pedestrian Facilities



Conclusion and Recommendations

The proposed ODH development is an approximate 49 acre multi-use development. Three right-in/right out access points are proposed along Hudson Road between Technology Parkway and Ridgeway Avenue, three full access points are proposed along Ridgeway Avenue between Hudson Road and Chancellor Drive and one full access point is proposed and would become the westbound approach to the existing T-intersection of Chancellor Drive and Commerce Drive. None of the site access points are anticipated to present safety or operational concerns. Sight visibility zones corresponding to intersection sight distance calculations as defined through AASHTO should be identified and maintained at these access points. These zones should not contain structures or plantings that would preclude unobstructed views of oncoming traffic. Current designs for the development do not indicate obstructions within the sight visibility zones. For the purposes of this traffic impact study two future projected analysis years were analyzed. The first analysis year analyzed land uses expected to be built by the end of 2019. The second analysis year is 2040, which assumes full buildout of the development.

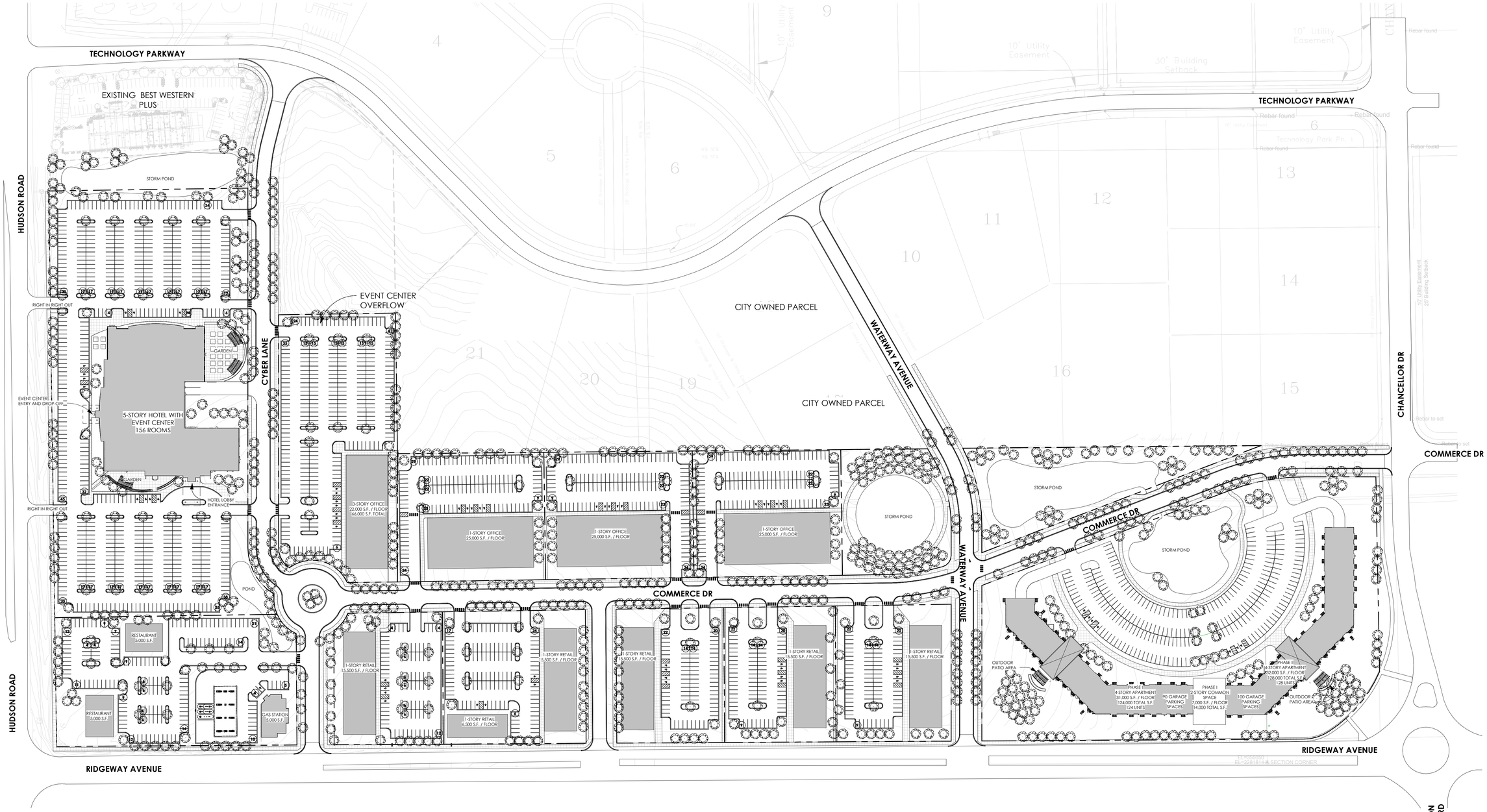
The Safety Analysis, Visualization, and Exploration Resource (SAVER) website administered by Iowa DOT was used to collect available crash data near the project site for the five-year period between January 1, 2012 and December 31, 2016. All of the study intersections had crash rates that were lower than the statewide average for intersections with a similar daily volume of entering vehicles. It should be noted the frequency of broadside crashes, which was the highest reported crash type at the intersection of Hudson Road and Ridgeway Avenue, is expected to be reduced as result of converting the intersection from two-way stop control to a signalized intersection. Similarly, the frequency of all types of crashes is expected to be reduced at the intersection of Chancellor Drive and Technology Parkway as a result of converting the intersection from two-way stop control to a roundabout. [2] Roundabouts generally reduce the frequency and severity of crashes over signalized/stop controlled intersections due to fewer conflict points and lower vehicular speeds transiting the intersection.

Currently, the closest bus stop to the proposed development is just east of the Kaplan University building, which is located on the southwest corner of the Nordic Drive and Performance Drive intersection. As the area develops, the City of Cedar Falls should coordinate with the Waterloo – Cedar Falls Metropolitan Transit Authority (MET) to a provide transit service stop or stops within the proposed development site. Prairie Lake Park is located to the north of the proposed development, which has a multi-use trail system around the lake and extending down to intersect with Technology Parkway. Sidewalks, bike lanes, and bike racks should be considered throughout the proposed ODH development.

The analysis presented herein indicates the study intersections will operate at an acceptable LOS D or better during the AM and PM peak hour conditions through 2040 with buildout of the proposed development, except for the intersection of Hudson Road and Ridgeway Avenue. Under projected 2019 conditions the intersection of Hudson Road and Ridgeway Avenue is projected to fall to LOS E in the AM peak hour with buildout and in the PM peak hour regardless if the proposed ODH development is built or not. This analysis assumes existing lane configuration and control for 2017 existing and 2019 projected conditions as identified in Figure 3 and recommended lane configuration and control for 2040 projected conditions as identified in Figure 11. The study intersection of Hudson Road and Ridgeway Avenue is not projected to meet MUTCD Warrant 2 criteria to justify a traffic control signal upon buildout 2019 conditions, but is upon buildout 2029 conditions. It is recommended this intersection be regularly assessed to determine when it should be signalized based upon MUTCD criteria and operational and safety considerations. Assuming the identified intersection improvements presented in Figure 11 are implemented, no other improvements at the study intersections is considered necessary.

[2] Highway Safety Manual 1st Edition, 2010

Appendix 1



DEVELOPMENT SUMMARY

OVERALL SITE AREA:

TOTAL PROPOSED SITE AREA: 49.20 ACRES

TOTAL USABLE SITE AREA: 42.20 ACRES

TOTAL ROAD R-O-W AREA: 7.00 ACRES

HOTEL SUMMARY:

SITE:

TOTAL SITE AREA: 392,543 SF (9.01 ACRES)
TOTAL PARKING PROVIDED: 599 PARKING SPACES

HOTEL SUMMARY:
TOTAL ROOMS: 156

	EVENT	HOTEL	TOTAL
FIRST FLOOR - PHASE 1	28,978SF	18,613 SF	47,591 SF
FIRST FLOOR - PHASE 2	25,217 SF	N/A	25,217 SF
SECOND FLOOR	N/A	17,733 SF	17,733 SF
THIRD FLOOR	N/A	17,733 SF	17,733 SF
FOURTH FLOOR	N/A	17,733 SF	17,733 SF
FIFTH FLOOR	N/A	17,733 SF	17,733 SF
GRAND TOTAL	54,195 SF	89,545 SF	143,740 SF

OFFICE SUMMARY:

SITE:

TOTAL SITE AREA: 403,365 S.F. (9.26 ACRES)
TOTAL PARKING PROVIDED: 665 PARKING SPACES

BUILDING SUMMARY:
TOTAL OFFICE SPACE: 141,000 S.F.

RETAIL SUMMARY:

SITE:

TOTAL SITE AREA: 366,000 S.F. (8.40ACRES)
TOTAL PARKING PROVIDED: 422 PARKING SPACES

BUILDING SUMMARY:
TOTAL RETAIL SPACE: 84,000 S.F.

STORMWATER SUMMARY:

SITE:

TOTAL SITE AREA: 130,069 SF(2.99 ACRES)

RESTAURANT & CONVENIENCE FOOD / FUEL SUMMARY:

SITE:

TOTAL SITE AREA: 144,082 SF(3.31 ACRES)

RESTAURANT:

RESTAURANT PARKING PROVIDED: 150 PARKING SPACES

BUILDING SUMMARY:
TOTAL RESTAURANT SPACE: 10,000 S.F.

CONVENIENCE FOOD / FUEL:

CONVENIENCE FOOD / FUEL PARKING PROVIDED: 18 PARKING SPACES

BUILDING SUMMARY:
TOTAL CONVENIENCE FOOD / FUEL SPACE: 5,000 S.F.

APARTMENT SUMMARY:

SITE:

TOTAL SITE AREA: 404,322 SF(9.28 ACRES)
TOTAL PARKING PROVIDED: 430 PARKING SPACES

BUILDING SUMMARY:

PHASE I:
APARTMENT BUILDING: 31,000 S.F. / FLOOR
124,000 S.F. TOTAL
124 UNITS

2 - STORY COMMON SPACE: 7,000 S.F. / FLOOR
14,000 S.F. TOTAL

PHASE II:
APARTMENT BUILDING: 32,000 S.F. / FLOOR
128,000 S.F. TOTAL
128 UNITS

N

0' 50' 100' 200'

SCALE = 1" =100'-0"

open door HOSPITALITY

RUSSELL

HOLIDAY INN & SUITES - CONFERENCE CENTER

CEDAR FALLS, IA

MASTER PLAN - OPTION 5

June 13, 2017

TUSHIE MONTGOMERY ARCHITECTS

Appendix 2

Background Traffic Counts (Raw Data)

(1) Hudson Road and Technology Parkway - All Vehicles

15-min Interval	From North (Southbound) Hudson Road			From East (Westbound) Technology Parkway			From South (Northbound) Hudson Road			From West (Eastbound) Technology Parkway			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	11	70	0	0	0	4	9	72	9	11	1	7	194	1056
7:15 - 7:30	5	84	3	3	0	2	13	100	11	15	4	9	249	1067
7:30 - 7:45	15	108	1	2	2	3	11	107	15	3	2	21	290	1006
7:45 - 8:00	42	105	1	1	0	3	24	97	28	3	1	18	323	934
8:00 - 8:15	19	76	2	2	1	2	12	67	16	0	0	8	205	843
8:15 - 8:30	10	72	2	0	1	0	8	72	10	1	4	8	188	
8:30 - 8:45	7	83	1	1	2	4	9	86	14	5	0	6	218	
8:45 - 9:00	17	83	2	0	0	2	8	95	12	1	1	11	232	

4:00 - 4:15	4	143	0	22	3	20	6	90	3	9	1	22	323	1239
4:15 - 4:30	3	114	4	9	0	16	9	115	3	3	0	15	291	1282
4:30 - 4:45	3	144	1	18	0	22	10	125	3	1	0	7	334	1308
4:45 - 5:00	3	98	4	16	2	13	9	131	2	0	0	13	291	1237
5:00 - 5:15	4	126	0	31	3	39	9	133	0	6	0	15	366	946
5:15 - 5:30	1	121	3	6	1	16	13	141	2	2	0	11	317	
5:30 - 5:45	0	99	1	13	0	15	6	116	2	0	0	11	263	
5:45 - 6:00	1	94	2	4	2	3	9	98	3	1	0	9	226	

* AM and PM counts collected during peak hours on Thursday, May 25, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.83
PM Intersection Peak Hour Factor (PHF) = 0.89

(1) Hudson Road and Technology Parkway - Articulated Trucks

15-min Interval	From North (Southbound) Hudson Road			From East (Westbound) Technology Parkway			From South (Northbound) Hudson Road			From West (Eastbound) Technology Parkway			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0	2	0	0	0	0	0	2	0	0	0	0	4	28
7:15 - 7:30	0	3	0	0	0	0	0	1	0	1	0	0	5	40
7:30 - 7:45	0	2	0	0	0	0	0	4	1	0	0	1	8	42
7:45 - 8:00	0	7	0	0	0	0	0	4	0	0	0	0	11	42
8:00 - 8:15	0	5	0	0	0	0	0	10	1	0	0	0	16	41
8:15 - 8:30	0	4	0	0	0	0	0	3	0	0	0	0	7	
8:30 - 8:45	0	4	0	0	0	0	1	3	0	0	0	0	8	
8:45 - 9:00	0	3	0	0	0	0	1	6	0	0	0	0	10	

4:00 - 4:15	0	4	0	0	1	0	0	1	0	0	0	1	7	27
4:15 - 4:30	0	2	0	0	0	0	0	4	0	0	0	1	7	27
4:30 - 4:45	0	2	0	1	0	0	0	4	0	0	0	0	7	28
4:45 - 5:00	0	5	0	0	0	0	0	1	0	0	0	0	6	30
5:00 - 5:15	0	2	0	0	0	1	2	2	0	0	0	0	7	29
5:15 - 5:30	0	3	0	0	0	0	2	3	0	0	0	0	8	
5:30 - 5:45	0	5	0	1	0	0	0	3	0	0	0	0	9	
5:45 - 6:00	0	3	0	0	0	0	0	2	0	0	0	0	5	

* AM and PM counts collected during peak hours on Thursday, May 25, 2017.

Background Traffic Counts (Raw Data)

(2) Hudson Road and Ridgeway Avenue - All Vehicles

15-min Interval	From North (Southbound) Hudson Road			From East (Westbound) Ridgeway Avenue			From South (Northbound) Hudson Road			From West (Eastbound) Ridgeway Avenue			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	13	59	0	9	1	9	0	85	5	2	8	0	191	1039
7:15 - 7:30	26	72	1	3	1	11	2	108	10	3	4	2	243	1044
7:30 - 7:45	24	102	1	4	3	11	3	120	10	6	9	2	295	1015
7:45 - 8:00	24	98	1	13	2	12	3	129	14	6	7	1	310	949
8:00 - 8:15	13	72	2	5	4	4	2	81	6	3	3	1	196	850
8:15 - 8:30	18	70	2	3	5	10	0	77	9	5	14	1	214	
8:30 - 8:45	7	84	1	3	3	17	1	85	6	13	7	2	229	
8:45 - 9:00	10	65	8	5	5	8	1	95	4	5	5	0	211	
4:00 - 4:15	22	158	12	8	8	20	1	93	5	1	5	0	333	1231
4:15 - 4:30	20	111	5	5	6	23	0	98	7	5	6	0	286	1253
4:30 - 4:45	18	139	9	1	8	33	1	103	4	9	3	2	330	1281
4:45 - 5:00	7	110	8	6	9	18	2	107	8	5	2	0	282	1210
5:00 - 5:15	27	129	17	6	8	22	3	131	5	4	3	0	355	1171
5:15 - 5:30	17	116	10	10	8	33	1	113	2	2	2	0	314	
5:30 - 5:45	12	95	7	9	5	31	4	83	6	4	3	0	259	
5:45 - 6:00	10	92	11	8	6	26	0	83	3	0	4	0	243	

* AM and PM counts collected during peak hours on Thursday, May 25, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.84
PM Intersection Peak Hour Factor (PHF) = 0.90

(2) Hudson Road and Ridgeway Avenue - Articulated Trucks

15-min Interval	From North (Southbound) Hudson Road			From East (Westbound) Ridgeway Avenue			From South (Northbound) Hudson Road			From West (Eastbound) Ridgeway Avenue			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0	1	0	0	0	0	0	2	0	0	0	0	3	27
7:15 - 7:30	0	4	0	0	0	0	0	1	0	0	0	0	5	37
7:30 - 7:45	0	2	0	0	0	0	0	5	0	0	0	0	7	40
7:45 - 8:00	0	6	0	0	0	0	1	4	0	1	0	0	12	42
8:00 - 8:15	0	5	0	0	0	1	0	7	0	0	0	0	13	38
8:15 - 8:30	0	4	0	0	0	0	0	4	0	0	0	0	8	
8:30 - 8:45	0	6	0	0	0	0	0	3	0	0	0	0	9	
8:45 - 9:00	0	3	0	0	0	0	0	5	0	0	0	0	8	
4:00 - 4:15	0	6	0	0	0	0	0	1	1	0	0	0	8	25
4:15 - 4:30	0	3	0	0	0	0	0	3	0	0	0	0	6	22
4:30 - 4:45	0	3	0	0	0	0	0	2	0	0	0	0	5	23
4:45 - 5:00	0	5	0	0	0	0	0	1	0	0	0	0	6	28
5:00 - 5:15	0	1	0	0	0	0	0	4	0	0	0	0	5	28
5:15 - 5:30	0	3	0	0	0	0	0	4	0	0	0	0	7	
5:30 - 5:45	0	7	0	0	0	0	0	3	0	0	0	0	10	
5:45 - 6:00	0	4	0	0	0	0	0	2	0	0	0	0	6	

* AM and PM counts collected during peak hours on Thursday, May 25, 2017.

Background Traffic Counts (Raw Data)

(3) Chancellor Drive and Technology Parkway - All Vehicles

15-min Interval	From North (Southbound) Chancellor Drive			From East (Westbound) Technology Parkway			From South (Northbound) Chancellor Drive			From West (Eastbound) Technology Parkway			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	2	7	10	0	0	0	9	16	0	4	0	2	50	356
7:15 - 7:30	1	8	17	0	1	0	21	19	2	2	0	1	72	380
7:30 - 7:45	1	1	27	0	0	1	23	25	0	3	0	1	82	391
7:45 - 8:00	1	4	39	0	0	0	49	53	0	1	0	5	152	368
8:00 - 8:15	1	4	26	0	0	1	16	24	0	1	1	0	74	293
8:15 - 8:30	1	2	25	0	0	2	18	28	1	2	0	4	83	
8:30 - 8:45	1	5	15	0	0	1	16	12	0	2	1	6	59	
8:45 - 9:00	0	2	19	0	0	0	32	19	0	3	0	2	77	
4:00 - 4:15	0	26	6	1	2	0	7	7	0	24	2	22	97	368
4:15 - 4:30	0	19	5	0	0	0	4	5	1	18	1	10	63	424
4:30 - 4:45	1	33	6	2	0	1	12	10	0	32	0	23	120	424
4:45 - 5:00	0	15	6	2	1	1	6	8	0	22	0	27	88	364
5:00 - 5:15	0	46	7	1	0	0	3	2	1	43	0	50	153	321
5:15 - 5:30	0	16	0	1	0	0	4	7	0	15	0	20	63	
5:30 - 5:45	0	19	4	1	0	3	2	5	0	12	0	14	60	
5:45 - 6:00	0	13	3	1	0	0	2	4	0	11	0	11	45	

* AM and PM counts collected during peak hours on Thursday, May 25, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.64
PM Intersection Peak Hour Factor (PHF) = 0.69

(3) Chancellor Drive and Technology Parkway - Articulated Trucks

15-min Interval	From North (Southbound) Chancellor Drive			From East (Westbound) Technology Parkway			From South (Northbound) Chancellor Drive			From West (Eastbound) Technology Parkway			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	3
7:30 - 7:45	1	0	0	0	0	0	0	0	0	0	0	0	1	5
7:45 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	5
8:00 - 8:15	0	0	0	0	0	1	0	0	0	0	1	0	2	5
8:15 - 8:30	1	0	0	0	0	1	0	0	0	0	0	0	2	
8:30 - 8:45	1	0	0	0	0	0	0	0	0	0	0	0	1	
8:45 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:00 - 4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	8
4:15 - 4:30	0	0	0	0	0	0	0	0	1	0	0	0	1	11
4:30 - 4:45	1	0	1	1	0	0	0	2	0	0	0	0	5	11
4:45 - 5:00	0	1	0	0	0	1	0	0	0	0	0	0	2	7
5:00 - 5:15	0	2	0	0	0	0	1	0	0	0	0	0	3	5
5:15 - 5:30	0	1	0	0	0	0	0	0	0	0	0	0	1	
5:30 - 5:45	0	0	1	0	0	0	0	0	0	0	0	0	1	
5:45 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	

* AM and PM counts collected during peak hours on Thursday, May 25, 2017.

Background Traffic Counts (Raw Data)

(4) Chancellor Drive/Lexington Boulevard and Ridgeway Avenue - All Vehicles

15-min Interval	From North (Southbound) Chancellor Drive			From East (Westbound) Ridgeway Avenue			From South (Northbound) Lexington Boulevard			From West (Eastbound) Ridgeway Avenue			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	4	1	2	6	16	18	2	0	9	5	26	1	90	511
7:15 - 7:30	6	1	0	8	9	35	6	3	8	5	41	0	122	524
7:30 - 7:45	0	0	0	3	17	38	3	1	22	7	35	0	126	524
7:45 - 8:00	2	1	0	4	19	78	7	3	13	7	35	4	173	494
8:00 - 8:15	4	1	0	10	13	33	0	2	11	1	26	2	103	423
8:15 - 8:30	1	0	1	10	13	39	2	1	16	5	32	2	122	
8:30 - 8:45	8	0	2	6	22	24	1	0	15	0	17	1	96	
8:45 - 9:00	3	1	0	9	15	43	1	1	8	2	19	0	102	
4:00 - 4:15	41	2	2	17	37	6	0	1	19	1	22	5	153	576
4:15 - 4:30	27	4	0	14	29	4	2	1	9	2	32	2	126	619
4:30 - 4:45	52	3	2	20	40	8	1	2	17	1	20	1	167	648
4:45 - 5:00	28	3	2	17	30	8	1	2	18	1	16	4	130	622
5:00 - 5:15	93	1	3	17	33	3	1	0	11	0	32	2	196	609
5:15 - 5:30	36	0	1	30	42	3	6	0	16	2	17	2	155	
5:30 - 5:45	32	0	2	25	37	3	2	0	16	2	19	3	141	
5:45 - 6:00	17	4	0	20	29	7	3	0	13	1	22	1	117	

* AM and PM counts collected during peak hours on Thursday, May 25, 2017.

AM Intersection Peak Hour Factor (PHF) = 0.76
PM Intersection Peak Hour Factor (PHF) = 0.83

(4) Chancellor Drive/Lexington Boulevard and Ridgeway Avenue - Articulated Trucks

15-min Interval	From North (Southbound) Chancellor Drive			From East (Westbound) Ridgeway Avenue			From South (Northbound) Lexington Boulevard			From West (Eastbound) Ridgeway Avenue			Int Count	Peak Hour
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
7:00 - 7:15	0	0	0	0	0	1	0	0	0	0	0	0	1	1
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:45 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	2
8:00 - 8:15	0	0	0	0	1	0	0	0	0	0	0	0	1	2
8:15 - 8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:30 - 8:45	1	0	0	0	0	0	0	0	0	0	0	0	1	
8:45 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:00 - 4:15	0	0	0	0	0	0	0	0	0	0	1	0	1	5
4:15 - 4:30	0	0	0	0	0	1	0	0	0	0	0	0	1	5
4:30 - 4:45	0	0	0	0	0	1	0	0	1	0	0	0	2	6
4:45 - 5:00	1	0	0	0	0	0	0	0	0	0	0	0	1	4
5:00 - 5:15	1	0	0	0	0	0	0	0	0	0	0	0	1	3
5:15 - 5:30	2	0	0	0	0	0	0	0	0	0	0	0	2	
5:30 - 5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	

* AM and PM counts collected during peak hours on Thursday, May 25, 2017.

Peak Hour Turning Movement Volumes

(1) Hudson Road and Technology Parkway - All Vehicles

15-min Interval	From North (Southbound) Hudson Road			From East (Westbound) Technology Parkway			From South (Northbound) Hudson Road			From West (Eastbound) Technology Parkway			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:15 - 7:30	5	84	3	3	1	2	13	100	11	15	4	9	250
7:30 - 7:45	15	108	1	2	2	3	11	107	15	3	2	21	290
7:45 - 8:00	42	105	1	1	1	3	24	97	28	3	1	18	324
8:00 - 8:15	19	76	2	2	1	2	12	67	16	0	0	8	205
2017 Volumes	**81**	**373**	**7**	**8**	**5**	**10**	**60**	**371**	**70**	**21**	**7**	**56**	**1069**
Growth Factor	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057
2019 Volumes	**86**	**394**	**7**	**8**	**5**	**11**	**63**	**392**	**74**	**22**	**7**	**59**	**1128**
Growth Factor	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887
2040 Volumes	**153**	**704**	**13**	**15**	**9**	**19**	**113**	**700**	**132**	**40**	**13**	**106**	**2017**
Percent Heavy Vehicle	0%	5%	0%	0%	0%	0%	0%	5%	3%	5%	0%	2%	-
												PHF =	0.82

4:30 - 4:45	3	144	1	18	0	22	10	125	3	1	1	7	335
4:45 - 5:00	3	98	4	16	2	13	9	131	2	0	2	13	293
5:00 - 5:15	4	126	0	31	3	39	9	133	0	6	1	15	367
5:15 - 5:30	1	121	3	6	1	16	13	141	2	2	1	11	318
2017 Volumes	**11**	**489**	**8**	**71**	**6**	**90**	**41**	**530**	**7**	**9**	**5**	**46**	**1313**
Growth Factor	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057
2019 Volumes	**12**	**517**	**8**	**75**	**6**	**95**	**43**	**560**	**7**	**10**	**5**	**49**	**1387**
Growth Factor	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887
2040 Volumes	**21**	**923**	**15**	**134**	**11**	**170**	**77**	**1000**	**13**	**17**	**9**	**87**	**2477**
Percent Heavy Vehicle	0%	2%	0%	1%	0%	1%	10%	2%	0%	0%	0%	0%	-

Note: Volume adjustments indicated in red are to allow for growth in background traffic. PHF = 0.89

(2) Hudson Road and Ridgeway Avenue - All Vehicles

15-min Interval	From North (Southbound) Hudson Road			From East (Westbound) Ridgeway Avenue			From South (Northbound) Hudson Road			From West (Eastbound) Ridgeway Avenue			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:15 - 7:30	26	72	1	3	1	11	2	108	10	3	4	2	243
7:30 - 7:45	24	102	1	4	3	11	3	120	10	6	9	2	295
7:45 - 8:00	24	98	1	13	2	12	3	129	14	6	7	1	310
8:00 - 8:15	13	72	2	5	4	4	2	81	6	3	3	1	196
2017 Volumes	**87**	**344**	**5**	**25**	**10**	**38**	**10**	**438**	**40**	**18**	**23**	**6**	**1044**
Growth Factor	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057
2019 Volumes	**92**	**364**	**5**	**26**	**11**	**40**	**11**	**463**	**42**	**19**	**24**	**6**	**1103**
Growth Factor	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887
2040 Volumes	**164**	**649**	**9**	**47**	**19**	**72**	**19**	**827**	**75**	**34**	**43**	**11**	**1969**
Percent Heavy Vehicle	0%	5%	0%	0%	0%	3%	10%	4%	0%	6%	0%	0%	-
												PHF =	0.84

4:30 - 4:45	18	139	9	1	8	33	1	103	4	9	3	2	330
4:45 - 5:00	7	110	8	6	9	18	2	107	8	5	2	1	283
5:00 - 5:15	27	129	17	6	8	22	3	131	5	4	3	1	356
5:15 - 5:30	17	116	10	10	8	33	1	113	2	2	2	1	315
2017 Volumes	**69**	**494**	**44**	**23**	**33**	**106**	**7**	**454**	**19**	**20**	**10**	**5**	**1284**
Growth Factor	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057
2019 Volumes	**73**	**522**	**46**	**24**	**35**	**112**	**7**	**480**	**20**	**21**	**11**	**5**	**1356**
Growth Factor	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887
2040 Volumes	**130**	**932**	**83**	**43**	**62**	**200**	**13**	**857**	**36**	**38**	**19**	**9**	**2422**
Percent Heavy Vehicle	0%	2%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	-

Note: Volume adjustments indicated in red are to allow for growth in background traffic. PHF = 0.90

Peak Hour Turning Movement Volumes

(3) Chancellor Drive and Technology Parkway - All Vehicles

15-min Interval	From North (Southbound) Chancellor Drive			From East (Westbound) Technology Parkway			From South (Northbound) Chancellor Drive			From West (Eastbound) Technology Parkway			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:15 - 7:30	1	8	17	0	0	1	21	19	2	2	2	1	74
7:30 - 7:45	1	1	27	0	0	0	23	25	1	3	1	1	83
7:45 - 8:00	1	4	39	0	0	1	49	53	1	1	1	5	155
8:00 - 8:15	2	4	26	0	0	2	16	24	1	1	1	0	77
2017 Volumes	**5**	**17**	**109**	**0**	**0**	**4**	**109**	**121**	**5**	**7**	**5**	**7**	**389**
Growth Factor	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057
2019 Volumes	**5**	**18**	**115**	**0**	**0**	**4**	**115**	**128**	**5**	**7**	**5**	**7**	**409**
Growth Factor	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887
2040 Volumes	**9**	**32**	**206**	**0**	**0**	**8**	**206**	**228**	**9**	**13**	**9**	**13**	**733**
Percent Heavy Vehicle	20%	0%	0%	#DIV/0!	#DIV/0!	25%	0%	0%	0%	0%	20%	0%	-

Note: Volume adjustments indicated in red are to allow for growth in background traffic. PHF = 0.63

4:30 - 4:45	1	33	6	2	0	1	12	10	1	32	1	23	122
4:45 - 5:00	2	15	6	2	1	1	6	8	2	22	2	27	94
5:00 - 5:15	1	46	7	1	0	0	3	2	1	43	1	50	155
5:15 - 5:30	1	16	0	1	0	0	4	7	1	15	1	20	66
2017 Volumes	**5**	**110**	**19**	**6**	**1**	**2**	**25**	**27**	**5**	**112**	**5**	**120**	**437**
Growth Factor	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057
2019 Volumes	**5**	**116**	**20**	**6**	**1**	**2**	**26**	**29**	**5**	**118**	**5**	**127**	**460**
Growth Factor	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887
2040 Volumes	**9**	**208**	**36**	**11**	**2**	**4**	**47**	**51**	**9**	**211**	**9**	**226**	**823**
Percent Heavy Vehicle	20%	4%	5%	17%	0%	50%	4%	7%	0%	0%	0%	0%	-

Note: Volume adjustments indicated in red are to allow for growth in background traffic. PHF = 0.70

(4) Chancellor Drive/Lexington Boulevard and Ridgeway Avenue - All Vehicles

15-min Interval	From North (Southbound) Chancellor Drive			From East (Westbound) Ridgeway Avenue			From South (Northbound) Lexington Boulevard			From West (Eastbound) Ridgeway Avenue			Intersection Count
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:15 - 7:30	6	1	1	8	9	35	6	3	8	5	41	0	123
7:30 - 7:45	0	2	2	3	17	38	3	1	22	7	35	0	130
7:45 - 8:00	2	1	1	4	19	78	7	3	13	7	35	4	174
8:00 - 8:15	4	1	1	10	13	33	0	2	11	1	26	2	104
2017 Volumes	**12**	**5**	**5**	**25**	**58**	**184**	**16**	**9**	**54**	**20**	**137**	**6**	**531**
Growth Factor	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057
2019 Volumes	**13**	**5**	**5**	**26**	**61**	**194**	**17**	**10**	**57**	**21**	**145**	**6**	**560**
Growth Factor	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887
2040 Volumes	**23**	**9**	**9**	**47**	**109**	**347**	**30**	**17**	**102**	**38**	**259**	**11**	**1001**
Percent Heavy Vehicle	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	-

Note: Volume adjustments indicated in red are to allow for growth in background traffic. PHF = 0.76

4:30 - 4:45	52	3	2	20	40	8	1	2	17	1	20	1	167
4:45 - 5:00	28	3	2	17	30	8	1	2	18	1	16	4	130
5:00 - 5:15	93	1	3	17	33	3	1	1	11	1	32	2	198
5:15 - 5:30	36	0	1	30	42	3	6	0	16	2	17	2	155
2017 Volumes	**209**	**7**	**8**	**84**	**145**	**22**	**9**	**5**	**62**	**5**	**85**	**9**	**650**
Growth Factor	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057	1.057
2019 Volumes	**221**	**7**	**8**	**89**	**153**	**23**	**10**	**5**	**66**	**5**	**90**	**10**	**687**
Growth Factor	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887	1.887
2040 Volumes	**394**	**13**	**15**	**159**	**274**	**42**	**17**	**9**	**117**	**9**	**160**	**17**	**1226**
Percent Heavy Vehicle	2%	0%	0%	0%	0%	5%	0%	0%	2%	0%	0%	0%	-

Note: Volume adjustments indicated in red are to allow for growth in background traffic. PHF = 0.82

Appendix 3

Quick Report

Crash Incidence Summary	
Possible/Unknown	4
Property Damage Only	3
	7

Injury Status Summary	
Possible (complaint of pain/injury)	4
Uninjured	15
	19

Property Damage		
	Total:	58,050.00
	Average:	8,292.86

Average Severity		
	Fatalites/Fatal Crash	0.00
	Fatalities/Crash	0.00
	Injuries/Crash	0.57

Crash Criteria

Jurisdiction: Cities (Cedar Falls)
Year: 2012, 2013, 2014, 2015, 2016
Map Selection: Yes
Filter: None

Manner of Crash/Collision Impact

Rear-end (front to rear)	1
Angle, oncoming left turn	2
Broadside (front to side)	1
Sideswipe, same direction	2
Sideswipe, opposite direction	1
	7

Surface Condition Summary

Dry	6
Snow	1
	7

Major Cause Summary

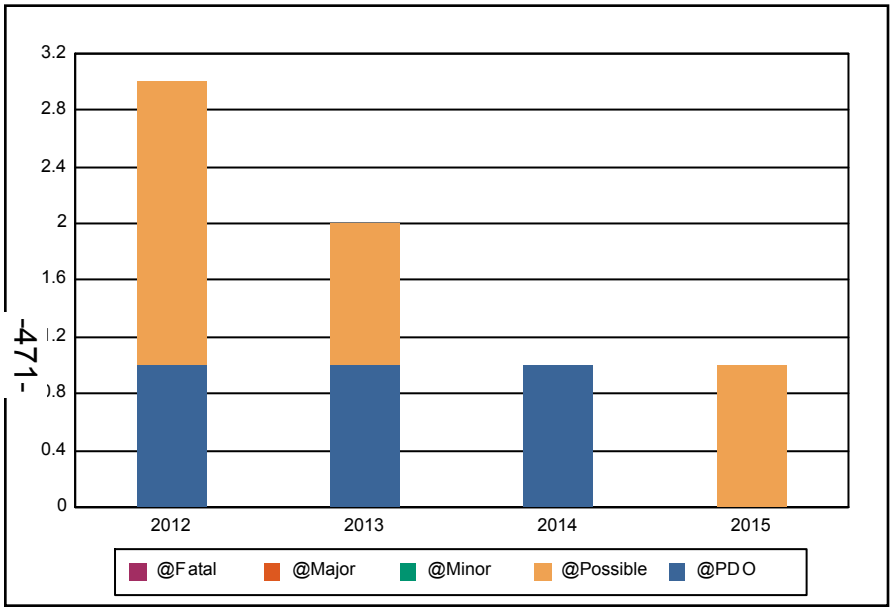
- 1 Ran Traffic Signal
- 1 Improper or erratic lane changing
- 1 Driver Distraction: Reaching for object(s)/fallen object(s)
- 2 FTYROW: Making left turn
- 1 Followed too close
- 1 Swerving/Evasive Action

Crash Time of Day Summary

	00:00 01:59	02:00 03:59	04:00 05:59	06:00 07:59	08:00 09:59	10:00 11:59	12:00 13:59	14:00 15:59	16:00 17:59	18:00 19:59	20:00 21:59	22:00 23:59	Total	%
Tuesday	0	0	0	0	0	0	1	0	1	0	0	0	2	28.57
Wednesday	0	0	0	0	0	0	0	1	0	0	0	0	1	14.29
Friday	0	0	0	0	1	1	0	2	0	0	0	0	4	57.14
	0	0	0	0	1	1	1	3	1	0	0	0	7	
	0.00	0.00	0.00	0.00	14.29	14.29	14.29	42.86	14.29	0.00	0.00	0.00		

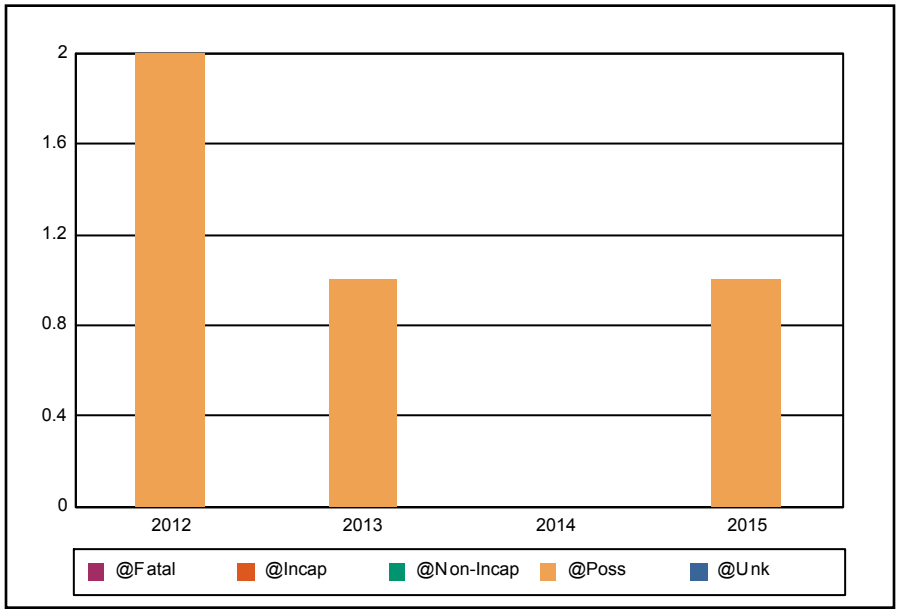
Crash Severity by Year

	Fatal	Major Injury	Minor Injury	Poss Injury	PDO	Totals
2012	0	0	0	2	1	3
2013	0	0	0	1	1	2
2014	0	0	0	0	1	1
2015	0	0	0	1	0	1
	0	0	0	4	3	7



Injury Status - Annual

	Fatal	Incapac.	Non-Incapac.	Poss	Unk	Total
2012	0	0	0	2	0	2
2013	0	0	0	1	0	1
2014	0	0	0	0	0	0
2015	0	0	0	1	0	1
	0	0	0	4	0	4



Quick Report

Crash Incidence Summary	
Major Injury	1
Minor Injury	3
Possible/Unknown	5
Property Damage Only	6
	15

Injury Status Summary	
Suspected serious/incapacitating	1
Suspected minor/non-incapacitating	5
Possible (complaint of pain/injury)	7
Uninjured	17
	30

Property Damage		
	Total:	178,000.00
	Average:	11,866.67

Average Severity		
	Fatalites/Fatal Crash	0.00
	Fatalities/Crash	0.00
	Injuries/Crash	0.87

Crash Criteria

Jurisdiction: Cities (Cedar Falls)
Year: 2012, 2013, 2014, 2015, 2016
Map Selection: Yes
Filter: None

Manner of Crash/Collision Impact

Non-collision (single vehicle)	1
Rear-end (front to rear)	2
Angle, oncoming left turn	1
Broadside (front to side)	9
Sideswipe, same direction	2
	15

Surface Condition Summary

Dry	13
Ice/frost	1
Snow	1
	15

Major Cause Summary

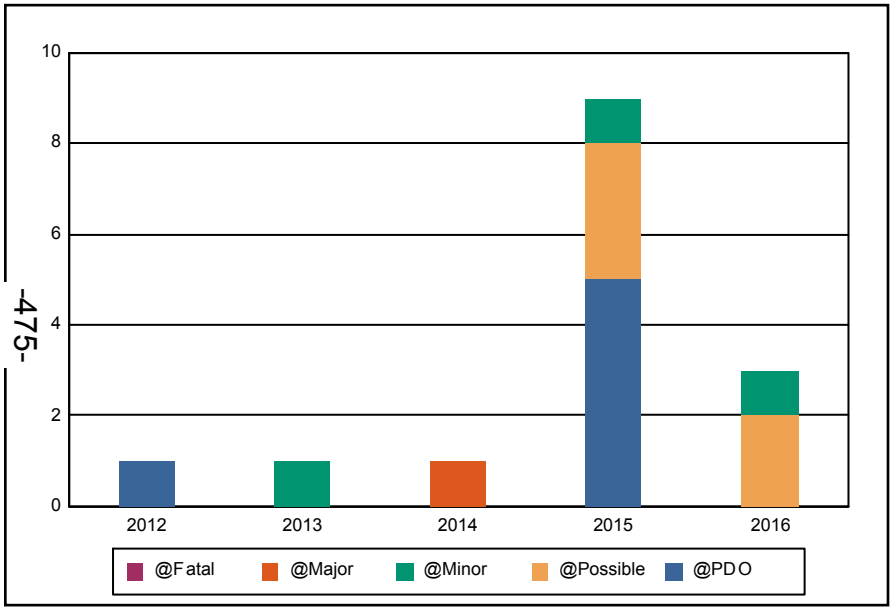
1 Ran Stop Sign
2 FTYROW: Making left turn
1 Improper or erratic lane changing
1 Ran off road - right
7 FTYROW: From stop sign
1 Driving too fast for conditions
1 Driver Distraction: Inattentive/lost in thought
1 Lost Control

Crash Time of Day Summary

	00:00 01:59	02:00 03:59	04:00 05:59	06:00 07:59	08:00 09:59	10:00 11:59	12:00 13:59	14:00 15:59	16:00 17:59	18:00 19:59	20:00 21:59	22:00 23:59	Total	%
Tuesday	0	0	0	0	1	0	0	0	2	0	0	0	3	20.00
Wednesday	0	0	0	1	0	0	0	1	2	0	0	0	4	26.67
Thursday	0	0	1	0	0	0	1	0	0	0	0	0	2	13.33
Friday	0	0	0	0	0	0	1	1	0	2	0	0	4	26.67
Saturday	0	0	0	0	1	0	1	0	0	0	0	0	2	13.33
	0	0	1	1	2	0	3	2	4	2	0	0	15	
	0.00	0.00	6.67	6.67	13.33	0.00	20.00	13.33	26.67	13.33	0.00	0.00		

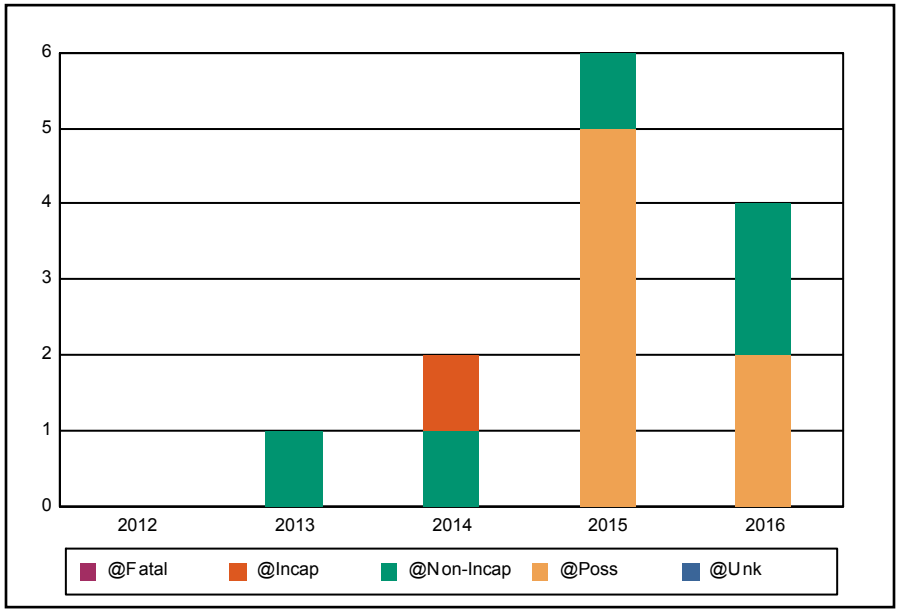
Crash Severity by Year

	Fatal	Major Injury	Minor Injury	Poss Injury	PDO	Totals
2012	0	0	0	0	1	1
2013	0	0	1	0	0	1
2014	0	1	0	0	0	1
2015	0	0	1	3	5	9
2016	0	0	1	2	0	3
	0	1	3	5	6	15



Injury Status - Annual

	Fatal	Incapac.	Non-Incapac.	Poss	Unk	Total
2012	0	0	0	0	0	0
2013	0	0	1	0	0	1
2014	0	1	1	0	0	2
2015	0	0	1	5	0	6
2016	0	0	2	2	0	4
	0	1	5	7	0	13



Crash Incidence Summary	
Property Damage Only	1
	1

Injury Status Summary	
Uninjured	2
	2

Property Damage		
	Total:	4,000.00
	Average:	4,000.00

Average Severity		
	Fatalites/Fatal Crash	0.00
	Fatalities/Crash	0.00
	Injuries/Crash	0.00

Crash Criteria

Jurisdiction: Cities (Cedar Falls)
Year: 2012, 2013, 2014, 2015, 2016
Map Selection: Yes
Filter: None

Manner of Crash/Collision Impact	
Broadside (front to side)	1
	1

Surface Condition Summary	
Dry	1
	1

Major Cause Summary

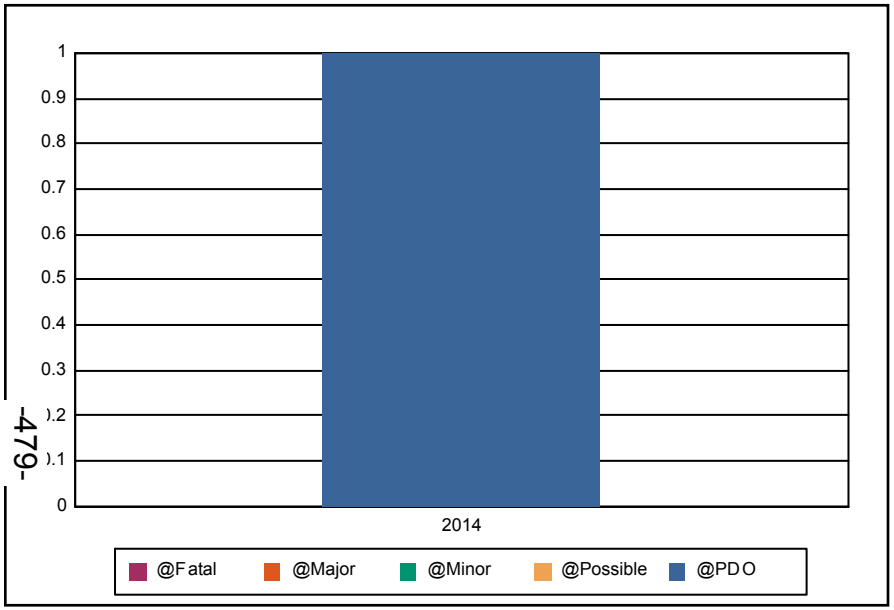
1 FTYROW: From stop sign

Crash Time of Day Summary

	00:00 01:59	02:00 03:59	04:00 05:59	06:00 07:59	08:00 09:59	10:00 11:59	12:00 13:59	14:00 15:59	16:00 17:59	18:00 19:59	20:00 21:59	22:00 23:59	Total	%
Monday	0	0	0	0	1	0	0	0	0	0	0	0	1	100.00
	0	0	0	0	1	0	0	0	0	0	0	0	1	
	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

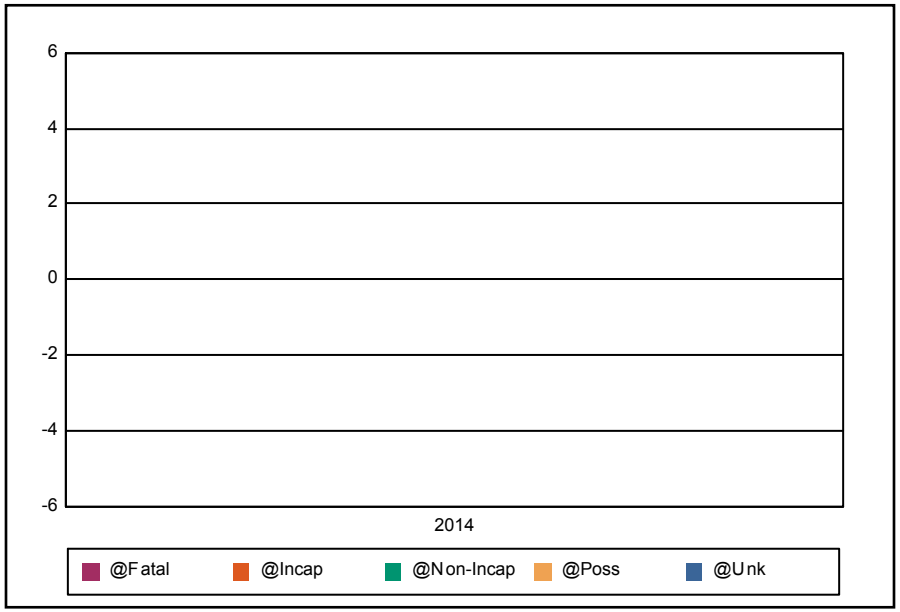
Crash Severity by Year

	Fatal	Major Injury	Minor Injury	Poss Injury	PDO	Totals
2014	0	0	0	0	1	1
	0	0	0	0	1	1



Injury Status - Annual

	Fatal	Incapac.	Non-Incapac.	Poss	Unk	Total
2014	0	0	0	0	0	0
	0	0	0	0	0	0



Crash Incidence Summary	
Minor Injury	1
Possible/Unknown	1
Property Damage Only	2
	4

Injury Status Summary	
Suspected minor/non-incapacitating	1
Uninjured	4
Unknown	1
	6

Property Damage		
	Total:	7,000.00
	Average:	1,750.00

Average Severity		
	Fatalites/Fatal Crash	0.00
	Fatalities/Crash	0.00
	Injuries/Crash	0.25

Crash Criteria

Jurisdiction: Cities (Cedar Falls)
Year: 2012, 2013, 2014, 2015, 2016
Map Selection: Yes
Filter: None

Manner of Crash/Collision Impact	
Non-collision (single vehicle)	3
Sideswipe, same direction	1
	4

Surface Condition Summary	
Dry	3
Ice/frost	1
	4

Major Cause Summary

3 Lost Control

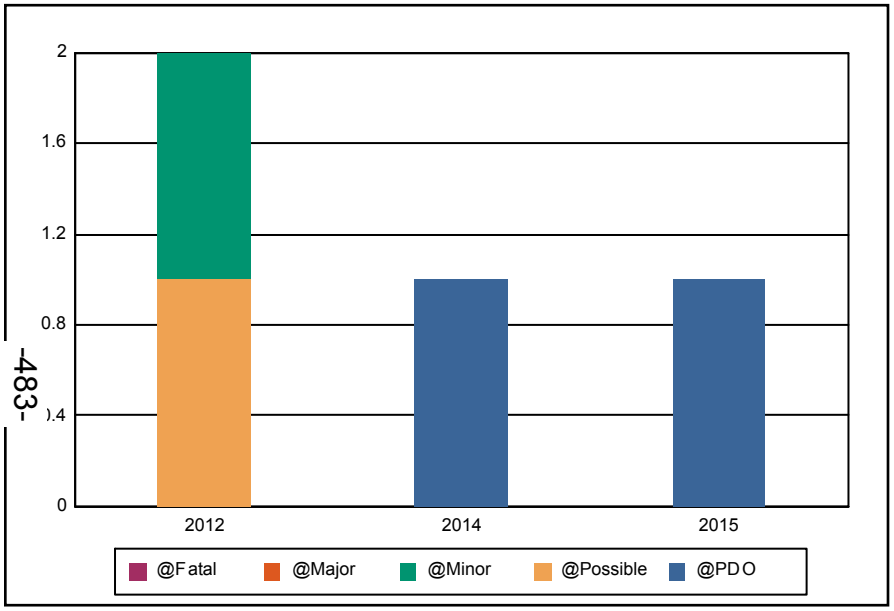
1 Unknown

Crash Time of Day Summary

	00:00 01:59	02:00 03:59	04:00 05:59	06:00 07:59	08:00 09:59	10:00 11:59	12:00 13:59	14:00 15:59	16:00 17:59	18:00 19:59	20:00 21:59	22:00 23:59	Total	%
Monday	0	0	0	1	0	0	0	0	0	0	0	0	1	25.00
Wednesday	0	0	0	1	0	0	0	0	0	0	0	0	1	25.00
Thursday	0	0	1	0	0	0	0	0	0	1	0	0	2	50.00
	0	0	1	2	0	0	0	0	0	1	0	0	4	
	0.00	0.00	25.00	50.00	0.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00		

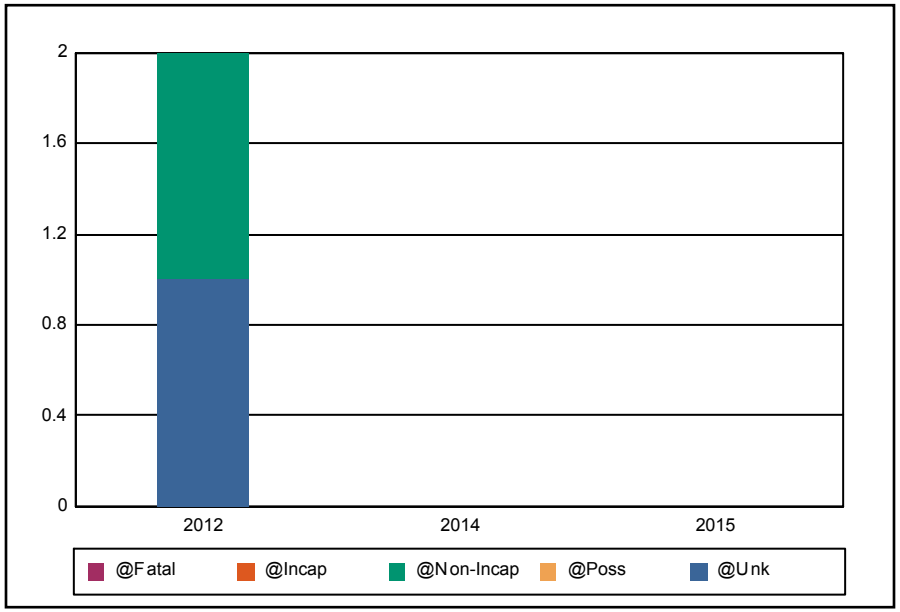
Crash Severity by Year

	Fatal	Major Injury	Minor Injury	Poss Injury	PDO	Totals
2012	0	0	1	1	0	2
2014	0	0	0	0	1	1
2015	0	0	0	0	1	1
	0	0	1	1	2	4



Injury Status - Annual

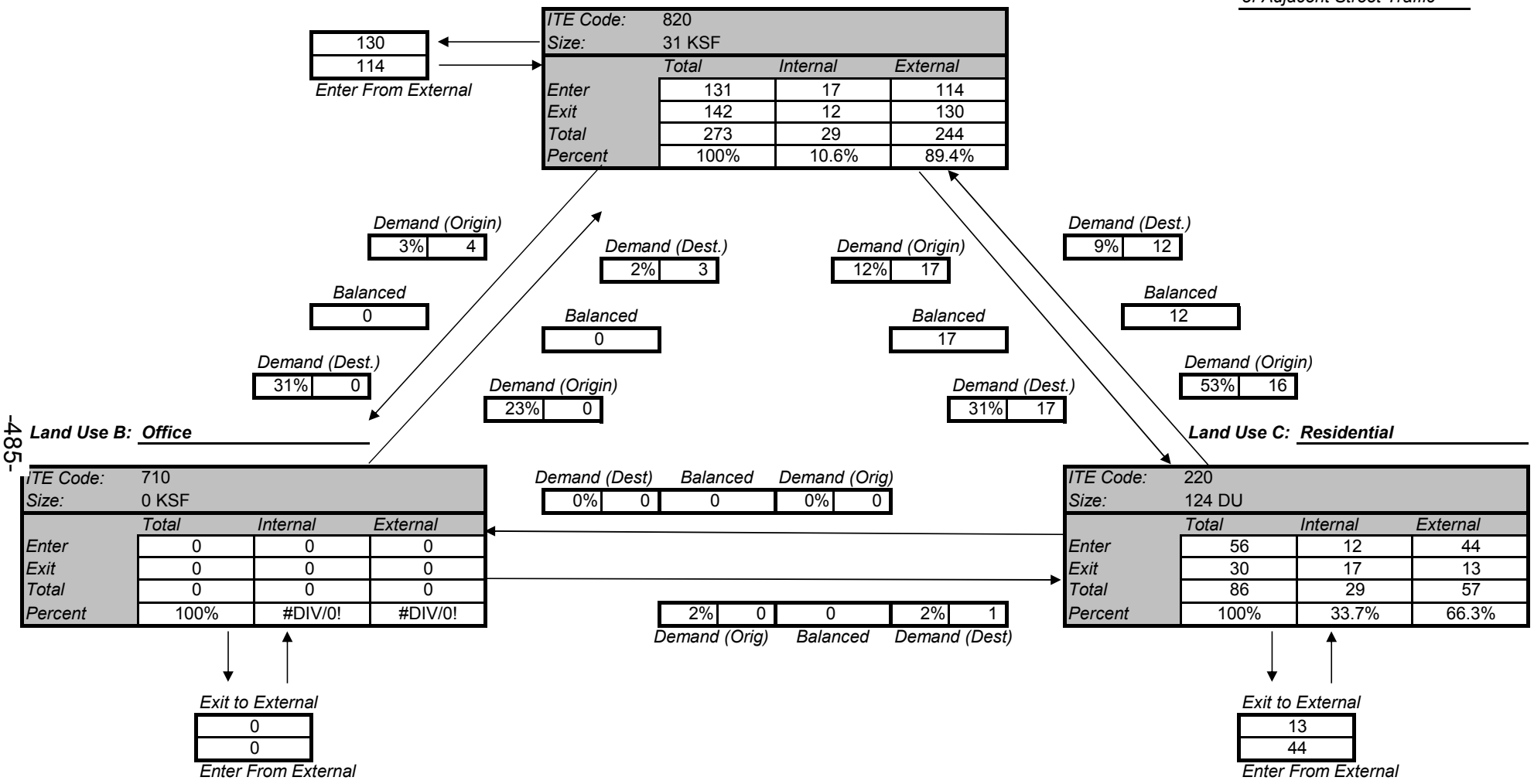
	Fatal	Incapac.	Non-Incapac.	Poss	Unk	Total
2012	0	0	1	0	1	2
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
	0	0	1	0	1	2



Appendix 4

MULTI-USE DEVELOPMENT
TRIP GENERATION AND INTERNAL CAPTURE SUMMARY

Development: Open Door Hospitality
Time Period: PM Peak Hour 2019 of Adjacent Street Traffic

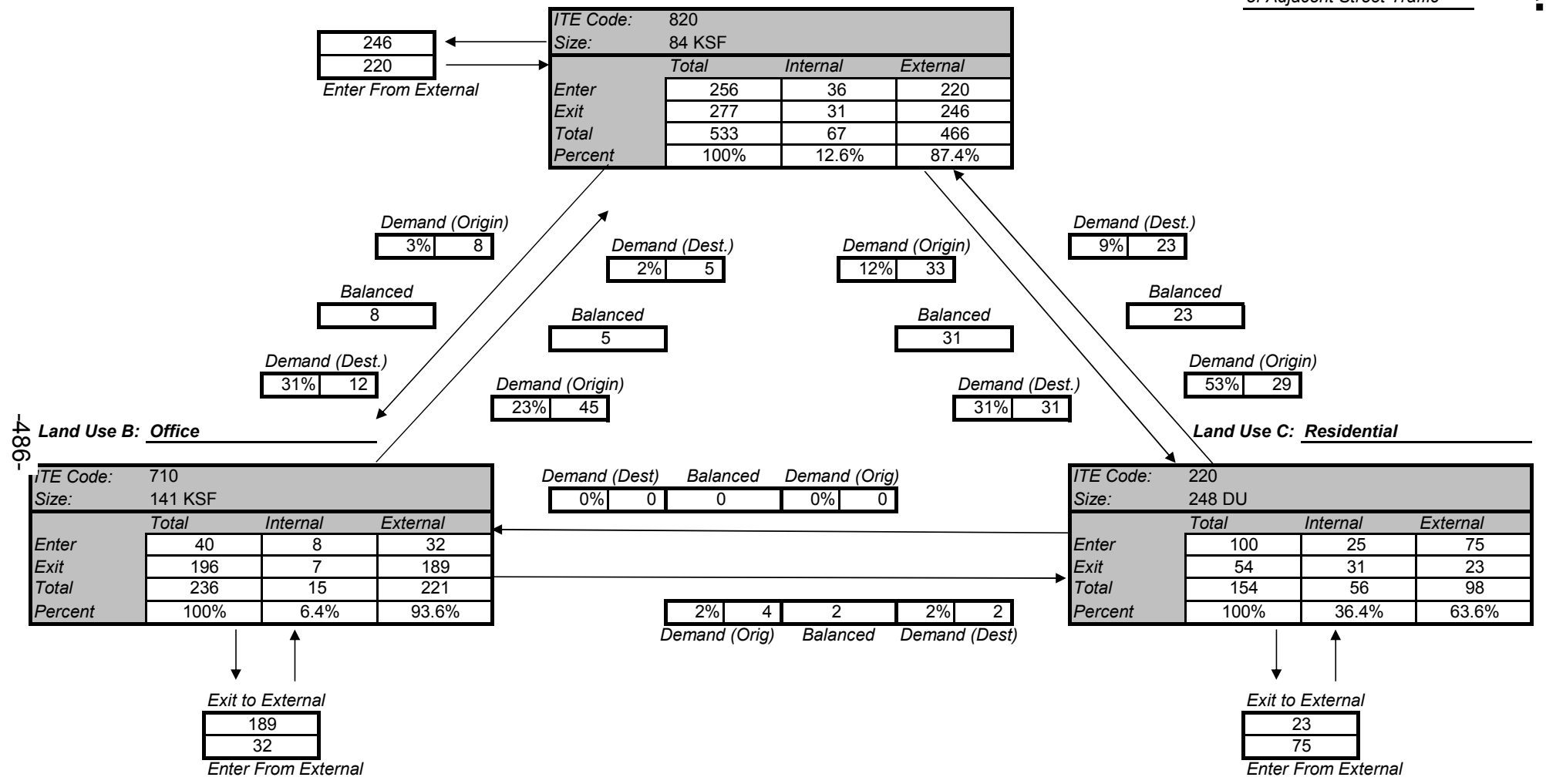


Net External Trips for Multi-Use Developments				
	Land Use A	Land Use B	Land Use C	Total
Enter	114	0	44	158
Exit	130	0	13	143
Total	244	0	57	301
Single Use Trip Gen Est.	273	0	86	359

Internal Capture
16%

MULTI-USE DEVELOPMENT
TRIP GENERATION AND INTERNAL CAPTURE SUMMARY

Development: Open Door Hospitality
Time Period: PM Peak Hour 2040 of Adjacent Street Traffic



Net External Trips for Multi-Use Developments				
	Land Use A	*Land Use B*	*Land Use C*	*Total*
Enter	220	32	75	327
Exit	246	189	23	458
Total	466	221	98	785
Single Use Trip Gen Est.	533	236	154	923

Internal Capture
15%

Appendix 5

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

316 Second Street SE
Cedar Rapids, Iowa 52401
Telephone (319) 364-0227
FAX (319) 364-4251

TRAFFIC SIGNAL WARRANTS – 2019 Future With Project

PROJECT NUMBER: 2171620 DATE: June 15, 2017
PROJECT NAME: Open Door Hospitality
PREPARED BY: Shive-Hattery

Major Street: Hudson Road — Critical Approach Speed: **45** mph
Minor Street: Ridgeway Avenue — Critical Approach Speed: **45** mph

Critical speed of major street traffic > 40mph ☐ RURAL (R)
In built up area of isolated community of < 10,000 population ☐ RURAL (R)
☒ URBAN (U)

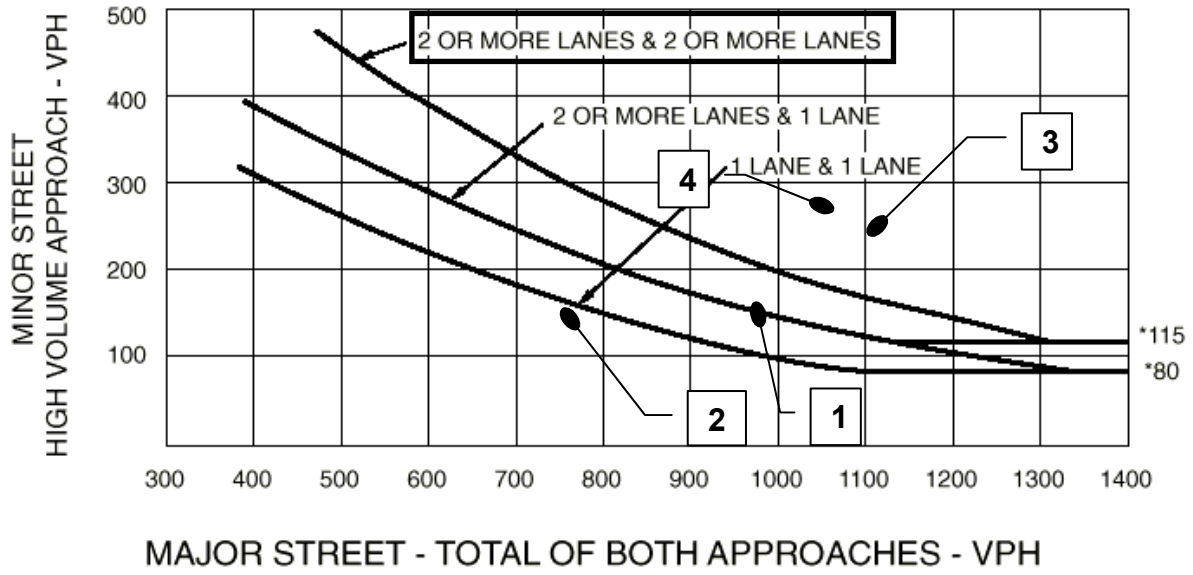
WARRANT 2 – Four Hour Vehicular Volume

SATISFIED* YES ☐ NO ☒

	APPROACH LANES		4-Hours			
APPROACH LANES	ONE	2 or MORE	7-8 AM (#1)	8-9 AM (#2)	4-5 PM (#3)	5-6 PM (#4)
Both Approaches – Major Street		**X**	**980**	**778**	**1,127**	**1,051**
Highest Approach – Minor Street		**X**	**154**	**147**	**248**	**277**

*Refer to Figure-1 to determine if this warrant is satisfied.

FIGURE 1 - FOUR HOUR VEHICULAR VOLUME



*Note: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor street approach with one lane.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right-of-way assignment must be shown.

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

316 Second Street SE
Cedar Rapids, Iowa 52401
Telephone (319) 364-0227
FAX (319) 364-4251

TRAFFIC SIGNAL WARRANTS – 2029 Future With Project

PROJECT NUMBER: 2171620 DATE: June 15, 2017
PROJECT NAME: Open Door Hospitality
PREPARED BY: Shive-Hattery

Major Street: Hudson Road — Critical Approach Speed: **45** mph
Minor Street: Ridgeway Avenue — Critical Approach Speed: **45** mph

Critical speed of major street traffic > 40mph ☐ RURAL (R)
In built up area of isolated community of < 10,000 population ☐ RURAL (R)
☒ URBAN (U)

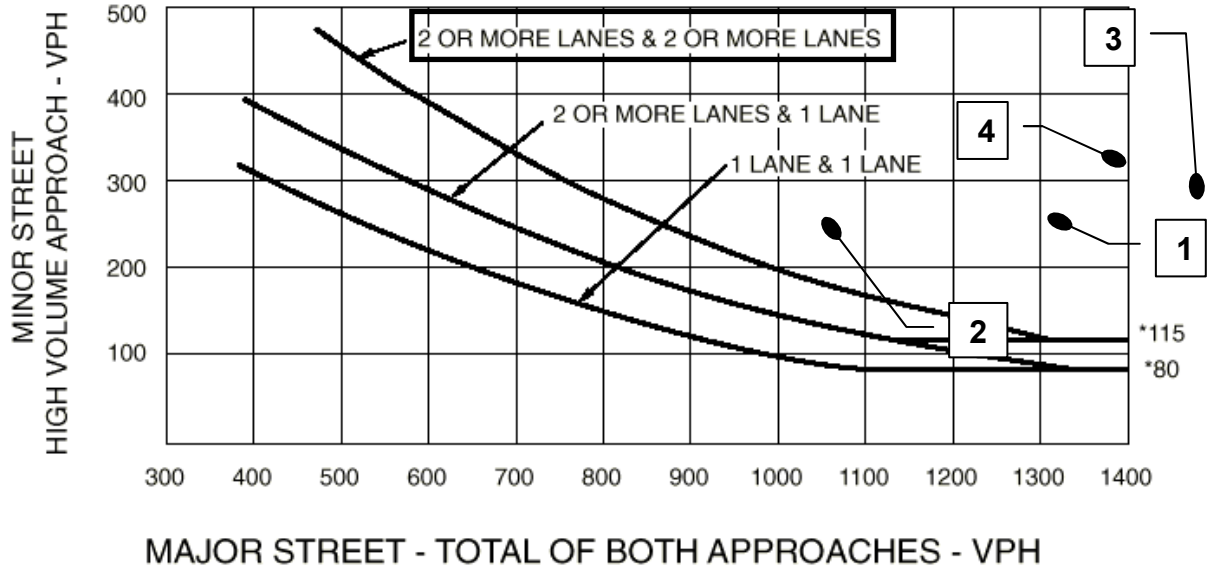
WARRANT 2 – Four Hour Vehicular Volume

SATISFIED* YES ☒ NO ☐

	APPROACH LANES		4-Hours			
APPROACH LANES	ONE	2 or MORE	7-8 AM (#1)	8-9 AM (#2)	4-5 PM (#3)	5-6 PM (#4)
Both Approaches – Major Street		**X**	**1,329**	**1,062**	**1,493**	**1,394**
Highest Approach – Minor Street		**X**	**255**	**245**	**291**	**329**

*Refer to Figure-1 to determine if this warrant is satisfied.

FIGURE 1 - FOUR HOUR VEHICULAR VOLUME



*Note: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor street approach with one lane.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right-of-way assignment must be shown.

Appendix 6

Generated with PTV VISTRO

2017 Existing AM No Build

Version 5.00-00

Intersection Level Of Service Report

Intersection 1: Hudson Road & Technology Parkway

Control Type:	Signalized	Delay (sec / veh):	8.9
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.247

Intersection Setup

Name	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
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	1	1	0	0	1	0	1
Pocket Length [ft]	320.00	100.00	100.00	200.00	100.00	200.00	140.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			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	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
Base Volume Input [veh/h]	60	371	70	81	373	7	21	7	56	8	5	10
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 [%]	0.00	5.00	3.00	0.00	5.00	0.00	5.00	0.00	2.00	0.00	0.00	0.00
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]	60	371	70	81	373	7	21	7	56	8	5	10
Peak Hour Factor	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200
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]	18	113	21	25	114	2	6	2	17	2	2	3
Total Analysis Volume [veh/h]	73	452	85	99	455	9	26	9	68	10	6	12
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		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	70
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	18	33	0	9	24	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	R	L	C	L	C	R
C, Cycle Length [s]	70	70	70	70	70	70	70	70	70	70	70
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	53	44	44	53	45	45	10	5	10	4	4
g / C, Green / Cycle	0.75	0.63	0.63	0.75	0.64	0.64	0.14	0.07	0.14	0.05	0.05
(v / s)_i Volume / Saturation Flow Rate	0.08	0.17	0.17	0.11	0.15	0.01	0.02	0.05	0.01	0.00	0.01
s, saturation flow rate [veh/h]	943	1642	1554	895	3127	1454	1377	1479	1339	1710	1454
c, Capacity [veh/h]	791	1032	976	749	1986	923	337	99	279	87	74
d1, Uniform Delay [s]	2.55	5.83	5.84	2.69	5.48	4.71	26.53	32.27	26.32	31.75	31.90
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.23	0.63	0.68	0.08	0.27	0.02	0.10	12.32	0.05	0.33	1.01
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
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
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

Lane Group Results

X, volume / capacity	0.09	0.27	0.27	0.13	0.23	0.01	0.08	0.78	0.04	0.07	0.16
d, Delay for Lane Group [s/veh]	2.78	6.46	6.51	2.77	5.75	4.73	26.63	44.59	26.37	32.08	32.91
Lane Group LOS	A	A	A	A	A	A	C	D	C	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh]	0.15	1.38	1.33	0.15	1.01	0.04	0.38	1.58	0.14	0.10	0.21
50th-Percentile Queue Length [ft]	3.78	34.50	33.18	3.87	25.14	0.92	9.44	39.56	3.61	2.55	5.25
95th-Percentile Queue Length [veh]	0.27	2.48	2.39	0.28	1.81	0.07	0.68	2.85	0.26	0.18	0.38
95th-Percentile Queue Length [ft]	6.80	62.10	59.73	6.97	45.25	1.65	16.99	71.21	6.49	4.59	9.44

Movement, Approach, & Intersection Results

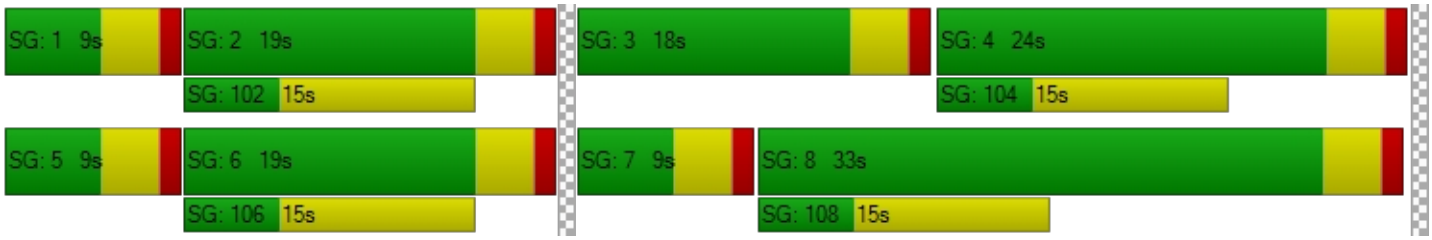
d_M, Delay for Movement [s/veh]	2.78	6.48	6.51	2.77	5.75	4.73	26.63	44.59	44.59	26.37	32.08	32.91
Movement LOS	A	A	A	A	A	A	C	D	D	C	C	C
d_A, Approach Delay [s/veh]	6.04			5.21			40.06			30.40		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	8.89											
Intersection LOS	A											
Intersection V/C	0.247											

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]	26.58	26.58	26.58	26.58
l_p,int, Pedestrian LOS Score for Intersection	2.624	2.701	2.060	2.267
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	429	429	829	571
d_b, Bicycle Delay [s]	21.61	21.61	12.01	17.86
l_b,int, Bicycle LOS Score for Intersection	2.063	2.024	1.730	1.606
Bicycle LOS	B	B	A	A

Sequence

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



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Intersection Level Of Service Report

Intersection 2: Hudson Road & Ridgeway Avenue

Control Type:	Two-way stop	Delay (sec / veh):	32.6
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.188

Intersection Setup

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
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]	250.00	100.00	100.00	220.00	100.00	100.00	250.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	45.00			45.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	10	438	40	87	344	5	18	23	6	25	10	38
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 [%]	10.00	4.00	0.00	0.00	5.00	0.00	6.00	0.00	0.00	0.00	0.00	3.00
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]	10	438	40	87	344	5	18	23	6	25	10	38
Peak Hour Factor	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400
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	130	12	26	102	1	5	7	2	7	3	11
Total Analysis Volume [veh/h]	12	521	48	104	410	6	21	27	7	30	12	45
Pedestrian Volume [ped/h]	0			0			0			0		

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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	0.01	0.01	0.00	0.10	0.00	0.00	0.12	0.17	0.01	0.19	0.07	0.06
d_M, Delay for Movement [s/veh]	8.36	0.00	0.00	8.96	0.00	0.00	27.56	31.03	13.36	32.65	28.18	10.42
Movement LOS	A	A	A	A	A	A	D	D	B	D	D	B
95th-Percentile Queue Length [veh]	0.03	0.00	0.00	0.34	0.00	0.00	0.39	0.62	0.62	0.67	0.23	0.20
95th-Percentile Queue Length [ft]	0.84	0.00	0.00	8.55	0.00	0.00	9.69	15.42	15.42	16.64	5.73	5.07
d_A, Approach Delay [s/veh]	0.17			1.79			27.46			20.53		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	3.48											
Intersection LOS	D											

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Intersection Level Of Service Report

Intersection 3: Chancellor Drive & Technology Parkway

Control Type:	Two-way stop	Delay (sec / veh):	17.6
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.027

Intersection Setup

Name	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
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	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
Base Volume Input [veh/h]	109	121	5	5	17	109	7	5	7	0	0	4
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 [%]	0.00	0.00	0.00	20.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	25.00
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]	109	121	5	5	17	109	7	5	7	0	0	4
Peak Hour Factor	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300
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]	43	48	2	2	7	43	3	2	3	0	0	2
Total Analysis Volume [veh/h]	173	192	8	8	27	173	11	8	11	0	0	6
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	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	0.12	0.00	0.00	0.01	0.00	0.00	0.03	0.03	0.01	0.00	0.00	0.01
d_M, Delay for Movement [s/veh]	7.97	0.00	0.00	7.85	0.00	0.00	16.69	17.61	9.48	16.44	17.49	9.59
Movement LOS	A	A	A	A	A	A	C	C	A	C	C	A
95th-Percentile Queue Length [veh]	1.10	1.10	1.10	0.58	0.58	0.58	0.23	0.23	0.23	0.02	0.02	0.02
95th-Percentile Queue Length [ft]	27.42	27.42	27.42	14.60	14.60	14.60	5.78	5.78	5.78	0.57	0.57	0.57
d_A, Approach Delay [s/veh]	3.70			0.30			14.29			9.59		
Approach LOS	A			A			B			A		
d_I, Intersection Delay [s/veh]	3.13											
Intersection LOS	C											

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Intersection Level Of Service Report

Intersection 4: Chancellor Drive/Lexington Boulevard & Ridgeway Avenue

Control Type:	Roundabout	Delay (sec / veh):	3.7
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
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			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	16	9	54	12	5	5	20	137	6	25	58	184
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00
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	9	54	12	5	5	20	137	6	25	58	184
Peak Hour Factor	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600
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	3	18	4	2	2	7	45	2	8	19	61
Total Analysis Volume [veh/h]	21	12	71	16	7	7	26	180	8	33	76	242
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	222			132			56			59		
Exiting Flow Rate [veh/h]	196			99			40			38		
Demand Flow Rate [veh/h]	16	9	54	12	5	5	20	137	6	25	58	184
Adjusted Demand Flow Rate [veh/h]	21	12	71	16	7	7	26	180	8	33	76	242

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00102	0.00102	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	1.00	1.00	1.00	1.00	0.99	1.00
Entry Flow Rate [veh/h]	104	30	101	114	111	244
Capacity of Entry and Bypass Lanes [veh/h]	1101	1207	1350	1350	1346	1346
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1101	1207	1350	1350	1328	1340
X, volume / capacity	0.09	0.02	0.07	0.08	0.08	0.18

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.31	0.08	0.24	0.27	0.27	0.66
95th-Percentile Queue Length [ft]	7.81	1.91	6.03	6.87	6.70	16.46
Approach Delay [s/veh]	4.09	3.18	3.30		3.93	
Approach LOS	A	A	A		A	
Intersection Delay [s/veh]	3.73					
Intersection LOS	A					

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Intersection Level Of Service Report

Intersection 1: Hudson Road & Technology Parkway

Control Type:	Signalized	Delay (sec / veh):	10.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.268

Intersection Setup

Name	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
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	1	1	0	0	1	0	1
Pocket Length [ft]	320.00	100.00	100.00	200.00	100.00	200.00	140.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			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	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
Base Volume Input [veh/h]	41	530	7	11	489	8	9	5	46	71	6	90
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 [%]	10.00	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
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]	41	530	7	11	489	8	9	5	46	71	6	90
Peak Hour Factor	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900
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	149	2	3	137	2	3	1	13	20	2	25
Total Analysis Volume [veh/h]	46	596	8	12	549	9	10	6	52	80	7	101
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		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	60
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	9	23	0	9	23	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	R	L	C	L	C	R
C, Cycle Length [s]	60	60	60	60	60	60	60	60	60	60	60
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	41	36	36	41	34	34	11	3	11	6	6
g / C, Green / Cycle	0.69	0.60	0.60	0.69	0.57	0.57	0.18	0.05	0.18	0.10	0.10
(v / s)_i Volume / Saturation Flow Rate	0.06	0.18	0.18	0.01	0.17	0.01	0.01	0.04	0.06	0.00	0.07
s, saturation flow rate [veh/h]	814	1683	1675	811	3204	1454	1377	1476	1428	1710	1442
c, Capacity [veh/h]	652	1009	1004	653	1826	828	426	80	395	175	148
d1, Uniform Delay [s]	3.45	5.89	5.89	3.36	6.73	5.61	20.20	28.09	21.16	24.38	26.11
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.21	0.76	0.77	0.01	0.42	0.02	0.02	11.92	0.25	0.09	5.44
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
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
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

Lane Group Results

X, volume / capacity	0.07	0.30	0.30	0.02	0.30	0.01	0.02	0.73	0.20	0.04	0.68
d, Delay for Lane Group [s/veh]	3.66	6.65	6.66	3.37	7.15	5.64	20.22	40.01	21.41	24.47	31.55
Lane Group LOS	A	A	A	A	A	A	C	D	C	C	C
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh]	0.12	1.35	1.35	0.02	1.29	0.04	0.11	1.05	0.93	0.09	1.54
50th-Percentile Queue Length [ft]	2.96	33.76	33.65	0.56	32.30	0.95	2.78	26.13	23.37	2.24	38.52
95th-Percentile Queue Length [veh]	0.21	2.43	2.42	0.04	2.33	0.07	0.20	1.88	1.68	0.16	2.77
95th-Percentile Queue Length [ft]	5.33	60.77	60.57	1.01	58.14	1.70	5.00	47.03	42.07	4.04	69.34

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	3.66	6.66	6.66	3.37	7.15	5.64	20.22	40.01	40.01	21.41	24.47	31.55
Movement LOS	A	A	A	A	A	A	C	D	D	C	C	C
d_A, Approach Delay [s/veh]	6.44			7.05			37.10			26.97		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	10.71											
Intersection LOS	B											
Intersection V/C	0.268											

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]	21.68	21.68	21.68	21.68
l_p,int, Pedestrian LOS Score for Intersection	2.680	2.747	2.003	2.175
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	500	500	633	633
d_b, Bicycle Delay [s]	16.88	16.88	14.01	14.01
l_b,int, Bicycle LOS Score for Intersection	2.096	2.030	1.672	1.870
Bicycle LOS	B	B	A	A

Sequence

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

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Intersection Level Of Service Report

Intersection 2: Hudson Road & Ridgeway Avenue

Control Type:	Two-way stop	Delay (sec / veh):	39.5
Analysis Method:	HCM 6th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.175

Intersection Setup

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
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]	250.00	100.00	100.00	220.00	100.00	100.00	250.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	45.00			45.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	7	454	19	69	494	44	20	10	5	23	33	106
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 [%]	0.00	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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]	7	454	19	69	494	44	20	10	5	23	33	106
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
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]	2	126	5	19	137	12	6	3	1	6	9	29
Total Analysis Volume [veh/h]	8	504	21	77	549	49	22	11	6	26	37	118
Pedestrian Volume [ped/h]	0			0			0			0		

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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	0.01	0.01	0.00	0.07	0.01	0.00	0.17	0.07	0.01	0.14	0.24	0.16
d_M, Delay for Movement [s/veh]	8.67	0.00	0.00	8.69	0.00	0.00	39.53	29.47	11.55	27.31	35.82	10.77
Movement LOS	A	A	A	A	A	A	E	D	B	D	E	B
95th-Percentile Queue Length [veh]	0.02	0.00	0.00	0.24	0.00	0.00	0.61	0.25	0.25	0.47	0.90	0.56
95th-Percentile Queue Length [ft]	0.61	0.00	0.00	5.91	0.00	0.00	15.16	6.36	6.36	11.82	22.48	14.08
d_A, Approach Delay [s/veh]	0.13			0.99			32.39			18.26		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	3.72											
Intersection LOS	E											

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Intersection Level Of Service Report

Intersection 3: Chancellor Drive & Technology Parkway

Control Type:	Two-way stop	Delay (sec / veh):	15.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.012

Intersection Setup

Name	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
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	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
Base Volume Input [veh/h]	25	27	5	5	110	19	112	5	120	6	1	2
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 [%]	4.00	7.00	0.00	20.00	4.00	5.00	0.00	0.00	0.00	17.00	0.00	50.00
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]	25	27	5	5	110	19	112	5	120	6	1	2
Peak Hour Factor	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000
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]	9	10	2	2	39	7	40	2	43	2	0	1
Total Analysis Volume [veh/h]	36	39	7	7	157	27	160	7	171	9	1	3
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	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	0.03	0.00	0.00	0.00	0.00	0.00	0.25	0.01	0.19	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	7.68	0.00	0.00	7.49	0.00	0.00	14.71	15.11	13.15	13.69	11.33	9.17
Movement LOS	A	A	A	A	A	A	B	C	B	B	B	A
95th-Percentile Queue Length [veh]	0.19	0.19	0.19	0.45	0.45	0.45	2.42	2.42	2.42	0.08	0.08	0.08
95th-Percentile Queue Length [ft]	4.74	4.74	4.74	11.31	11.31	11.31	60.43	60.43	60.43	2.02	2.02	2.02
d_A, Approach Delay [s/veh]	3.37			0.27			13.93			12.46		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	8.33											
Intersection LOS	C											

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Intersection Level Of Service Report

Intersection 4: Chancellor Drive/Lexington Boulevard & Ridgeway Avenue

Control Type:	Roundabout	Delay (sec / veh):	4.7
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
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			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	9	5	62	209	7	8	5	85	9	84	145	22
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 [%]	0.00	0.00	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
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]	9	5	62	209	7	8	5	85	9	84	145	22
Peak Hour Factor	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200
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	2	19	64	2	2	2	26	3	26	44	7
Total Analysis Volume [veh/h]	11	6	76	255	9	10	6	104	11	102	177	27
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	370			290			371			23		
Exiting Flow Rate [veh/h]	364			188			111			12		
Demand Flow Rate [veh/h]	9	5	62	209	7	8	5	85	9	84	145	22
Adjusted Demand Flow Rate [veh/h]	11	6	76	255	9	10	6	104	11	102	177	27

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00102	0.00102	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	0.98	0.98	1.00	1.00	1.00	0.99
Entry Flow Rate [veh/h]	95	280	57	65	144	164
Capacity of Entry and Bypass Lanes [veh/h]	947	1027	1014	1014	1391	1391
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	931	1008	1014	1014	1391	1382
X, volume / capacity	0.10	0.27	0.06	0.06	0.10	0.12

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.33	1.11	0.18	0.20	0.35	0.40
95th-Percentile Queue Length [ft]	8.30	27.67	4.45	5.06	8.63	9.95
Approach Delay [s/veh]	4.80	6.26	4.08		3.48	
Approach LOS	A	A	A		A	
Intersection Delay [s/veh]	4.68					
Intersection LOS	A					

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Intersection Level Of Service Report

Intersection 1: Hudson Road & Technology Parkway

Control Type:	Signalized	Delay (sec / veh):	9.0
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.261

Intersection Setup

Name	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
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	1	1	0	0	1	0	1
Pocket Length [ft]	320.00	100.00	100.00	200.00	100.00	200.00	140.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			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	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
Base Volume Input [veh/h]	60	371	70	81	373	7	21	7	56	8	5	10
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	0.00	5.00	3.00	0.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
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]	63	392	74	86	394	7	22	7	59	8	5	11
Peak Hour Factor	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200
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]	19	120	23	26	120	2	7	2	18	2	2	3
Total Analysis Volume [veh/h]	77	478	90	105	480	9	27	9	72	10	6	13
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		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	70
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	19	33	0	9	23	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	R	L	C	L	C	R
C, Cycle Length [s]	70	70	70	70	70	70	70	70	70	70	70
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	52	44	44	52	44	44	10	5	10	4	4
g / C, Green / Cycle	0.75	0.63	0.63	0.75	0.63	0.63	0.14	0.07	0.14	0.05	0.05
(v / s)_i Volume / Saturation Flow Rate	0.08	0.18	0.18	0.12	0.15	0.01	0.02	0.05	0.01	0.00	0.01
s, saturation flow rate [veh/h]	928	1642	1553	877	3127	1454	1375	1478	1333	1710	1454
c, Capacity [veh/h]	773	1024	969	729	1970	916	341	104	280	92	78
d1, Uniform Delay [s]	2.65	6.05	6.06	2.82	5.68	4.84	26.32	32.11	26.11	31.56	31.73
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.26	0.70	0.74	0.09	0.29	0.02	0.10	11.68	0.05	0.29	0.99
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
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
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

Lane Group Results

X, volume / capacity	0.10	0.28	0.29	0.14	0.24	0.01	0.08	0.78	0.04	0.07	0.17
d, Delay for Lane Group [s/veh]	2.91	6.75	6.80	2.91	5.97	4.86	26.42	43.79	26.16	31.86	32.72
Lane Group LOS	A	A	A	A	A	A	C	D	C	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh]	0.17	1.52	1.45	0.17	1.10	0.04	0.39	1.64	0.14	0.10	0.23
50th-Percentile Queue Length [ft]	4.18	37.88	36.37	4.34	27.49	0.94	9.76	41.11	3.59	2.53	5.64
95th-Percentile Queue Length [veh]	0.30	2.73	2.62	0.31	1.98	0.07	0.70	2.96	0.26	0.18	0.41
95th-Percentile Queue Length [ft]	7.52	68.18	65.46	7.81	49.48	1.69	17.56	74.00	6.46	4.56	10.16

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Movement, Approach, & Intersection Results

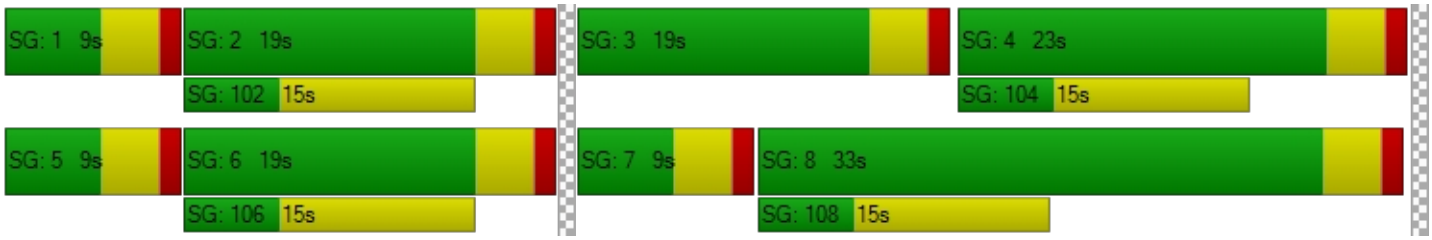
d_M, Delay for Movement [s/veh]	2.91	6.77	6.80	2.91	5.97	4.86	26.42	43.79	43.79	26.16	31.86	32.72
Movement LOS	A	A	A	A	A	A	C	D	D	C	C	C
d_A, Approach Delay [s/veh]	6.31			5.42			39.45			30.28		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	9.03											
Intersection LOS	A											
Intersection V/C	0.261											

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]	26.58	26.58	26.58	26.58
l_p,int, Pedestrian LOS Score for Intersection	2.643	2.716	2.066	2.274
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	429	429	829	543
d_b, Bicycle Delay [s]	21.61	21.61	12.01	18.58
l_b,int, Bicycle LOS Score for Intersection	2.092	2.050	1.738	1.607
Bicycle LOS	B	B	A	A

Sequence

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



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Intersection Level Of Service Report

Intersection 2: Hudson Road & Ridgeway Avenue

Control Type:	Two-way stop	Delay (sec / veh):	37.9
Analysis Method:	HCM 6th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.222

Intersection Setup

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
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]	250.00	100.00	100.00	220.00	100.00	100.00	250.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	45.00			45.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	10	438	40	87	344	5	18	23	6	25	10	38
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	10.00	4.00	0.00	0.00	5.00	0.00	6.00	0.00	0.00	0.00	0.00	3.00
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]	11	463	42	92	364	5	19	24	6	26	11	40
Peak Hour Factor	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400
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	138	13	27	108	1	6	7	2	8	3	12
Total Analysis Volume [veh/h]	13	551	50	110	433	6	23	29	7	31	13	48
Pedestrian Volume [ped/h]	0			0			0			0		

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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	0.01	0.01	0.00	0.11	0.00	0.00	0.14	0.20	0.01	0.22	0.09	0.07
d_M, Delay for Movement [s/veh]	8.43	0.00	0.00	9.11	0.00	0.00	31.08	34.97	14.89	37.90	31.14	10.58
Movement LOS	A	A	A	A	A	A	D	D	B	E	D	B
95th-Percentile Queue Length [veh]	0.04	0.00	0.00	0.38	0.00	0.00	0.49	0.75	0.75	0.81	0.28	0.22
95th-Percentile Queue Length [ft]	0.93	0.00	0.00	9.38	0.00	0.00	12.17	18.79	18.79	20.15	6.97	5.57
d_A, Approach Delay [s/veh]	0.18			1.83			31.07			22.69		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	3.83											
Intersection LOS	E											

Intersection Level Of Service Report
Intersection 3: Chancellor Drive & Technology Parkway

Control Type:	Two-way stop	Delay (sec / veh):	18.5
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.028

Intersection Setup

Name	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
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	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
Base Volume Input [veh/h]	109	121	5	5	17	109	7	5	7	0	0	4
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	20.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	25.00
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]	115	128	5	5	18	115	7	5	7	0	0	4
Peak Hour Factor	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300
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]	46	51	2	2	7	46	3	2	3	0	0	2
Total Analysis Volume [veh/h]	183	203	8	8	29	183	11	8	11	0	0	6
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	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	0.13	0.00	0.00	0.01	0.00	0.00	0.04	0.03	0.01	0.00	0.00	0.01
d_M, Delay for Movement [s/veh]	8.03	0.00	0.00	7.88	0.00	0.00	17.55	18.48	9.60	17.26	18.39	9.66
Movement LOS	A	A	A	A	A	A	C	C	A	C	C	A
95th-Percentile Queue Length [veh]	1.20	1.20	1.20	0.63	0.63	0.63	0.25	0.25	0.25	0.02	0.02	0.02
95th-Percentile Queue Length [ft]	29.97	29.97	29.97	15.80	15.80	15.80	6.14	6.14	6.14	0.58	0.58	0.58
d_A, Approach Delay [s/veh]	3.73			0.29			14.88			9.66		
Approach LOS	A			A			B			A		
d_I, Intersection Delay [s/veh]	3.13											
Intersection LOS	C											

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Intersection Level Of Service Report

Intersection 4: Chancellor Drive/Lexington Boulevard & Ridgeway Avenue

Control Type:	Roundabout	Delay (sec / veh):	3.8
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
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			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	16	9	54	12	5	5	20	137	6	25	58	184
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00
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]	17	10	57	13	5	5	21	145	6	26	61	194
Peak Hour Factor	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600
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]	6	3	19	4	2	2	7	48	2	9	20	64
Total Analysis Volume [veh/h]	22	13	75	17	7	7	28	191	8	34	80	255
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	236			138			58			63		
Exiting Flow Rate [veh/h]	208			104			41			41		
Demand Flow Rate [veh/h]	17	10	57	13	5	5	21	145	6	26	61	194
Adjusted Demand Flow Rate [veh/h]	22	13	75	17	7	7	28	191	8	34	80	255

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00102	0.00102	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	1.00	1.00	1.00	1.00	0.99	1.00
Entry Flow Rate [veh/h]	110	31	107	121	116	257
Capacity of Entry and Bypass Lanes [veh/h]	1085	1200	1347	1347	1341	1341
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1085	1200	1347	1347	1323	1335
X, volume / capacity	0.10	0.03	0.08	0.09	0.09	0.19

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.34	0.08	0.26	0.29	0.28	0.70
95th-Percentile Queue Length [ft]	8.44	1.99	6.44	7.34	7.06	17.62
Approach Delay [s/veh]	4.20	3.21	3.34		4.02	
Approach LOS	A	A	A		A	
Intersection Delay [s/veh]	3.80					
Intersection LOS	A					

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Intersection Level Of Service Report

Intersection 1: Hudson Road & Technology Parkway

Control Type:	Signalized	Delay (sec / veh):	11.0
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.283

Intersection Setup

Name	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
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	1	1	0	0	1	0	1
Pocket Length [ft]	320.00	100.00	100.00	200.00	100.00	200.00	140.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			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	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
Base Volume Input [veh/h]	41	530	7	11	489	8	9	5	46	71	6	90
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	10.00	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
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]	43	560	7	12	517	8	10	5	49	75	6	95
Peak Hour Factor	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900
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	157	2	3	145	2	3	1	14	21	2	27
Total Analysis Volume [veh/h]	48	629	8	13	581	9	11	6	55	84	7	107
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		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	60
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	9	23	0	9	23	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	R	L	C	L	C	R
C, Cycle Length [s]	60	60	60	60	60	60	60	60	60	60	60
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	41	36	36	41	34	34	11	3	11	6	6
g / C, Green / Cycle	0.68	0.60	0.60	0.68	0.57	0.57	0.18	0.05	0.18	0.10	0.10
(v / s)_i Volume / Saturation Flow Rate	0.06	0.19	0.19	0.02	0.18	0.01	0.01	0.04	0.06	0.00	0.07
s, saturation flow rate [veh/h]	797	1683	1676	792	3204	1454	1378	1475	1426	1710	1442
c, Capacity [veh/h]	635	1002	998	634	1812	822	430	82	397	179	151
d1, Uniform Delay [s]	3.57	6.09	6.09	3.46	6.95	5.72	20.06	28.05	21.06	24.28	26.12
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.23	0.84	0.84	0.01	0.47	0.02	0.02	12.48	0.26	0.09	6.06
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
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
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

Lane Group Results

X, volume / capacity	0.08	0.32	0.32	0.02	0.32	0.01	0.03	0.74	0.21	0.04	0.71
d, Delay for Lane Group [s/veh]	3.80	6.93	6.93	3.48	7.42	5.75	20.09	40.53	21.32	24.37	32.17
Lane Group LOS	A	A	A	A	A	A	C	D	C	C	C
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh]	0.13	1.47	1.47	0.03	1.41	0.04	0.12	1.11	0.98	0.09	1.65
50th-Percentile Queue Length [ft]	3.19	36.83	36.72	0.63	35.30	0.96	3.04	27.64	24.50	2.24	41.29
95th-Percentile Queue Length [veh]	0.23	2.65	2.64	0.05	2.54	0.07	0.22	1.99	1.76	0.16	2.97
95th-Percentile Queue Length [ft]	5.74	66.30	66.09	1.13	63.54	1.74	5.48	49.76	44.10	4.02	74.32

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	3.80	6.93	6.93	3.48	7.42	5.75	20.09	40.53	40.53	21.32	24.37	32.17
Movement LOS	A	A	A	A	A	A	C	D	D	C	C	C
d_A, Approach Delay [s/veh]	6.71			7.31			37.41			27.29		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	10.97											
Intersection LOS	B											
Intersection V/C	0.283											

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]	21.68	21.68	21.68	21.68
l_p,int, Pedestrian LOS Score for Intersection	2.702	2.765	2.006	2.178
Crosswalk LOS	B	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	500	500	633	633
d_b, Bicycle Delay [s]	16.88	16.88	14.01	14.01
l_b,int, Bicycle LOS Score for Intersection	2.125	2.057	1.678	1.886
Bicycle LOS	B	B	A	A

Sequence

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

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Intersection Level Of Service Report

Intersection 2: Hudson Road & Ridgeway Avenue

Control Type:	Two-way stop	Delay (sec / veh):	47.0
Analysis Method:	HCM 6th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.212

Intersection Setup

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
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]	250.00	100.00	100.00	220.00	100.00	100.00	250.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	45.00			45.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	7	454	19	69	494	44	20	10	5	23	33	106
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	0.00	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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]	7	480	20	73	522	46	21	11	5	24	35	112
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
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]	2	133	6	20	145	13	6	3	1	7	10	31
Total Analysis Volume [veh/h]	8	533	22	81	580	51	23	12	6	27	39	124
Pedestrian Volume [ped/h]	0			0			0			0		

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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	0.01	0.01	0.00	0.08	0.01	0.00	0.21	0.09	0.01	0.16	0.28	0.17
d_M, Delay for Movement [s/veh]	8.78	0.00	0.00	8.81	0.00	0.00	47.01	32.49	12.18	30.44	41.02	10.98
Movement LOS	A	A	A	A	A	A	E	D	B	D	E	B
95th-Percentile Queue Length [veh]	0.03	0.00	0.00	0.26	0.00	0.00	0.76	0.31	0.31	0.56	1.09	0.61
95th-Percentile Queue Length [ft]	0.63	0.00	0.00	6.42	0.00	0.00	18.90	7.66	7.66	13.89	27.14	15.33
d_A, Approach Delay [s/veh]	0.12			1.00			37.66			19.91		
Approach LOS	A			A			E			C		
d_I, Intersection Delay [s/veh]	4.06											
Intersection LOS	E											

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Intersection Level Of Service Report

Intersection 3: Chancellor Drive & Technology Parkway

Control Type:	Two-way stop	Delay (sec / veh):	15.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.012

Intersection Setup

Name	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
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	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
Base Volume Input [veh/h]	25	27	5	5	110	19	112	5	120	6	1	2
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	4.00	7.00	0.00	20.00	4.00	5.00	0.00	0.00	0.00	17.00	0.00	50.00
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]	26	29	5	5	116	20	118	5	127	6	1	2
Peak Hour Factor	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000
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]	9	10	2	2	41	7	42	2	45	2	0	1
Total Analysis Volume [veh/h]	37	41	7	7	166	29	169	7	181	9	1	3
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	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	0.03	0.00	0.00	0.00	0.00	0.00	0.27	0.01	0.21	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	7.71	0.00	0.00	7.49	0.00	0.00	15.50	15.89	13.86	14.12	11.48	9.19
Movement LOS	A	A	A	A	A	A	C	C	B	B	B	A
95th-Percentile Queue Length [veh]	0.20	0.20	0.20	0.48	0.48	0.48	2.74	2.74	2.74	0.08	0.08	0.08
95th-Percentile Queue Length [ft]	4.97	4.97	4.97	12.09	12.09	12.09	68.61	68.61	68.61	2.10	2.10	2.10
d_A, Approach Delay [s/veh]	3.36			0.26			14.68			12.78		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	8.74											
Intersection LOS	C											

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Intersection Level Of Service Report

Intersection 4: Chancellor Drive/Lexington Boulevard & Ridgeway Avenue

Control Type:	Roundabout	Delay (sec / veh):	4.9
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
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			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	9	5	62	209	7	8	5	85	9	84	145	22
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	0.00	0.00	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
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]	10	5	66	221	7	8	5	90	10	89	153	23
Peak Hour Factor	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200
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	2	20	67	2	2	2	27	3	27	47	7
Total Analysis Volume [veh/h]	12	6	80	270	9	10	6	110	12	109	187	28
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	391			308			393			24		
Exiting Flow Rate [veh/h]	385			199			118			12		
Demand Flow Rate [veh/h]	10	5	66	221	7	8	5	90	10	89	153	23
Adjusted Demand Flow Rate [veh/h]	12	6	80	270	9	10	6	110	12	109	187	28

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00102	0.00102	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	0.98	0.98	1.00	1.00	1.00	0.99
Entry Flow Rate [veh/h]	100	295	61	68	153	173
Capacity of Entry and Bypass Lanes [veh/h]	926	1008	993	993	1390	1390
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	911	990	993	993	1390	1381
X, volume / capacity	0.11	0.29	0.06	0.07	0.11	0.12

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.36	1.22	0.19	0.22	0.37	0.42
95th-Percentile Queue Length [ft]	9.01	30.52	4.83	5.49	9.21	10.62
Approach Delay [s/veh]	4.97	6.59	4.20		3.53	
Approach LOS	A	A	A		A	
Intersection Delay [s/veh]	4.86					
Intersection LOS	A					

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Intersection Level Of Service Report

Intersection 1: Hudson Road & Technology Parkway

Control Type:	Signalized	Delay (sec / veh):	9.5
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.313

Intersection Setup

Name	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
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	1	1	0	0	1	0	1
Pocket Length [ft]	320.00	100.00	100.00	200.00	100.00	200.00	140.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			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	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
Base Volume Input [veh/h]	60	371	70	81	373	7	21	7	56	8	5	10
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	0.00	5.00	3.00	0.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
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	58	0	75	0	0	0	8	0	5	6	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]	63	450	74	161	394	7	22	15	59	13	11	11
Peak Hour Factor	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200
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]	19	137	23	49	120	2	7	5	18	4	3	3
Total Analysis Volume [veh/h]	77	549	90	196	480	9	27	18	72	16	13	13
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]	70
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	13	33	0	9	29	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	R	L	C	L	C	R
C, Cycle Length [s]	70	70	70	70	70	70	70	70	70	70	70
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	51	42	42	51	43	43	11	5	11	5	5
g / C, Green / Cycle	0.73	0.60	0.60	0.73	0.62	0.62	0.15	0.08	0.15	0.07	0.07
(v / s)_i Volume / Saturation Flow Rate	0.08	0.20	0.20	0.23	0.15	0.01	0.02	0.06	0.01	0.01	0.01
s, saturation flow rate [veh/h]	929	1642	1563	846	3127	1454	1358	1498	1333	1710	1454
c, Capacity [veh/h]	759	989	941	685	1927	896	354	116	293	116	98
d1, Uniform Delay [s]	2.94	6.94	6.94	3.52	6.11	5.21	25.48	31.79	25.39	30.77	30.82
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.27	0.90	0.95	0.24	0.31	0.02	0.09	10.31	0.08	0.43	0.60
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
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
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

Lane Group Results

X, volume / capacity	0.10	0.33	0.33	0.29	0.25	0.01	0.08	0.77	0.05	0.11	0.13
d, Delay for Lane Group [s/veh]	3.20	7.83	7.89	3.76	6.42	5.23	25.57	42.10	25.47	31.20	31.42
Lane Group LOS	A	A	A	A	A	A	C	D	C	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh]	0.19	1.93	1.86	0.41	1.18	0.04	0.38	1.78	0.23	0.21	0.22
50th-Percentile Queue Length [ft]	4.75	48.37	46.53	10.36	29.45	1.00	9.56	44.49	5.65	5.35	5.43
95th-Percentile Queue Length [veh]	0.34	3.48	3.35	0.75	2.12	0.07	0.69	3.20	0.41	0.39	0.39
95th-Percentile Queue Length [ft]	8.55	87.07	83.75	18.64	53.01	1.80	17.22	80.09	10.17	9.63	9.77

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	3.20	7.86	7.89	3.76	6.42	5.23	25.57	42.10	42.10	25.47	31.20	31.42
Movement LOS	A	A	A	A	A	A	C	D	D	C	C	C
d_A, Approach Delay [s/veh]	7.36			5.64			38.29			29.08		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	9.51											
Intersection LOS	A											
Intersection V/C	0.313											

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]	26.58	26.58	26.58	26.58
l_p,int, Pedestrian LOS Score for Intersection	2.667	2.756	2.070	2.381
Crosswalk LOS	B	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	429	429	829	714
d_b, Bicycle Delay [s]	21.61	21.61	12.01	14.46
l_b,int, Bicycle LOS Score for Intersection	2.150	2.125	1.753	1.629
Bicycle LOS	B	B	A	A

Sequence

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

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Intersection Level Of Service Report

Intersection 2: Hudson Road & Ridgeway Avenue

Control Type:	Two-way stop	Delay (sec / veh):	45.1
Analysis Method:	HCM 6th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.294

Intersection Setup

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
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]	250.00	100.00	100.00	220.00	100.00	100.00	250.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	45.00			45.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	10	438	40	87	344	5	18	23	6	25	10	38
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	10.00	4.00	0.00	0.00	5.00	0.00	6.00	0.00	0.00	0.00	0.00	3.00
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	13	0	0	5	0	0	8	0	5	6	60
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	476	42	92	369	5	19	32	6	31	17	100
Peak Hour Factor	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400	0.8400
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	142	13	27	110	1	6	10	2	9	5	30
Total Analysis Volume [veh/h]	13	567	50	110	439	6	23	38	7	37	20	119
Pedestrian Volume [ped/h]	0			0			0			0		

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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	0.01	0.01	0.00	0.11	0.00	0.00	0.17	0.27	0.01	0.29	0.14	0.17
d_M, Delay for Movement [s/veh]	8.45	0.00	0.00	9.17	0.00	0.00	37.73	38.74	17.88	45.11	33.55	11.36
Movement LOS	A	A	A	A	A	A	E	E	C	E	D	B
95th-Percentile Queue Length [veh]	0.04	0.00	0.00	0.38	0.00	0.00	0.60	1.07	1.07	1.13	0.46	0.63
95th-Percentile Queue Length [ft]	0.93	0.00	0.00	9.53	0.00	0.00	15.06	26.82	26.82	28.34	11.57	15.65
d_A, Approach Delay [s/veh]	0.17			1.82			36.25			20.98		
Approach LOS	A			A			E			C		
d_I, Intersection Delay [s/veh]	5.09											
Intersection LOS	E											

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Intersection Level Of Service Report

Intersection 3: Chancellor Drive & Technology Parkway

Control Type:	Two-way stop	Delay (sec / veh):	20.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.031

Intersection Setup

Name	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
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	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
Base Volume Input [veh/h]	109	121	5	5	17	109	7	5	7	0	0	4
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	20.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	25.00
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	19	0	0	25	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]	115	147	5	5	43	115	7	5	7	0	0	4
Peak Hour Factor	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300
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]	46	58	2	2	17	46	3	2	3	0	0	2
Total Analysis Volume [veh/h]	183	233	8	8	68	183	11	8	11	0	0	6
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	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	0.14	0.00	0.00	0.01	0.00	0.00	0.04	0.03	0.01	0.00	0.00	0.01
d_M, Delay for Movement [s/veh]	8.15	0.00	0.00	7.95	0.00	0.00	19.16	20.05	9.97	18.78	19.83	9.85
Movement LOS	A	A	A	A	A	A	C	C	A	C	C	A
95th-Percentile Queue Length [veh]	1.39	1.39	1.39	0.80	0.80	0.80	0.27	0.27	0.27	0.02	0.02	0.02
95th-Percentile Queue Length [ft]	34.82	34.82	34.82	19.94	19.94	19.94	6.85	6.85	6.85	0.61	0.61	0.61
d_A, Approach Delay [s/veh]	3.52			0.25			16.03			9.85		
Approach LOS	A			A			C			A		
d_I, Intersection Delay [s/veh]	2.91											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 4: Chancellor Drive/Lexington Boulevard & Ridgeway Avenue

Control Type:	Roundabout	Delay (sec / veh):	4.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
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			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	16	9	54	12	5	5	20	137	6	25	58	184
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00
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	3	0	0	2	0	0	92	0	0	120	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]	17	13	57	13	7	5	21	237	6	26	181	194
Peak Hour Factor	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600	0.7600
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]	6	4	19	4	2	2	7	78	2	9	60	64
Total Analysis Volume [veh/h]	22	17	75	17	9	7	28	312	8	34	238	255
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	357			299			60			67		
Exiting Flow Rate [veh/h]	329			265			43			45		
Demand Flow Rate [veh/h]	17	13	57	13	7	5	21	237	6	26	181	194
Adjusted Demand Flow Rate [veh/h]	22	17	75	17	9	7	28	312	8	34	238	255

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00102	0.00102	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	1.00	1.00	1.00	1.00	0.98	0.99
Entry Flow Rate [veh/h]	114	33	164	185	253	282
Capacity of Entry and Bypass Lanes [veh/h]	959	1018	1345	1345	1337	1337
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	959	1018	1345	1345	1314	1324
X, volume / capacity	0.12	0.03	0.12	0.14	0.19	0.21

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.40	0.10	0.41	0.48	0.69	0.80
95th-Percentile Queue Length [ft]	10.08	2.51	10.36	11.88	17.35	19.94
Approach Delay [s/veh]	4.86	3.82	3.73		4.42	
Approach LOS	A	A	A		A	
Intersection Delay [s/veh]	4.21					
Intersection LOS	A					

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Intersection Level Of Service Report

Intersection 1: Hudson Road & Technology Parkway

Control Type:	Signalized	Delay (sec / veh):	11.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.339

Intersection Setup

Name	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
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	1	1	0	0	1	0	1
Pocket Length [ft]	320.00	100.00	100.00	200.00	100.00	200.00	140.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			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	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
Base Volume Input [veh/h]	41	530	7	11	489	8	9	5	46	71	6	90
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	10.00	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
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	80	0	74	0	0	0	7	0	7	8	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]	43	640	7	86	517	8	10	12	49	82	14	95
Peak Hour Factor	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900
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	180	2	24	145	2	3	3	14	23	4	27
Total Analysis Volume [veh/h]	48	719	8	97	581	9	11	13	55	92	16	107
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]	60
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	9	23	0	9	23	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	R	L	C	L	C	R
C, Cycle Length [s]	60	60	60	60	60	60	60	60	60	60	60
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	41	33	33	41	34	34	11	3	11	7	7
g / C, Green / Cycle	0.68	0.54	0.54	0.68	0.56	0.56	0.19	0.06	0.19	0.11	0.11
(v / s)_i Volume / Saturation Flow Rate	0.06	0.22	0.22	0.12	0.18	0.01	0.01	0.05	0.06	0.01	0.07
s, saturation flow rate [veh/h]	798	1683	1676	811	3204	1454	1367	1496	1422	1710	1442
c, Capacity [veh/h]	630	907	904	626	1793	813	432	88	400	189	159
d1, Uniform Delay [s]	3.70	8.17	8.17	4.11	7.14	5.88	19.77	27.97	20.87	24.09	25.77
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.24	1.32	1.33	0.11	0.48	0.02	0.02	13.21	0.29	0.19	4.85
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
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
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

Lane Group Results

X, volume / capacity	0.08	0.40	0.40	0.15	0.32	0.01	0.03	0.77	0.23	0.08	0.67
d, Delay for Lane Group [s/veh]	3.93	9.50	9.50	4.22	7.62	5.91	19.80	41.19	21.16	24.28	30.63
Lane Group LOS	A	A	A	A	A	A	B	D	C	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh]	0.13	2.24	2.23	0.21	1.45	0.04	0.12	1.24	1.07	0.20	1.60
50th-Percentile Queue Length [ft]	3.32	55.89	55.72	5.26	36.22	0.99	3.01	30.99	26.74	5.09	40.03
95th-Percentile Queue Length [veh]	0.24	4.02	4.01	0.38	2.61	0.07	0.22	2.23	1.93	0.37	2.88
95th-Percentile Queue Length [ft]	5.97	100.60	100.29	9.46	65.20	1.78	5.43	55.78	48.14	9.17	72.06

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	3.93	9.50	9.50	4.22	7.62	5.91	19.80	41.19	41.19	21.16	24.28	30.63
Movement LOS	A	A	A	A	A	A	B	D	D	C	C	C
d_A, Approach Delay [s/veh]	9.15			7.12			38.21			26.10		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	11.74											
Intersection LOS	B											
Intersection V/C	0.339											

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]	21.68	21.68	21.68	21.68
l_p,int, Pedestrian LOS Score for Intersection	2.732	2.807	2.011	2.272
Crosswalk LOS	B	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	500	500	633	633
d_b, Bicycle Delay [s]	16.88	16.88	14.01	14.01
l_b,int, Bicycle LOS Score for Intersection	2.199	2.126	1.690	1.914
Bicycle LOS	B	B	A	A

Sequence

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

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Intersection Level Of Service Report

Intersection 2: Hudson Road & Ridgeway Avenue

Control Type:	Two-way stop	Delay (sec / veh):	61.8
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.269

Intersection Setup

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
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]	250.00	100.00	100.00	220.00	100.00	100.00	250.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	45.00			45.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	7	454	19	69	494	44	20	10	5	23	33	106
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	0.00	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	12	0	0	7	0	0	7	0	7	8	60
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]	7	492	20	73	529	46	21	18	5	31	43	172
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
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]	2	137	6	20	147	13	6	5	1	9	12	48
Total Analysis Volume [veh/h]	8	547	22	81	588	51	23	20	6	34	48	191
Pedestrian Volume [ped/h]	0			0			0			0		

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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	0.01	0.01	0.00	0.08	0.01	0.00	0.27	0.15	0.01	0.22	0.36	0.27
d_M, Delay for Movement [s/veh]	8.80	0.00	0.00	8.86	0.00	0.00	61.84	35.28	14.19	34.88	46.24	11.82
Movement LOS	A	A	A	A	A	A	F	E	B	D	E	B
95th-Percentile Queue Length [veh]	0.03	0.00	0.00	0.26	0.00	0.00	0.98	0.54	0.54	0.81	1.48	1.07
95th-Percentile Queue Length [ft]	0.63	0.00	0.00	6.50	0.00	0.00	24.49	13.38	13.38	20.17	36.88	26.73
d_A, Approach Delay [s/veh]	0.12			1.00			45.16			20.74		
Approach LOS	A			A			E			C		
d_I, Intersection Delay [s/veh]	5.35											
Intersection LOS	F											

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Intersection Level Of Service Report

Intersection 3: Chancellor Drive & Technology Parkway

Control Type:	Two-way stop	Delay (sec / veh):	17.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.013

Intersection Setup

Name	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
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	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
Base Volume Input [veh/h]	25	27	5	5	110	19	112	5	120	6	1	2
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	4.00	7.00	0.00	20.00	4.00	5.00	0.00	0.00	0.00	17.00	0.00	50.00
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	27	0	0	25	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]	26	56	5	5	141	20	118	5	127	6	1	2
Peak Hour Factor	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000
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]	9	20	2	2	50	7	42	2	45	2	0	1
Total Analysis Volume [veh/h]	37	80	7	7	201	29	169	7	181	9	1	3
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	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	0.03	0.00	0.00	0.00	0.00	0.00	0.30	0.01	0.22	0.03	0.00	0.00
d_M, Delay for Movement [s/veh]	7.79	0.00	0.00	7.58	0.00	0.00	17.54	17.86	15.40	15.41	12.17	9.47
Movement LOS	A	A	A	A	A	A	C	C	C	C	B	A
95th-Percentile Queue Length [veh]	0.31	0.31	0.31	0.61	0.61	0.61	3.20	3.20	3.20	0.10	0.10	0.10
95th-Percentile Queue Length [ft]	7.72	7.72	7.72	15.18	15.18	15.18	79.92	79.92	79.92	2.38	2.38	2.38
d_A, Approach Delay [s/veh]	2.33			0.22			16.46			13.79		
Approach LOS	A			A			C			B		
d_I, Intersection Delay [s/veh]	8.75											
Intersection LOS	C											

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Intersection Level Of Service Report

Intersection 4: Chancellor Drive/Lexington Boulevard & Ridgeway Avenue

Control Type:	Roundabout	Delay (sec / veh):	5.5
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
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			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	9	5	62	209	7	8	5	85	9	84	145	22
Base Volume Adjustment Factor	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568	1.0568
Heavy Vehicles Percentage [%]	0.00	0.00	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
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	2	0	0	3	0	0	127	0	0	119	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]	10	7	66	221	10	8	5	217	10	89	272	23
Peak Hour Factor	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200	0.8200
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	2	20	67	3	2	2	66	3	27	83	7
Total Analysis Volume [veh/h]	12	9	80	270	12	10	6	265	12	109	332	28
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	546			453			396			27		
Exiting Flow Rate [veh/h]	540			344			121			15		
Demand Flow Rate [veh/h]	10	7	66	221	10	8	5	217	10	89	272	23
Adjusted Demand Flow Rate [veh/h]	12	9	80	270	12	10	6	265	12	109	332	28

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00102	0.00102	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	0.98	0.98	1.00	1.00	1.00	1.00
Entry Flow Rate [veh/h]	103	298	134	150	221	250
Capacity of Entry and Bypass Lanes [veh/h]	791	870	990	990	1386	1386
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	779	854	990	990	1386	1381
X, volume / capacity	0.13	0.34	0.13	0.15	0.16	0.18

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.45	1.53	0.46	0.53	0.57	0.66
95th-Percentile Queue Length [ft]	11.13	38.16	11.59	13.32	14.13	16.40
Approach Delay [s/veh]	5.96	8.10	4.96		3.99	
Approach LOS	A	A	A		A	
Intersection Delay [s/veh]	5.45					
Intersection LOS	A					

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2040 Projected AM No Build

Intersection Level Of Service Report
Intersection 1: Hudson Road & Technology Parkway

Control Type:	Signalized	Delay (sec / veh):	11.5
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.397

Intersection Setup

Name	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
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	1	1	0	0	1	0	1
Pocket Length [ft]	320.00	100.00	100.00	200.00	100.00	200.00	140.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			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	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
Base Volume Input [veh/h]	60	371	70	81	373	7	21	7	56	8	5	10
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	0.00	5.00	3.00	0.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
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]	113	700	132	153	704	13	40	13	106	15	9	19
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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]	29	179	34	39	180	3	10	3	27	4	2	5
Total Analysis Volume [veh/h]	115	714	135	156	718	13	41	13	108	15	9	19
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		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	60
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	13	23	0	9	19	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	R	L	C	L	C	R
C, Cycle Length [s]	60	60	60	60	60	60	60	60	60	60	60
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	41	32	32	41	32	32	11	6	11	5	5
g / C, Green / Cycle	0.68	0.53	0.53	0.68	0.54	0.54	0.19	0.10	0.19	0.08	0.08
(v / s)_i Volume / Saturation Flow Rate	0.14	0.27	0.27	0.20	0.23	0.01	0.03	0.08	0.01	0.01	0.01
s, saturation flow rate [veh/h]	822	1642	1553	766	3127	1454	1366	1477	1292	1710	1454
c, Capacity [veh/h]	624	869	822	578	1673	778	434	156	336	142	120
d1, Uniform Delay [s]	4.30	9.10	9.10	4.98	8.46	6.58	20.17	26.25	19.99	25.50	25.70
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.65	2.07	2.19	0.25	0.81	0.04	0.09	7.90	0.05	0.19	0.60
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
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
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

Lane Group Results

X, volume / capacity	0.18	0.50	0.50	0.27	0.43	0.02	0.09	0.77	0.04	0.06	0.16
d, Delay for Lane Group [s/veh]	4.95	11.17	11.29	5.23	9.27	6.62	20.26	34.15	20.04	25.68	26.30
Lane Group LOS	A	B	B	A	A	A	C	C	C	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh]	0.34	3.03	2.89	0.36	2.13	0.06	0.46	1.93	0.17	0.12	0.26
50th-Percentile Queue Length [ft]	8.52	75.76	72.30	8.94	53.13	1.58	11.48	48.37	4.15	3.00	6.50
95th-Percentile Queue Length [veh]	0.61	5.45	5.21	0.64	3.83	0.11	0.83	3.48	0.30	0.22	0.47
95th-Percentile Queue Length [ft]	15.33	136.37	130.14	16.10	95.64	2.84	20.66	87.07	7.47	5.40	11.71

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	4.95	11.22	11.29	5.23	9.27	6.62	20.26	34.15	34.15	20.04	25.68	26.30
Movement LOS	A	B	B	A	A	A	C	C	C	C	C	C
d_A, Approach Delay [s/veh]	10.48			8.52			30.64			23.99		
Approach LOS	B			A			C			C		
d_I, Intersection Delay [s/veh]	11.51											
Intersection LOS	B											
Intersection V/C	0.397											

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]	21.68	21.68	21.68	21.68
l_p,int, Pedestrian LOS Score for Intersection	2.811	2.845	2.111	2.322
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	500	500	633	500
d_b, Bicycle Delay [s]	16.88	16.88	14.01	16.88
l_b,int, Bicycle LOS Score for Intersection	2.355	2.291	1.827	1.631
Bicycle LOS	B	B	A	A

Sequence

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

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Intersection Level Of Service Report
Intersection 2: Hudson Road & Ridgeway Avenue

Control Type:	Signalized	Delay (sec / veh):	11.1
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.397

Intersection Setup

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
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]	250.00	100.00	100.00	220.00	100.00	100.00	250.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	45.00			45.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	10	438	40	87	344	5	18	23	6	25	10	38
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	10.00	4.00	0.00	0.00	5.00	0.00	6.00	0.00	0.00	0.00	0.00	3.00
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]	19	827	75	164	649	9	34	43	11	47	19	72
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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	211	19	42	166	2	9	11	3	12	5	18
Total Analysis Volume [veh/h]	19	844	77	167	662	9	35	44	11	48	19	73
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		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	60
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	9	21	0	11	23	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C	R
C, Cycle Length [s]	60	60	60	60	60	60	60	60	60	60	60
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	42	33	33	42	36	36	11	4	11	4	4
g / C, Green / Cycle	0.69	0.55	0.55	0.69	0.60	0.60	0.18	0.06	0.18	0.07	0.07
(v / s)_i Volume / Saturation Flow Rate	0.03	0.28	0.28	0.23	0.20	0.20	0.03	0.03	0.03	0.01	0.05
s, saturation flow rate [veh/h]	718	1656	1608	731	1642	1635	1352	1652	1415	1710	1419
c, Capacity [veh/h]	588	900	874	568	983	978	404	104	392	123	102
d1, Uniform Delay [s]	3.37	8.75	8.75	4.92	6.11	6.11	20.87	27.40	21.04	26.27	27.38
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.10	2.14	2.20	0.29	0.95	0.95	0.09	4.16	0.14	0.58	9.01
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
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
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

Lane Group Results

X, volume / capacity	0.03	0.52	0.52	0.29	0.34	0.34	0.09	0.53	0.12	0.15	0.72
d, Delay for Lane Group [s/veh]	3.48	10.89	10.95	5.21	7.06	7.06	20.96	31.56	21.18	26.85	36.40
Lane Group LOS	A	B	B	A	A	A	C	C	C	C	D
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	0.05	3.15	3.07	0.34	1.57	1.56	0.38	0.81	0.52	0.25	1.18
50th-Percentile Queue Length [ft]	1.18	78.72	76.82	8.49	39.18	39.03	9.40	20.23	13.01	6.24	29.40
95th-Percentile Queue Length [veh]	0.08	5.67	5.53	0.61	2.82	2.81	0.68	1.46	0.94	0.45	2.12
95th-Percentile Queue Length [ft]	2.12	141.70	138.28	15.29	70.53	70.26	16.92	36.41	23.41	11.23	52.91

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	3.48	10.91	10.95	5.21	7.06	7.06	20.96	31.56	31.56	21.18	26.85	36.40
Movement LOS	A	B	B	A	A	A	C	C	C	C	C	D
d_A, Approach Delay [s/veh]	10.77			6.69			27.44			29.88		
Approach LOS	B			A			C			C		
d_I, Intersection Delay [s/veh]	11.15											
Intersection LOS	B											
Intersection V/C	0.397											

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]	21.68	21.68	21.68	21.68
l_p,int, Pedestrian LOS Score for Intersection	2.773	2.809	2.005	2.543
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	500	500	567	633
d_b, Bicycle Delay [s]	16.88	16.88	15.41	14.01
l_b,int, Bicycle LOS Score for Intersection	2.335	2.251	1.708	1.791
Bicycle LOS	B	B	A	A

Sequence

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

Intersection Level Of Service Report
Intersection 3: Chancellor Drive & Technology Parkway

Control Type:	Roundabout	Delay (sec / veh):	5.5
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
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	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
Base Volume Input [veh/h]	109	121	5	5	17	109	7	5	7	0	0	4
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	20.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	25.00
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]	206	228	9	9	32	206	13	9	13	0	0	8
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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]	53	58	2	2	8	53	3	2	3	0	0	2
Total Analysis Volume [veh/h]	210	233	9	9	33	210	13	9	13	0	0	8
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	35			210			44			456		
Exiting Flow Rate [veh/h]	22			210			33			246		
Demand Flow Rate [veh/h]	206	228	9	9	32	206	13	9	13	0	0	8
Adjusted Demand Flow Rate [veh/h]	210	233	9	9	33	210	13	9	13	0	0	8

Lanes

Overwrite Calculated Critical Headway	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1380.00	1380.00
B (coefficient)	0.00102	0.00102	0.00102	0.00102
HV Adjustment Factor	1.00	0.99	0.96	0.80
Entry Flow Rate [veh/h]	452	254	37	10
Capacity of Entry and Bypass Lanes [veh/h]	1333	1114	1320	867
Pedestrian Impedance	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1333	1108	1264	694
X, volume / capacity	0.34	0.23	0.03	0.01

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A
95th-Percentile Queue Length [veh]	1.52	0.88	0.09	0.04
95th-Percentile Queue Length [ft]	37.99	21.92	2.14	0.88
Approach Delay [s/veh]	5.78	5.35	3.07	5.31
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	5.50			
Intersection LOS	A			

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Intersection Level Of Service Report

Intersection 4: Chancellor Drive/Lexington Boulevard & Ridgeway Avenue

Control Type:	Roundabout	Delay (sec / veh):	4.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
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			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	16	9	54	12	5	5	20	137	6	25	58	184
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00
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	17	102	23	9	9	38	259	11	47	109	347
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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	4	26	6	2	2	10	66	3	12	28	89
Total Analysis Volume [veh/h]	31	17	104	23	9	9	39	264	11	48	111	354
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	326			192			80			87		
Exiting Flow Rate [veh/h]	287			144			57			56		
Demand Flow Rate [veh/h]	30	17	102	23	9	9	38	259	11	47	109	347
Adjusted Demand Flow Rate [veh/h]	31	17	104	23	9	9	39	264	11	48	111	354

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00102	0.00102	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	1.00	1.00	1.00	1.00	0.99	1.00
Entry Flow Rate [veh/h]	152	41	148	167	162	356
Capacity of Entry and Bypass Lanes [veh/h]	990	1135	1321	1321	1312	1312
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	990	1135	1321	1321	1294	1306
X, volume / capacity	0.15	0.04	0.11	0.13	0.12	0.27

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.54	0.11	0.38	0.43	0.42	1.11
95th-Percentile Queue Length [ft]	13.54	2.81	9.41	10.78	10.48	27.64
Approach Delay [s/veh]	5.06	3.47	3.69		4.72	
Approach LOS	A	A	A		A	
Intersection Delay [s/veh]	4.40					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 1: Hudson Road & Technology Parkway

Control Type:	Signalized	Delay (sec / veh):	14.6
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.459

Intersection Setup

Name	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
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	1	1	0	0	1	0	1
Pocket Length [ft]	320.00	100.00	100.00	200.00	100.00	200.00	140.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			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	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
Base Volume Input [veh/h]	41	530	7	11	489	8	9	5	46	71	6	90
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	10.00	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
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]	77	1000	13	21	923	15	17	9	87	134	11	170
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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]	20	255	3	5	235	4	4	2	22	34	3	43
Total Analysis Volume [veh/h]	79	1020	13	21	942	15	17	9	89	137	11	173
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		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	60
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	23	0	9	23	0	9	19	0	9	19	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	R	L	C	L	C	R
C, Cycle Length [s]	60	60	60	60	60	60	60	60	60	60	60
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	38	32	32	38	30	30	14	5	14	9	9
g / C, Green / Cycle	0.63	0.54	0.54	0.63	0.50	0.50	0.24	0.09	0.24	0.15	0.15
(v / s)_i Volume / Saturation Flow Rate	0.12	0.31	0.31	0.03	0.29	0.01	0.01	0.07	0.10	0.01	0.12
s, saturation flow rate [veh/h]	653	1683	1676	606	3204	1454	1362	1474	1390	1710	1442
c, Capacity [veh/h]	468	898	894	444	1594	723	498	133	436	261	220
d1, Uniform Delay [s]	6.16	9.45	9.45	5.76	10.76	7.68	17.51	26.65	19.06	21.73	24.54
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.78	2.69	2.70	0.04	1.62	0.05	0.03	7.58	0.41	0.07	6.10
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
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
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

Lane Group Results

X, volume / capacity	0.17	0.58	0.58	0.05	0.59	0.02	0.03	0.73	0.31	0.04	0.79
d, Delay for Lane Group [s/veh]	6.94	12.13	12.15	5.80	12.38	7.73	17.54	34.23	19.47	21.80	30.63
Lane Group LOS	A	B	B	A	B	A	B	C	B	C	C
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh]	0.32	3.80	3.79	0.06	3.56	0.08	0.17	1.57	1.52	0.13	2.59
50th-Percentile Queue Length [ft]	8.08	95.12	94.78	1.55	89.00	2.08	4.30	39.33	37.91	3.24	64.68
95th-Percentile Queue Length [veh]	0.58	6.85	6.82	0.11	6.41	0.15	0.31	2.83	2.73	0.23	4.66
95th-Percentile Queue Length [ft]	14.54	171.21	170.61	2.79	160.21	3.75	7.75	70.79	68.24	5.83	116.43

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	6.94	12.14	12.15	5.80	12.38	7.73	17.54	34.23	34.23	19.47	21.80	30.63
Movement LOS	A	B	B	A	B	A	B	C	C	B	C	C
d_A, Approach Delay [s/veh]	11.77			12.17			31.76			25.56		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	14.59											
Intersection LOS	B											
Intersection V/C	0.459											

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]	21.68	21.68	21.68	21.68
l_p,int, Pedestrian LOS Score for Intersection	2.971	2.971	2.052	2.217
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	633	633	500	500
d_b, Bicycle Delay [s]	14.01	14.01	16.88	16.88
l_b,int, Bicycle LOS Score for Intersection	2.477	2.366	1.749	2.089
Bicycle LOS	B	B	A	B

Sequence

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

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Intersection Level Of Service Report

Intersection 2: Hudson Road & Ridgeway Avenue

Control Type:	Signalized	Delay (sec / veh):	16.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.475

Intersection Setup

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
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]	250.00	100.00	100.00	220.00	100.00	100.00	250.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	45.00			45.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	7	454	19	69	494	44	20	10	5	23	33	106
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	0.00	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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]	13	857	36	130	932	83	38	19	9	43	62	200
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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	219	9	33	238	21	10	5	2	11	16	51
Total Analysis Volume [veh/h]	13	874	37	133	951	85	39	19	9	44	63	204
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		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	60
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	9	22	0	10	23	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C	R
C, Cycle Length [s]	60	60	60	60	60	60	60	60	60	60	60
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	35	27	27	35	30	30	17	10	17	11	11
g / C, Green / Cycle	0.58	0.44	0.44	0.58	0.50	0.50	0.28	0.17	0.28	0.18	0.18
(v / s)_i Volume / Saturation Flow Rate	0.02	0.27	0.27	0.17	0.31	0.31	0.03	0.02	0.03	0.04	0.14
s, saturation flow rate [veh/h]	599	1683	1659	761	1683	1635	1331	1618	1364	1710	1454
c, Capacity [veh/h]	398	737	727	490	834	811	521	282	551	304	259
d1, Uniform Delay [s]	7.22	13.08	13.08	7.76	11.14	11.15	15.74	20.91	15.77	21.15	23.70
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.15	3.93	3.98	0.30	3.59	3.70	0.06	0.15	0.06	0.33	5.31
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
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
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

Lane Group Results

X, volume / capacity	0.03	0.62	0.62	0.27	0.63	0.63	0.07	0.10	0.08	0.21	0.79
d, Delay for Lane Group [s/veh]	7.37	17.01	17.07	8.05	14.73	14.85	15.80	21.06	15.83	21.48	29.00
Lane Group LOS	A	B	B	A	B	B	B	C	B	C	C
Critical Lane Group	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	0.06	4.45	4.40	0.53	4.51	4.41	0.34	0.30	0.39	0.69	2.80
50th-Percentile Queue Length [ft]	1.54	111.27	109.97	13.36	112.69	110.27	8.60	7.59	9.72	17.36	69.96
95th-Percentile Queue Length [veh]	0.11	7.91	7.84	0.96	7.99	7.85	0.62	0.55	0.70	1.25	5.04
95th-Percentile Queue Length [ft]	2.77	197.77	195.97	24.05	199.73	196.37	15.47	13.67	17.49	31.25	125.94

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	7.37	17.04	17.07	8.05	14.78	14.85	15.80	21.06	21.06	15.83	21.48	29.00
Movement LOS	A	B	B	A	B	B	B	C	C	B	C	C
d_A, Approach Delay [s/veh]	16.90			14.02			18.00			25.62		
Approach LOS	B			B			B			C		
d_I, Intersection Delay [s/veh]	16.67											
Intersection LOS	B											
Intersection V/C	0.475											

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]	21.68	21.68	21.68	21.68
l_p,int, Pedestrian LOS Score for Intersection	2.857	2.961	2.042	2.516
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	500	500	600	633
d_b, Bicycle Delay [s]	16.88	16.88	14.70	14.01
l_b,int, Bicycle LOS Score for Intersection	2.322	2.524	1.670	2.073
Bicycle LOS	B	B	A	B

Sequence

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

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Intersection Level Of Service Report

Intersection 3: Chancellor Drive & Technology Parkway

Control Type:	Roundabout	Delay (sec / veh):	6.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
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	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
Base Volume Input [veh/h]	25	27	5	5	110	19	112	5	120	6	1	2
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	4.00	7.00	0.00	20.00	4.00	5.00	0.00	0.00	0.00	17.00	0.00	50.00
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]	47	51	9	9	208	36	211	9	226	11	2	4
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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	13	2	2	53	9	54	2	58	3	1	1
Total Analysis Volume [veh/h]	48	52	9	9	212	37	215	9	231	11	2	4
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	235			65			244			321		
Exiting Flow Rate [veh/h]	20			52			233			271		
Demand Flow Rate [veh/h]	47	51	9	9	208	36	211	9	226	11	2	4
Adjusted Demand Flow Rate [veh/h]	48	52	9	9	212	37	215	9	231	11	2	4

Lanes

Overwrite Calculated Critical Headway	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1380.00	1380.00
B (coefficient)	0.00102	0.00102	0.00102	0.00102
HV Adjustment Factor	0.95	0.96	1.00	0.83
Entry Flow Rate [veh/h]	115	270	455	21
Capacity of Entry and Bypass Lanes [veh/h]	1087	1292	1076	996
Pedestrian Impedance	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1034	1235	1076	824
X, volume / capacity	0.11	0.21	0.42	0.02

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A
95th-Percentile Queue Length [veh]	0.35	0.79	2.14	0.06
95th-Percentile Queue Length [ft]	8.81	19.69	53.50	1.58
Approach Delay [s/veh]	4.42	4.73	7.89	4.57
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	6.40			
Intersection LOS	A			

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Intersection Level Of Service Report

Intersection 4: Chancellor Drive/Lexington Boulevard & Ridgeway Avenue

Control Type:	Roundabout	Delay (sec / veh):	7.0
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
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			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	9	5	62	209	7	8	5	85	9	84	145	22
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	0.00	0.00	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
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]	17	9	117	394	13	15	9	160	17	159	274	42
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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	2	30	101	3	4	2	41	4	41	70	11
Total Analysis Volume [veh/h]	17	9	119	402	13	15	9	163	17	162	280	43
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	582			459			585			35		
Exiting Flow Rate [veh/h]	573			297			175			18		
Demand Flow Rate [veh/h]	17	9	117	394	13	15	9	160	17	159	274	42
Adjusted Demand Flow Rate [veh/h]	17	9	119	402	13	15	9	163	17	162	280	43

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00102	0.00102	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	0.98	0.98	1.00	1.00	1.00	0.99
Entry Flow Rate [veh/h]	148	439	89	101	228	259
Capacity of Entry and Bypass Lanes [veh/h]	763	865	834	834	1376	1376
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	750	849	834	834	1376	1367
X, volume / capacity	0.19	0.51	0.11	0.12	0.17	0.19

Movement, Approach, & Intersection Results

Lane LOS	A	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.71	2.92	0.36	0.41	0.59	0.69
95th-Percentile Queue Length [ft]	17.81	73.03	8.91	10.19	14.84	17.29
Approach Delay [s/veh]	6.91	11.06	5.44		4.08	
Approach LOS	A	B	A		A	
Intersection Delay [s/veh]	7.02					
Intersection LOS	A					

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Intersection Level Of Service Report

Intersection 1: Hudson Road & Technology Parkway

Control Type:	Signalized	Delay (sec / veh):	13.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.491

Intersection Setup

Name	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
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	1	1	0	0	1	0	1
Pocket Length [ft]	320.00	100.00	100.00	200.00	100.00	200.00	140.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			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	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
Base Volume Input [veh/h]	60	371	70	81	373	7	21	7	56	8	5	10
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	0.00	5.00	3.00	0.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
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	80	0	141	0	0	0	26	0	14	15	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]	113	780	132	294	704	13	40	39	106	29	24	19
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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]	29	199	34	75	180	3	10	10	27	7	6	5
Total Analysis Volume [veh/h]	115	796	135	300	718	13	41	40	108	30	24	19
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]	60
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	12	23	0	9	20	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	R	L	C	L	C	R
C, Cycle Length [s]	60	60	60	60	60	60	60	60	60	60	60
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	39	30	30	39	30	30	14	7	14	7	7
g / C, Green / Cycle	0.64	0.49	0.49	0.64	0.50	0.50	0.23	0.12	0.23	0.12	0.12
(v / s)_i Volume / Saturation Flow Rate	0.14	0.29	0.29	0.40	0.23	0.01	0.03	0.10	0.02	0.01	0.01
s, saturation flow rate [veh/h]	830	1642	1561	748	3127	1454	1335	1515	1283	1710	1454
c, Capacity [veh/h]	595	803	763	528	1565	728	466	190	362	200	170
d1, Uniform Delay [s]	5.17	11.09	11.09	8.17	9.76	7.59	18.49	25.54	18.59	23.83	23.81
k, delay calibration	0.50	0.50	0.50	0.31	0.50	0.50	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
d2, Incremental Delay [s]	0.72	3.22	3.39	2.73	0.97	0.04	0.08	6.69	0.10	0.26	0.29
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
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
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

Lane Group Results

X, volume / capacity	0.19	0.59	0.59	0.57	0.46	0.02	0.09	0.78	0.08	0.12	0.11
d, Delay for Lane Group [s/veh]	5.89	14.31	14.48	10.89	10.73	7.63	18.57	32.24	18.69	24.10	24.10
Lane Group LOS	A	B	B	B	B	A	B	C	B	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh]	0.42	4.04	3.87	1.29	2.42	0.07	0.43	2.28	0.32	0.30	0.24
50th-Percentile Queue Length [ft]	10.46	100.92	96.81	32.22	60.42	1.78	10.85	57.01	7.93	7.60	6.06
95th-Percentile Queue Length [veh]	0.75	7.27	6.97	2.32	4.35	0.13	0.78	4.10	0.57	0.55	0.44
95th-Percentile Queue Length [ft]	18.83	181.66	174.26	57.99	108.75	3.20	19.54	102.61	14.28	13.68	10.91

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	5.89	14.38	14.48	10.89	10.73	7.63	18.57	32.24	32.24	18.69	24.10	24.10
Movement LOS	A	B	B	B	B	A	B	C	C	B	C	C
d_A, Approach Delay [s/veh]	13.46			10.74			29.27			21.87		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	13.80											
Intersection LOS	B											
Intersection V/C	0.491											

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]	21.68	21.68	21.68	21.68
l_p,int, Pedestrian LOS Score for Intersection	2.844	2.902	2.119	2.469
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	500	500	633	533
d_b, Bicycle Delay [s]	16.88	16.88	14.01	16.13
l_b,int, Bicycle LOS Score for Intersection	2.423	2.410	1.871	1.680
Bicycle LOS	B	B	A	A

Sequence

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

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Intersection Level Of Service Report

Intersection 2: Hudson Road & Ridgeway Avenue

Control Type:	Signalized	Delay (sec / veh):	16.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.503

Intersection Setup

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
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]	250.00	100.00	100.00	220.00	100.00	100.00	250.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	45.00			45.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	10	438	40	87	344	5	18	23	6	25	10	38
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	10.00	4.00	0.00	0.00	5.00	0.00	6.00	0.00	0.00	0.00	0.00	3.00
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	47	0	0	14	0	0	26	0	14	15	116
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]	19	874	75	164	663	9	34	69	11	61	34	188
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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	223	19	42	169	2	9	18	3	16	9	48
Total Analysis Volume [veh/h]	19	892	77	167	677	9	35	70	11	62	35	192
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]	60
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	21	0	9	21	0	9	21	0	9	21	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C	R
C, Cycle Length [s]	60	60	60	60	60	60	60	60	60	60	60
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	36	27	27	36	30	30	16	9	16	10	10
g / C, Green / Cycle	0.59	0.45	0.45	0.59	0.50	0.50	0.27	0.15	0.27	0.17	0.17
(v / s)_i Volume / Saturation Flow Rate	0.03	0.30	0.30	0.23	0.21	0.21	0.03	0.05	0.05	0.02	0.14
s, saturation flow rate [veh/h]	721	1656	1610	741	1642	1635	1289	1670	1342	1710	1419
c, Capacity [veh/h]	504	736	716	479	821	817	510	256	496	291	242
d1, Uniform Delay [s]	5.74	13.22	13.22	8.34	9.53	9.54	16.17	22.70	16.48	21.18	24.00
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.14	4.75	4.88	0.43	1.57	1.58	0.06	0.70	0.11	0.18	5.84
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
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
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

Lane Group Results

X, volume / capacity	0.04	0.67	0.67	0.35	0.42	0.42	0.07	0.32	0.13	0.12	0.79
d, Delay for Lane Group [s/veh]	5.88	17.96	18.09	8.78	11.10	11.11	16.23	23.40	16.59	21.37	29.84
Lane Group LOS	A	B	B	A	B	B	B	C	B	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	0.08	4.93	4.82	0.66	2.42	2.41	0.31	0.95	0.57	0.38	2.68
50th-Percentile Queue Length [ft]	2.05	123.30	120.54	16.49	60.53	60.30	7.87	23.79	14.19	9.58	67.05
95th-Percentile Queue Length [veh]	0.15	8.57	8.42	1.19	4.36	4.34	0.57	1.71	1.02	0.69	4.83
95th-Percentile Queue Length [ft]	3.68	214.35	210.57	29.69	108.95	108.54	14.16	42.82	25.54	17.25	120.69

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	5.88	18.02	18.09	8.78	11.11	11.11	16.23	23.40	23.40	16.59	21.37	29.84
Movement LOS	A	B	B	A	B	B	B	C	C	B	C	C
d_A, Approach Delay [s/veh]	17.79			10.65			21.23			25.97		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	16.31											
Intersection LOS	B											
Intersection V/C	0.503											

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]	21.68	21.68	21.68	21.68
l_p,int, Pedestrian LOS Score for Intersection	2.805	2.867	2.023	2.571
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	567	567	567	567
d_b, Bicycle Delay [s]	15.41	15.41	15.41	15.41
l_b,int, Bicycle LOS Score for Intersection	2.375	2.263	1.751	2.036
Bicycle LOS	B	B	A	B

Sequence

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

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Intersection Level Of Service Report

Intersection 3: Chancellor Drive & Technology Parkway

Control Type:	Roundabout	Delay (sec / veh):	5.8
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
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	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
Base Volume Input [veh/h]	109	121	5	5	17	109	7	5	7	0	0	4
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	20.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	25.00
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	27	0	0	47	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]	206	255	9	9	79	206	13	9	13	0	0	8
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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]	53	65	2	2	20	53	3	2	3	0	0	2
Total Analysis Volume [veh/h]	210	260	9	9	81	210	13	9	13	0	0	8
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	35			210			92			483		
Exiting Flow Rate [veh/h]	22			210			81			273		
Demand Flow Rate [veh/h]	206	255	9	9	79	206	13	9	13	0	0	8
Adjusted Demand Flow Rate [veh/h]	210	260	9	9	81	210	13	9	13	0	0	8

Lanes

Overwrite Calculated Critical Headway	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1380.00	1380.00
B (coefficient)	0.00102	0.00102	0.00102	0.00102
HV Adjustment Factor	1.00	0.99	0.96	0.80
Entry Flow Rate [veh/h]	479	302	37	10
Capacity of Entry and Bypass Lanes [veh/h]	1333	1114	1257	844
Pedestrian Impedance	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1333	1109	1203	675
X, volume / capacity	0.36	0.27	0.03	0.01

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A
95th-Percentile Queue Length [veh]	1.66	1.10	0.09	0.04
95th-Percentile Queue Length [ft]	41.46	27.54	2.25	0.90
Approach Delay [s/veh]	6.01	5.80	3.23	5.46
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	5.81			
Intersection LOS	A			

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Intersection Level Of Service Report

Intersection 4: Chancellor Drive/Lexington Boulevard & Ridgeway Avenue

Control Type:	Roundabout	Delay (sec / veh):	5.0
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
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			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	16	9	54	12	5	5	20	137	6	25	58	184
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00
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	5	0	0	3	0	0	129	0	0	231	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	22	102	23	12	9	38	388	11	47	340	347
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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	6	26	6	3	2	10	99	3	12	87	89
Total Analysis Volume [veh/h]	31	22	104	23	12	9	39	396	11	48	347	354
Pedestrian Volume [ped/h]	0			0			0			0		

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2040 Projected AM Buildout

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	458			433			83			92		
Exiting Flow Rate [veh/h]	419			385			60			61		
Demand Flow Rate [veh/h]	30	22	102	23	12	9	38	388	11	47	340	347
Adjusted Demand Flow Rate [veh/h]	31	22	104	23	12	9	39	396	11	48	347	354

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00102	0.00102	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	1.00	1.00	1.00	1.00	0.98	0.99
Entry Flow Rate [veh/h]	157	44	210	237	359	401
Capacity of Entry and Bypass Lanes [veh/h]	865	888	1317	1317	1306	1306
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	865	888	1317	1317	1284	1294
X, volume / capacity	0.18	0.05	0.16	0.18	0.27	0.31

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.66	0.16	0.57	0.65	1.12	1.31
95th-Percentile Queue Length [ft]	16.51	3.91	14.14	16.33	28.08	32.83
Approach Delay [s/veh]	5.99	4.52	4.14		5.40	
Approach LOS	A	A	A		A	
Intersection Delay [s/veh]	5.04					
Intersection LOS	A					

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2040 Projected PM Buildout

Version 5.00-00

Intersection Level Of Service Report

Intersection 1: Hudson Road & Technology Parkway

Control Type:	Signalized	Delay (sec / veh):	17.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.552

Intersection Setup

Name	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
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	1	1	0	0	1	0	1
Pocket Length [ft]	320.00	100.00	100.00	200.00	100.00	200.00	140.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			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	Hudson Road			Hudson Road			Technology Parkway			Technology Parkway		
Base Volume Input [veh/h]	41	530	7	11	489	8	9	5	46	71	6	90
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	10.00	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
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	162	0	113	0	0	0	11	0	14	16	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]	77	1162	13	134	923	15	17	20	87	148	27	170
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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]	20	296	3	34	235	4	4	5	22	38	7	43
Total Analysis Volume [veh/h]	79	1186	13	137	942	15	17	20	89	151	28	173
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		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	60
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	9	23	0	9	23	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	R	L	C	L	C	R
C, Cycle Length [s]	60	60	60	60	60	60	60	60	60	60	60
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	37	29	29	37	30	30	15	6	15	9	9
g / C, Green / Cycle	0.62	0.48	0.48	0.62	0.49	0.49	0.24	0.09	0.24	0.16	0.16
(v / s)_i Volume / Saturation Flow Rate	0.12	0.36	0.36	0.21	0.29	0.01	0.01	0.07	0.11	0.02	0.12
s, saturation flow rate [veh/h]	654	1683	1677	637	3204	1454	1346	1495	1381	1710	1442
c, Capacity [veh/h]	465	807	804	441	1581	717	490	141	433	268	226
d1, Uniform Delay [s]	6.30	12.66	12.66	8.74	10.94	7.80	17.33	26.60	19.07	21.74	24.30
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.79	6.15	6.18	0.40	1.66	0.05	0.03	8.57	0.48	0.17	5.35
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
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
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

Lane Group Results

X, volume / capacity	0.17	0.74	0.74	0.31	0.60	0.02	0.03	0.77	0.35	0.10	0.77
d, Delay for Lane Group [s/veh]	7.10	18.81	18.84	9.13	12.60	7.86	17.36	35.17	19.55	21.91	29.65
Lane Group LOS	A	B	B	A	B	A	B	D	B	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh]	0.33	6.14	6.12	0.46	3.61	0.08	0.17	1.78	1.68	0.33	2.54
50th-Percentile Queue Length [ft]	8.24	153.39	153.04	11.41	90.28	2.11	4.28	44.39	41.98	8.29	63.44
95th-Percentile Queue Length [veh]	0.59	10.20	10.18	0.82	6.50	0.15	0.31	3.20	3.02	0.60	4.57
95th-Percentile Queue Length [ft]	14.82	254.95	254.49	20.53	162.51	3.80	7.70	79.90	75.56	14.91	114.19

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	7.10	18.83	18.84	9.13	12.60	7.86	17.36	35.17	35.17	19.55	21.91	29.65
Movement LOS	A	B	B	A	B	A	B	D	D	B	C	C
d_A, Approach Delay [s/veh]	18.10			12.10			32.76			24.70		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	17.26											
Intersection LOS	B											
Intersection V/C	0.552											

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]	21.68	21.68	21.68	21.68
l_p,int, Pedestrian LOS Score for Intersection	3.027	3.040	2.061	2.339
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	500	500	633	633
d_b, Bicycle Delay [s]	16.88	16.88	14.01	14.01
l_b,int, Bicycle LOS Score for Intersection	2.614	2.462	1.768	2.140
Bicycle LOS	B	B	A	B

Sequence

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

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Intersection Level Of Service Report

Intersection 2: Hudson Road & Ridgeway Avenue

Control Type:	Signalized	Delay (sec / veh):	21.8
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.548

Intersection Setup

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
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]	250.00	100.00	100.00	220.00	100.00	100.00	250.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	45.00			45.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Hudson Road			Hudson Road			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	7	454	19	69	494	44	20	10	5	23	33	106
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	0.00	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	19	0	0	14	0	0	11	0	14	16	91
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]	13	876	36	130	946	83	38	30	9	57	78	291
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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	223	9	33	241	21	10	8	2	15	20	74
Total Analysis Volume [veh/h]	13	894	37	133	965	85	39	31	9	58	80	297
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]	60
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	5	2	0	1	6	0	3	8	0	7	4	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]	30	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]	9	19	0	9	19	0	9	20	0	12	23	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	No	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

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C	R
C, Cycle Length [s]	60	60	60	60	60	60	60	60	60	60	60
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
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
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	31	23	23	31	26	26	21	14	21	15	15
g / C, Green / Cycle	0.52	0.38	0.38	0.52	0.43	0.43	0.35	0.23	0.35	0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	0.02	0.28	0.28	0.17	0.32	0.32	0.03	0.02	0.04	0.05	0.20
s, saturation flow rate [veh/h]	605	1683	1660	778	1683	1636	1297	1645	1344	1710	1454
c, Capacity [veh/h]	352	630	621	439	727	706	582	379	620	414	352
d1, Uniform Delay [s]	9.40	16.37	16.37	10.11	14.24	14.25	13.07	18.31	13.19	18.17	21.77
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	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
d2, Incremental Delay [s]	0.20	7.80	7.91	0.38	6.44	6.64	0.05	0.12	0.06	0.22	5.55
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
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
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

Lane Group Results

X, volume / capacity	0.04	0.74	0.74	0.30	0.73	0.73	0.07	0.11	0.09	0.19	0.84
d, Delay for Lane Group [s/veh]	9.60	24.17	24.28	10.50	20.67	20.89	13.12	18.43	13.26	18.40	27.32
Lane Group LOS	A	C	C	B	C	C	B	B	B	B	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	0.08	5.82	5.76	0.70	5.88	5.77	0.30	0.39	0.45	0.79	3.94
50th-Percentile Queue Length [ft]	1.95	145.52	143.95	17.43	147.11	144.20	7.50	9.86	11.27	19.76	98.56
95th-Percentile Queue Length [veh]	0.14	9.78	9.69	1.25	9.86	9.71	0.54	0.71	0.81	1.42	7.10
95th-Percentile Queue Length [ft]	3.51	244.44	242.33	31.37	246.57	242.67	13.49	17.74	20.28	35.56	177.41

Movement, Approach, & Intersection Results

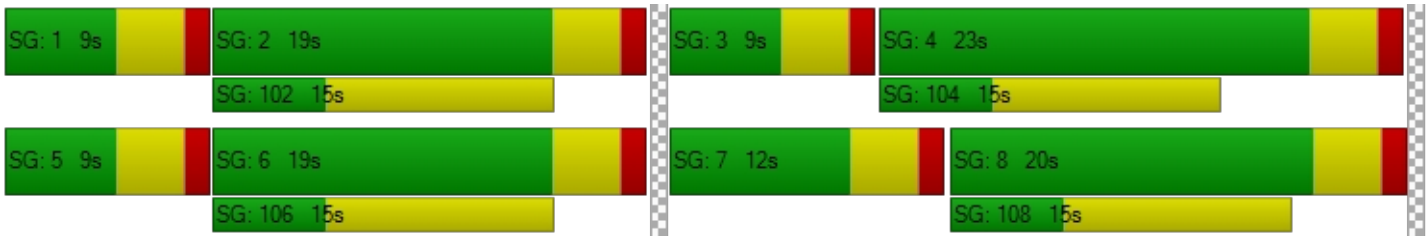
d_M, Delay for Movement [s/veh]	9.60	24.22	24.28	10.50	20.77	20.89	13.12	18.43	18.43	13.26	18.40	27.32
Movement LOS	A	C	C	B	C	C	B	B	B	B	B	C
d_A, Approach Delay [s/veh]	24.02			19.62			15.81			23.80		
Approach LOS	C			B			B			C		
d_I, Intersection Delay [s/veh]	21.77											
Intersection LOS	C											
Intersection V/C	0.548											

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]	21.68	21.68	21.68	21.68
l_p,int, Pedestrian LOS Score for Intersection	2.880	3.002	2.055	2.544
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	500	500	533	633
d_b, Bicycle Delay [s]	16.88	16.88	16.13	14.01
l_b,int, Bicycle LOS Score for Intersection	2.338	2.536	1.690	2.277
Bicycle LOS	B	B	A	B

Sequence

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



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Intersection Level Of Service Report

Intersection 3: Chancellor Drive & Technology Parkway

Control Type:	Roundabout	Delay (sec / veh):	6.7
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
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	Chancellor Drive			Chancellor Drive			Technology Parkway			Access		
Base Volume Input [veh/h]	25	27	5	5	110	19	112	5	120	6	1	2
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	4.00	7.00	0.00	20.00	4.00	5.00	0.00	0.00	0.00	17.00	0.00	50.00
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	54	0	0	38	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]	47	105	9	9	246	36	211	9	226	11	2	4
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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	27	2	2	63	9	54	2	58	3	1	1
Total Analysis Volume [veh/h]	48	107	9	9	251	37	215	9	231	11	2	4
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	235			65			285			379		
Exiting Flow Rate [veh/h]	20			52			274			329		
Demand Flow Rate [veh/h]	47	105	9	9	246	36	211	9	226	11	2	4
Adjusted Demand Flow Rate [veh/h]	48	107	9	9	251	37	215	9	231	11	2	4

Lanes

Overwrite Calculated Critical Headway	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1380.00	1380.00
B (coefficient)	0.00102	0.00102	0.00102	0.00102
HV Adjustment Factor	0.95	0.96	1.00	0.83
Entry Flow Rate [veh/h]	174	311	455	21
Capacity of Entry and Bypass Lanes [veh/h]	1087	1292	1033	938
Pedestrian Impedance	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1028	1236	1033	776
X, volume / capacity	0.16	0.24	0.44	0.02

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A
95th-Percentile Queue Length [veh]	0.57	0.94	2.29	0.07
95th-Percentile Queue Length [ft]	14.17	23.55	57.30	1.68
Approach Delay [s/veh]	4.97	5.04	8.41	4.86
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	6.67			
Intersection LOS	A			

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Intersection Level Of Service Report

Intersection 4: Chancellor Drive/Lexington Boulevard & Ridgeway Avenue

Control Type:	Roundabout	Delay (sec / veh):	8.8
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
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			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lexington Boulevard			Chancellor Drive			Ridgeway Avenue			Ridgeway Avenue		
Base Volume Input [veh/h]	9	5	62	209	7	8	5	85	9	84	145	22
Base Volume Adjustment Factor	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873	1.8873
Heavy Vehicles Percentage [%]	0.00	0.00	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
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	4	0	0	5	0	0	260	0	0	181	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]	17	13	117	394	18	15	9	420	17	159	455	42
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
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	3	30	101	5	4	2	107	4	41	116	11
Total Analysis Volume [veh/h]	17	13	119	402	18	15	9	429	17	162	464	43
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	848			643			590			39		
Exiting Flow Rate [veh/h]	839			481			180			22		
Demand Flow Rate [veh/h]	17	13	117	394	18	15	9	420	17	159	455	42
Adjusted Demand Flow Rate [veh/h]	17	13	119	402	18	15	9	429	17	162	464	43

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00102	0.00102	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	0.98	0.98	1.00	1.00	1.00	1.00
Entry Flow Rate [veh/h]	152	444	214	242	315	357
Capacity of Entry and Bypass Lanes [veh/h]	582	717	831	831	1371	1371
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	572	704	831	831	1371	1365
X, volume / capacity	0.26	0.62	0.26	0.29	0.23	0.26

Movement, Approach, & Intersection Results

Lane LOS	A	C	A	A	A	A
95th-Percentile Queue Length [veh]	1.04	4.31	1.03	1.21	0.89	1.04
95th-Percentile Queue Length [ft]	25.91	107.77	25.69	30.22	22.18	26.10
Approach Delay [s/veh]	9.80	16.15	7.35		4.72	
Approach LOS	A	C	A		A	
Intersection Delay [s/veh]	8.77					
Intersection LOS	A					

Russell Construction Cedar Falls Hotel Conference Center Wetland Delineation

Prepared For:

Russell Construction Co.

Project No. 2171620

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

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Introduction

Shive-Hattery was contracted by Russell Construction Co. to complete a wetland and other Waters of the United States (WUS) survey on a parcel of land located in Cedar Falls, Black Hawk County, Iowa (Figures 1-2). Shive-Hattery delineated 0.62 acres of wetlands within the survey area. Russell Construction Co. is planning to undertake a project to construct a new hotel conference center on this parcel.

Background

General Description of Project Area

The project site is located in Cedar Falls, Black Hawk County, Iowa (Figures 1-2). The site is bordered by W. Ridgeway Ave. on the south, Hudson Rd. on the west, developed commercial parcels on the north, and a grassed parcel on the east. The survey area consists mostly of cropped fields (corn and soybean rotation), with a grassed area in the northwest portion. A drainageway runs from south to north on the site, originating at a culvert that passes under W. Ridgeway Ave., and continuing through to a city-owned parcel on the north side of the survey area.

A pre-delineation investigation was performed to gather information to assist with identifying wetland areas and other WUS in the survey area. Each source of information included as part of this investigation is described below.

U.S. Geological Survey Topographic Map and LiDAR Data

The U.S. Geological Survey (USGS) 7.5-Minute Topographic Map (topo) (Figure 3) includes towns, roads, streams, landmark features, contour lines, general delineation of wet areas, latitude, longitude, drainage, and general land uses. This was used to identify drainages or WUS within the project site. In addition, LiDAR 2-foot contours were obtained to assess the drainage of the survey area (Figure 3).

The east half of the survey area slopes to the drainageway that runs from the south boundary at W. Ridgeway Ave. to the adjacent parcel to the north. This area is currently cropped, in a soybean and corn rotation. The west half of the survey area slopes to the west, ultimately to the drainage ditch that runs north-south the length of the property along Hudson Rd. Much of this area is also cropped, in a corn soybean rotation, with the very northwest portion of the survey area characterized by herbaceous upland vegetation.

National Wetland Inventory Map

The National Wetlands Inventory (NWI) maps are produced at a scale of 1:24,000. Wetlands on NWI maps are classified in accordance with Cowardin at al. (1979), and depict probable wetland areas based on stereoscopic analysis of high altitude aerial photographs. The NWI map was reviewed to identify potential wetland areas located on the project site. The NWI does not show any mapped wetlands or WUS within the wetland survey area (Figure 4).

NRCS Soil Survey

The NRCS soil survey map for the project area (Figure 4), was obtained from the Web Soil Survey (WSS) to identify soil types. The NRCS Map Unit Symbol, Map Unit Name, and WSS Hydric Soil Rating status for the soils of the delineation area are listed in **Table 1**.

Table 1: NRCS Map Units and Names for Soil Groups within the Wetland Delineation Limits

NRCS Map Unit Symbol	NRCS Map Unit Name	WSS Hydric Soil Rating
83B	Kenyon loam, 2 to 5 percent slopes	No
184	Klinger silty clay loam, 1 to 4 percent slopes	No
391B	Clyde-Floyd complex, 1 to 4 percent slopes	Yes
426C	Aredale loam, 5 to 9 percent slopes	No

Climate Data

An evaluation of the antecedent precipitation conditions for the site was conducted using the Combined Method of 30-Day Rolling Totals and NRCS Engineering Field Handbook Weighting Factors as outlined in Sprecher and Warne, 2000. The NRCS Field Office Technical Guide (FOTG) website was utilized for compiling WETS data for the site, specifically for Waterloo (WATERLOO MUNI AP, IA). The WETS data provides a month by month summary and probability analysis of precipitation, providing the normal range of monthly precipitation, utilizing NRCS National Water and Climate Center historical climatic data from the National Weather Service data station. Daily precipitation values were obtained from the NWS COOP station [IA8706] Waterloo, from which 30-day rolling totals were determined. All data was plotted to determine if the 30-day rolling totals were within range of normal precipitation for the 1st, 2nd, and 3rd prior 30 days from the date of observation. Condition values and weights were then used to determine that the prior period has been normal with regard to antecedent precipitation conditions (Appendix B).

Methodology

The wetland delineation was conducted on November 8th, 2017 by John Mottet (Civil Engineer Intern) and Kasey Hutchinson (Water Resources Consultant), both of Shive-Hattery, using the Level 2 routine onsite determination method defined in the 1987 Corps of Engineers Wetlands Delineation Manual and the U.S. Army Corps of Engineers (USACE) Midwest Regional Supplement, Version 2.0 (Delineation Manual). Wetland boundaries are determined by examining the vegetation, soils, and hydrology for wetland indicators. Criteria and indicators for each are outlined in the Delineation Manual.

Wetland boundaries were flagged and surveyed using a Trimble R8 Model 2 GPS unit. All sample points were also flagged and surveyed (Figure 5).

Wetland and other WUS Delineation

Three wetlands were delineated within the survey area: WL1, WL2, and WL3. A summary of characteristics are provided in **Table 2**. The attached data sheets (Appendix B) document additional detail on the dominant plant species, results of the soil sampling, and hydrology observations for each sample point. Photographs of delineated wetland as well as other potential WUS are provided in Appendix C.

Sample points are restricted to the delineated wetlands themselves. This is because the areas adjacent to the identified wetlands had markedly different vegetation that did not satisfy wetland criteria according to the vegetation indicator tests.

Wetland WL1

0.01 acres
Sample Point SP-1

Wetland WL1 is a palustrine emergent wetland located where the culvert that runs beneath W. Ridgeway Ave. discharges into the north-south drainageway. This area is slightly depressed, and was inundated during the time of the survey. The upland/wetland transition is marked by both a change in slope as well as a change in vegetation.

Wetland WL2

0.29 acres
Sample Points SP-2, SP-3

Wetland WL2 is a palustrine emergent wetland located in the cropped farm field at the north boundary of the survey area. Much of this area is disturbed due to farming activities. Even so, sporadic wetland vegetation was identified within the corn/soybean residue, as were soil indicators. The upland/wetland transition is marked by both a change in slope, as the delineated wetland area flattens out relative to the upslope portion of the drainageway, as well as an absence of wetland vegetation upslope from the identified wetland.

Wetland WL3

0.32 acres
Sample Points SP-4, SP-5

Wetland WL3 is a palustrine emergent wetland that runs the entire length of the drainage ditch on the west side of the survey area along Hudson Rd. This ditch is heavily vegetated and the side slopes are relatively steep, especially along the south portion of the ditch; the delineated wetland is in large part restricted to the bottom of the ditch. Portions of the ditch were inundated during the time of the survey.

Table 2. Project Area Wetlands and other Water Resources

Area ID	Dominant Vegetation	Hydric Soil Indicator	Hydrology Indicators
WL1	Black Willow Broad-Leaf Cattail Reed Canary Grass	Assumed-Saturated	A1: Surface Water A2: High Water Table A3: Saturation D2: Geomorphic Position D5: FAC-Neutral Test
WL2	Broad-Leaf Cattail Black Willow Reed Canary Grass Sedge	F6: Redox Dark Surface	A3: Saturation C3: Oxidized Rhizospheres on Living Roots D2: Geomorphic Position D5: FAC-Neutral Test

WL3	Reed Canary Grass Broad-Leaf Cattail	F6: Redox Dark Surface	A1: Surface Water A2: High Water Table A3: Saturation D2: Geomorphic Position D5: FAC-Neutral Test

Conclusions and Recommendations

The wetland survey conducted by Shive-Hattery staff using standard practices, procedures, and professional judgment, resulted in the identification of palustrine emergent wetland in three different locations within the survey area, totaling 0.62 acres. The scientific-based wetland analysis of the site presented in this report reflects the conditions of the wetland survey area at the time the work was conducted. Boundary and jurisdictional decisions ultimately rest with the USACE. If work is planned to be completed within or around these areas, work should be coordinated with the USACE and the IDNR, and no activities that will disturb or impact the delineated wetlands should commence prior to receiving wetland boundary approvals/concurrences and relevant permits from all regulating authorities.

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Appendix A - Figures

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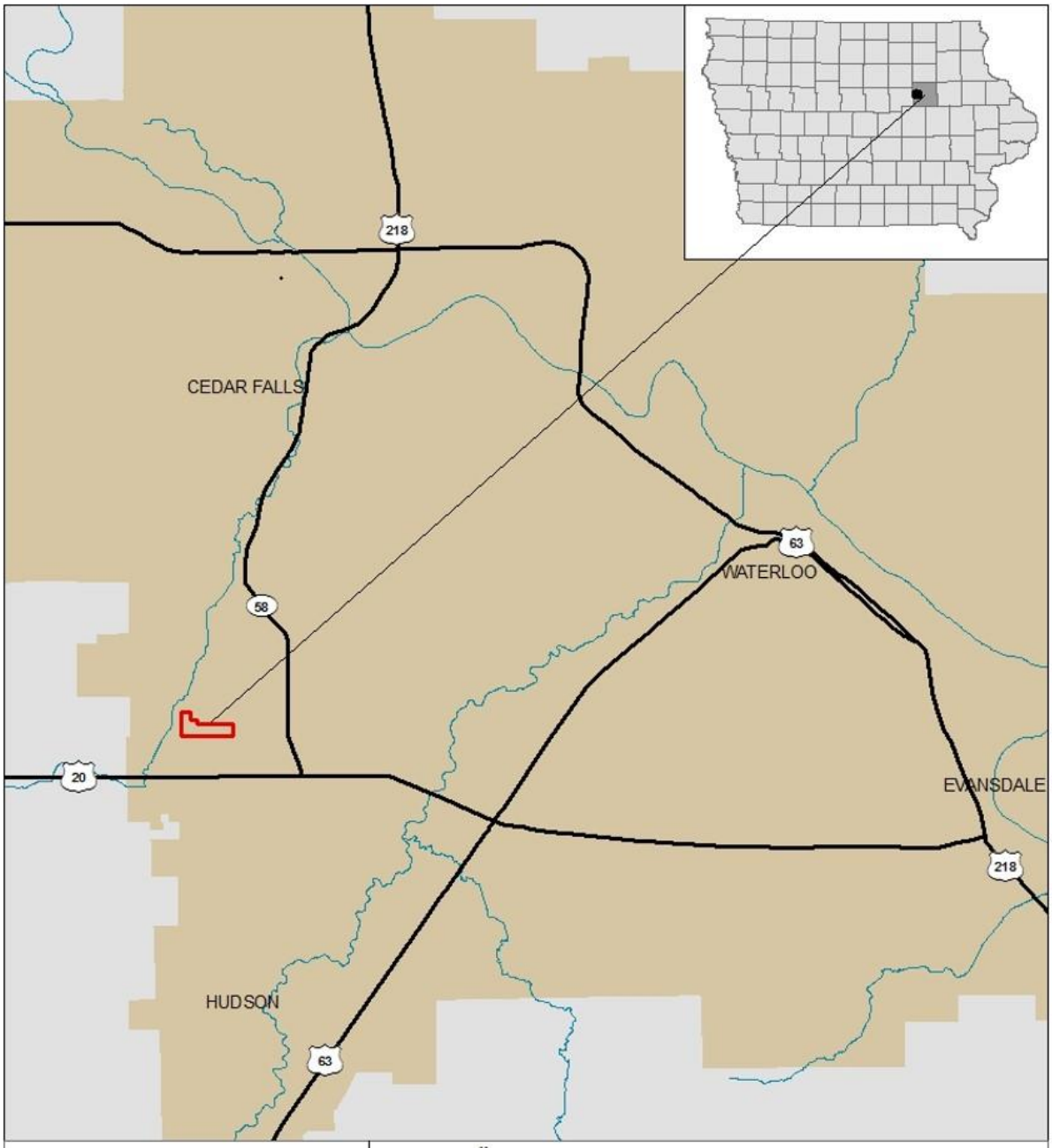

Figure 1: Wetlands Survey Location Map

Project #2171620

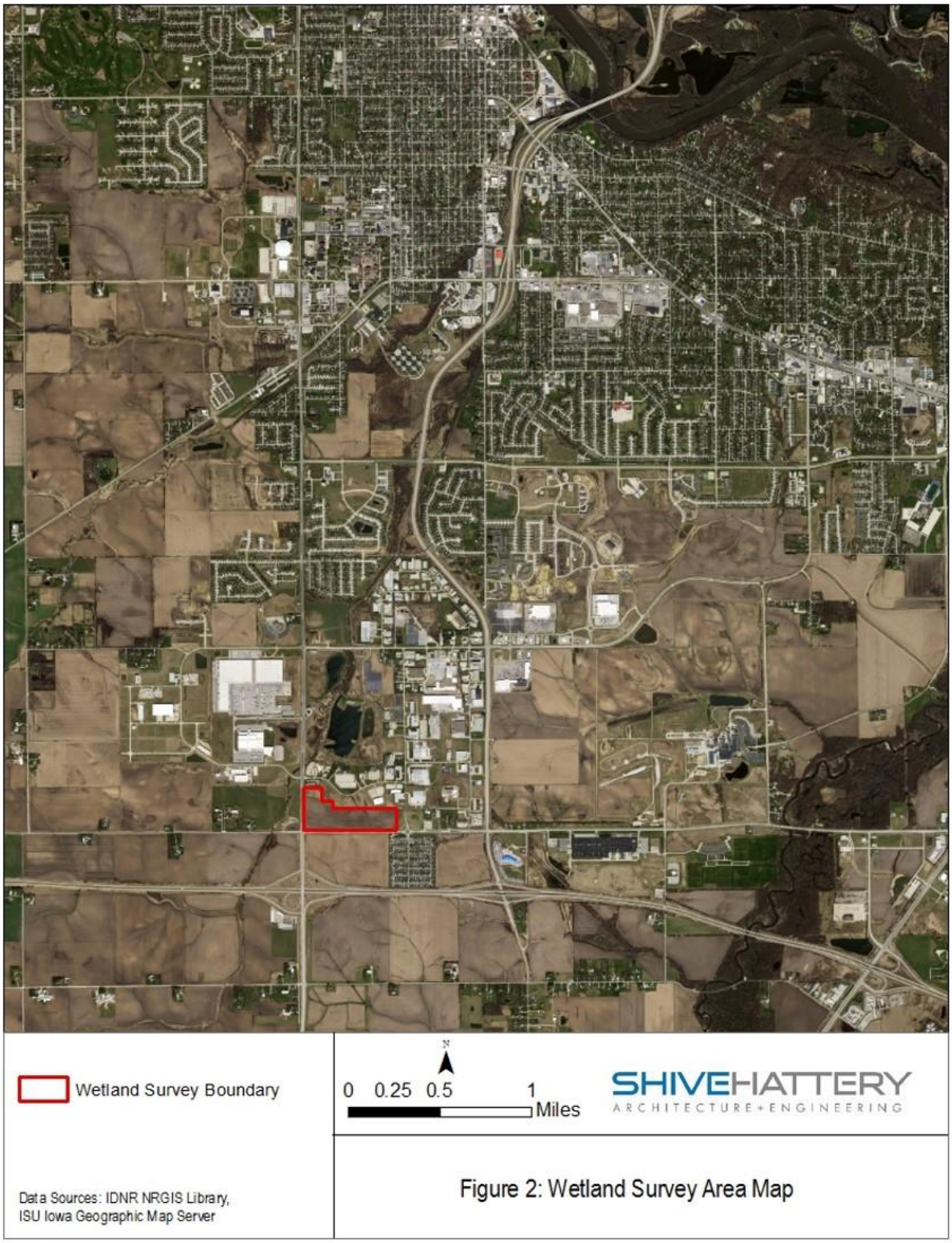

Figure 2: Wetland Survey Area Map

Project #2171620

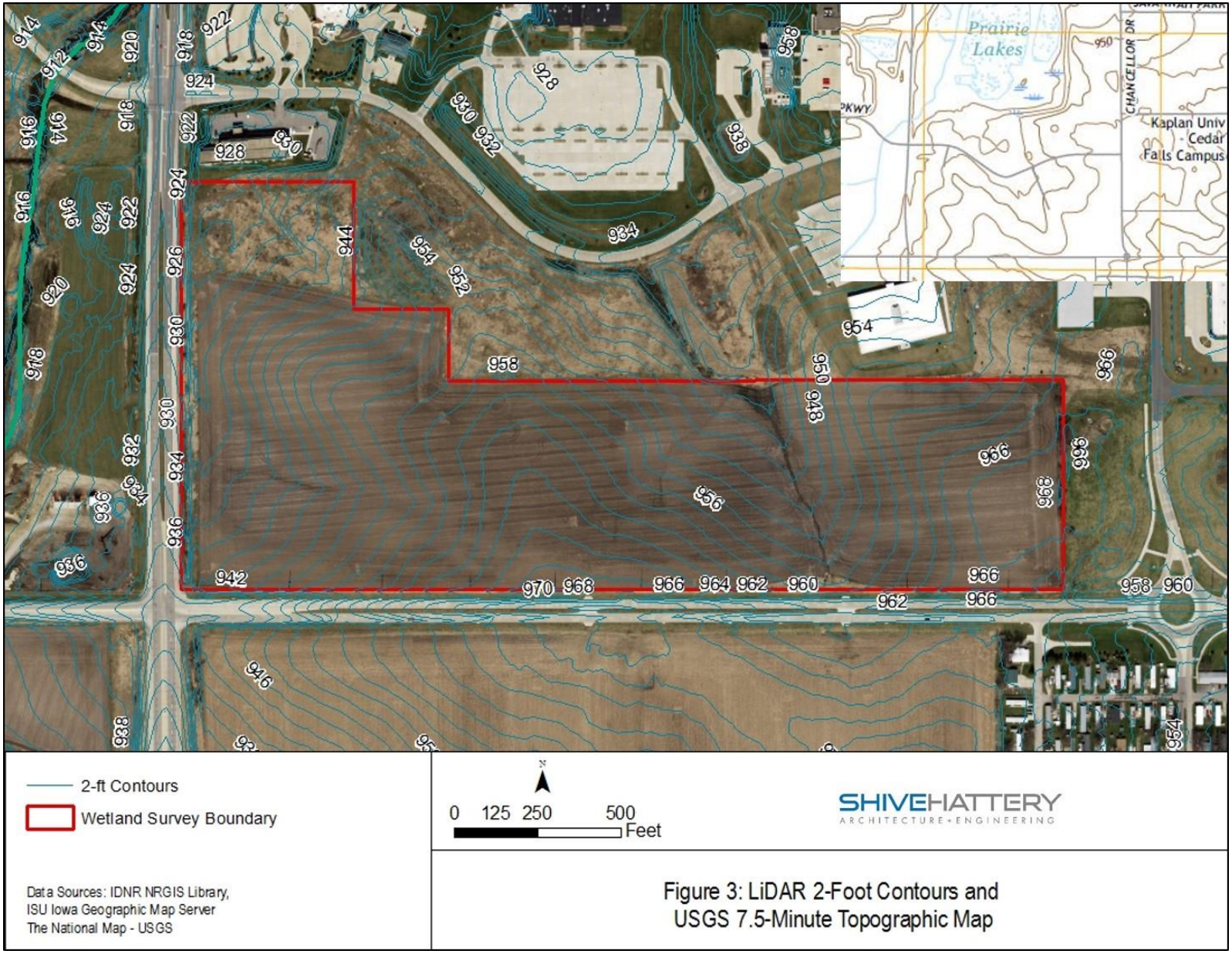

Figure 3: LiDAR 2-Foot Contours and USGS 7.5-Minute Topographic Map

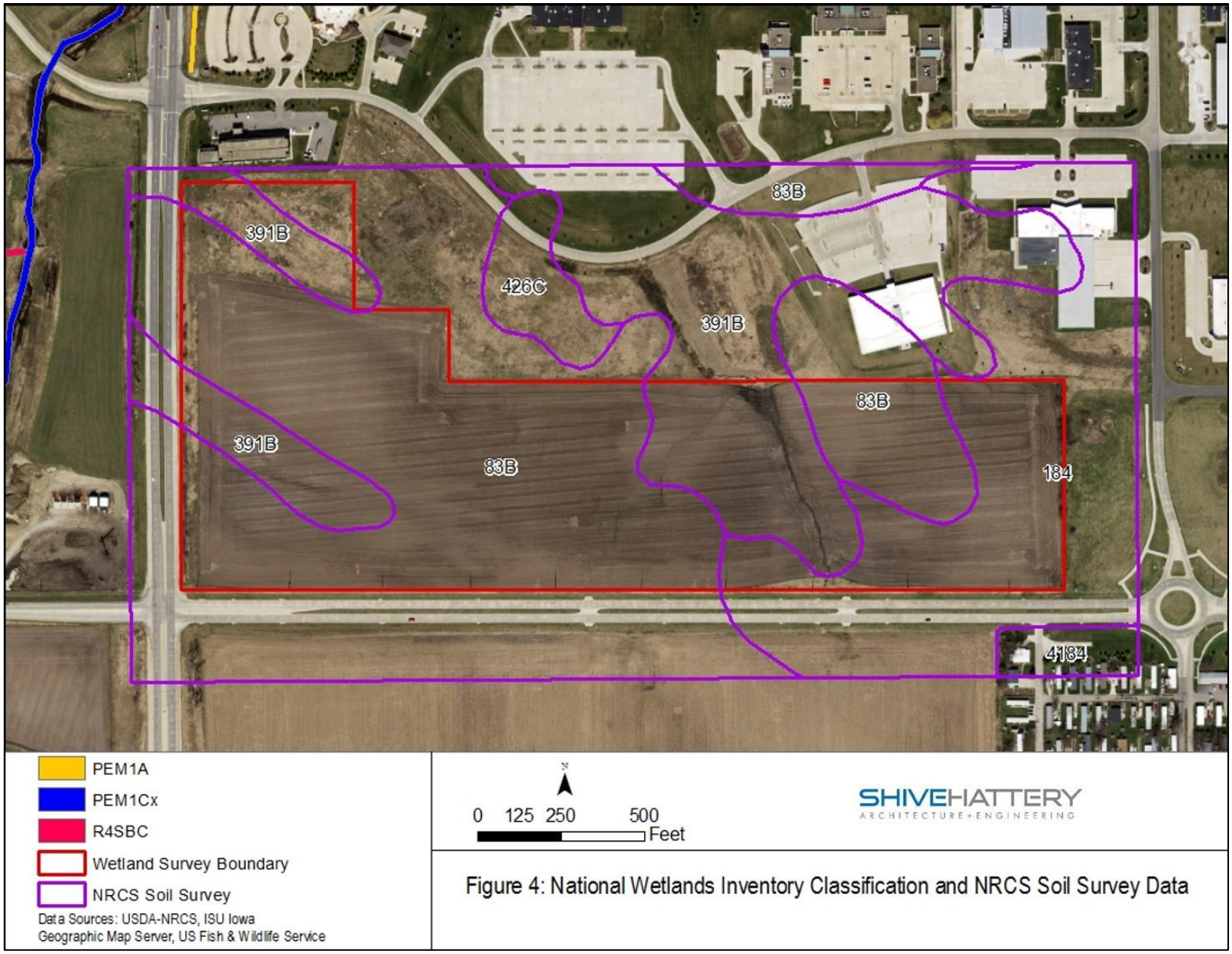

Figure 4: National Wetlands Inventory Classification and NRCS Soil Survey Data

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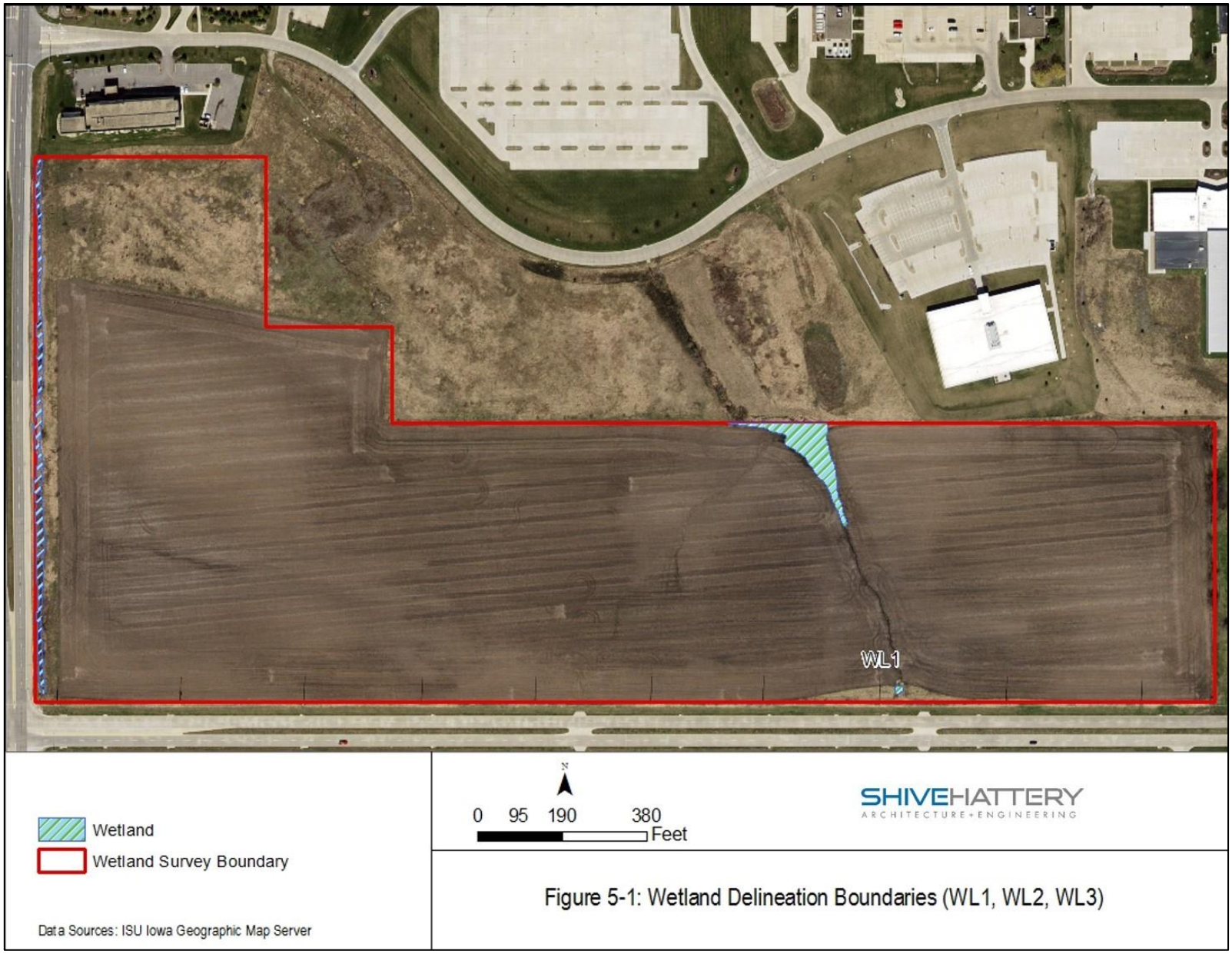

Figure 5-1: Wetland Delineation Boundaries (WL1, WL2, WL3)

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Figure 5-2: Wetland Delineation Boundaries (WL1, WL2) and Sample Points

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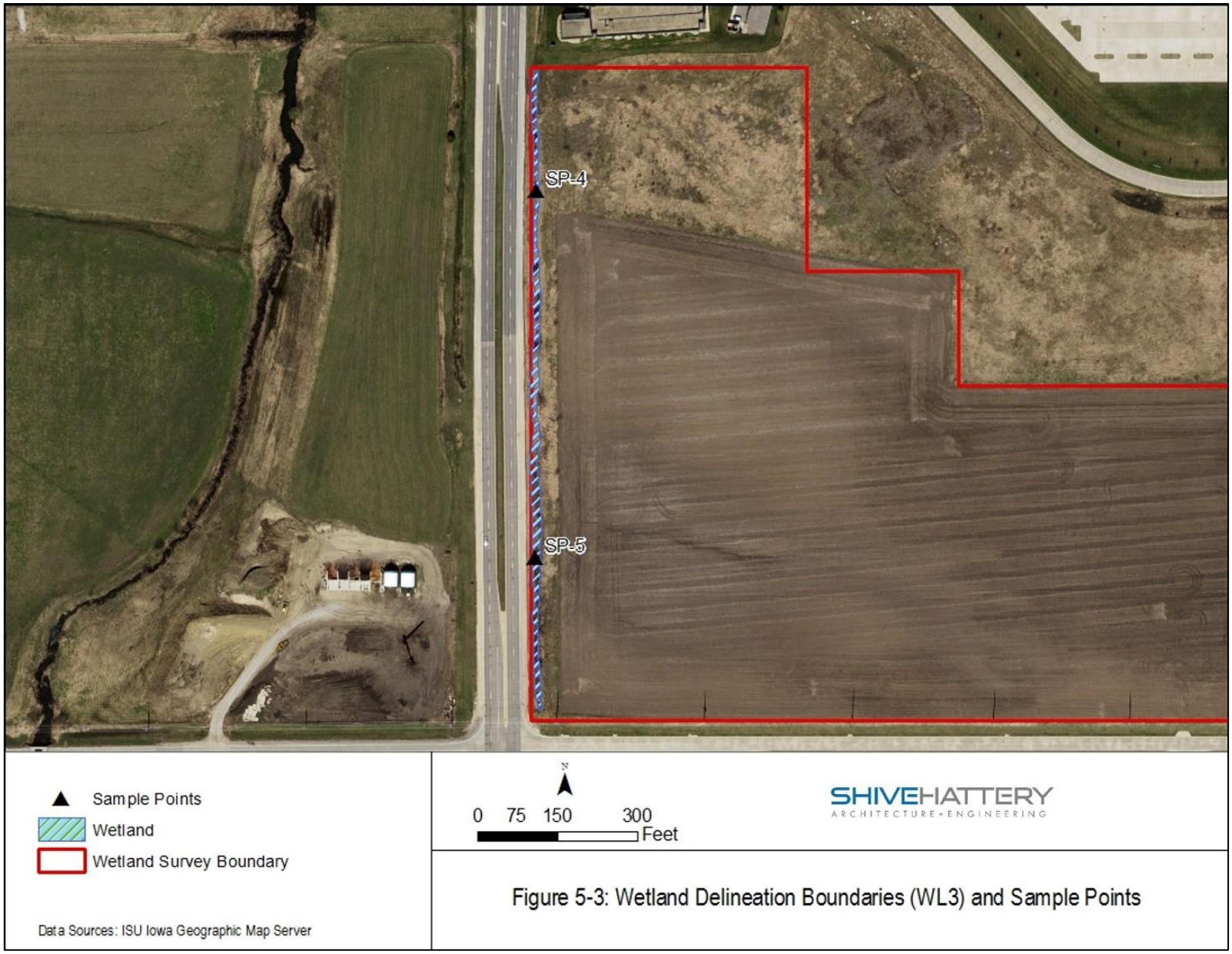

Figure 5-3: Wetland Delineation Boundaries (WL3) and Sample Points

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Appendix B – Evaluation of Antecedent Precipitation

Evaluation of Antecedent Precipitation, Combined Methods of 30-day Rolling Totals and NRCS Engineering Field Handbook Weighting Factors

Prior Period	**Condition** Dry, Wet, Normal	**Condition Value**	**Period Weight Value**	**Product of Previous 2 Columns**
1st prior 30 days	W	3	3	9
2nd prior 30 days	D	1	2	2
3rd prior 30 days	D	1	1	1
			Sum	12
			Precipitation Condition	Prior period has been normal

If sum is 6-9, prior period has been drier than normal.
If sum is 10-14, prior period has been normal.
If sum is 15-18, prior period had been wetter than normal

Appendix C - Photographs

Photo 1: Looking north down drainageway toward wetland WL2, from the perimeter of wetland WL1.

Photo 2: Looking south at wetland WL1. This small wetland is restricted to a depression located around the culvert that runs beneath W. Ridgeway Ave.

Photo 3: Looking north at sample point SP-2 in wetland WL2. The grassed areas marks the parcel boundary, and is located on the City-owned parcel.

Photo 4: Looking south at wetland WL2 that runs up a portion of the partially-disturbed drainageway. Photo taken from within wetland WL2.

Photo 5: Standing within wetland WL3 looking south toward W. Ridgeway Ave. Hudson Rd. runs the length of wetland WL3, to the right in this photo.

Photo 6: Looking north standing along the edge of wetland WL3 and Hudson Rd. Wetland WL3 runs the length of this ditch. This ditch has steep side slopes, sloping to upland.

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Appendix D – Wetland Delineation Data Sheets

Shive-Hattery | 316 Second Street SE | Suite 500 | PO Box 1803 | Cedar Rapids, IA 52406-1803 | 319.364.0227 | fax 319.364.4251 | shive-hattery.com

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: _____ City/County: _____ Sampling Date: _____

Applicant/Owner: _____ State: _____ Sampling Point: _____

Investigator(s): _____ Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____

Slope (%): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No _____	**Is the Sampled Area within a Wetland?** **Yes _____ No _____**
Hydric Soil Present?	Yes _____ No _____	
Wetland Hydrology Present?	Yes _____ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species _____	x 1 =	_____
FACW species _____	x 2 =	_____
FAC species _____	x 3 =	_____
FACU species _____	x 4 =	_____
UPL species _____	x 5 =	_____
Column Totals: _____ (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes _____ No _____**

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: _____ City/County: _____ Sampling Date: _____

Applicant/Owner: _____ State: _____ Sampling Point: _____

Investigator(s): _____ Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____

Slope (%): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	**Is the Sampled Area within a Wetland?** **Yes _____ No _____**
Remarks:	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes _____ No _____**

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: _____ City/County: _____ Sampling Date: _____

Applicant/Owner: _____ State: _____ Sampling Point: _____

Investigator(s): _____ Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____

Slope (%): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	**Is the Sampled Area within a Wetland?** **Yes _____ No _____**
Remarks:	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species _____	x 1 =	_____
FACW species _____	x 2 =	_____
FAC species _____	x 3 =	_____
FACU species _____	x 4 =	_____
UPL species _____	x 5 =	_____
Column Totals: _____ (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes _____ No _____**

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: _____ City/County: _____ Sampling Date: _____

Applicant/Owner: _____ State: _____ Sampling Point: _____

Investigator(s): _____ Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____

Slope (%): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	**Is the Sampled Area within a Wetland?** **Yes _____ No _____**
Remarks:	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species _____	x 1 =	_____
FACW species _____	x 2 =	_____
FAC species _____	x 3 =	_____
FACU species _____	x 4 =	_____
UPL species _____	x 5 =	_____
Column Totals: _____ (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes _____ No _____**

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: _____ City/County: _____ Sampling Date: _____

Applicant/Owner: _____ State: _____ Sampling Point: _____

Investigator(s): _____ Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____

Slope (%): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No _____	**Is the Sampled Area within a Wetland?** **Yes _____ No _____**
Hydric Soil Present?	Yes _____ No _____	
Wetland Hydrology Present?	Yes _____ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes _____ No _____**

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

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- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
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Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
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- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

November 20, 2017

Shane Graham
City of Cedar Falls, IA
Department of Planning
220 Clay Street
Cedar Falls, IA 50613-2726

RE: Subdivision Application – Reason of Request Letter

Dear Mr. Graham:

Thank you for your consideration of the proposed subdivision located at the northeast corner of Hudson Road and Ridgeway Avenue named Gateway Business Park at Cedar Falls. Although the parcel is currently being used in an agricultural capacity the current zoning is HWY-1 Highway Commercial and the intent of this subdivision is to fully develop the parcel into that use. The ultimate buildout of the entire parcel (46.03 acres) will be mixed use commercial with the focal point and primary user an IHG brand hotel (Holiday Inn, 8.76 acres).

Specific uses of the remaining area are not determined at this time but potential uses could include office and retail in addition to restaurant and convenience food/fuel. Market conditions will dictate the development speed and use of the remaining undeveloped land as time progresses.

Again, thank you for your consideration of the proposed subdivision and please do not hesitate to call if you required any additional information.

Sincerely,

SHIVE-HATTERY, INC.

Isaac J. Hodgins, PE
Civil Engineer

dlc/IJH

Project #2171620

DEPARTMENT OF COMMUNITY DEVELOPMENT
SUBDIVISION APPLICATION

City of Cedar Falls
220 Clay Street
Cedar Falls, Iowa 50613

Application Type:
- ☐ Minor Plat
- ☒ Major Plat – Preliminary
- ☐ Major Plat – Final: Preliminary approval/renewal date: _____

Proposed Subdivision Name: Gateway Business Park at Cedar Falls

Parcel #: 8914-35-451-003

Parcel's Address: W 1/2 of the SE 1/4 of Section 35, T89N, R14W and part of Lot 23, Cedar Falls Technology Park Phase II

City: Cedar Falls State: IA ZIP: 50613

Current zoning of parcel: HWY-1 Current # of lots: 2 Proposed # of lots: 7

Applicant's Name: CF Gateway Park, Inc. Attn: Atul Patel

Applicant's mailing address (if other): 307 Winding Ridge Road

City: Cedar Falls State: IA ZIP: 50613

Applicant's Email: atuldesi@yahoo.com Daytime Phone: (319) 493-0686

A COMPLETE SUBMITTAL INCLUDES A PAPER AND AN ELECTRONIC COPY OF:

**Original signed versions of these documents are not required until before City Council approval.*

- ☒ Completed application
- ☒ $300 nonrefundable fee
- ☒ Sewer tapping fee, if applicable City staff indicated not required at this time
- ☒ Traffic Study, if applicable
- ☒ Letter explaining reason for request and details about future uses (Word)
- ☒ *2 signed surveyor certificates Draft Certificate
- ☒ *6 full size signed appropriate plats; see engineering checklists (AutoCAD and PDF 11x17). If applicable also include low water entry elevations.
- ☒ Stormwater management plan with site grading proposed - see section 27- 405 of Ordinance
- ☒ Environmental Checklist and Report - required if the parcel is 3 acres or more
- ☒ Topographic and soils map analysis plat
  - ☒ Topographic elevations and contours at two-foot intervals of the property
  - ☒ A soils map analysis of the property, which describes soil types and soil characteristics.
  - ☒ An aerial photograph with identified soil types
  - ☒ Proposed lot lines and street locations of the plat map.
- ☒ Signed approval of subdivision plat name by Black Hawk County Auditor
- ☒ Signed proof of ownership Recorded Warranty Deed included

Over →

- ☐ Minor Plat: Affidavit of ownership including dates of acquisition
- ☐ Final Plat: Abstract of Title and Attorney Opinion

☐ *2 signed proposed owner's statements or deeds, addressing at minimum: (Word) **Under Review by Owner**

- ☐ Restrictions
- ☐ Easements
- ☐ Building lines
- ☐ Relationship to public streets and public utilities
- ☐ Public improvements and connections
- ☐ "Tracts" – land not intended to be developed must be identified as to their intended usage, future maintenance and ownership.

☒ Legal description of property (Word)

☒ Names and addresses of neighboring property owners of the requested area (Word)

To the best of my knowledge the foregoing and attached statements are true and correct, I sign this completed application with the intent of having my property subdivided and consent to having the property plated. *Note: if there is more than one property owner all will need to sign and date this document.*

_____ Date: 11/20/17

Property Owner's Signature:

_____ Date: _____

Applicant's Signature (if different):

DEPARTMENT OF COMMUNITY DEVELOPMENT

City of Cedar Falls
220 Clay Street
Cedar Falls, Iowa 50613
Phone: 319-273-8600
Fax: 319-273-8610
www.cedarfalls.com

MEMORANDUM

Planning & Community Services Division

TO: Planning and Zoning Commission

FROM: Iris Lehmann, Planner I

DATE: January 4, 2018

SUBJECT: Site plan review of property in the College Hill Neighborhood Overlay

---

REQUEST: Install a drive-through at 2128 College Street

PETITIONER: Rabbani Wahidy (Bani's Liquor and Tobacco Outlet)

LOCATION: 2128 College Street

PROPOSAL

The owner of 2128 College Street is requesting a site plan review to install a drive-through at 2128 College Street. The property is located within the College Hill Neighborhood Overlay at the north east corner of College Street and W. 22nd Street.

BACKGROUND

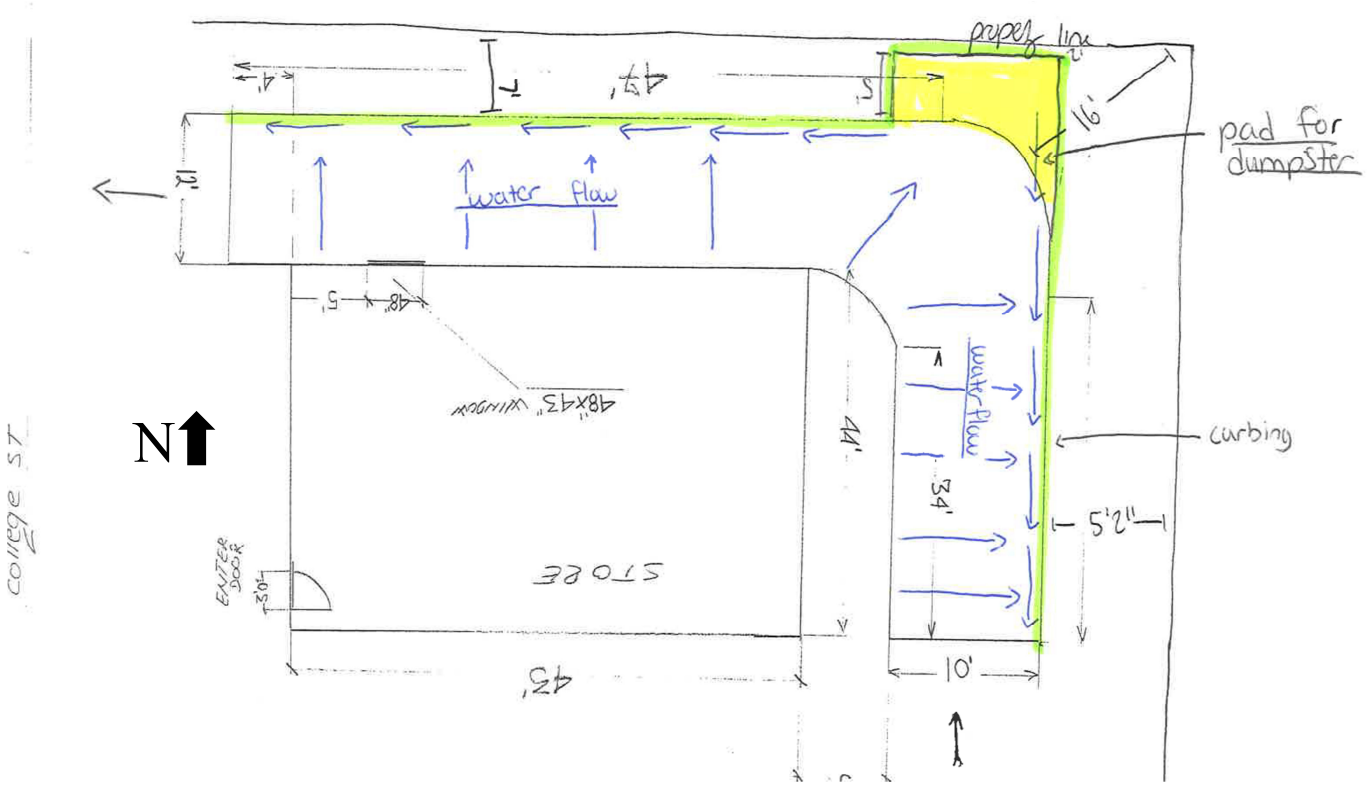
The petitioner proposes to install a drive-through at 2128 College Street which will consist of a new window on the north face of the building and the installation of an access route along the east and north side of the building, see image to the right. In addition to these improvements the applicant proposes to update his existing freestanding sign to publicize the drive-through and pave a 5 foot by 10 foot slab at the north east corner of the drive-through for the business's dumpsters.

This item requires review by the Planning & Zoning Commission and the City Council due to the fact that this property is located within the College Hill Neighborhood Overlay (Section 29-160). The Overlay requires a site plan review (i.e. design review) for any "substantial improvement" to any exterior façade. A substantial improvement in the College Hill Neighborhood Overlay is defined in Section 29-160, c, 20 and includes: "Any modification of the exterior appearance of the structure by virtue of adding or removing exterior windows or doors."

ANALYSIS

2128 College Street is located in the C-3 Commercial Zoning District. Bani's Liquor and Tobacco Outlet is a legal conforming use for C-3 Zoning. Drive-throughs are permitted both in C-3 zoning and within the College Hill Neighborhood district. The addition of a drive-through to this property would be a permitted use.

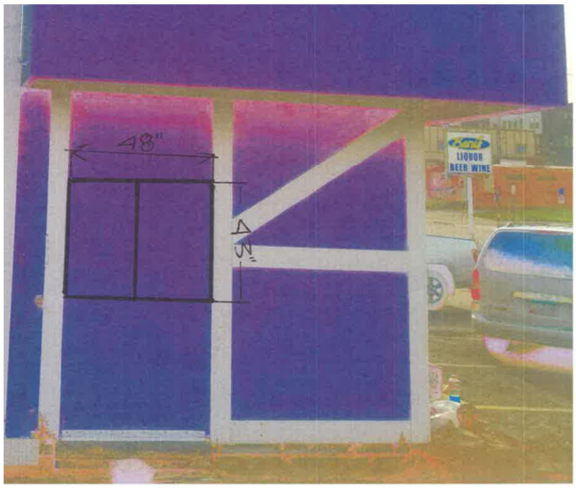
The applicant proposes to newly pave roughly 1,100 square feet of concrete, this includes the area for the dumpster shown in yellow in the site plan below. All paving installed for just vehicular movement, for example driveways, must remain at least 3 feet from the property line. The proposed drive will be 7 feet from the northern property line and 5 feet 2 inches from the eastern property line. The pad for the dumpster will have a 2 foot setback from the northern property line. As the pad is not intended for vehicular use no setback is required. All zoning setbacks are met.



As the newly paved area is less than 5,000 square feet, no stormwater management plan for the improvement is required (Sec. 27-403, b, 2). However, in the applicant's site plan he has indicated the direction of water flow (shown with blue arrows above) over the new pavement. The water will be routed away from the business and toward the property's parking lots to the south and west. Curbing will be installed along the outside edge of the new paving to help control the water flow and keep it from flowing into the neighboring properties. Staff has no concerns with the proposed paving.

Access to the drive-through window will be one way. Vehicles will enter from the south and exit heading west. Screening along the northern and eastern property lines are already in place and will help mitigate the incoming headlights. Staff has no concerns with the location and route of the drive-through.

The applicant wishes to install a new 48 inch by 43 inch window for the drive-through. The window will be installed near the north western corner of the building into an existing door, shown in the image to the right. The window will not create a new opening in the building so would not damage the building's integrity. The window will be facing north and will not be readily visible from either street frontage. Staff has no concerns with the installation of the proposed window.



TECHNICAL COMMENTS
City technical staff, including Cedar Falls Utilities (CFU) personnel, had a few comments on the proposed project. All comments have been addressed.

The existing building is currently served with water, electric, gas, and communications. CFU has already moved the gas meter from the north side of the building to the front.

PLANNING & ZONING COMMISSION
Discussion/Vote
1/10/2018

STAFF RECOMMENDATION
The Community Development Department recommends approving the submitted site plan for a drive- through at 2128 College Street.

Attachments:
Letter of intent
Project details

Dear City of Cedar Falls,

I am the owner of 2128 College Street and am requesting a site plan/façade review for my property at this address. We would like to install a drive though on the north side of the building. We believe that this drive through will provide more convenience to the public and will help business. Improvements for the drive through consist of a new window at the north western corner of the building and new paving (concrete) for access. Access to the drive through window will be one way, with the entrance at the south eastern corner of the property. Directional arrows are being considered. I will update by freestanding signage to publicize the drive through.

In order to make room for this drive though we have demolished two storage sheds along the back of the property. Also CFU has already moved the gas meter from the north side of the building to the front.

In addition, I will pave roughly a 5 foot by 10 foot slab at the north eastern corner of the drive through. I plan to move my dumpsters to this location.

Thank you for your consideration, cooperation, and time,

12/7/17

(RABBANI WAHIDY)


pad for dumpster
curbing
5'11"
property line
water flow
34'
10'
44'
9'
5'
47'
water flow
7'
48"x43" window
STORE
42'
48"
5'
4'
3'0"
ENTER DOOR
12'

View 1

Item 5.B.

Existing sign will be updated to include “Drive Through”

DEPARTMENT OF COMMUNITY DEVELOPMENT

City of Cedar Falls
220 Clay Street
Cedar Falls, Iowa 50613
Phone: 319-273-8600
Fax: 319-273-8610
www.cedarfalls.com

MEMORANDUM

Planning & Community Services Division

TO: Planning and Zoning Commission

FROM: Iris Lehmann, Planner I

DATE: January 3, 2018

SUBJECT: Sign review of property in the Central Business District Overlay

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REQUEST: New signage on storefront

PETITIONER: Owner: MMC Properties; Contractor: Nagle Signs Inc.

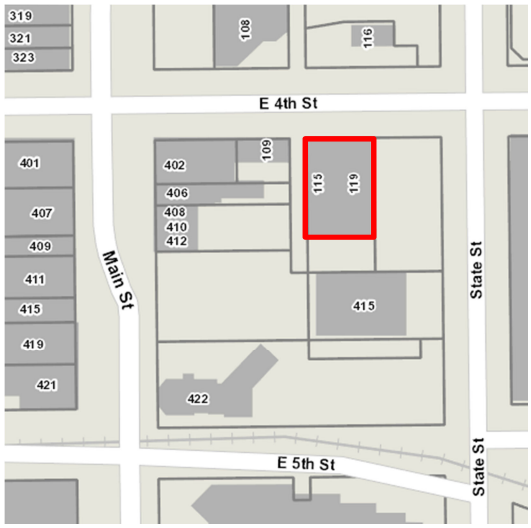
LOCATION: 115 E 4th Street Suite 102

PROPOSAL

The property owner of 115 E 4th Street is requesting a site plan review for a new projecting sign at 115 E 4th Street in the Central Business District (CBD) Overlay.

BACKGROUND

The petitioner proposes to install one new projecting sign on the facade of 115 E 4th Street for a tenant that will be leasing Suite 102 of the building. The property is located on the south side of E 4th Street in between Main Street and State Street, see map to the right. The sign will advertise the new tenant, Far Side Games.



This item requires review by the Planning and Zoning Commission and the City Council due to the fact that this property is located within the Central Business District (Section 29-168). The downtown district requires a building site plan review (i.e. design review) for any "substantial improvement" to an exterior façade, including new signs and awnings. A substantial improvement to properties in the CBD Overlay is defined in Section 29-186(c) and reads as follows:

> *"Substantial improvement" includes any new building construction within the overlay district or any renovation of an existing structure that involves any modification of the exterior appearance of the structure by virtue of adding or removing exterior windows or*

doors or altering the color or exterior materials of existing walls. All facade improvements, changes, alterations, modifications or replacement of existing facade materials will be considered a substantial improvement. Included in this definition are any new, modified or replacement awnings or similar material extensions over the public sidewalk area. A substantial improvement also includes any increase or decrease in existing building height and/or alteration of the existing roof pitch or appearance. Routine repair or replacement of existing roof materials that do not materially change the appearance, shape or configuration of the existing roof will not be considered a "substantial improvement. Owner-occupied detached single family residences will not be subject to these regulations."

Typically signage is not part of the review process unless the review is mandated by the Ordinance (Section 29-168(i)). In this case, when a new projecting sign is installed that overhangs the public right-of-way the Planning and Zoning Commission and City Council must review and approve the request. Not all signs are reviewed in this manner. If a sign or projecting sign is simply replaced, review of this level is not triggered and a permit can be issued with only staff level review.

ANALYSIS

The projecting sign will be placed on the second floor near the suite's entrance on E 4th Street. The sign will not be lighted. The projecting sign will be 10.5 square feet and at least 14 feet above the sidewalk. The size and placement of the sign meets city code and height clearances. Anything projecting over city right-of-way needs to have a clearance of at least 10 feet (Section 3-59). If approved by the Planning and Zoning Commission, this item will be placed on the next regularly scheduled City Council meeting. If the City Council approves this request, a sign permit will be issued for the new sign.

TECHNICAL COMMENTS

No comments.

PLANNING & ZONING COMMISSION

Discussion/Vote
1/10/2018

STAFF RECOMMENDATION

The Community Development Department recommends approval of the submitted signage plan for 115 E 4th Street.

Attachments:

Details of proposed signage

APPLICATION FOR SIGN PERMIT
CITY OF CEDAR FALLS, IOWA

Site Address 115 E. 4th St Suite 102

Owner's Name MMC PROPERTIES Ph. No. _____

Owner's Address PO Box 188 Cedar Falls, IA 50613

Contractor NAGLE SIGNS INC Ph. No. 233-4604

Contractor's Address PO Box 2098 WATERLOO, IA 50704

Surface Area of Sign 10½ ft Lighted? Yes____ No X

Zoning District C-3 Height from grade or roof to top of sign _____

Materials to be used in construction Alum Tube Frame - Alum Face - PVC ½ white

Type of sign (pole, wall, roof, etc.) Wall - Projection

Permanent X Temporary___ If temp., dates to be displayed _____

New sign X Replacement sign_____ Lot dimensions 130' x 130'

Is the proposed sign advertising the use on the premises? Yes X No____

No. of existing signs on site 2 Total area of existing signs on site _____ APPROX

Overhanging Sign: Clearance above sidewalk 14' APPROX ESCAPE 2'x4'= 8ft

Distance projecting from building 3'6" 1tm Twenty First 5'x4' = 20ft

Does sign project into public right of way? Yes X No____

No sign may project over or onto public property except as permitted by ordinance. Signs which require City Council approval for any reason must be accompanied by City Council authorization. Signs may not be placed within the "vision triangle" as described in Sec. 29-200(b) of the Zoning Ordinance. This permit must be accompanied by a **SITE PLAN** which shows the adjacent streets, the lot dimensions, driveways, and sign locations (proposed and existing) and by a **PICTURE OR ILLUSTRATION** showing dimensions of the proposed sign, sign wording, letter size and any special features. If the proposed sign is a wall sign, a site plan is not required, however, the picture or illustration must show the size of the wall on which the sign will be located and any existing signs already mounted on the wall.

Fee $ 25.00

I hereby certify that I have read and examined this application and know the same to be true and correct. All provisions of laws and ordinances governing this type of work will be complied with whether specified herein or not. The granting of a permit does not presume to give authority to violate or cancel the provisions of any other state or local law regulating construction or the performance of construction.

Scott Kane
Signature of Contractor or Owner

12-28-17
Date

Nagle signs inc.

WATERLOO
1020 Wilbur Ave. PO BOX 2098
Waterloo, IA 50704
319-233-4604 · 800-728-4604
Fax: 319-233-7514

MARSHALLTOWN
405 Iowa Ave. West
Marshalltown, IA 50158
641-752-6608 · 888-656-7446
Fax: 641-752-6968

PROJECT
FAR SIDE GAMES

LOCATION
CEDAR FALLS, IA

REPRESENTATIVE
SCOTT KANE

DESIGNER
HMF

SKETCH #
12-22-17A2

SCALE
1"=1'0"

FILE NAME
FAR SIDE / 12-22-17A

PRINT FILE(S)

REVISION(S)
1 -
2
3
4

WORK ORDER #

INTERNATIONAL SIGN ASSOCIATION

CLIENT APPROVAL
SIGNATURE DATE

naglesigns.com

PLATE MOUNT TO WALL WITH GUY WIRES ON TOP

EXTERIOR PROJECTION SIGN

BLACK 2" THICK STRUCTURE

½" RAISED WHITE

RECESSED FENCE LOGO, BORDER and COPY


115
FOR LEASE
Chris Fischels
319-830-5000
SULENTIC FISCHELS
COMMERCIAL GROUP
319-234-5000
OPEN

Item 5.C.